WILLIAMSON COUNTY

DEPARTMENT OF INFRASTRUCTURE

BRUSHY CREEK TRAIL

FEDERAL AID PROJECT NUMBER: STP1802(205)TP
TXDOT CSJ: 0914-05-191

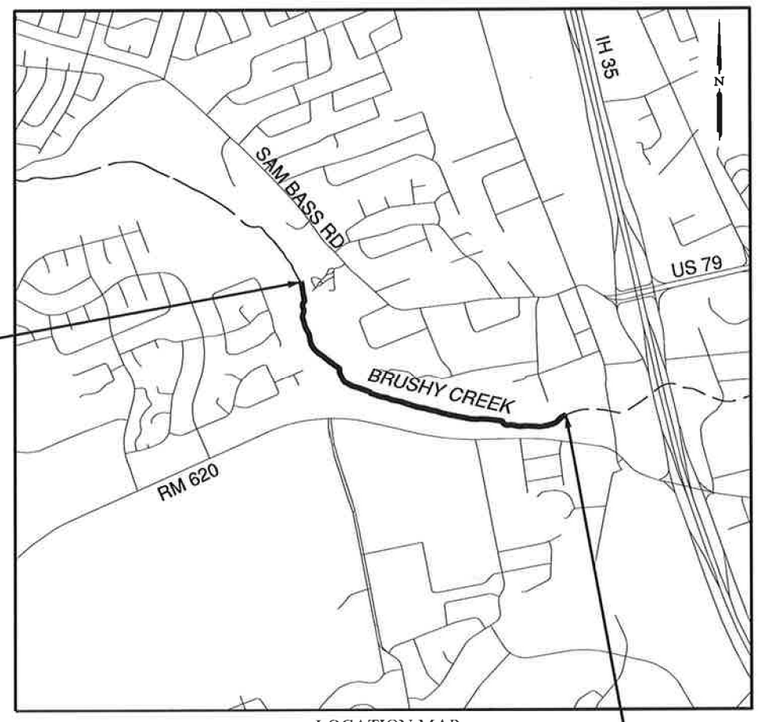
FOR THE CONSTRUCTION OF SHARED USE PATH

LIMITS: FROM HERITAGE TRAIL AT CREEKSIDE PLAZA
TO 1.1 MI. NW ALONG BRUSHY CREEK
WILLIAMSON COUNTY PROJECT NO: WPL18TAP
TOTAL LENGTH = 0.913 MILES (4,818.18 FEET)

SHARED USE PATH DESIGN SPEED = 12 MPH

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND THE SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, MAY 2012)

TDLR INSPECTION REQUIRED
TDLR NO. EABPRJB8819579



LOCATION MAP
NTS

EXCEPTIONS: NONE
EQUATIONS: NONE
RR X-INGS: NONE

FINAL SUBMITTAL
AUGUST 2018

FINAL PLANS STATEMENT:

THE CONSTRUCTION WORK PERFORMED
IN ACCORDANCE WITH THE PLANS AND CONTRACT.

P.E. _____

COUNTY ENGINEER _____ DATE _____

RECOMMENDED FOR LETTING 8/13/18

WILLIAMSON COUNTY
COUNTY ENGINEER

SUBMITTED FOR LETTING 8/22/2018

DocuSigned by:
Bobby D Ramthun, P.E.
AREA ENGINEER

RECOMMENDED FOR LETTING _____

TXDOT DISTRICT DESIGN ENGINEER

APPROVED FOR LETTING _____

TXDOT DISTRICT ENGINEER

PLANS PREPARED BY:

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
7800 SHOAL CREEK BLVD, STE 220 W | AUSTIN, TX 78757 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

rvi
planning + landscape architecture
712 Congress Avenue, Suite 300
Austin, Texas 78701
(512) 480-0032

Plotted on: 8/3/2018

Design Filename: H:\projects\508\67\00\design\Civil\General\50867001NDEX01.dgn

SHEET NO.		DESCRIPTION
		GENERAL
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11-12		SURVEY CONTROL
13, 13A-13D		GENERAL NOTES
14		ESTIMATE AND QUANTITY
15-16		SUMMARY OF QUANTITIES
17		SUMMARY OF QUANTITIES (BRIDGE)
18-19		TYPICAL SECTIONS
		TRAFFIC CONTROL PLAN
20		TCP NARRATIVE
21-22		TRAFFIC CONTROL PLAN
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		ROADWAY
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45		CONCRETE CURB DETAILS
46-48	*	TXDOT - PEDESTRIAN HANDRAIL DETAILS (PRD-13)
48A-48D	*	TXDOT - PEDESTRIAN FACILITIES CURB RAMPS (PED-18)
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		DRAINAGE
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		CROSS SECTIONS
100-125		CROSS SECTIONS

THE STANDARD SHEETS SPECIFICALLY SHOWN WITH PRECEDING (*) HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

REVIEW AND APPROVAL

STATE OF TEXAS
JAMES A. LUTZ
84722
LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 8/3/2018 DATE

PAPE-DAWSON ENGINEERS

AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS
7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
INDEX

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 2

Plotted on: 7/30/2018

Design Filename: H:\projects\508\67\00\design\Civil\General\5086700PRJLAYOUT01.dgn

MATCHLINE A

20' TEMPORARY ACCESS EASEMENT

BEGIN 20' TEMPORARY ACCESS EASEMENT
3127025.2259, 10162217.2724

CLARK RD

PT
3125909.6540, 10161992.8638

R= 410'

PC
3126279.1172, 10161946.9371

N

MATCHLINE A

20' TEMPORARY ACCESS EASEMENT

PI
3125542.3709, 10162241.4265

LEGEND

- LIMITS OF CONSTRUCTION
- PROPERTY LINE
- EASEMENT LINE
- 100 YR FLOODPLAIN LIMIT
- CREEK FLOW DIRECTION
- TREE

JOHNSON 60/40 PARTNERSHIP
WCAD PARCEL # R055732
1523 SAM BASS RD
VOLUME 1755, PAGE 505

TRANSOM GEORGE III & THERESA TRUSTEES OF
GEORGE E & THERESA G TRANSOM LIVING TR
WCAD PARCEL # R322050
1000 CLARK ST
INSTR # 2008029796

END 20' TEMPORARY ACCESS EASEMENT
3125372.0277, 10162334.6841

NO INFORMATION
WCAD PARCEL
065677

BEGIN PROJECT
STA 210+05.00

PT STA 210+31.98

PC STA 210+58.05

PRC STA 212+39.92

PC STA 211+97.12

PRC STA 212+85.11

PRC STA 213+59.98

100' ELECTRIC EASEMENT

20' WASTEWATER EASEMENT

℄ BRUSHY CREEK TRAIL

PRC STA 214+59.88

EOP

PRC STA 217+08.24

PRC STA 218+01.94

100 YR FLOODPLAIN

PC STA 219+69.32

LCRA
WCAD PARCEL
R322049
BRANDI LN
INSTR # 2004021432

MATCHLINE STA 220+00

FAITH, MISSIONARY
BAPTIST
WCAD PARCEL # R380197
1561 SAM BASS RD
INSTR # 9655326

BRUSHY CREEK

CITY OF ROUND ROCK
WCAD PARCEL # R341181
SAM BASS RD
INSTR # 9633172

NO INFORMATION
WCAD PARCEL # R087758

209+00 210+00 211+00 212+00 213+00 214+00 215+00 216+00 217+00 218+00 219+00 220+00

60" SS

OH E

DESIGN

STATE OF TEXAS
HEATHER McNEAL
114428
LICENSED
PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 7/30/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS
JAMES A. LUTZ
84722
LICENSED
PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 7/30/2018 DATE

SCALE: 1"= 100'

PAPE-DAWSON ENGINEERS
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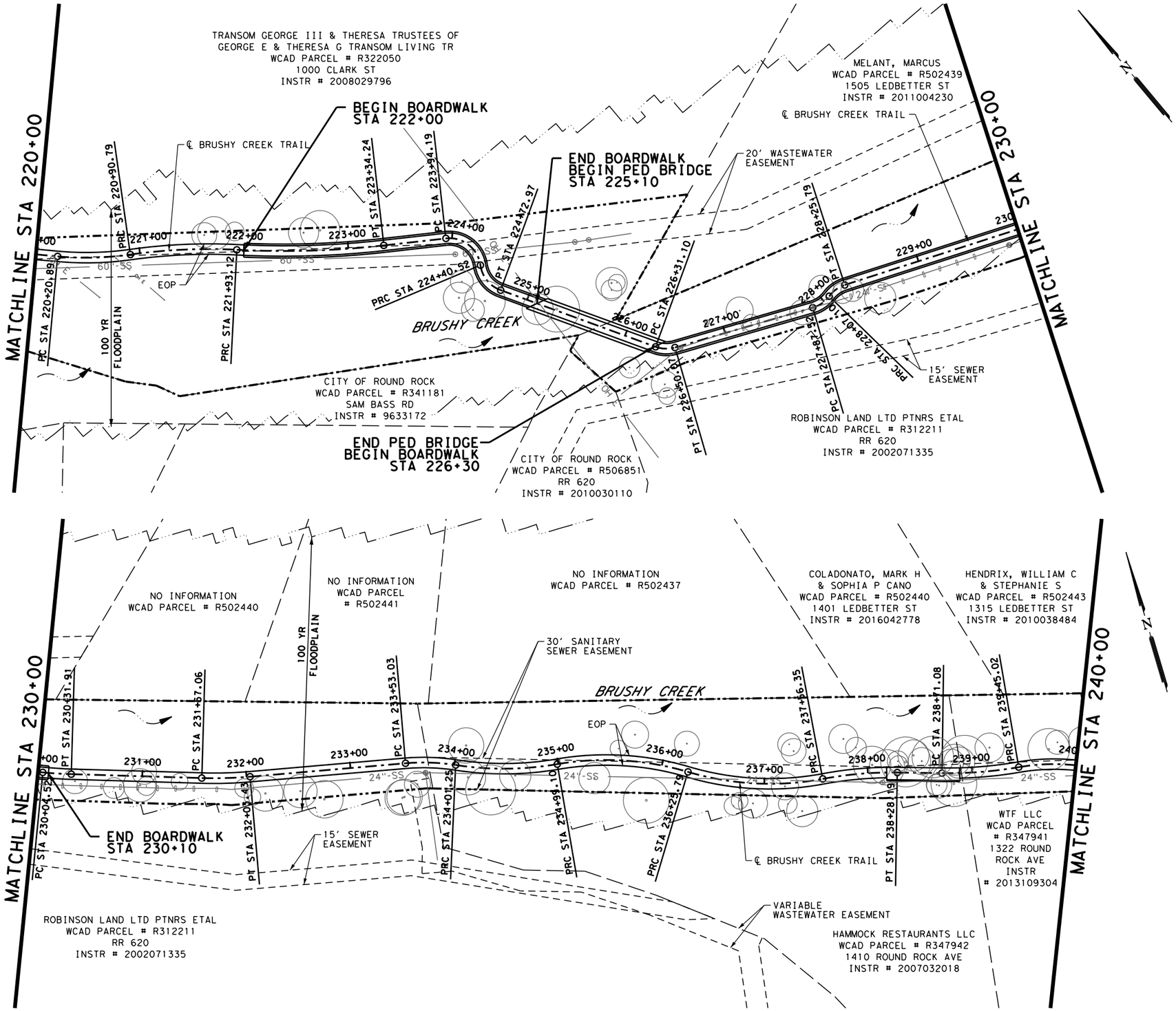
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
PROJECT LAYOUT

SHEET 1 OF 3

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 7/30/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 3



LEGEND

- LIMITS OF CONSTRUCTION
- PROPERTY LINE
- EASEMENT LINE
- 100 YR FLOODPLAIN LIMIT
- CREEK FLOW DIRECTION
- TREE

DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 7/30/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 7/30/2018 DATE

SCALE: 1"= 100'

PAPE-DAWSON ENGINEERS
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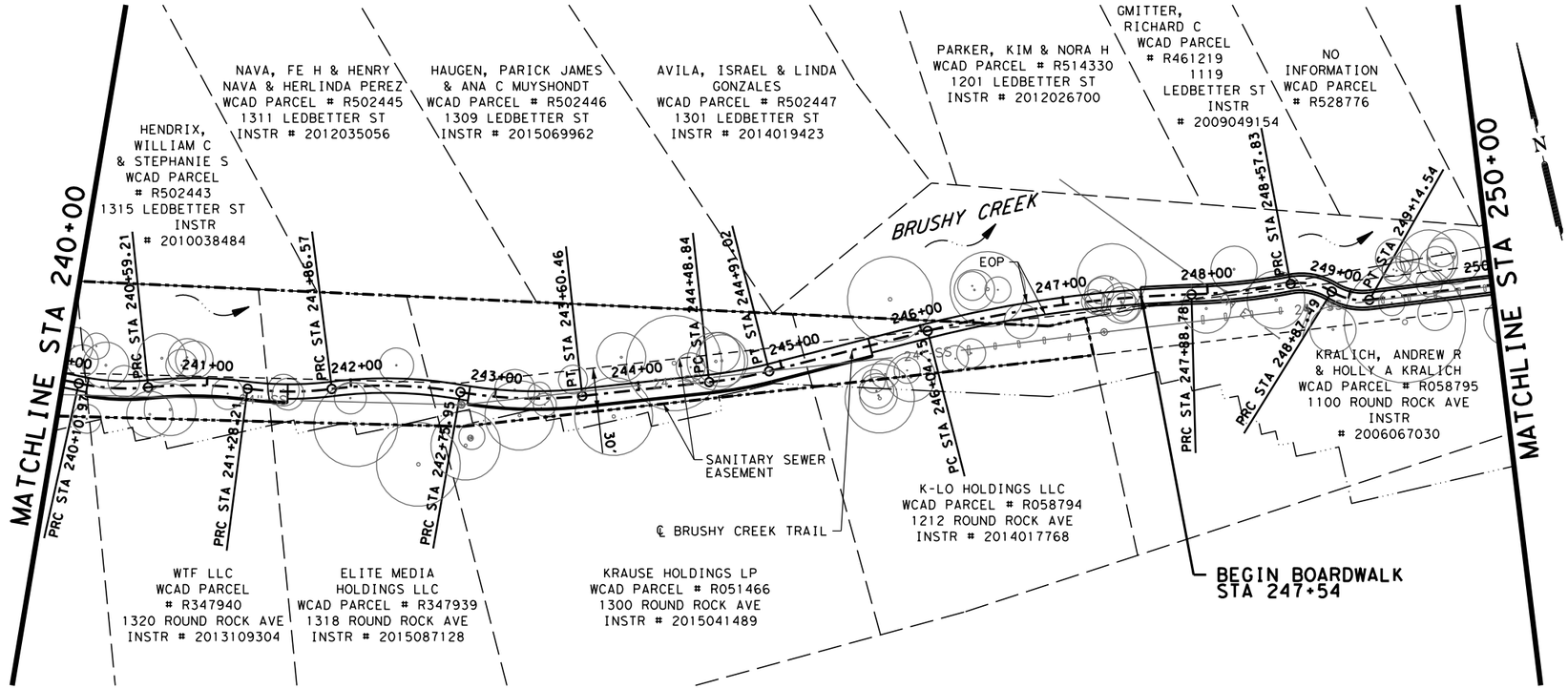
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
PROJECT LAYOUT

SHEET 2 OF 3

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 7/30/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 4



LEGEND

- LIMITS OF CONSTRUCTION
- PROPERTY LINE
- EASEMENT LINE
- 100 YR FLOODPLAIN LIMIT
- CREEK FLOW DIRECTION
- TREE

DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 7/30/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 7/30/2018 DATE

SCALE: 1"= 100'

PAPE-DAWSON ENGINEERS

AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS

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TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
PROJECT LAYOUT

SHEET 3 OF 3

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 7/30/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 5

Plotted on: 7/30/2018

Design Filename: H:\projects\508\67\00\design\Civil\General\508670OPRJLAYOUT03.dgn

Plotted on: 7/30/2018

Design Filename: H:\projects\508\67\00\design\Civil\General\5086700HADS01.dgn

℄ BRUSHY CREEK TRAIL

Beginning chain ALN_F02 description

Curve CV001						
P.I. Station		210+18.66	N	10,163,073.9868	E	3,125,219.0514
Delta	=	22° 05′ 00.35"	(RT)			
Degree	=	81° 51′ 04.03"				
Tangent	=	13.6595				
Length	=	26.9800				
Radius	=	70.0000				
External	=	1.3203				
Long Chord	=	26.8133				
Mid. Ord.	=	1.2958				
P.C. Station		210+05.00	N	10,163,085.7715	E	3,125,212.1446
P.T. Station		210+31.98	N	10,163,060.4701	E	3,125,221.0210
C.C.			N	10,163,050.3765	E	3,125,151.7526
Back	= S	30° 22′ 26.41" E				
Ahead	= S	8° 17′ 26.06" E				
Chord Bear	= S	19° 19′ 56.23" E				

Course from PT CV001 to PC CV002 S 8° 17′ 26.06" E Dist 165.1423

Curve CV002						
P.I. Station		212+18.57	N	10,162,875.8297	E	3,125,247.9261
Delta	=	9° 25′ 53.62"	(LT)			
Degree	=	22° 02′ 12.61"				
Tangent	=	21.4480				
Length	=	42.7991				
Radius	=	260.0000				
External	=	0.8831				
Long Chord	=	42.7508				
Mid. Ord.	=	0.8802				
P.C. Station		211+97.12	N	10,162,897.0536	E	3,125,244.8334
P.T. Station		212+39.92	N	10,162,855.3996	E	3,125,254.4549
C.C.			N	10,162,934.5439	E	3,125,502.1163
Back	= S	8° 17′ 26.06" E				
Ahead	= S	17° 43′ 19.68" E				
Chord Bear	= S	13° 00′ 22.87" E				

Curve CV003						
P.I. Station		212+66.71	N	10,162,829.8775	E	3,125,262.6109
Delta	=	56° 22′ 16.17"	(RT)			
Degree	=	114° 35′ 29.61"				
Tangent	=	26.7936				
Length	=	49.1931				
Radius	=	50.0000				
External	=	6.7265				
Long Chord	=	47.2329				
Mid. Ord.	=	5.9289				
P.C. Station		212+39.92	N	10,162,855.3996	E	3,125,254.4549
P.T. Station		212+89.11	N	10,162,808.9521	E	3,125,245.8770
C.C.			N	10,162,840.1795	E	3,125,206.8277
Back	= S	17° 43′ 19.68" E				
Ahead	= S	38° 38′ 56.50" W				
Chord Bear	= S	10° 27′ 48.41" W				

Curve CV004						
P.I. Station		213+27.92	N	10,162,778.6442	E	3,125,221.6400
Delta	=	58° 00′ 25.16"	(LT)			
Degree	=	81° 51′ 04.01"				
Tangent	=	38.8072				
Length	=	70.8689				
Radius	=	70.0000				
External	=	10.0375				
Long Chord	=	67.8808				
Mid. Ord.	=	8.7787				
P.C. Station		212+89.11	N	10,162,808.9521	E	3,125,245.8770
P.T. Station		213+59.98	N	10,162,742.0309	E	3,125,234.5034
C.C.			N	10,162,765.2338	E	3,125,300.5460
Back	= S	38° 38′ 56.50" W				
Ahead	= S	19° 21′ 28.66" E				
Chord Bear	= S	9° 38′ 43.92" W				

Curve CV005						
P.I. Station		214+11.62	N	10,162,693.3124	E	3,125,251.6198
Delta	=	35° 46′ 24.83"	(RT)			
Degree	=	35° 48′ 35.50"				
Tangent	=	51.6378				
Length	=	99.8986				
Radius	=	160.0000				
External	=	8.1263				
Long Chord	=	98.2839				
Mid. Ord.	=	7.7336				
P.C. Station		213+59.98	N	10,162,742.0309	E	3,125,234.5034
P.T. Station		214+59.88	N	10,162,643.7795	E	3,125,237.0268
C.C.			N	10,162,688.9959	E	3,125,083.5488
Back	= S	19° 21′ 28.66" E				
Ahead	= S	16° 24′ 56.17" W				
Chord Bear	= S	1° 28′ 16.25" E				

℄ BRUSHY CREEK TRAIL CONT.

Curve CV006						
P.I. Station		215+99.18	N	10,162,510.1626	E	3,125,197.6616
Delta	=	64° 40′ 50.23"	(LT)			
Degree	=	26° 02′ 36.73"				
Tangent	=	139.2950				
Length	=	248.3557				
Radius	=	220.0000				
External	=	40.3903				
Long Chord	=	235.3766				
Mid. Ord.	=	34.1251				
P.C. Station		214+59.88	N	10,162,643.7795	E	3,125,237.0268
P.T. Station		217+08.24	N	10,162,417.4359	E	3,125,301.6080
C.C.			N	10,162,581.6069	E	3,125,448.0589
Back	= S	16° 24′ 56.17" W				
Ahead	= S	48° 15′ 54.06" E				
Chord Bear	= S	15° 55′ 28.94" E				

Curve CV009						
P.I. Station		217+58.47	N	10,162,383.9971	E	3,125,339.0928
Delta	=	51° 07′ 58.79"	(RT)			
Degree	=	54° 34′ 02.67"				
Tangent	=	50.2321				
Length	=	93.7061				
Radius	=	105.0000				
External	=	11.3970				
Long Chord	=	90.6273				
Mid. Ord.	=	10.2811				
P.C. Station		217+08.24	N	10,162,417.4359	E	3,125,301.6080
P.T. Station		218+01.94	N	10,162,333.8279	E	3,125,336.5794
C.C.			N	10,162,339.0815	E	3,125,231.7109
Back	= S	48° 15′ 54.06" E				
Ahead	= S	2° 52′ 04.74" W				
Chord Bear	= S	22° 41′ 54.66" E				

Curve CV010						
P.I. Station		219+01.42	N	10,162,234.4795	E	3,125,331.6023
Delta	=	47° 42′ 02.26"	(LT)			
Degree	=	25° 27′ 53.25"				
Tangent	=	99.4729				
Length	=	187.3199				
Radius	=	225.0000				
External	=	21.0079				
Long Chord	=	181.9569				
Mid. Ord.	=	19.2139				
P.C. Station		218+01.94	N	10,162,333.8279	E	3,125,336.5794
P.T. Station		219+89.26	N	10,162,163.9364	E	3,125,401.7345
C.C.			N	10,162,322.5700	E	3,125,561.2976
Back	= S	2° 52′ 04.74" W				
Ahead	= S	44° 49′ 57.52" E				
Chord Bear	= S	20° 58′ 56.39" E				

Course from PT CV010 to PC CV011 S 44° 49′ 57.52" E Dist 31.6268

Curve CV011						
P.I. Station		220+56.00	N	10,162,116.6091	E	3,125,448.7862
Delta	=	13° 21′ 00.26"	(LT)			
Degree	=	19° 05′ 54.65"				
Tangent	=	35.1095				
Length	=	69.9011				
Radius	=	300.0013				
External	=	2.0475				
Long Chord	=	69.7431				
Mid. Ord.	=	2.0336				
P.C. Station		220+20.89	N	10,162,141.5077	E	3,125,424.0326
P.T. Station		220+90.79	N	10,162,098.0989	E	3,125,478.6200
C.C.			N	10,162,353.0201	E	3,125,636.7843
Back	= S	44° 49′ 57.52" E				
Ahead	= S	58° 10′ 57.78" E				
Chord Bear	= S	51° 30′ 27.65" E				

Curve CV012						
P.I. Station		221+42.11	N	10,162,071.0411	E	3,125,522.2303
Delta	=	11° 03′ 42.81"	(RT)			
Degree	=	10° 48′ 38.03"				
Tangent	=	51.3219				
Length	=	102.3248				
Radius	=	529.9981				
External	=	2.4791				
Long Chord	=	102.1660				
Mid. Ord.	=	2.4675				
P.C. Station		220+90.79	N	10,162,098.0986	E	3,125,478.6204
P.T. Station		221+93.12	N	10,162,036.1188	E	3,125,559.8386
C.C.			N	10,161,647.7414	E	3,125,199.1990
Back	= S	58° 10′ 57.78" E				
Ahead	= S	47° 07′ 14.97" E				
Chord Bear	= S	52° 39′ 06.37" E				

DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 7/30/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 7/30/2018 DATE

PAPE-DAWSON ENGINEERS

AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS

7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711

TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL

HORIZONTAL ALIGNMENT DATA

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 7/30/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 6

	Curve Data				
Curve CV013					
P.I. Station	222+63.84	N	10,161,987.9970	E	3,125,611.6615
Delta =	9° 24′ 07.92"	(LT)			
Degree =	6° 39′ 44.28"				
Tangent =	70.7215				
Length =	141.1254				
Radius =	859.9999				
External =	2.9030				
Long Chord =	140.9671				
Mid. Ord. =	2.8932				
P.C. Station	221+93.12	N	10,162,036.1198	E	3,125,559.8375
P.T. Station	223+34.24	N	10,161,948.9869	E	3,125,670.6509
C.C.		N	10,162,666.3194	E	3,126,145.0284
Back = S	47° 07′ 14.97" E				
Ahead = S	56° 31′ 22.89" E				
Chord Bear = S	51° 49′ 18.93" E				

Course from PT CV013 to PC CV014 S 56° 31′ 22.89" E Dist 59.9445

	Curve Data				
Curve CV014					
P.I. Station	224+23.41	N	10,161,899.8040	E	3,125,745.0231
Delta =	88° 29′ 22.19"	(RT)			
Degree =	190° 59′ 09.36"				
Tangent =	29.2193				
Length =	46.3330				
Radius =	30.0000				
External =	11.8780				
Long Chord =	41.8635				
Mid. Ord. =	8.5090				
P.C. Station	223+94.19	N	10,161,915.9215	E	3,125,720.6510
P.T. Station	224+40.52	N	10,161,875.0155	E	3,125,729.5537
C.C.		N	10,161,890.8982	E	3,125,704.1029
Back = S	56° 31′ 22.89" E				
Ahead = S	31° 57′ 59.30" W				
Chord Bear = S	12° 16′ 41.79" E				

	Curve Data				
Curve CV015					
P.I. Station	224+58.54	N	10,161,859.7291	E	3,125,720.0141
Delta =	61° 58′ 49.91"	(LT)			
Degree =	190° 59′ 09.36"				
Tangent =	18.0189				
Length =	32.4529				
Radius =	30.0000				
External =	4.9954				
Long Chord =	30.8935				
Mid. Ord. =	4.2824				
P.C. Station	224+40.52	N	10,161,875.0155	E	3,125,729.5537
P.T. Station	224+72.97	N	10,161,844.1265	E	3,125,729.0273
C.C.		N	10,161,859.1329	E	3,125,755.0044
Back = S	31° 57′ 59.30" W				
Ahead = S	30° 00′ 50.61" E				
Chord Bear = S	0° 58′ 34.34" W				

Course from PT CV015 to PC CV016 S 30° 00′ 50.61" E Dist 158.1262

	Curve Data				
Curve CV016					
P.I. Station	226+40.91	N	10,161,698.7090	E	3,125,813.0318
Delta =	36° 13′ 11.50"	(LT)			
Degree =	190° 59′ 09.66"				
Tangent =	9.8113				
Length =	18.9647				
Radius =	30.0000				
External =	1.5636				
Long Chord =	18.6505				
Mid. Ord. =	1.4861				
P.C. Station	226+31.10	N	10,161,707.2046	E	3,125,808.1240
P.T. Station	226+50.07	N	10,161,694.7550	E	3,125,822.0110
C.C.		N	10,161,722.2109	E	3,125,834.1011
Back = S	30° 00′ 50.61" E				
Ahead = S	66° 14′ 02.11" E				
Chord Bear = S	48° 07′ 26.36" E				

Course from PT CV016 to PC CV017 S 66° 14′ 02.11" E Dist 137.4533

	Curve Data				
Curve CV017					
P.I. Station	227+97.67	N	10,161,635.2685	E	3,125,957.1015
Delta =	37° 24′ 01.21"	(LT)			
Degree =	190° 59′ 09.35"				
Tangent =	10.1545				
Length =	19.5828				
Radius =	30.0000				
External =	1.6720				
Long Chord =	19.2369				
Mid. Ord. =	1.5837				
P.C. Station	227+87.52	N	10,161,639.3608	E	3,125,947.8080
P.T. Station	228+07.10	N	10,161,637.6622	E	3,125,966.9698
C.C.		N	10,161,666.8168	E	3,125,959.8982
Back = S	66° 14′ 02.11" E				
Ahead = N	76° 21′ 56.68" E				
Chord Bear = S	84° 56′ 02.71" E				

	Curve Data				
Curve CV018					
P.I. Station	228+16.76	N	10,161,639.9396	E	3,125,976.3591
Delta =	35° 42′ 08.13"	(RT)			
Degree =	190° 59′ 09.54"				
Tangent =	9.6615				
Length =	18.6937				
Radius =	30.0000				
External =	1.5174				
Long Chord =	18.3927				
Mid. Ord. =	1.4443				
P.C. Station	228+07.10	N	10,161,637.6622	E	3,125,966.9698
P.T. Station	228+25.79	N	10,161,636.3097	E	3,125,985.3127
C.C.		N	10,161,608.5076	E	3,125,974.0415
Back = N	76° 21′ 56.68" E				
Ahead = S	67° 55′ 55.19" E				
Chord Bear = S	85° 46′ 59.26" E				

Course from PT CV018 to PC CV019 S 67° 55′ 55.19" E Dist 178.7210

	Curve Data				
Curve CV019					
P.I. Station	230+18.22	N	10,161,564.0157	E	3,126,163.6371
Delta =	3° 55′ 24.08"	(LT)			
Degree =	14° 19′ 26.23"				
Tangent =	13.7004				
Length =	27.3902				
Radius =	399.9997				
External =	0.2346				
Long Chord =	27.3848				
Mid. Ord. =	0.2344				
P.C. Station	230+04.52	N	10,161,569.1630	E	3,126,150.9404
P.T. Station	230+31.91	N	10,161,559.7491	E	3,126,176.6563
C.C.		N	10,161,939.8582	E	3,126,301.2230
Back = S	67° 55′ 55.19" E				
Ahead = S	71° 51′ 19.27" E				
Chord Bear = S	69° 53′ 37.23" E				

Course from PT CV019 to PC CV020 S 71° 51′ 19.27" E Dist 125.1577

	Curve Data				
Curve CV020					
P.I. Station	231+80.27	N	10,161,513.5457	E	3,126,317.6437
Delta =	6° 38′ 27.54"	(LT)			
Degree =	14° 19′ 26.19"				
Tangent =	23.2074				
Length =	46.3628				
Radius =	400.0001				
External =	0.6727				
Long Chord =	46.3369				
Mid. Ord. =	0.6715				
P.C. Station	231+57.06	N	10,161,520.7729	E	3,126,295.5904
P.T. Station	232+03.43	N	10,161,508.9174	E	3,126,340.3849
C.C.		N	10,161,900.8823	E	3,126,420.1572
Back = S	71° 51′ 19.27" E				
Ahead = S	78° 29′ 46.81" E				
Chord Bear = S	75° 10′ 33.04" E				

Course from PT CV020 to PC CV023 S 78° 29′ 46.81" E Dist 149.6038

	Curve Data				
Curve CV023					
P.I. Station	233+77.26	N	10,161,474.2502	E	3,126,510.7243
Delta =	13° 49′ 01.58"	(RT)			
Degree =	28° 39′ 15.30"				
Tangent =	24.2276				
Length =	48.2201				
Radius =	199.9556				
External =	1.4624				
Long Chord =	48.1033				
Mid. Ord. =	1.4518				
P.C. Station	233+53.03	N	10,161,479.0819	E	3,126,486.9834
P.T. Station	234+01.25	N	10,161,463.8884	E	3,126,532.6243
C.C.		N	10,161,283.1430	E	3,126,447.1062
Back = S	78° 29′ 46.81" E				
Ahead = S	64° 40′ 45.23" E				
Chord Bear = S	71° 35′ 16.02" E				

	Curve Data				
Curve CV024					
P.I. Station	234+50.61	N	10,161,442.7765	E	3,126,577.2450
Delta =	18° 41′ 12.82"	(LT)			
Degree =	19° 05′ 54.94"				
Tangent =	49.3605				
Length =	97.8443				
Radius =	300.0000				
External =	4.0336				
Long Chord =	97.4113				
Mid. Ord. =	3.9801				
P.C. Station	234+01.25	N	10,161,463.8872	E	3,126,532.6267
P.T. Station	234+99.10	N	10,161,437.0741	E	3,126,626.2750
C.C.		N	10,161,735.0655	E	3,126,660.9324
Back = S	64° 40′ 45.23" E				
Ahead = S	83° 21′ 58.05" E				
Chord Bear = S	74° 01′ 21.64" E				

DESIGN

STATE OF TEXAS · HEATHER McNEAL · 114428 · LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 7/30/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS · JAMES A. LUTZ · 84722 · LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 7/30/2018 DATE

PAPE-DAWSON ENGINEERS
AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS
7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
HORIZONTAL ALIGNMENT DATA

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 7/30/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 7

Plotted on: 7/30/2018

Design Filename: H:\projects\508\67\00\design\Civil\General\508670OHADS02.dgn

Curve Data

Curve CV025

P.I. Station	235+63.59	N	10,161,429.6238	E	3,126,690.3346
Delta =	26° 23′ 46.77"	(RT)			
Degree =	20° 50′ 05.38"				
Tangent =	64.4914				
Length =	126.6933				
Radius =	275.0000				
External =	7.4609				
Long Chord =	125.5758				
Mid. Ord. =	7.2638				
P.C. Station	234+99.10	N	10,161,437.0741	E	3,126,626.2750
P.T. Station	236+25.79	N	10,161,394.4708	E	3,126,744.4031
C.C.		N	10,161,163.9153	E	3,126,594.5058
Back = S	83° 21′ 58.05" E				
Ahead = S	56° 58′ 11.28" E				
Chord Bear = S	70° 10′ 04.66" E				

Curve Data

Curve CV026

P.I. Station	236+92.33	N	10,161,358.2035	E	3,126,800.1854
Delta =	27° 12′ 08.59"	(LT)			
Degree =	20° 50′ 05.43"				
Tangent =	66.5355				
Length =	130.5620				
Radius =	274.9998				
External =	7.9346				
Long Chord =	129.3392				
Mid. Ord. =	7.7121				
P.C. Station	236+25.79	N	10,161,394.4708	E	3,126,744.4031
P.T. Station	237+56.35	N	10,161,351.4475	E	3,126,866.3770
C.C.		N	10,161,625.0261	E	3,126,894.3003
Back = S	56° 58′ 11.28" E				
Ahead = S	84° 10′ 19.87" E				
Chord Bear = S	70° 34′ 15.57" E				

Curve Data

Curve CV027

P.I. Station	237+92.39	N	10,161,347.7881	E	3,126,902.2301
Delta =	11° 26′ 00.89"	(RT)			
Degree =	15° 54′ 55.79"				
Tangent =	36.0393				
Length =	71.8393				
Radius =	359.9999				
External =	1.7994				
Long Chord =	71.7201				
Mid. Ord. =	1.7905				
P.C. Station	237+56.35	N	10,161,351.4475	E	3,126,866.3770
P.T. Station	238+28.19	N	10,161,337.0941	E	3,126,936.6462
C.C.		N	10,160,993.3083	E	3,126,829.8229
Back = S	84° 10′ 19.86" E				
Ahead = S	72° 44′ 18.98" E				
Chord Bear = S	78° 27′ 19.42" E				

Course from PT CV027 to PC CV028 S 72° 44′ 18.98" E Dist 42.8859

Curve Data

Curve CV028

P.I. Station	239+08.15	N	10,161,313.3671	E	3,127,013.0062
Delta =	10° 35′ 27.91"	(LT)			
Degree =	14° 19′ 26.22"				
Tangent =	37.0755				
Length =	73.9397				
Radius =	399.9999				
External =	1.7146				
Long Chord =	73.8345				
Mid. Ord. =	1.7072				
P.C. Station	238+71.08	N	10,161,324.3685	E	3,126,977.6006
P.T. Station	239+45.02	N	10,161,309.0605	E	3,127,049.8308
C.C.		N	10,161,706.3528	E	3,127,096.2932
Back = S	72° 44′ 18.98" E				
Ahead = S	83° 19′ 46.89" E				
Chord Bear = S	78° 02′ 02.93" E				

Curve Data

Curve CV029

P.I. Station	239+78.30	N	10,161,305.1948	E	3,127,082.8859
Delta =	18° 53′ 42.60"	(RT)			
Degree =	28° 38′ 52.39"				
Tangent =	33.2805				
Length =	65.9566				
Radius =	200.0000				
External =	2.7501				
Long Chord =	65.6581				
Mid. Ord. =	2.7128				
P.C. Station	239+45.02	N	10,161,309.0605	E	3,127,049.8308
P.T. Station	240+10.97	N	10,161,290.8329	E	3,127,112.9080
C.C.		N	10,161,110.4143	E	3,127,026.5995
Back = S	83° 19′ 46.89" E				
Ahead = S	64° 26′ 04.29" E				
Chord Bear = S	73° 52′ 55.59" E				

Curve Data

Curve CV030

P.I. Station	240+35.30	N	10,161,280.3347	E	3,127,134.8534
Delta =	18° 25′ 27.05"	(LT)			
Degree =	38° 11′ 49.86"				
Tangent =	24.3272				
Length =	48.2344				
Radius =	150.0000				
External =	1.9599				
Long Chord =	48.0268				
Mid. Ord. =	1.9346				
P.C. Station	240+10.97	N	10,161,290.8329	E	3,127,112.9080
P.T. Station	240+59.21	N	10,161,277.3104	E	3,127,158.9918
C.C.		N	10,161,426.1468	E	3,127,177.6393
Back = S	64° 26′ 04.29" E				
Ahead = S	82° 51′ 31.33" E				
Chord Bear = S	73° 38′ 47.81" E				

Curve Data

Curve CV031

P.I. Station	240+93.86	N	10,161,273.0027	E	3,127,193.3741
Delta =	13° 10′ 38.47"	(RT)			
Degree =	19° 05′ 54.95"				
Tangent =	34.6511				
Length =	68.9964				
Radius =	299.9999				
External =	1.9945				
Long Chord =	68.8445				
Mid. Ord. =	1.9814				
P.C. Station	240+59.21	N	10,161,277.3104	E	3,127,158.9919
P.T. Station	241+28.21	N	10,161,260.9704	E	3,127,225.8691
C.C.		N	10,160,979.6377	E	3,127,121.6969
Back = S	82° 51′ 31.33" E				
Ahead = S	69° 40′ 52.86" E				
Chord Bear = S	76° 16′ 12.10" E				

Curve Data

Curve CV032

P.I. Station	241+57.54	N	10,161,250.7828	E	3,127,253.3824
Delta =	14° 32′ 19.66"	(LT)			
Degree =	24° 54′ 40.35"				
Tangent =	29.3388				
Length =	58.3625				
Radius =	230.0000				
External =	1.8637				
Long Chord =	58.2060				
Mid. Ord. =	1.8487				
P.C. Station	241+28.21	N	10,161,260.9704	E	3,127,225.8691
P.T. Station	241+86.57	N	10,161,247.8282	E	3,127,282.5720
C.C.		N	10,161,476.6589	E	3,127,305.7345
Back = S	69° 40′ 52.86" E				
Ahead = S	84° 13′ 12.52" E				
Chord Bear = S	76° 57′ 02.69" E				

Curve Data

Curve CV033

P.I. Station	242+31.59	N	10,161,243.2939	E	3,127,327.3679
Delta =	17° 04′ 14.87"	(RT)			
Degree =	19° 05′ 54.95"				
Tangent =	45.0248				
Length =	89.3825				
Radius =	299.9999				
External =	3.3599				
Long Chord =	89.0522				
Mid. Ord. =	3.3227				
P.C. Station	241+86.57	N	10,161,247.8282	E	3,127,282.5720
P.T. Station	242+75.95	N	10,161,225.8094	E	3,127,368.8592
C.C.		N	10,160,949.3534	E	3,127,252.3601
Back = S	84° 13′ 12.52" E				
Ahead = S	67° 08′ 57.65" E				
Chord Bear = S	75° 41′ 05.08" E				

Curve Data

Curve CV034

P.I. Station	243+18.49	N	10,161,209.2917	E	3,127,408.0561
Delta =	16° 08′ 22.57"	(LT)			
Degree =	19° 05′ 54.93"				
Tangent =	42.5350				
Length =	84.5068				
Radius =	300.0000				
External =	3.0004				
Long Chord =	84.2277				
Mid. Ord. =	2.9707				
P.C. Station	242+75.95	N	10,161,225.8094	E	3,127,368.8592
P.T. Station	243+60.46	N	10,161,204.3210	E	3,127,450.2997
C.C.		N	10,161,502.2654	E	3,127,485.3583
Back = S	67° 08′ 57.65" E				
Ahead = S	83° 17′ 20.22" E				
Chord Bear = S	75° 13′ 08.93" E				

Course from PT CV034 to PC CV035 S 83° 17′ 20.22" E Dist 88.3869

DESIGN

STATE OF TEXAS · HEATHER McNEAL · 114428 · LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 7/30/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS · JAMES A. LUTZ · 84722 · LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 7/30/2018 DATE

PAPE-DAWSON ENGINEERS
AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS
7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
HORIZONTAL ALIGNMENT DATA

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 7/30/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 8

Plotted on: 7/30/2018

Design Filename: H:\projects\508\67\00\design\Civil\General\508670OHADS03.dgn

Curve Data

Curve CV035

P.I. Station	244+69.97	N	10,161,191.5236	E	3,127,559.0579
Delta =	8° 03′ 16.54"	(LT)			
Degree =	19° 05′ 54.94"				
Tangent =	21.1217				
Length =	42.1737				
Radius =	300.0000				
External =	0.7426				
Long Chord =	42.1390				
Mid. Ord. =	0.7408				
P.C. Station	244+48.84	N	10,161,193.9919	E	3,127,538.0810
P.T. Station	244+91.02	N	10,161,192.0188	E	3,127,580.1738
C.C.		N	10,161,491.9363	E	3,127,573.1397
Back = S	83° 17′ 20.22" E				
Ahead = N	88° 39′ 23.25" E				
Chord Bear = S	87° 18′ 58.48" E				

Course from PT CV035 to PC CV037 N 88° 39′ 23.25" E Dist 113.1338

Curve Data

Curve CV037

P.I. Station	246+96.85	N	10,161,196.8451	E	3,127,785.9544
Delta =	12° 49′ 21.35"	(RT)			
Degree =	6° 56′ 41.79"				
Tangent =	92.7033				
Length =	184.6322				
Radius =	825.0001				
External =	5.1921				
Long Chord =	184.2471				
Mid. Ord. =	5.1596				
P.C. Station	246+04.15	N	10,161,194.6715	E	3,127,693.2765
P.T. Station	247+88.78	N	10,161,178.3962	E	3,127,876.8034
C.C.		N	10,160,369.8982	E	3,127,712.6204
Back = N	88° 39′ 23.25" E				
Ahead = S	78° 31′ 15.40" E				
Chord Bear = S	84° 55′ 56.08" E				

Curve Data

Curve CV038

P.I. Station	248+23.38	N	10,161,171.5103	E	3,127,910.7122
Delta =	9° 12′ 00.77"	(LT)			
Degree =	13° 19′ 28.54"				
Tangent =	34.5978				
Length =	69.0469				
Radius =	430.0001				
External =	1.3896				
Long Chord =	68.9727				
Mid. Ord. =	1.3851				
P.C. Station	247+88.79	N	10,161,178.3956	E	3,127,876.8065
P.T. Station	248+57.83	N	10,161,170.1346	E	3,127,945.2827
C.C.		N	10,161,599.7947	E	3,127,962.3807
Back = S	78° 31′ 15.40" E				
Ahead = S	87° 43′ 16.18" E				
Chord Bear = S	83° 07′ 15.79" E				

Curve Data

Curve CV039

P.I. Station	248+73.38	N	10,161,169.5165	E	3,127,960.8149
Delta =	42° 28′ 24.73"	(RT)			
Degree =	143° 14′ 22.03"				
Tangent =	15.5445				
Length =	29.6521				
Radius =	40.0000				
External =	2.9142				
Long Chord =	28.9778				
Mid. Ord. =	2.7163				
P.C. Station	248+57.83	N	10,161,170.1346	E	3,127,945.2827
P.T. Station	248+87.49	N	10,161,158.5725	E	3,127,971.8539
C.C.		N	10,161,130.1662	E	3,127,943.6922
Back = S	87° 43′ 16.18" E				
Ahead = S	45° 14′ 51.45" E				
Chord Bear = S	66° 29′ 03.81" E				

Curve Data

Curve CV040

P.I. Station	249+01.55	N	10,161,148.6690	E	3,127,981.8433
Delta =	38° 44′ 58.73"	(LT)			
Degree =	143° 14′ 21.97"				
Tangent =	14.0665				
Length =	27.0524				
Radius =	40.0000				
External =	2.4012				
Long Chord =	26.5397				
Mid. Ord. =	2.2653				
P.C. Station	248+87.49	N	10,161,158.5725	E	3,127,971.8539
P.T. Station	249+14.54	N	10,161,147.1980	E	3,127,995.8327
C.C.		N	10,161,186.9787	E	3,128,000.0157
Back = S	45° 14′ 51.45" E				
Ahead = S	83° 59′ 50.17" E				
Chord Bear = S	64° 37′ 20.81" E				

Course from PT CV040 to PC CV041 S 83° 59′ 50.17" E Dist 98.4215

Curve Data

Curve CV041

P.I. Station	250+29.48	N	10,161,135.1781	E	3,128,110.1421
Delta =	36° 33′ 48.24"	(RT)			
Degree =	114° 35′ 29.59"				
Tangent =	16.5182				
Length =	31.9076				
Radius =	50.0000				
External =	2.6579				
Long Chord =	31.3689				
Mid. Ord. =	2.5237				
P.C. Station	250+12.96	N	10,161,136.9055	E	3,128,093.7145
P.T. Station	250+44.87	N	10,161,124.0045	E	3,128,122.3078
C.C.		N	10,161,087.1797	E	3,128,088.4857
Back = S	83° 59′ 50.17" E				
Ahead = S	47° 26′ 01.94" E				
Chord Bear = S	65° 42′ 56.06" E				

Curve Data

Curve CV042

P.I. Station	251+07.62	N	10,161,081.5543	E	3,128,168.5268
Delta =	51° 32′ 10.60"	(LT)			
Degree =	44° 04′ 25.23"				
Tangent =	62.7553				
Length =	116.9321				
Radius =	130.0000				
External =	14.3545				
Long Chord =	113.0299				
Mid. Ord. =	12.9271				
P.C. Station	250+44.87	N	10,161,124.0045	E	3,128,122.3078
P.T. Station	251+61.80	N	10,161,091.3391	E	3,128,230.5146
C.C.		N	10,161,219.7492	E	3,128,210.2450
Back = S	47° 26′ 01.94" E				
Ahead = N	81° 01′ 47.47" E				
Chord Bear = S	73° 12′ 07.24" E				

Curve Data

Curve CV043

P.I. Station	252+12.75	N	10,161,099.2833	E	3,128,280.8420
Delta =	12° 22′ 26.48"	(RT)			
Degree =	12° 11′ 26.14"				
Tangent =	50.9505				
Length =	101.5047				
Radius =	469.9999				
External =	2.7536				
Long Chord =	101.3075				
Mid. Ord. =	2.7376				
P.C. Station	251+61.80	N	10,161,091.3391	E	3,128,230.5146
P.T. Station	252+63.30	N	10,161,096.2582	E	3,128,331.7027
C.C.		N	10,160,627.0874	E	3,128,303.7969
Back = N	81° 01′ 47.47" E				
Ahead = S	86° 35′ 46.05" E				
Chord Bear = N	87° 13′ 00.71" E				

Course from PT CV043 to PC CV044 S 86° 35′ 46.05" E Dist 119.4399

Curve Data

Curve CV044

P.I. Station	253+90.93	N	10,161,088.6805	E	3,128,459.1033
Delta =	9° 21′ 34.40"	(RT)			
Degree =	57° 17′ 44.90"				
Tangent =	8.1860				
Length =	16.3355				
Radius =	100.0000				
External =	0.3345				
Long Chord =	16.3173				
Mid. Ord. =	0.3334				
P.C. Station	253+82.74	N	10,161,089.1666	E	3,128,450.9318
P.T. Station	253+99.08	N	10,161,086.8720	E	3,128,467.0870
C.C.		N	10,160,989.3430	E	3,128,444.9944
Back = S	86° 35′ 46.05" E				
Ahead = S	77° 14′ 11.65" E				
Chord Bear = S	81° 54′ 58.85" E				

Curve Data

Curve CV045

P.I. Station	254+25.45	N	10,161,081.0450	E	3,128,492.8107
Delta =	29° 33′ 03.68"	(LT)			
Degree =	57° 17′ 44.80"				
Tangent =	26.3754				
Length =	51.5763				
Radius =	100.0000				
External =	3.4198				
Long Chord =	51.0065				
Mid. Ord. =	3.3068				
P.C. Station	253+99.08	N	10,161,086.8720	E	3,128,467.0870
P.T. Station	254+50.66	N	10,161,088.6629	E	3,128,518.0621
C.C.		N	10,161,184.4011	E	3,128,489.1796
Back = S	77° 14′ 11.65" E				
Ahead = N	73° 12′ 44.67" E				
Chord Bear = N	87° 59′ 16.51" E				

DESIGN

STATE OF TEXAS · HEATHER McNEAL · 114428 · LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 7/30/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS · JAMES A. LUTZ · 84722 · LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 7/30/2018 DATE

PAPE-DAWSON ENGINEERS
AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS
7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
HORIZONTAL ALIGNMENT DATA

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 7/30/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 9

Plotted on: 7/30/2018

Design Filename: H:\projects\508\67\00\design\Civil\General\5086700HADS04.dgn

℄ BRUSHY CREEK TRAIL CONT.

Curve Data

Curve CV046
P.I. Station 254+61.54 N 10,161,091.8058 E 3,128,528.4801
Delta = 12° 25′ 14.73" (RT)
Degree = 57° 17′ 44.97"
Tangent = 10.8818
Length = 21.6783
Radius = 99.9999
External = 0.5903
Long Chord = 21.6359
Mid. Ord. = 0.5869
P.C. Station 254+50.66 N 10,161,088.6629 E 3,128,518.0621
P.T. Station 254+72.33 N 10,161,092.6344 E 3,128,539.3303
C.C. N 10,160,992.9248 E 3,128,546.9445
Back = N 73° 12′ 44.67" E
Ahead = N 85° 37′ 59.40" E
Chord Bear = N 79° 25′ 22.04" E

Curve Data

Curve CV047
P.I. Station 255+28.54 N 10,161,096.9139 E 3,128,595.3721
Delta = 18° 30′ 21.05" (LT)
Degree = 16° 36′ 26.90"
Tangent = 56.2049
Length = 111.4309
Radius = 345.0000
External = 4.5483
Long Chord = 110.9471
Mid. Ord. = 4.4891
P.C. Station 254+72.33 N 10,161,092.6344 E 3,128,539.3303
P.T. Station 255+83.76 N 10,161,118.7599 E 3,128,647.1576
C.C. N 10,161,436.6329 E 3,128,513.0614
Back = N 85° 37′ 59.40" E
Ahead = N 67° 07′ 38.35" E
Chord Bear = N 76° 22′ 48.88" E

Curve Data

Curve CV048
P.I. Station 255+95.49 N 10,161,123.3182 E 3,128,657.9630
Delta = 4° 07′ 59.51" (RT)
Degree = 17° 37′ 46.20"
Tangent = 11.7275
Length = 23.4448
Radius = 324.9995
External = 0.2115
Long Chord = 23.4397
Mid. Ord. = 0.2114
P.C. Station 255+83.76 N 10,161,118.7599 E 3,128,647.1576
P.T. Station 256+07.21 N 10,161,127.0858 E 3,128,669.0688
C.C. N 10,160,819.3149 E 3,128,773.4799
Back = N 67° 07′ 38.35" E
Ahead = N 71° 15′ 37.87" E
Chord Bear = N 69° 11′ 38.11" E

Course from PT CV048 to PC CV049 N 71° 15′ 37.87" E Dist 24.2953

Curve Data

Curve CV049
P.I. Station 256+59.71 N 10,161,143.9531 E 3,128,718.7882
Delta = 33° 04′ 27.38" (LT)
Degree = 60° 18′ 40.83"
Tangent = 28.2073
Length = 54.8392
Radius = 95.0000
External = 4.0992
Long Chord = 54.0810
Mid. Ord. = 3.9296
P.C. Station 256+31.50 N 10,161,134.8911 E 3,128,692.0762
P.T. Station 256+86.34 N 10,161,166.1242 E 3,128,736.2265
C.C. N 10,161,224.8551 E 3,128,661.5560
Back = N 71° 15′ 37.87" E
Ahead = N 38° 11′ 10.48" E
Chord Bear = N 54° 43′ 24.17" E

Curve Data

Curve CV050
P.I. Station 257+56.68 N 10,161,221.4056 E 3,128,779.7072
Delta = 32° 39′ 59.36" (RT)
Degree = 23° 52′ 23.66"
Tangent = 70.3321
Length = 136.8331
Radius = 240.0000
External = 10.0932
Long Chord = 134.9873
Mid. Ord. = 9.6859
P.C. Station 256+86.34 N 10,161,166.1242 E 3,128,736.2265
P.T. Station 258+23.18 N 10,161,244.4743 E 3,128,846.1484
C.C. N 10,161,017.7514 E 3,128,924.8678
Back = N 38° 11′ 10.48" E
Ahead = N 70° 51′ 09.84" E
Chord Bear = N 54° 31′ 10.16" E

==========
Ending chain ALN_F02 description

DESIGN

STATE OF TEXAS · HEATHER McNEAL · 114428 · LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 7/30/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS · JAMES A. LUTZ · 84722 · LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 7/30/2018 DATE

PAPE-DAWSON ENGINEERS
AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS
7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
HORIZONTAL ALIGNMENT DATA

SHEET 5 OF 5

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 7/30/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 10

Plotted on: 7/30/2018

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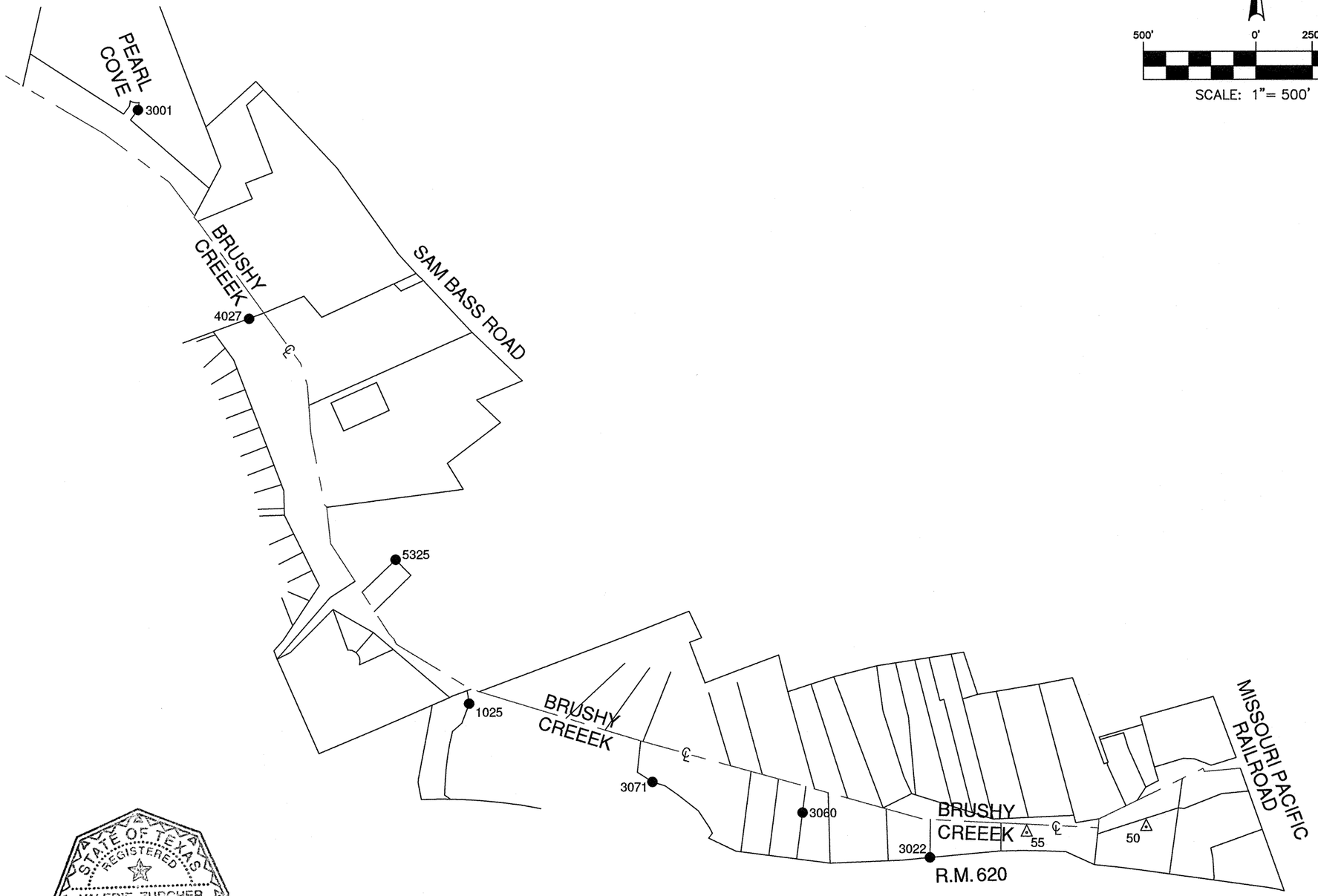

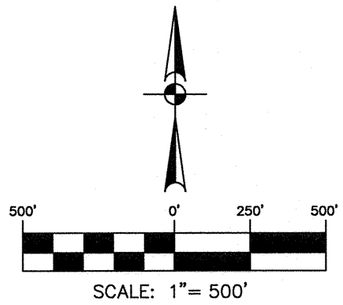

NOTES:

1. COORDINATES SHOWN ARE DISPLAYED IN US SURVEY FEET, BASED ON THE NORTH AMERICAN DATUM OF 1983 (NA 2011) EPOCH 2010.00 FROM THE TEXAS COORDINATE SYSTEM ESTABLISHED FOR THE SOUTH CENTRAL ZONE, WITH A SURFACE ADJUSTMENT FACTOR OF 1.00012 APPLIED.

2. ELEVATIONS SHOWN ARE BASED ON NAVD88 (GEOID 03).

LEGEND

CONC.	CONCRETE
FD.	FOUND
PCC	POINT OF COMPOUND CURVATURE
PRC	POINT OF REVERSE CURVATURE
I.R.	1/2" IRON ROD
℄	CENTERLINE
P.L.	PROPERTY LINE
●	FOUND MONUMENT
△	CONTROL POINT
RM	RANCH TO MARKET

SYMBOL LEGEND

	FH	FIRE HYDRANT
		GATE
	GI	GRATE INLET
(S)	SSMH	SANITARY SEWER MANHOLE
	SL	STREET LIGHT
	UP	UTILITY POLE
	HT	HIGH LINE TOWER

TREE LEGEND

(·)	TREE 6	6" TREE – UNKNOWN SPECIES
(·)	AELM 6	6" AMERICAN ELM
(·)	CELM 6	6" CEDAR ELM
(·)	RO 6	6" RED OAK
(·)	PCN 6	6" PECAN
(·)	SYC 6	6" SYCAMORE
(·)	BX 6	6" BOX ELDER

LINE LEGEND

—— x —— x ——	BARBED WIRE FENCE
——SS——SS——	SANITARY SEWER LINE
——OHE——OHE——	OVERHEAD ELECTRIC

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028800

BRUSHY CREEK TRAIL
FROM STA. 200+77.00 TO
STA. 258+30.83
IN WILLIAMSON COUNTY, TEXAS

PRIMARY HORIZONTAL
AND VERTICAL CONTROL

STATE OF TEXAS
REGISTERED
VALERIE ZURCHER
6222
PROFESSIONAL
LAND SURVEYOR
10/02/2017

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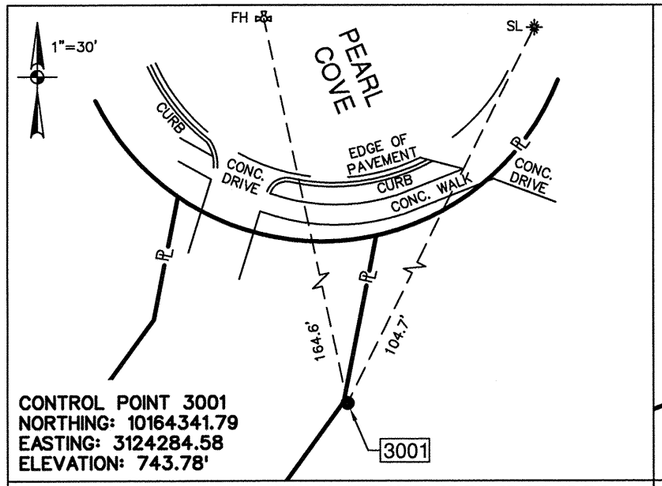
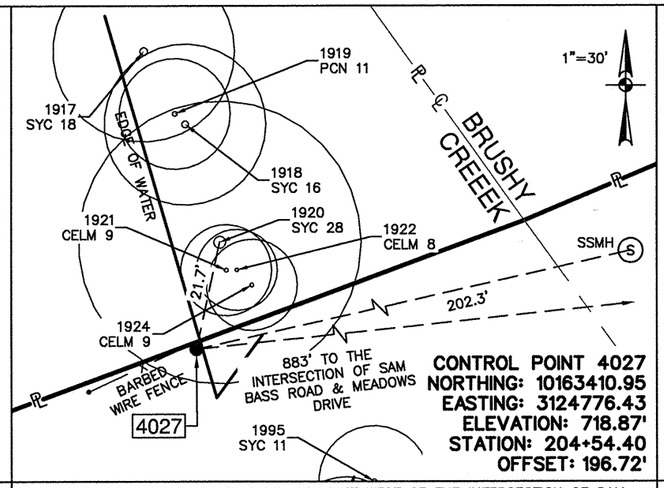
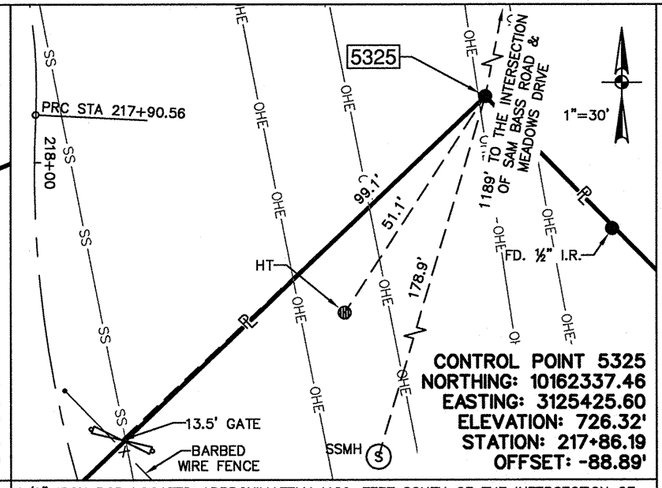


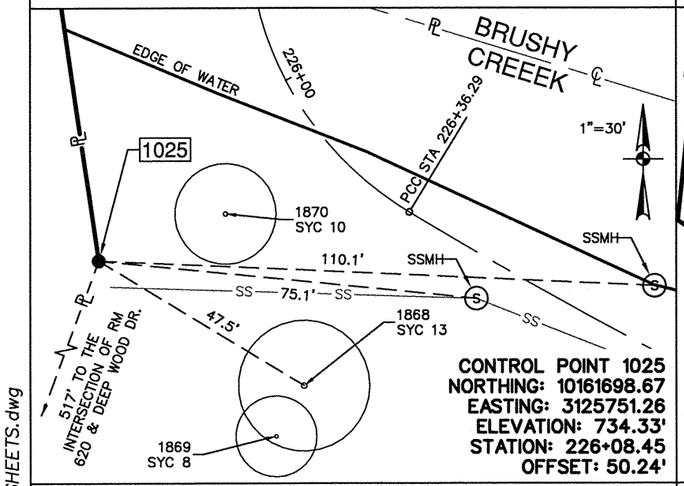
1/2" IRON ROD LOCATED APPROXIMATELY 82–FEET SOUTH OF THE CENTER OF THE CUL–DE–SAC FOR PEARL COVE.



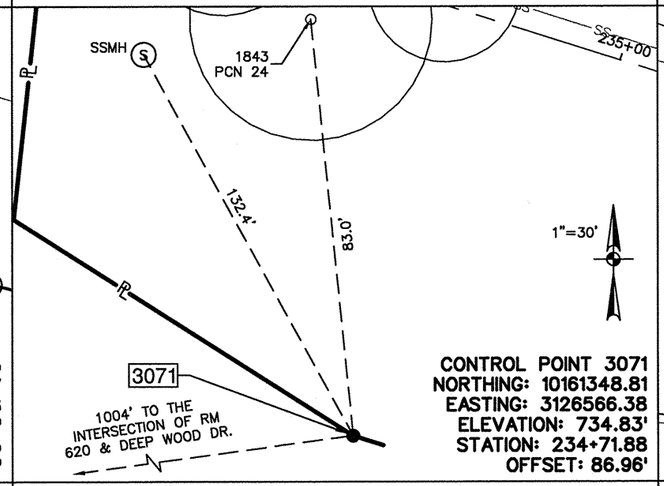
80–D NAIL LOCATED APPROXIMATELY 883–FEET WEST OF THE INTERSECTION OF SAM BASS ROAD & MEADOWS DRIVE.



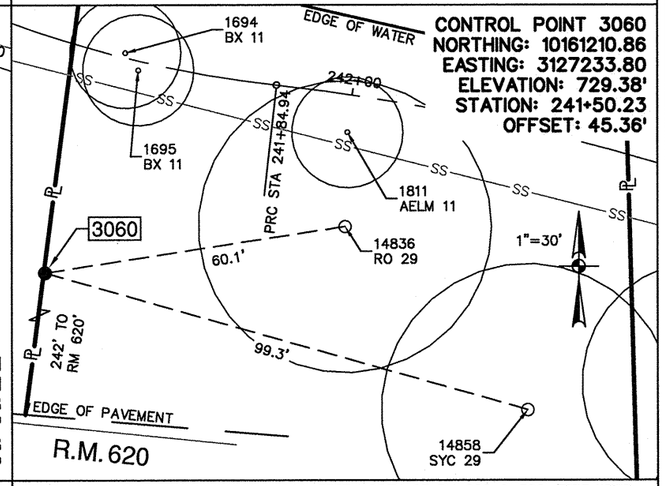
1/2" IRON ROD LOCATED APPROXIMATELY 1189–FEET SOUTH OF THE INTERSECTION OF SAM BASS ROAD & MEADOWS DRIVE.



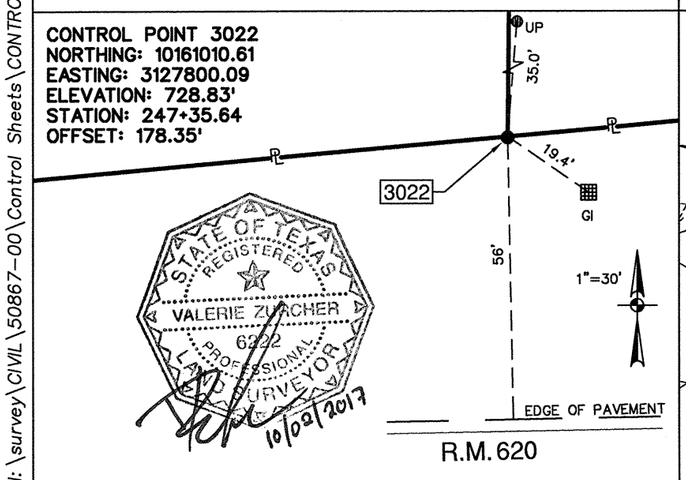
IRON ROD WITH CAP MARKED "BAKER–AICKLEN" LOCATED APPROXIMATELY 517–FEET NORTHEAST OF THE INTERSECTION OF RM 620 AND DEEP WOOD DR.



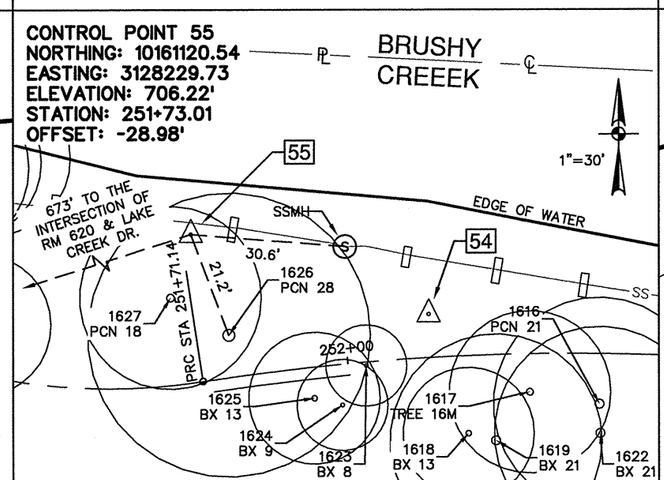
1/2" IRON ROD LOCATED APPROXIMATELY 1004–FEET EAST OF THE INTERSECTION OF RM 620 AND DEEP WOOD DR.



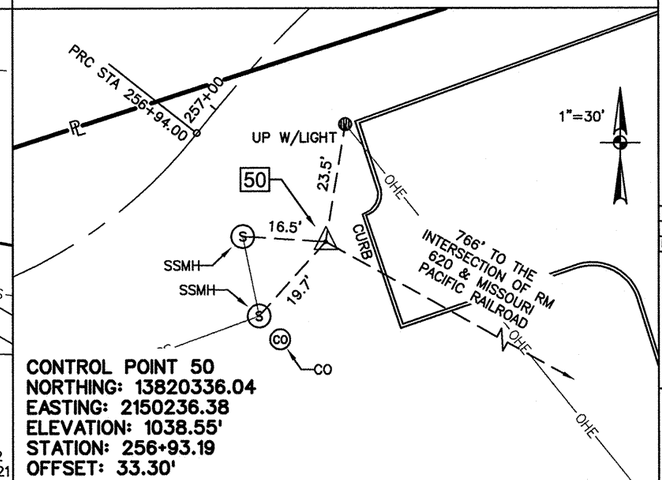
MAG NAIL LOCATED APPROXIMATELY 242–FEET NORTH OF RM 620 & 386–FEET WEST OF LAKE CREEK DRIVE.



3/8" IRON ROD LOCATED APPROXIMATELY 56–FEET NORTH OF RM 620 & 214–FEET EAST OF LAKE CREEK DRIVE.



1/2" IRON ROD WITH RED CAP MARKED "TRAVERSE" LOCATED APPROXIMATELY 673–FEET NORTHEAST OF THE INTERSECTION OF RM 620 AND LAKE CREEK DR.



1/2" IRON ROD WITH RED CAP MARKED "TRAVERSE" LOCATED APPROXIMATELY 766–FEET NORTHWEST OF THE INTERSECTION OF RM 620 AND THE MISSOURI PACIFIC RAILROAD.

NOTES:

1. COORDINATES SHOWN ARE DISPLAYED IN US SURVEY FEET, BASED ON THE NORTH AMERICAN DATUM OF 1983 (NA 2011) EPOCH 2010.00 FROM THE TEXAS COORDINATE SYSTEM ESTABLISHED FOR THE SOUTH CENTRAL ZONE, WITH A SURFACE ADJUSTMENT FACTOR OF 1.00012 APPLIED.

2. ELEVATIONS SHOWN ARE BASED ON NAVD88 (GEOID 03).

LEGEND

CONC.	CONCRETE
FD.	FOUND
PCC	POINT OF COMPOUND CURVATURE
PRC	POINT OF REVERSE CURVATURE
I.R.	1/2" IRON ROD
℄	CENTERLINE
PL	PROPERTY LINE
●	FOUND MONUMENT
△	CONTROL POINT
RM	RANCH TO MARKET

SYMBOL LEGEND

FH	FH	FIRE HYDRANT
		GATE
GI	GI	GRATE INLET
S	SSMH	SANITARY SEWER MANHOLE
SL	SL	STREET LIGHT
UP	UP	UTILITY POLE
HT	HT	HIGH LINE TOWER

TREE LEGEND

TREE 6	6" TREE – UNKNOWN SPECIES
AELM 6	6" AMERICAN ELM
CELM 6	6" CEDAR ELM
RO 6	6" RED OAK
PCN 6	6" PECAN
SYC 6	6" SYCAMORE
BX 6	6" BOX ELDER

LINE LEGEND

x x	BARBED WIRE FENCE
SS SS	SANITARY SEWER LINE
OHE OHE	OVERHEAD ELECTRIC

REV. NO.	DATE	DESCRIPTION	BY

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028800

BRUSHY CREEK TRAIL
FROM STA. 200+77.00 TO
STA. 258+30.83
IN WILLIAMSON COUNTY, TEXAS

PRIMARY HORIZONTAL AND VERTICAL CONTROL

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GENERAL NOTES: Version September 6, 2016

Basis of Estimate

Item	Description	**Rate
**204	**Sprinkling** (Dust) (Item 132) (Item 247)	 30 GAL/CY 30 GAL/CY 30 GAL/CY
**210	**Roll (Flat Wheel)** (Item 247)	 1 HR/200 TON
**210	**Roll (Tamping and Heavy Tamping)**	1 HR/200 CY
**210	**Roll (Lt Pneumatic Tire)** (Item 132) (Item 247)	 1 HR/500 CY 1 HR/200 TON
247	**Flexible Base (CMP IN PLC)**	132 LB/CF

** For Informational Purposes Only

GENERAL
Perform work during good weather. If work is damaged by a weather event, the Contractor is responsible for all costs associated with replacing damaged work.

References to manufacturer's trade name or catalog numbers are for the purpose of identification only. Similar materials from other manufacturers are permitted if they are of equal quality, comply with the specifications for this project, and are approved.

If work is performed at Contractor's option, when inclement weather is impending, and the work is damaged by subsequent precipitation, the Contractor is responsible for all costs associated with replacing the work, if required.

The roadbed will be free of organic material prior to placing any section of the pavement structure.

Equip all construction equipment used in roadway work with highly visible omnidirectional flashing warning lights.

Use a self-contained vacuum broom to sweep the roadway and keep it free of sediment as directed. The contractor will be responsible for any sweeping above and beyond the normal maintenance required to keep fugitive sediment off the roadway as directed by the Engineer.

Protect all areas of the right of way, which are not included in the actual limits of the proposed construction areas, from disturbance. Restore any area disturbed because of the Contractor's operations to a condition as good as, or better than, before the beginning of work at no cost to the state.

Damage to existing pipes and SET's due to Contractor operations will be repaired at Contractor's expense.

All locations used for storing construction equipment, materials, and stockpiles of any type, within the right of way, will be as directed. Use of right of way for these purposes will be restricted to those locations where driver sight distance to businesses and side street intersections is not

Project Number: STP1802(205)TP **Control:** 0914-05-191
County: Williamson
Highway: Brushy Creek Trail

obstructed and at other locations where an unsightly appearance will not exist. The Contractor will not have exclusive use of right of way but will cooperate in the use of the right of way with the city/county and various public utility companies as required.

ITEM 5 – CONTROL OF THE WORK
Mark and maintain 100-foot station intervals for the duration of the project, as directed. Consider subsidiary to pertinent Items.

Electronic Shop Drawing Submittals:
Submit Electronic Shop Drawing Submittals according to the current **Guide to Electronic Shop Drawing Submittal (GESDS).** For instructions on submitting shop drawings electronically go to TxDOT website (Business with TxDOT > Bridge Information > Shop Drawings. File is titled: **Guide to Electronic Shop Drawing Submittal.**)

For information on the electronic shop plan process, please visit the Bridge Division/Fabrication Branch web pages at: http://www.txdot.gov/business/resources/specifications/shop-drawings.html
The Guide to Electronic Shop Drawing Submittal at:
ftp://ftp.dot.state.tx.us/pub/txdot-info/library/pubs/bus/bridge/e_submit_guide.pdf
and the Submittal Requirements table at:
ftp://ftp.dot.state.tx.us/pub/txdot-info/library/pubs/bus/bridge/electronic_submission.pdfhave been updated to include additional guidance on segmental bridge submittals.

And

Copies of the standard shop drawings are on file with Traffic Operations Division, Bridge Division, and the Materials Section of Construction Division. Additional shop drawings for roadway illumination assemblies built in conformance with these drawings are not required. Pre-approved shop drawing manufacturers and assembly model numbers can be found at TxDOT website (Business with TxDOT > Materials Information > Material Producer List. Category is Roadway Illumination and Electrical Supplies

1. **In the E-mail "To:" box place the E-mail address to the following:**
Submit all Shop Drawings (and Working Drawings, if/when required), which do not require direct submittal to the **Bridge Division Fabrication Section**, electronically, to the following address:

Georgetown Area	Nathan Wright	Nathan.Wright@txdot.gov	AUS_GE-ShopReview@txdot.gov

And

Consultant E-Mail Contact:

Pape-Dawson Engineers	Derek Mueller	DMueller@pape-dawson.com

PAPE-DAWSON ENGINEERS
AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS
7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

GENERAL NOTES

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 13

2. In the e-mail "CC:" or "Copy To:" box place the following E-mail addresses:

In every e-mail submittal, the "CC:" or "Copy To:" line of the header will include the following e-mail addresses:

a. Contractor's Contact:

AND

b. Area Office Contact:

Georgetown Area	Nathan Wright	Nathan.Wright@txdot.gov	AUS_GE-ShopReview@txdot.gov

ITEM 6 - CONTROL OF MATERIALS
Give a minimum of 1 business day notice for materials, which require inspection at the Plant.

ITEM 7 – LEGAL RELATIONS AND RESPONSIBILITIES
Refer to the Environmental Permits, Issues and Commitments (EPIC) plan sheets for additional requirements and permits.

When any abandoned well is encountered, cease construction operations in this area and notify the Engineer who will coordinate the proper plugging procedures. A water well driller licensed in the State of Texas must be used to plug a well.

Erosion control and stabilization measures must be initiated immediately in portions of the site where construction activities have temporarily ceased and will not resume for a period exceeding 14 calendar days. Track all exposed soil, stockpiles, and slopes. Tracking consists of operating a tracked vehicle or equipment up and down the slope, leaving track marks perpendicular to the direction of the slope. Re-track slopes and stockpiles after each rain event or every 14 days, whichever occurs first. This work is subsidiary.

Perform maintenance of vehicles or equipment at designated maintenance sites. Keep a spill kit on-site during fueling and maintenance. This work is subsidiary.

Maintain positive drainage for permanent and temporary work for the duration of the project. Be responsible for any items associated with the temporary or interim drainage and all related maintenance. This work is subsidiary.

Suspend all activities near any significant recharge features, such as sinkholes, caves, or any other subterranean openings that are discovered during construction or core sampling. Do not proceed until the designated Geologist or TCEQ representative is present to evaluate and approve remedial action.

Locate aboveground storage tanks kept on-site for construction purposes in a contained area as to not allow any exposure to soils. The containment will be sized to capture 150% of the total capacity of the storage tanks.

Project Number: STP1802(205)TP **Control:** 0914-05-191
County: Williamson
Highway: Brushy Creek Trail

PSL in Edwards Aquifer Recharge and Contributing Zone
Obtain written approval from the Engineer for all on or off right of way PSLs not specifically addressed in the plans. Provide a signed SW3P sketch of the location 30 business days prior to use of the PSL. Include a list of materials, equipment and portable facilities that will be stored at the PSL.

PSL in USACE Jurisdictional Area
Do not initiate activities in a PSL associated with a U.S. Army Corps of Engineers (USACE) jurisdictional area that have not been previously evaluated by the USACE as part of the permit review of this project. Such activities include, but are not limited to, haul roads, equipment staging areas, borrow and disposal sites. Associated defined here means materials are delivered to or from the PSL. The jurisdictional area includes all waters of the U.S. including wetlands or associated wetlands affected by activities associated with this project. Special restrictions may be required for such work. Consult with the USACE regarding activities, including PSLs that have not been previously evaluated by the USACE. Provide the Department with a copy of all USACE coordination and approvals before initiating activities.

Proceed with activities in PSLs that do not affect a USACE jurisdictional area if self-determination has been made that the PSL is non-jurisdictional or proper clearances have been obtained in USACE jurisdictional areas or have been previously evaluated by the USACE as part of the permit review of this project. Document any determinations that PSL activities do not affect a USACE jurisdictional area. Maintain copies of PSL determinations for review by the Department or any regulatory agency. The Contractor must document and coordinate with the USACE, if required, before any excavation material hauled from or embankment material hauled into a USACE jurisdictional area by either (1) or (2) below.

1. **Restricted Use of Materials for the Previously Evaluated Permit Areas.** When an area within the project limits has been evaluated by the USACE as part of the permit process for this project:
   a. suitable excavation of required material in the areas shown on the plans and cross sections as specified in Standard Specification Item 110, Excavation is used for permanent or temporary fill within a USACE jurisdictional area;
   b. suitable embankment from within the USACE jurisdictional area is used as fill within a USACE evaluated area;
   c. Unsuitable excavation or excess excavation that is disposed of at an approved location within a USACE evaluated area.
2. **Contractor Materials from Areas Other than Previously Evaluated Areas.** Provide the Department with a copy of all USACE coordination and approvals before initiating any activities in a jurisdictional area within the project limits that has not been evaluated by the USACE or for any off right of way locations used for the following, but not limited to, haul roads, equipment staging areas, borrow and disposal sites:
   a. Standard Specification Item 132, Embankment is used for temporary or permanent fill within a USACE jurisdictional area;
   b. Unsuitable excavation or excess excavation that is disposed of outside a USACE evaluated area.

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GENERAL NOTES

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Work over or near Bodies of Water (Lakes, Rivers, Ponds, Creeks, etc.).
Keep on site a universal spill kit adequate for the body of water and the work being performed. No debris is allowed to fall into a body of water. Debris that falls into the water must be removed at the end of each work day. Debris that falls into the floodway must be removed at the end of each work week or prior to a rain event. This work is subsidiary.

Migratory Birds and Bats.
Migratory birds and bats may be nesting within the project limits and concentrated on roadway structures such as bridges and culverts. Remove all old and unoccupied migratory bird nests from any structures, trees, etc. between September 1st and January 31st. Prevent migratory birds from re-nesting or perform construction activities between February 1st and August 31st.

All methods used for the removal of old bird or bat nesting areas and the prevention of re-nesting must be approved by the Engineer well in advance of the planned use.

In the event that any active nests are encountered on-site during construction, all construction activity within the immediate vicinity of the nest must cease immediately. Contact the Engineer to determine how to proceed.

No extension of time or compensation payment will be granted for a delay or suspension of work caused by migratory birds or bats. This work is subsidiary.

Additional Environmental Requirements

TxDOT recognizes the particular sensitivity of certain features in the project area that warrant additional consideration with respect to the preservation of water quality and quantity. These include all operations within the limits of the 100-year floodplain associated with Brushy Creek. Therefore, along with the water quality protection BMPs that would be included in the WPAP and SWP3, TxDOT proposes the following goals and specific measures. The specific measures listed below would be incorporated into the project's plan set and would become a binding part of the project's bid documents.

1. TxDOT has redesigned the boardwalk and piers to avoid contact with groundwater and surface water during construction activities. Piers have been shortened to 10 feet in depth to avoid hitting groundwater (per the geotechnical information gathered during the project development phase). Test bores would be drilled during construction to establish pier locations that would not hit void space or groundwater and no deeper than proposed depths in most cases.
2. TxDOT would be committed to minimizing disturbed areas and protecting natural vegetation, especially in the vicinity of sensitive recharge features and major drainage pathways.
   - o Springs and seeps would have construction exclusion zones established around them that would include sedimentation control BMPs. These areas would be demarcated with orange construction fencing and noted on the plans documents. No construction work would take place within these areas.
   - o Disturbance would be minimized to the greatest extent practicable to minimize erosion in the vicinity of Brushy Creek.

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   - o Disturbed areas would be stabilized as soon as practicable.
3. TxDOT would be committed to minimizing erosion and preventing sediment from leaving the project site.
   - o Measures would be taken to prevent escaped sediment from being carried from the project site into Brushy Creek. In addition to the erosion and sediment control BMPs, work within the 100-year floodplain of Brushy Creek would be scheduled during periods of low-flow or no flow.
4. Within the limits of the 100-year floodplain: All drill tailings shall be removed daily
   - o Overnight storage of equipment and materials (including stockpiles) shall be prohibited
   - o Equipment refueling shall be prohibited
5. Drill Shafts shall not be constructed using Slurry Displacement Methods or petroleum-based drilling fluids or lubricants.
6. If, during subsurface activities over the Edwards Aquifer Recharge Zone, groundwater or large karst voids are encountered (greater than 6 inches in any direction),
   - o drilled shafts shall be encased in steel in the following manner:
     - In cases of large voids above the water table, steel casing shall extend no less than 24 inches above and 24 inches below the extent of the void
     - In cases of groundwater contact, steel casing shall extend from the bottom of the bore to no less than 24 inches above groundwater contact on the day of pouring
   - o The project contractor hired by TxDOT would supply a licensed Professional Geoscientist (PG) as required by the Edwards Aquifer Rules.
     - If voids are encountered during construction, all work would stop up to 25 feet from the void site and the PG would perform an initial geologic assessment. The buffer distance may be greater if the PG or karst biologist deems appropriate.
     - If the PG determines that the feature provides potential habitat for listed karst invertebrate species, a karst biologist holding an appropriate Section 10(a)(1)(A) permit would inspect the feature to determine its scientific or conservation value.
     - The surface expression of the void would be covered between the time the void is opened and the time that a karst biologist is available to inspect it, in order to minimize the influence of diurnal variations in surface temperature and to retain moisture.
     - Hazard fencing or barricades would be used to protect the area if there is a fall hazard, such as the case of an open shaft.
     - Appropriate BMPs, including the installation of silt fencing and/or silt socks and immediate area work stoppage, would be implemented to minimize surface runoff from entering the feature.

ITEM 8 – PROSECUTION AND PROGRESS
Electronic versions of schedules will be saved in Primavera P6 format.

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GENERAL NOTES

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A CPM schedule in Primavera format and a PSSR is required. Use software fully compatible with Primavera P6.

ITEM 100 - PREPARING RIGHT OF WAY
Prep ROW must not begin until trees designated for preservation have been protected, items listed in the EPIC have been addressed, and SW3P controls installed. Burning brush is not allowed.

Follow requirements of Item 752 and corresponding general notes when working on or within the drip line of a tree when the diameter 4.5 ft. above the ground is 12 in. or greater.

Unless shown otherwise in the plans, perform pruning or removal for areas within 30' of edge of pavement under construction. Trim or remove vegetation along sidewalks, along paths, along guard fence, along rails, around signs, markers, and structures to provide visibility to traveling public, line of sight for travelers, and 5' of clearance. Trim to provide a minimum of 14' vertical clearance under all trees. Use work methods described in Item 752. Flailing equipment is not allowed on oak trees or in urban areas. This work is subsidiary.

Use hand methods or other means of removal if doing work by mechanical methods is impractical. This work is subsidiary.

Backfill material will be Type B Embankment using ordinary compaction.

ITEM 110 – EXCAVATION
The Engineer will define unsuitable material.

ITEM 132 – ALL EMBANKMENT
At no time will the retaining wall backfill material exceed the adjacent embankment operation by more than one lift. At no time will the embankment adjacent to the retaining wall backfill exceed the wall backfill by any elevation.

The Engineer will define unsuitable material. Material which the Contractor might deem to be unsuitable due to moisture content will not be considered unsuitable material.

Prior to begin embankment of existing area, correct or replace unstable material to a depth of 6" below existing grade. Embankment areas will be inspected prior to beginning work.

Rock or broken concrete produced by the project is allowed in earth embankments. The size of the rock or broken concrete will not exceed the layer thickness requirements in Section 132.3.4., "Compaction Methods." The material will not be placed vertically within 5' of the finished subgrade elevation.

Embankment placed vertically within 5' of the finished subgrade elevation or within the edges of the subgrade and treated with lime, cement, or other calcium based additives must have a sulfate content less than 3000 ppm. Allow 5 business days for testing. Treatment of sulfate material 3000 ppm to 7000 ppm requires 7 days of mellowing and continuous water curing, in accordance TxDOT guidelines for Treatment of Sulfate-Rich Soils and Bases in Pavement Structures (9/2005). Material over 7000 ppm is not allowed.

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Highway: Brushy Creek Trail

ITEM 168 – VEGETATIVE WATERING
Water all areas of project to be seeded or sodded.

Maintain the seedbed in a condition favorable for the growth of grass. Watering can be postponed immediately after a rainfall on the site of ½ inch or greater, but will be resumed before the soil dries out. Continue watering until final acceptance.

Vegetative watering rates and quantities are based on ¼ inch of watering per week over a 3-month watering cycle. The actual rates used and paid for will be as directed and will be based on prevailing weather conditions to maintain the seedbed.

Obtain water at a source that is metered (furnish a current certification of the meter being used) or furnish the manufacturer's specifications showing the tank capacity for each truck used. Notify the Engineer, each day that watering takes place, before watering, so that meter readings or truck counts can be verified.

ITEM 204 – SPRINKLING
Apply water for dust control as directed. When dust control is not being maintained, cease operations until dust control is maintained. Consider subsidiary to the pertinent Items.

ITEM 216 - PROOF ROLLING
Correct and perform "Proof Rolling" retest at the Contractor's expense, to the satisfaction of the Engineer, when initial "Proof Rolling" yields a failing result.

ITEM 247 - FLEXIBLE BASE
The lift thickness will be 4" to 6" unless shown in the plans. When compacted in multiple lifts, the density of the bottom and middle lifts will be 95% and 98% of the maximum dry density, respectively.

Correction of subgrade soft spots is subsidiary.

Complete all subgrade, ditches, slopes, and place all drainage structures to conform to required lines, grades, and cross-sections, as shown and directed, prior to the placement of Flex Base.

Do not use a vibratory

ITEM 400 - EXCAVATION AND BACKFILL FOR STRUCTURES
Backfill the bridge ends in accordance with the limits shown on TxDOT "CSAB" Standard. Use material in accordance with "CSAB" or Item 423, Type BS. The "CSAB" optional bond breaker materials are allowed. This work is subsidiary.

ITEM 416 - DRILLED SHAFT FOUNDATIONS
Stake all Foundations, for approval, before beginning drilling operations.

Remove spoils from a flood plain at the end of each work day.

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GENERAL NOTES

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Project Number: STP1802(205)TP **Control:** 0914-05-191
County: Williamson
Highway: Brushy Creek Trail

ITEM - 420, 425, 441, & 462
Notify the Austin District Bridge Engineer prior to opening each phase of bridge or bridge class culvert construction to traffic. Notification is required for all new and modified structures.

ITEM 420 – CONCRETE SUBSTRUCTURES
Do not use PMDF in areas where a "Free Joint" is indicated in the plans.

Where Retaining Walls are integral parts of the abutment header, do not place the abutment cap prior to backfilling the wall and the abutment area up to the elevation of the bottom of the abutment cap.

Mass placements are defined as placements with a least dimension greater than or equal to 5 ft., or designated elsewhere on the plans.

The "H" values shown on Bridge Layouts are estimated column heights. Calculate the actual column heights based on field conditions.

Perform work during good weather unless otherwise directed. If work is performed at Contractor's option, when inclement weather is impending, and the work is damaged by the weather, the Contractor is responsible for all costs associated with repairs/replacement.

Upon completion of the structure, stencil the National Bridge Inventory (NBI) number (structure number) using black paint and 4" tall numbers at location designated. This work is subsidiary.

Bonding agents are required at construction joints. Do not use membrane curing for structural concrete as defined in Item 421, Table 8.

Remove all loose Formwork and other Materials from the floodplain or drainage areas daily.

ITEM 432 - RIPRAP
Mow strip riprap will be 4 in. and all other riprap will be 5 in. unless otherwise shown on the plans or in the pay items.

ITEM 502 - BARRICADES, SIGNS, AND TRAFFIC HANDLING
Cover, relocate or remove existing signs that conflict with traffic control. Install all permanent signs, delineation, and object markers required for the operation of the roadway before opening to traffic. Use of temporary mounts is allowed or may be required until the permanent mounts are installed or not impacted by construction. Maintain the temporary mounts. This work is subsidiary.

Place a 28-inch, reflectorized cone meeting requirements of BC (10)-14 on top of foundations that have protruding studs. This work is subsidiary.

ITEM 752 – TREE AND BRUSH REMOVAL
Prior to begin tree trimming, provide on-the-job training for employees performing the trimming to demonstrate proper work methods. TxDOT shall observe the training. This work is subsidiary.

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GENERAL NOTES

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Item No	Description	Unit	Quantity
	TRAFFIC CONTROL		
0502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	7
0506-6034	CONSTRUCTION PERIMETER FENCE	LF	1,102
	ROADWAY		
0100-6002	PREPARING ROW	STA	49
0110-6001	EXCAVATION (ROADWAY)	CY	879
0132-6004	EMBANKMENT (FINAL)(DENS CONT)(TY B)	CY	450
0161-6014	COMPOST MANUF TOPSOIL (BOS OR PB) (4")	SY	4,573
0164-6037	DRILL SEEDING (PERM) (URBAN) (SANDY)	SY	4,573
0168-6001	VEGETATIVE WATERING	MG	77
0169-6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY	4,573
0420-6011	CL B CONC (FLUME)	CY	5
0432-6022	RIPRAP (STONE COMMON) (DRY) (6 IN)	CY	949
0432-6025	RIPRAP (STONE COMMON) (DRY) (15 IN)	CY	40
0442-6007	STR STEEL (MISC NON - BRIDGE)	LB	2,625
0450-6052	RAIL (HANDRAIL) (TY F)	LF	175
0529-6015	CONC CURB (TY C1)	LF	209
0529-6018	CONC CURB (TY F3)	LF	175
0529-6027	CONC CURB (TY C2)	LF	281
0531-6001	CONC SIDEWALKS (4")	SY	3,950
0531-6003	CONC SIDEWALKS (6")	SY	887
	DRAINAGE		
0432-6002	RIPRAP (CONC)(5 IN)	CY	17
0459-6007	GABION MATTRESSES (GALV)(12 IN)	SY	24
	LANDSCAPING		
0100-6004	PREPARING ROW(TREE)(12" TO 24" DIA)	EA	40
1004-6001	TREE PROTECTION	EA	126
	SW3P		
0506-6003	ROCK FILTER DAMS (INSTALL) (TY 3)	LF	35
0506-6011	ROCK FILTER DAMS (REMOVE)	LF	35
0506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	224
0506-6024	CONSTRUCTION EXITS (REMOVE)	SY	224
0506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	4,616
0506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	4,616
0506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	156
0506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	156
	BOARDWALK		
WC4999-6001	PRECAST CONCRETE BOARDWALK SYSTEM	LS	1
	BRIDGE		
0400-6005	CEMENT STABILIZED BACKFILL	CY	36
0420-6013	CL C CONC (ABUT)	CY	25
0420-6039	CL C CONC (MASS) (COLUMN)	CY	42
0420-6045	CL C CONC (MASS) (FOOTING)	CY	45
0422-6001	REINF CONC SLAB (SLAB)	SF	134
4000-6003	PREFABRICATED PED STEEL TRUSS BRIDGE (120 FT)	EA	1

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BRUSHY CREEK TRAIL
ESTIMATE & QUANTITY

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 14

ROADWAY QUANTITIES

	ITEM	0100-6002	0110-6001	0132-6004	0161-6014	0164-6037	0168-6001	0169-6001
	SHEET	PREPARING ROW	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY B)	COMPOST MANUF TOPSOIL (BOS OR PB) (4")	DRILL SEEDING (PERM) (URBAN) (SANDY)	VEGETATIVE WATERING	SOIL RETENTION BLANKETS (CL 1) (TY A)
SHT NO		STA	CY	CY	SY	SY	MG	SY
35	PLAN & PROFILE (BEGIN PROJECT TO STA 214+00)	4	69		268	268	4.50	268
36	PLAN & PROFILE (STA 214+00 TO STA 219+00)	5	89	4	338	338	5.70	338
37	PLAN & PROFILE (STA 219+00 TO STA 224+00)	5	28	40	394	394	6.62	394
38	PLAN & PROFILE (STA 224+00 TO STA 229+00)	5						
39	PLAN & PROFILE (STA 229+00 TO STA 234+00)	5	62	65	642	642	10.81	642
40	PLAN & PROFILE (STA 234+00 TO STA 239+00)	5	104	176	925	925	15.57	925
41	PLAN & PROFILE (STA 239+00 TO STA 244+00)	5	244	108	844	844	14.20	844
42	PLAN & PROFILE (STA 244+00 TO STA 249+00)	5	137	30	403	403	6.79	403
43	PLAN & PROFILE (STA 249+00 TO STA 254+00)	5	63	8	238	238	4.00	238
44	PLAN & PROFILE (STA 254+00 TO END PROJECT)	5	83	19	522	522	8.79	522
	TOTALS	49	879	450	4573	4573	76.97	4573

	ITEM	0420-6011	0432-6022	0432-6025	0442-6007	0450-6052	0529-6015	0529-6018
	SHEET	CL B CONC (FLUME)	RIPRAP (STONE COMMON) (DRY) (6 IN)	RIRRAP (STONE COMMON) (DRY) (15 IN)	STR STEEL (MISC NON - BRIDGE)	RAIL (HANDRAIL) (TY F)	CONC CURB (TY C1)	CONC CURB (TY F3)
SHT NO		CY	CY	CY	LB	LF	LF	LF
35	PLAN & PROFILE (BEGIN PROJECT TO STA 214+00)							
36	PLAN & PROFILE (STA 214+00 TO STA 219+00)							
37	PLAN & PROFILE (STA 219+00 TO STA 224+00)		172					
38	PLAN & PROFILE (STA 224+00 TO STA 229+00)		327	40				
39	PLAN & PROFILE (STA 229+00 TO STA 234+00)		95					
40	PLAN & PROFILE (STA 234+00 TO STA 239+00)	4			1750		70	
41	PLAN & PROFILE (STA 239+00 TO STA 244+00)						139	
42	PLAN & PROFILE (STA 244+00 TO STA 249+00)	2	125		875			
43	PLAN & PROFILE (STA 249+00 TO STA 254+00)		220			91		91
44	PLAN & PROFILE (STA 254+00 TO END PROJECT)		10			84		84
	TOTALS	5	949	40	2625	175	209	175

	ITEM	0529-6027	0531-6001	0531-6003
	SHEET	CONC CURB (TY C2)	CONC SIDEWALKS (4")	CONC SIDEWALKS (6")
SHT NO		LF	SY	SY
35	PLAN & PROFILE (BEGIN PROJECT TO STA 214+00)		439	
36	PLAN & PROFILE (STA 214+00 TO STA 219+00)		556	
37	PLAN & PROFILE (STA 219+00 TO STA 224+00)		334	
38	PLAN & PROFILE (STA 224+00 TO STA 229+00)			
39	PLAN & PROFILE (STA 229+00 TO STA 234+00)		434	
40	PLAN & PROFILE (STA 234+00 TO STA 239+00)		529	93
41	PLAN & PROFILE (STA 239+00 TO STA 244+00)	118	271	343
42	PLAN & PROFILE (STA 244+00 TO STA 249+00)	163	213	217
43	PLAN & PROFILE (STA 249+00 TO STA 254+00)		183	122
44	PLAN & PROFILE (STA 254+00 TO END PROJECT)		991	112
	TOTALS	281	3950	887

DRAINAGE QUANTITIES

	ITEM	0432-6002	0459-6007
	DRAINAGE	RIPRAP (CONC) (5 IN)	GABION MATTRESSES (GALV) (12 IN)
SHT NO		CY	SY
58	DRAINAGE DETAILS	16.5	24
	TOTALS	16.5	24

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BRUSHY CREEK TRAIL
SUMMARY QUATITIES

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 15

LANDSCAPING QUANTITIES

	ITEM	0100-6004	1004-6001
	LANDSCAPE SUMMARY	PREPARING ROW(TREE)(12" TO 24" DIA)	TREE PROTECTION
SHT NO		EA	EA
79	LANDSCAPING	40	126
	TOTALS	40	126

SW3P QUANTITIES

	ITEM	0506-6003	0506-6011	0506-6020	0506-6024	0506-6038	0506-6039	0506-6041	0506-6043
	SW3P SUMMARY	ROCK FILTER DAMS (INSTALL) (TY 3)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
SHT NO		LF	LF	SY	SY	LF	LF	LF	LF
89	SW3P (STA 209+00 TO STA 219+00)			112	112	909	909		
90	SW3P (STA 219+00 TO STA 229+00)					914	914		
91	SW3P (STA 229+00 TO STA 239+00)					996	996		
92	SW3P (STA 239+00 TO STA 249+00)	35	35			826	826	156	156
93	SW3P (STA 249+00 TO END PROJECT)			112	112	971	971		
	TOTALS	35	35	224	224	4616	4616	156	156

TCP QUANTITIES

	ITEM	0502-6001	0506-6034
	SHEET	BARRICADES, SIGNS AND TRAFFIC HANDLING	CONSTRUCTION PERIMETER FENCE
SHT NO		MO	LF
21	TRAFFIC CONTROL PLAN	7	827
22	TRAFFIC CONTROL PLAN		275
	TOTALS	7	1102

BOARDWALK QUANTITIES

	ITEM	WC4999-6001
	BOARDWALK SUMMARY	PRECAST CONCRETE BOARDWALK SYSTEM
SHT NO		LS
50	BORADWALK PLAN	1.0
	TOTALS	1.0

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BRUSHY CREEK TRAIL
SUMMARY QUATITIES

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 16

SUMMARY OF BRIDGE ESTIMATED QUANTITIES ①

ITEM NO.	0400	0420	420	420	0422	4000
DESCRIPTION CODE	6005	6013	6039	6045	6001	
DESCRIPTION	CEMENT STABILIZED BACKFILL (BEHIND ABUTMENT)	CL C CONC (ABUT)	CL C CONC (MASS) (COLUMN)	CL C CONC (MASS) (FOOTING)	REINF CONC SLAB ② (SLAB)	PREFABRICATED PEDESTRIAN STEEL TRUSS BRIDGE EA
	CY	CY	CY	CY	SF	
ABUTMENT NO. 1	16.8	12.5	21.1	22.3		
ABUTMENT NO. 2	19.0	12.6	21.1	22.3		
120.250' PREFABRICATED PEDESTRIAN BRIDGE						1
PREFABRICATED PEDESTRIAN BRIDGE DECK ②					134.3	
TOTAL	35.8	25.1	42.2	44.6	134.3	1

① THE 2014 TXDOT "STANDARD SPECIFICATIONS FOR CONSTRUCTION OF HIGHWAYS, STREETS AND BRIDGES" AND THE LATEST SPECIAL PROVISIONS TO THE ITEMS OF WORK ARE HEREBY INCORPORATED INTO THIS PROJECT.

② THE COST OF A 6" CONCRETE DECK IS TO BE CONSIDERED SUBSIDIARY TO THE COST OF THE PREFABRICATED PEDESTRIAN STEEL TRUSS BRIDGE.

NOTES

1. THE 2014 EDITION OF TxDOT'S "STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS AND BRIDGES" AND THE LATEST SPECIAL PROVISIONS TO THE ITEMS OF WORK ARE HEREBY INCORPORATED INTO THIS PROJECT.
2. SPECIAL SPECIFICATION 4000 "PREFABRICATED PEDESTRIAN STEEL TRUSS BRIDGE SPAN" SHALL APPLY TO THIS PROJECT.
3. ELEVATION OF SELECTED BRIDGE SHOULD BE SIMILAR TO VIEW SHOWN ON LAYOUT. CONTRACTOR SHALL RECEIVE APPROVAL OF BRIDGE STYLE, COLOR OR FINISH FROM THE CITY OF SAN ANTONIO BEFORE A PREFABRICATED BRIDGE MANUFACTURER IS CHOSEN.
4. BACKWALL HEIGHT, WINGWALL HEIGHT, JOINT TYPE, ANCHOR BOLT NUMBER SIZE & LOCATION, CAP WIDTH, TOP OF CAP ELEVATIONS, AS WELL AS OTHER RELATED INFORMATION SHALL BE VERIFIED BY CONTRACTOR ONCE PREFABRICATED BRIDGE MANUFACTURE HAS BEEN CHOSEN.
5. THE BRIDGE DECK SHALL BE REINFORCED CONCRETE WITH A ROUGH BROOM FINISH.
6. EXPANSION JOINTS SELECTED SHALL CONSIDER ADA REQUIREMENTS.
7. ACCEPTABLE PREFABRICATED BRIDGE MANUFACTURES INCLUDE:
   a) CONTECH ENGINEERED SOLUTIONS, LLC
   b) OR APPROVED EQUAL
8. CONTRACTOR SHALL PROVIDE BEARINGS AS REQUIRED.
9. THE BRIDGE SUPERSTRUCTURE LOADING SHOWN HERE IN WAS USED FOR THE DESIGN OF THE ABUTMENTS. THE CONTRACTOR SHALL VERIFY THAT CHOSEN PREFABRICATED BRIDGE MANUFACTURER DOES NOT EXCEED THESE LOADS.

BRIDGE DESIGN ABUTMENT REACTIONS (KIPS)*			
LOAD	P	H	L
DEAD LOAD	51.28		
UNIFORM LIVE LOAD	47.25		
VEHICLE LOAD (H10)	10.00		
WIND UPLIFT (WINDWARD)	-17.25		
WIND UPLIFT (LEEWARD)	-6.00		
WIND VERTICAL	8.1		
WIND HORIZONTAL		22.31	
THERMAL			7.69

\+ DOWNWARD
\- UPWARD

* THE PEDESTRIAN BRIDGE LOADS ARE TRANSFERRED TO THE ABUTMENT THROUGH 4 REACTIONS 2 ON BOTH ENDS OF THE SPAN SPACED AT 14'-10" APART. THE LOADS PROVIDED ARE PER REACTION.

"P" = VERTICAL LOAD PER BASE PLATE (4 PER BRIDGE)

"H" = HORIZONTAL LOAD PER ABUTMENT (2 PER BRIDGE)

"L" = LONGITUDINAL LOAD PER BASE PLATE (4 PER BRIDGE)

STATE OF TEXAS
MELVIN K. LARA
91638
LICENSED
PROFESSIONAL ENGINEER

7-31-18

H10 AND PEDESTRIAN LOADING

REV. NO.	DATE	DESCRIPTION	BY

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
FIRM REGISTRATION NO. F-199

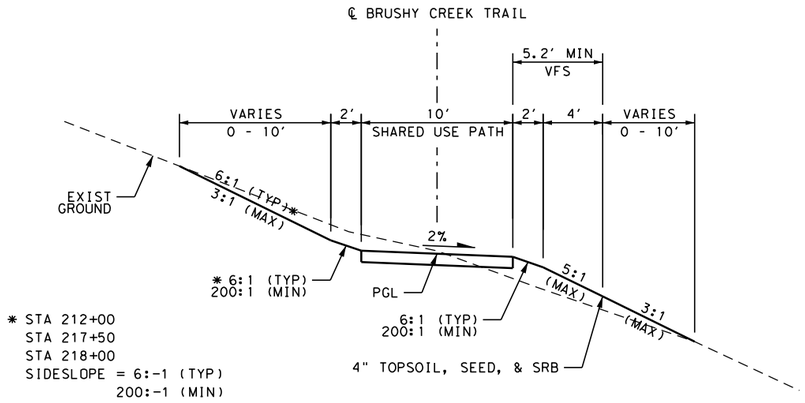
PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
7800 SHOAL CREEK BLVD, STE 220 W | AUSTIN, TX 78757 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL

SUMMARY OF QUANTITIES (BRIDGE)

SHEET 1 OF 1

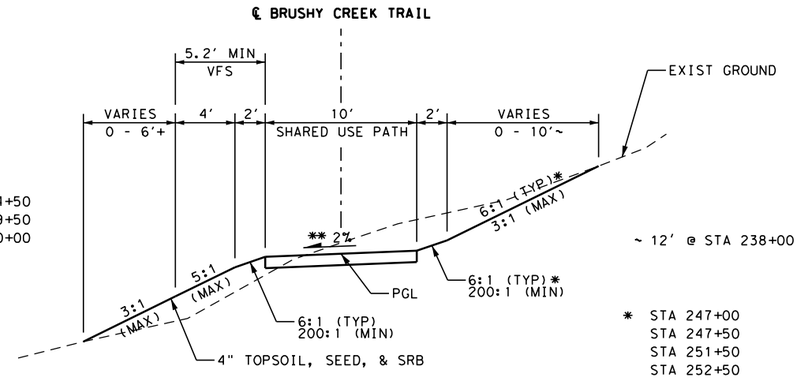
	PROJECT NO.: STP 1802 (205) TP		DATE: 7-27-18
DRWN.BY: AMH	DSGN.BY: MKL	CHKD.BY: AR	SHEET NO.: 17



* STA 212+00
STA 217+50
STA 218+00
SIDESLOPE = 6:-1 (TYP)
200:-1 (MIN)

BRUSHY CREEK TRAIL
TYPICAL SECTION

FROM BEGIN PROJECT TO STA 222+00
NTS



\+ 7' @ STA 234+50
8' @ STA 239+50
7' @ STA 240+00

~ 12' @ STA 238+00

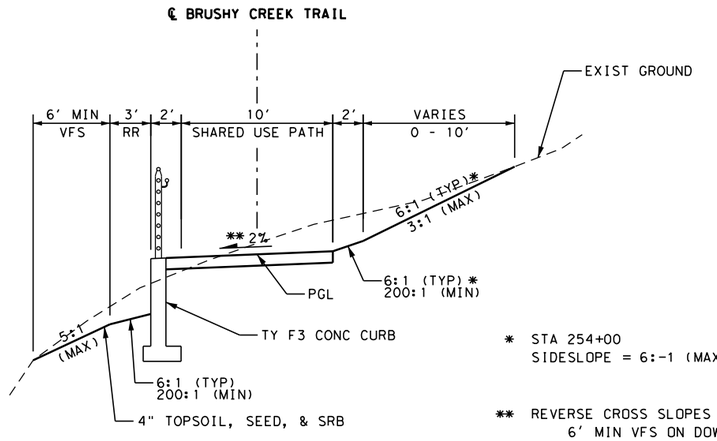
* STA 247+00
STA 247+50
STA 251+50
STA 252+50
SIDESLOPE = 6:-1 (MAX)
200:1 (MIN)

** REVERSE CROSS SLOPES (-2%) W/
5.2' MIN VFS ON DOWN STEAM SIDE
STA 252+70 TO 253+09

BRUSHY CREEK TRAIL
TYPICAL SECTION

FROM STA 233+10 TO 238+18
STA 238+88 TO 240+17
STA 241+56 TO 242+82
STA 245+63 TO 247+54
STA 251+44 TO 253+09
STA 254+84 TO END PROJECT
NTS

NOTES:
VFS - VEGETATIVE FILTER STRIP
SRB - SOIL RETENTION BLANKET
RR - ROCK RIPRAP

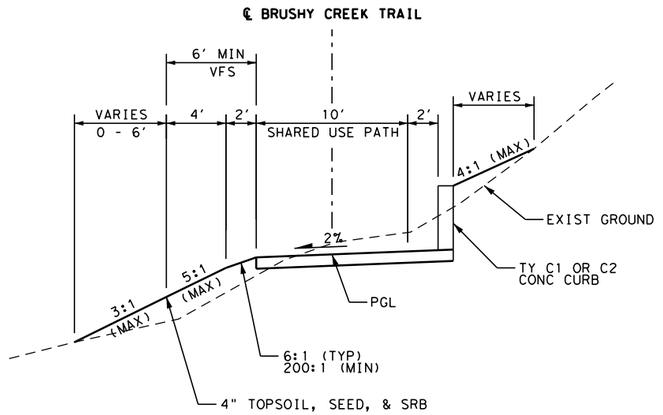


* STA 254+00
SIDESLOPE = 6:-1 (MAX)

** REVERSE CROSS SLOPES (-2%) W/
6' MIN VFS ON DOWN STEAM SIDE
STA 253+09 TO 253+60

BRUSHY CREEK TRAIL
TYPICAL SECTION

FROM STA 253+09 TO 254+84
NTS



BRUSHY CREEK TRAIL
TYPICAL SECTION

FROM STA 238+18 TO 238+88
STA 240+17 TO 241+56
STA 242+82 TO 245+63
NTS

DESIGN

STATE OF TEXAS
HEATHER McNEAL
114428
LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 7/30/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS
JAMES A. LUTZ
84722
LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 7/30/2018 DATE

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TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

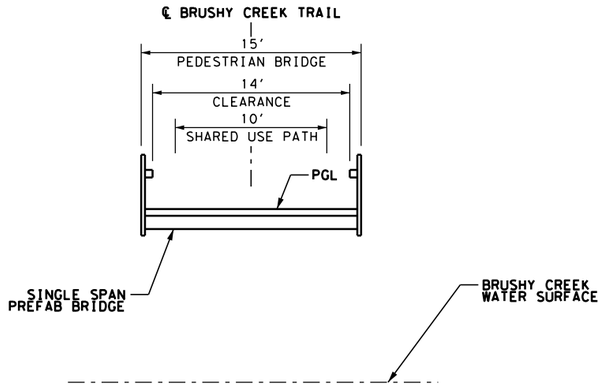
BRUSHY CREEK TRAIL
TYPICAL SECTIONS

SHEET 1 OF 2

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 7/30/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 18

Plotted on: 7/30/2018

Design Filename: H:\projects\508\67\00\design\Civil\General\5086700TYP01.dgn

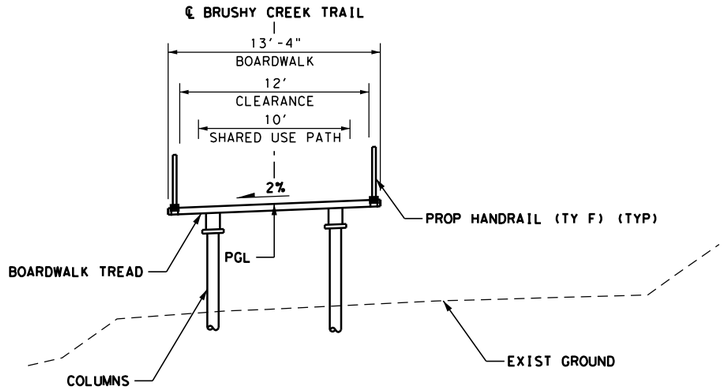


BRUSHY CREEK TRAIL
TYPICAL SECTION

FROM STA 225+10 TO STA 226+30

NTS

(SEE BRIDGE PLANS FOR DETAILED TYPICAL SECTION)



BRUSHY CREEK TRAIL
TYPICAL SECTION

FROM STA 222+00 TO STA 225+10
STA 226+30 TO STA 233+10
STA 247+54 TO STA 251+44

NTS

(SEE BOARDWALK PLANS FOR DETAILED TYPICAL SECTION)

DESIGN

STATE OF TEXAS
HEATHER McNEAL
114428
LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 7/30/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS
JAMES A. LUTZ
84722
LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 7/30/2018 DATE

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TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
TYPICAL SECTIONS

SHEET 2 OF 2

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 7/30/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 19

Plotted on: 7/30/2018

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DETOURS, BARRICADES, WARNING SIGNS, SEQUENCE OF WORK, ETC.

THE CONTRACTORS ATTENTION IS DIRECTED TO THE REQUIREMENTS OF ITEM 7, "LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC", OF THE STANDARD SPECIFICATIONS. IN ADDITION TO THESE REQUIREMENTS, THE FOLLOWING PROVISIONS SHALL ALSO GOVERN ON THIS CONTRACT:

GENERAL

1. TRAFFIC MUST BE HANDLED THROUGHOUT THE PROJECT DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING A SAFE AND COMFORTABLE PASSAGE FOR VEHICULAR AND PEDESTRIAN TRAFFIC WITH MINIMAL INCONVENIENCE TO THE PUBLIC, AS SHOWN IN THE PLANS OR AS DIRECTED/APPROVED BY THE ENGINEER.
2. THE CONTRACTOR MAY PROPOSE/RECOMMEND MODIFICATIONS TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE ENGINEER, ANY MAJOR RECOMMENDED MODIFICATION BY THE CONTRACTOR SHALL INCLUDE ANY CHANGES TO THE VARIOUS BID ITEMS, IMPACT TO TRAFFIC, EFFECT OF OVERALL PROJECT IN TIME AND COST, ETC. IF THIS PROPOSAL IS IMPLEMENTED, THE CONTRACTOR WILL BE RESPONSIBLE FOR DEVELOPING DETAILED PLAN SHEETS TO BE SEALED BY A LICENSED PROFESSIONAL ENGINEER FOR INCLUSION WITH THE CHANGE ORDER. THE CONTRACTOR CANNOT PROCEED WITH ANY CONSTRUCTION OPERATIONS BASED ON A REVISED PHASE/SEQUENCE UNTIL WRITTEN APPROVAL IS OBTAINED FROM THE ENGINEER. IF AT ANY TIME DURING CONSTRUCTION THE CONTRACTORS PROPOSED PLAN OF OPERATION FOR HANDLING TRAFFIC DOES NOT PROVIDE FOR SAFE AND COMFORTABLE MOVEMENT, THE CONTRACTOR WILL IMMEDIATELY CHANGE THEIR OPERATION TO CORRECT THE UNSATISFACTORY CONDITION.
3. DO NOT STORE ANY CONSTRUCTION MATERIAL OR EQUIPMENT AT ANY LOCATION THAT WILL CONSTITUTE A HAZARD AND WILL ENDANGER TRAFFIC.
4. THE CONTRACTOR WILL PROVIDE ADVANCE NOTIFICATION TO THE ENGINEER IMPENDING/UPCOMING LANE CLOSURES FOR ALL TEMPORARY AND/OR PERMANENT LANE, RAMP, CONNECTOR, FRONTAGE, SHOULDER, ETC. CLOSURES OR DETOURS. SEE GENERAL NOTES FOR NOTIFICATION REQUIREMENTS.
5. ACCESS TO ADJOINING PROPERTY MUST BE MAINTAINED AT ALL TIMES.
6. TEMPORARY DRAINAGE IS THE RESPONSIBILITY OF THE CONTRACTOR.
7. REMOVAL AND DISPOSAL OF EXISTING ABANDONED UTILITIES (EITHER PREVIOUSLY ABANDONED OR ABANDONED DURING THIS PROJECT) REQUIRED TO SUPPORT THIS PROJECT'S CONSTRUCTION SHALL BE PERFORMED UNDER THE OVERALL PREPARE RIGHT-OF-WAY ITEM (ITEM 100).
8. COORDINATE WITH ADJACENT PROJECTS.
9. COVER PERMANENT SIGNS IF NOT USED. THIS IS SUBSIDIARY TO ITEM 502.
10. EXCAVATION WITHIN 5 FEET OF AN EXISTING ELECTRIC ENERGY POLE WILL REQUIRE POLE BRACING.

SEQUENCE OF WORK

1. THIS PROJECT WILL BE CONSTRUCTED IN 2 PHASES. BEFORE THE COMMENCEMENT OF EACH PHASE, INSTALL ADVANCE WARNING SIGNS, TEMPORARY SIGNS AND BARRICADES AS SHOWN ON THE PLANS AND/OR AS DIRECTED/APPROVED BY THE ENGINEER.
2. PREPARING ROW/REMOVAL OF EXISTING ITEMS TO BE DONE ONLY IN AREAS WHERE WORK IS OCCURING, AS PER THE PHASES NOTED BELOW.
3. A BRIEF DESCRIPTION OF THESE PHASES ARE AS FOLLOWS:

<u>PHASE I CONSTRUCTION</u>:

CLEARING AND TESTING.

PHASE I:

1. PLACE PROJECT BARRICADES AND CONSTRUCTION FENCE AND INSTALL ADVANCE WARNING SIGNS. INSTALL TEMPORARY EROSION CONTROL MEASURES.
2. CLEAR PROJECT LIMITS AS INDICATED IN THE PLANS.
3. ONCE PROJECT IS CLEAR AND ACCESSIBLE, THE COUNTY WILL PROVIDE A GEOTECHNICAL ENGINEER TO COLLECT AND ANALYZE TEST HOLES AT THE ABUTMENTS, DRILL SHAFTS, AND RETAINING WALL LOCATIONS.
4. COMPLETE ALL PHASE I PRIOR TO STARTING ANY DRILL SHAFT WORK, UNLESS OTHERWISE ALLOWED BY THE ENGINEER.

<u>PHASE II CONSTRUCTION</u>:

CONSTRUCT PEDESTRIAN BRIDGE, BOARDWALK, AND SHARED USE PATH.

PHASE II:

1. INSTALL TEMPORARY EROSION CONTROL MEASURES.
2. CONSTRUCT BRIDGE ABUTMENTS, ASSEMBLE AND PLACE PEDESTRIAN BRIDGE PER PLANS.
3. CONSTRUCT DRILL SHAFTS AND ASSEMBLE BOARDWALK PER PLANS.
4. IF VOIDS ARE ENCOUNTERED DURING CONSTRUCTION, ALL WORK SHALL STOP UP TO 25 FEET FROM THE VOID SITE AND THE PROFESSIONAL GEOLOGIST (PG) SHALL PERFORM AN INITIAL GEOLOGIC ASSESSMENT. THE BUFFER DISTANCE MAY BE GREATER IF THE PG OR KARST BIOLOGIST DEEMS APPROPRIATE.
5. ONCE MAJOR CONSTRUCTION EQUIPMENT TRACKING IS CLEARING OF GROUND LEVEL PATH, PREPARE SUBGRADE FOR SHARED USE PATH AND INSTALL SIDEWALK PER PLANS.
6. PLACE TOPSOIL, SEEDING, AND SOIL RETENTION BLANKETS AND WATER PER PLANS.
7. COMPLETE FINAL CLEAN UP.

SAFETY

1. THE CONTRACTOR WILL PROVIDE, CONSTRUCT AND MAINTAIN BARRICADES AND SIGNS IN ACCORDANCE WITH STATE STANDARDS BC (1-12)-14. ANY SIGNS REQUIRED THAT ARE NOT DETAILED IN THE STANDARD SHEETS SHALL BE IN CONFORMANCE WITH THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" AND THE "STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS."
2. BARRICADES AND WARNING SIGNS SHALL BE PLACED AS INDICATED ON THE PLANS. THIS SHALL BE CONSIDERED THE MINIMUM REQUIRED TO PROVIDE FOR THE SAFETY OF TRAFFIC DURING CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN OTHER SUCH BARRICADES AND SIGNS DEEMED NECESSARY BY THE ENGINEER OR AS DIRECTED BY FIELD CONDITIONS.
3. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN FLAGGERS AS DIRECTED/APPROVED BY THE ENGINEER, AT SUCH POINTS, AND FOR SUCH PERIODS OF TIME AS MAY BE REQUIRED, TO PROVIDE FOR THE SAFETY OF THE TRAVELING PUBLIC AND THE CONTRACTORS PERSONNEL.
4. THE CONTRACTOR SHALL KEEP THE ROADWAY CLEAN AND FREE OF DIRT OR OTHER MATERIALS DURING HAULING OPERATIONS. IF THE CONTRACTOR DOES NOT MAINTAIN A CLEAN ROADWAY, THEY SHALL CEASE ALL CONSTRUCTION OPERATIONS, WHEN DIRECTED BY THE ENGINEER, TO CLEAN THE ROADWAY TO THE SATISFACTION OF THE ENGINEER.

HAULING EQUIPMENT

1. THE USE OF RUBBER-TIRED EQUIPMENT WILL BE REQUIRED FOR MOVING DIRT OR OTHER MATERIALS ALONG OR ACROSS PAVEMENTED SURFACES. WHERE THE CONTRACTOR DESIRES TO MOVE ANY EQUIPMENT NOT LICENSED FOR OPERATION ON PUBLIC HIGHWAYS, ON OR ACROSS PAVEMENT, THEY SHALL PROTECT THE PAVEMENT FROM DAMAGE AS DIRECTED/APPROVED BY THE ENGINEER.
2. THROUGHOUT CONSTRUCTION OPERATIONS, THE CONTRACTOR WILL BE REQUIRED TO CONDUCT THEIR HAULING OPERATIONS IN A MANNER SUCH THAT VEHICLES WILL NOT HAUL OVER PREVIOUSLY RECOMPACTED SUBGRADE OR COMPACTED BASE MATERIAL, EXCEPT IN SHORT SECTIONS FOR DUMPING MANIPULATIONS.

FINAL CLEAN UP

UPON COMPLETION OF THE WORK AND BEFORE FINAL ACCEPTANCE AND FINAL PAYMENT IS MADE, THE CONTRACTOR SHALL CLEAR AND REMOVE FROM THE SITE ALL SURPLUS AND DISCARDED MATERIALS AND DEBRIS OF EVERY KIND AND LEAVE THE ENTIRE PROJECT IN A SMOOTH, NEAT AND SIGHTLY CONDITION.

PAYMENT

ALL BARRICADES, SIGNS, AND FLAGGERS SHALL BE SUBSIDIARY TO ITEM 502 BARRICADES, SIGNS AND TRAFFIC HANDLING. ALL EROSION AND SEDIMENT CONTROL DEVICES WILL BE PAID FOR UNDER ITEM 506 TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS. ALL OTHER WORK AND MATERIALS SHALL BE SUBSIDIARY TO THE VARIOUS BID ITEMS UNLESS OTHERWISE INDICATED IN THE PLANS.

DESIGN

STATE OF TEXAS · HEATHER McNEAL · 114428 · LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 8/3/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS · JAMES A. LUTZ · 84722 · LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 8/3/2018 DATE

PAPE-DAWSON ENGINEERS
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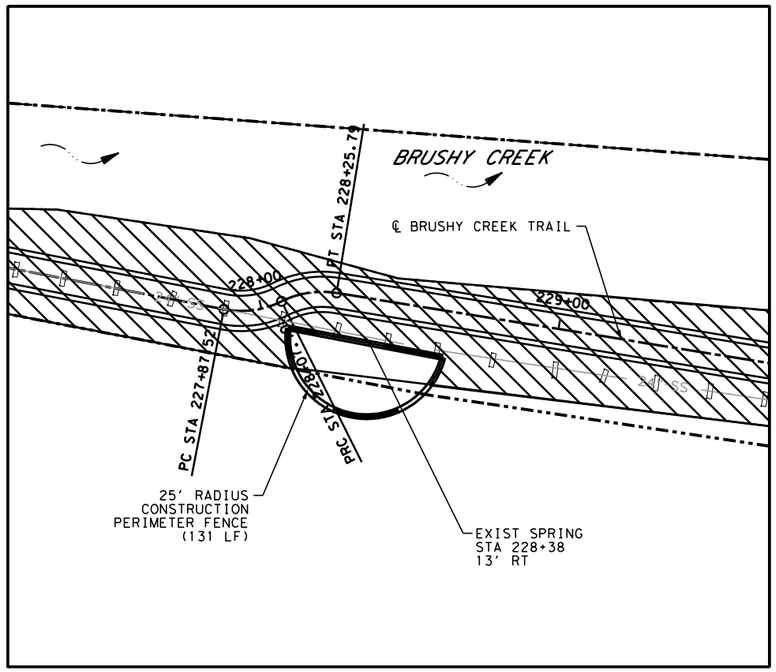
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

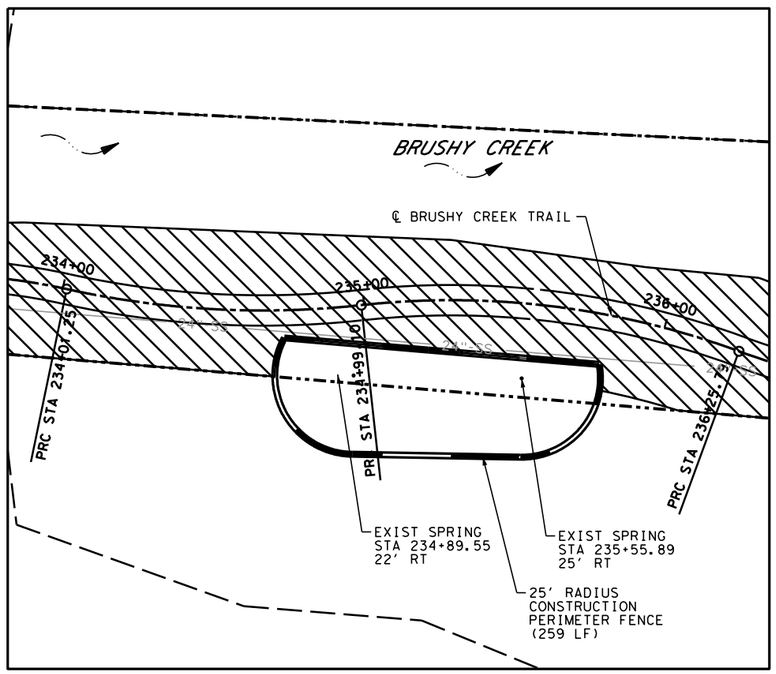
BRUSHY CREEK TRAIL
TCP NARRATIVE

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 20

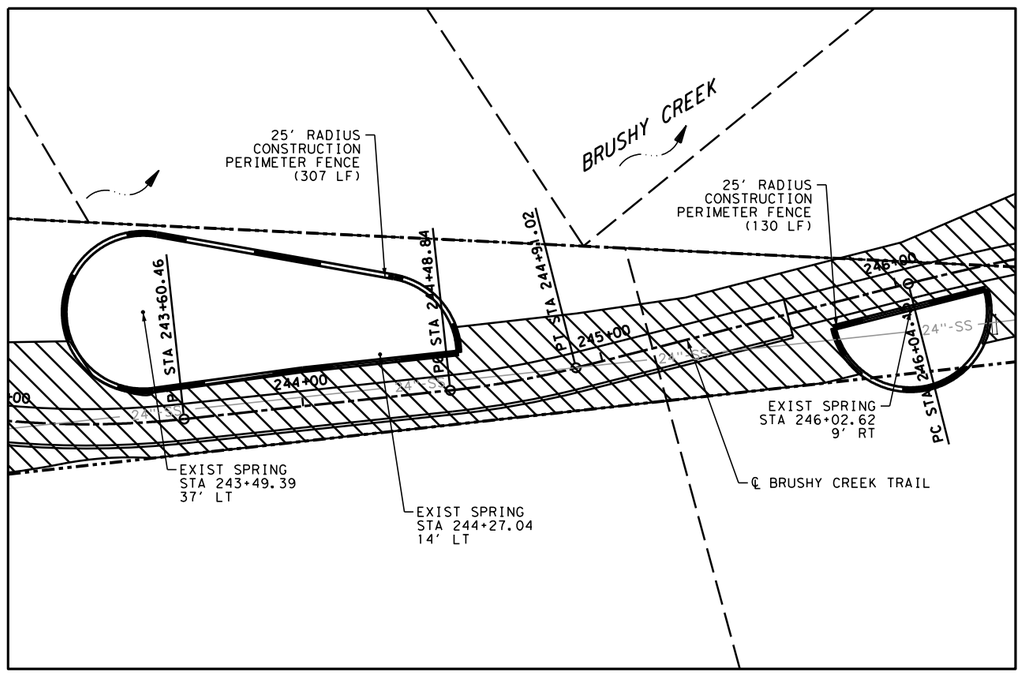
ITEM	DESCRIPTION	UNIT	QTY
0502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	7
0506-6034	CONSTRUCTION PERIMETER FENCE	LF	827



TRAFFIC CONTROL PLAN
STA 227+15 TO 229+70



TRAFFIC CONTROL PLAN
STA 233+82 TO 236+36



TRAFFIC CONTROL PLAN
STA 243+02 TO STA 246+40

TCP LEGEND

- CONSTR. PERIMETER FENCE
- TY 3 BARRICADE
- WORK ZONE AREA
- CREEK FLOW DIRECTION
- PROPERTY LINE
- LIMITS OF CONSTRUCTION

DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 8/3/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 8/3/2018 DATE

SCALE: 1"= 50'

PAPE-DAWSON ENGINEERS

AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS

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TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
TRAFFIC CONTROL PLAN

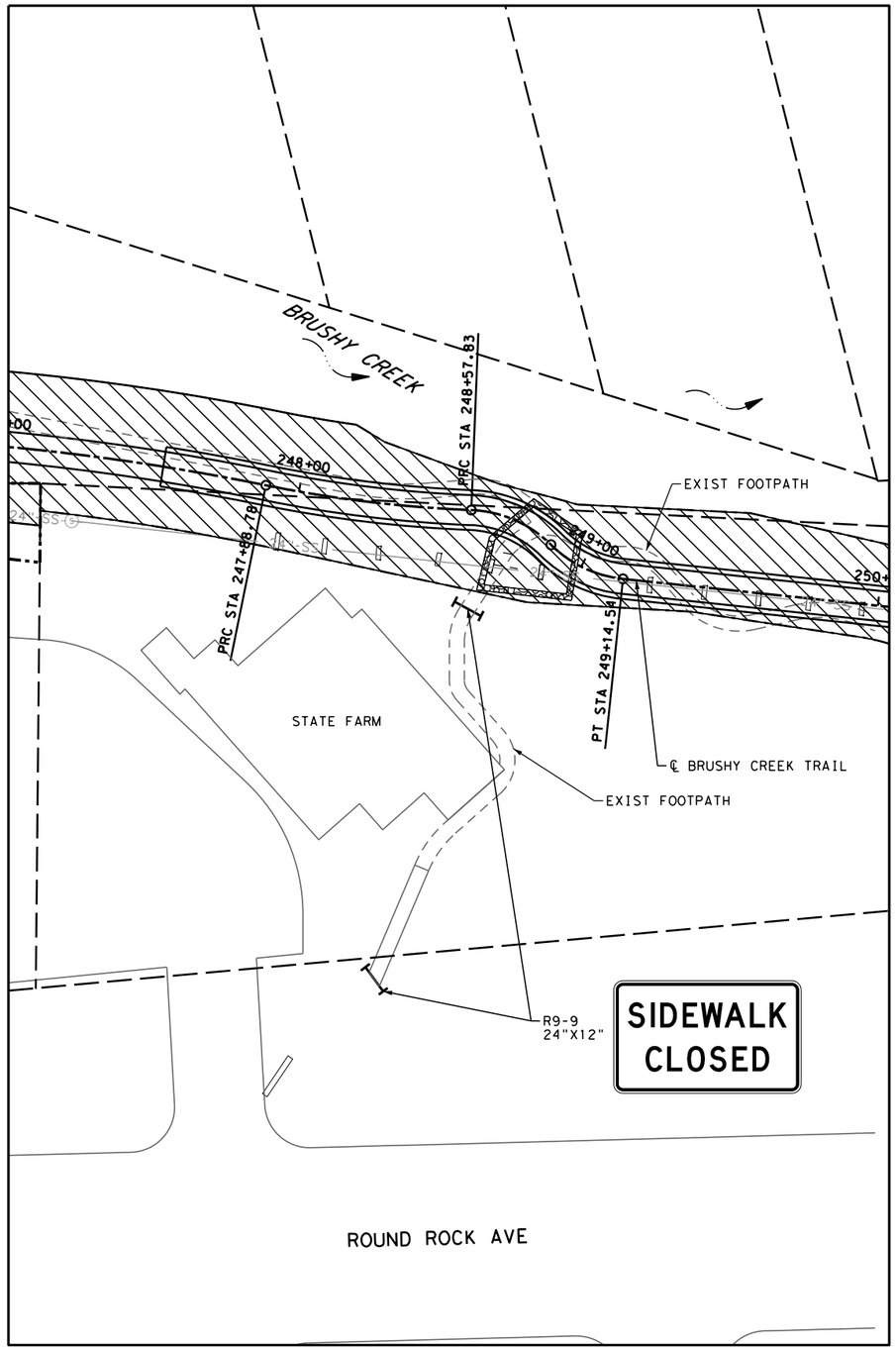
SHEET 1 OF 2

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 21

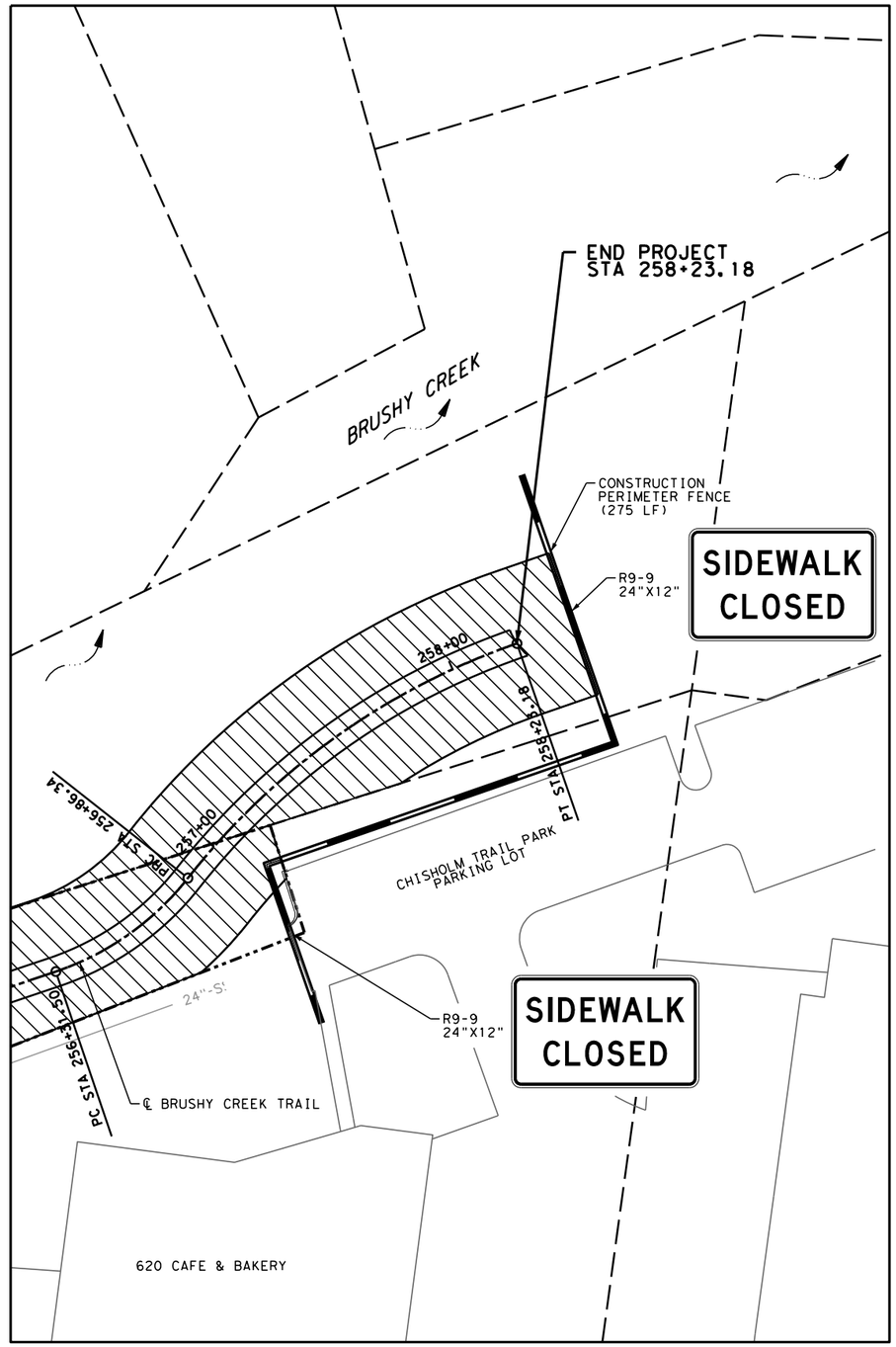
Plotted on: 8/3/2018

Design Filename: H:\projects\508\67\00\design\Civil\TCP\5086700_TCP01.dgn

ITEM	DESCRIPTION	UNIT	QTY
0506-6034	CONSTRUCTION PERIMETER FENCE	LF	275



TRAFFIC CONTROL PLAN
STA 247+02 TO 250+04



TRAFFIC CONTROL PLAN
STA 256+17 TO END PROJECT

N

TCP LEGEND

- CONSTR. PERIMETER FENCE
- TY 3 BARRICADE
- WORK ZONE AREA
- CREEK FLOW DIRECTION
- PROPERTY LINE
- LIMITS OF CONSTRUCTION

DESIGN

STATE OF TEXAS
HEATHER McNEAL
114428
LICENSED
PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 7/30/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS
JAMES A. LUTZ
84722
LICENSED
PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 7/30/2018 DATE

SCALE: 1"= 50'

PAPE-DAWSON ENGINEERS
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TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
TRAFFIC CONTROL PLAN

SHEET 2 OF 2

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 7/30/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 22

Plotted on: 7/30/2018

Design Filename: H:\projects\508\67\00\design\Civil\TCP\5086700_TCP02.dgn

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).

2. The development and design of the Traffic Control Plan (TCP)is the responsibility of the Engineer.

3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.

4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.

5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.

6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.

7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.

8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.

10. As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.

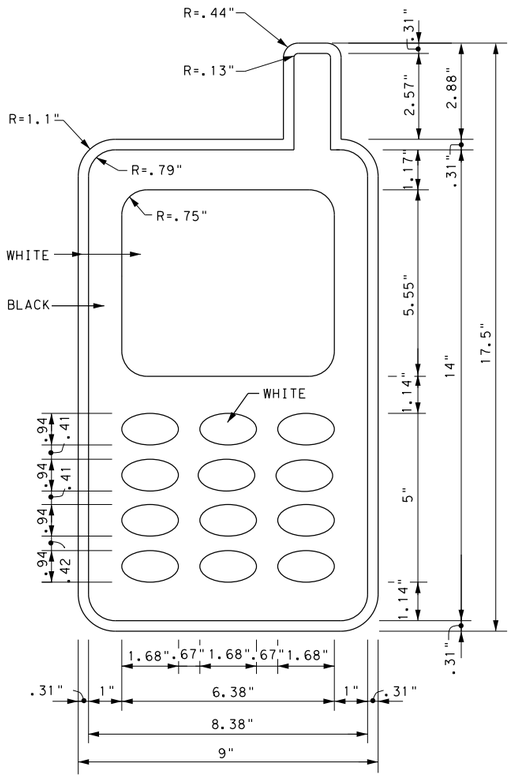
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

12. The Engineer has the final decision on the location of all traffic control devices.

13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY APPAREL NOTES:

1. Workers on foot who are exposed to traffic or to construction equipment within the right-of-way shall wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel," or equivalent revisions, and labeled as ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. Class 3 garments should be considered for high traffic volume work areas or night time work.



3.0" Radius, 1.25" Border, 0.75" Indent, Black on Yellow;
[STAY ALERT] Font: D
3.0" Radius, 1.25" Border, 0.75" Indent, Black on Orange;
[TALK OR TEXT LATER] Font: C specified length;

SIGN DETAIL (G20-10T)

Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found on-line at the web address given below or by contacting:

Texas Department of Transportation
Traffic Operations Division - TE
Phone (512) 416-3118

THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)
TRAFFIC ENGINEERING STANDARD SHEETS

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	191	NA
4-03 5-10 8-14	DIST	COUNTY		SHEET NO.
9-07 7-13	AUS	WILLIAMSON		23

DATE: 7/30/2018 2:29:46 PM
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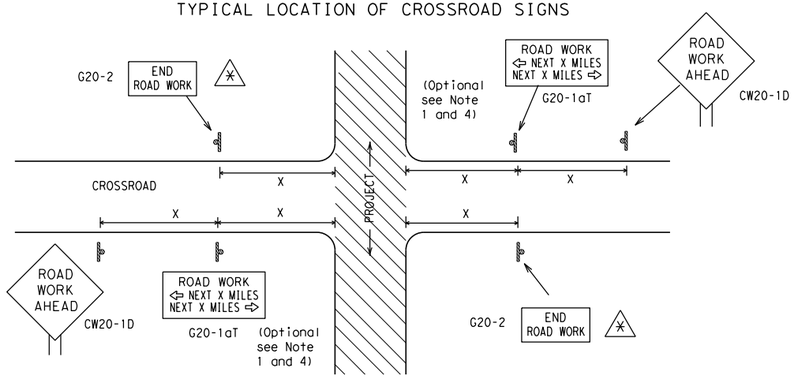
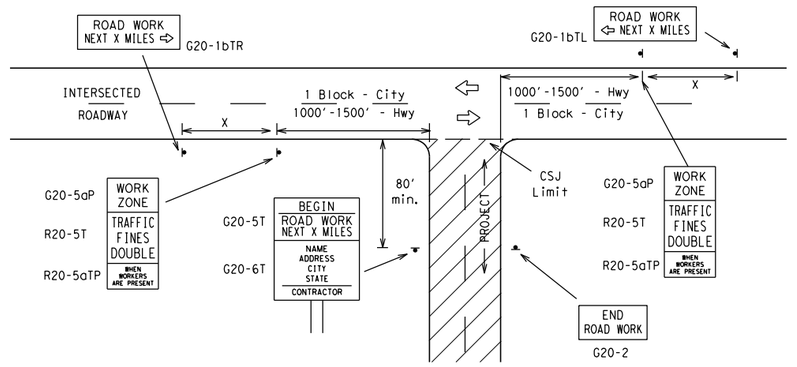
TYPICAL LOCATION OF CROSSROAD SIGNS



✳ May be mounted on back of "ROAD WORK AHEAD"(CW20-1D) sign with approval of Engineer. (See note 2 below)

1. The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D)sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
2. The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK"(G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume. This information shall be shown in the plans.
3. Based on existing field conditions, the Engineer/Inspector may require additional signs such as FLAGGER AHEAD, LOOSE GRAVEL, or other appropriate signs. When additional signs are required, these signs will be considered part of the minimum requirements. The Engineer/Inspector will determine the proper location and spacing of any sign not shown on the BC sheets, Traffic Control Plan sheets or the Work Zone Standard Sheets.
4. The "ROAD WORK NEXT X MILES"(G20-1aT)sign shall be required at high volume crossroads to advise motorists of the length of construction in either direction from the intersection. The Engineer will determine whether a roadway is considered high volume.
5. Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
6. When work occurs in the intersection area, appropriate traffic control devices, as shown elsewhere in the plans or as determined by the Engineer/Inspector, shall be in place.

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

1. The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at or near an intersection.
2. If construction closes the road at a T-intersection the Contractor shall place the "CONTRACTOR NAME"(G20-6T) sign behind the Type 3 Barricades for the road closure (see BC(10) also). The "ROAD WORK NEXT X MILES" left arrow(G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR)" signs shall be replaced by the detour signing called for in the plans.

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING[1,5,6]

SIZE			SPACING	
Sign Number or Series	Conventional Road	Expressway/ Freeway	Posted Speed	Sign Spacing "X" △
			MPH	Feet (Apprx.)
CW20[4] CW21 CW22 CW23 CW25	48" x 48"	48" x 48"	30	120
			35	160
			40	240
			45	320
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"	50	400
			55	500[2]
			60	600[2]
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"	65	700[2]
			70	800[2]
			75	900[2]
			80	1000[2]
			✳	✳ [3]

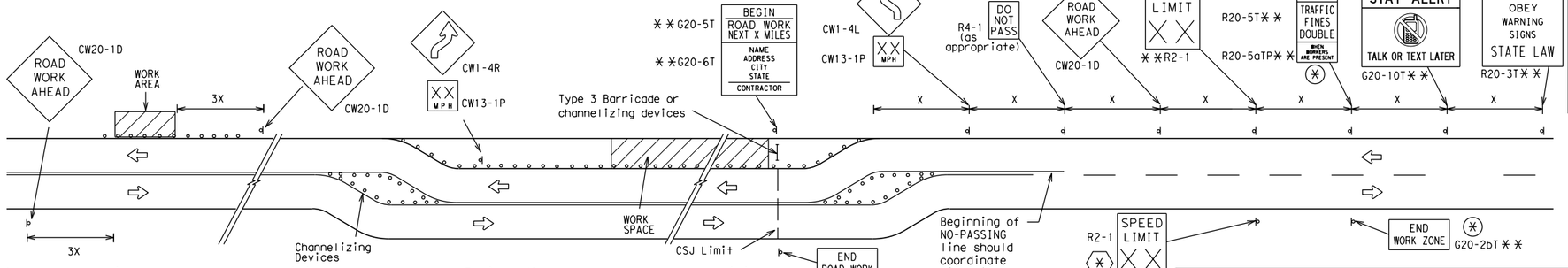
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

GENERAL NOTES

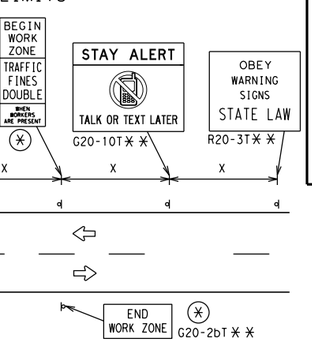
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may be used on low volume crossroads at the discretion of the Engineer. See Note 2 under "Typical Location of Crossroad Signs".
5. Only diamond shaped warning sign sizes are indicated.
6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

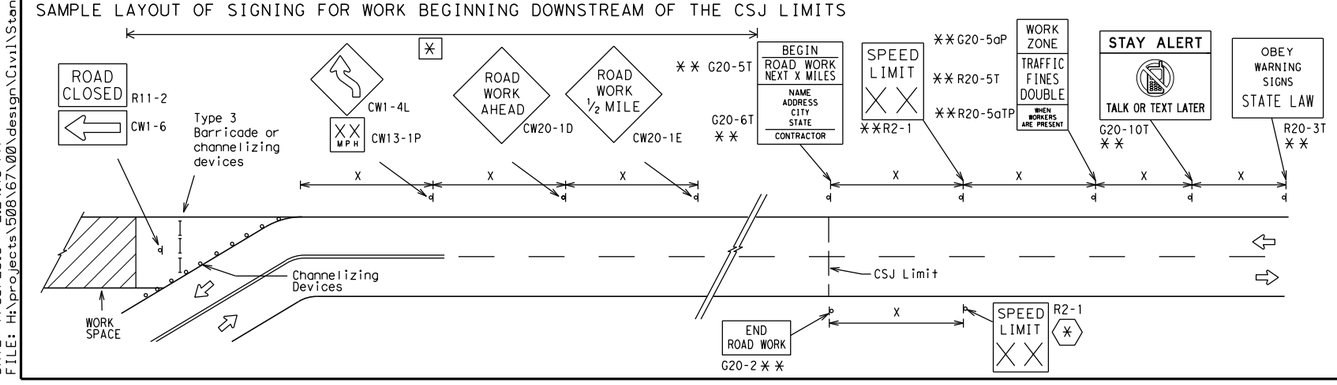


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing of signs and channelizing devices.

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING DOWNSTREAM OF THE CSJ LIMITS



NOTES

The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES"(G20-5T)sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.

(✳) The "BEGIN WORK ZONE"(G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.

✳✳ Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.

[✳] Area for placement of "ROAD WORK AHEAD" (CW20-1D)sign and other signs or devices as called for on the Traffic Control Plan.

(✳) Contractor will install a regulatory speed limit sign at the end of the work zone.

LEGEND	
⊢⊣	Type 3 Barricade
○ ○ ○	Channelizing Devices
▬●	Sign
X	See Typical Construction Warning Sign Size and Spacing chart or the TMUTCD for sign spacing requirements.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	AUS	WILLIAMSON		24

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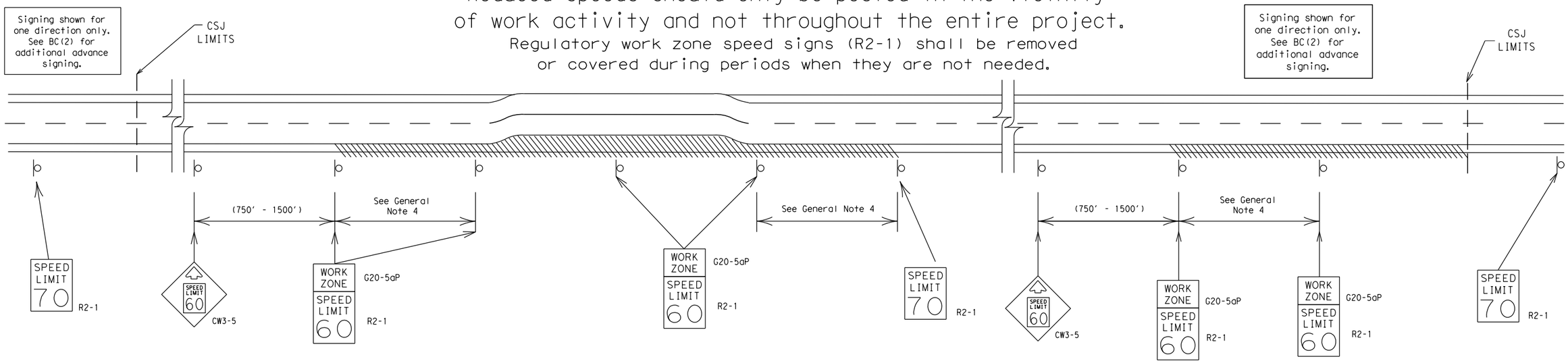
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

Work zone speed limits shall be regulatory, established in accordance with the "Procedures for Establishing Speed Zones," and approved by the Texas Transportation Commission, or by City Ordinance when within Incorporated City Limits.

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.

Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit should be included on the design of the traffic control plans when restricted geometrics with a lower design speed are present in the work zone and modification of the geometrics to a higher design speed is not feasible.

Long/Intermediate Term Work Zone Speed Limit signs, when approved as described above, should be posted and visible to the motorist when work activity is present. Work activity may also be defined as a change in the roadway that requires a reduced speed for motorists to safely negotiate the work area, including:

a) rough road or damaged pavement surface
b) substantial alteration of roadway geometrics (diversions)
c) construction detours
d) grade
e) width
f) other conditions readily apparent to the driver

As long as any of these conditions exist, the work zone speed limit signs should remain in place.

SHORT TERM WORK ZONE SPEED LIMITS

This type of work zone speed limit may be included on the design of the traffic control plans when workers or equipment are not behind concrete barrier, when work activity is within 10 feet of the traveled way or actually in the travelled way.

Short Term Work Zone Speed Limit signs should be posted and visible to the motorists only when work activity is present. When work activity is not present, signs shall be removed or covered.
(See Removing or Covering on BC(4)).

GENERAL NOTES

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. Frequency of work zone speed limit signs should be:
   40 mph and greater 0.2 to 2 miles
   35 mph and less 0.2 to 1 mile
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. Fabrication, erection and maintenance of the"ADVANCE SPEED LIMIT"(CW3-5)sign, "WORK ZONE"(G20-5aP) plaque and the "SPEED LIMIT"(R2-1)signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Techniques that may help reduce traffic speeds include but are not limited to:
   A. Law enforcement.
   B. Flagger stationed next to sign.
   C. Portable changeable message sign (PCMS).
   D. Low-power (drone) radar transmitter.
   E. Speed monitor trailers or signs.
9. Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
10. For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

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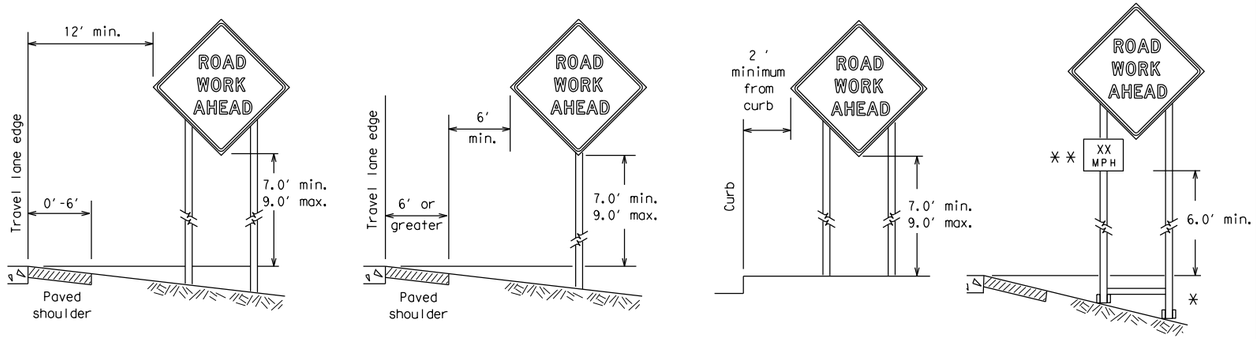
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		25

97

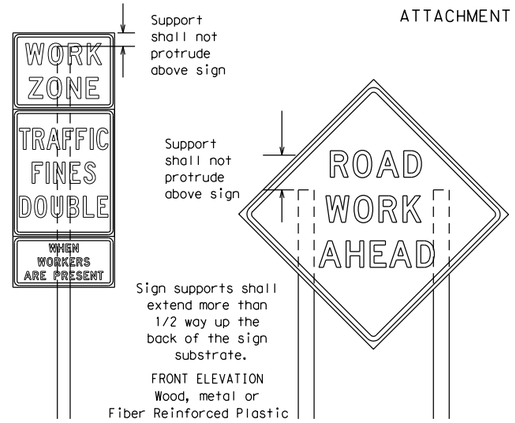
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

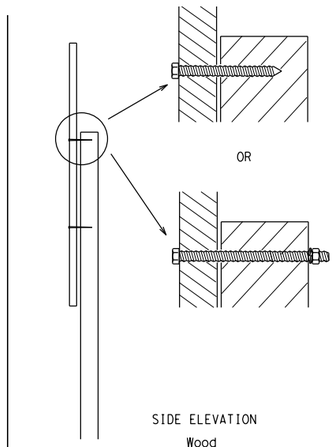
⁎⁎ When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

ATTACHMENT FOR SIGN SUPPORTS



FRONT ELEVATION
Wood, metal or Fiber Reinforced Plastic

Splicing embedded perforated square metal tubing in order to extend post height will only be allowed when the splice is made using four bolts, two above and two below the spice point. Splice must be located entirely behind the sign substrate, not near the base of the support. Splice insert lengths should be at least 5 times nominal post size, centered on the splice and of at least the same gauge material.



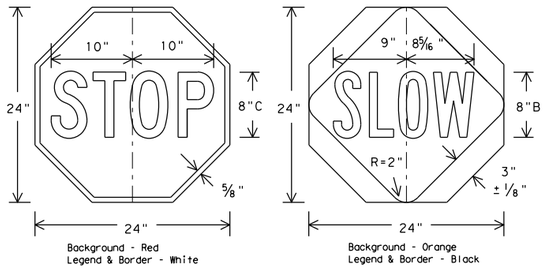
SIDE ELEVATION
Wood

Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

Nails shall NOT be allowed. Each sign shall be attached directly to the sign support. Multiple signs shall not be joined or spliced by any means. Wood supports shall not be extended or repaired by splicing or other means.

STOP/SLOW PADDLES

1. STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24" as detailed below.
2. When used at night, the STOP/SLOW paddle shall be retroreflectorized.
3. STOP/SLOW paddles may be attached to a staff with a minimum length of 6′ to the bottom of the sign.
4. Any lights incorporated into the STOP or SLOW paddle faces shall only be as specifically described in Section 6E.03 Hand Signaling Devices in the TMUTCD.



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

1. Permanent signs are used to give notice of traffic laws or regulations, call attention to conditions that are potentially hazardous to traffic operations, show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, or cultural information. Drivers proceeding through a work zone need the same, if not better route guidance as normally installed on a roadway without construction.
2. When permanent regulatory or warning signs conflict with work zone conditions, remove or cover the permanent signs until the permanent sign message matches the roadway condition.
3. When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
4. If existing signs are to be relocated on their original supports, they shall be installed on crashworthy bases as shown on the SMD Standard sheets. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards. This work should be paid for under the appropriate pay item for relocating existing signs.
5. If permanent signs are to be removed and relocated using temporary supports, the Contractor shall use crashworthy supports as shown on the BC sheets or the CWZTCD. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
6. Any sign or traffic control device that is struck or damaged by the Contractor or his/her construction equipment shall be replaced as soon as possible by the Contractor to ensure proper guidance for the motorists. This will be subsidiary to Item 502.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
5. The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
6. The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD). The Contractor shall install the sign support in accordance with the manufacturer's recommendations. If there is a question regarding installation procedures, the Contractor shall furnish the Engineer a copy of the manufacturer's installation recommendations so the Engineer can verify the correct procedures are being followed.
7. The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
8. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
9. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

DURATION OF WORK (as defined by the "Texas Manual on Uniform Traffic Control Devices" Part 6)

1. The types of sign supports, sign mounting height, the size of signs, and the type of sign substrates can vary based on the type of work being performed. The Engineer is responsible for selecting the appropriate size sign for the type of work being performed. The Contractor is responsible for ensuring the sign support, sign mounting height and substrate meets manufacturer's recommendations in regard to crashworthiness and duration of work requirements.
   a. Long-term stationary - work that occupies a location more than 3 days.
   b. Intermediate-term stationary - work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than one hour.
   c. Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
   d. Short, duration - work that occupies a location up to 1 hour.
   e. Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

1. The bottom of Long-term/Intermediate-term signs shall be at least 7 feet, but not more than 9 feet, above the paved surface, except as shown for supplemental plaques mounted below other signs.
2. The bottom of Short-term/Short Duration signs shall be a minimum of 1 foot above the pavement surface but no more than 2 feet above the ground.
3. Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
4. Short-term/Short Duration signs shall be used only during daylight and shall be removed at the end of the workday or raised to appropriate Long-term/Intermediate sign height.
5. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

SIZE OF SIGNS

1. The Contractor shall furnish the sign sizes shown on BC (2) unless otherwise shown in the plans or as directed by the Engineer.

SIGN SUBSTRATES

1. The Contractor shall ensure the sign substrate is installed in accordance with the manufacturer's recommendations for the type of sign support that is being used. The CWZTCD lists each substrate that can be used on the different types and models of sign supports.
2. "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
3. All wooden individual sign panels fabricated from 2 or more pieces shall have one or more plywood cleat, 1/2" thick by 6" wide, fastened to the back of the sign and extending fully across the sign. The cleat shall be attached to the back of the sign using wood screws that do not penetrate the face of the sign panel. The screws shall be placed on both sides of the splice and spaced at 6" centers. The Engineer may approve other methods of splicing the sign face.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the color and retro-reflectivity requirements of DMS-8300 for rigid signs or DMS-8310 for roll-up signs. The web address for DMS specifications is shown on BC(1).
2. White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
3. Orange sheeting, meeting the requirements of DMS-8300 Type B_{FL} or Type C_{FL}, shall be used for rigid signs with orange backgrounds.

SIGN LETTERS

1. All sign letters and numbers shall be clear, and open rounded type uppercase alphabet letters as approved by the Federal Highway Administration (FHWA) and as published in the "Standard Highway Sign Design for Texas" manual. Signs, letters and numbers shall be of first class workmanship in accordance with Department Standards and Specifications.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
2. Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
3. Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
4. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
5. Burlap shall NOT be used to cover signs.
6. Duct tape or other adhesive material shall NOT be affixed to a sign face.
7. Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

1. Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
6. Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the CWZTCD list.
7. Sandbags shall only be placed along or laid over the base supports of the traffic control device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners. Sandbags shall be placed along the length of the skids to weigh down the sign support.
8. Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAGS ON SIGNS

1. Flags may be used to draw attention to warning signs. When used the flag shall be 16 inches square or larger and shall be orange or fluorescent red-orange in color. Flags shall not be allowed to cover any portion of the sign face.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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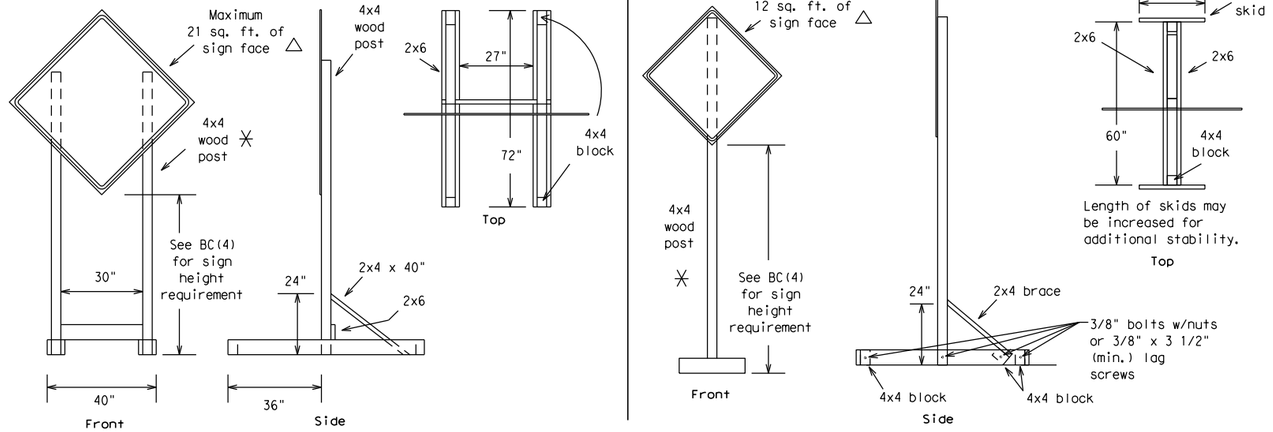
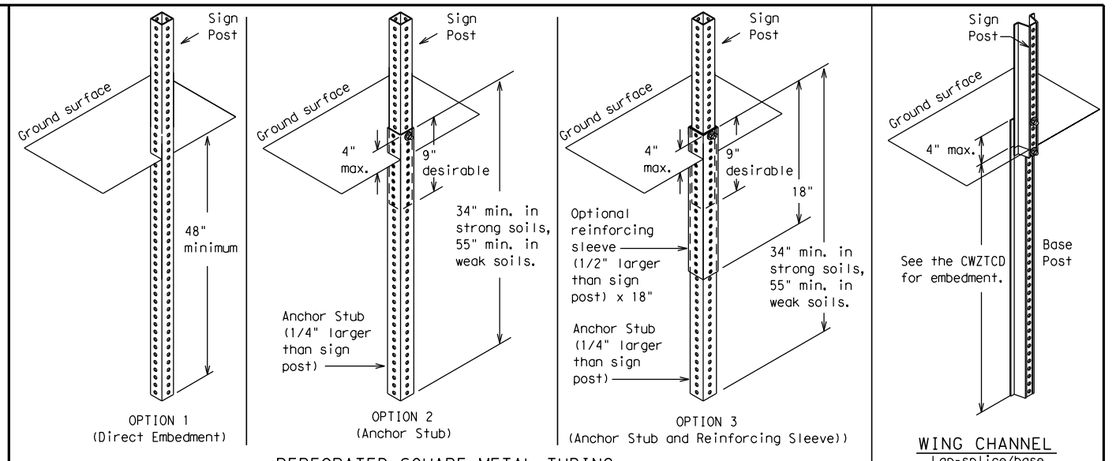


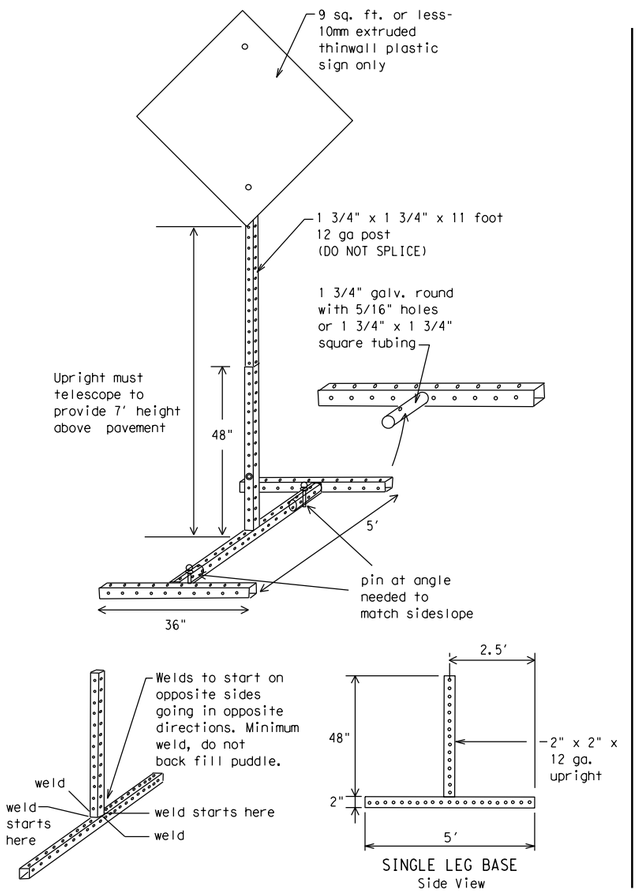
SKID MOUNTED WOOD SIGN SUPPORTS

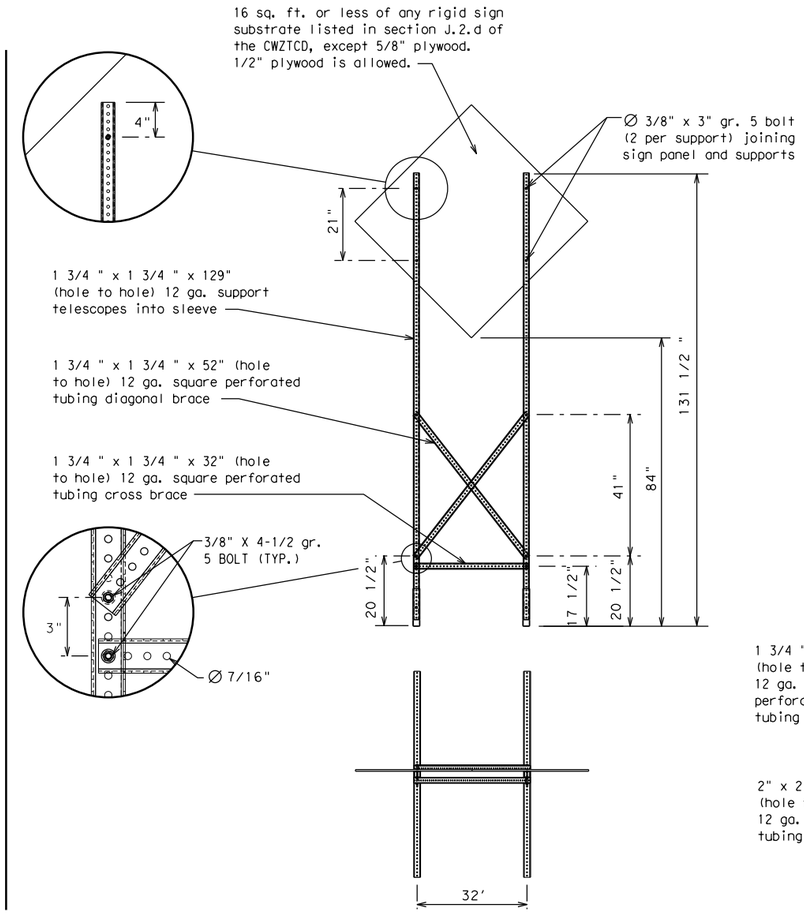
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □

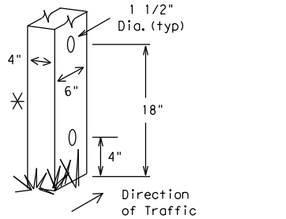


GROUND MOUNTED SIGN SUPPORTS

Refer to the CWZTCD and the manufacturer's installation procedure for each type sign support.
The maximum sign square footage shall adhere to the manufacturer's recommendation.
Two post installations can be used for larger signs.

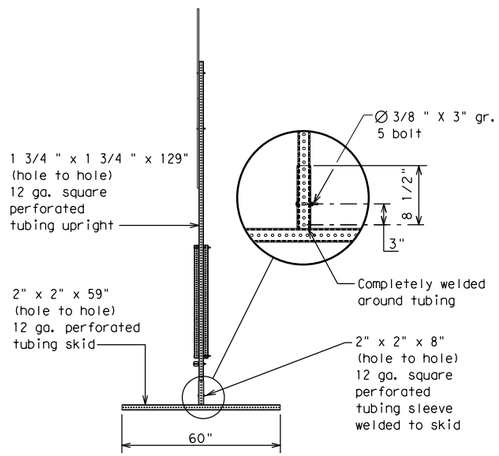






Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS



WEDGE ANCHORS

Both steel and plastic Wedge Anchor Systems as shown on the SMD Standard Sheets may be used as temporary sign supports for signs up to 10 square feet of sign face. They may be set in concrete or in sturdy soils if approved by the Engineer. (See web address for "Traffic Engineering Standard Sheets" on BC(1)).

OTHER DESIGNS

MORE DETAILS OF APPROVED LONG/INTERMEDIATE AND SHORT TERM SUPPORTS CAN BE FOUND ON THE CWZTCD LIST. SEE BC(1) FOR WEBSITE LOCATION.

GENERAL NOTES

1. Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
2. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
3. When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.

□ See BC(4) for definition of "Work Duration."

✳ Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.

△ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

SHEET 5 OF 12

Texas Department of Transportation — Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	191	NA
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	AUS	WILLIAMSON		27

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SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

1. The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
2. Messages on PCMS should contain no more than 8 words (about four to eight characters per word), not including simple words such as "TO," "FOR," "AT," etc.
3. Messages should consist of a single phase, or two phases that alternate. Three-phase messages are not allowed. Each phase of the message should convey a single thought, and must be understood by itself.
4. Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
5. Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
6. When in use the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
7. The message term "WEEKEND" should be used only if the work is to start on Saturday morning and end by Sunday evening at midnight. Actual days and hours of work should be displayed on the PCMS if work is to begin on Friday evening and/or continue into Monday morning.
8. The Engineer/Inspector may select one of two options which are available for displaying a two-phase message on a PCMS. Each phase may be displayed for either four seconds each or for three seconds each.
9. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
10. Do not present redundant information on a two-phase message; i.e., keeping two lines of the message the same and changing the third line.
11. Do not use the word "Danger" in message.
12. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
13. Do not display messages that scroll horizontally or vertically across the face of the sign.
14. The following table lists abbreviated words and two-word phrases that are acceptable for use on a PCMS. Both words in a phrase must be displayed together. Words or phrases not on this list should not be abbreviated, unless shown in the TMUTCD.
15. PCMS character height should be at least 18 inches for trailer mounted units. They should be visible from at least 1/2 (.5) mile and the text should be legible from at least 600 feet at night and 800 feet in daylight. Truck mounted units must have a character height of 10 inches and must be legible from at least 400 feet.
16. Each line of text should be centered on the message board rather than left or right justified.
17. If disabled, the PCMS should default to an illegible display that will not alarm motorists and will only be used to alert workers that the PCMS has malfunctioned. A pattern such as a series of horizontal solid bars is appropriate.

WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD
Alternate	ALT
Avenue	AVE
Best Route	BEST RTE
Boulevard	BLVD
Bridge	BRDG
Cannot	CANT
Center	CTR
Construction Ahead	CONST AHD
CROSSING	XING
Detour Route	DETOUR RTE
Do Not	DONT
East	E
Eastbound	(route) E
Emergency	EMER
Emergency Vehicle	EMER VEH
Entrance, Enter	ENT
Express Lane	EXP LN
Expressway	EXPWY
XXXX Feet	XXXX FT
Fog Ahead	FOG AHD
Freeway	FRWY, FWY
Freeway Blocked	FWY BLKD
Friday	FRI
Hazardous Driving	HAZ DRIVING
Hazardous Material	HAZMAT
High-Occupancy	HOV
Vehicle Highway	HWY
Hour(s)	HR, HRS
Information	INFO
It Is	ITS
Junction	JCT
Left	LFT
Left Lane	LFT LN
Lane Closed	LN CLOSED
Lower Level	LWR LEVEL
Maintenance	MAINT

WORD OR PHRASE	ABBREVIATION
Major	MAJ
Miles	MI
Miles Per Hour	MPH
Minor	MNR
Monday	MON
Normal	NORM
North	N
Northbound	(route) N
Parking	PKING
Road	RD
Right Lane	RT LN
Saturday	SAT
Service Road	SERV RD
Shoulder	SHLDR
Slippery	SLIP
South	S
Southbound	(route) S
Speed	SPD
Street	ST
Sunday	SUN
Telephone	PHONE
Temporary	TEMP
Thursday	THURS
To Downtown	TO DWNTN
Traffic	TRAF
Travelers	TRVLRS
Tuesday	TUES
Time Minutes	TIME MIN
Upper Level	UPR LEVEL
Vehicles (s)	VEH, VEHS
Warning	WARN
Wednesday	WED
Weight Limit	WT LIMIT
West	W
Westbound	(route) W
Wet Pavement	WET PVMT
Will Not	WONT

Roadway designation # IH-number, US-number, SH-number, FM-number

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

(The Engineer may approve other messages not specifically covered here.)

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

- FREEWAY CLOSED X MILE
- FRONTAGE ROAD CLOSED
- ROAD CLOSED AT SH XXX
- SHOULDER CLOSED XXX FT
- ROAD CLSD AT FM XXXX
- RIGHT LN CLOSED XXX FT
- RIGHT X LANES CLOSED
- RIGHT X LANES OPEN
- CENTER LANE CLOSED
- DAYTIME LANE CLOSURES
- NIGHT LANE CLOSURES
- I-XX SOUTH EXIT CLOSED
- VARIOUS LANES CLOSED
- EXIT XXX CLOSED X MILE
- EXIT CLOSED
- RIGHT LN TO BE CLOSED
- MALL DRIVEWAY CLOSED
- X LANES CLOSED TUE - FRI
- XXXXXXXX BLVD CLOSED

Other Condition List

- ROADWORK XXX FT
- ROAD REPAIRS XXXX FT
- FLAGGER XXXX FT
- LANE NARROWS XXXX FT
- RIGHT LN NARROWS XXXX FT
- TWO-WAY TRAFFIC XX MILE
- MERGING TRAFFIC XXXX FT
- CONST TRAFFIC XXX FT
- LOOSE GRAVEL XXXX FT
- UNEVEN LANES XXXX FT
- DETOUR X MILE
- ROUGH ROAD XXXX FT
- ROADWORK PAST SH XXXX
- ROADWORK NEXT FRI-SUN
- BUMP XXXX FT
- US XXX EXIT X MILES
- TRAFFIC SIGNAL XXXX FT
- LANES SHIFT *

* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

- MERGE RIGHT
- FORM X LINES RIGHT
- DETOUR NEXT X EXITS
- USE XXXXX RD EXIT
- USE EXIT XXX
- USE EXIT I-XX NORTH
- STAY ON US XXX SOUTH
- USE I-XX E TO I-XX N
- TRUCKS USE US XXX N
- WATCH FOR TRUCKS
- WATCH FOR TRUCKS
- EXPECT DELAYS
- EXPECT DELAYS
- PREPARE TO STOP
- REDUCE SPEED XXX FT
- END SHOULDER USE
- USE OTHER ROUTES
- WATCH FOR WORKERS
- STAY IN LANE *

Location List

- AT FM XXXX
- BEFORE RAILROAD CROSSING
- NEXT X MILES
- PAST US XXX EXIT
- XXXXXXX TO XXXXXXX
- US XXX TO FM XXXX

Warning List

- SPEED LIMIT XX MPH
- MAXIMUM SPEED XX MPH
- MINIMUM SPEED XX MPH
- ADVISORY SPEED XX MPH
- RIGHT LANE EXIT
- USE CAUTION
- DRIVE SAFELY
- DRIVE WITH CARE

** Advance Notice List

- TUE-FRI XX AM- X PM
- APR XX-XX X PM-X AM
- BEGINS MONDAY
- BEGINS MAY XX
- MAY X-X XX PM - XX AM
- NEXT FRI-SUN
- XX AM TO XX PM
- NEXT TUE AUG XX
- TONIGHT XX PM- XX AM

* LANES SHIFT in Phase 1 must be used with STAY IN LANE in Phase 2.

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

1. Only 1 or 2 phases are to be used on a PCMS.
2. The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
4. A Location Phase is necessary only if a distance or location is not included in the first phase selected.
5. If two PCMS are used in sequence, they must be separated by a minimum of 1000 ft. Each PCMS shall be limited to two phases, and should be understandable by themselves.
6. For advance notice, when the current date is within seven days of the actual work date, calendar days should be replaced with days of the week. Advance notification should typically be for no more than one week prior to the work.

WORDING ALTERNATIVES

1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
2. Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
3. EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
4. Highway names and numbers replaced as appropriate.
5. ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
6. AHEAD may be used instead of distances if necessary.
7. FT and MI, MILE and MILES interchanged as appropriate.
8. AT, BEFORE and PAST interchanged as needed.
9. Distances or AHEAD can be eliminated from the message if a location phase is used.

PCMS SIGNS WITHIN THE R.O.W. SHALL BE BEHIND GUARDRAIL OR CONCRETE BARRIER OR SHALL HAVE A MINIMUM OF FOUR (4) PLASTIC DRUMS PLACED PERPENDICULAR TO TRAFFIC ON THE UPSTREAM SIDE OF THE PCMS, WHEN EXPOSED TO ONE DIRECTION OF TRAFFIC. WHEN EXPOSED TO TWO WAY TRAFFIC, THE FOUR DRUMS SHOULD BE PLACED WITH ONE DRUM AT EACH OF THE FOUR CORNERS OF THE UNIT.

FULL MATRIX PCMS SIGNS

1. When Full Matrix PCMS signs are used, the character height and legibility/visibility requirements shall be maintained as listed in Note 15 under "PORTABLE CHANGEABLE MESSAGE SIGNS" above.
2. When symbol signs, such as the "Flagger Symbol"(CW20-7) are represented graphically on the Full Matrix PCMS sign and, with the approval of the Engineer, it shall maintain the legibility/visibility requirement listed above.
3. When symbol signs are represented graphically on the Full Matrix PCMS, they shall only supplement the use of the static sign represented, and shall not substitute for, or replace that sign.
4. A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

Texas Department of Transportation

Traffic Operations Division Standard

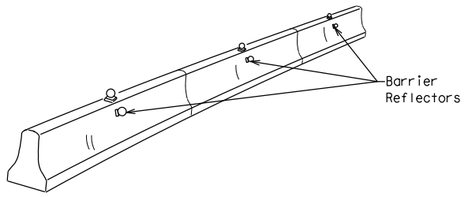
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	191	NA
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	AUS	WILLIAMSON		28

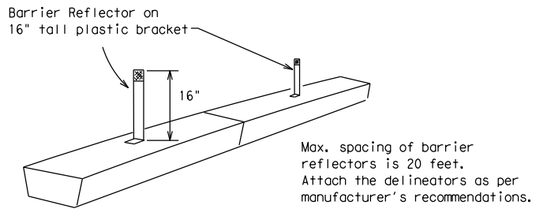
100

1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.

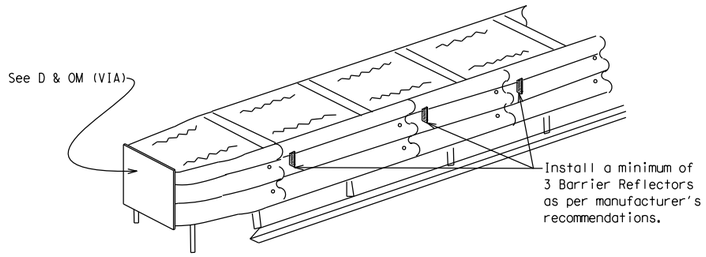


CONCRETE TRAFFIC BARRIER (CTB)

3. Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector. The Barrier Reflector mounted on the side of the CTB shall be located directly below the reflector mounted on top of the barrier, as shown in the detail above.
4. Where CTB separates two-way traffic, three barrier reflectors shall be mounted on each section of CTB. The reflector unit on top shall have two yellow reflective faces (Bi-Directional)while the reflectors on each side of the barrier shall have one yellow reflective face, as shown in the detail above.
5. When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
6. Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
7. Maximum spacing of Barrier Reflectors is forty (40) feet.
8. Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
9. Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
10. Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
11. Single slope barriers shall be delineated as shown on the above detail.



LOW PROFILE CONCRETE BARRIER (LPCB)

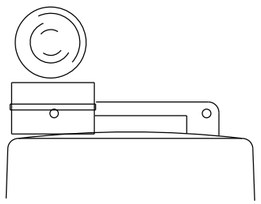


DELINEATION OF END TREATMENTS

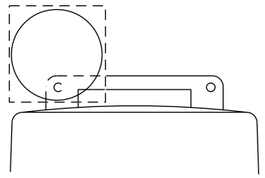
END TREATMENTS FOR
CTB'S USED
IN WORK ZONES

End treatments used on CTB's in work zones shall meet crashworthy standards as defined in the National Cooperative Highway Research Report 350. Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



Warning reflector may be round or square.Must have a yellow reflective surface area of at least 30 square inches

WARNING LIGHTS

1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B_{FL} or C_{FL} Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
4. Type-C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control devices. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "SB".
5. The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
6. When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.
7. When used to delineate curves, Type-C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
8. The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

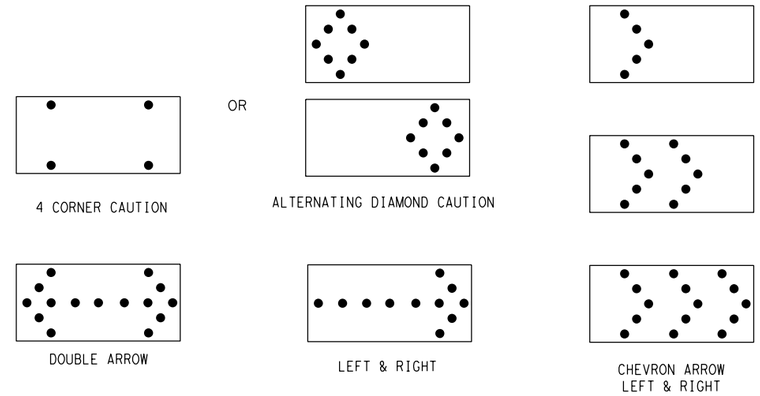
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing devices to form a merging taper may be used for delineation. If used, the successive flashing of the sequential warning lights should occur from the beginning of the taper to the end of the merging taper in order to identify the desired vehicle path. The rate of flashing for each light shall be 65 flashes per minute, plus or minus 10 flashes.
4. Type C and D steady-burn warning lights are intended to be used in a series to delineate the edge of the travel lane on detours, on lane changes, on lane closures, and on other similar conditions.
5. Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
6. Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
7. The maximum spacing for warning lights on drums should be identical to the channelizing device spacing.

WARNING REFLECTORS MOUNTED ON PLASTIC DRUMS AS A SUBSTITUTE FOR TYPE C (STEADY BURN) WARNING LIGHTS

1. A warning reflector or approved substitute may be mounted on a plastic drum as a substitute for a Type C, steady burn warning light at the discretion of the Contractor unless otherwise noted in the plans.
2. The warning reflector shall be yellow in color and shall be manufactured using a sign substrate approved for use with plastic drums listed on the CWZTCD.
3. The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
4. Round reflectors shall be fully reflectorized, including the area where attached to the drum.
5. Square substrates must have a minimum of 30 square inches of reflectorized sheeting. They do not have to be reflectorized where it attaches to the drum.
6. The side of the warning reflector facing approaching traffic shall have sheeting meeting the color and retroreflectivity requirements for DMS 8300-Type B or Type C.
7. When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
8. The warning reflector should be mounted on the side of the handle nearest approaching traffic.
9. The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.

Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

1. The Flashing Arrow Board should be used for all lane closures on multi-lane roadways, or slow moving maintenance or construction activities on the travel lanes.
2. Flashing Arrow Boards should not be used on two-lane, two-way roadways, detours, diversions or work on shoulders unless the "CAUTION" display (see detail below) is used.
3. The Engineer/Inspector shall choose all appropriate signs, barricades and/or other traffic control devices that should be used in conjunction with the Flashing Arrow Board.
4. The Flashing Arrow Board should be able to display the following symbols:



5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
6. The straight line caution display is NOT ALLOWED.
7. The Flashing Arrow Board shall be capable of minimum 50 percent dimming from rated lamp voltage. The flashing rate of the lamps shall not be less than 25 nor more than 40 flashes per minute.
8. Minimum lamp "on time" shall be approximately 50 percent for the flashing arrow and equal intervals of 25 percent for each sequential phase of the flashing chevron.
9. The sequential arrow display is NOT ALLOWED.
10. The flashing arrow display is the TxDOT standard; however, the sequential Chevron display may be used during daylight operations.
11. The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
12. A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
13. A full matrix PCMS may be used to simulate a Flashing Arrow Board provided it meets visibility, flash rate and dimming requirements on this sheet for the same size arrow.
14. Minimum mounting height of trailer mounted Arrow Boards should be 7 feet from roadway to bottom of panel.

REQUIREMENTS			
TYPE	MINIMUM SIZE	MINIMUM NUMBER OF PANEL LAMPS	MINIMUM VISIBILITY DISTANCE
B	30 x 60	13	3/4 mile
C	48 x 96	15	1 mile

ATTENTION
Flashing Arrow Boards shall be equipped with automatic dimming devices.

WHEN NOT IN USE, REMOVE THE ARROW BOARD FROM THE RIGHT-OF-WAY OR PLACE THE ARROW BOARD BEHIND CONCRETE TRAFFIC BARRIER OR GUARDRAIL.

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350) or the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR

BC(7)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	191	NA
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	AUS	WILLIAMSON		29

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GENERAL NOTES

1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
2. For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
3. For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
4. Drums and all related items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
5. Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
6. The Contractor shall have a maximum of 24 hours to replace any plastic drums identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

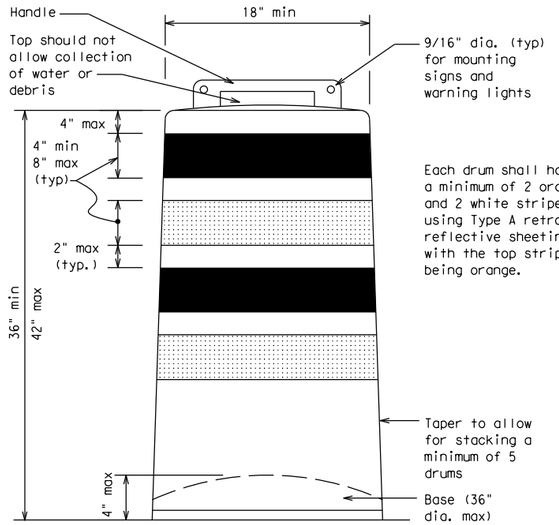
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
3. Plastic drums shall be constructed of lightweight flexible, and deformable materials. The Contractor shall NOT use metal drums or single piece plastic drums as channelization devices or sign supports.
4. Drums shall present a profile that is a minimum of 18 inches in width at the 36 inch height when viewed from any direction. The height of drum unit (body installed on base) shall be a minimum of 36 inches and a maximum of 42 inches.
5. The top of the drum shall have a built-in handle for easy pickup and shall be designed to drain water and not collect debris. The handle shall have a minimum of two widely spaced 9/16 inch diameter holes to allow attachment of a warning light, warning reflector unit or approved compliant sign.
6. The exterior of the drum body shall have a minimum of four alternating orange and white retroreflective circumferential stripes not less than 4 inches nor greater than 8 inches in width. Any non-reflectorized space between any two adjacent stripes shall not exceed 2 inches in width.
7. Bases shall have a maximum width of 36 inches, a maximum height of 4 inches, and a minimum of two footholds of sufficient size to allow base to be held down while separating the drum body from the base.
8. Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
9. Drum body shall have a maximum unballasted weight of 11 lbs.
10. Drum and base shall be marked with manufacturer's name and model number.

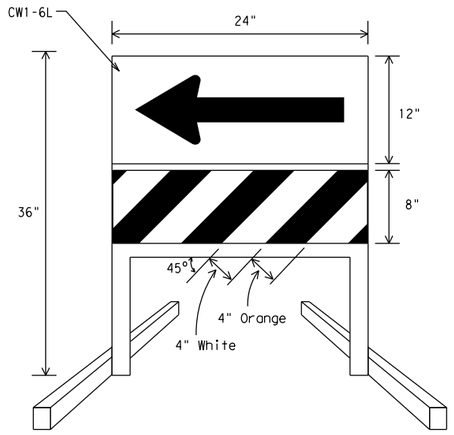
RETROREFLECTIVE SHEETING

1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall be suitable for use on and shall adhere to the drum surface such that, upon vehicular impact, the sheeting shall remain adhered in-place and exhibit no delaminating, cracking, or loss of retroreflectivity other than that loss due to abrasion of the sheeting surface.

BALLAST

1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other ballasting devices as approved by the Engineer. Stacking of sandbags will be allowed, however height of sandbags above pavement surface may not exceed 12 inches.
2. Bases with built-in ballast shall weigh between 40 lbs. and 50 lbs. Built-in ballast can be constructed of an integral crumb rubber base or a solid rubber base.
3. Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
4. The ballast shall not be heavy objects, water, or any material that would become hazardous to motorists, pedestrians, or workers when the drum is struck by a vehicle.
5. When used in regions susceptible to freezing, drums shall have drainage holes in the bottoms so that water will not collect and freeze becoming a hazard when struck by a vehicle.
6. Ballast shall not be placed on top of drums.
7. Adhesives may be used to secure base of drums to pavement.





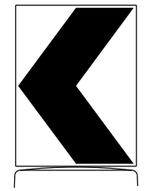
DIRECTION INDICATOR BARRICADE

1. The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
2. If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
3. The Direction Indicator Barricade shall consist of One-Direction Large Arrow (CW1-6) sign in the size shown with a black arrow on a background of Type B_{FL} or Type C_{FL} Orange retroreflective sheeting above a rail with Type A retroreflective sheeting in alternating 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Sheeting types shall be as per DMS 8300.
4. Double arrows on the Direction Indicator Barricade will not be allowed.
5. Approved manufacturers are shown on the CWZTCD List. Ballast shall be as approved by the manufacturers instructions.

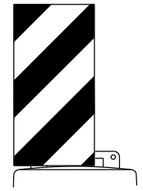
This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

DETECTABLE PEDESTRIAN BARRICADES

1. When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a device that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.
3. Detectable pedestrian barricades similar to the one pictured above, longitudinal channelizing devices, some concrete barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.
4. Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)" and should not be used as a control for pedestrian movements.
5. Warning lights shall not be attached to detectable pedestrian barricades.
6. Detectable pedestrian barricades may use 8" nominal barricade rails as shown on BC(10) provided that the top rail provides a smooth continuous rail suitable for hand trailing with no splinters, burrs, or sharp edges.



18" x 24" Sign
(Maximum Sign Dimension)
Chevron CW1-8, Opposing Traffic Lane Divider, Driveway sign D70a, Keep Right R4 series or other signs as approved by Engineer



12" x 24"
Vertical Panel
mount with diagonals sloping down towards travel way

Plywood, Aluminum or Metal sign substrates shall NOT be used on plastic drums

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. Chevrons and other work zone signs with an orange background shall be manufactured with Type B_{FL} or Type C_{FL} Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face Material," unless otherwise specified in the plans.
3. Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
4. Other sign messages (text or symbolic) may be used as approved by the Engineer. Sign dimensions shall not exceed 18 inches in width or 24 inches in height, except for the R9 series signs discussed in note 8 below.
5. Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
6. Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
7. Chevrons may be placed on drums on the outside of curves, on merging tapers or on shifting tapers. When used in these locations they may be placed on every drum or spaced not more than on every third drum. A minimum of three (3) should be used at each location called for in the plans.
8. R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-14

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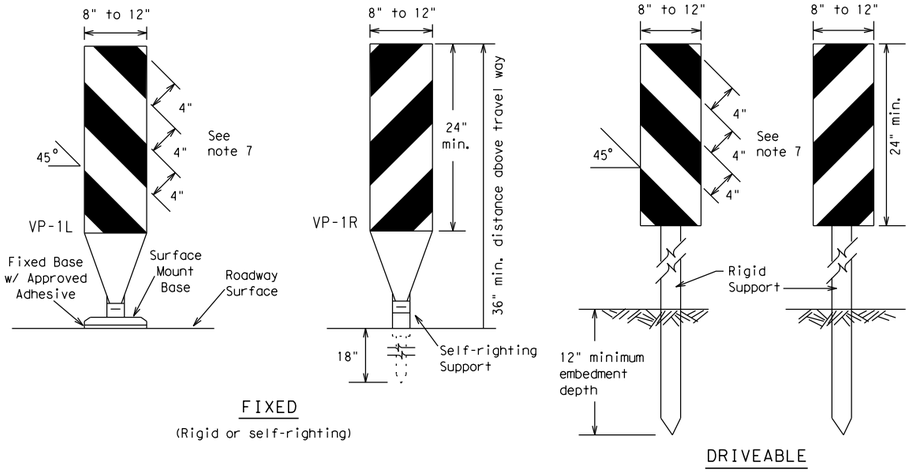
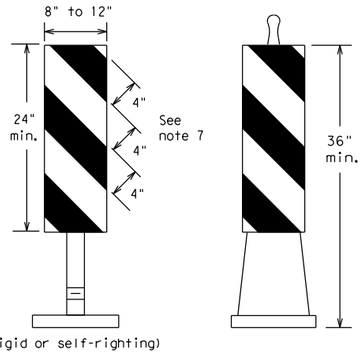
9-07 8-14	AUS	WILLIAMSON		30



FIXED

(Rigid or self-righting)

DRIVEABLE

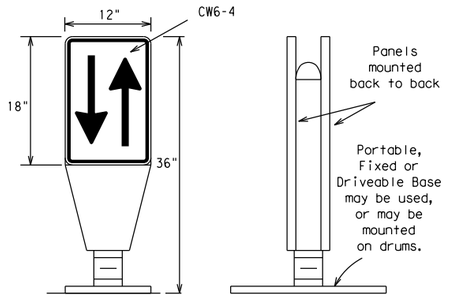


(Rigid or self-righting)

PORTABLE

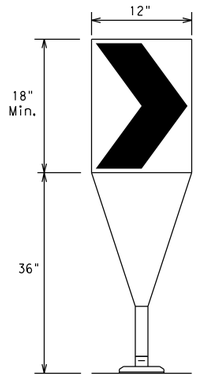
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual Appendix B "Treatment of Pavement Drop-offs in Work Zones" for additional guidelines on the use of VP's for drop-offs.
3. VP's should be mounted back to back if used at the edge of cuts adjacent to two-way two lane roadways. Stripes are to be reflective orange and reflective white and should always slope downward toward the travel lane.
4. VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
5. Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
6. Sheeting for the VP's shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.

VERTICAL PANELS (VPs)



1. Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base is secured to the pavement with an adhesive or rubber weight to minimize movement caused by a vehicle impact or wind gust.
2. The OTLD may be used in combination with 42" cones or VPs.
3. Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
4. The OTLD shall be orange with a black non-reflective legend. Sheeting for the OTLD shall be retroreflective Type B_{FL} or Type C_{FL} conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.

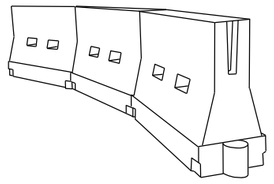
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

1. The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
2. Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of the roadway.
3. Chevrons, when used, shall be erected on the outside of a sharp curve or turn, or on the far side of an intersection. They shall be in line with and at right angles to approaching traffic. Spacing should be such that the motorist always has three in view, until the change in alignment eliminates its need.
4. To be effective, the chevron should be visible for at least 500 feet.
5. Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B_{FL} or Type C_{FL} conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
6. For Long Term Stationary use on tapers or transitions on freeways and divided highways self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

CHEVRONS



LONGITUDINAL CHANNELIZING DEVICES (LCD)

1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
2. LCDs may be used instead of a line of cones or drums.
3. LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
5. LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
6. LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10) placed near the top of the LCD along the full length of the device.

WATER BALLASTED SYSTEMS USED AS BARRIERS

1. Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

If used to channelize pedestrians, longitudinal channelizing devices or water ballasted systems must have a continuous detectable bottom for users of long canes and the top of the unit shall not be less than 32 inches in height.

HOLLOW OR WATER BALLASTED SYSTEMS USED AS LONGITUDINAL CHANNELIZING DEVICES OR BARRIERS

GENERAL NOTES

1. Work Zone channelizing devices illustrated on this sheet may be installed in close proximity to traffic and are suitable for use on high or low speed roadways. The Engineer/Inspector shall ensure that spacing and placement is uniform and in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
2. Channelizing devices shown on this sheet may have a driveable, fixed or portable base. The requirement for self-righting channelizing devices must be specified in the General Notes or other plan sheets.
3. Channelizing devices on self-righting supports should be used in work zone areas where channelizing devices are frequently impacted by errant vehicles or vehicle related wind gusts making alignment of the channelizing devices difficult to maintain. Locations of these devices shall be detailed elsewhere in the plans. These devices shall conform to the TMUTCD and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
4. The Contractor shall maintain devices in a clean condition and replace damaged, nonreflective, faded, or broken devices and bases as required by the Engineer/Inspector. The Contractor shall be required to maintain proper device spacing and alignment.
5. Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
6. Pavement surfaces shall be prepared in a manner that ensures proper bonding between the adhesives, the fixed mount bases and the pavement surface. Adhesives shall be prepared and applied according to the manufacturer's recommendations.
7. The installation and removal of channelizing devices shall not cause detrimental effects to the final pavement surfaces, including pavement surface discoloration or surface integrity. Driveable bases shall not be permitted on final pavement surfaces. The Engineer/Inspector shall approve all application and removal procedures of fixed bases.

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices On a Taper	On a Tangent
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'
35		205'	225'	245'	35'	70'
40		265'	295'	320'	40'	80'
45	L = WS	450'	495'	540'	45'	90'
50		500'	550'	600'	50'	100'
55		550'	605'	660'	55'	110'
60		600'	660'	720'	60'	120'
65		650'	715'	780'	65'	130'
70		700'	770'	840'	70'	140'
75		750'	825'	900'	75'	150'
80		800'	880'	960'	80'	160'

** Taper lengths have been rounded off.
L=Length of Taper (FT.) W=Width of Offset (FT.)
S=Posted Speed (MPH)

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-14

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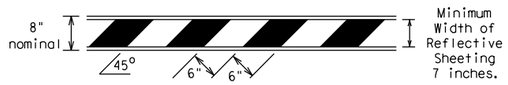
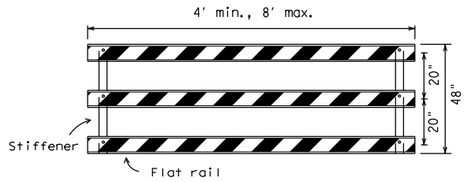
TYPE 3 BARRICADES

1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type 3 Barricades and a list of all materials used in the construction of Type 3 Barricades.
2. Type 3 Barricades shall be used at each end of construction projects closed to all traffic.
3. Barricades extending across a roadway should have stripes that slope downward in the direction toward which traffic must turn in detouring. When both right and left turns are provided, the chevron striping may slope downward in both directions from the center of the barricade. Where no turns are provided at a closed road striping should slope downward in both directions toward the center of roadway.
4. Striping of rails, for the right side of the roadway, should slope downward to the left. For the left side of the roadway, striping should slope downward to the right.
5. Identification markings may be shown only on the back of the barricade rails. The maximum height of letters and/or company logos used for identification shall be 1".
6. Barricades shall not be placed parallel to traffic unless an adequate clear zone is provided.
7. Warning lights shall NOT be installed on barricades.
8. Where barricades require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand is recommended. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight. Sand bags shall not be stacked in a manner that covers any portion of a barricade rails reflective sheeting. Rock, concrete, iron, steel or other solid objects will NOT be permitted. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall not be used for sandbags. Sandbags shall only be placed along or upon the base supports of the device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners.
9. Sheeting for barricades shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



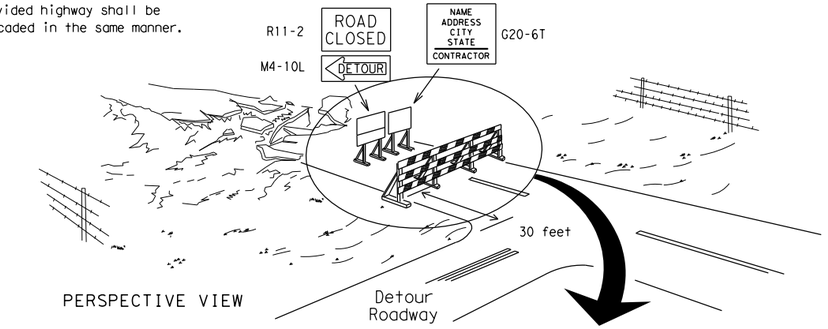
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

TYPICAL PANEL DETAIL
FOR SKID OR POST TYPE BARRICADES

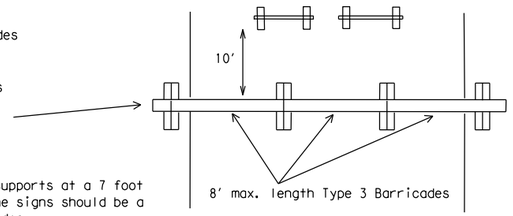
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.

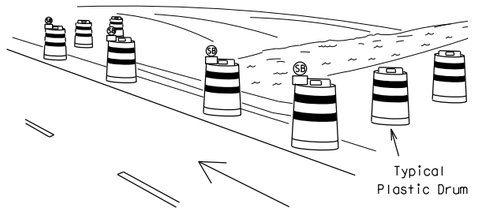
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

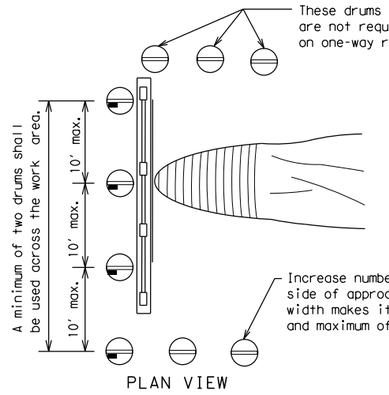
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

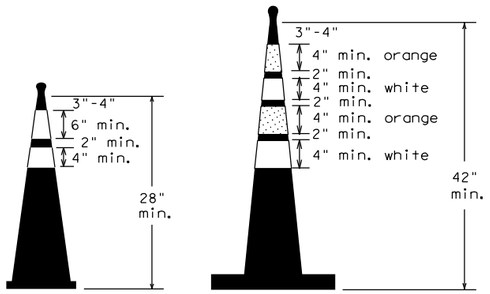
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder width is greater than 12 feet, steady-burn lights may be omitted if drums are used.
5. Drums must extend the length of the culvert widening.



PLAN VIEW

LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones

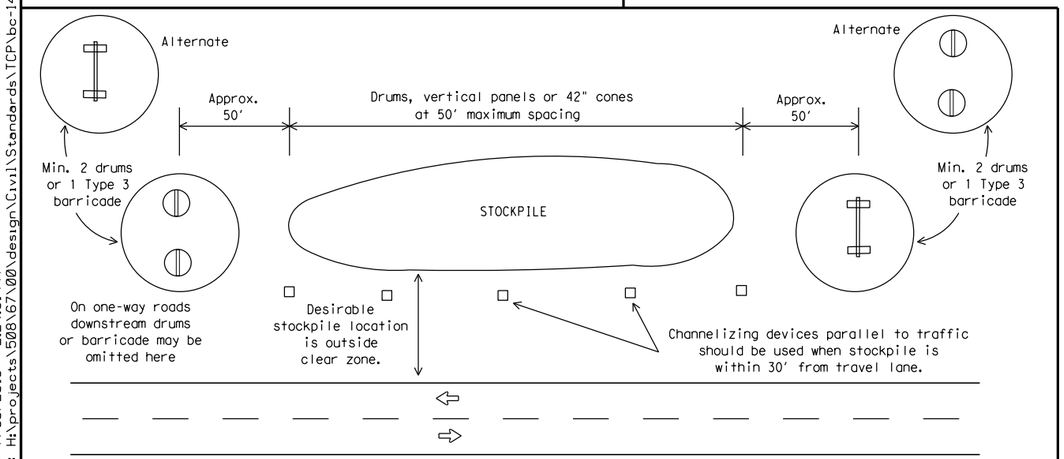
One-Piece cones

Tubular Marker

28" Cones shall have a minimum weight of 9 1/2 lbs.

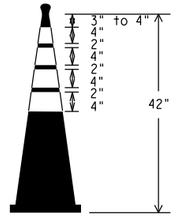
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

1. Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
2. One-piece cones have the body and base of the cone molded in one consolidated unit. Two-piece cones have a cone shaped body and a separate rubber base, or ballast, that is added to keep the device upright and in place.
3. Two-piece cones may have a handle or loop extending up to 8" above the minimum height shown, in order to aid in retrieving the device.
4. Cones or tubular markers used at night shall have white or white and orange reflective bands as shown above. The reflective bands shall have a smooth, sealed outer surface and meet the requirements of Departmental Material Specification DMS-8300 Type A.
5. 28" cones and tubular markers are generally suitable for short duration and short-term stationary work as defined on BC(4). These should not be used for intermediate-term or long-term stationary work unless personnel is on-site to maintain them in their proper upright position.
6. 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
7. Cones or tubular markers used on each project should be of the same size and shape.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

THIS DEVICE SHALL NOT BE USED ON PROJECTS LET AFTER MARCH 2014.



EDGELINE CHANNELIZER

1. This device is intended only for use in place of a vertical panel to channelize traffic by indicating the edge of the travel lane. It is not intended to be used in transitions or tapers.
2. This device shall not be used to separate lanes of traffic (opposing or otherwise) or warn of objects.
3. This device is based on a 42 inch, two-piece cone with an alternate striping pattern: four 4 inch retroreflective bands, with an approximate 2 inch gap between bands. The color of the band should correspond to the color of the edgeline (yellow for left edgeline, white for right edgeline) for which the device is substituted or for which it supplements. The reflectorized bands shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
4. The base must weigh a minimum of 30 lbs.

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REVISIONS	0914	05	191	NA
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	AUS	WILLIAMSON		32

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DATE: 7/30/2018 2:29:52 PM
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WORK ZONE PAVEMENT MARKINGS

GENERAL

1. The Contractor shall be responsible for maintaining work zone and existing pavement markings, in accordance with the standard specifications and special provisions, on all roadways open to traffic within the CSJ limits unless otherwise stated in the plans.
2. Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
3. Additional supplemental pavement marking details may be found in the plans or specifications.
4. Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
5. When short term markings are required on the plans, short term markings shall conform with the TMUTCD, the plans and details as shown on the Standard Plan Sheet WZ(STPM).
6. When standard pavement markings are not in place and the roadway is opened to traffic, DO NOT PASS signs shall be erected to mark the beginning of the sections where passing is prohibited and PASS WITH CARE signs at the beginning of sections where passing is permitted.
7. All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

1. Raised pavement markers are to be placed according to the patterns on BC(12).
2. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and Departmental Material Specification DMS-4200 or DMS-4300.

PREFABRICATED PAVEMENT MARKINGS

1. Removable prefabricated pavement markings shall meet the requirements of DMS-8241.
2. Non-removable prefabricated pavement markings (foil back) shall meet the requirements of DMS-8240.

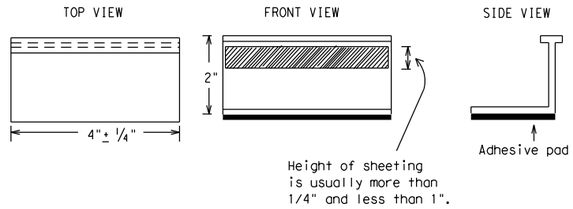
MAINTAINING WORK ZONE PAVEMENT MARKINGS

1. The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
2. Work zone pavement markings shall be inspected in accordance with the frequency and reporting requirements of work zone traffic control device inspections as required by Form 599.
3. The markings should provide a visible reference for a minimum distance of 300 feet during normal daylight hours and 160 feet when illuminated by automobile low-beam headlights at night, unless sight distance is restricted by roadway geometrics.
4. Markings failing to meet this criteria within the first 30 days after placement shall be replaced at the expense of the Contractor as per Specification Item 662.

REMOVAL OF PAVEMENT MARKINGS

1. Pavement markings that are no longer applicable, could create confusion or direct a motorist toward or into the closed portion of the roadway shall be removed or obliterated before the roadway is opened to traffic.
2. The above shall not apply to detours in place for less than three days, where flaggers and/or sufficient channelizing devices are used in lieu of markings to outline the detour route.
3. Pavement markings shall be removed to the fullest extent possible, so as not to leave a discernable marking. This shall be by any method approved by TxDOT Specification Item 677 for "Eliminating Existing Pavement Markings and Markers".
4. The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
5. Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
6. Blast cleaning may be used but will not be required unless specifically shown in the plans.
7. Over-painting of the markings SHALL NOT BE permitted.
8. Removal of raised pavement markers shall be as directed by the Engineer.
9. Removal of existing pavement markings and markers will be paid for directly in accordance with Item 677, "ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS," unless otherwise stated in the plans.
10. Black-out marking tape may be used to cover conflicting existing markings for periods less than two weeks when approved by the Engineer.

Temporary Flexible-Reflective Roadway Marker Tabs



STAPLES OR NAILS SHALL NOT BE USED TO SECURE TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS TO THE PAVEMENT SURFACE

1. Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
2. Tabs detailed on this sheet are to be inspected and accepted by the Engineer or designated representative. Sampling and testing is not normally required, however at the option of the Engineer, either "A" or "B" below may be imposed to assure quality before placement on the roadway.
   A. Select five (5) or more tabs at random from each lot or shipment and submit to the Construction Division, Materials and Pavement Section to determine specification compliance.
   B. Select five (5) tabs and perform the following test. Affix five (5) tabs at 24 inch intervals on an asphaltic pavement in a straight line. Using a medium size passenger vehicle or pickup, run over the markers with the front and rear tires at a speed of 35 to 40 miles per hour, four (4) times in each direction. No more than one (1) out of the five (5) reflective surfaces shall be lost or displaced as a result of this test.
3. Small design variances may be noted between tab manufacturers.
4. See Standard Sheet WZ(STPM) for tab placement on new pavements. See Standard Sheet TCP(7-1) for tab placement on seal coat work.

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

1. Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
2. All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
3. Adhesive for guidemarks shall be bituminous material hot applied or butyl rubber pad for all surfaces, or thermoplastic for concrete surfaces.

Guidemarks shall be designated as:
YELLOW - (two amber reflective surfaces with yellow body).
WHITE - (one silver reflective surface with white body).

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
TRAFFIC BUTTONS	DMS-4300
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY REMOVABLE, PREFABRICATED PAVEMENT MARKINGS	DMS-8241
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS	DMS-8242

A list of prequalified reflective raised pavement markers, non-reflective traffic buttons, roadway marker tabs and other pavement markings can be found at the Material Producer List web address shown on BC(1).

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	191	NA
2-98 9-07	DIST	COUNTY		SHEET NO.
1-02 7-13	AUS	WILLIAMSON		33
11-02 8-14				

DATE: 7/30/2018 2:29:52 PM
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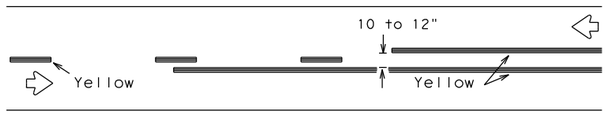
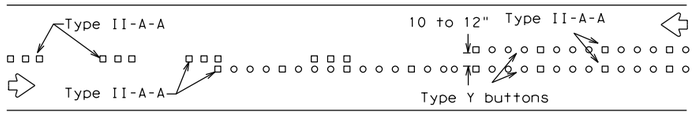
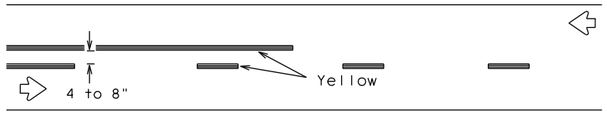
PAVEMENT MARKING PATTERNS



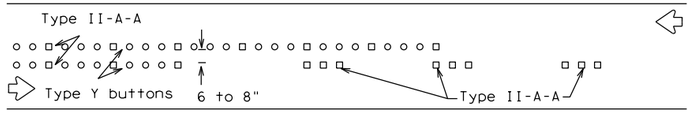
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



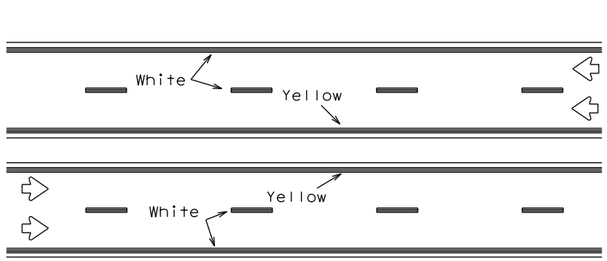
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



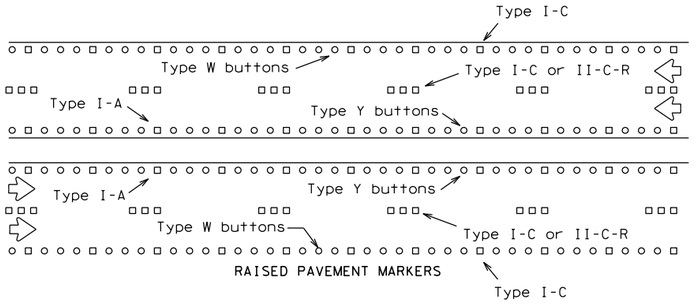
RAISED PAVEMENT MARKERS - PATTERN B

Pattern A is the TXDOT Standard, however Pattern B may be used if approved by the Engineer.
Prefabricated markings may be substituted for reflectorized pavement markings.

CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO-LANE, TWO-WAY HIGHWAYS



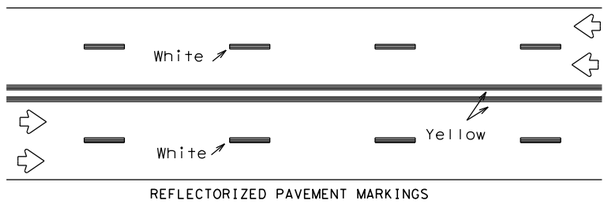
REFLECTORIZED PAVEMENT MARKINGS



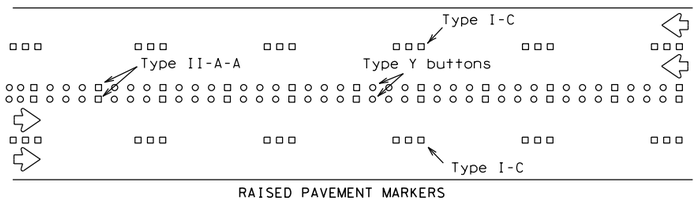
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



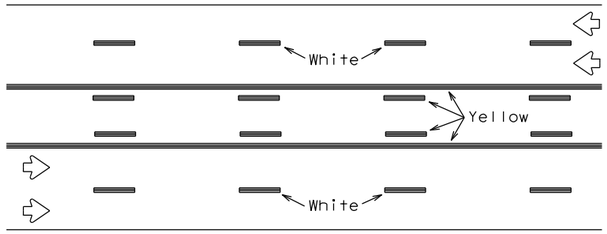
REFLECTORIZED PAVEMENT MARKINGS



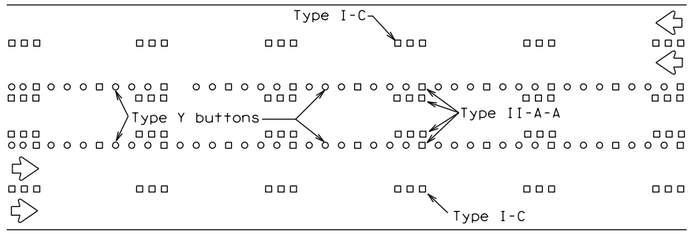
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

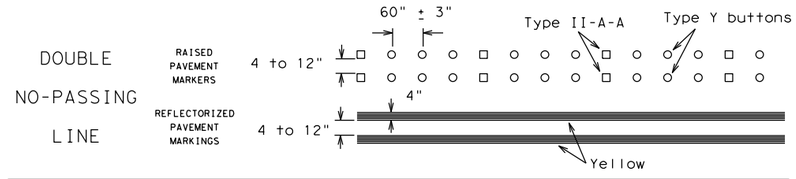
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

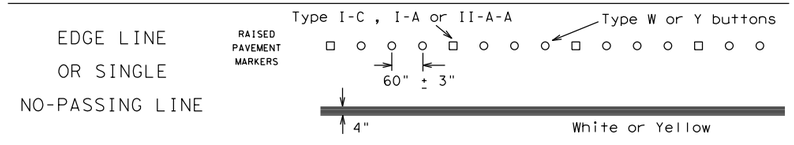
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

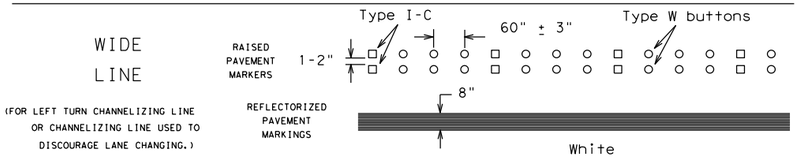


EDGE LINE OR SINGLE NO-PASSING LINE



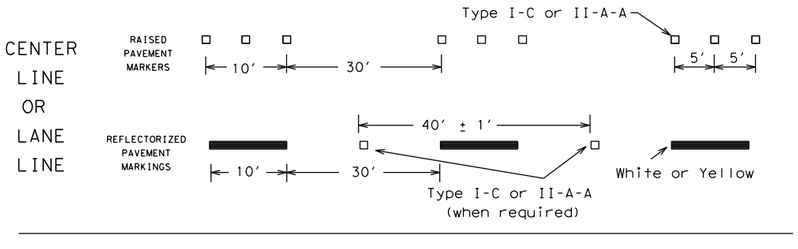
WIDE LINE

(FOR LEFT TURN CHANNELIZING LINE OR CHANNELIZING LINE USED TO DISCOURAGE LANE CHANGING.)

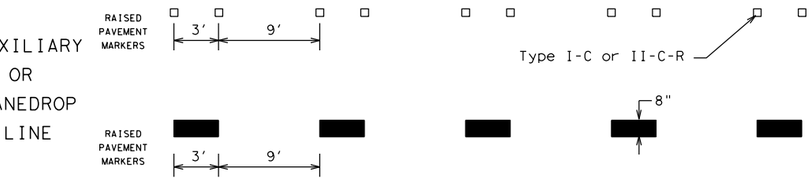


BROKEN LINES

CENTER LINE OR LANE LINE

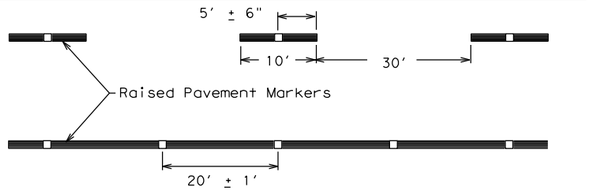


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

If raised pavement markers are used to supplement REMOVABLE markings, the markers shall be applied to the top of the tape at the approximate mid length of tape used for broken lines or at 20 foot spacing for solid lines. This allows an easier removal of raised pavement markers and tape.



Centerline only - not to be used on edge lines

Raised pavement markers used as standard pavement markings shall be from the approved products list and meet the requirements of Item 672 "RAISED PAVEMENT MARKERS."

Texas Department of Transportation

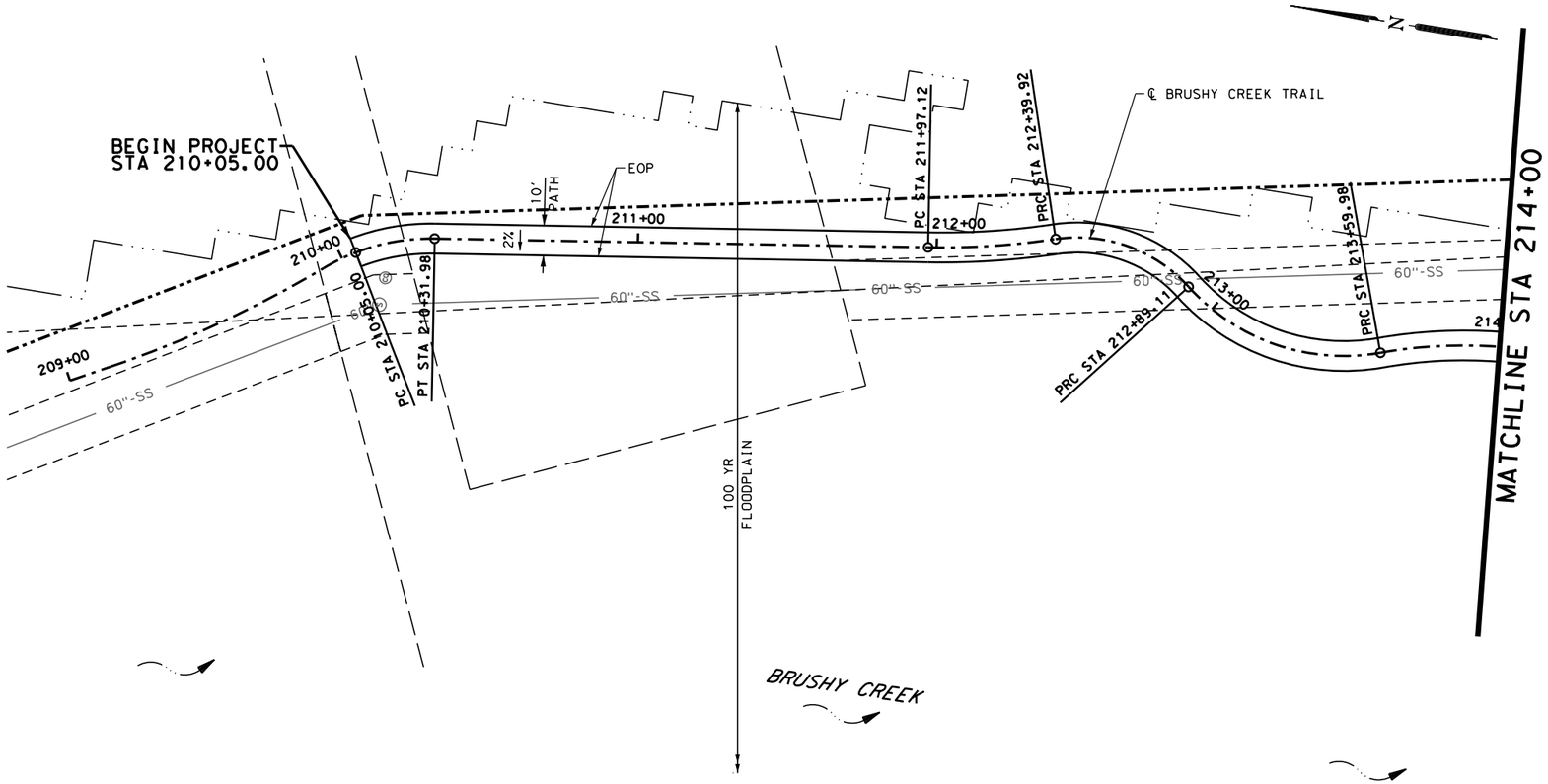
Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	191	NA
1-97 9-07	DIST	COUNTY		SHEET NO.
2-98 7-13	AUS	WILLIAMSON		34
11-02 8-14				

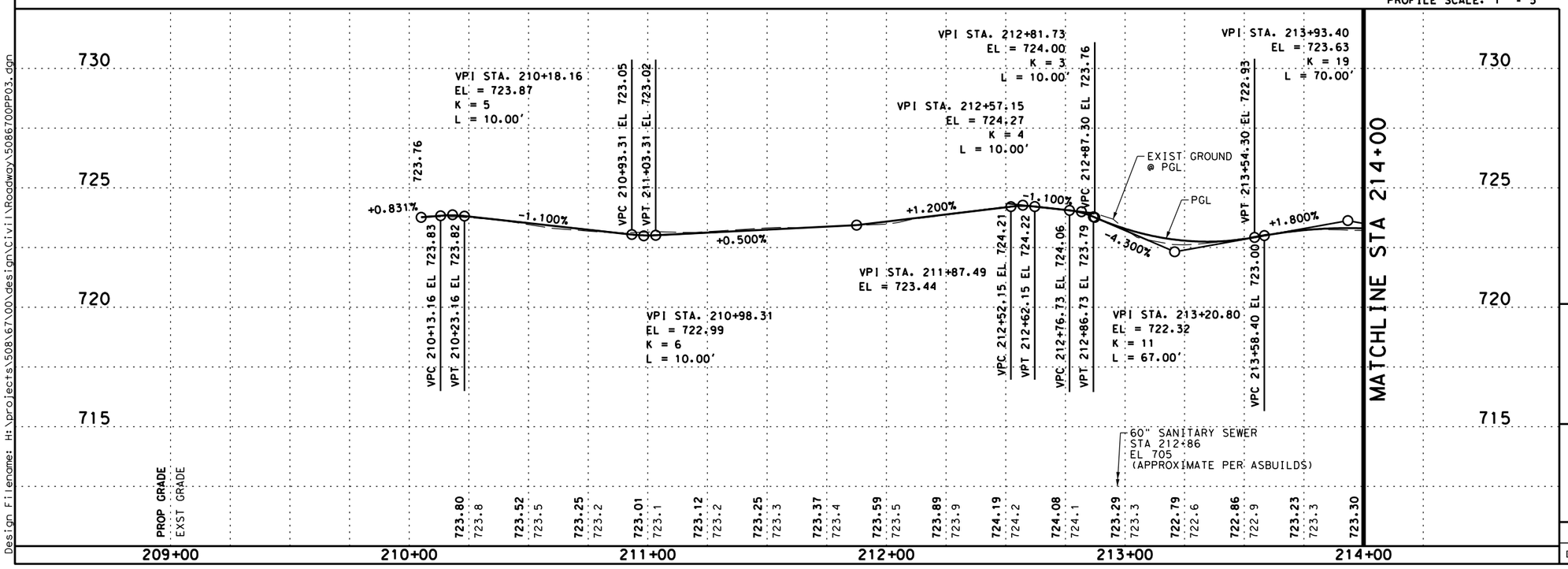
ITEM	DESC	DESCRIPTION	UNIT	QTY
0100	6002	PREPARING ROW	STA	4
0110	6001	EXCAVATION (ROADWAY)	CY	69
0161	6014	COMPOST MANUF TOPSOIL (BOS OR PB) (4")	SY	268
0164	6037	DRILL SEEDING (PERM) (URBAN) (SANDY)	SY	268
0168	6001	VEGETATIVE WATERING	MG	4.50
0169	6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY	268
0531	6001	CONC SIDEWALKS (4")	SY	439



LEGEND

- LIMITS OF CONSTRUCTION
- PROPERTY LINE
- EASEMENT LINE
- 100 YR FLOODPLAIN LIMIT
- CREEK FLOW DIRECTION
- TREE

PLAN SCALE: 1" = 50'
PROFILE SCALE: 1" = 5'



DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 8/3/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 8/3/2018 DATE

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS

7800 SHOAL CREEK BLVD, STE 220 W | AUSTIN, TX 78757 | 512.454.8711

TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL

PLAN AND PROFILE (STA 210+05 TO STA 214+00)

SHEET 1 OF 10

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 35

Plotted on: 8/3/2018

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Plotted on: 8/3/2018

ITEM	DESC	DESCRIPTION	UNIT	QTY
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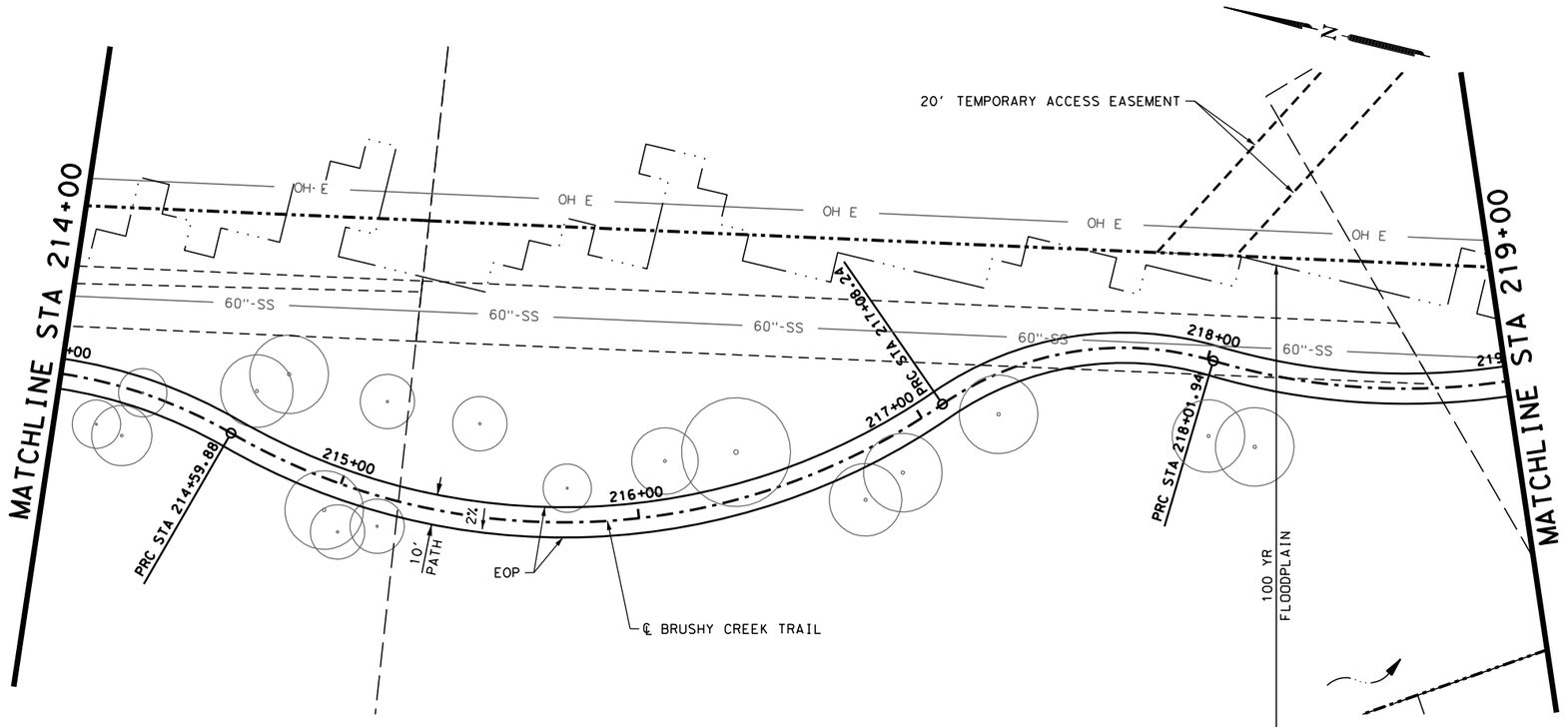
0110	6001	EXCAVATION (ROADWAY)	CY	89
0132	6004	EMBANKMENT (FINAL)(DENS CONT)(TY B)	CY	4
0161	6014	COMPOST MANUF TOPSOIL (BOS OR PB) (4")	SY	338
0164	6037	DRILL SEEDING (PERM) (URBAN) (SANDY)	SY	338
0168	6001	VEGETATIVE WATERING	MG	5.70
0169	6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY	338
0531	6001	CONC SIDEWALKS (4")	SY	556



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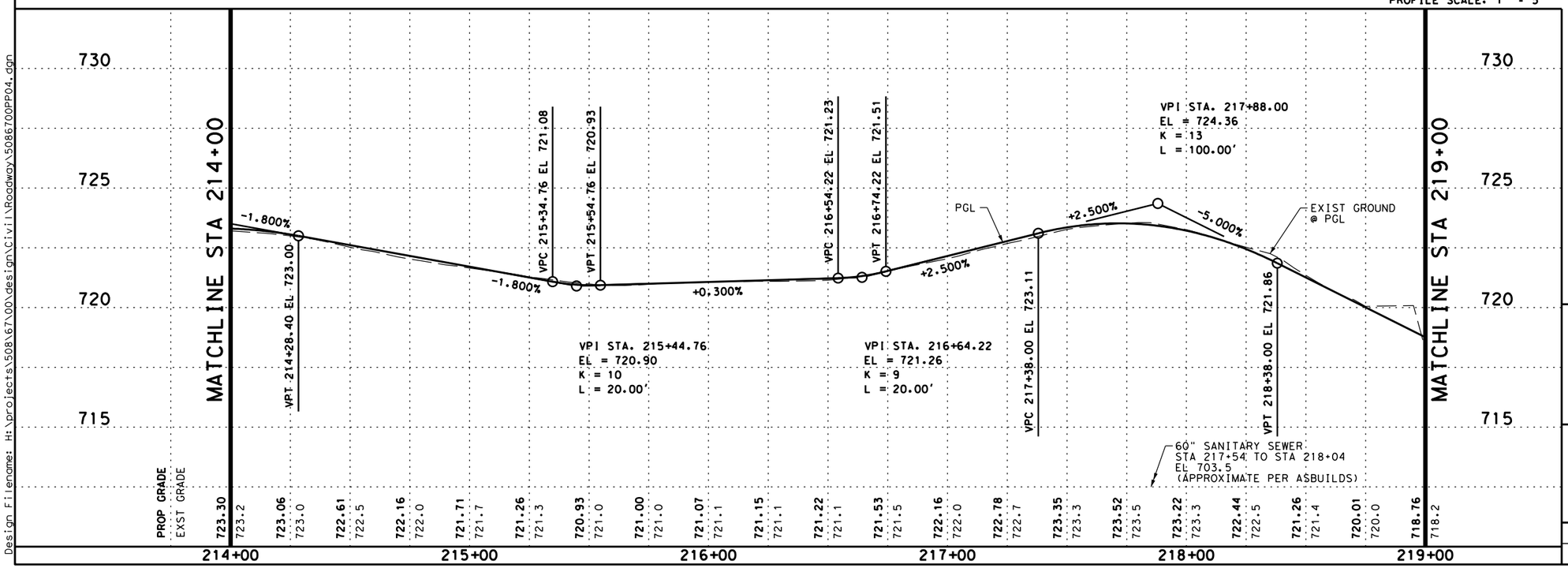
PROFILE SCALE: 1" = 5'



LEGEND

- LIMITS OF CONSTRUCTION
- PROPERTY LINE
- EASEMENT LINE
- 100 YR FLOODPLAIN LIMIT
- CREEK FLOW DIRECTION
- TREE

DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 8/3/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 8/3/2018 DATE

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BRUSHY CREEK TRAIL

PLAN AND PROFILE (STA 214+00 TO STA 219+00)

SHEET 2 OF 10

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 36

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Plotted on: 8/3/2018

ITEM	DESC	DESCRIPTION	UNIT	QTY
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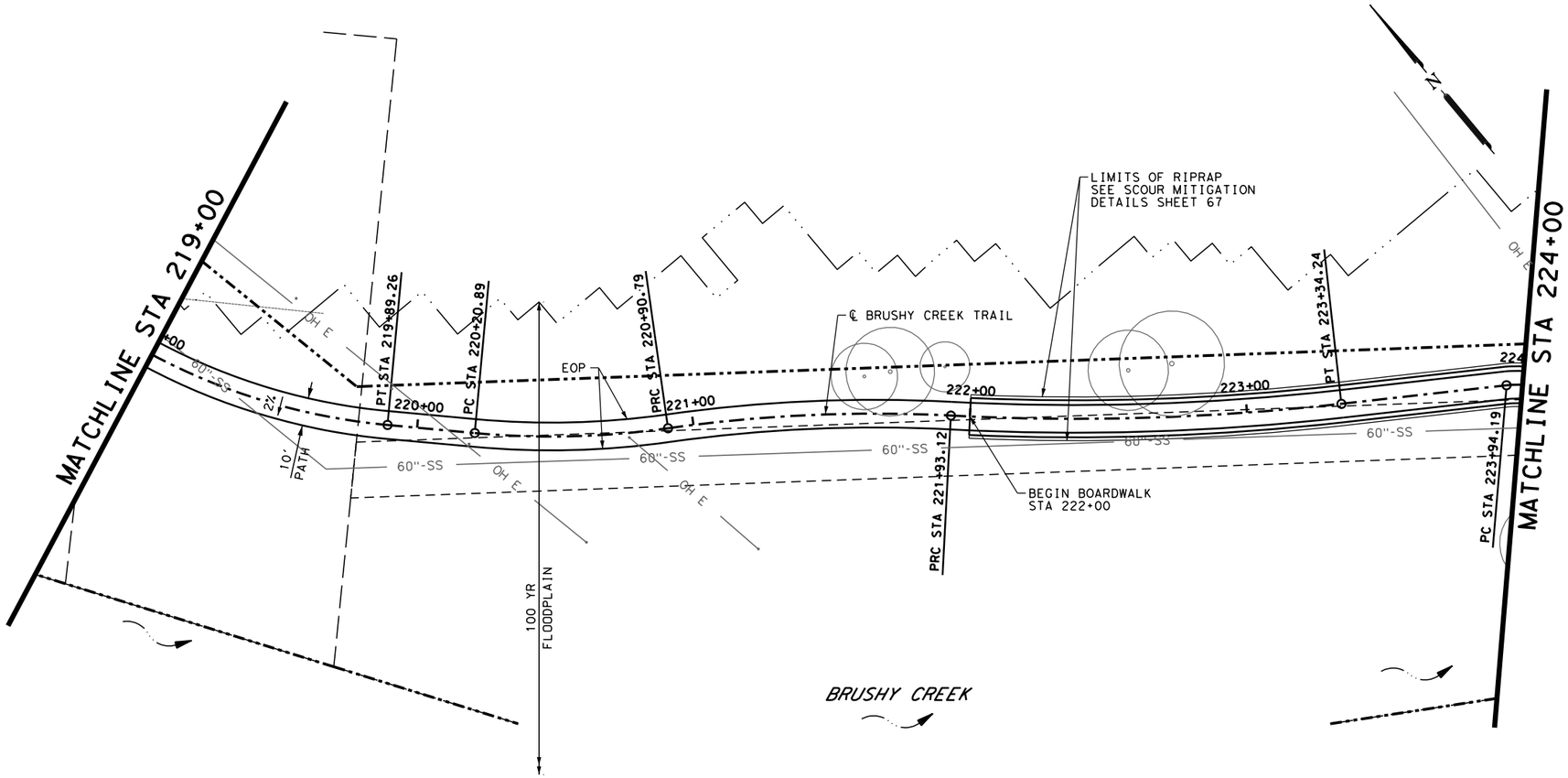
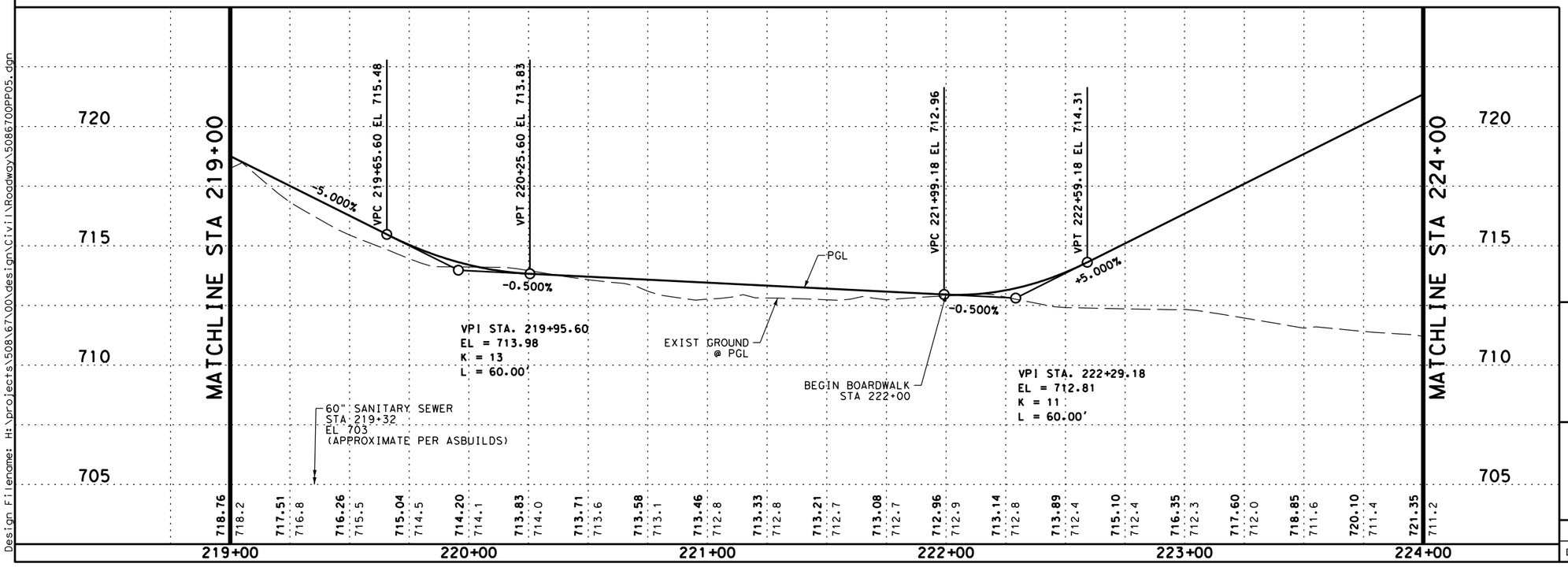
0110	6001	EXCAVATION (ROADWAY)	CY	28
0132	6004	EMBANKMENT (FINAL)(DENS CONT)(TY B)	CY	40
0161	6014	COMPOST MANUF TOPSOIL (BOS OR PB) (4")	SY	394
0164	6037	DRILL SEEDING (PERM) (URBAN) (SANDY)	SY	394
0168	6001	VEGETATIVE WATERING	MG	6.62
0169	6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY	394
0432	6022	RIPRAP (STONE COMMON)(DRY)(6 IN)	CY	172
0531	6001	CONC SIDEWALKS (4")	SY	334





LEGEND

- LIMITS OF CONSTRUCTION
- PROPERTY LINE
- EASEMENT LINE
- 100 YR FLOODPLAIN LIMIT
- CREEK FLOW DIRECTION
- TREE

DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 8/3/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 8/3/2018 DATE

PAPE-DAWSON ENGINEERS

AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS

7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711

TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL

PLAN AND PROFILE (STA 219+00 TO STA 224+00)

SHEET 3 OF 10

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 37

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Plotted on: 8/3/2018

ITEM	DESC	DESCRIPTION	UNIT	QTY
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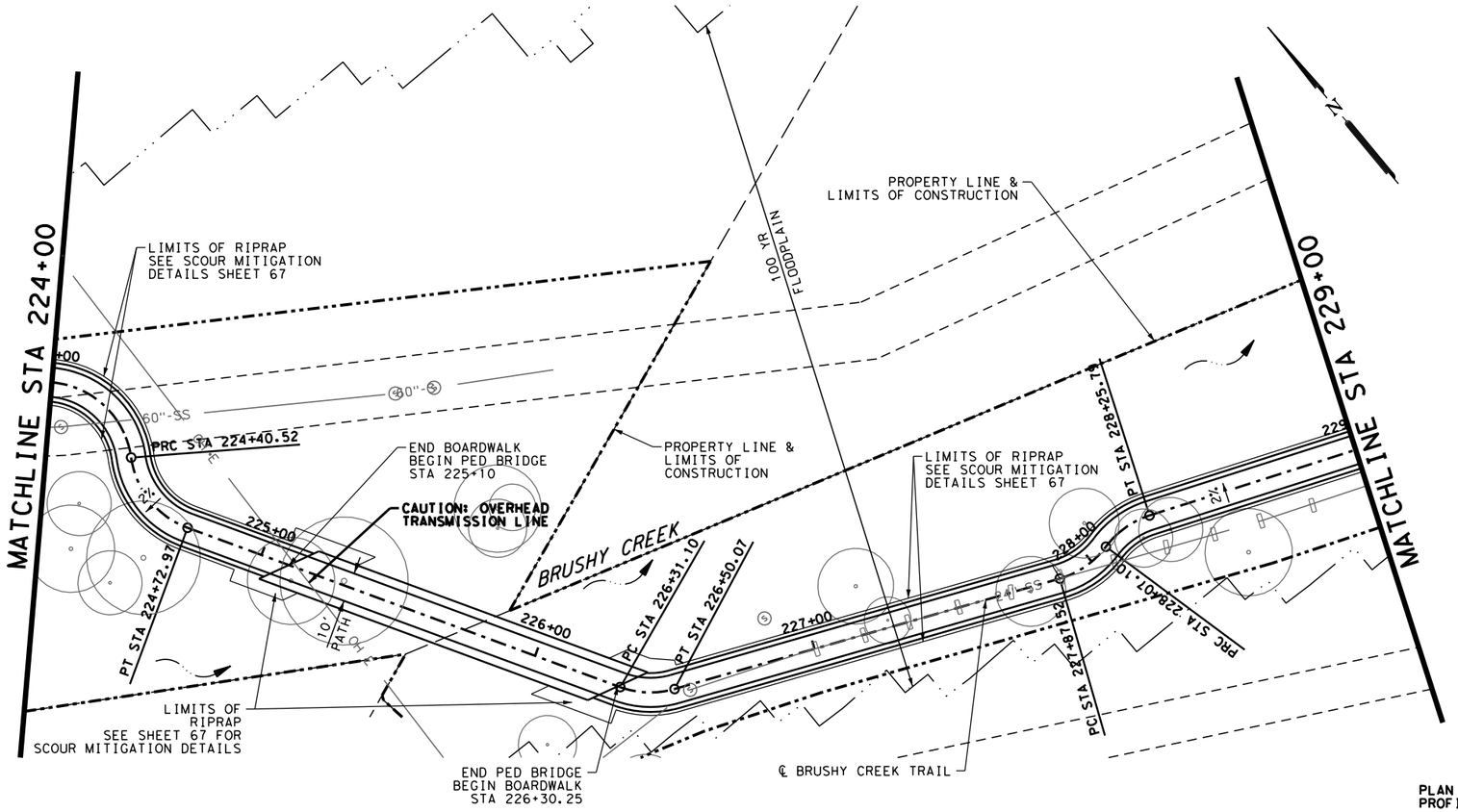
0432	6022	RIPRAP (STONE COMMON) (DRY) (6 IN)	CY	327
0432	6025	RIRRAP (STONE COMMON) (DRY) (15 IN)	CY	40



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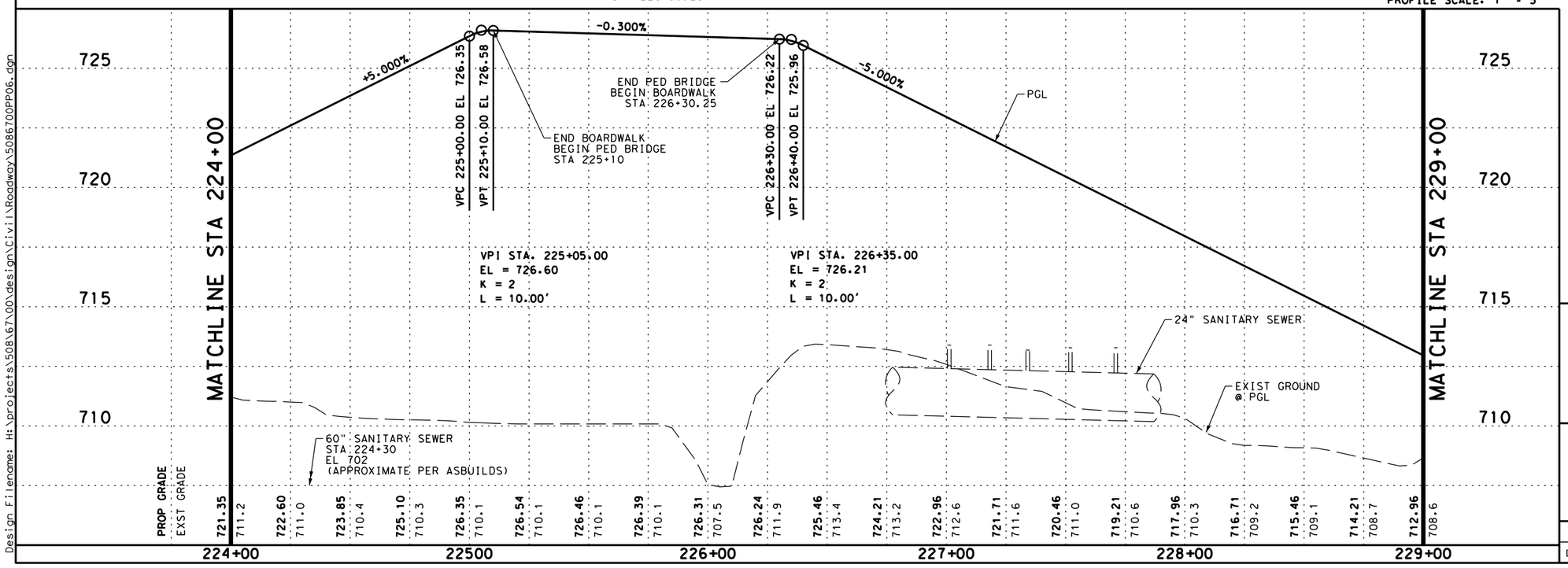
PROFILE SCALE: 1" = 5'



LEGEND

- LIMITS OF CONSTRUCTION
- PROPERTY LINE
- EASEMENT LINE
- 100 YR FLOODPLAIN LIMIT
- CREEK FLOW DIRECTION
- TREE

DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 8/3/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 8/3/2018 DATE

PAPE-DAWSON ENGINEERS

AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS

7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711

TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL

PLAN AND PROFILE (STA 224+00 TO STA 229+00)

SHEET 4 OF 10

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 38

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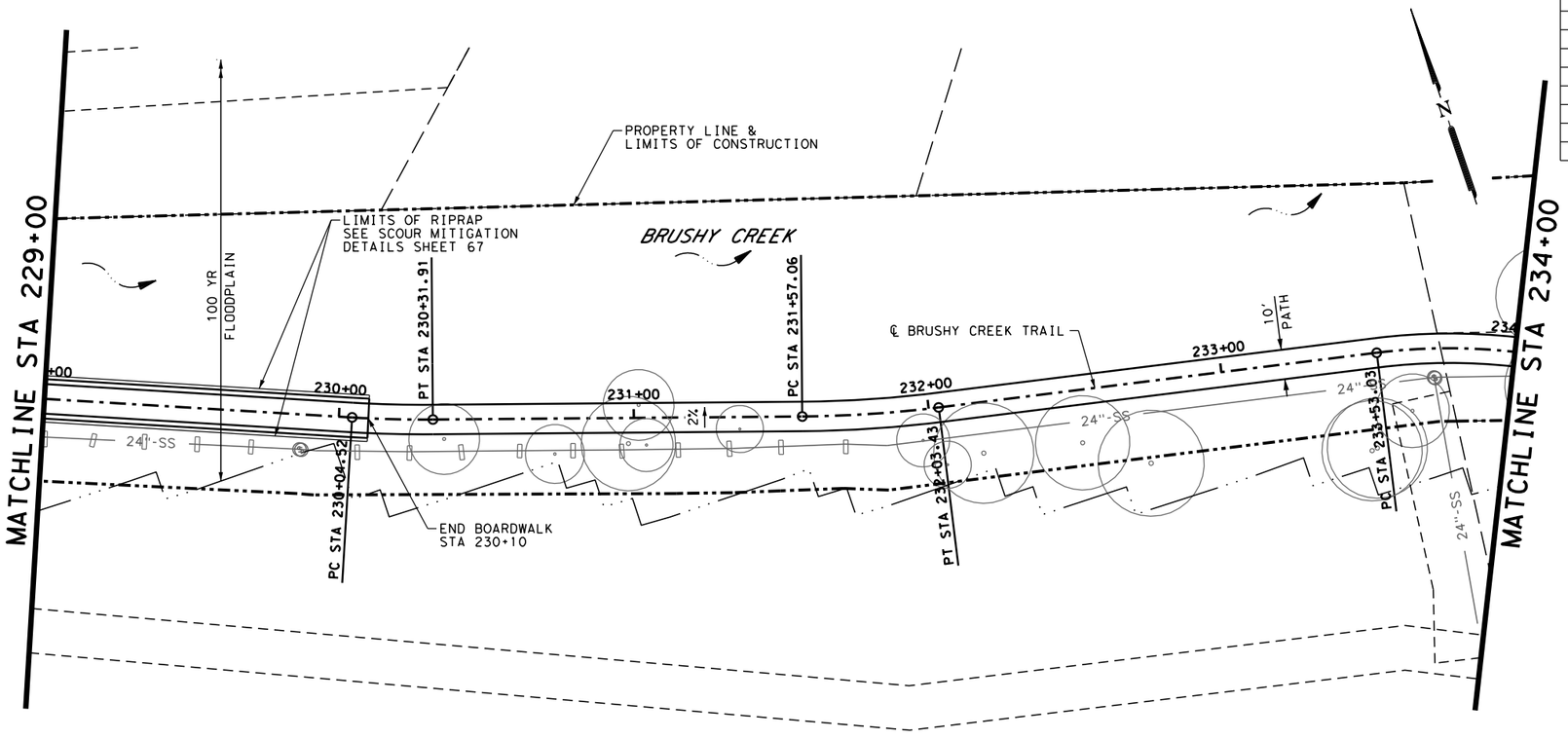
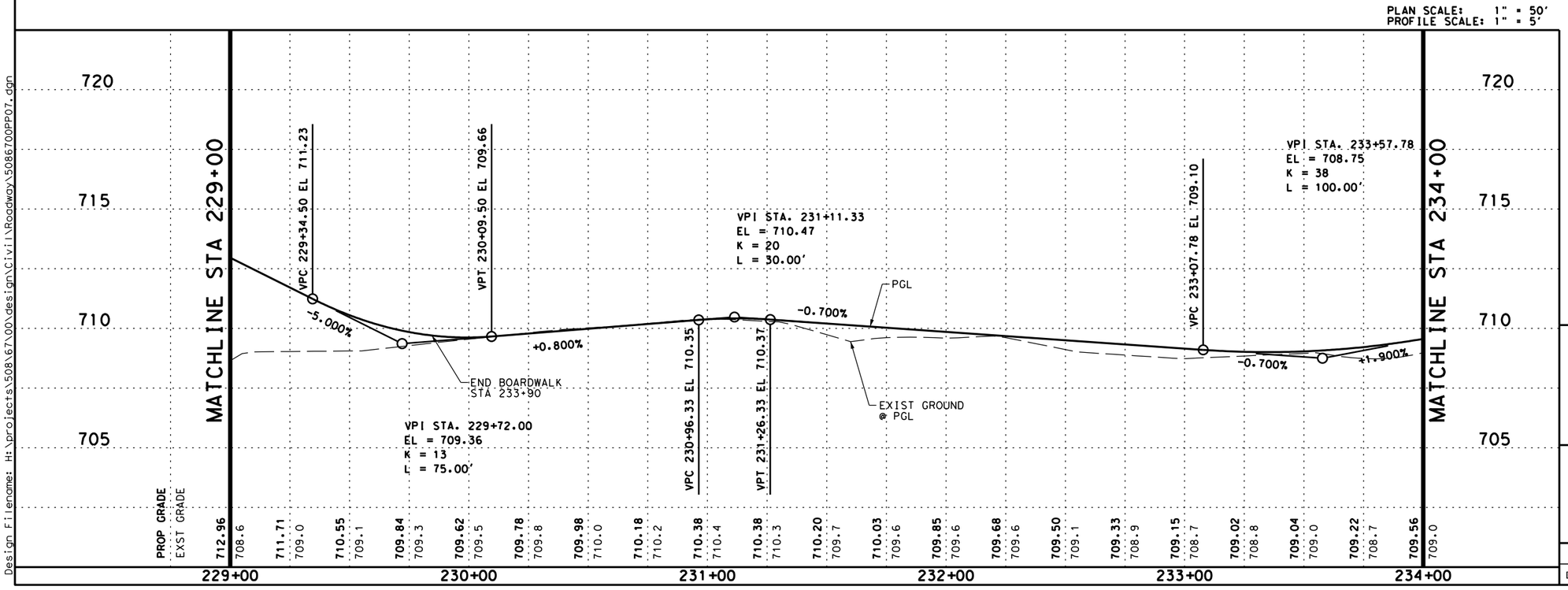
Plotted on: 8/3/2018

ITEM	DESC	DESCRIPTION	UNIT	QTY
0100	6002	PREPARING ROW	STA	5
0110	6001	EXCAVATION (ROADWAY)	CY	62
0132	6004	EMBANKMENT (FINAL)(DENS CONT)(TY B)	CY	65
0161	6014	COMPOST MANUF TOPSOIL (BOS OR PB) (4")	SY	642
0164	6037	DRILL SEEDING (PERM) (URBAN) (SANDY)	SY	642
0168	6001	VEGETATIVE WATERING	MG	10.81
0169	6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY	642
0432	6022	RIPRAP (STONE COMMON)(DRY)(6 IN)	CY	95
0531	6001	CONC SIDEWALKS (4")	SY	434





LEGEND

- LIMITS OF CONSTRUCTION
- PROPERTY LINE
- EASEMENT LINE
- 100 YR FLOODPLAIN LIMIT
- CREEK FLOW DIRECTION
- TREE

DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 8/3/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 8/3/2018 DATE

PAPE-DAWSON ENGINEERS

AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS

7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711

TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL

PLAN AND PROFILE (STA 229+00 TO STA 234+00)

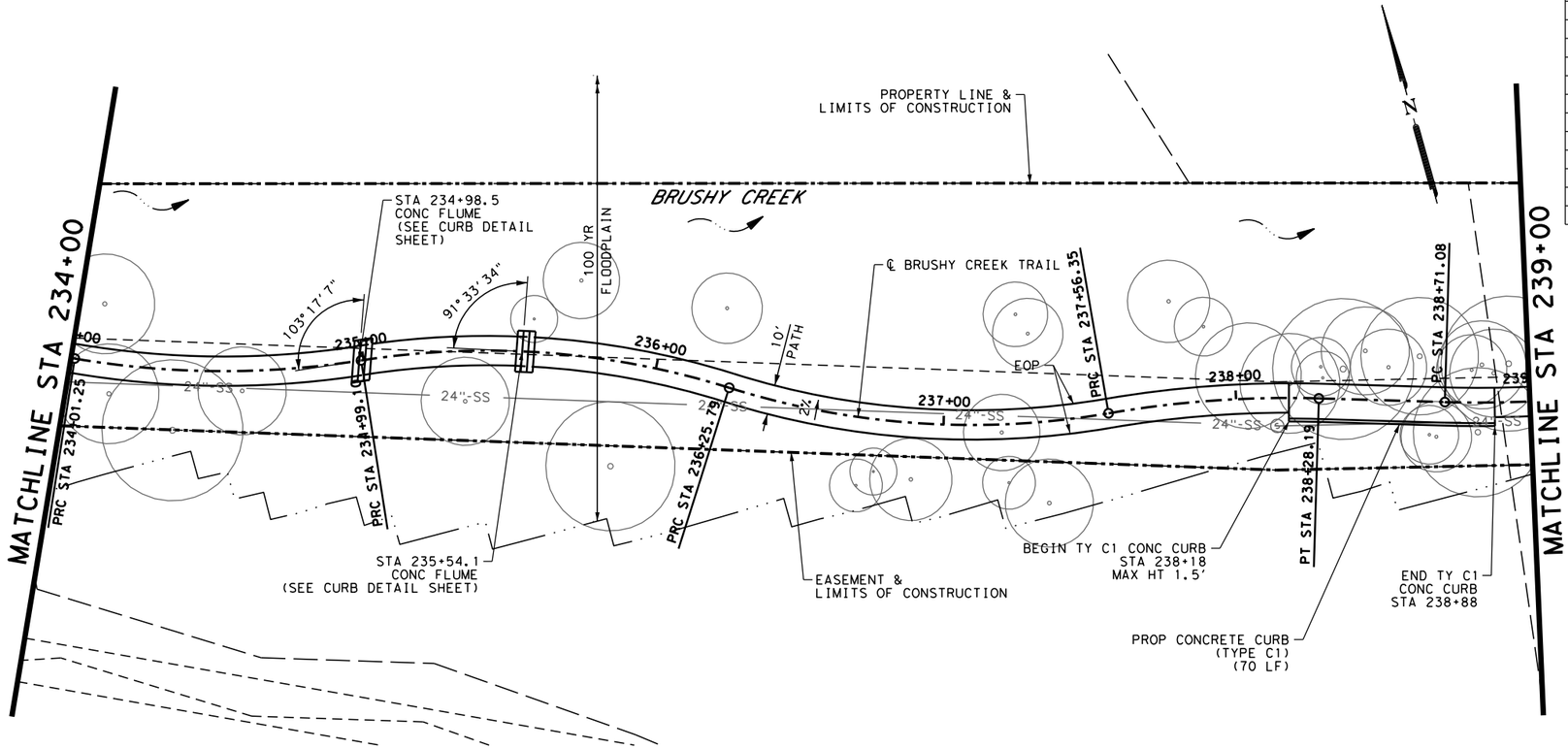
SHEET 5 OF 10

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 39

Design Filename: H:\projects\508\67\00\design\Civil\Roadway\5086700PP07.dgn

Plotted on: 8/3/2018

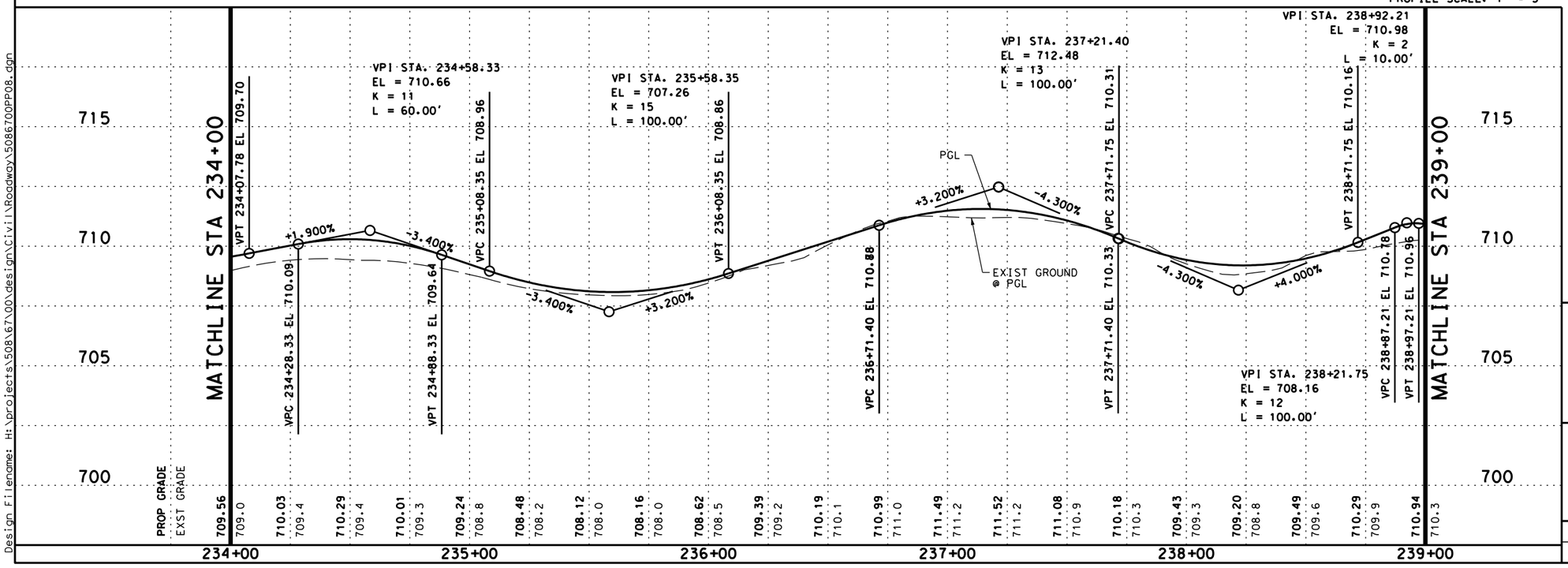
ITEM	DESC	DESCRIPTION	UNIT	QTY
0100	6002	PREPARING ROW	STA	5
0110	6001	EXCAVATION (ROADWAY)	CY	104
0132	6004	EMBANKMENT (FINAL)(DENS CONT)(TY B)	CY	176
0161	6014	COMPOST MANUF TOPSOIL (BOS OR PB) (4")	SY	925
0164	6037	DRILL SEEDING (PERM) (URBAN) (SANDY)	SY	925
0168	6001	VEGETATIVE WATERING	MG	15.57
0169	6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY	925
0420	6011	CL B CONC (FLUME)	CY	4
0442	6007	STR STEEL (MISC NON - BRIDGE)	LB	1750
0529	6015	CONC CURB (TY C1)	LF	70
0531	6001	CONC SIDEWALKS (4")	SY	529
0531	6003	CONC SIDEWALKS (6")	SY	93



LEGEND

- LIMITS OF CONSTRUCTION
- PROPERTY LINE
- EASEMENT LINE
- 100 YR FLOODPLAIN LIMIT
- CREEK FLOW DIRECTION
- TREE

PLAN SCALE: 1" = 50'
PROFILE SCALE: 1" = 5'



DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 8/3/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 8/3/2018 DATE

PAPE-DAWSON ENGINEERS

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7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711

TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL

PLAN AND PROFILE (STA 234+00 TO STA 239+00)

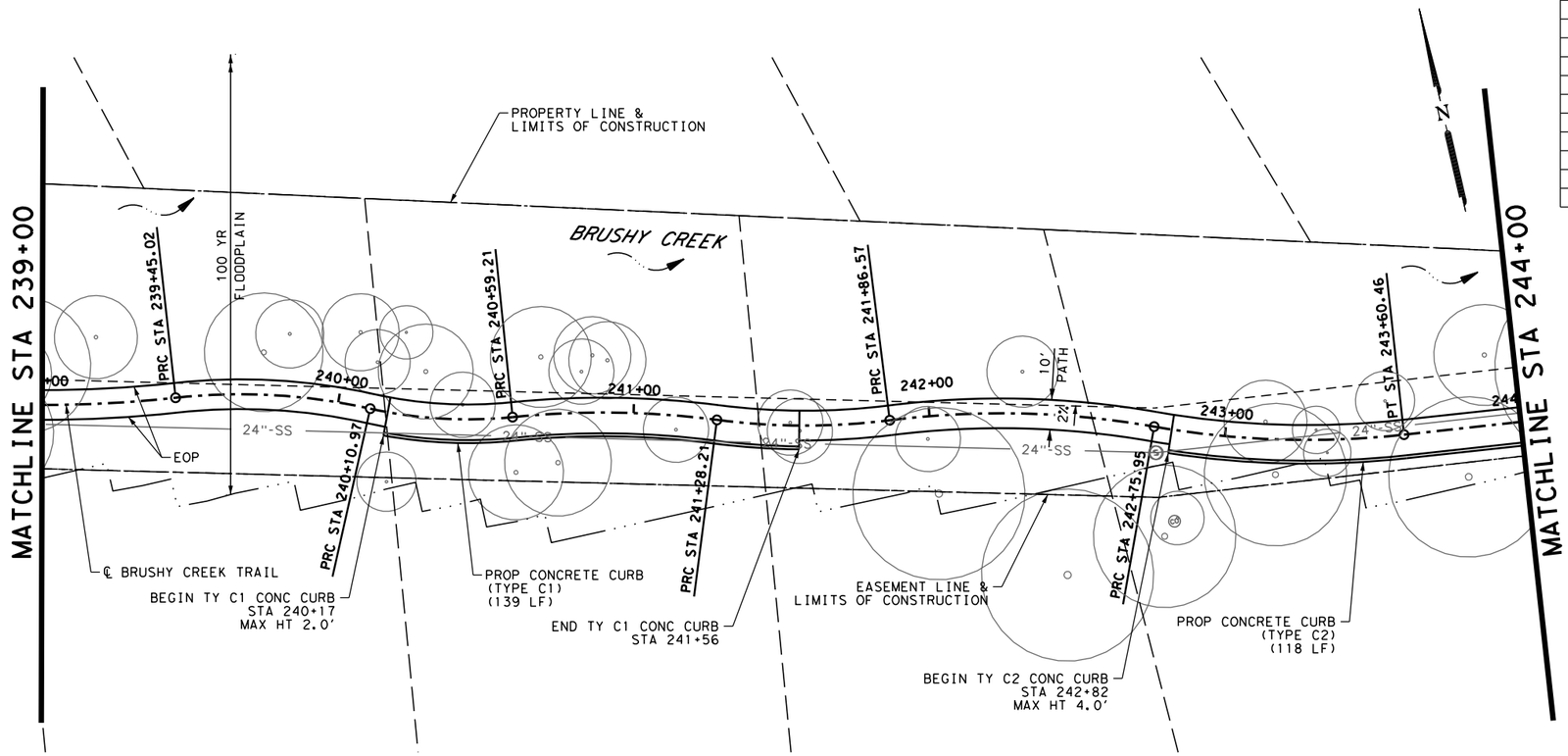
SHEET 6 OF 10

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 40

Design Filename: H:\projects\508\67\00\design\Civil\Roadway\5086700PP08.dgn

Plotted on: 8/3/2018

ITEM	DESC	DESCRIPTION	UNIT	QTY
0100	6002	PREPARING ROW	STA	5
0110	6001	EXCAVATION (ROADWAY)	CY	244
0132	6004	EMBANKMENT (FINAL)(DENS CONT)(TY B)	CY	108
0161	6014	COMPOST MANUF TOPSOIL (BOS OR PB) (4")	SY	844
0164	6037	DRILL SEEDING (PERM) (URBAN) (SANDY)	SY	844
0168	6001	VEGETATIVE WATERING	MG	14.20
0169	6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY	844
0529	6015	CONC CURB (TY C1)	LF	139
0529	6027	CONC CURB (TY C2)	LF	118
0531	6001	CONC SIDEWALKS (4")	SY	271
0531	6003	CONC SIDEWALKS (6")	SY	343



LEGEND

- LIMITS OF CONSTRUCTION
- PROPERTY LINE
- EASEMENT LINE
- 100 YR FLOODPLAIN LIMIT
- CREEK FLOW DIRECTION
- TREE

DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 8/3/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 8/3/2018 DATE

PAPE-DAWSON ENGINEERS

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TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL

PLAN AND PROFILE (STA 239+00 TO STA 244+00)

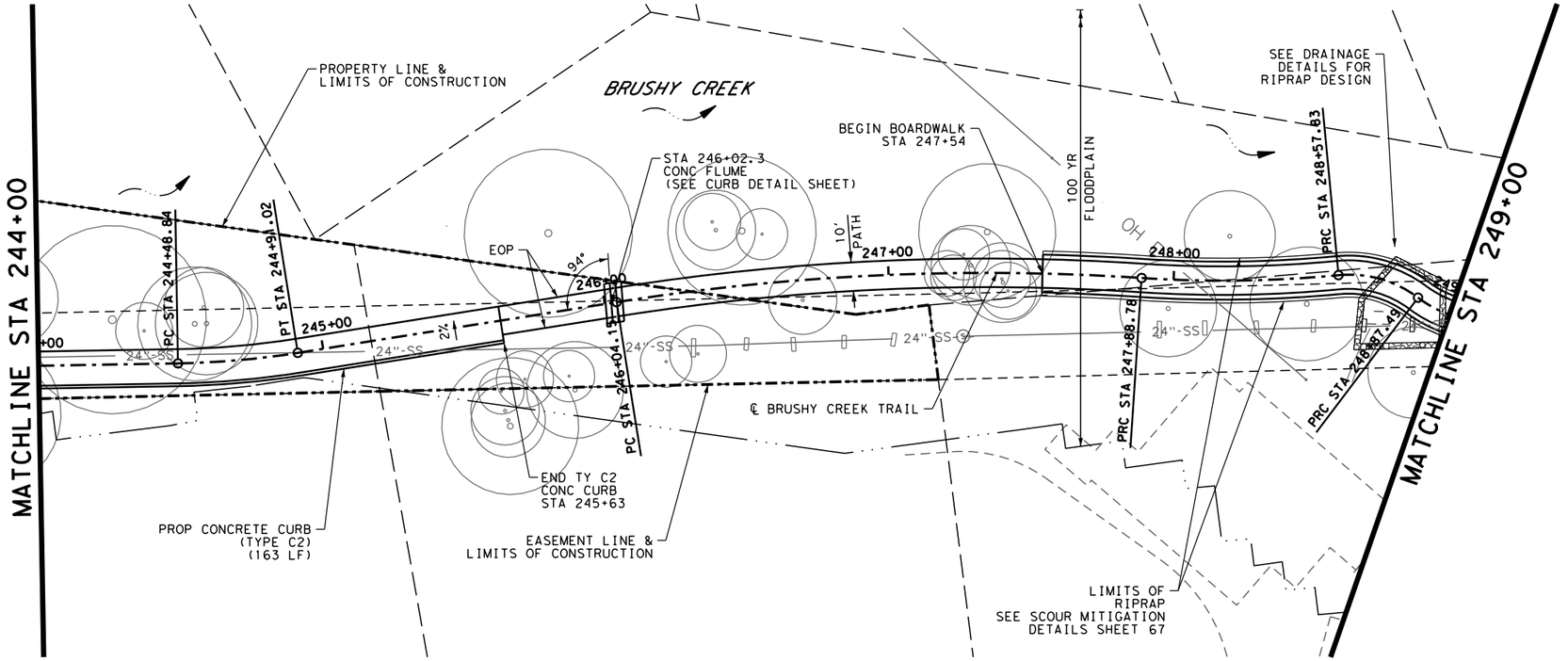
SHEET 7 OF 10

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 41

Design Filename: H:\projects\508\67\00\design\Civil\Roadway\5086700PP09.dgn

Plotted on: 8/3/2018

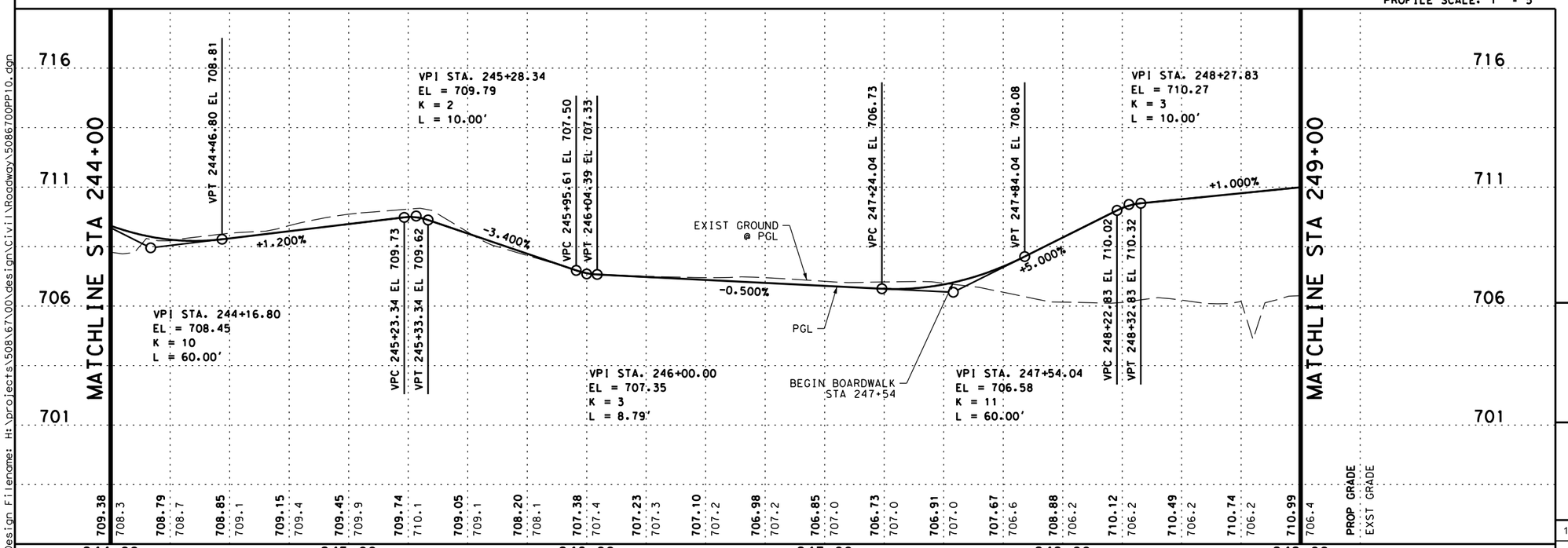
ITEM	DESC	DESCRIPTION	UNIT	QTY
0100	6002	PREPARING ROW	STA	5
0110	6001	EXCAVATION (ROADWAY)	CY	137
0132	6004	EMBANKMENT (FINAL)(DENS CONT)(TY B)	CY	30
0161	6014	COMPOST MANUF TOPSOIL (BOS OR PB) (4")	SY	403
0164	6037	DRILL SEEDING (PERM) (URBAN) (SANDY)	SY	403
0168	6001	VEGETATIVE WATERING	MG	6.79
0169	6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY	403
0420	6011	CL B CONC (FLUME)	CY	2
0432	6022	RIPRAP (STONE COMMON)(DRY)(6 IN)	CY	125
0442	6007	STR STEEL (MISC NON - BRIDGE)	LB	875
0529	6027	CONC CURB (TY C2)	LF	163
0531	6001	CONC SIDEWALKS (4")	SY	213
0531	6003	CONC SIDEWALKS (6")	SY	217



LEGEND

- LIMITS OF CONSTRUCTION
- PROPERTY LINE
- EASEMENT LINE
- 100 YR FLOODPLAIN LIMIT
- CREEK FLOW DIRECTION
- TREE

PLAN SCALE: 1" = 50'
PROFILE SCALE: 1" = 5'



DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 8/3/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 8/3/2018 DATE

PAPE-DAWSON ENGINEERS

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BRUSHY CREEK TRAIL

PLAN AND PROFILE (STA 244+00 TO STA 249+00)

SHEET 8 OF 10

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 42

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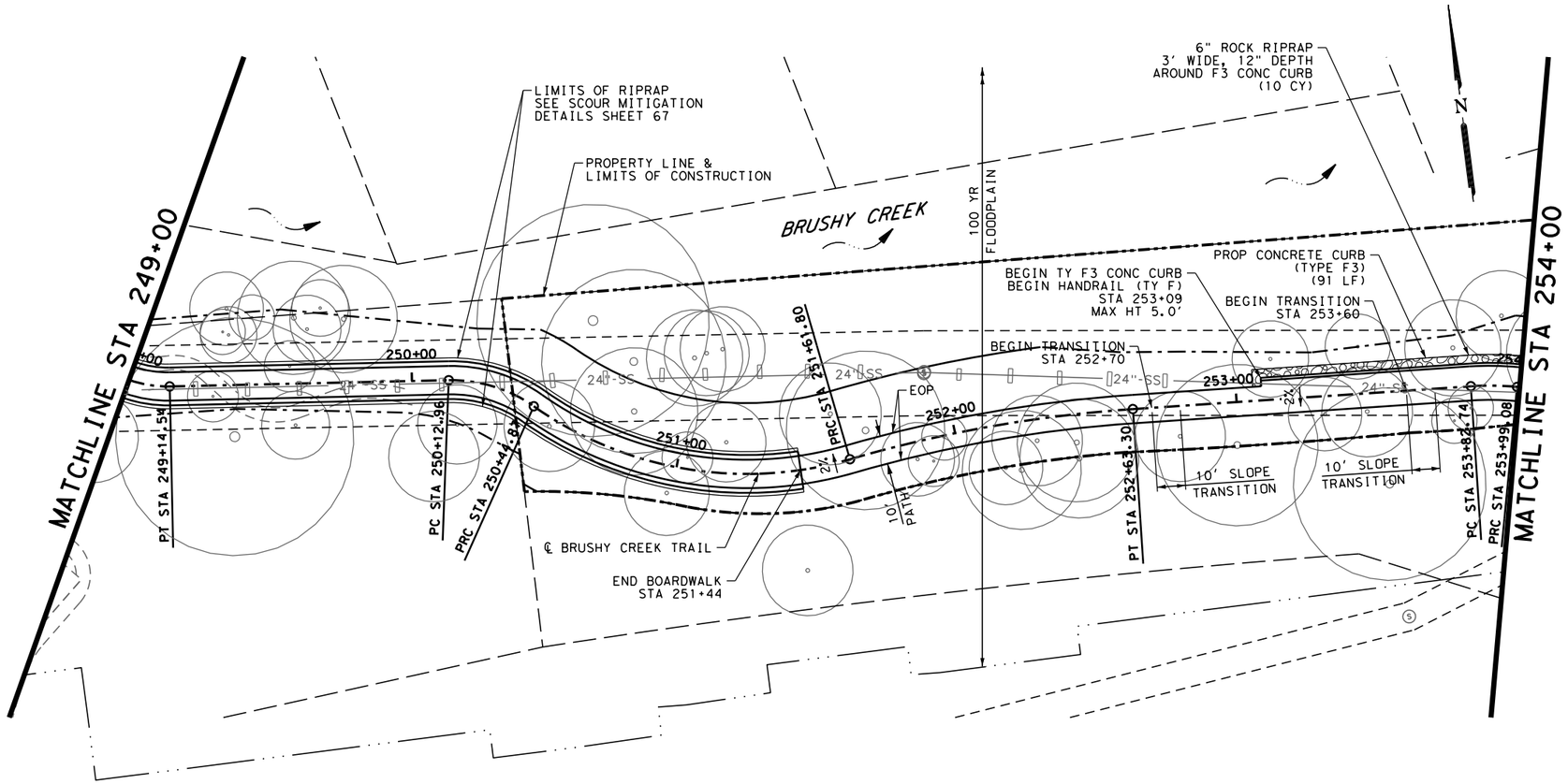

Plotted on: 8/3/2018

Design Filename: H:\projects\508\67\00\design\Civil\Roadway\5086700PP11.dgn

ITEM	DESC	DESCRIPTION	UNIT	QTY
0100	6002	PREPARING ROW	STA	5
0110	6001	EXCAVATION (ROADWAY)	CY	63
0132	6004	EMBANKMENT (FINAL)(DENS CONT)(TY B)	CY	8
0161	6014	COMPOST MANUF TOPSOIL (BOS OR PB) (4")	SY	238
0164	6037	DRILL SEEDING (PERM) (URBAN) (SANDY)	SY	238
0168	6001	VEGETATIVE WATERING	MG	4.00
0169	6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY	238
0432	6022	RIPRAP (STONE COMMON)(DRY)(6 IN)	CY	220
0450	6052	RAIL (HANDRAIL)(TY F)	LF	91
0529	6018	CONC CURB (TY F3)	LF	91
0531	6001	CONC SIDEWALKS (4")	SY	183
0531	6003	CONC SIDEWALKS (6")	SY	122

LEGEND

—·—·—·	LIMITS OF CONSTRUCTION
— — —	PROPERTY LINE
- - - -	EASEMENT LINE
—··—··—	100 YR FLOODPLAIN LIMIT
⤳	CREEK FLOW DIRECTION
◯	TREE

PLAN SCALE: 1" = 50'
PROFILE SCALE: 1" = 5'

DESIGN

HEATHER McNEAL
114428
LICENSED
Heather McNeal
HEATHER McNEAL, P.E.
8/3/2018
DATE

REVIEW AND APPROVAL

JAMES A. LUTZ
84722
LICENSED
James A. Lutz
JAMES A. LUTZ, P.E.
8/3/2018
DATE

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7800 SHOAL CREEK BLVD, STE 220 W | AUSTIN, TX 78757 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL

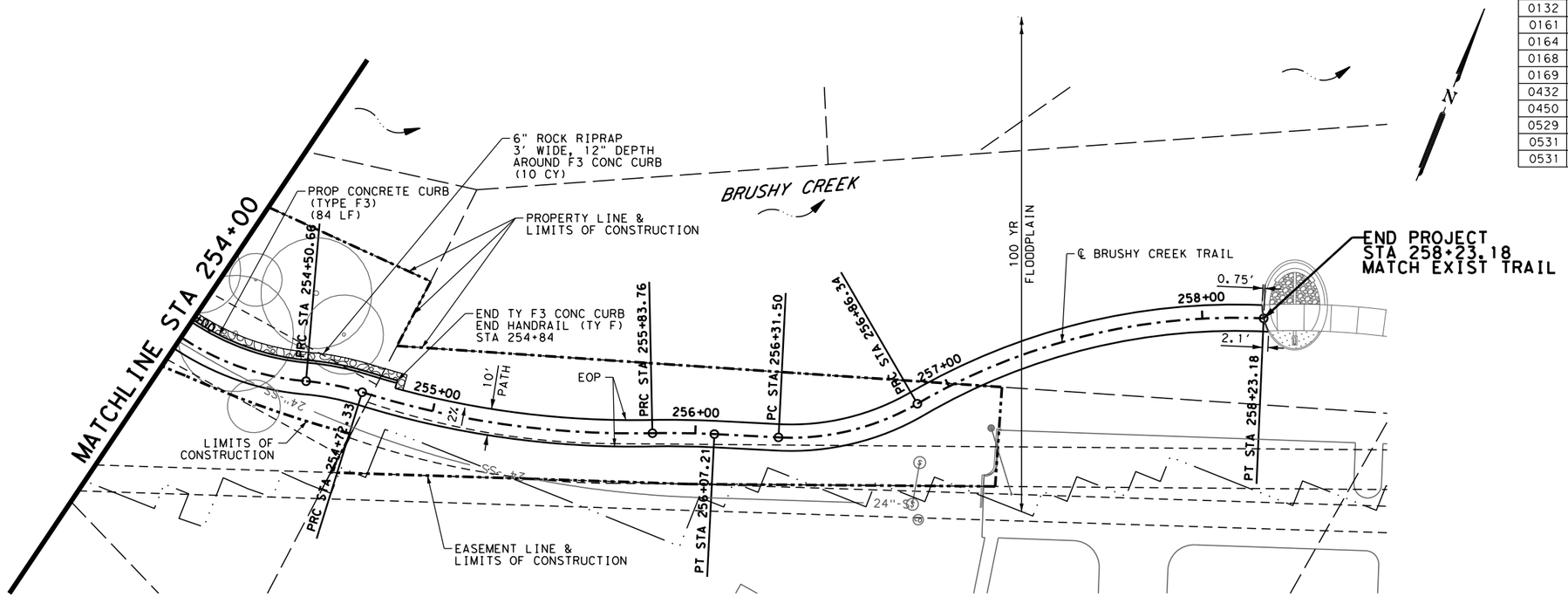
PLAN AND PROFILE
(STA 249+00 TO STA 254+00)

SHEET 9 OF 10

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 43

Plotted on: 8/3/2018

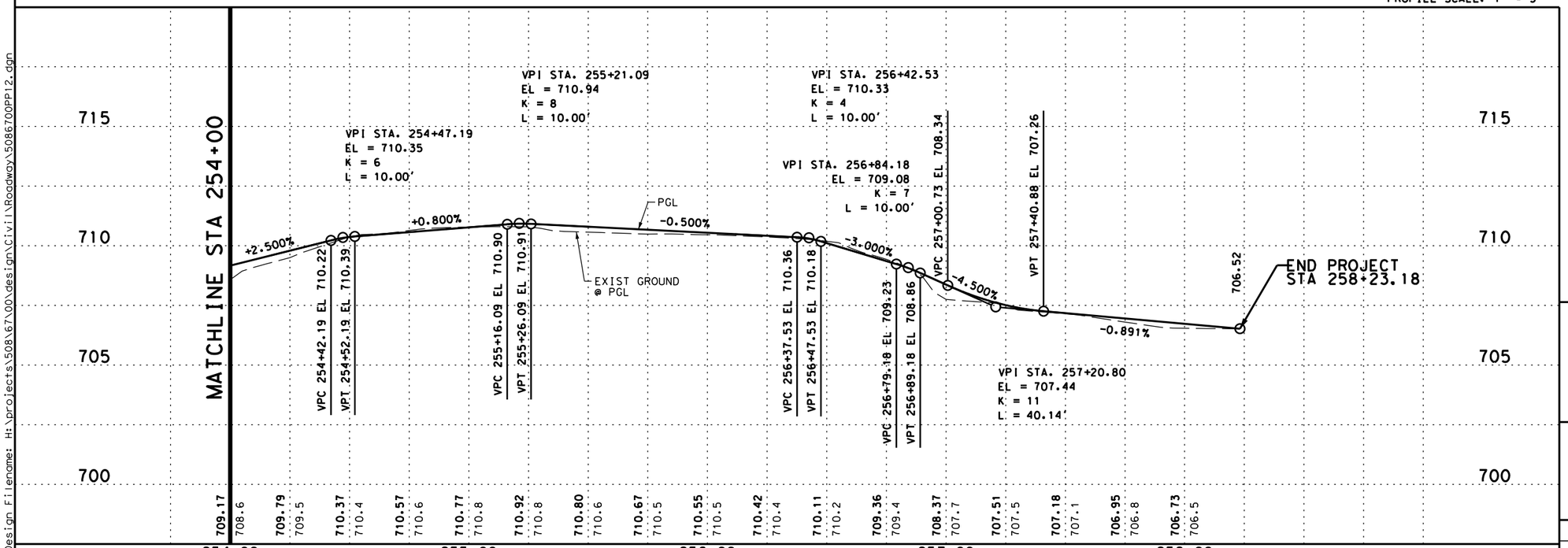
ITEM	DESC	DESCRIPTION	UNIT	QTY
0100	6002	PREPARING ROW	STA	5
0110	6001	EXCAVATION (ROADWAY)	CY	83
0132	6004	EMBANKMENT (FINAL)(DENS CONT)(TY B)	CY	19
0161	6014	COMPOST MANUF TOPSOIL (BOS OR PB) (4")	SY	522
0164	6037	DRILL SEEDING (PERM) (URBAN) (SANDY)	SY	522
0168	6001	VEGETATIVE WATERING	MG	8.79
0169	6001	SOIL RETENTION BLANKETS (CL 1) (TY A)	SY	522
0432	6022	RIPRAP (STONE COMMON)(DRY)(6 IN)	CY	10
0450	6052	RAIL (HANDRAIL)(TY F)	LF	84
0529	6018	CONC CURB (TY F3)	LF	84
0531	6001	CONC SIDEWALKS (4")	SY	991
0531	6003	CONC SIDEWALKS (6")	SY	112



LEGEND

- LIMITS OF CONSTRUCTION
- PROPERTY LINE
- EASEMENT LINE
- 100 YR FLOODPLAIN LIMIT
- CREEK FLOW DIRECTION
- TREE

PLAN SCALE: 1" = 50'
PROFILE SCALE: 1" = 5'



DESIGN

STATE OF TEXAS · HEATHER McNEAL · 114428 · LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 8/3/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS · JAMES A. LUTZ · 84722 · LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 8/3/2018 DATE

PAPE-DAWSON ENGINEERS

AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS

7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711

TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL

PLAN AND PROFILE (STA 254+00 TO END PROJECT)

SHEET 10 OF 10

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 44

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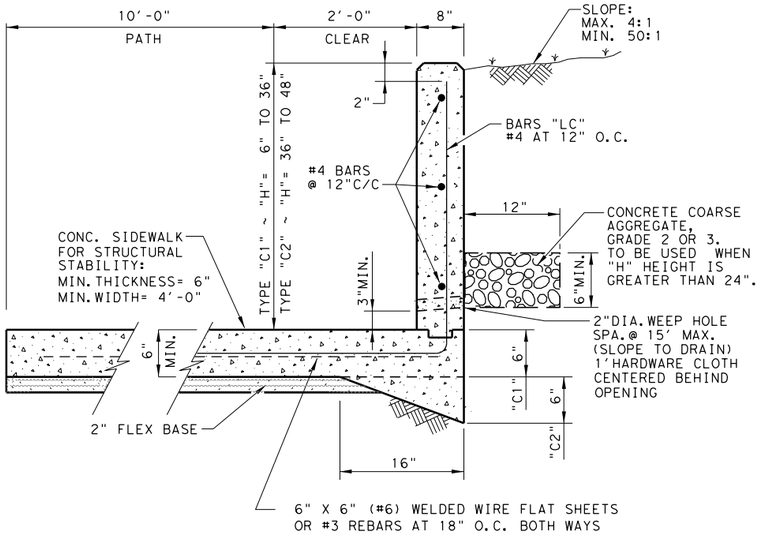
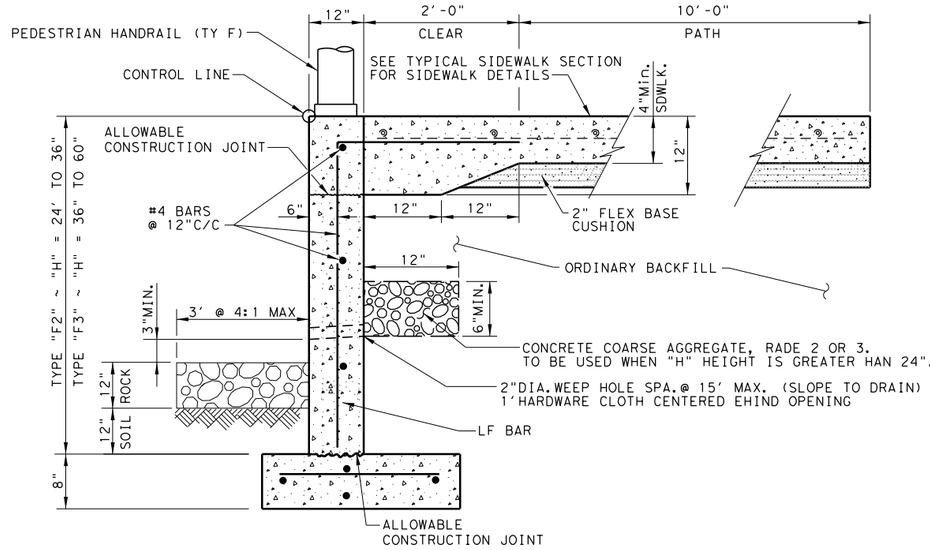
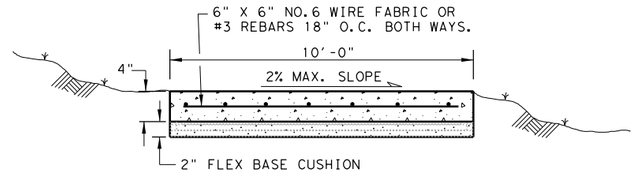


TYPE "C1" & "C2" CURB



TYPE "F3" CURB ‡

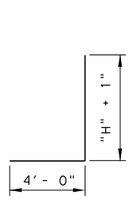


TYPICAL SIDEWALK SECTION

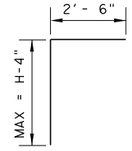
GROOVED JOINTS IN THE SIDE WALK SHALL BE AT A MAX. SPACING OF 10 FT. AND SHALL HAVE 3/4" EXPANSION JOINTS AT A MAX. SPACING OF 60'

GENERAL NOTES:
- All Concrete shall be Class "C".
- All Reinforcing Steel shall be Grade 60.
- ‡ Until the sidewalk is complete, lateral support for the "F" curbs will be required.

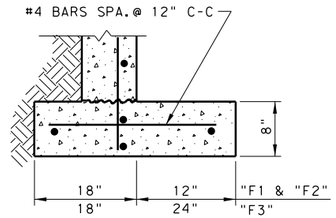
DESIGN SOIL PARAMETERS:
- Soil Unit Wt. = 120 pcf
- Phi = 30 Degrees
- Cohesion = 50 psf
- Min. PI = 15
- Max. PI = 30
- SURCHARGE:
  - TYPE F CURB q = 2' Adjacent to sidewalk
  - Max. slope behind TYPE C Curb = 4:1
  - Min. Factor of Safety against sliding is 1.5.
  - Designed in accordance with current AASHTO Standards and Interim Specifications.



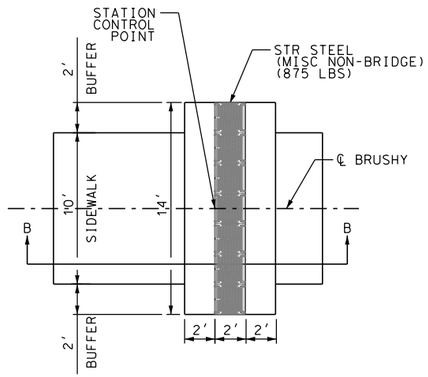
BAR "LC"



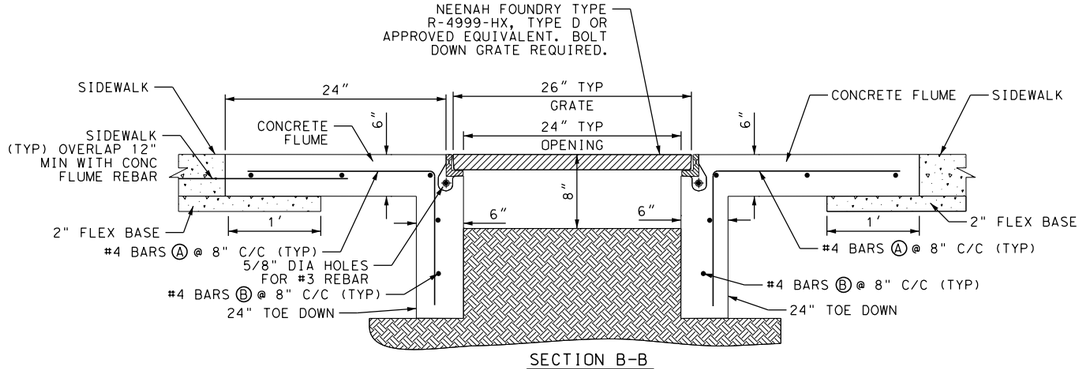
BAR "LF"



FOOTING DETAIL



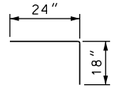
CONCRETE FLUME DETAIL
N.T.S.



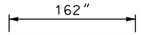
SECTION B-B
N.T.S.

NOTE: CONCRETE AND REBAR FOR FRAME AND COVER INCIDENTAL TO THE CONCRETE FLUME ITEM 420. FRAME AND COVER PAID FOR UNDER ITEM 442.

NOTE:
2' WIDE SIDEWALK GAP TO PROVIDE NATURAL DRAINAGE FLUME. TO BE FIELD LOCATED BASED ON SITE DRAINAGE CONDITIONS.



Ⓐ BAR DETAIL
#4 BAR @ 8" C-C



Ⓑ BAR DETAIL
#4 BAR @ 8" C-C

DESIGN

STATE OF TEXAS · HEATHER McNEAL · 114428 · LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 8/3/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS · JAMES A. LUTZ · 84722 · LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 8/3/2018 DATE

PAPE-DAWSON ENGINEERS
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TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL

CONCRETE CURB DETAILS

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 45

Plotted on: 8/3/2018
Design Filename: H:\projects\508\67\00\design\Civil\Standards\Roadway\miscurbdetails.dgn

DATE: 7/30/2018
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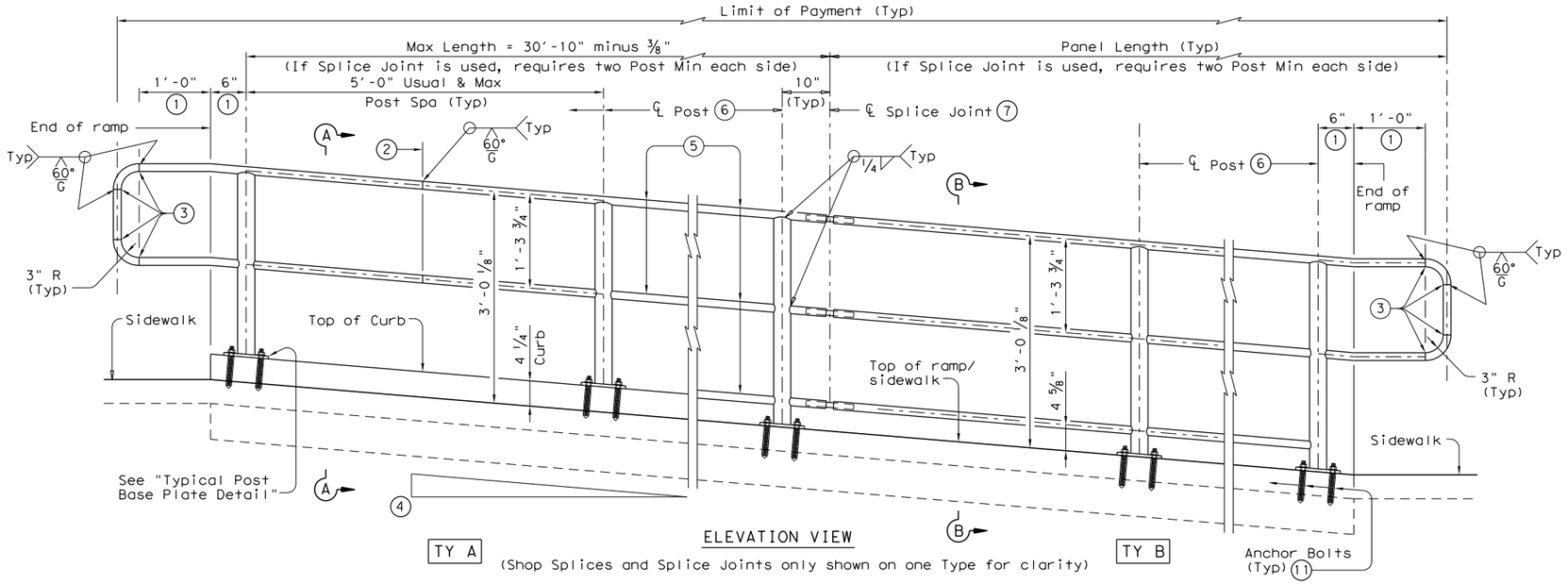
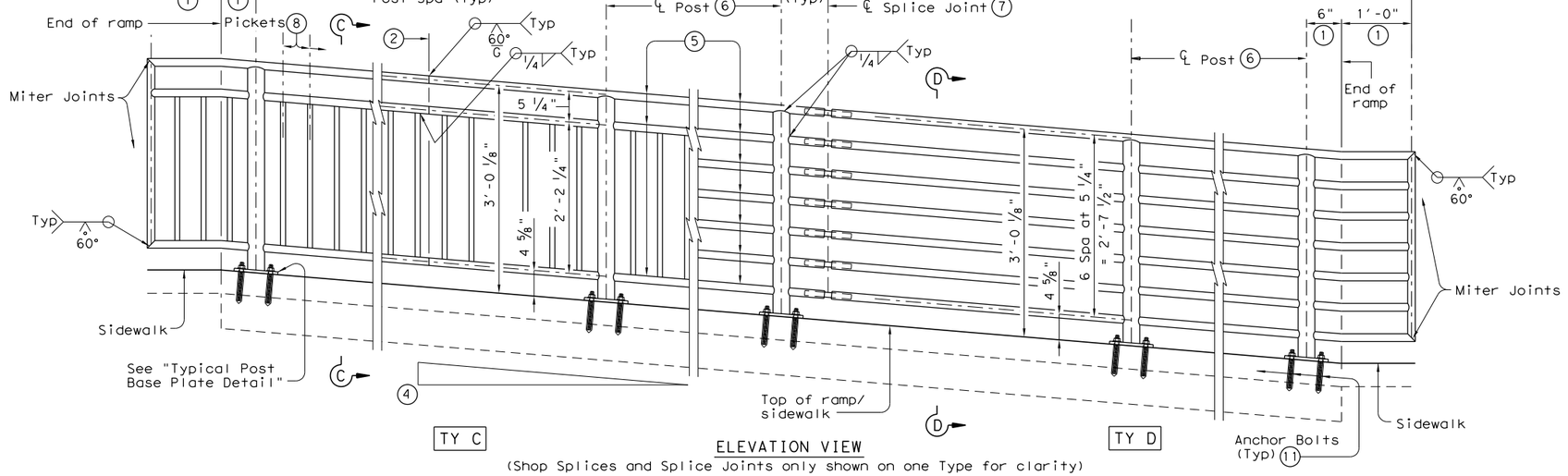
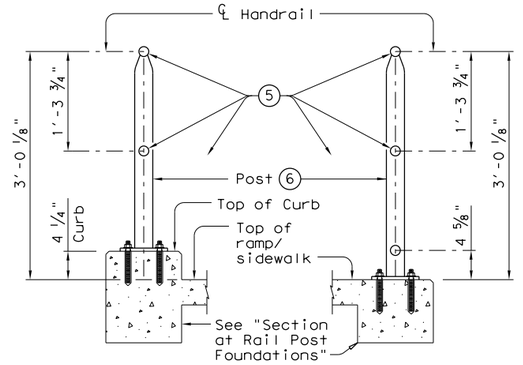


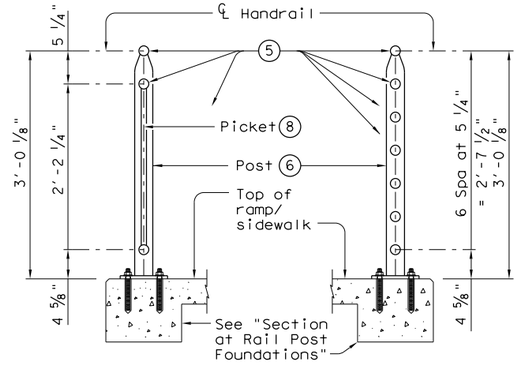


RECOMMENDED USAGE (9)(10)	
Dropoff Height/ Condition	Recommended Rail Options
< 30" dropoff	TY A, TY B, TY C, or TY D
≥ 30" dropoff, or along Bike Path	TY E or TY F



SECTION A-A
(Showing Handrail TY A)

SECTION B-B
(Showing Handrail TY B)



SECTION C-C
(Showing Handrail TY C)

SECTION D-D
(Showing Handrail TY D)

(1) Parallel to ground.

(2) One shop splice per panel is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.

(3) Shop splice is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.

(4) See Ramp Details located elsewhere in plans for ramp slope and dimensions. Maximum ramp slope will not exceed 8.3 percent. Level landing required for each 30" rise if grade exceeds 5 percent.

(5) 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp / sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.

(6) 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). See "Post Mount Detail" for crimping and trimming post to fit Dia. of top rail. Provide holes as needed in post for galvanizing drainage and venting. Plumb all posts.

(7) See "Handrail Fabrication Details" for Splice Joints.

(8) ℄ ⅝" Dia. Round Bar equal spacing at 4 ½" Max. Plumb all pickets.

(9) When needed for accessibility (grade > 5 percent) or as needed for pedestrian safety.

(10) Not to be used on bridges.

(11) See "General Notes" for anchor bolt information.

SHEET 1 OF 3

Texas Department of Transportation

Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT Decmeber 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED MAY, 2013 (VP)	0914	05	191	NA
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		46

DATE: 7/30/2018
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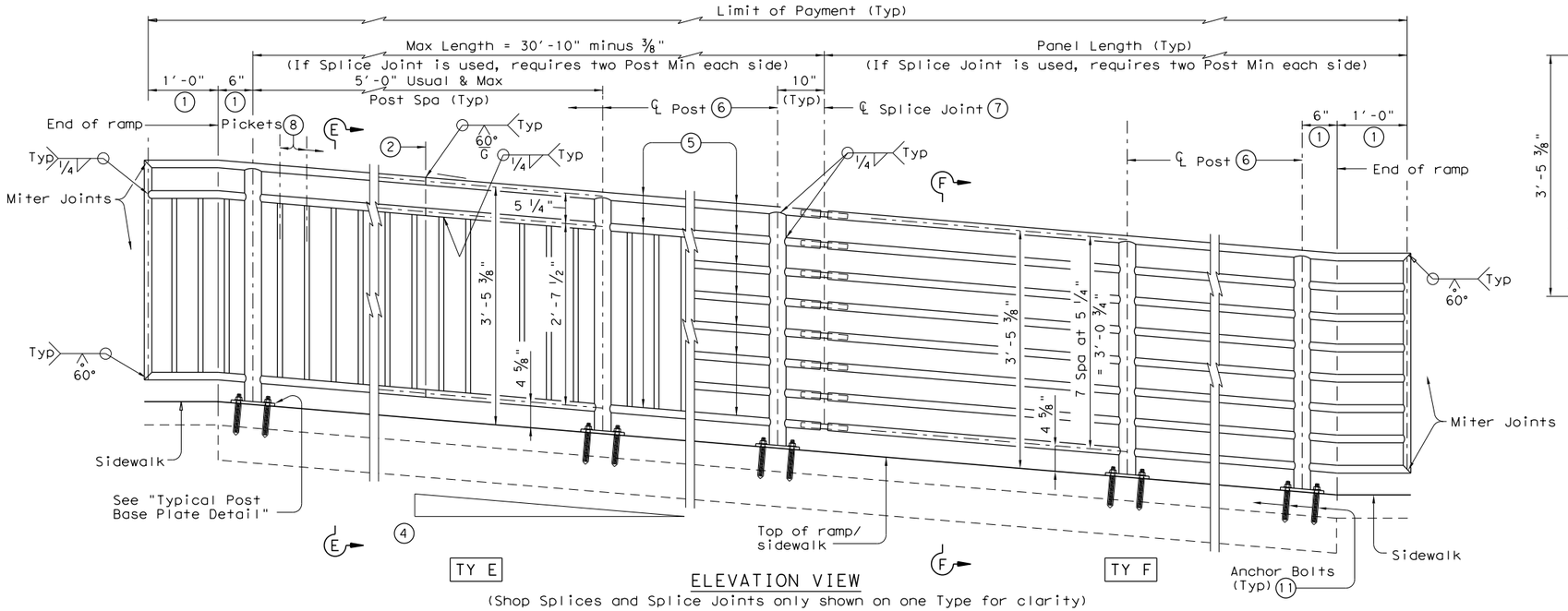
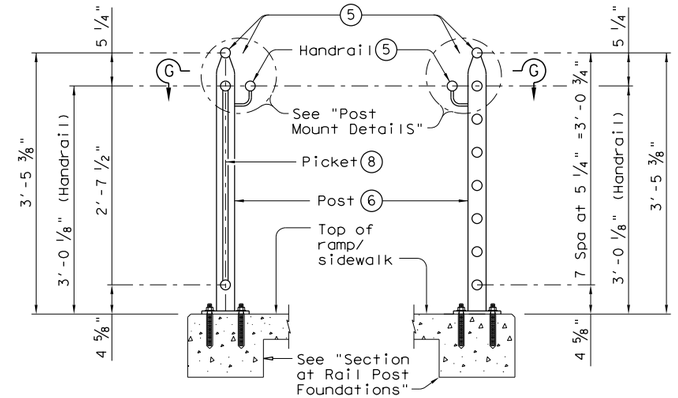


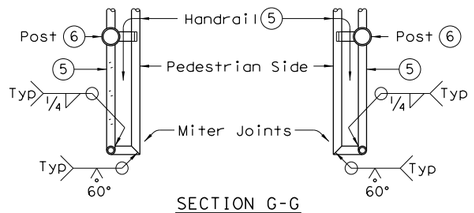
ELEVATION VIEW

(Shop Splices and Splice Joints only shown on one Type for clarity)

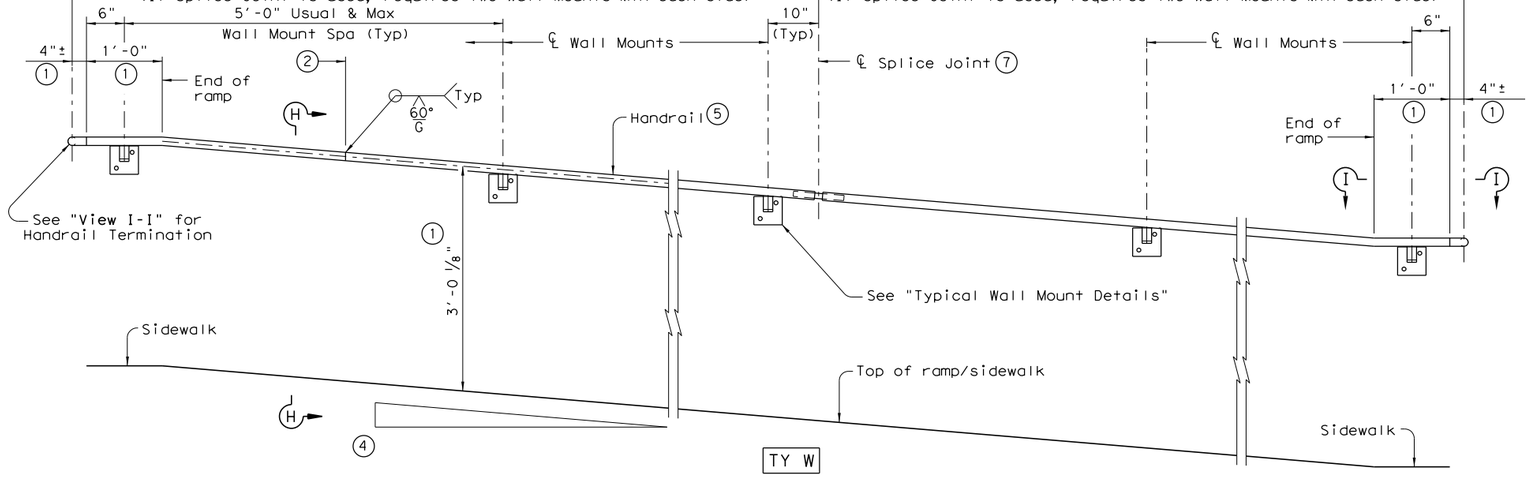


SECTION E-E
(Showing Handrail TY E)

SECTION F-F
(Showing Handrail TY F)

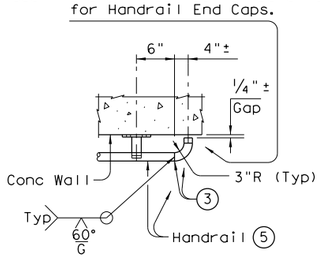


SECTION G-G
(Showing Handrail Termination)



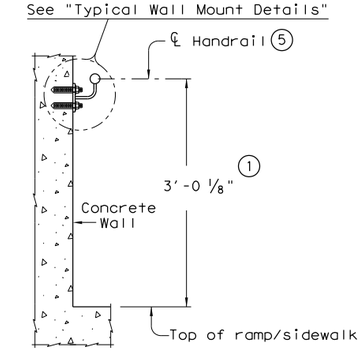
ELEVATION VIEW

See "Handrail Fabrication Details" for Handrail End Caps.



VIEW I-I
(Showing Handrail Termination)

See "Typical Wall Mount Details"



SECTION H-H
(Showing Handrail TY W)

1. Parallel to ground.
2. One shop splice per panel is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
3. Shop splice is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
4. See Ramp Details located elsewhere in plans for ramp slope and dimensions. Maximum ramp slope will not exceed 8.3 percent. Level landing required for each 30" rise if grade exceeds 5 percent.
5. 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp / sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.
6. 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). See "Post Mount Detail" for crimping and trimming post to fit Dia. of top rail. Provide holes as needed in post for galvanizing drainage and venting. Plumb all posts.
7. See "Handrail Fabrication Details" for Splice Joints.
8. ℄ ⅝" Dia. Round Bar equal spacing at 4 ½" Max. Plumb all pickets.
11. See "General Notes" for anchor bolt information.

Texas Department of Transportation — Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	191	NA
REVISED MAY, 2013 (VP)	DIST	COUNTY		SHEET NO.
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DATE: 7/30/2018
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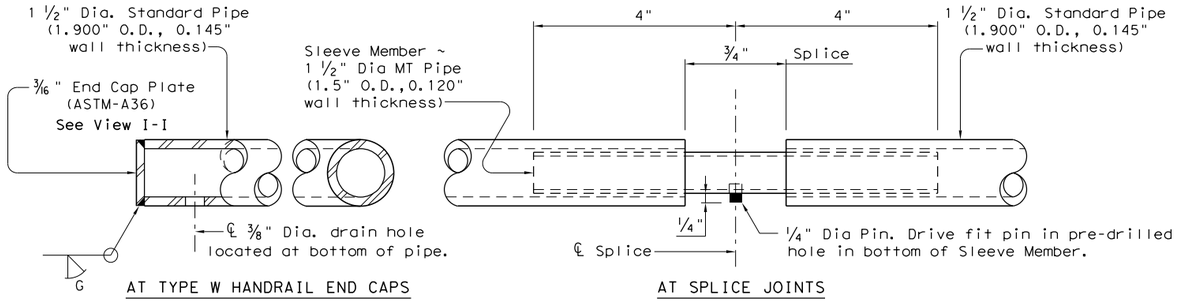
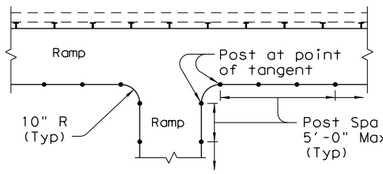


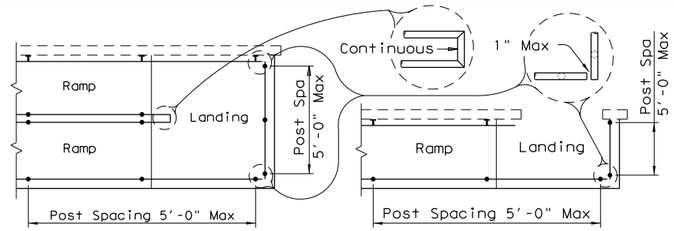
AT TYPE W HANDRAIL END CAPS

AT SPLICE JOINTS

HANDRAIL FABRICATION DETAILS



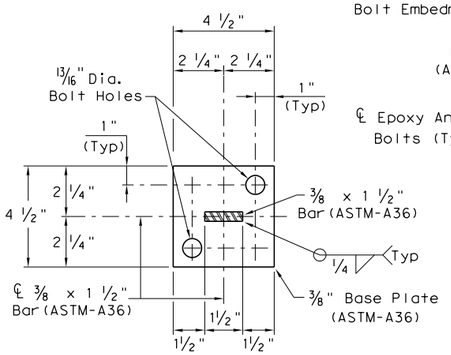
RAMP INTERSECTION



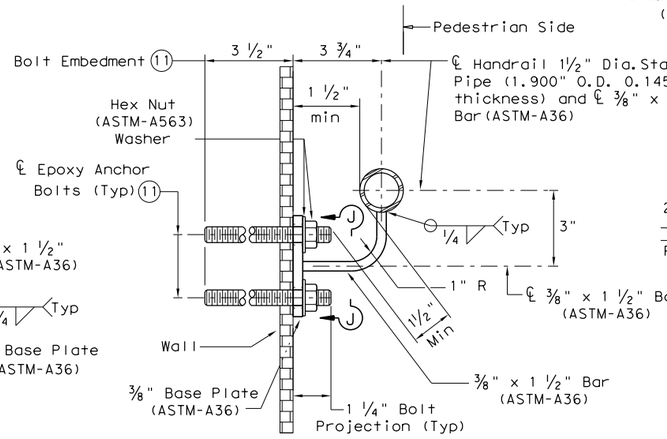
MULTI-LEVEL RAMP

SINGLE-LEVEL RAMP

PLAN SHOWING RAIL AT RAMP CONDITIONS

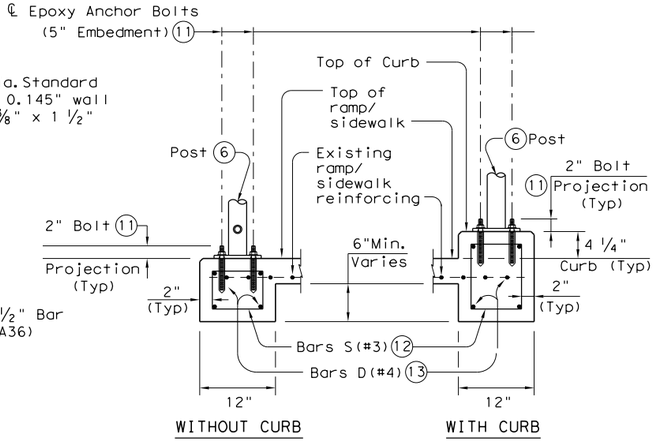


SECTION J-J
(Anchor Bolts not shown for clarity)



SECTION AT WALL MOUNT

TYPICAL WALL MOUNT DETAILS



WITHOUT CURB

WITH CURB

SECTION AT RAIL POST FOUNDATIONS

GENERAL NOTES

Designed according to ADAAG, Texas Accessibility Standards, Uniform Building Code, and AASHTO LRFD Specifications.

Handrail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Pipe will conform to ASTM-A53 Grade B or A500 Grade B. Steel plates and steel bars will conform to ASTM-A36. Mechanical tubing (MT) will conform to ASTM A513 Grade 1015 or higher. Galvanize all steel components except reinforcing steel unless noted otherwise.

Concrete for foundations will be in accordance with Item 531 "Sidewalks". All reinforcing steel must be Grade 60. Bar laps, where required, will be as follows: Uncoated ~ #4 = 1'-5" Epoxy coated ~ #4 = 2'-1"

When the plans require painted steel, follow the requirements for painting galvanized steel in Item 446, "Cleaning and Painting Steel". Sleeve Members will receive galvanization and only get field painted after installation unless directed otherwise by Engineer.

Epoxy Anchor bolts for wall mount and post base plate will be ⅝" Dia. ASTM A36 threaded rods with one hex nut and one hardened steel washer at each bolt. ⅝" Dia. threaded rod embedment depth for wall mounts is 3 ½" and embedment depth for post base plate is 5".

Embed threaded rods into concrete with a Type III (Class C) epoxy meeting the requirements of DMS-6100, "Epoxies and Adhesives". Mix and dispense adhesive with the manufacturer's static mixing nozzle/dual cartridge system. Core drill holes (percussion drilling not permitted).

At the contractor's option the post base plate anchor bolts may be cast with the Ramp/Sidewalk (See Cast-in-Place Anchor Bolt Options).

Optional cast-in-place anchor bolts will be ⅝" Dia ASTM A307 Grade A bolts (or A36 threaded rods with one tack welded hex nut each) with one hex nut and one hardened steel washer at each bolt. Embedment depth of cast-in-place bolt will be 8" for post base plate.

Handrails and any wall or other surface adjacent to them will be free of any sharp or abrasive elements.

Submit shop drawings to the Engineer unless otherwise noted. For curved handrail applications, fabricate the handrail to the curve if radius is less than 600 ft. Shop drawings are required when rail is fabricated to the curve.

For all handrails, erection drawings will be submitted to the Engineer for approval to ensure proper installation.

Drawings will show handrail mount locations with bolts setting, spacing, ramp slope, and/or splice joint locations, and handrail lengths with identification showing where each handrail goes on the layout.

Payment for concrete sidewalks or curb ramps will be paid for in accordance with Item 531 "Sidewalks".

Payment for all items shown is to be included in unit price bid in accordance with Item 450 "Railing" of the type specified.

All exposed edges will be rounded or chamfered to approximately ⅛" by grinding.

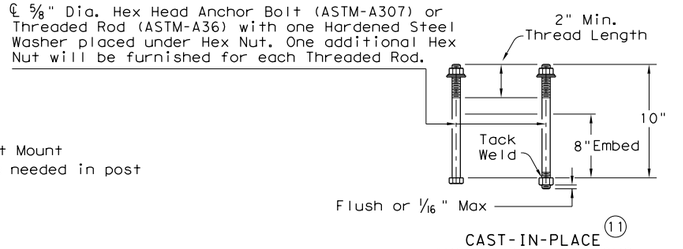
(5) 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp/sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.

(6) 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). Plumb all posts. See "Post Mount Detail" for crimping and trimming post to fit the diamenter of top rail. Provide holes as needed in post for galvanizing drainage and venting.

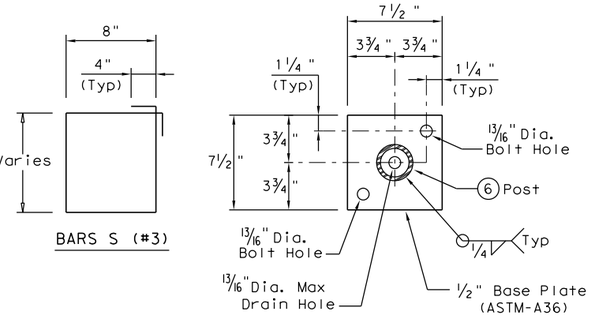
(11) See "General Notes" for anchor bolt information.

(12) Bars S(#3) spaced at 12" Max (Spaced 3" from outside edge of overall length of Ramp/Sidewalk).

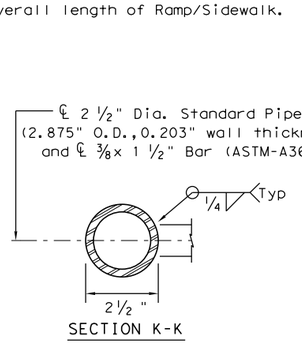
(13) Provide 1 ½" end cover to Bars D(#4) from outside edge of overall length of Ramp/Sidewalk.



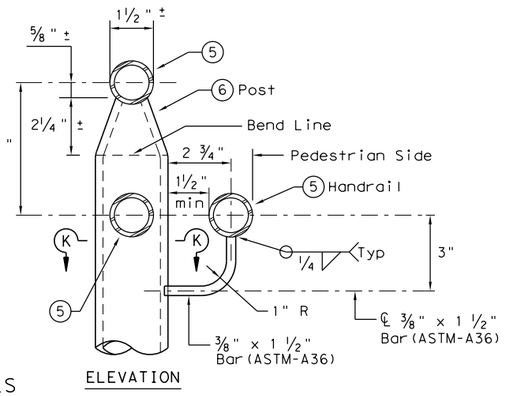
CAST-IN-PLACE ANCHOR BOLT OPTIONS
(Used for Post Base Plate only)



TYPICAL POST BASE PLATE DETAIL



SECTION K-K



ELEVATION

POST MOUNT DETAILS

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	191	NA
REVISED MAY, 2013 (VP)	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		48

DATE: 8/3/2018
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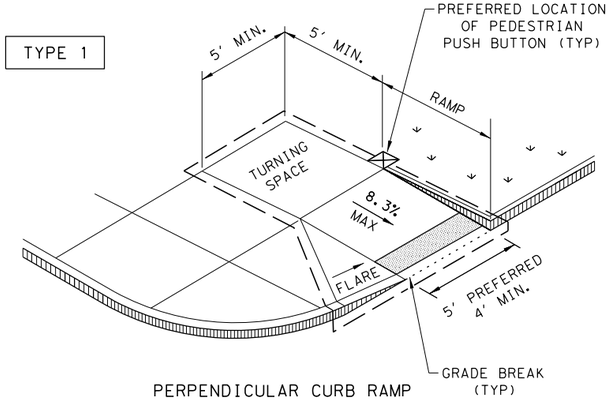
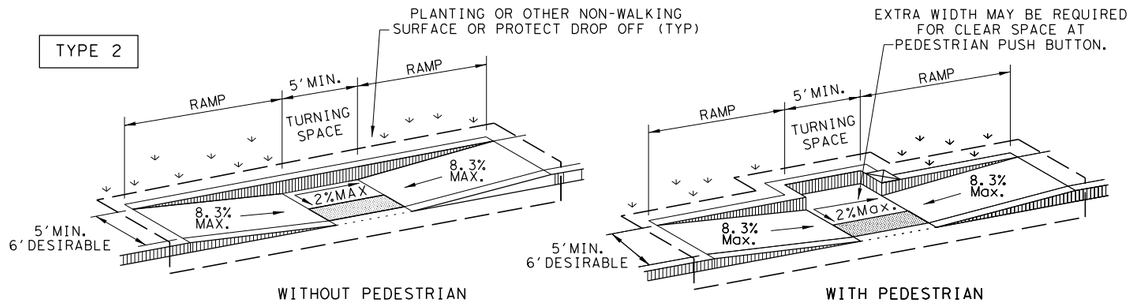
TYPE 1



PERPENDICULAR CURB RAMP

TYPE 2

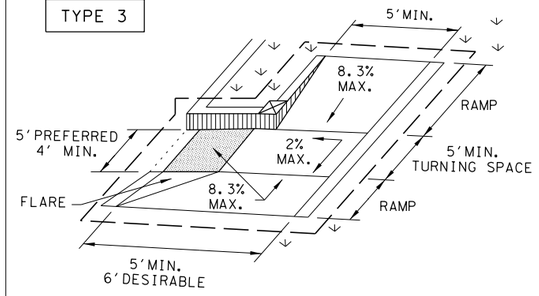


WITHOUT PEDESTRIAN PUSH BUTTON

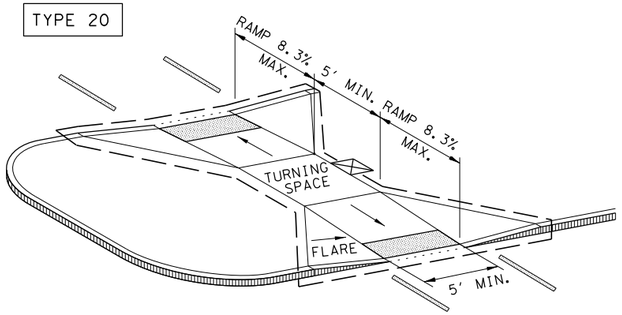
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3



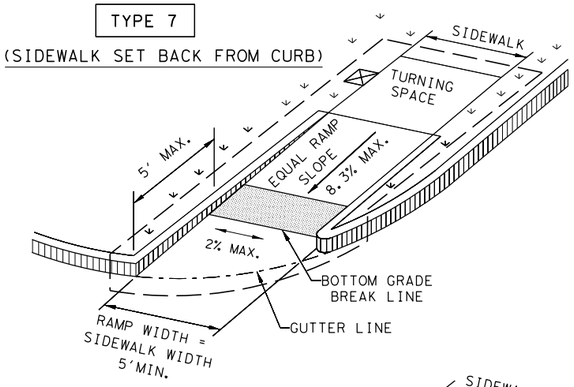
TYPE 20



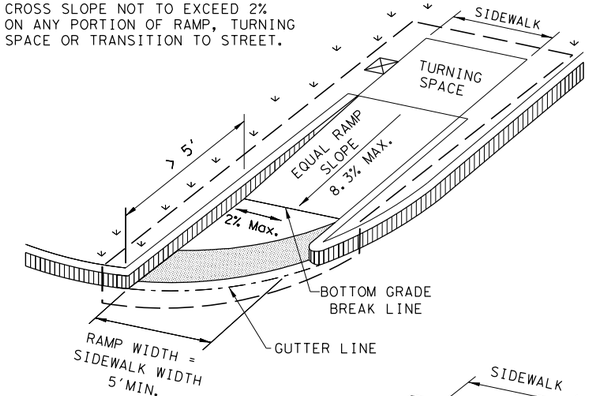
CURB RAMPS AT MEDIAN ISLANDS

TYPE 7

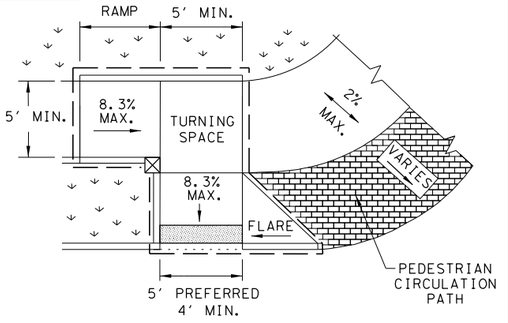
(SIDEWALK SET BACK FROM CURB)



CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



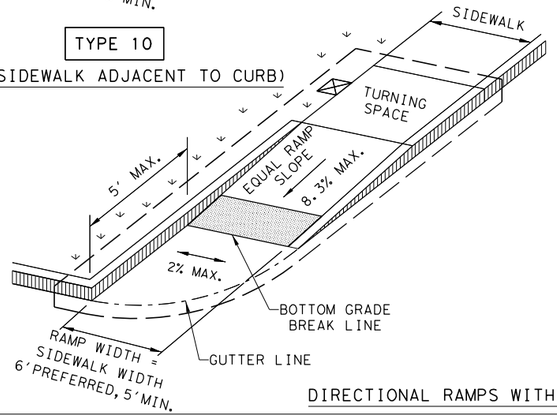
TYPE 6



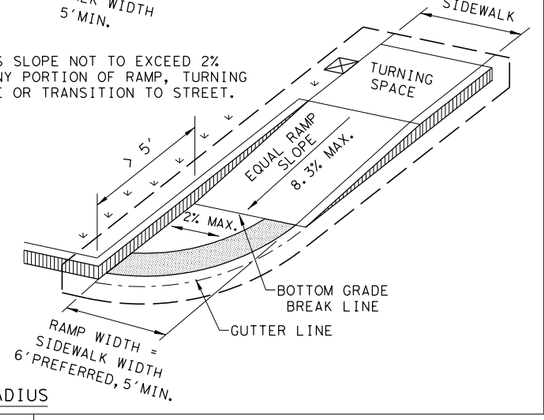
COMBINATION CURB RAMPS

TYPE 10

(SIDEWALK ADJACENT TO CURB)

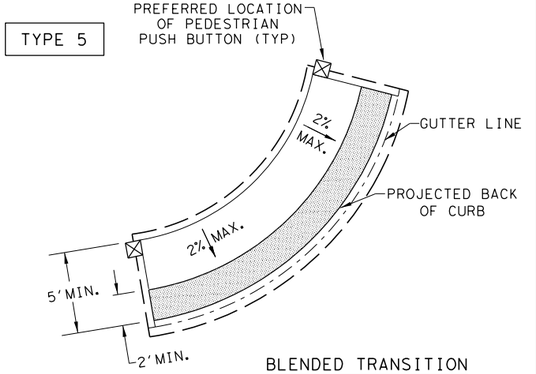


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



DIRECTIONAL RAMPS WITHIN RADIUS

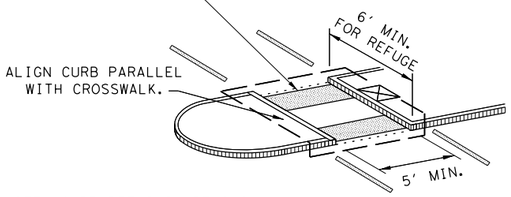
TYPE 5



BLENDED TRANSITION
(FLUSH LANDING)

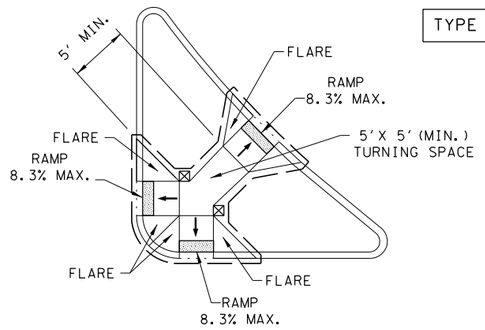
TYPE 21

INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.

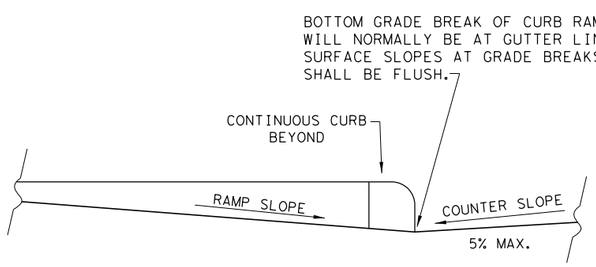


NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

TYPE 22



COMBINATION ISLAND RAMPS



TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY

NOTES / LEGEND:

SEE GENERAL NOTES ON SHEET 2 OF 4 FOR MORE INFORMATION.

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

DETECTABLE WARNING SURFACE

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

GUTTER LINE

GRADE BREAK

RAMP LIMITS OF PAYMENT

SHEET 1 OF 4

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	191	NA
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		48A

DATE: 8/3/2018
FILE: H:\projects\508\67\00\design\Civil\Standards\Roadway\ped18.dgn

GENERAL NOTES

CURB RAMPS

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
4. The minimum sidewalk width is 5'. Where the sidewalk is adjacent to the back of curb, a 6' sidewalk width is desirable. Where a 5' sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4' for short distances. 5'x 5' passing areas at intervals not to exceed 200' are required.
5. Turning Spaces shall be 5'x 5' minimum. Cross slope shall be maximum 2%.
6. Clear space at the bottom of curb ramps shall be a minimum of 4'x 4' wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
9. To serve as a pedestrian refuge area, the median should be a minimum of 6' wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5'x 5' landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
16. Provide a smooth transition where the curb ramps connect to the street.
17. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
18. Existing features that comply with applicalble standards may remain in place unless otherwise shown on the plans.

DETECTABLE WARNING MATERIAL

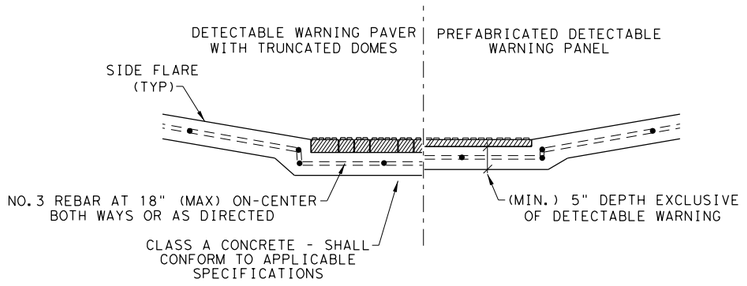
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
20. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
21. Detectable warning surfaces must be firm, stable and slip resistant.
22. Detectable warning surfaces shall be a minimum of 24 inches in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

DETECTABLE WARNING PAVERS (IF USED)

25. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

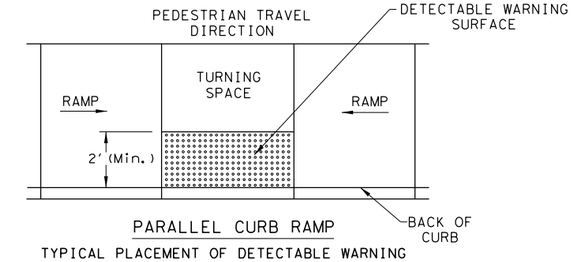
SIDEWALKS

27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
28. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
29. Street grades and cross slopes shall be as shown elsewhere in the plans.
30. Changes in level greater than 1/4 inch are not permitted.
31. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than five percent (5%) must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with PROWAG R409.
32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
33. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
34. Sidewalk details are shown elsewhere in the plans.



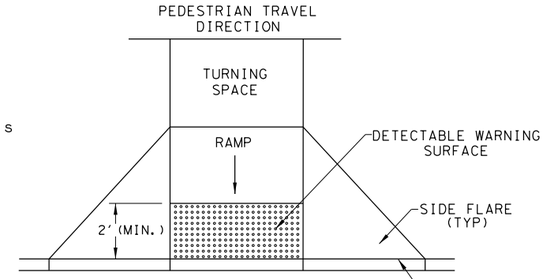
SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

DETECTABLE WARNING SURFACE DETAILS



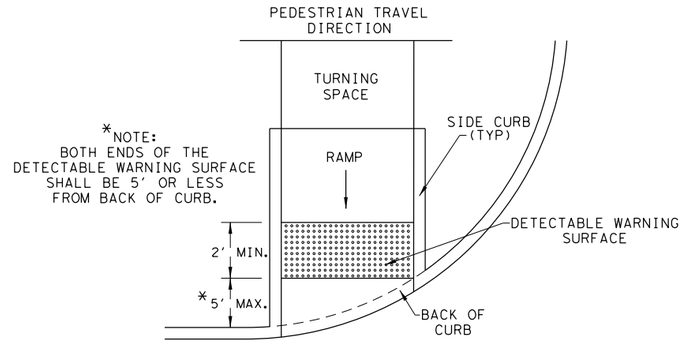
PARALLEL CURB RAMP

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING AT STREET EDGE.



PERPENDICULAR CURB RAMP

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.



DIRECTIONAL CURB RAMP

TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.

Texas Department of Transportation | Design Division Standard

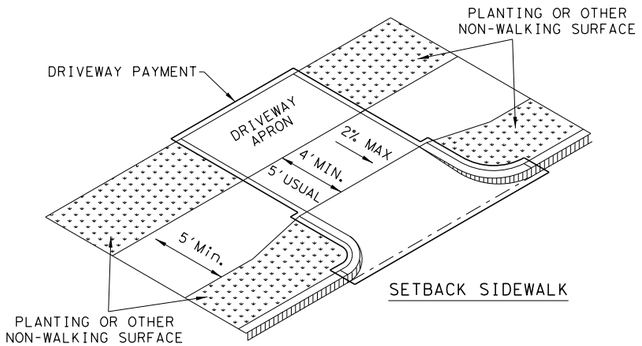
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

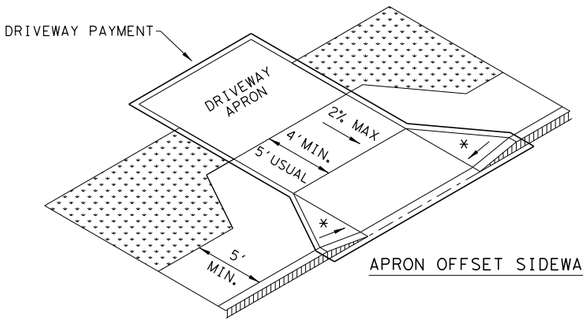
FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG	
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0914	05	191	NA	
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.	
	AUS	WILLIAMSON		48B	

DATE: 8/3/2018
FILE: H:\projects\508\67\00\design\Civil\Standards\Roadway\ped18.dgn

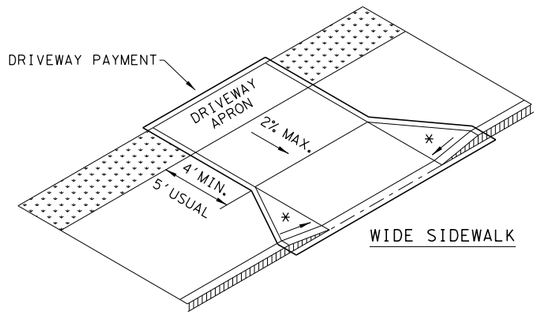
SIDEWALK TREATMENT AT DRIVEWAYS



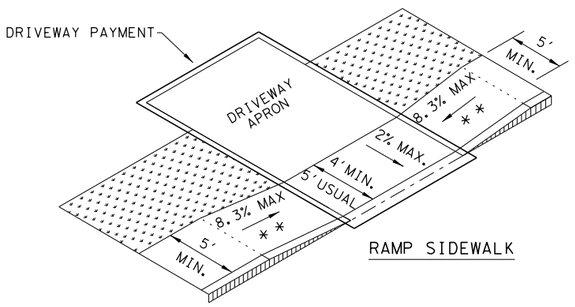
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

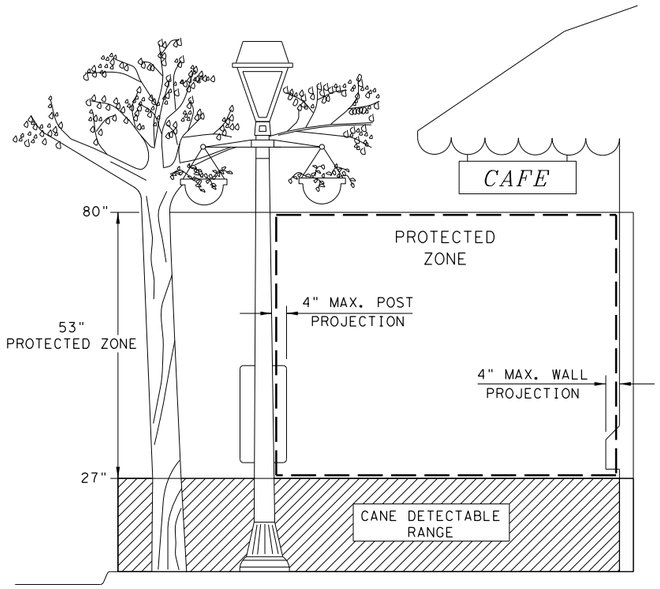


RAMP SIDEWALK

NOTES:

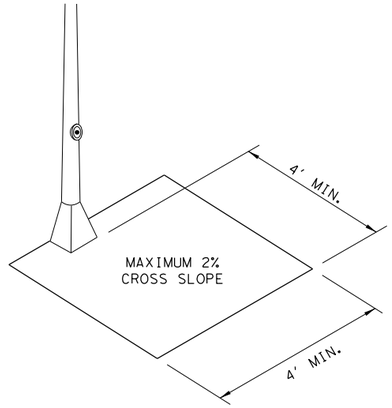
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

* * IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.

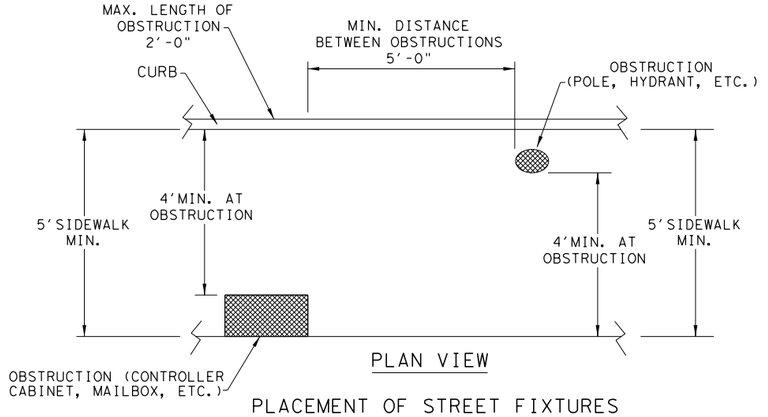


PROTECTED ZONE

NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



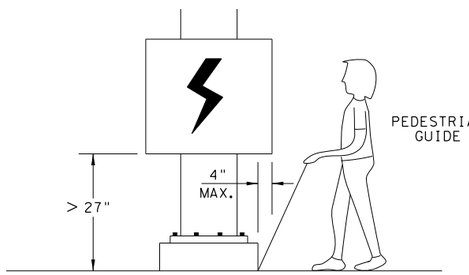
CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



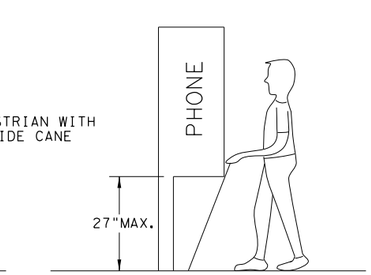
PLAN VIEW

PLACEMENT OF STREET FIXTURES

NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' X 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.



WHEN AN OBSTRUCTION OF A HEIGHT GREATER THAN 27" FROM THE SURFACE WOULD CREATE A PROTRUSION OF MORE THAN 4" INTO THE PEDESTRIAN CIRCULATION AREA, CONSTRUCT ADDITIONAL CURB OR FOUNDATION AT THE BOTTOM TO PROVIDE A MAXIMUM 4" OVERHANG.



PROTRUDING OBJECTS OF A HEIGHT ≤27" ARE DETECTABLE BY CANE AND DO NOT REQUIRE ADDITIONAL TREATMENT.

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

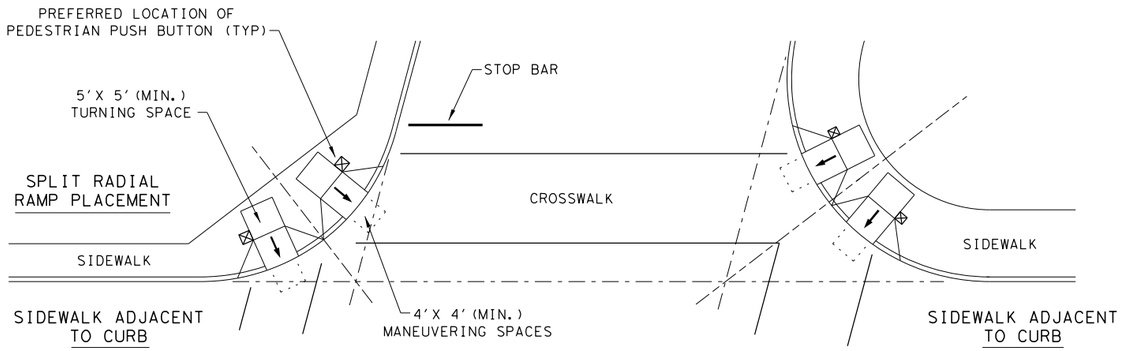
PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	191	NA
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		48C

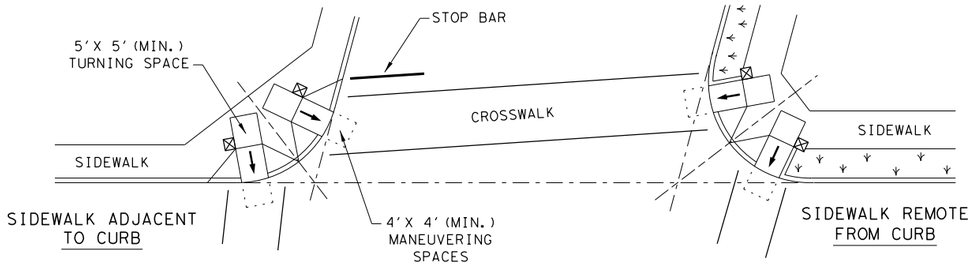
DATE: 8/3/2018
FILE: H:\projects\508\67\00\design\Civil\Standards\Roadway\ped18.dgn

TYPICAL CROSSING LAYOUTS

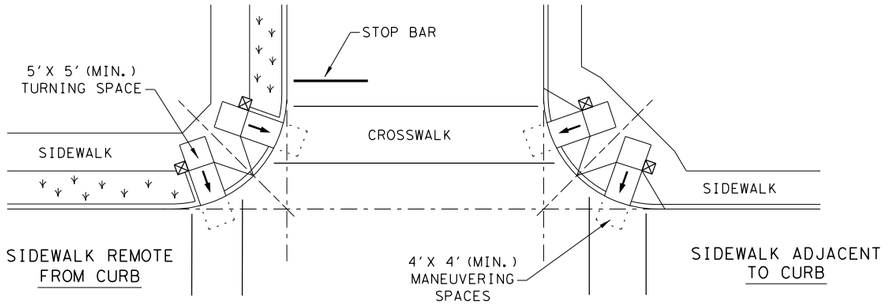
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



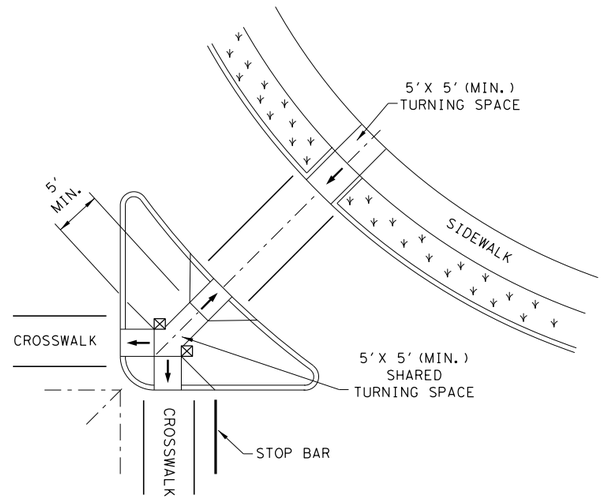
SKEWED INTERSECTION WITH "LARGE" RADIUS



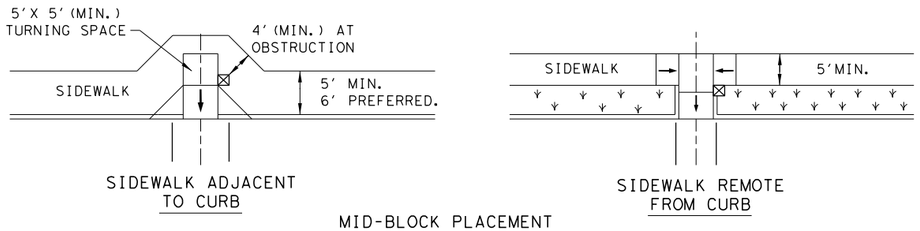
SKEWED INTERSECTION WITH "SMALL" RADIUS



NORMAL INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION
W/FREE RIGHT TURN & ISLAND



MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

LEGEND:

SHOWS DOWNWARD SLOPE. →

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (IF APPLICABLE). ⊠

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	191	NA
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		48D

BRUSHY CREEK REGIONAL TRAIL BOARDWALKS

GENERAL NOTES

1. This structure has been designed in accordance with the project architects plan layout and guidelines. Suitability for access and intended usage shall be the responsibility of the architect.
2. Vehicular access larger than the design live load shall be limited by permanent physical means.
3. Prior to construction the contractor shall verify all elevations through the project architect.

DESIGN DATA

1. Boardwalk shall be designed in accordance with the AASHTO LRFD bridge design specifications and the LRFD guide specification for the design of pedestrian bridges.

   Design Live Load: Pedestrian Loading - 90 psf Uniform
   Vehicular Loading -
   H-10 Truck - 20,000 lbs total load

2. Abutments and piers shall be designed for lateral earth pressure, live load surcharge and structure loads.

   Maximum Anticipated Pier Loads (Service Level): Compressive = 12.3 Tons (DL + LL)

   Allowable bearing pressure: 25,000 psf.

   Piers shall be embedded a minimum of 5'-0" into Hard Limestone. Estimated depth of piers is 7'-0" minimum. (Contractor To Verify)

   Contractor should anticipate deeper footings will be required in some areas due to variable conditions at this site.

4. All geotechnical recommendations contained in the report of subsurface investigation titled "Geotechnical Engineering Study For Brushy Creek Regional Trail" shall be followed. Report was dated May 4, 2018 and produced by Raba Kistner Consultants, Inc.
5. Railing shall be designed in accordance with AASHTO specifications. The railing supplier is responsible for the engineering of the detailed railing in accordance with the project specifications.

MATERIALS

1. All bolts, nuts, washers, and hardware shall be hot dipped galvanized after fabrication in accordance with ASTM A153.
2. Vertical posts and horizontal rails and for railing shall be hot dipped galvanized per ASTM A123.
3. Connection/splices of posts and rails shall be welded and protected with galvanizing paint per ASTM A780.
4. Cast-in-place concrete shall have a 28-day concrete compressive strength of 4000 psi.
5. All foundation reinforcing shall be Grade 60 conforming to ASTM A615.

PROJECT COMPONENTS SUPPLIED BY BOARDWALK MANUFACTURER
PRECAST CONCRETE TREADS
PRECAST CONCRETE BEAMS
RUBBER LEVELING PADS
COMPOSITE CLIP ANGLES WITH 3/4" DIAMETER RODS, WASHERS AND NUTS (6x6x3/8x0'-4")

PROJECT COMPONENTS SUPPLIED BY CONTRACTOR
HILTI HIT-HY-200 EPOXY ADHESIVE ANCHORING SYSTEM OR EQUAL (CLIP ANGLE AND DOWELED CONNECTIONS)
CAST-IN-PLACE CONCRETE DRILLED SHAFT FOUNDATIONS
CAST-IN-PLACE CONCRETE TURN-DOWN APPROACH SLABS
3/4" DIAMETER x 1'-5" LONG THREADED BARS WITH NUTS AND WASHERS (BEAM TO DRILLED SHAFT CONNECTION)
3/4" DIAMETER x 1'-8" LONG THREADED BARS WITH NUTS AND WASHERS (BEAM TO BRIDGE BENT CONNECTION)
SHIM AND NON-SHRINK GROUT (LEVELING FOR TREAD TO BEAM/ BEAM TO CAST-IN-PLACE CONCRETE PIER)
RAILING AND CONNECTION HARDWARE
1/2" EXPANSION JOINT MATERIAL (BOARDWALK TRANSITION TO CAST-IN-PLACE CONCRETE AND TRUSS BRIDGE)
STEEL TRANSITION COVER PLATE (BOARDWALK TO TRUSS BRIDGE)

STATE OF TEXAS
JASON V. PHILBIN
123761
LICENSED
PROFESSIONAL ENGINEER
8-6-18

Drawings Developed By:
PERMATRAK NORTH AMERICA
6419 Bannington Road, Suite B
CHARLOTTE, NC 28226
TBPE FIRM NO. 18057

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PREPARED FOR:
PAPE-DAWSON ENGINEERS, RVI PLANNING + LANDSCAPE ARCHITECTURE

FOR REVIEW & APPROVAL

Drawings Developed By:
PermaTrak®
The Concrete Boardwalk Company
www.permatrak.com TEL: 877-332-7862

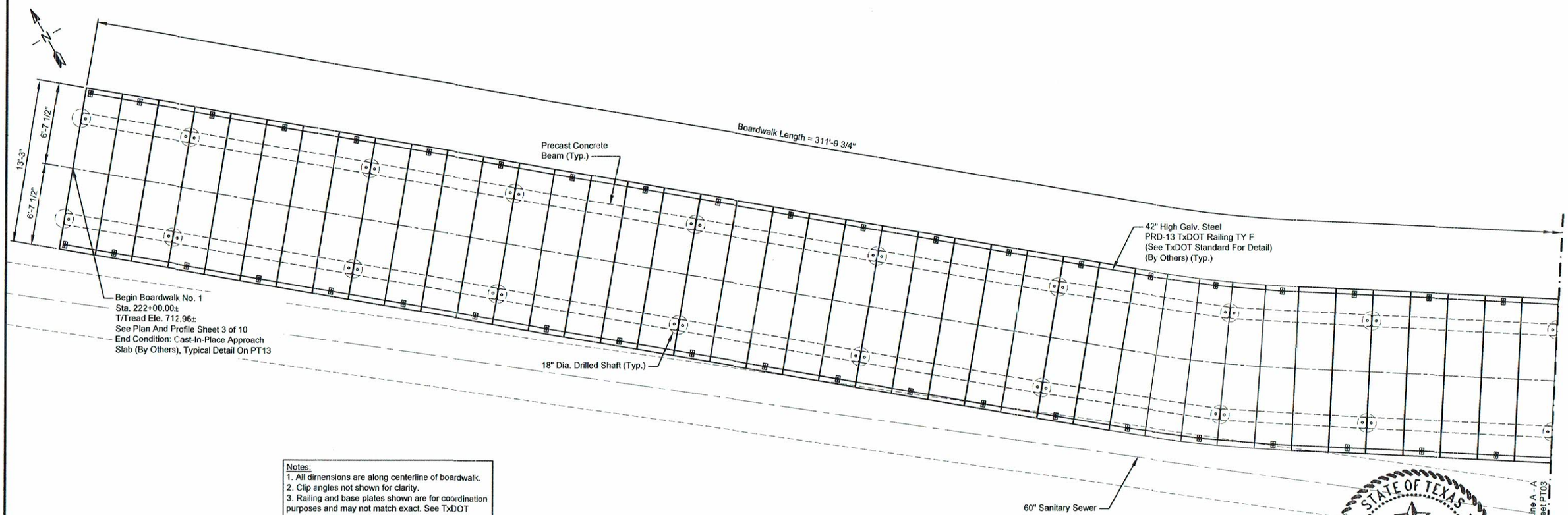
OFFICE LOCATIONS
FLORIDA
TEXAS
LOUISIANA
NORTH CAROLINA
OHIO

PROJECT TITLE:
BRUSHY CREEK REGIONAL TRAIL
ROUNDROCK, TEXAS

JOB NUMBER:	2017-846
DATE:	08/03/2018
DESIGNED BY:	EMD
DRAWN BY:	RPU
CHECKED BY:	EMD
SHEET NO.	PT01 49

BRUSHY CREEK TRAIL BOARDWALKS

	BOARDWALK LOCATIONS AND LENGTHS			APPROXIMATE NUMBER OF COMPONENTS REQUIRED PER BOARDWALK					
BOARDWALK	APPROXIMATE BEGINNING STATION	APPROXIMATE END STATION	TOTAL BOARDWALK LENGTH	TREADS	BEAMS	CAST-IN-PLACE APPROACH SLAB	GRADE BEAM ABUTMENT	PIERS	CLIP ANGLES
#1	222+00.00	225+10.00	311'-9 3/4"±	98	52	1	1	54	126
#2	226+30.00	230+12.00	381'-4 1/4"±	121	64	1	1	66	154
#3	247+54.00	251+45.00	391'-0"±	124	66	2	N/A	68	158



Notes:
1. All dimensions are along centerline of boardwalk.
2. Clip angles not shown for clarity.
3. Railing and base plates shown are for coordination purposes and may not match exact. See TxDOT standard for details.
4. The boardwalk centerline shown is chorded and not a smooth radial centerline. Therefore stationing and dimensions may differ slightly from those shown on site drawings.

PARTIAL BOARDWALK PLAN NO. 1

Scale: Not To Scale

STATE OF TEXAS
JASON V. PHILBIN
123761
LICENSED
PROFESSIONAL ENGINEER
8-6-18

Drawings Developed By:
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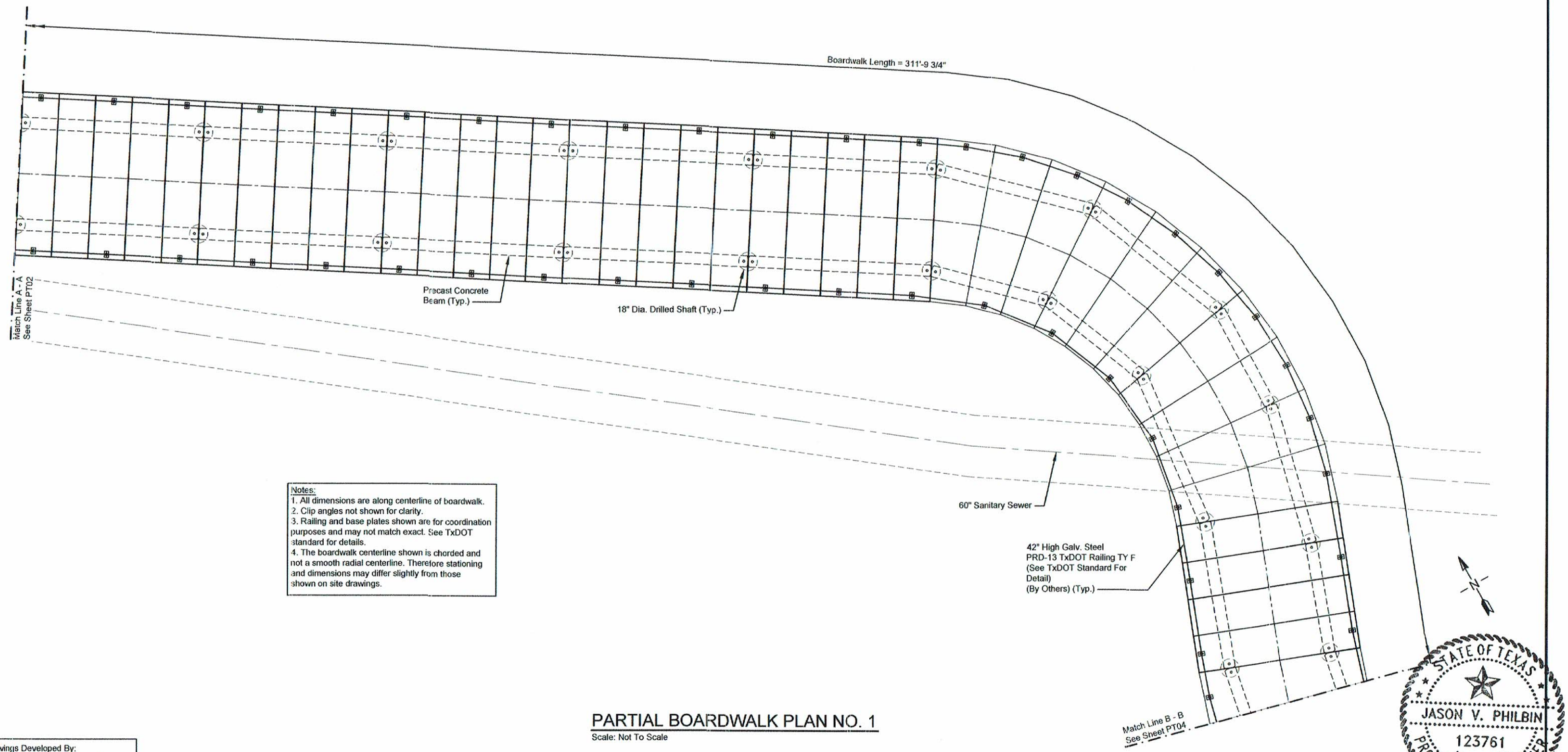
ROUNDROCK, TEXAS

JOB NUMBER: 2017-846
DATE: 08/03/2018
DESIGNED BY: EMD
DRAWN BY: RPU
CHECKED BY: EMD
SHEET NO.
PT02 50



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JASON V. PHILBIN
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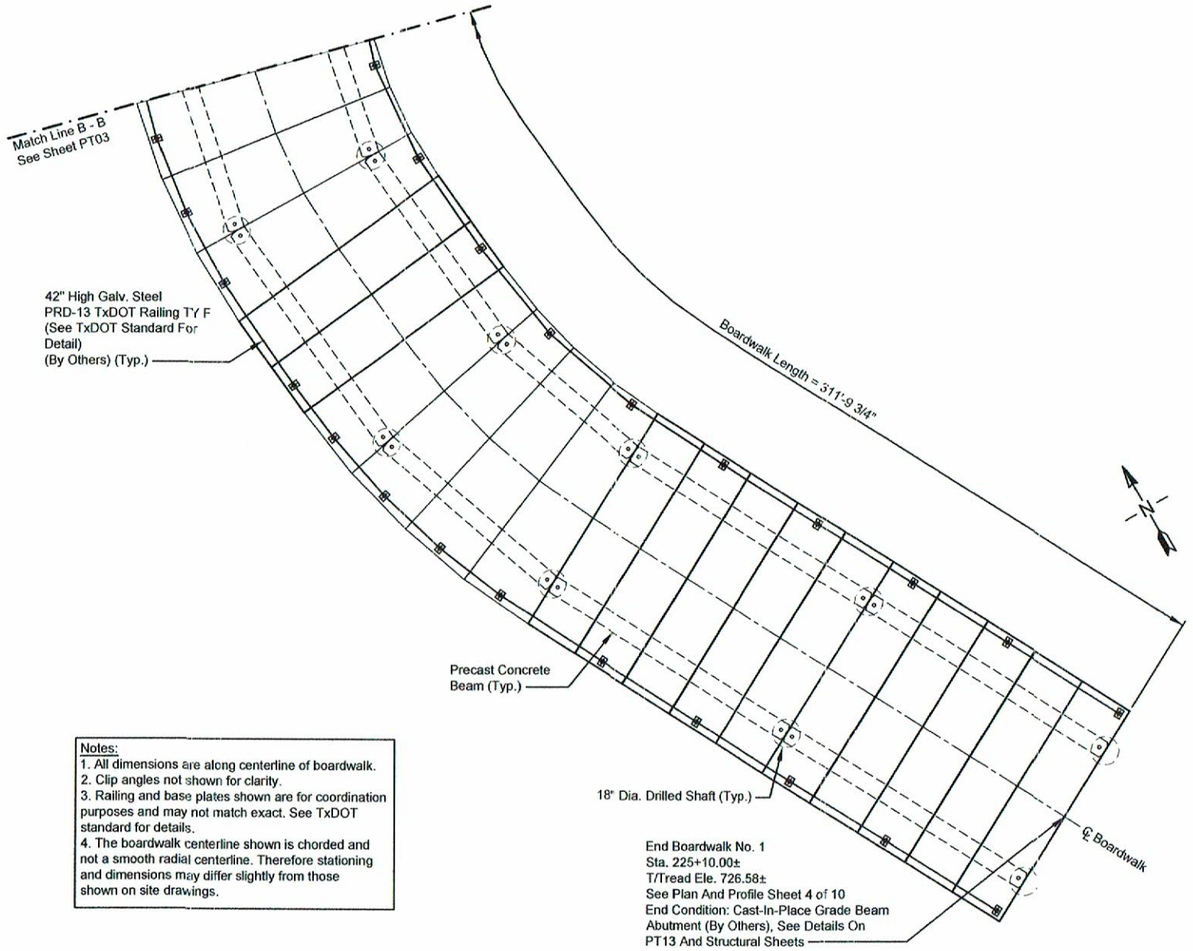
ROUNDROCK TEXAS

JOB NUMBER: 2017-846
DATE: 08/03/2018
DESIGNED BY: EMD
DRAWN BY: RPU
CHECKED BY: EMD
SHEET NO.
PT03 51



Notes:
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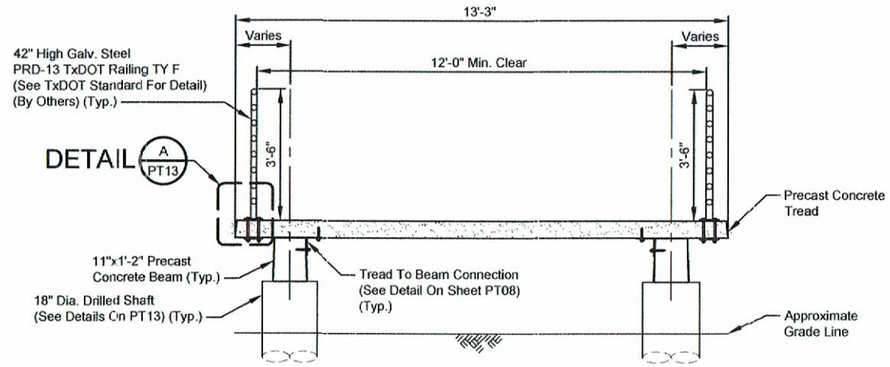
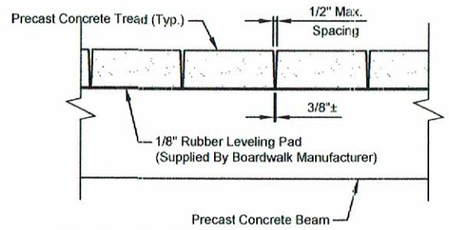
PARTIAL BOARDWALK PLAN NO. 1

Scale: Not To Scale



TYPICAL SECTION

Scale = 1/2" = 1'-0"



TYPICAL TREAD SPACING DETAIL

Scale: Not To Scale

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JASON V. PHILBIN
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PROFESSIONAL ENGINEER
8-6-18

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ROUNDROCK TEXAS

JOB NUMBER: 2017-846
DATE: 08/03/2018
DESIGNED BY: EMD
DRAWN BY: RPU
CHECKED BY: EMD
SHEET NO.
PT04 52

Notes:
1. All dimensions are along centerline of boardwalk.
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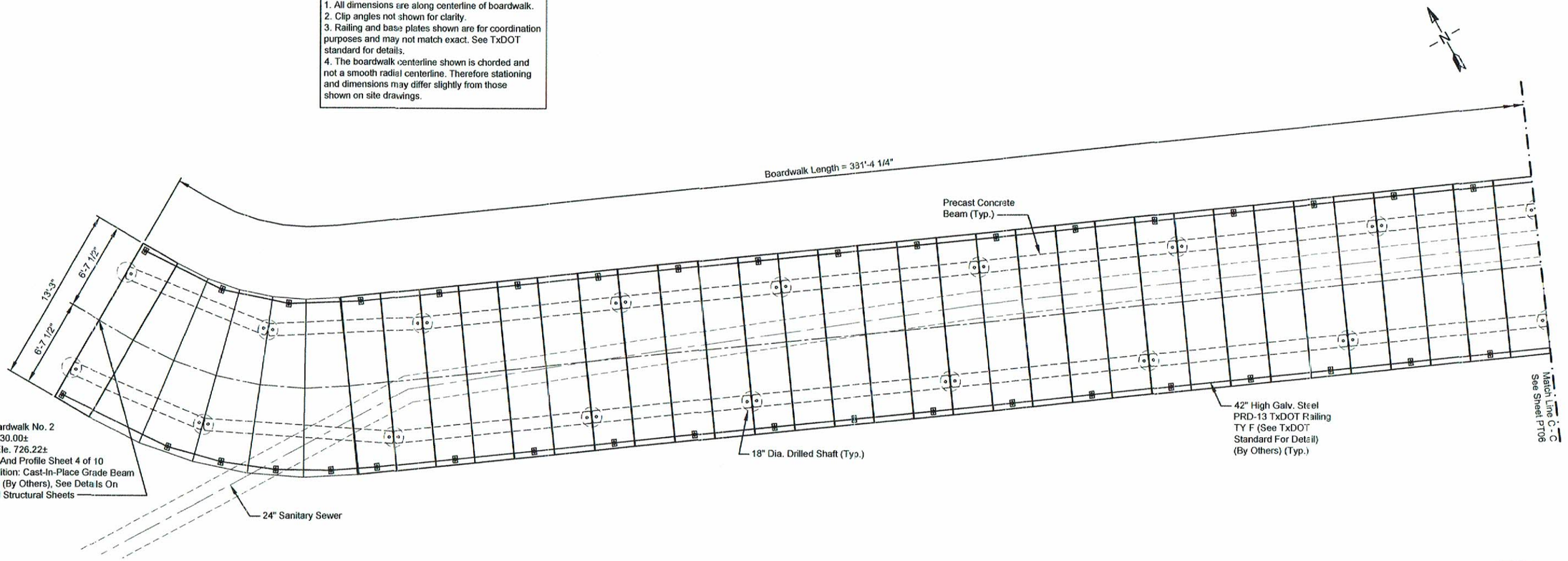

PARTIAL BOARDWALK PLAN NO. 2

Scale: Not To Scale

STATE OF TEXAS
JASON V. PHILBIN
123761
LICENSED
PROFESSIONAL ENGINEER
6-6-18

Drawings Developed By:
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CHARLOTTE, NC 28226
TBPE FIRM NO. 18057

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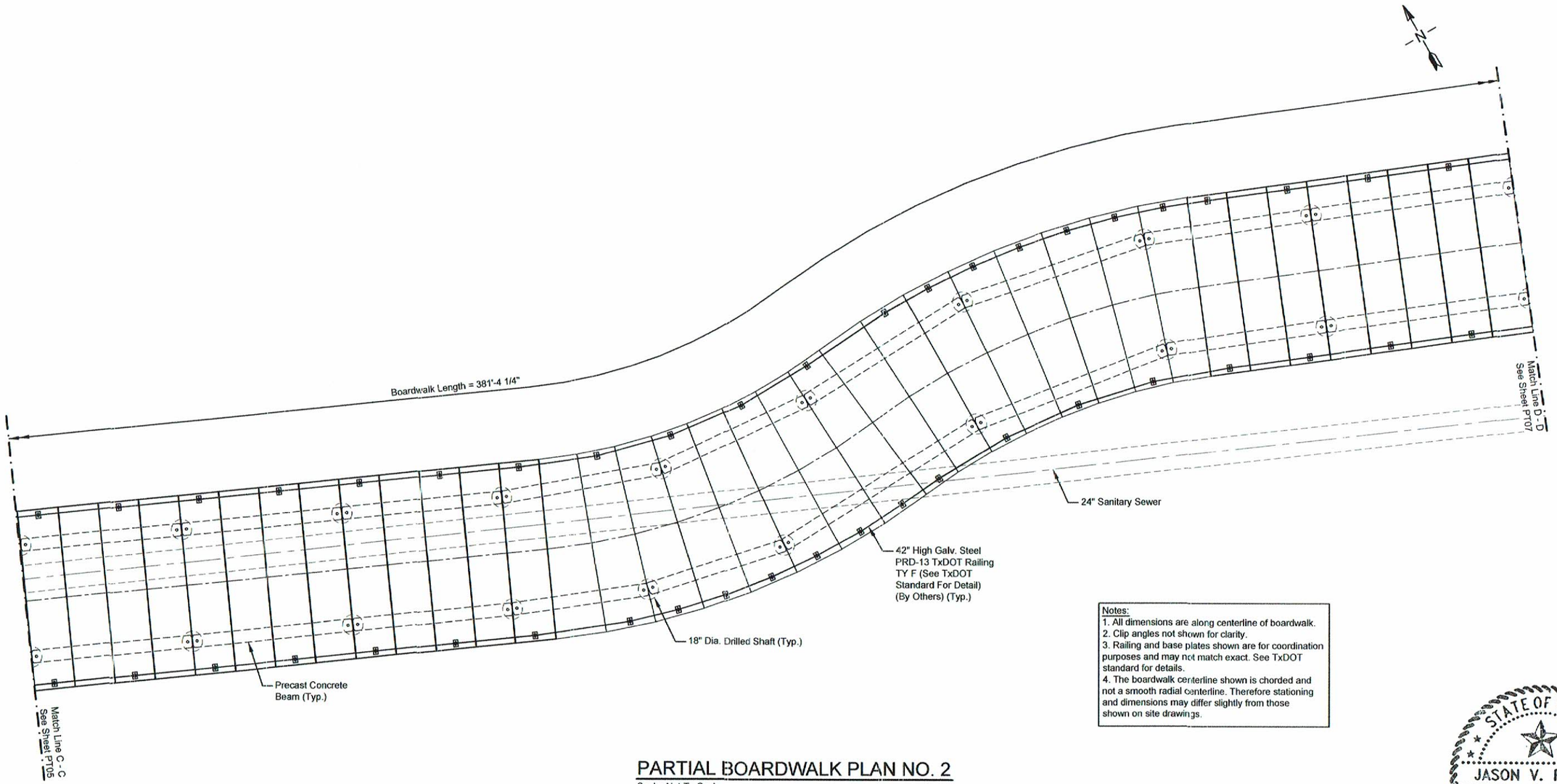
OFFICE LOCATIONS
FLORIDA
TEXAS
LOUISIANA
NORTH CAROLINA
OHIO

PROJECT TITLE:
BRUSHY CREEK REGIONAL TRAIL
ROUNDROCK TEXAS

JOB NUMBER:	2017-846
DATE:	08/03/2018
DESIGNED BY:	EMD
DRAWN BY:	RPU
CHECKED BY:	EMD
SHEET NO.	PT05 53



Notes:
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PARTIAL BOARDWALK PLAN NO. 2

Scale: Not To Scale

STATE OF TEXAS
JASON V. PHILBIN
123761
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PROFESSIONAL ENGINEER
8-6-18

Drawings Developed By:
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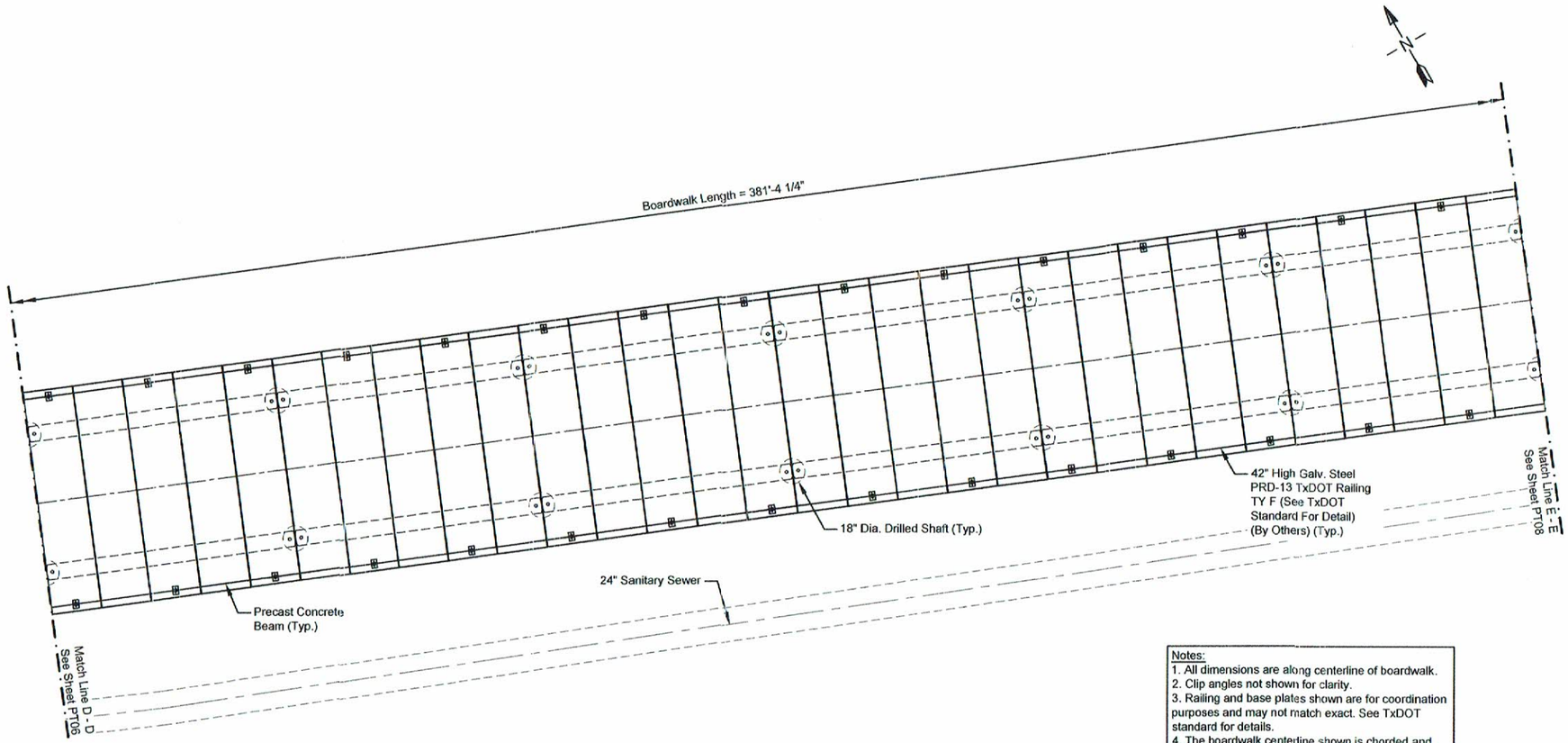
OHIO

PROJECT TITLE:
BRUSHY CREEK REGIONAL TRAIL
ROUNDROCK, TEXAS

JOB NUMBER: 2017-846
DATE: 08/03/2018
DESIGNED BY: EMD
DRAWN BY: RPU
CHECKED BY: EMD
SHEET NO. PT06 54



Notes:
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2. Clip angles not shown for clarity.
3. Railing and base plates shown are for coordination purposes and may not match exact. See TxDOT standard for details.
4. The boardwalk centerline shown is chorded and not a smooth radial centerline. Therefore stationing and dimensions may differ slightly from those shown on site drawings.

PARTIAL BOARDWALK PLAN NO. 2

Scale: Not To Scale

STATE OF TEXAS
JASON V. PHILBIN
123761
LICENSED
PROFESSIONAL ENGINEER
8-6-18

Drawings Developed By:
PERMATRAK NORTH AMERICA
6419 Bannington Road, Suite B
CHARLOTTE, NC 28226
TBPE FIRM NO. 18057

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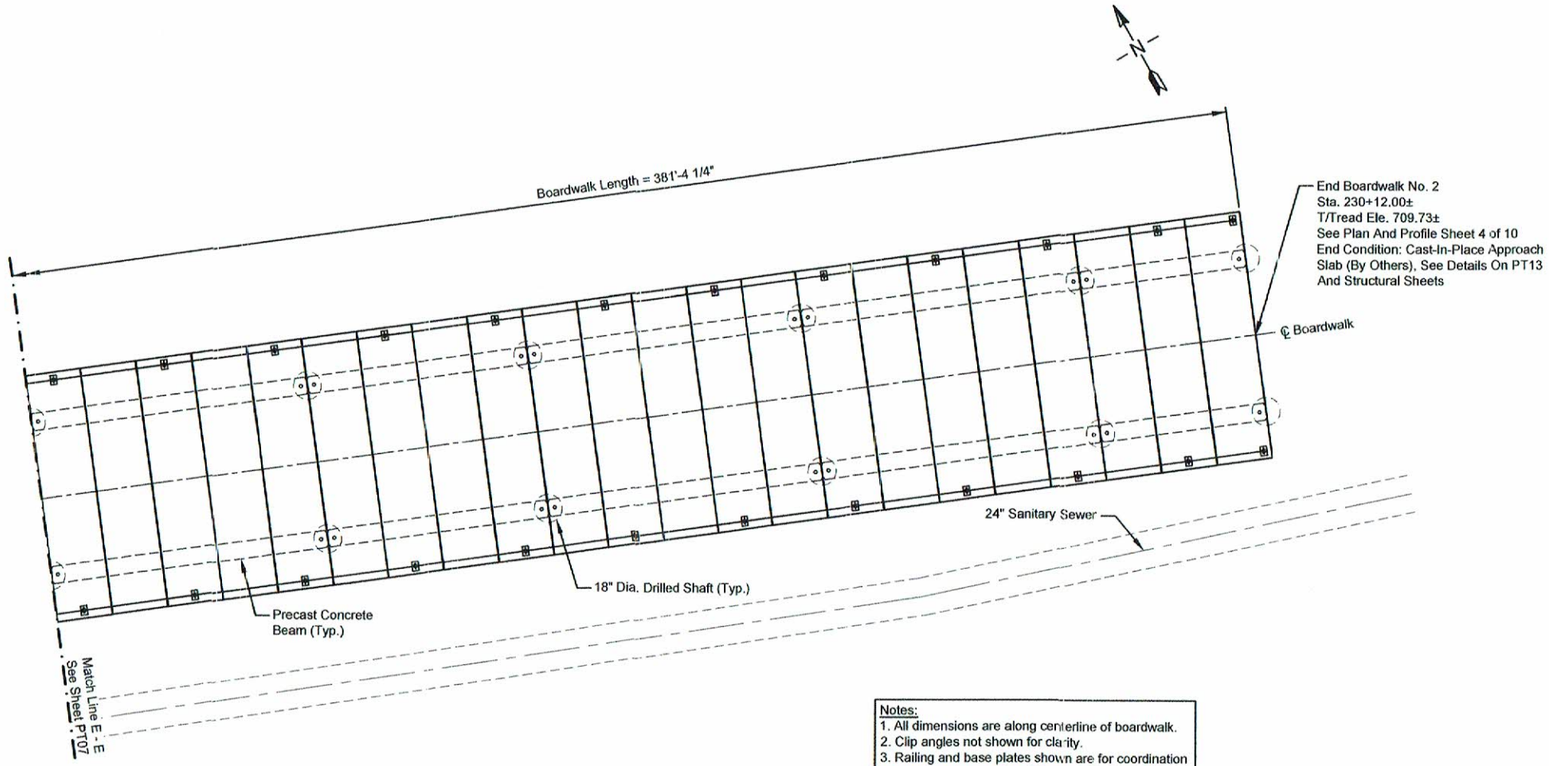
SHEET NO.
PT07 55



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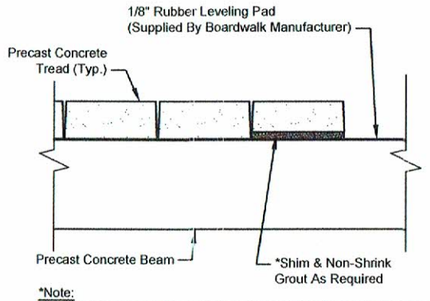
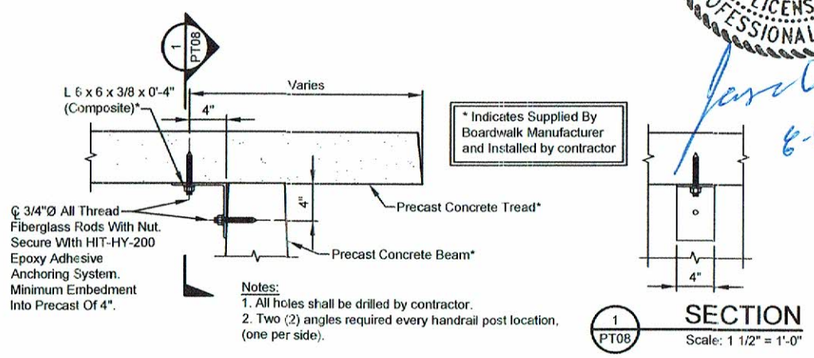


*Note:
Due to tolerances and variance in precast production and installation accuracy, shimming and grouting may be required. Where required the entire bearing area and void shall be shim and grouted.

TYPICAL SHIM/GROUT DETAIL

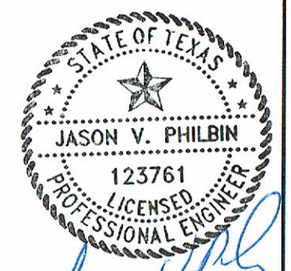
Scale: Not To Scale (UNDER TREAD)



Notes:
1. All holes shall be drilled by contractor.
2. Two (2) angles required every handrail post location, (one per side).

TREAD TO BEAM CONNECTION

Scale: Not To Scale



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PROJECT TITLE:
BRUSHY CREEK REGIONAL TRAIL
ROUNDROCK, TEXAS

JOB NUMBER:	2017-846
DATE:	08/03/2018
DESIGNED BY:	EMD
DRAWN BY:	RPU
CHECKED BY:	EMD
SHEET NO.	PT08 56

Notes:
1. All dimensions are along centerline of boardwalk.
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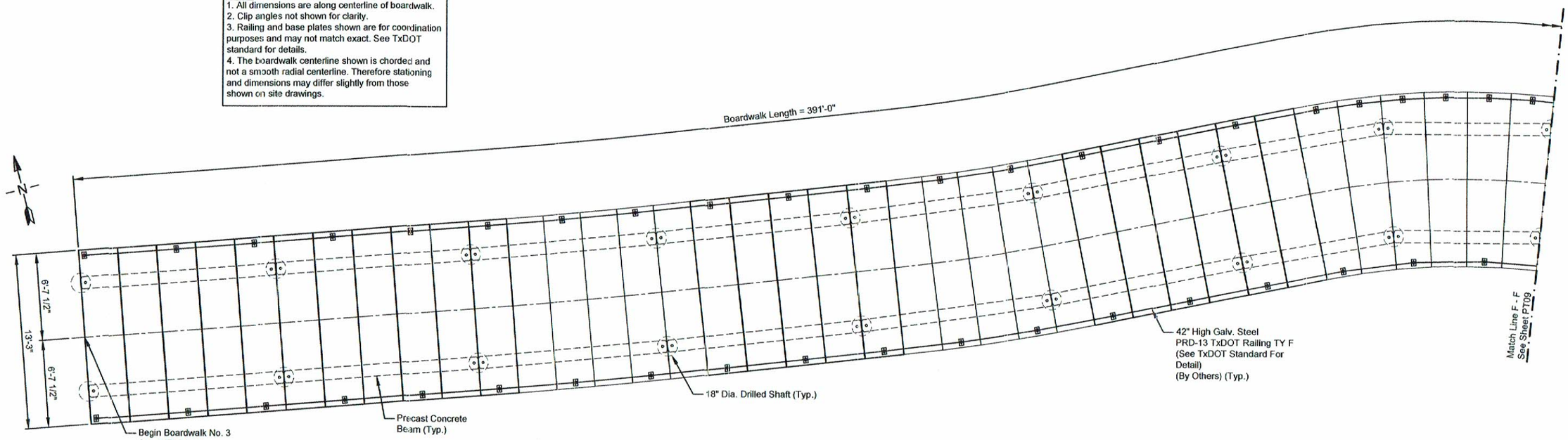
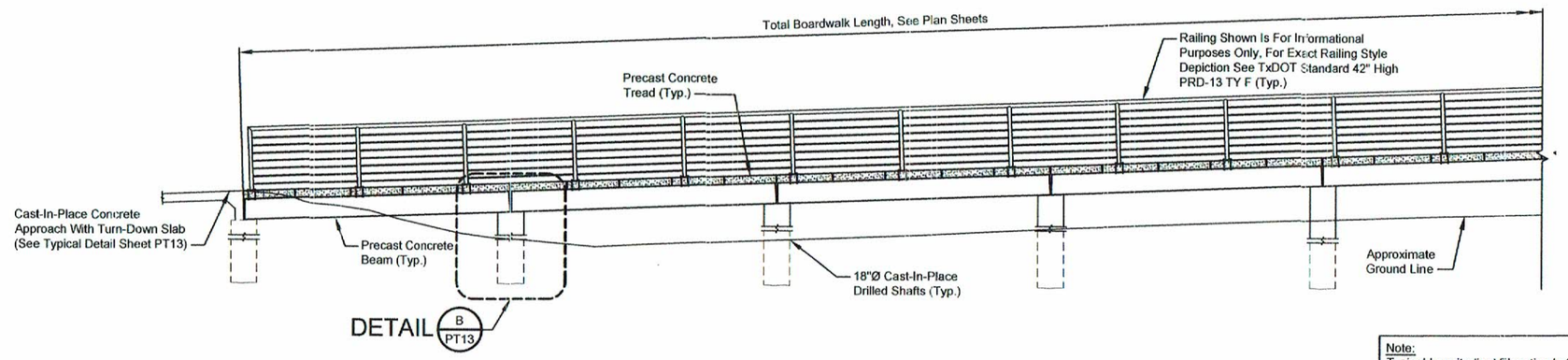


PARTIAL BOARDWALK PLAN NO. 3

Scale: Not To Scale



TYPICAL PARTIAL BOARDWALK LONGITUDINAL ELEVATION

Scale: 1/4" = 1'-0"

Note:
Typical Longitudinal Elevation Is Shown For Informational Purposes Only And Should Not Be Used For Bidding Purposes. See Plan And Profile Sheets For Actual Elevation Information.

STATE OF TEXAS
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JOB NUMBER: 2017-846
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DESIGNED BY: EMD
DRAWN BY: RPU
CHECKED BY: EMD
SHEET NO.
PT09 57

Notes:
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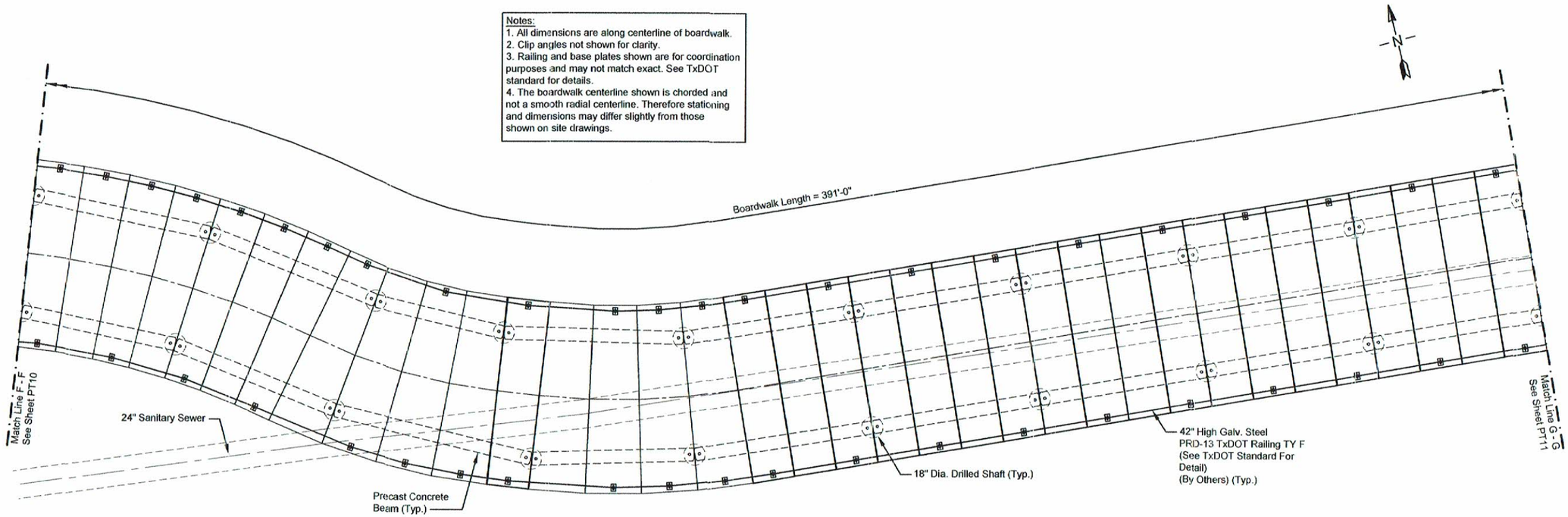

PARTIAL BOARDWALK PLAN NO. 3

Scale: Not To Scale

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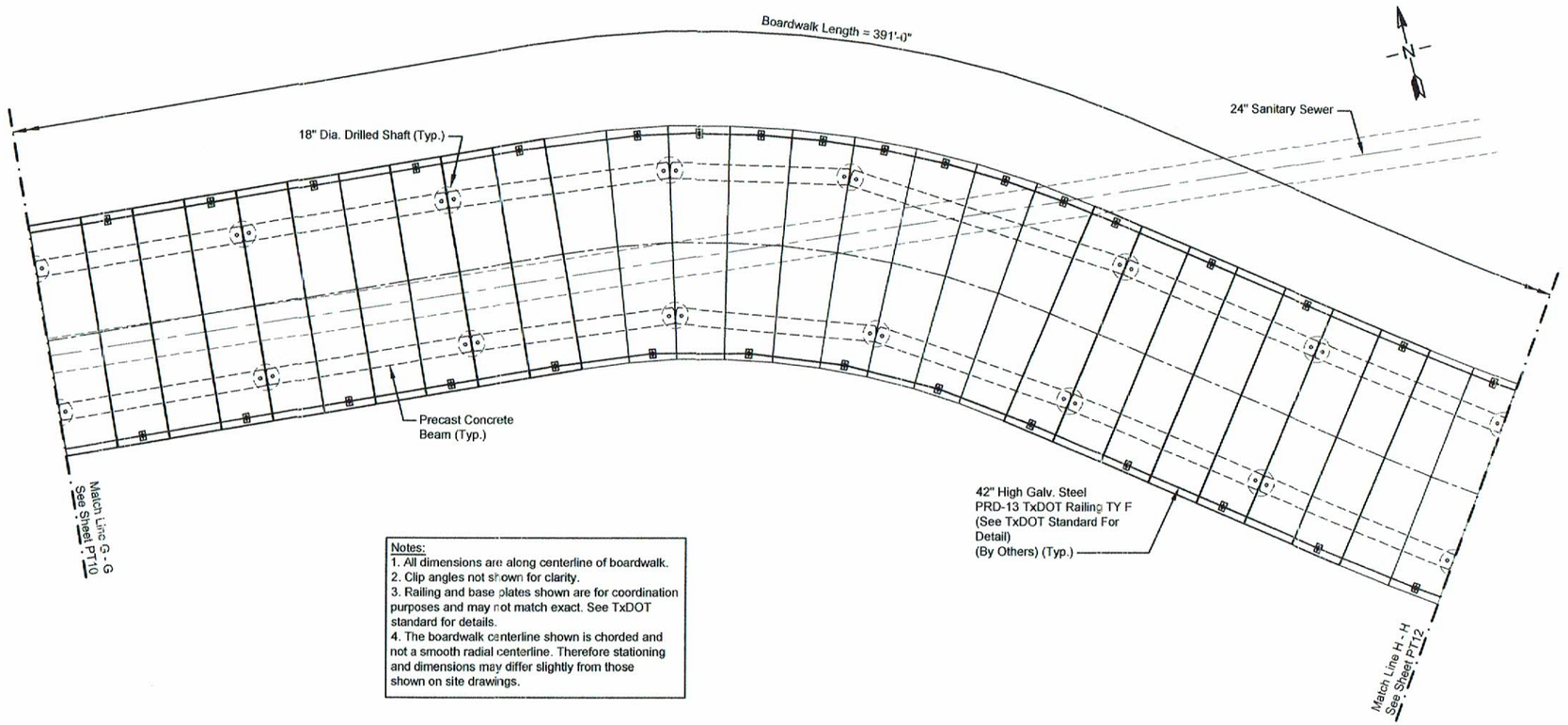
JOB NUMBER:	2017-846
DATE:	08/03/2018
DESIGNED BY:	EMD
DRAWN BY:	RPU
CHECKED BY:	EMD
SHEET NO.	PT10 58



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PARTIAL BOARDWALK PLAN NO. 3

Scale: Not To Scale

Jason V Philbin 8-6-18

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DESIGNED BY: EMD
DRAWN BY: RPU
CHECKED BY: EMD
SHEET NO.
PT11 59

Notes:
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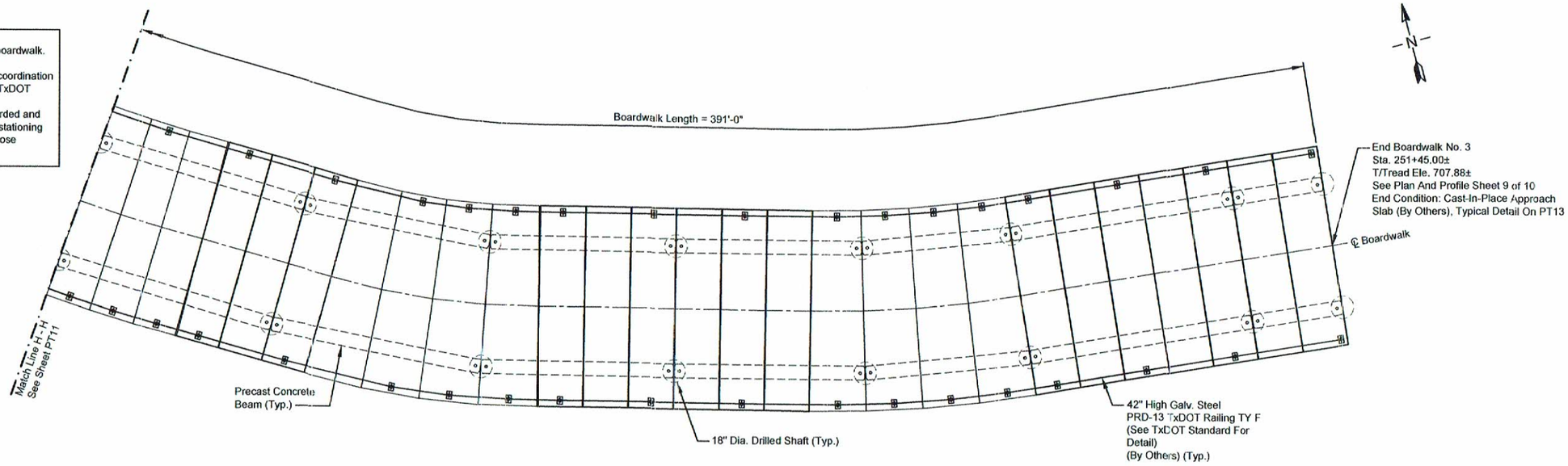
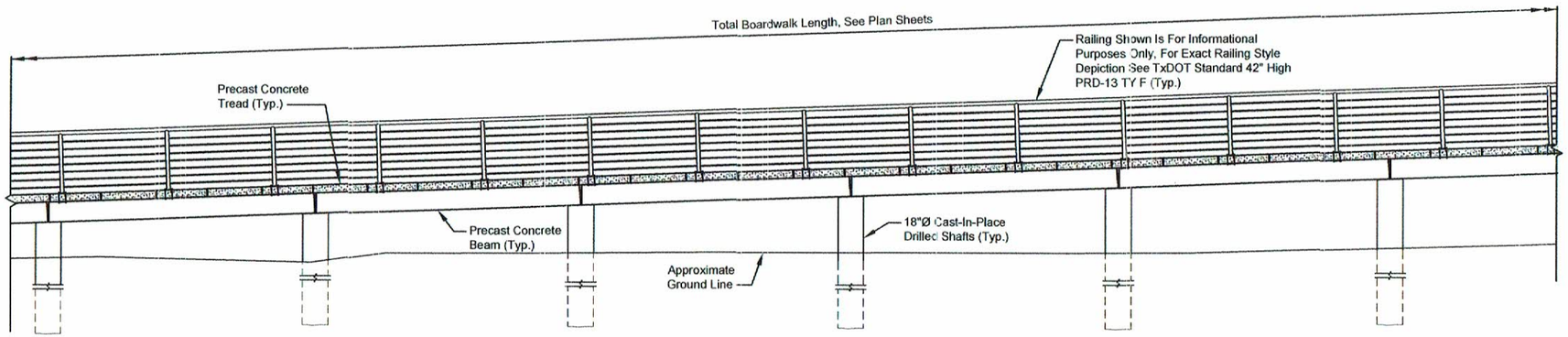


PARTIAL BOARDWALK PLAN NO. 3

Scale: Not To Scale



TYPICAL PARTIAL BOARDWALK LONGITUDINAL ELEVATION

Scale: 1/4" = 1'-0"

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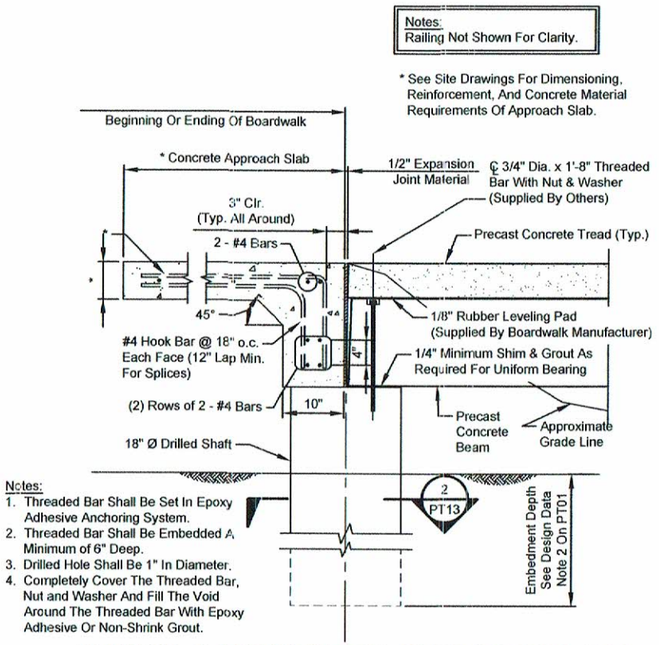
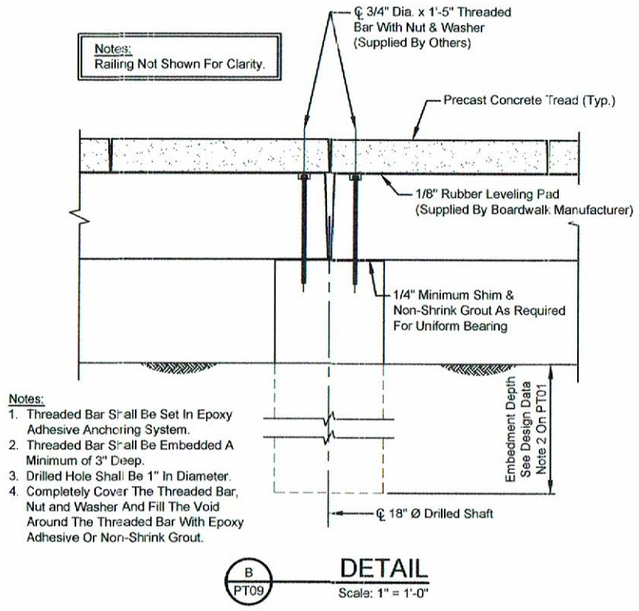
PT12 60



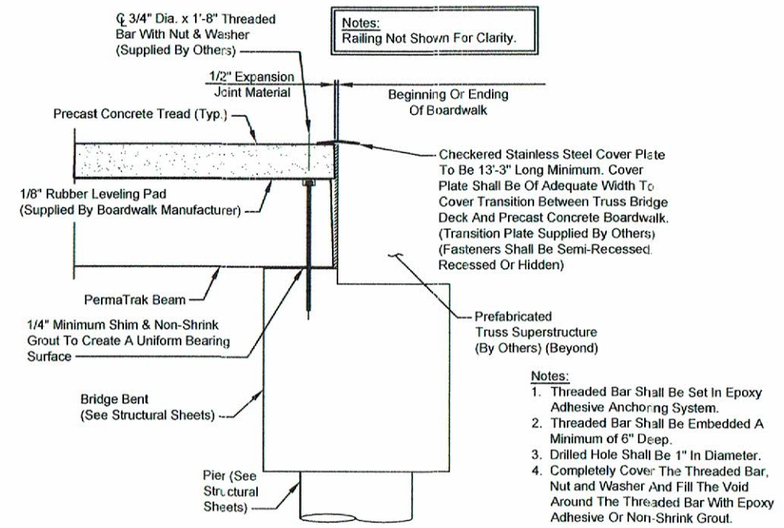
TYPICAL CAST-IN-PLACE APPROACH DETAIL

Scale: 1" = 1'-0"



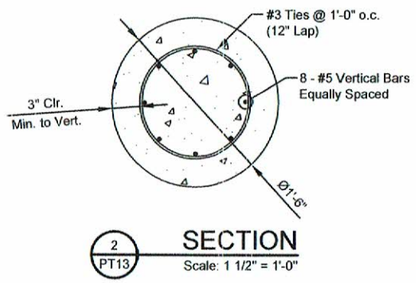
B PT09 **DETAIL**

Scale: 1" = 1'-0"



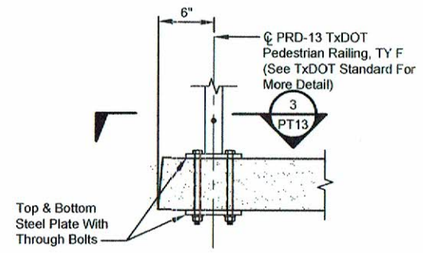
TYPICAL CAST-IN-PLACE GRADE BEAM ABUTMENT DETAIL

Scale: 1" = 1'-0"



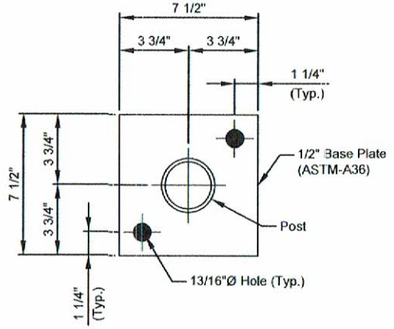
2 PT13 **SECTION**

Scale: 1 1/2" = 1'-0"



A PT04 **DETAIL**

Scale: Not To Scale



S PT13 **SECTION**

Scale: Not To Scale

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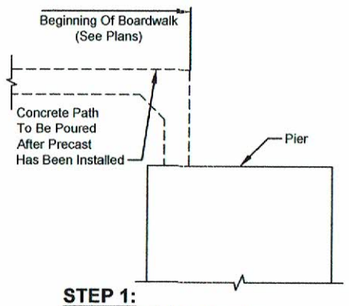
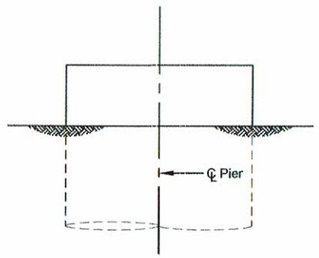
CHECKED BY:	EMD
SHEET NO.	PT13 61

Precast Concrete Installation Diagrams

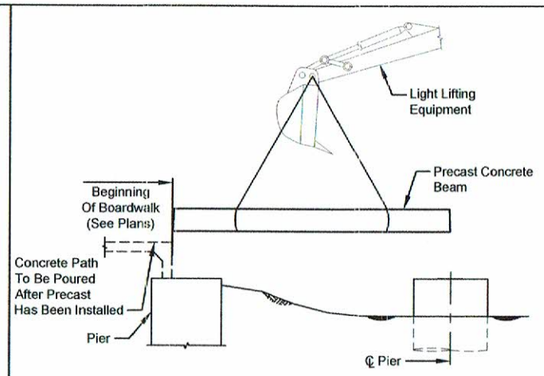
NOTES:
This document is intended to provide the installer guidelines for typical Precast Concrete applications. It is not meant to be all inclusive and may be adjusted based upon encountered field conditions.



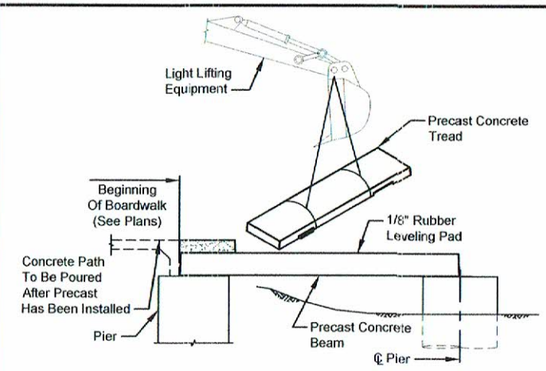
STEP 1:
Survey center of pier control points.
Excavate subgrade to bearing elevation.
Set pier supplied by contractor.
Check horizontal and vertical contour.



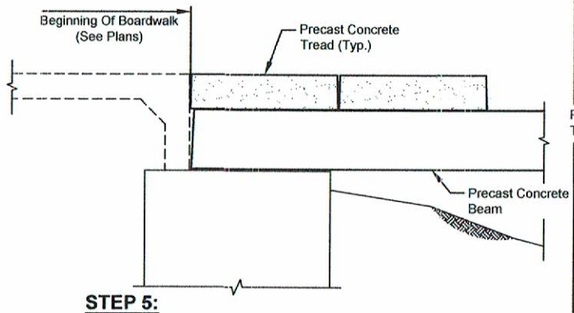
STEP 2:
Survey center of pier control points.
Excavate subgrade to bearing elevation.
Set pier supplied by contractor.
Check horizontal and vertical contour.



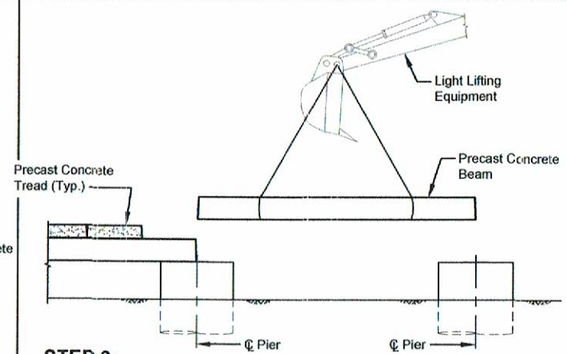
STEP 3:
Position beam over piers and place in final position.



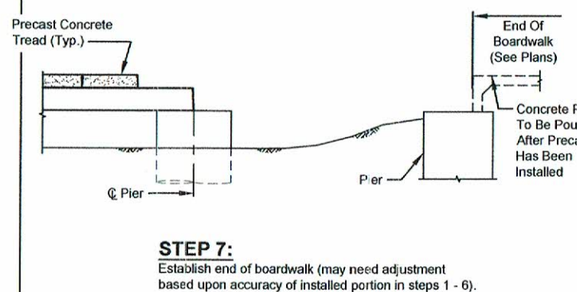
STEP 4:
Lay rubber leveling pad on top of beam, position precast tread on top of beam, be sure tread fits snug against abutment.



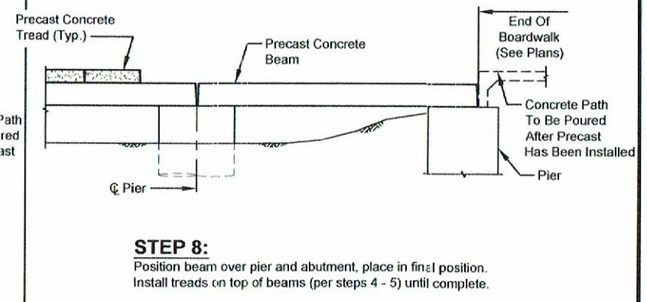
STEP 5:
Set 2nd tread ahead of 1st tread, aligning tongues with grooves, check joint spacing, adjust tread position if needed, continue setting treads until 1/3 span reached.



STEP 6:
Continue installing piers, beams and treads at design locations until reaching ending abutment. If "Top Down Construction" is desired then the engineer must be contacted for approval. Top surface of boardwalk must be protected with plywood or other means while operating machinery on the boardwalk.



STEP 7:
Establish end of boardwalk (may need adjustment based upon accuracy of installed portion in steps 1 - 6). Survey center of pier control points. Excavate subgrade to bearing elevation. Set pier supplied by contractor. Check horizontal, vertical contour and check squareness with boardwalk alignment and adjust if necessary.



STEP 8:
Position beam over pier and abutment, place in final position.
Install treads on top of beams (per steps 4 - 5) until complete.

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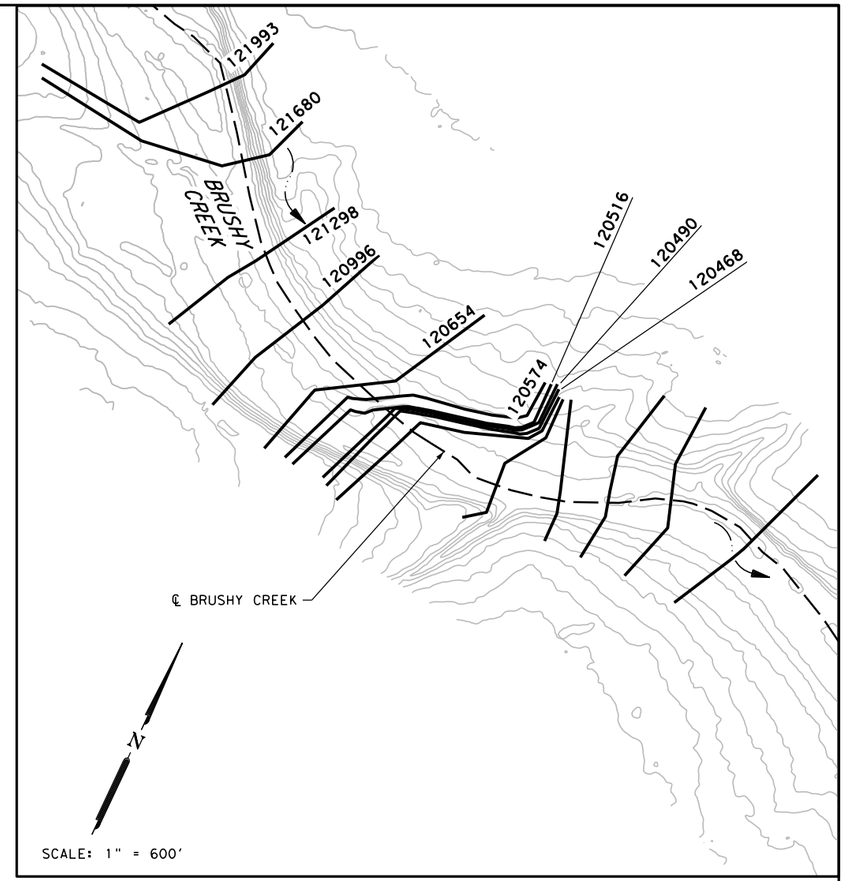
CHECKED BY:	EMD
SHEET NO.	PT14 62

HEC-RAS CROSS SECTION OUTPUT

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach1	121993	2yr_Existing	CorEff	2380	724.48	733.80		734.16	0.00493	4.93	534.73	129.62	0.35
Reach1	121993	2yr_Existing	Prop	2380	724.48	733.80		734.16	0.00493	4.93	534.73	129.62	0.35
Reach1	121993	100yr_Existing	CorEff	15400	724.48	743.24		743.83	0.00369	7.41	3136.85	439.31	0.34
Reach1	121993	100yr_Existing	Prop	15400	724.48	743.24		743.83	0.00369	7.41	3136.90	439.31	0.34
Reach1	121993	500yr_Existing	CorEff	25400	724.48	746.70		747.33	0.00335	8.14	4766.33	503.85	0.34
Reach1	121993	500yr_Existing	Prop	25400	724.48	746.70		747.34	0.00334	8.14	4767.84	504.02	0.34
Reach1	121680	2yr_Existing	CorEff	2390	723.40	732.75		733.00	0.00307	4.23	678.06	169.25	0.31
Reach1	121680	2yr_Existing	Prop	2390	723.40	732.75		733.00	0.00307	4.23	678.06	169.25	0.31
Reach1	121680	100yr_Existing	CorEff	15400	723.40	742.43		743.07	0.00279	7.68	3202.65	435.18	0.34
Reach1	121680	100yr_Existing	Prop	15400	723.40	742.43		743.07	0.00279	7.68	3202.71	435.18	0.34
Reach1	121680	500yr_Existing	CorEff	25500	723.40	745.97		746.70	0.00270	8.66	4935.65	525.54	0.35
Reach1	121680	500yr_Existing	Prop	25500	723.40	745.98		746.70	0.00270	8.65	4937.60	525.95	0.35
Reach1	121298	2yr_Existing	CorEff	2390	722.07	731.57		731.76	0.00300	3.49	685.28	120.05	0.26
Reach1	121298	2yr_Existing	Prop	2390	722.07	731.57		731.76	0.00300	3.49	685.28	120.05	0.26
Reach1	121298	100yr_Existing	CorEff	15400	722.07	741.02		741.62	0.00331	6.68	2881.14	360.72	0.31
Reach1	121298	100yr_Existing	Prop	15400	722.07	741.02		741.62	0.00331	6.68	2881.23	360.73	0.31
Reach1	121298	500yr_Existing	CorEff	25500	722.07	744.27		745.08	0.00371	8.09	4221.72	457.01	0.34
Reach1	121298	500yr_Existing	Prop	25500	722.07	744.27		745.09	0.00371	8.09	4224.56	457.11	0.34
Reach1	120996	2yr_Existing	CorEff	2400	721.41	730.24		730.56	0.00531	4.57	529.45	121.73	0.36
Reach1	120996	2yr_Existing	Prop	2400	721.41	730.24		730.56	0.00531	4.57	529.45	121.73	0.36
Reach1	120996	100yr_Existing	CorEff	15400	721.41	739.54		740.44	0.00433	8.28	2511.64	376.14	0.39
Reach1	120996	100yr_Existing	Prop	15400	721.41	739.54		740.44	0.00432	8.28	2511.85	376.16	0.39
Reach1	120996	500yr_Existing	CorEff	25500	721.41	742.62		743.77	0.00470	9.85	3830.83	487.00	0.42
Reach1	120996	500yr_Existing	Prop	25500	721.41	742.63		743.78	0.00469	9.84	3837.07	487.17	0.42
Reach1	120654	2yr_Existing	CorEff	2400	720.66	729.93		730.08	0.00054	3.14	764.26	161.42	0.25
Reach1	120654	2yr_Existing	Prop	2400	720.66	729.93		730.08	0.00054	3.14	764.26	161.42	0.25
Reach1	120654	100yr_Existing	CorEff	15400	720.66	739.34		739.77	0.00082	5.55	3815.15	526.38	0.27
Reach1	120654	100yr_Existing	Prop	15400	720.66	739.34		739.77	0.00082	5.55	3815.47	526.39	0.27
Reach1	120654	500yr_Existing	CorEff	25500	720.66	742.38		742.98	0.00102	6.85	5463.75	558.38	0.3
Reach1	120654	500yr_Existing	Prop	25500	720.66	742.39		743.00	0.00101	6.84	5471.25	558.50	0.3
Reach1	120574	2yr_Existing	CorEff	2400	720.48	729.69	725.31	729.95	0.00491	4.10	594.24	123.14	0.29
Reach1	120574	2yr_Existing	Prop	2400	720.48	729.69	725.31	729.95	0.00491	4.10	594.24	123.14	0.29
Reach1	120574	100yr_Existing	CorEff	15400	720.48	739.04	732.92	739.58	0.00418	6.93	3284.16	705.33	0.31
Reach1	120574	100yr_Existing	Prop	15400	720.48	739.04	732.92	739.58	0.00418	6.93	3284.72	705.37	0.31
Reach1	120574	500yr_Existing	CorEff	25500	720.48	742.30	738.37	742.69	0.00277	6.39	5773.43	785.52	0.26
Reach1	120574	500yr_Existing	Prop	25500	720.48	742.31	738.37	742.70	0.00275	6.38	5784.55	785.58	0.26
Reach1	120552			Bridge									
Reach1	120516	2yr_Existing	CorEff	2400	720.35	729.25	724.97	729.46	0.00417	3.70	652.96	117.99	0.26
Reach1	120516	2yr_Existing	Prop	2400	720.35	729.25	724.97	729.46	0.00417	3.70	652.96	117.99	0.26
Reach1	120516	100yr_Existing	CorEff	15400	720.35	737.88	731.84	738.50	0.00482	7.06	2860.12	640.16	0.33
Reach1	120516	100yr_Existing	Prop	15400	720.35	737.88	731.84	738.50	0.00482	7.06	2860.51	640.21	0.33
Reach1	120516	500yr_Existing	CorEff	25500	720.35	741.98	736.85	742.35	0.00243	5.92	5791.41	755.49	0.24
Reach1	120516	500yr_Existing	Prop	25500	720.35	741.99	736.85	742.36	0.00242	5.91	5800.72	755.65	0.24
Reach1	120490	2yr_Existing	CorEff	2400	720.28	729.24	725.19	729.40	0.00072	3.23	751.69	179.46	0.25
Reach1	120490	2yr_Existing	Prop	2400	720.28	729.24	725.19	729.40	0.00072	3.23	751.69	179.46	0.25
Reach1	120490	100yr_Existing	CorEff	15500	720.28	737.90	731.26	738.34	0.00103	6.00	4391.58	785.83	0.28
Reach1	120490	100yr_Existing	Prop	15500	720.28	737.91	731.26	738.34	0.00103	6.00	4392.06	785.84	0.28
Reach1	120490	500yr_Existing	CorEff	25500	720.28	741.94	734.25	742.28	0.00074	5.90	7738.82	861.34	0.25
Reach1	120490	500yr_Existing	Prop	25500	720.28	741.95	734.25	742.29	0.00074	5.89	7749.44	861.41	0.25
Reach1	120480			Culvert									
Reach1	120468	2yr_Existing	CorEff	2400	720.22	729.10	724.70	729.25	0.00193	3.14	774.66	170.46	0.24
Reach1	120468	2yr_Existing	Prop	2400	720.22	729.10	724.70	729.25	0.00193	3.14	774.66	170.46	0.24
Reach1	120468	100yr_Existing	CorEff	15500	720.22	737.98	731.20	738.25	0.00135	4.91	4861.50	812.16	0.23
Reach1	120468	100yr_Existing	Prop	15500	720.22	737.98	731.20	738.25	0.00135	4.91	4862.09	812.17	0.23
Reach1	120468	500yr_Existing	CorEff	25500	720.22	742.00	734.03	742.21	0.00089	4.72	8255.82	871.31	0.2
Reach1	120468	500yr_Existing	Prop	25500	720.22	742.01	734.03	742.22	0.00088	4.72	8266.08	871.36	0.2



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1. BRUSHY CREEK IS IDENTIFIED ON FIRM PANEL 48491C0490E, DATED SEPTEMBER 26, 2008. THE UPSTREAM/ DOWNSTREAM AREA AND PROPOSED CROSSING ARE IN ZONE "AE".
2. COORDINATION WITH LOCAL FLOODPLAIN ADMINSTRATOR (WILLIAMSON COUNTY) ON JULY 27, 2018.
3. NO ADVERSE IMPACTS TO ADJACENT STRUCTURES DUE TO RISE IN FLOODPLAIN.

HYDRAULIC METHOD:
WATER SURFACE ELEVATIONS COMPUTED USING A HEC-RAS (V.5.0.3) MODEL CREATED FOR BRUSHY CREEK.
FILE NAME: "BRUSHY_CREEK.PRJ".

THE ORIGINAL MODEL WAS DEVELOPED THROUGH A 2015 FEMA STUDY OF THE UPPER BRUSHY CREEK WATERSHED. EFFECTIVE AND PROPOSED MODELS WERE DEVELOPED USING SURVEY DATA AND LIDAR DATA.

CORRECTED EFFECTIVE MODEL CREATED AFTER ADDING ADDITIONAL CROSS SECTIONS NEAR PROPOSED BRIDGE LOCATION. PROPOSED MODEL CREATED AFTER ADDING PROPOSED BRIDGE STRUCTURE TO MODEL.

HYDROLOGIC METHOD:
EFFECTIVE FLOWS WERE OBTAINED FROM THE 2015 FEMA STUDY HEC-RAS MODEL. FLOWS WERE USED TO ANALYZE CONDITIONS IN THE CORRECTED EFFECTIVE AND PROPOSED MODELS.

DESIGN

STATE OF TEXAS — LUKE REED — 101242 — LICENSED PROFESSIONAL ENGINEER

LUKE REED, P.E. — 7/30/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 7/30/2018 DATE

PAPE-DAWSON ENGINEERS
AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS
7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
HYDRAULIC DATA
BRUSHY CREEK TRAIL PEDESTRIAN BRIDGE

SHEET 1 OF 6

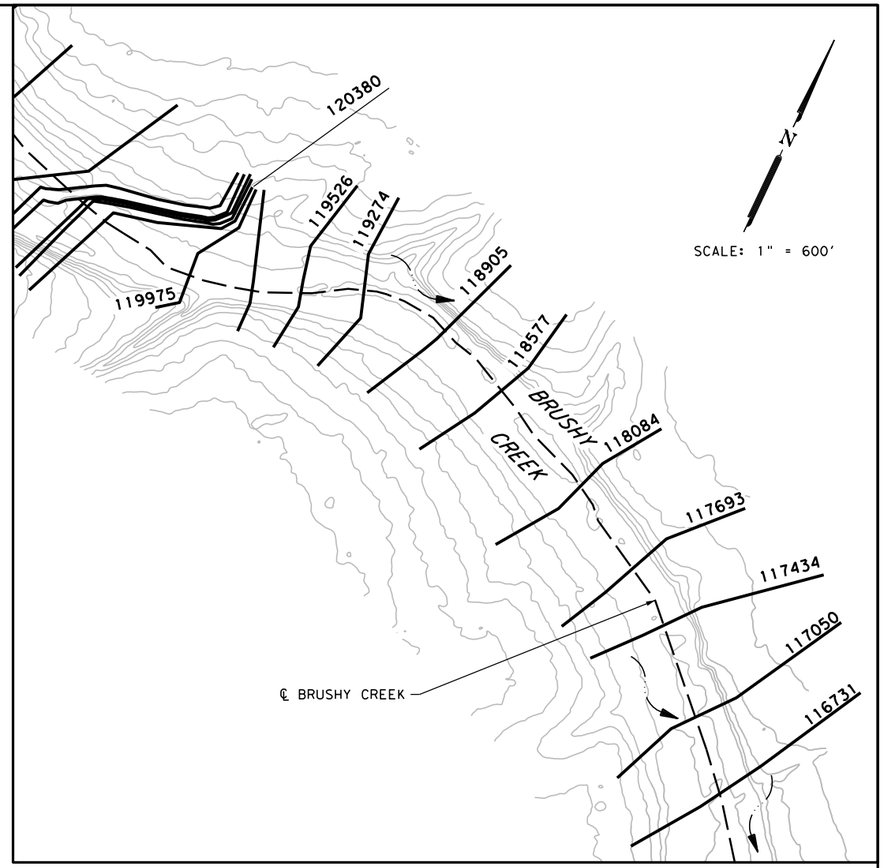
100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 7/30/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 63

Plotted on: 7/30/2018

Design Filename: H:\projects\508\67\00\design\Civil\Drainage\508700HDS_BRIDGE01.dgn

HEC-RAS CROSS SECTION OUTPUT

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach1	120380	2yr_Existing	CorEff	2410	720.00	728.87	724.45	729.04	0.00285	3.30	731.02	161.58	0.27
Reach1	120380	2yr_Existing	Prop	2410	720.00	728.87	724.45	729.04	0.00285	3.30	731.02	161.58	0.27
Reach1	120380	100yr_Existing	CorEff	15500	720.00	737.90	731.28	738.12	0.00129	4.48	5051.95	766.88	0.22
Reach1	120380	100yr_Existing	Prop	15500	720.00	737.90	731.28	738.12	0.00129	4.48	5052.46	766.89	0.22
Reach1	120380	500yr_Existing	CorEff	25600	720.00	741.94	734.05	742.13	0.00089	4.43	8240.97	806.50	0.19
Reach1	120380	500yr_Existing	Prop	25600	720.00	741.95	734.05	742.14	0.00089	4.43	8250.62	806.56	0.19
Reach1	119975	2yr_Existing	CorEff	2410	718.96	727.75		727.95	0.00250	3.64	665.71	136.72	0.28
Reach1	119975	2yr_Existing	Prop	2410	718.96	727.75		727.95	0.00250	3.64	665.71	136.72	0.28
Reach1	119975	100yr_Existing	CorEff	15500	718.96	736.95		737.49	0.00210	6.55	3153.67	387.26	0.3
Reach1	119975	100yr_Existing	Prop	15500	718.96	736.95		737.49	0.00210	6.55	3154.08	387.29	0.3
Reach1	119975	500yr_Existing	CorEff	25600	718.96	741.06		741.65	0.00179	7.16	4883.75	442.17	0.29
Reach1	119975	500yr_Existing	Prop	25600	718.96	741.07		741.66	0.00179	7.15	4890.34	442.33	0.29
Reach1	119720	2yr_Existing	CorEff	2410	718.30	727.22		727.41	0.00180	3.46	695.96	120.51	0.25
Reach1	119720	2yr_Existing	Prop	2410	718.30	727.22		727.41	0.00180	3.46	695.96	120.51	0.25
Reach1	119720	100yr_Existing	CorEff	15500	718.30	736.27		736.96	0.00226	7.18	2738.51	305.94	0.33
Reach1	119720	100yr_Existing	Prop	15500	718.30	736.28		736.96	0.00226	7.17	2738.89	305.95	0.33
Reach1	119720	500yr_Existing	CorEff	25600	718.30	740.33		741.18	0.00218	8.29	4111.98	380.17	0.34
Reach1	119720	500yr_Existing	Prop	25600	718.30	740.35		741.20	0.00217	8.28	4118.81	380.33	0.34
Reach1	119526	2yr_Existing	CorEff	2420	717.80	726.69		726.93	0.00343	3.96	611.82	125.26	0.32
Reach1	119526	2yr_Existing	Prop	2420	717.80	726.69		726.93	0.00343	3.96	611.82	125.26	0.32
Reach1	119526	100yr_Existing	CorEff	15500	717.80	735.79		736.45	0.00295	6.98	2659.83	312.21	0.34
Reach1	119526	100yr_Existing	Prop	15500	717.80	735.79		736.45	0.00295	6.98	2660.27	312.25	0.34
Reach1	119526	500yr_Existing	CorEff	25600	717.80	739.89		740.70	0.00269	7.97	4114.37	378.36	0.34
Reach1	119526	500yr_Existing	Prop	25600	717.80	739.91		740.71	0.00268	7.95	4122.02	378.64	0.33
Reach1	119274	2yr_Existing	CorEff	2420	717.16	725.81		726.04	0.00360	3.87	627.06	132.50	0.3
Reach1	119274	2yr_Existing	Prop	2420	717.16	725.81		726.04	0.00360	3.87	627.07	132.50	0.3
Reach1	119274	100yr_Existing	CorEff	15500	717.16	735.06		735.69	0.00316	6.99	2834.46	339.98	0.33
Reach1	119274	100yr_Existing	Prop	15500	717.16	735.06		735.69	0.00315	6.99	2835.08	339.99	0.33
Reach1	119274	500yr_Existing	CorEff	25700	717.16	739.29		740.00	0.00275	7.75	4354.87	377.66	0.32
Reach1	119274	500yr_Existing	Prop	25700	717.16	739.31		740.02	0.00273	7.74	4363.89	377.80	0.32
Reach1	118905	2yr_Existing	CorEff	2420	716.28	724.23		724.57	0.00442	4.69	516.18	97.93	0.36
Reach1	118905	2yr_Existing	Prop	2420	716.28	724.23		724.57	0.00442	4.69	516.19	97.93	0.36
Reach1	118905	100yr_Existing	CorEff	15500	716.28	733.47		734.36	0.00418	8.23	2357.96	262.71	0.39
Reach1	118905	100yr_Existing	Prop	15500	716.28	733.47		734.37	0.00418	8.22	2358.80	262.72	0.39
Reach1	118905	500yr_Existing	CorEff	25700	716.28	737.57		738.76	0.00418	9.79	3585.03	360.87	0.41
Reach1	118905	500yr_Existing	Prop	25700	716.28	737.61		738.79	0.00414	9.76	3599.00	361.64	0.41
Reach1	118577	2yr_Existing	CorEff	2440	715.37	723.27		723.69	0.00178	5.21	468.16	102.20	0.42
Reach1	118577	2yr_Existing	Prop	2440	715.37	723.27		723.69	0.00178	5.21	468.16	102.20	0.42
Reach1	118577	100yr_Existing	CorEff	15600	715.37	732.45		733.46	0.00189	8.75	2445.06	272.73	0.42
Reach1	118577	100yr_Existing	Prop	15600	715.37	732.45		733.47	0.00189	8.75	2446.30	272.75	0.42
Reach1	118577	500yr_Existing	CorEff	25800	715.37	736.38		737.81	0.00207	10.59	3644.24	357.40	0.45
Reach1	118577	500yr_Existing	Prop	25800	715.37	736.44		737.85	0.00204	10.55	3663.35	358.01	0.45
Reach1	118084	2yr_Existing	CorEff	2440	714.10	721.47		722.02	0.00865	5.91	412.81	84.77	0.47
Reach1	118084	2yr_Existing	Prop	2440	714.10	721.48		722.02	0.00865	5.91	412.83	84.77	0.47
Reach1	118084	100yr_Existing	CorEff	15600	714.10	730.74		731.90	0.00621	9.43	2092.96	254.05	0.46
Reach1	118084	100yr_Existing	Prop	15600	714.10	730.75		731.91	0.00620	9.42	2095.24	254.16	0.46
Reach1	118084	500yr_Existing	CorEff	25900	714.10	734.86		736.21	0.00549	10.62	3270.35	317.46	0.45
Reach1	118084	500yr_Existing	Prop	25900	714.10	734.94		736.28	0.00538	10.55	3296.72	318.47	0.44
Reach1	117693	2yr_Existing	CorEff	2450	713.09	719.92		720.45	0.00231	5.85	418.98	91.05	0.48
Reach1	117693	2yr_Existing	Prop	2450	713.09	719.92		720.45	0.00230	5.85	419.06	91.06	0.48
Reach1	117693	100yr_Existing	CorEff	15700	713.09	728.29		730.14	0.00318	11.33	1726.74	213.21	0.57
Reach1	117693	100yr_Existing	Prop	15700	713.09	728.31		730.16	0.00316	11.30	1732.29	213.72	0.57
Reach1	117693	500yr_Existing	CorEff	25900	713.09	731.71		734.36	0.00362	13.88	2576.27	277.72	0.62
Reach1	117693	500yr_Existing	Prop	25900	713.09	731.95		734.50	0.00342	13.62	2645.14	283.74	0.6
Reach1	117434	2yr_Existing	CorEff	2450	712.43	719.44		719.85	0.00204	5.17	473.59	90.35	0.4
Reach1	117434	2yr_Existing	Prop	2450	712.43	719.44		719.85	0.00204	5.17	473.70	90.36	0.4
Reach1	117434	100yr_Existing	CorEff	15700	712.43	727.61		729.13	0.00398	10.40	1861.10	213.61	0.52
Reach1	117434	100yr_Existing	Prop	15700	712.43	727.65		729.15	0.00394	10.37	1868.57	213.89	0.52
Reach1	117434	500yr_Existing	CorEff	26000	712.43	730.89		733.22	0.00461	13.11	2648.59	298.67	0.59
Reach1	117434	500yr_Existing	Prop	26000	712.43	731.17		733.43	0.00436	12.90	2735.99	317.46	0.57
Reach1	117050	2yr_Existing	CorEff	2460	711.44	717.26		718.38	0.00817	8.49	289.84	78.41	0.78
Reach1	117050	2yr_Existing	Prop	2460	711.44	717.27		718.39	0.00815	8.47	290.43	78.68	0.78
Reach1	117050	100yr_Existing	CorEff	15700	711.44	725.93		727.60	0.00386	10.71	1719.48	246.53	0.59
Reach1	117050	100yr_Existing	Prop	15700	711.44	726.05		727.66	0.00370	10.56	1748.00	248.01	0.58
Reach1	117050	500yr_Existing	CorEff	26000	711.44	729.68		731.60	0.00326	11.82	2736.63	305.21	0.56
Reach1	117050	500yr_Existing	Prop	26000	711.44	730.16		731.92	0.00288	11.34	2887.91	330.12	0.53
Reach1	116731	2yr_Existing	CorEff	2470	710.62	716.88		717.18	0.00154	4.42	558.25	107.49	0.34
Reach1	116731	2yr_Existing	Prop	2470	710.62	716.89		717.19	0.00154	4.42	559.23	107.52	0.34
Reach1	116731	100yr_Existing	CorEff	15800	710.62	725.35		726.59	0.00209	9.39	2126.88	304.19	0.45
Reach1	116731	100yr_Existing	Prop	15800	710.62	725.50		726.70	0.00199	9.24	2173.47	307.27	0.44
Reach1	116731	500yr_Existing	CorEff	26100	710.62	729.26		730.69	0.00188	10.55	3479.18	379.23	0.45
Reach1	116731	500yr_Existing	Prop	26100	710.62	729.81		731.11	0.00164	10.08	3690.53	387.07	0.42



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WATER SURFACE ELEVATIONS COMPUTED USING A HEC-RAS (V.5.0.3) MODEL CREATED FOR BRUSHY CREEK.
FILE NAME: "BRUSHY_CREEK.PRJ".

THE ORIGINAL MODEL WAS DEVELOPED THROUGH A 2015 FEMA STUDY OF THE UPPER BRUSHY CREEK WATERSHED. EFFECTIVE AND PROPOSED MODELS WERE DEVELOPED USING SURVEY DATA AND LIDAR DATA.

CORRECTED EFFECTIVE MODEL CREATED AFTER ADDING ADDITIONAL CROSS SECTIONS NEAR PROPOSED BRIDGE LOCATION. PROPOSED MODEL CREATED AFTER ADDING PROPOSED BRIDGE STRUCTURE TO MODEL.

HYDROLOGIC METHOD:
EFFECTIVE FLOWS WERE OBTAINED FROM THE 2015 FEMA STUDY HEC-RAS MODEL. FLOWS WERE USED TO ANALYZE CONDITIONS IN THE CORRECTED EFFECTIVE AND PROPOSED MODELS.

DESIGN

STATE OF TEXAS — LUKE REED — 101242 — LICENSED PROFESSIONAL ENGINEER

LUKE REED, P.E. — 7/30/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 7/30/2018 DATE

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
7800 SHOAL CREEK BLVD, STE 220 W | AUSTIN, TX 78757 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
HYDRAULIC DATA
BRUSHY CREEK TRAIL PEDESTRIAN BRIDGE

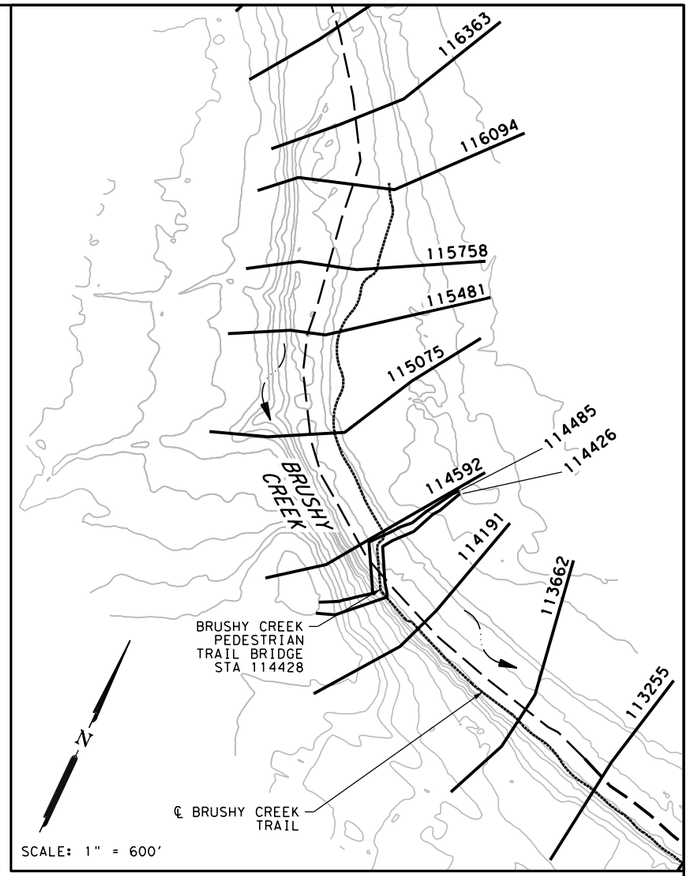
100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 7/30/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 64

Plotted on: 7/30/2018

Design Filename: H:\projects\508\67\00\design\Civil\Drainage\5086700HDS_BRIDGE02.dgn

HEC-RAS CROSS SECTION OUTPUT

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach1	116363	2yr_Existing	CorEff	2470	709.68	716.29		716.53	0.00198	4.11	708.78	180.09	0.33
Reach1	116363	2yr_Existing	Prop	2470	709.68	716.30		716.54	0.00197	4.10	711.26	180.33	0.33
Reach1	116363	100yr_Existing	CorEff	15800	709.68	725.37		725.76	0.00125	5.92	3895.42	432.32	0.29
Reach1	116363	100yr_Existing	Prop	15800	709.68	725.53		725.91	0.00118	5.82	3963.68	432.93	0.28
Reach1	116363	500yr_Existing	CorEff	26100	709.68	729.42		729.90	0.00111	6.71	5681.39	451.04	0.29
Reach1	116363	500yr_Existing	Prop	26100	709.68	729.96		730.40	0.00098	6.43	5927.84	453.49	0.27
Reach1	116094	2yr_Existing	CorEff	2480	708.99	715.78		716.08	0.00149	4.46	632.15	147.99	0.34
Reach1	116094	2yr_Existing	Prop	2480	708.99	715.80		716.09	0.00147	4.44	634.96	148.12	0.33
Reach1	116094	100yr_Existing	CorEff	15800	708.99	724.96		725.43	0.00143	6.48	3666.06	433.21	0.31
Reach1	116094	100yr_Existing	Prop	15800	708.99	725.15		725.59	0.00135	6.34	3745.41	434.43	0.3
Reach1	116094	500yr_Existing	CorEff	26200	708.99	729.07		729.60	0.00123	7.16	5527.39	468.17	0.3
Reach1	116094	500yr_Existing	Prop	26200	708.99	729.67		730.14	0.00107	6.82	5808.06	475.47	0.28
Reach1	115758	2yr_Existing	CorEff	2480	708.12	715.25		715.53	0.00180	4.83	752.99	204.42	0.39
Reach1	115758	2yr_Existing	Prop	2480	708.12	715.27		715.55	0.00176	4.80	758.93	204.67	0.39
Reach1	115758	100yr_Existing	CorEff	15900	708.12	724.16		724.93	0.00139	8.66	3140.96	384.44	0.41
Reach1	115758	100yr_Existing	Prop	15900	708.12	724.39		725.12	0.00130	8.47	3230.84	395.05	0.4
Reach1	115758	500yr_Existing	CorEff	26200	708.12	728.29		729.15	0.00122	9.69	5037.41	526.57	0.41
Reach1	115758	500yr_Existing	Prop	26200	708.12	729.01		729.76	0.00102	9.09	5437.32	568.81	0.37
Reach1	115481	2yr_Existing	CorEff	2490	707.41	714.80		714.96	0.00208	3.18	783.24	160.54	0.25
Reach1	115481	2yr_Existing	Prop	2490	707.41	714.84		714.99	0.00204	3.15	789.59	160.91	0.25
Reach1	115481	100yr_Existing	CorEff	15900	707.41	723.81		724.40	0.00222	6.39	2856.38	329.44	0.31
Reach1	115481	100yr_Existing	Prop	15900	707.41	724.07		724.63	0.00206	6.23	2941.95	333.85	0.29
Reach1	115481	500yr_Existing	CorEff	26300	707.41	728.04		728.69	0.00186	7.01	4712.11	555.17	0.29
Reach1	115481	500yr_Existing	Prop	26300	707.41	728.83		729.37	0.00151	6.49	5156.99	587.81	0.27
Reach1	115075	2yr_Existing	CorEff	2500	706.37	714.21		714.39	0.00099	3.41	739.06	162.66	0.27
Reach1	115075	2yr_Existing	Prop	2500	706.37	714.27		714.45	0.00096	3.37	748.15	163.19	0.27
Reach1	115075	100yr_Existing	CorEff	16000	706.37	722.72		723.54	0.00197	7.46	2442.22	225.06	0.36
Reach1	115075	100yr_Existing	Prop	16000	706.37	723.05		723.83	0.00182	7.27	2517.92	228.40	0.35
Reach1	115075	500yr_Existing	CorEff	26400	706.37	726.53		727.79	0.00236	9.37	3608.42	454.51	0.4
Reach1	115075	500yr_Existing	Prop	26400	706.37	727.65		728.66	0.00181	8.53	4137.07	487.43	0.35
Reach1	114592	2yr_Existing	CorEff	2510	705.51	713.17		713.42	0.00594	4.06	620.56	167.60	0.36
Reach1	114592	2yr_Existing	Prop	2510	705.51	713.28		713.52	0.00540	3.95	639.58	168.81	0.35
Reach1	114592	100yr_Existing	CorEff	16000	705.51	721.21		722.10	0.00495	7.81	2206.56	211.68	0.4
Reach1	114592	100yr_Existing	Prop	16000	705.51	721.73		722.54	0.00427	7.46	2316.98	214.04	0.37
Reach1	114592	500yr_Existing	CorEff	26400	705.51	724.78		726.13	0.00540	9.71	3011.09	238.14	0.43
Reach1	114592	500yr_Existing	Prop	26400	705.51	726.37		727.44	0.00379	8.68	3393.88	242.98	0.37
Reach1	114485	2yr_Existing	CorEff	2510	705.32	713.16		713.26	0.00043	2.51	1000.32	207.97	0.2
Reach1	114485	2yr_Existing	Prop	2510	705.32	713.25	709.22	713.34	0.00041	2.47	1017.58	208.45	0.2
Reach1	114485	100yr_Existing	CorEff	16000	705.32	721.32		721.84	0.00063	5.80	2839.77	241.46	0.29
Reach1	114485	100yr_Existing	Prop	16000	705.32	721.76	714.07	722.25	0.00056	5.61	2946.06	243.39	0.27
Reach1	114485	500yr_Existing	CorEff	26400	705.32	724.97		725.81	0.00074	7.41	3754.25	261.89	0.32
Reach1	114485	500yr_Existing	Prop	26400	705.32	726.43	716.30	727.13	0.00055	6.80	4150.96	283.20	0.28
Reach1	114428			Bridge									
Reach1	114426	2yr_Existing	CorEff	2510	705.22	713.07		713.22	0.00075	3.10	810.96	183.48	0.26
Reach1	114426	2yr_Existing	Prop	2510	705.22	713.08		713.23	0.00075	3.09	811.57	183.50	0.26
Reach1	114426	100yr_Existing	CorEff	16000	705.22	721.07		721.78	0.00092	6.78	2493.62	229.89	0.34
Reach1	114426	100yr_Existing	Prop	16000	705.22	721.08		721.79	0.00092	6.78	2495.93	229.95	0.34
Reach1	114426	500yr_Existing	CorEff	26400	705.22	724.61		725.73	0.00106	8.61	3341.64	250.15	0.38
Reach1	114426	500yr_Existing	Prop	26400	705.22	724.61		725.73	0.00106	8.61	3342.05	250.16	0.38
Reach1	114191	2yr_Existing	CorEff	2520	704.80	712.80		712.97	0.00172	3.28	787.50	169.21	0.25
Reach1	114191	2yr_Existing	Prop	2520	704.80	712.80		712.97	0.00172	3.28	787.50	169.21	0.25
Reach1	114191	100yr_Existing	CorEff	16100	704.80	720.69		721.44	0.00256	7.35	2536.26	241.70	0.36
Reach1	114191	100yr_Existing	Prop	16100	704.80	720.69		721.44	0.00256	7.35	2536.26	241.70	0.36
Reach1	114191	500yr_Existing	CorEff	26500	704.80	724.21		725.35	0.00290	9.15	3426.35	268.66	0.39
Reach1	114191	500yr_Existing	Prop	26500	704.80	724.21		725.35	0.00290	9.15	3426.35	268.66	0.39
Reach1	113662	2yr_Existing	CorEff	2530	703.86	712.24		712.36	0.00080	2.80	904.56	187.59	0.22
Reach1	113662	2yr_Existing	Prop	2530	703.86	712.24		712.36	0.00080	2.80	904.56	187.59	0.22
Reach1	113662	100yr_Existing	CorEff	16100	703.86	719.58		720.23	0.00204	6.62	2696.25	277.36	0.34
Reach1	113662	100yr_Existing	Prop	16100	703.86	719.58		720.23	0.00204	6.62	2696.25	277.36	0.34
Reach1	113662	500yr_Existing	CorEff	26600	703.86	722.98		723.95	0.00239	8.23	3714.27	358.60	0.37
Reach1	113662	500yr_Existing	Prop	26600	703.86	722.98		723.95	0.00239	8.23	3714.27	358.60	0.37
Reach1	113255	2yr_Existing	CorEff	2530	703.14	711.77		711.87	0.00193	2.54	1013.81	260.81	0.21
Reach1	113255	2yr_Existing	Prop	2530	703.14	711.77		711.87	0.00193	2.54	1013.81	260.81	0.21
Reach1	113255	100yr_Existing	CorEff	16100	703.14	718.75		719.20	0.00272	5.61	3102.80	322.54	0.29
Reach1	113255	100yr_Existing	Prop	16100	703.14	718.75		719.20	0.00272	5.61	3102.80	322.54	0.29
Reach1	113255	500yr_Existing	CorEff	26700	703.14	722.07		722.75	0.00296	6.93	4205.36	341.19	0.32
Reach1	113255	500yr_Existing	Prop	26700	703.14	722.07		722.75	0.00296	6.93	4205.36	341.19	0.32



NOTE:
1. BRUSHY CREEK IS IDENTIFIED ON FIRM PANEL 48491C0490E, DATED SEPTEMBER 26, 2008. THE UPSTREAM/ DOWNSTREAM AREA AND PROPOSED CROSSING ARE IN ZONE "AE".
2. COORDINATION WITH LOCAL FLOODPLAIN ADMINSTRATOR (WILLIAMSON COUNTY) ON JULY 27, 2018.
3. NO ADVERSE IMPACTS TO ADJACENT STRUCTURES DUE TO RISE IN FLOODPLAIN.

HYDRAULIC METHOD:
WATER SURFACE ELEVATIONS COMPUTED USING A HEC-RAS (V.5.0.3) MODEL CREATED FOR BRUSHY CREEK.
FILE NAME: "BRUSHY_CREEK.PRJ".

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DESIGN

STATE OF TEXAS — LUKE REED — 101242 — LICENSED PROFESSIONAL ENGINEER

LUKE REED, P.E. — 7/30/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 7/30/2018 DATE

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7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
HYDRAULIC DATA
BRUSHY CREEK TRAIL PEDESTRIAN BRIDGE

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 7/30/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 64A

Plotted on: 7/30/2018

Design Filename: H:\projects\508\67\00\design\Civil\Drainage\5086700HDS_BRIDGE02A.dgn

Plotted on: 7/30/2018

Design Filename: H:\projects\508\67.00\design\Civil\Drainage\508670OHDS_BRIDGE02B.dgn

HEC-RAS BRIDGE OUTPUT

Plan: Prop	Brushy_Creek	Reach1 RS: 114428	Profile: 2yr_Existing	
E.G. US. (ft)	713.34	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	713.25	E.G. Elev (ft)	713.33	713.29
Q Total (cfs)	2510	W.S. Elev (ft)	713.2	713.08
Q Bridge (cfs)	2510	Crit W.S. (ft)	709.38	709.72
Q Weir (cfs)		Max Chl Dpth (ft)	7.88	7.87
Weir Sta Lft (ft)		Vel Total (ft/s)	2.82	3.62
Weir Sta Rgt (ft)		Flow Area (sq ft)	891.65	693.8
Weir Submerg		Froude # Chl	0.22	0.3
Weir Max Depth (ft)		Specif Force (cu ft)	2859.95	2248.07
Min El Weir Flow (ft)	719.88	Hydr Depth (ft)	5.09	4.53
Min El Prs (ft)	723.58	W.P. Total (ft)	242.82	201.18
Delta EG (ft)	0.11	Conv. Total (cfs)	90101.1	67233.9
Delta WS (ft)	0.17	Top Width (ft)	175.1	153.04
BR Open Area (sq ft)	2254.85	Frctn Loss (ft)	0.02	0.03
BR Open Vel (ft/s)	3.62	C & E Loss (ft)	0.02	0.03
BR Sluice Coef		Shear Total (lb/sq ft)	0.18	0.3
BR Sel Method	Energy only	Power Total (lb/ft s)	0.5	1.09

Plan: Prop	Brushy_Creek	Reach1 RS: 114428	Profile: 100yr_Existing	
E.G. US. (ft)	722.25	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	721.76	E.G. Elev (ft)	722.13	722.01
Q Total (cfs)	16000	W.S. Elev (ft)	721.29	720.98
Q Bridge (cfs)	15844	Crit W.S. (ft)	714.53	715.57
Q Weir (cfs)	156.39	Max Chl Dpth (ft)	15.96	15.76
Weir Sta Lft (ft)	183.14	Vel Total (ft/s)	7.34	7.92
Weir Sta Rgt (ft)	229.35	Flow Area (sq ft)	2157.41	1999.99
Weir Submerg	0.08	Froude # Chl	0.32	0.36
Weir Max Depth (ft)	2.38	Specif Force (cu ft)	19001.70	16684.92
Min El Weir Flow (ft)	719.88	Hydr Depth (ft)	19.30	14.9
Min El Prs (ft)	723.58	W.P. Total (ft)	463.21	427.92
Delta EG (ft)	0.46	Conv. Total (cfs)	260685.50	247260.50
Delta WS (ft)	0.68	Top Width (ft)	111.80	134.23
BR Open Area (sq ft)	2254.85	Frctn Loss (ft)	0.06	0.06
BR Open Vel (ft/s)	7.92	C & E Loss (ft)	0.06	0.16
BR Sluice Coef		Shear Total (lb/sq ft)	1.10	1.22
BR Sel Method	Energy/Weir	Power Total (lb/ft s)	8.04	9.68

Plan: Prop	Brushy_Creek	Reach1 RS: 114428	Profile: 500yr_Existing	
E.G. US. (ft)	727.13	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	726.43	E.G. Elev (ft)	727.13	727.13
Q Total (cfs)	26400	W.S. Elev (ft)	726.43	725.76
Q Bridge (cfs)	22990	Crit W.S. (ft)	716.83	718.19
Q Weir (cfs)	3410.34	Max Chl Dpth (ft)	21.11	20.54
Weir Sta Lft (ft)	138.92	Vel Total (ft/s)	8.04	8.98
Weir Sta Rgt (ft)	424.19	Flow Area (sq ft)	3284.85	2940.07
Weir Submerg	0.40	Froude # Chl	0.34	0.42
Weir Max Depth (ft)	7.26	Specif Force (cu ft)	36573.98	32585.15
Min El Weir Flow (ft)	719.88	Hydr Depth (ft)	13.57	19.32
Min El Prs (ft)	723.58	W.P. Total (ft)	829.56	734.05
Delta EG (ft)	1.40	Conv. Total (cfs)		
Delta WS (ft)	1.82	Top Width (ft)	242.07	152.15
BR Open Area (sq ft)	2254.85	Frctn Loss (ft)		
BR Open Vel (ft/s)	10.20	C & E Loss (ft)		
BR Sluice Coef		Shear Total (lb/sq ft)		
BR Sel Method	Press/Weir	Power Total (lb/ft s)		

NOTE:
1. BRUSHY CREEK IS IDENTIFIED ON FIRM PANEL 48491C0490E, DATED SEPTEMBER 26, 2008. THE UPSTREAM/ DOWNSTREAM AREA AND PROPOSED CROSSING ARE IN ZONE "AE".
2. COORDINATION WITH LOCAL FLOODPLAIN ADMINSTRATOR (WILLIAMSON COUNTY) ON JULY 27, 2018.
3. NO ADVERSE IMPACTS TO ADJACENT STRUCTURES DUE TO RISE IN FLOODPLAIN.

HYDRAULIC METHOD:
WATER SURFACE ELEVATIONS COMPUTED USING A HEC-RAS (V.5.0.3) MODEL CREATED FOR BRUSHY CREEK.
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DESIGN

STATE OF TEXAS — LUKE REED — 101242 — LICENSED PROFESSIONAL ENGINEER

LUKE REED, P.E. — 7/30/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 7/30/2018 DATE

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TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

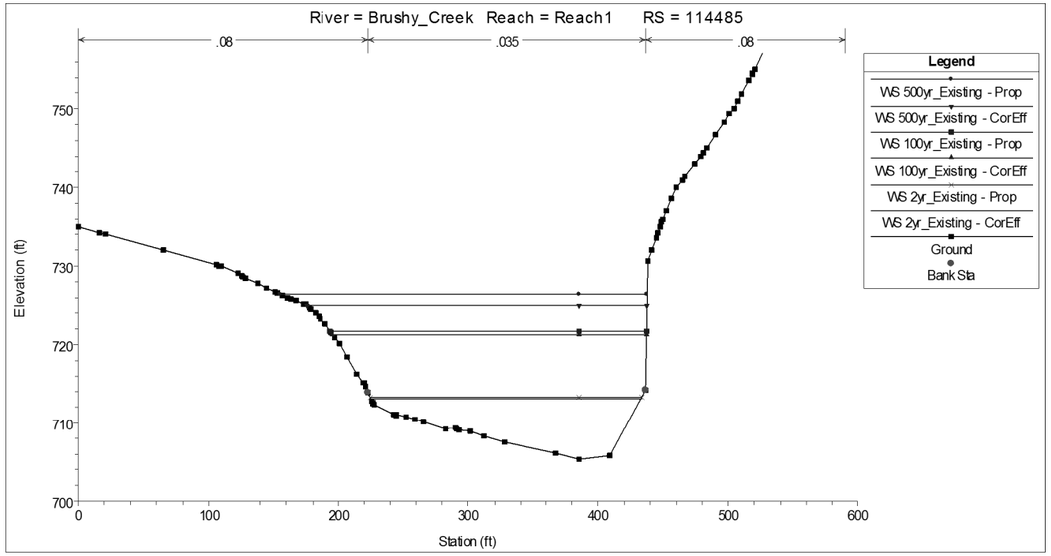
BRUSHY CREEK TRAIL
HYDRAULIC DATA
BRUSHY CREEK TRAIL PEDESTRIAN BRIDGE

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 7/30/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 64B

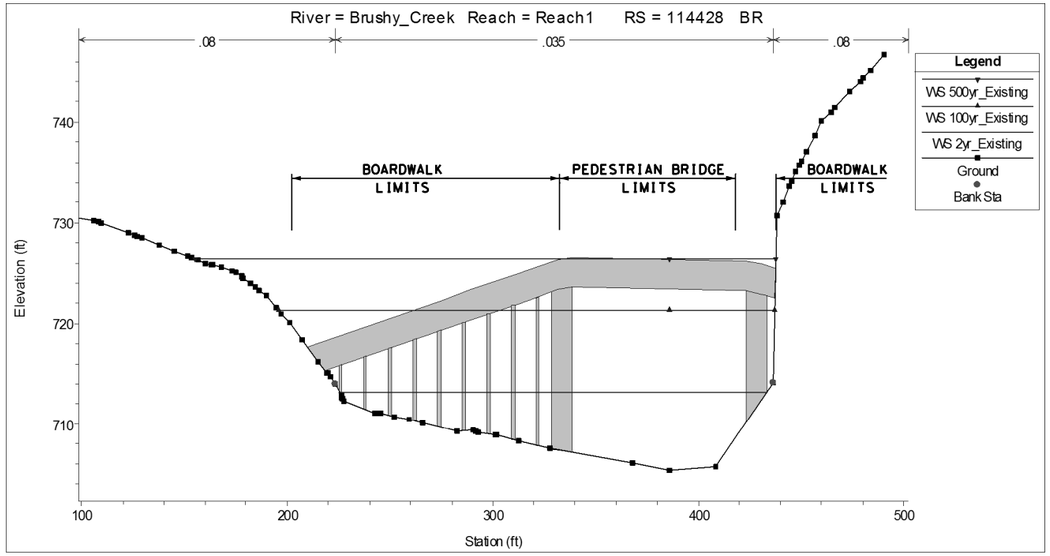
Plotted on: 7/30/2018

Design Filename: H:\projects\508\67\00\design\Civil\Drainage\508670OHDS_BRIDGE03.dgn

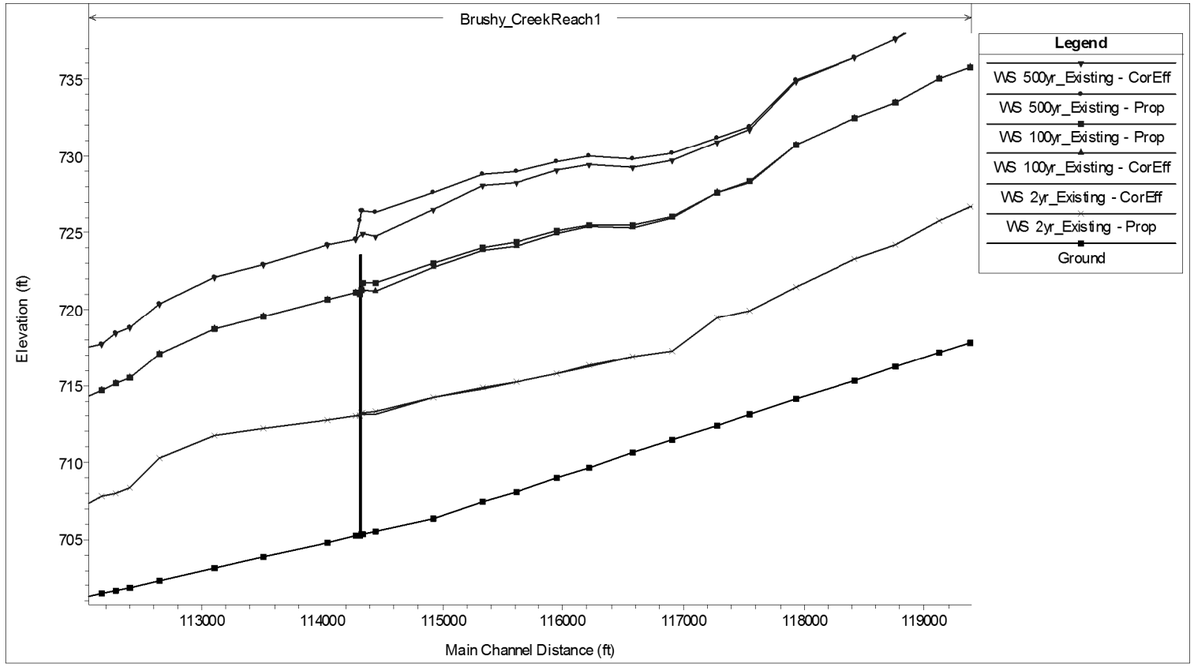
HEC-RAS UPSTREAM CHANNEL CROSS SECTION



HEC-RAS BRIDGE UPSTREAM



HEC-RAS CHANNEL PROFILE



NOTE:
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2. COORDINATION WITH LOCAL FLOODPLAIN ADMINSTRATOR (WILLIAMSON COUNTY) ON JULY 27, 2018.
3. NO ADVERSE IMPACTS TO ADJACENT STRUCTURES DUE TO RISE IN FLOODPLAIN.
4. BRIDGE HAS 1' FREEBOARD FROM 100 YR STORM.
5. BOARDWALK HAS 10' FREEBOARD FROM 2 YR STORM.

HYDRAULIC METHOD:

WATER SURFACE ELEVATIONS COMPUTED USING A HEC-RAS (V.5.0.3) MODEL CREATED FOR BRUSHY CREEK.
FILE NAME: "BRUSHY_CREEK.PRJ".

THE ORIGINAL MODEL WAS DEVELOPED THROUGH A 2015 FEMA STUDY OF THE UPPER BRUSHY CREEK WATERSHED.

EFFECTIVE AND PROPOSED MODELS WERE DEVELOPED USING SURVEY DATA AND LIDAR DATA.

CORRECTED EFFECTIVE MODEL CREATED AFTER ADDING ADDITIONAL CROSS SECTIONS NEAR PROPOSED BRIDGE LOCATION.

PROPOSED MODEL CREATED AFTER ADDING PROPOSED BRIDGE STRUCTURE TO MODEL.

HYDROLOGIC METHOD:

EFFECTIVE FLOWS WERE OBTAINED FROM THE 2015 FEMA STUDY HEC-RAS MODEL. FLOWS WERE USED TO ANALYZE CONDITIONS IN THE CORRECTED EFFECTIVE AND PROPOSED MODELS.

DESIGN

STATE OF TEXAS — LUKE REED — 101242 — LICENSED PROFESSIONAL ENGINEER

LUKE REED, P.E. — 7/30/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 7/30/2018 DATE

PAPE-DAWSON ENGINEERS
AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS
7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL

HYDRAULIC DATA
BRUSHY CREEK TRAIL PEDESTRIAN BRIDGE

PIER SCOUR (100-YR EXISTING)											
Pier: #1 (CL = 225.82)		Pier: #2 (CL = 237.82)		Pier: #3 (CL = 249.82)		Pier: #4 (CL = 261.82)		Pier: #5 (CL = 273.82)		Pier: #6 (CL = 285.82)	
INPUT DATA		INPUT DATA		INPUT DATA		INPUT DATA		INPUT DATA		INPUT DATA	
Pier Shape:	Round nose	Pier Shape:	Round nose	Pier Shape:	Round nose	Pier Shape:	Round nose	Pier Shape:	Round nose	Pier Shape:	Round nose
Pier Width (ft):	1.5	Pier Width (ft):	1.5	Pier Width (ft):	1.5	Pier Width (ft):	1.5	Pier Width (ft):	1.5	Pier Width (ft):	1.5
Grain Size D50 (mm):	4.72	Grain Size D50 (mm):	4.72	Grain Size D50 (mm):	4.72	Grain Size D50 (mm):	4.72	Grain Size D50 (mm):	4.72	Grain Size D50 (mm):	4.72
Depth Upstream (ft):	13.27	Depth Upstream (ft):	13.27	Depth Upstream (ft):	13.27	Depth Upstream (ft):	13.27	Depth Upstream (ft):	13.27	Depth Upstream (ft):	13.27
Velocity Upstream (ft/s):	5.61	Velocity Upstream (ft/s):	5.61	Velocity Upstream (ft/s):	5.61	Velocity Upstream (ft/s):	5.61	Velocity Upstream (ft/s):	5.61	Velocity Upstream (ft/s):	5.61
K1 Nose Shape:	1	K1 Nose Shape:	1	K1 Nose Shape:	1	K1 Nose Shape:	1	K1 Nose Shape:	1	K1 Nose Shape:	1
Pier Angle:	10	Pier Angle:	10	Pier Angle:	10	Pier Angle:	10	Pier Angle:	10	Pier Angle:	10
Pier Length (ft):	16	Pier Length (ft):	16	Pier Length (ft):	16	Pier Length (ft):	16	Pier Length (ft):	16	Pier Length (ft):	16
K2 Angle Coef:	1.75	K2 Angle Coef:	1.75	K2 Angle Coef:	1.75	K2 Angle Coef:	1.75	K2 Angle Coef:	1.75	K2 Angle Coef:	1.75
K3 Bed Cond Coef:	1.1	K3 Bed Cond Coef:	1.1	K3 Bed Cond Coef:	1.1	K3 Bed Cond Coef:	1.1	K3 Bed Cond Coef:	1.1	K3 Bed Cond Coef:	1.1
Grain Size D90 (mm):	45	Grain Size D90 (mm):	45	Grain Size D90 (mm):	45	Grain Size D90 (mm):	45	Grain Size D90 (mm):	45	Grain Size D90 (mm):	45
K4 Armouring Coef:	0.4	K4 Armouring Coef:	0.4	K4 Armouring Coef:	0.4	K4 Armouring Coef:	0.4	K4 Armouring Coef:	0.4	K4 Armouring Coef:	0.4
RESULTS		RESULTS		RESULTS		RESULTS		RESULTS		RESULTS	
Scour Depth Ys (ft):	2.83	Scour Depth Ys (ft):	2.83	Scour Depth Ys (ft):	2.83	Scour Depth Ys (ft):	2.83	Scour Depth Ys (ft):	2.83	Scour Depth Ys (ft):	2.83
Froude #:	0.27	Froude #:	0.27	Froude #:	0.27	Froude #:	0.27	Froude #:	0.27	Froude #:	0.27
Equation:	CSU equation	Equation:	CSU equation	Equation:	CSU equation	Equation:	CSU equation	Equation:	CSU equation	Equation:	CSU equation

PIER SCOUR (100-YR EXISTING)											
Pier: #7 (CL = 297.82)		Pier: #8 (CL = 309.82)		Pier: #9 (CL = 321.82)		Pier: #10 (CL = 333.82)		Pier: #11 (CL = 428.67)		Pier: #12 (CL = 440.67)	
INPUT DATA		INPUT DATA		INPUT DATA		INPUT DATA		INPUT DATA		INPUT DATA	
Pier Shape:	Round nose	Pier Shape:	Round nose	Pier Shape:	Round nose	Pier Shape:	Square nose	Pier Shape:	Square nose	Pier Shape:	Round nose
Pier Width (ft):	1.5	Pier Width (ft):	1.5	Pier Width (ft):	1.5	Pier Width (ft):	10	Pier Width (ft):	10	Pier Width (ft):	1.5
Grain Size D50 (mm):	4.72	Grain Size D50 (mm):	4.72	Grain Size D50 (mm):	4.72	Grain Size D50 (mm):	4.72	Grain Size D50 (mm):	4.72	Grain Size D50 (mm):	4.72
Depth Upstream (ft):	13.27	Depth Upstream (ft):	13.27	Depth Upstream (ft):	13.27	Depth Upstream (ft):	13.27	Depth Upstream (ft):	13.27	Depth Upstream (ft):	13.27
Velocity Upstream (ft/s):	5.61	Velocity Upstream (ft/s):	5.61	Velocity Upstream (ft/s):	5.61	Velocity Upstream (ft/s):	5.61	Velocity Upstream (ft/s):	5.61	Velocity Upstream (ft/s):	5.61
K1 Nose Shape:	1	K1 Nose Shape:	1	K1 Nose Shape:	1	K1 Nose Shape:	1	K1 Nose Shape:	1	K1 Nose Shape:	1
Pier Angle:	10	Pier Angle:	10	Pier Angle:	10	Pier Angle:	10	Pier Angle:	10	Pier Angle:	10
Pier Length (ft):	16	Pier Length (ft):	16	Pier Length (ft):	16	Pier Length (ft):	16	Pier Length (ft):	16	Pier Length (ft):	16
K2 Angle Coef:	1.75	K2 Angle Coef:	1.75	K2 Angle Coef:	1.75	K2 Angle Coef:	1.75	K2 Angle Coef:	1.16	K2 Angle Coef:	1.97
K3 Bed Cond Coef:	1.1	K3 Bed Cond Coef:	1.1	K3 Bed Cond Coef:	1.1	K3 Bed Cond Coef:	1.1	K3 Bed Cond Coef:	1.1	K3 Bed Cond Coef:	1.1
Grain Size D90 (mm):	45	Grain Size D90 (mm):	45	Grain Size D90 (mm):	45	Grain Size D90 (mm):	45	Grain Size D90 (mm):	45	Grain Size D90 (mm):	45
K4 Armouring Coef:	0.4	K4 Armouring Coef:	0.4	K4 Armouring Coef:	0.4	K4 Armouring Coef:	0.4	K4 Armouring Coef:	0.4	K4 Armouring Coef:	0.4
RESULTS		RESULTS		RESULTS		RESULTS		RESULTS		RESULTS	
Scour Depth Ys (ft):	2.83	Scour Depth Ys (ft):	2.83	Scour Depth Ys (ft):	2.83	Scour Depth Ys (ft):	9.7	Scour Depth Ys (ft):	6.43	Scour Depth Ys (ft):	3.18
Froude #:	0.27	Froude #:	0.27	Froude #:	0.27	Froude #:	0.27	Froude #:	0.27	Froude #:	0.27
Equation:	CSU equation	Equation:	CSU equation	Equation:	CSU equation	Equation:	CSU equation	Equation:	CSU equation	Equation:	CSU equation

PIER SCOUR (100-YR EXISTING)			
Pier: #13 (CL = 452.67)		Pier: #14 (CL = 464.67)	
INPUT DATA		INPUT DATA	
Pier Shape:	Round nose	Pier Shape:	Round nose
Pier Width (ft):	1.5	Pier Width (ft):	1.5
Grain Size D50 (mm):	4.72	Grain Size D50 (mm):	4.72
Depth Upstream (ft):	13.27	Depth Upstream (ft):	13.27
Velocity Upstream (ft/s):	5.61	Velocity Upstream (ft/s):	5.61
K1 Nose Shape:	1	K1 Nose Shape:	1
Pier Angle:	10	Pier Angle:	10
Pier Length (ft):	16	Pier Length (ft):	16
K2 Angle Coef:	1.75	K2 Angle Coef:	1.75
K3 Bed Cond Coef:	1.1	K3 Bed Cond Coef:	1.1
Grain Size D90 (mm):	45	Grain Size D90 (mm):	45
K4 Armouring Coef:	0.4	K4 Armouring Coef:	0.4
RESULTS		RESULTS	
Scour Depth Ys (ft):	2.83	Scour Depth Ys (ft):	2.83
Froude #:	0.27	Froude #:	0.27
Equation:	CSU equation	Equation:	CSU equation

CONTRACTION SCOUR (100-YR EXISTING)			
INPUT DATA	LEFT	CHANNEL	RIGHT
Average Depth (ft):	5.9	12.47	7.04
Approach Velocity (ft/s):	3.88	7.46	3.47
Br Average Depth (ft):	1.50	19.37	3.56
BR Opening Flow (cfs):	2.26	15839.87	1.48
BR Top WD (ft):	29.22	111.08	0.73
Grain Size D50 (mm):	4.72	4.72	4.72
Approach Flow (cfs):	950.01	14695.05	354.94
Approach Top WD (ft):	41.53	157.99	14.52
K1 Coefficient:	0.64	0.64	0.64
RESULTS			
Scour Depth Ys (ft):	0	0	0
Critical Velocity (ft/s):	3.75	4.25	3.86
Equation:	Live	Live	Clear

NOTE:
INFORMATION ON RIPRAP DESIGN SHOWN ON SHEET **67**

DESIGN

STATE OF TEXAS
LUKE REED
101242
LICENSED PROFESSIONAL ENGINEER

LUKE REED, P.E. — 7/30/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS
JAMES A. LUTZ
84722
LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 7/30/2018 DATE

PAPE-DAWSON ENGINEERS
AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS
7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL

HYDRAULIC DATA
BRUSHY CREEK TRAIL PEDESTRIAN BRIDGE

SHEET 6 OF 6

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 7/30/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: **66**

Plotted on: 7/30/2018

Design Filename: H:\projects\508\67\00\design\Civil\Drainage\5086700HDS_BRIDGE04.dgn

Plotted on: 7/30/2018

Design Filename: H:\projects\508\67.00\design\Civil\Drainage\508670OMITIGATION_DETAILS.dgn

ROCK RIPRAP STONE SIZING AT PIERS

$$V_{des} = (K1)(K2)(V_{avg})$$

K1 = 1.5
K2 = 1.2
Vavg = 3.88
Vdes = 7.0 fps

$$D50 = \frac{0.692\ (V_{des})'}{(SG-1)(2g)}$$

SG = 2.5
g = 32.2

D50 = 0.35′ = 4.19"
D50 = 6" DESIGN

RIPRAP EXTENT

2(Pw) = 3′
Pw= 1.5′

RIPRAP THICKNESS

3(D50) = 18"

ROCK RIPRAP STONE SIZING AT VERTICAL ABUTMENTS

$$Fr = \frac{V}{sqrt(gY)}$$

V = 7.46
g = 32.2
Y = 19.37
Fr = 0.30

$$D50 = \frac{(K)(Y)}{SG-1}\ Fr'$$

K = 1.02
Y = 19.37
SG = 2.5
Fr = 0.30

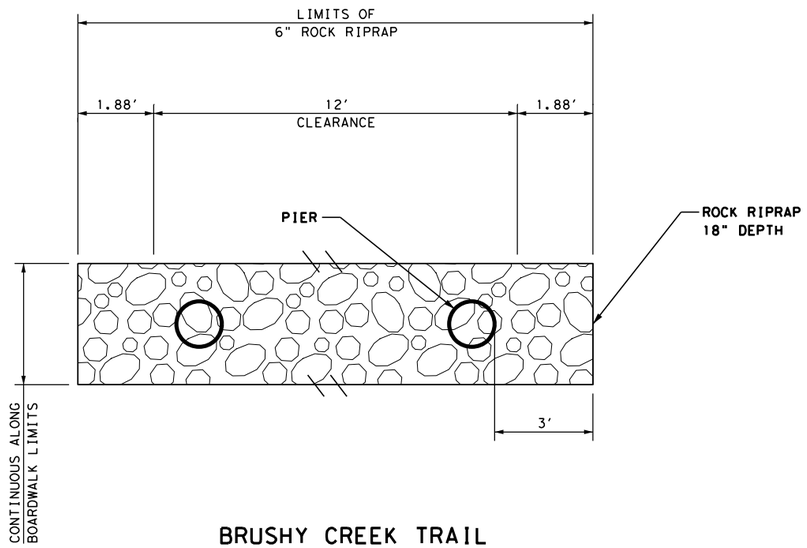
D50 = 1.18′ = 14.10"
D50 = 15" DESIGN

RIPRAP EXTENT

2(Yd) = 7.1′
Yd = 3.56′

RIPRAP THICKNESS

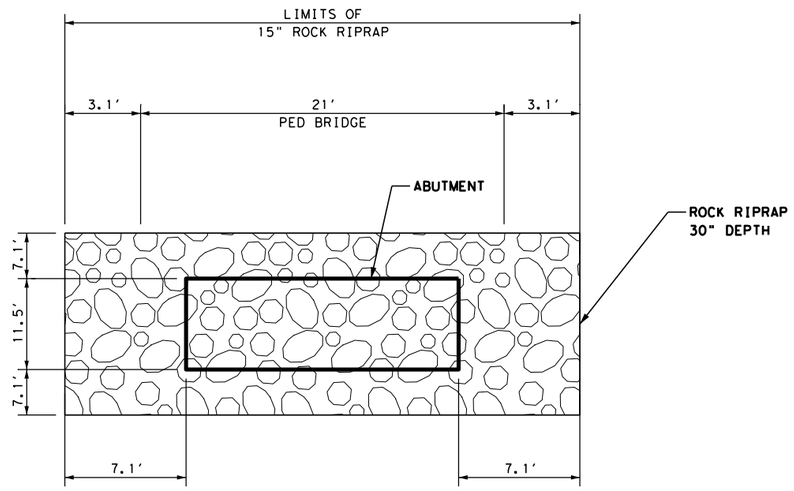
2(D50) = 30"



BRUSHY CREEK TRAIL PIER RIPRAP DETAIL

NTS

*SEE STRUCTURAL PLANS FOR PIER DETAILS



BRUSHY CREEK TRAIL ABUTMENT RIPRAP DETAIL

NTS

*SEE STRUCTURAL PLANS FOR ABUTMENT DETAILS

DESIGN

STATE OF TEXAS — LUKE REED — 101242 — LICENSED PROFESSIONAL ENGINEER

LUKE REED, P.E. — 7/30/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 7/30/2018 DATE

PAPE-DAWSON ENGINEERS

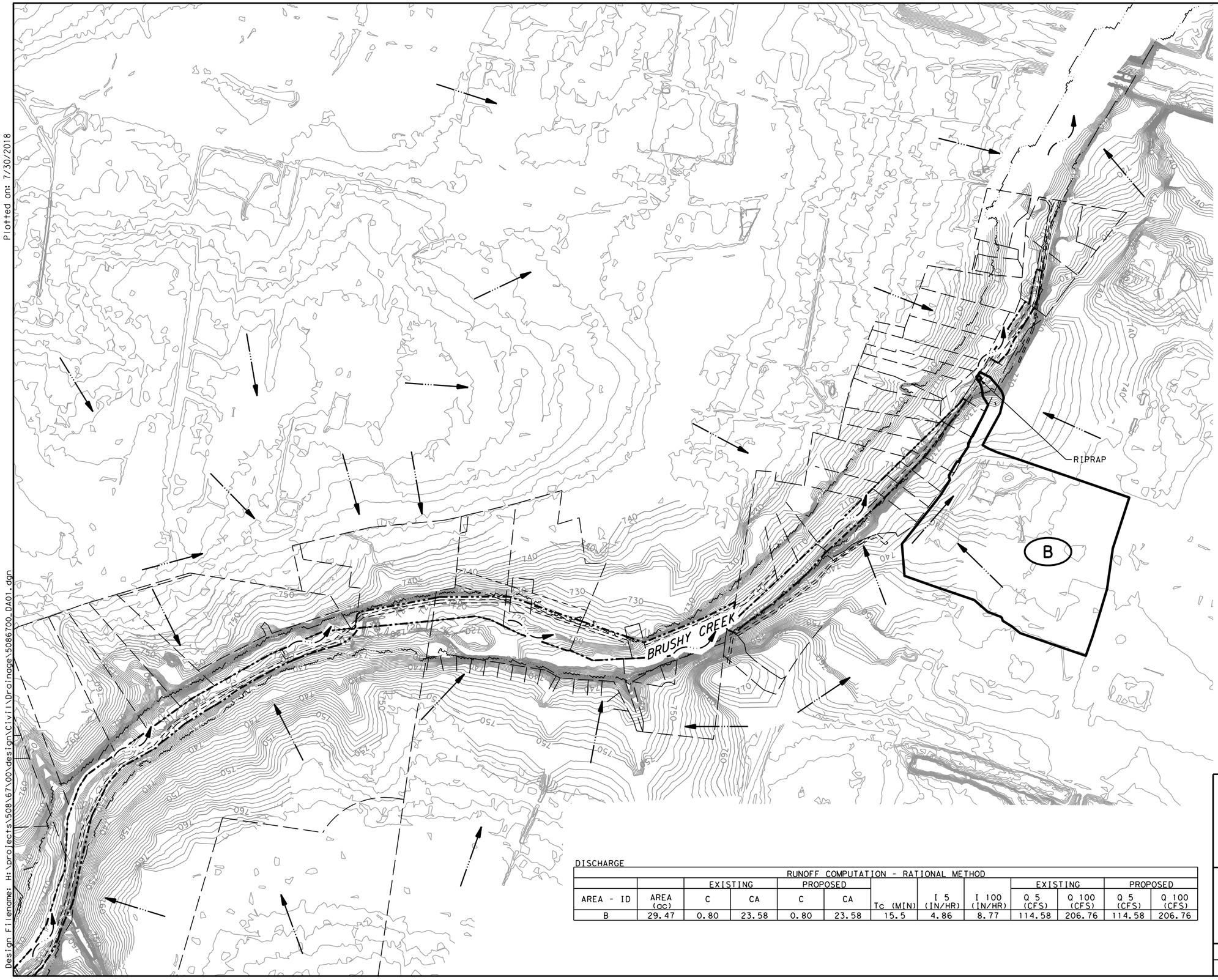
AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS
7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
SCOUR MITIGATION DETAILS

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 7/30/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 67

Plotted on: 7/30/2018

Design Filename: H:\projects\508\67\00\design\Civil\Drainage\5086700_DA01.dgn



LEGEND

- FLOW ARROW
- EXISTING CONTOUR
- LIMITS OF CONSTRUCTION
- PROPERTY LINE
- EASEMENT LINE
- 100 YR FLOODPLAIN LIMIT
- CREEK FLOW DIRECTION
- AREA ID
- DRAINAGE AREA BOUNDARY

NOTE:

1. DRAINAGE AREA DEVELOPED FROM 2017 SURVEY & 2010 LIDAR DATA.
2. INTENSITIES CALCULATED USING TXDOT WILLIAMSON COUNTY RAINFALL INTENSITY-DURATION-FREQUENCY COEFFICIENTS.
3. INTERIOR DRAINAGE AREA MAP FOR WATER CROSSING AT STA 248+81.

DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 7/30/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 7/30/2018 DATE

SCALE: 1"= 600'

DISCHARGE

RUNOFF COMPUTATION - RATIONAL METHOD

		EXISTING		PROPOSED					EXISTING		PROPOSED	
AREA - ID	AREA (ac)	C	CA	C	CA	Tc (MIN)	I 5 (IN/HR)	I 100 (IN/HR)	Q 5 (CFS)	Q 100 (CFS)	Q 5 (CFS)	Q 100 (CFS)
B	29.47	0.80	23.58	0.80	23.58	15.5	4.86	8.77	114.58	206.76	114.58	206.76

PAPE-DAWSON ENGINEERS

AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS

7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711

TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

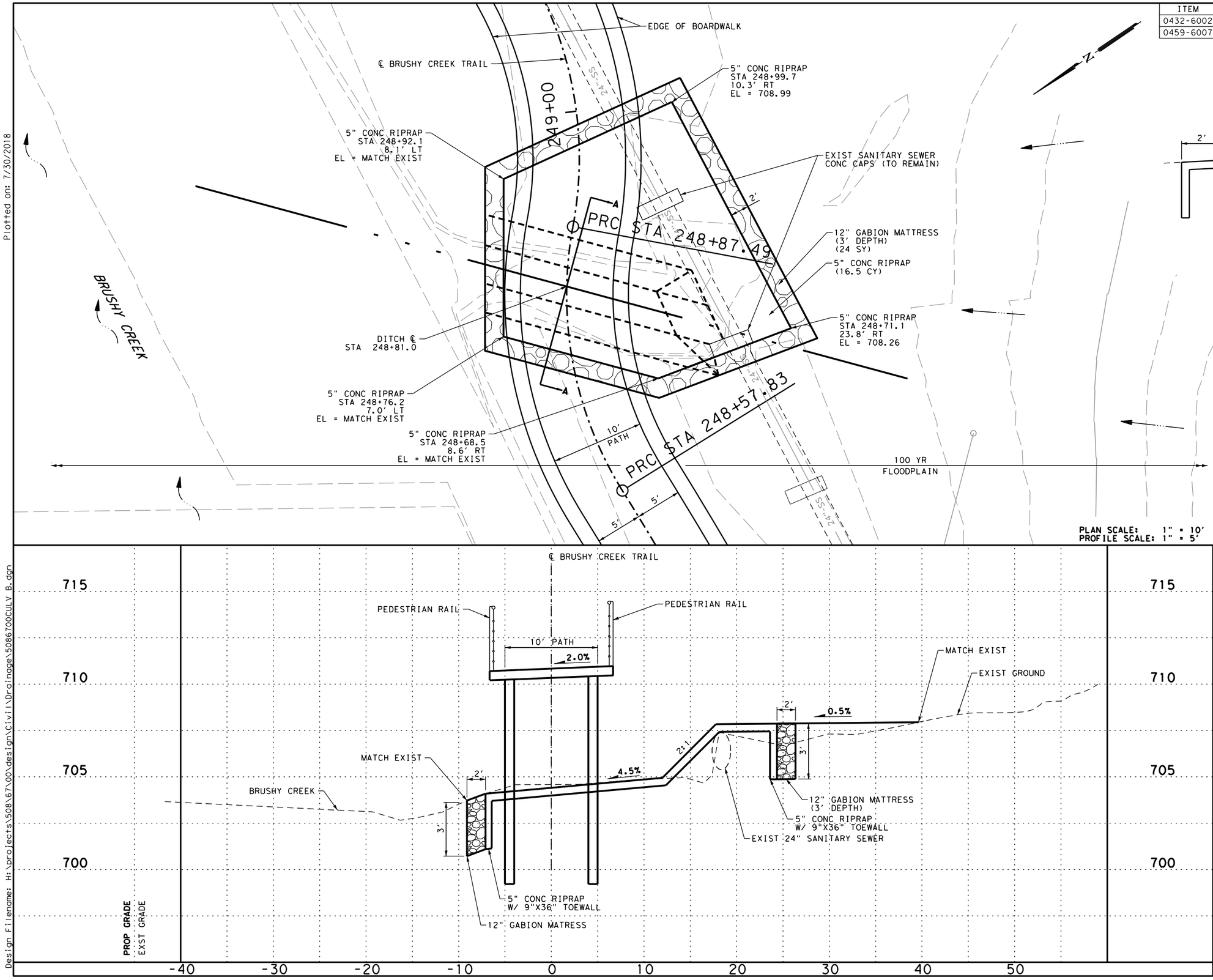
BRUSHY CREEK TRAIL
INTERIOR DRAINAGE AREA MAP

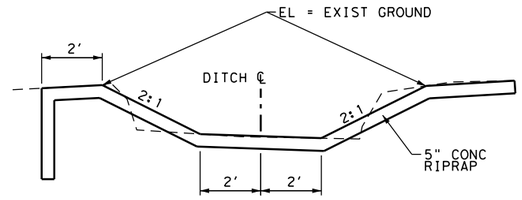
100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 7/30/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 68

Plotted on: 7/30/2018

Design Filename: H:\projects\508\67\00\design\Civil\Drainage\5086700CULV B.dgn

ITEM	DESCRIPTION	UNIT	QTY
0432-6002	RIPRAP (CONC)(5 IN)	CY	16.5
0459-6007	GABION MATTRESSES (GALV)(12 IN)	SY	24





SECTION A-A

LEGEND

- FLOW ARROW
- 100 YR FLOODPLAIN LIMIT
- CREEK FLOW DIRECTION

NOTE:

1-FT CONTOURS SHOWN ARE DEVELOPED FROM 2017 SURVEY & 2010 LIDAR DATA.

PLAN SCALE: 1" = 10'
PROFILE SCALE: 1" = 5'

DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 7/30/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 7/30/2018 DATE

PAPE-DAWSON ENGINEERS

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TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

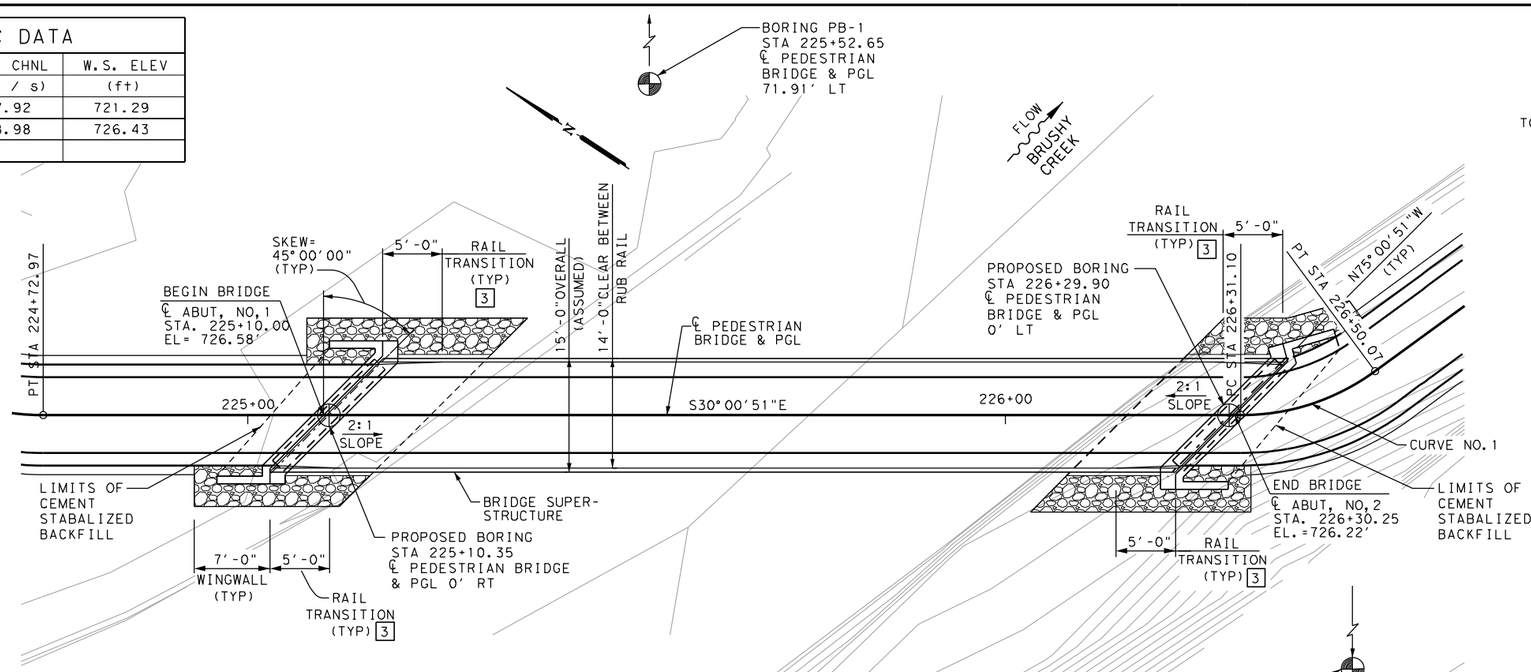
BRUSHY CREEK TRAIL
INTERIOR DRAINAGE DETAILS

SHEET 1 OF 1

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 7/30/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 69

Plotted on: $DATE$

HYDRAULIC DATA			
FREQUENCY (YR)	Q TOTAL (cfs)	VEL CHNL (ft / s)	W.S. ELEV (ft)
100	16,000	7.92	721.29
500	26,400	8.98	726.43



PLAN
1" = 20'

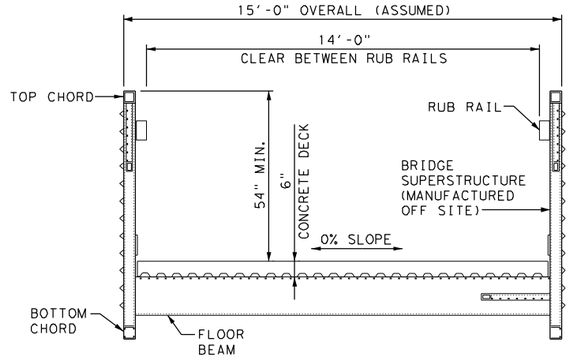
2 THE GEOTECHNICAL ENGINEER SHALL BE CONTACTED PRIOR TO DRILLING AND CONSTRUCTION OF THE ABUTMENT FOUNDATION TO DETERMINE THE SUTIBILITY OF THE LIMESTONE LAYER FOR FOUNDATION PLACEMENT.

3 TRANSITION FROM TYPE "F" RAIL (12'-0" CLEAR WIDTH) TO PEDESTRIAN BRIDGE RUB RAIL (14'-0" CLEAR WIDTH). TYPICAL AT BRIDGE END.

CURVE NO. 1
PI STA. 226+40.91
DELTA=36°13'11"(LT)
DEGREE=190°59'10"
RADIUS=30.00'
TANGENT=9.81'

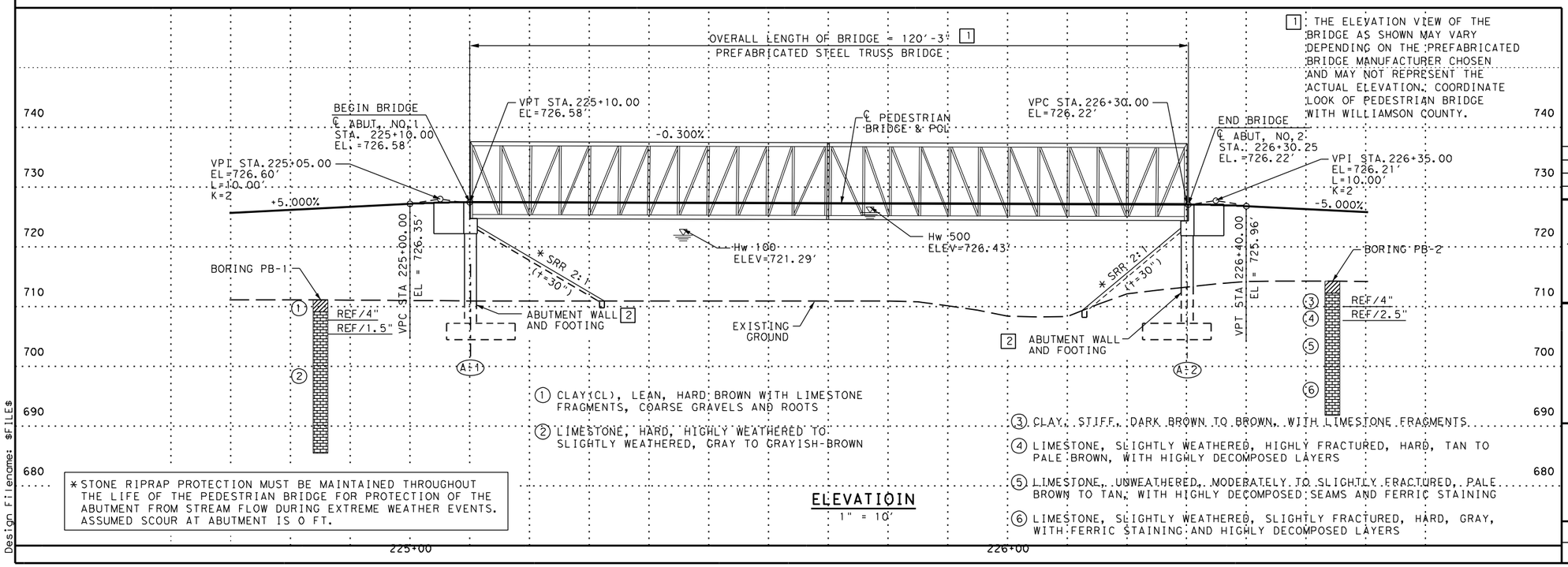
LEGEND
- BORING LOCATION
- PROPOSED BORING

VERTICAL: 5' 10'
HORIZONTAL: 10' 20'
SCALE IN FEET



TYPICAL BRIDGE SECTION
NOT TO SCALE

GENERAL NOTES
1. DESIGNED FOR H10 AND PEDESTRIAN LOADING ACCORDING AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS 7TH EDITION.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL UTILITIES, PRIOR TO CONSTRUCTION.
3. FUTURE OVERLAY WILL NOT BE PERMITTED FOR USE ON THIS BRIDGE.
4. REFER TO SRR STANDARD FOR ABUTMENT CAP/RIPRAP CONNECTION DETAILS.
5. IF WORKING NEAR POWERLINES, COMPLY WITH THE APPROPRIATE SECTIONS OF THE TEXAS STATE LAWS AND FEDERAL REGULATIONS RELATING TO THE TYPE OF WORK INVOLVED.
6. SEE CSAB STANDARD FOR CEMENT STABILIZED BACKFILL DETAILS.
7. SEE ABUTMENT WALL AND FOOTING DETAILS SHEET FOR FOUNDATION DETAILS.



1 THE ELEVATION VIEW OF THE BRIDGE AS SHOWN MAY VARY DEPENDING ON THE PREFABRICATED BRIDGE MANUFACTURER CHOSEN AND MAY NOT REPRESENT THE ACTUAL ELEVATION. COORDINATE LOOK OF PEDESTRIAN BRIDGE WITH WILLIAMSON COUNTY.

(1) CLAY(CL), LEAN, HARD BROWN WITH LIMESTONE FRAGMENTS, COARSE GRAVELS AND ROOTS

(2) LIMESTONE, HARD, HIGHLY WEATHERED TO SLIGHTLY WEATHERED, GRAY TO GRAYISH-BROWN

(3) CLAY, STIFF, DARK BROWN TO BROWN, WITH LIMESTONE FRAGMENTS

(4) LIMESTONE, SLIGHTLY WEATHERED, HIGHLY FRACTURED, HARD, TAN TO PALE BROWN, WITH HIGHLY DECOMPOSED LAYERS

(5) LIMESTONE, UNWEATHERED, MODERATELY TO SLIGHTLY FRACTURED, PALE BROWN TO TAN, WITH HIGHLY DECOMPOSED SEAMS AND FERRIC STAINING

(6) LIMESTONE, SLIGHTLY WEATHERED, SLIGHTLY FRACTURED, HARD, GRAY, WITH FERRIC STAINING AND HIGHLY DECOMPOSED LAYERS

* STONE RIPRAP PROTECTION MUST BE MAINTAINED THROUGHOUT THE LIFE OF THE PEDESTRIAN BRIDGE FOR PROTECTION OF THE ABUTMENT FROM STREAM FLOW DURING EXTREME WEATHER EVENTS. ASSUMED SCOUR AT ABUTMENT IS 0 FT.

ELEVATIOIN
1" = 10'

STATE OF TEXAS
MELVIN K. LARA
91638
LICENSED PROFESSIONAL ENGINEER
8-14-18

H10 AND PEDESTRIAN LOADING

REV. NO.	DATE	DESCRIPTION	BY

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
FIRM REGISTRATION NO. F-199

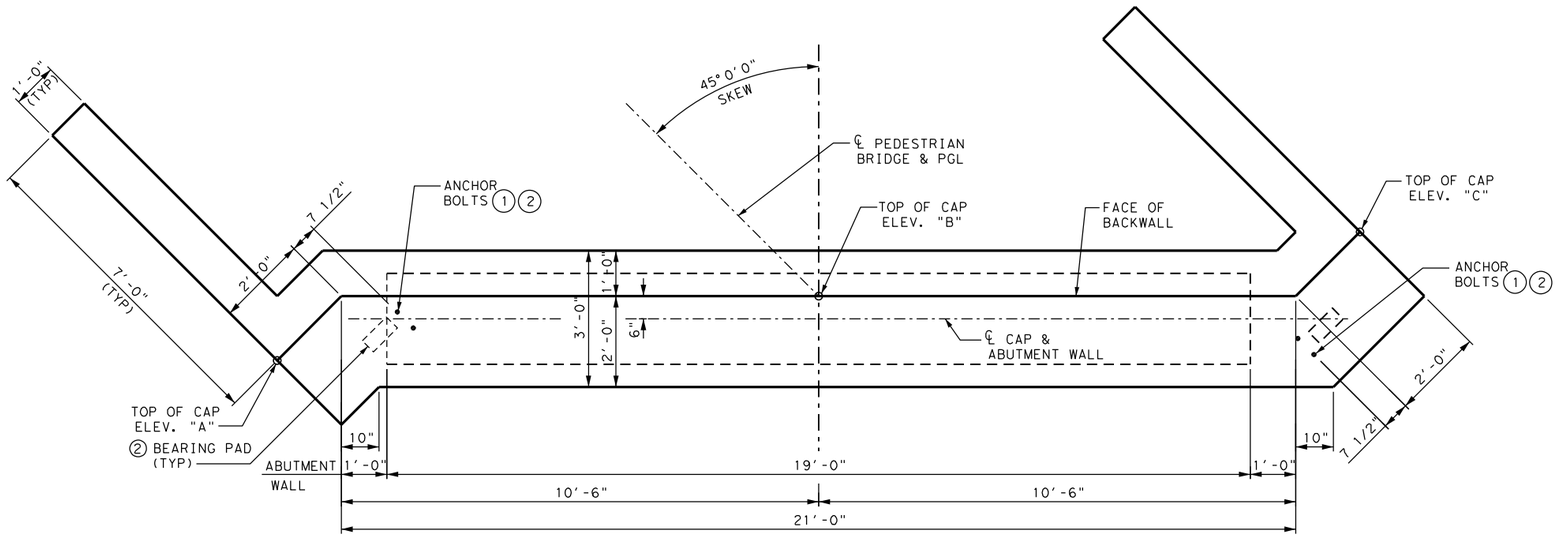
PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
7800 SHOAL CREEK BLVD, STE 220 W | AUSTIN, TX 78757 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
PEDESTRIAN BRIDGE LAYOUT

SHEET 1 OF 1

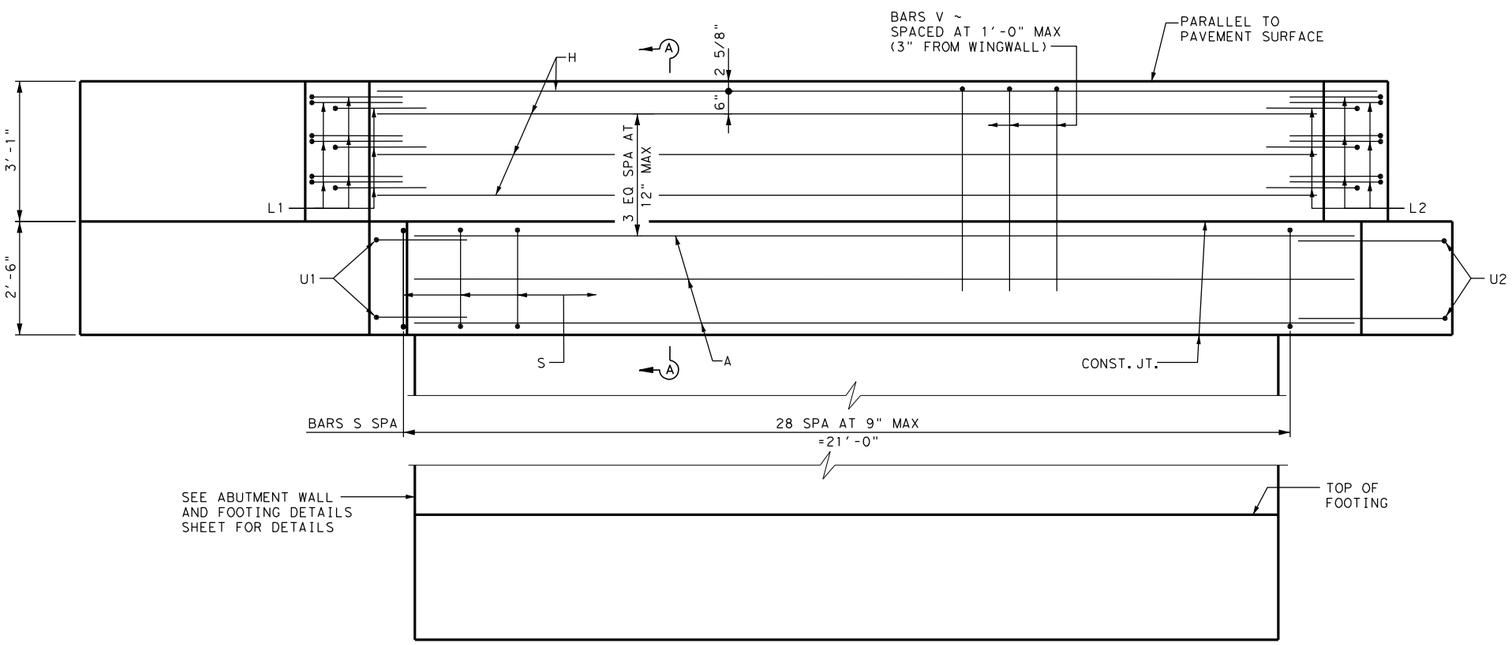
	PROJECT NO.: STP 1802 (205) TP		DATE: 7-27-18
DRWN.BY: AMH	DSGN.BY: MKL	CHKD.BY: A.R.	SHEET NO.: 70

Design Filename: $FILE$

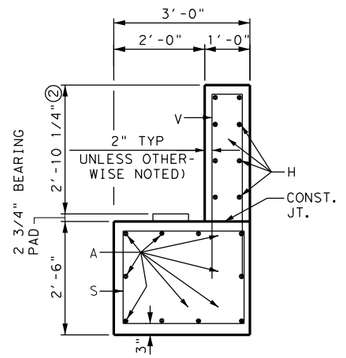


PLAN

(LOOKING BACKSTATION)



ELEVATION



SECTION A-A

CONTROL ELEVATIONS (2)

ABUT. NO.	PT "A" ELEV.	PT "B" ELEV.	PT "C" ELEV.
1	723.50'	723.50'	723.50'

GENERAL NOTES:

1. DESIGNED ACCORDING TO CURRENT AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
2. SEE ABUTMENT WALL AND FOOTING DETAILS SHEET FOR ALL FOUNDATION DETAILS AND NOTES NOT SHOWN.
3. CALCULATED BEARING PRESSURE =5,972 PSF.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.
REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

MATERIAL NOTES:

CLASS "C" CONCRETE STRENGTH
F'c= 3,600 PSI.

PROVIDE GRADE 60 REINFORCING STEEL.

(1) 4 ~ 1" DIA. F1554 GRADE 105 ANCHOR BOLTS W/2~NUTS & 1 ~ 2 1/2" O.D. WASHER EACH. (SHALL BE VERIFIED BY BRIDGE MANUFACTURER.

(2) BACKWALL HEIGHT, WINGWALL HEIGHT, ANCHOR BOLT NUMBER, SIZE & LOCATION, TOP OF CAP ELEVATIONS, AS WELL AS OTHER RELATED INFORMATION SHALL BE VERIFIED BY CONTRACTOR AFTER A PREFABRICATED BRIDGE MANUFACTURER HAS BEEN CHOSEN.

STATE OF TEXAS
MELVIN K. LARA
91638
LICENSED
PROFESSIONAL ENGINEER

7-31-18

H10 AND PEDESTRIAN LOADING

REV. NO.	DATE	DESCRIPTION	BY

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
FIRM REGISTRATION NO. F-199

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
7800 SHOAL CREEK BLVD, STE 220 W | AUSTIN, TX 78757 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

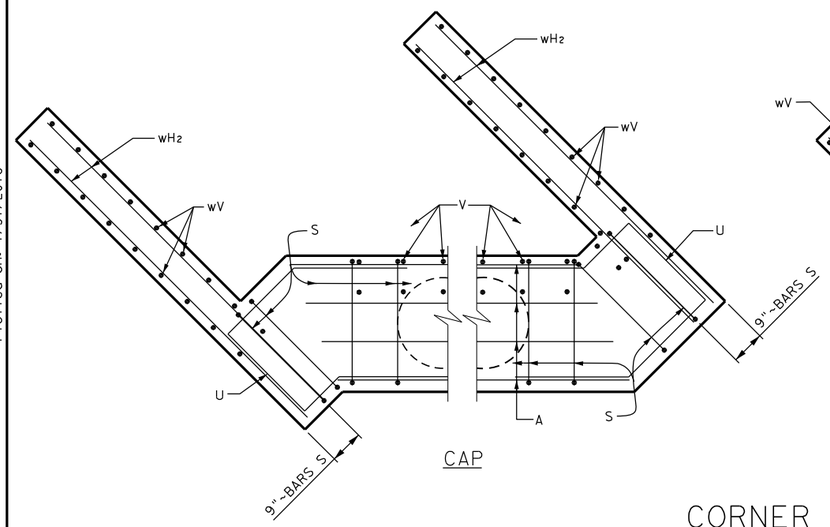
BRUSHY CREEK TRAIL

ABUTMENT 1

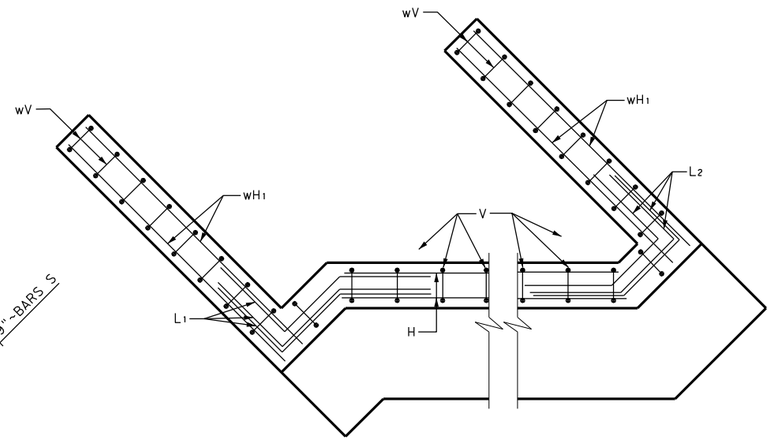
SHEET 1 OF 2

	PROJECT NO.: STP 1802 (205) TP		DATE: 7-27-18
DRWN.BY: AMH	DSGN.BY: MKL	CHKD.BY: AR	SHEET NO.: 71

Plotted on: 7/31/2018
Design Filename: Z:\COMMERCIAL JOBS\18-152C - BrushyCreekProject\Bridge\5086700*ABT*02-2.DGN



CAP



BACKWALL

CORNER DETAILS

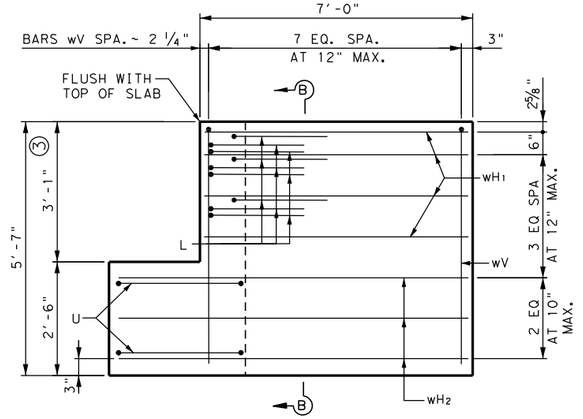
① TABLE OF ESTIMATED QUANTITIES

BAR	NO.	SIZE	LENGTH	WEIGHT
A	10	#11	21'-0"	1116
H	8	#6	21'-0"	252
L1	9	#6	5'-11"	80
L2	9	#6	5'-9"	78
S	33	#5	10'-4"	280
U	4	#6	11'-1"	67
V	24	#5	9'-0"	225
wH1	16	#6	6'-7"	158
wH2	12	#6	8'-7"	155
wV	16	#5	11'-0"	184
REINFORCING STEEL ②			Lb	2,595
CLASS "C" CONCRETE			CY	12.5

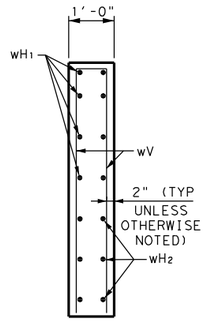
① QUANTITIES SHOWN ARE FOR ONE ABUTMENT ONLY

② FOR CONTRACTORS INFORMATION ONLY

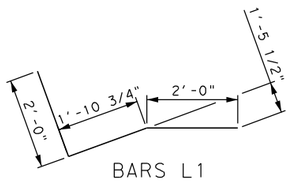
③ BACKWALL HEIGHT, WINGWALL HEIGHT, ANCHOR BOLT NUMBER, SIZE & LOCATION, TOP OF CAP ELEVATIONS, AS WELL AS OTHER RELATED INFORMATION SHALL BE VERIFIED BY CONTRACTOR AFTER A PREFABRICATED BRIDGE MANUFACTURER HAS BEEN CHOSEN.



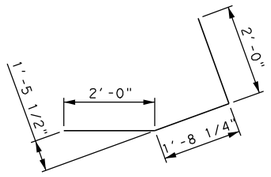
WINGWALL ELEVATION



SECTION B-B



BARS L1



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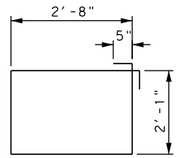
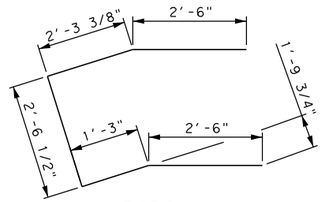


BARS S



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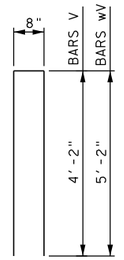


BARS V & wV

STATE OF TEXAS
MELVIN K. LARA
91638
LICENSED
PROFESSIONAL ENGINEER

7-31-18

H10 AND PEDESTRIAN LOADING

REV. NO.	DATE	DESCRIPTION	BY

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
FIRM REGISTRATION NO. F-199

PAPE-DAWSON ENGINEERS

AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS
7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL

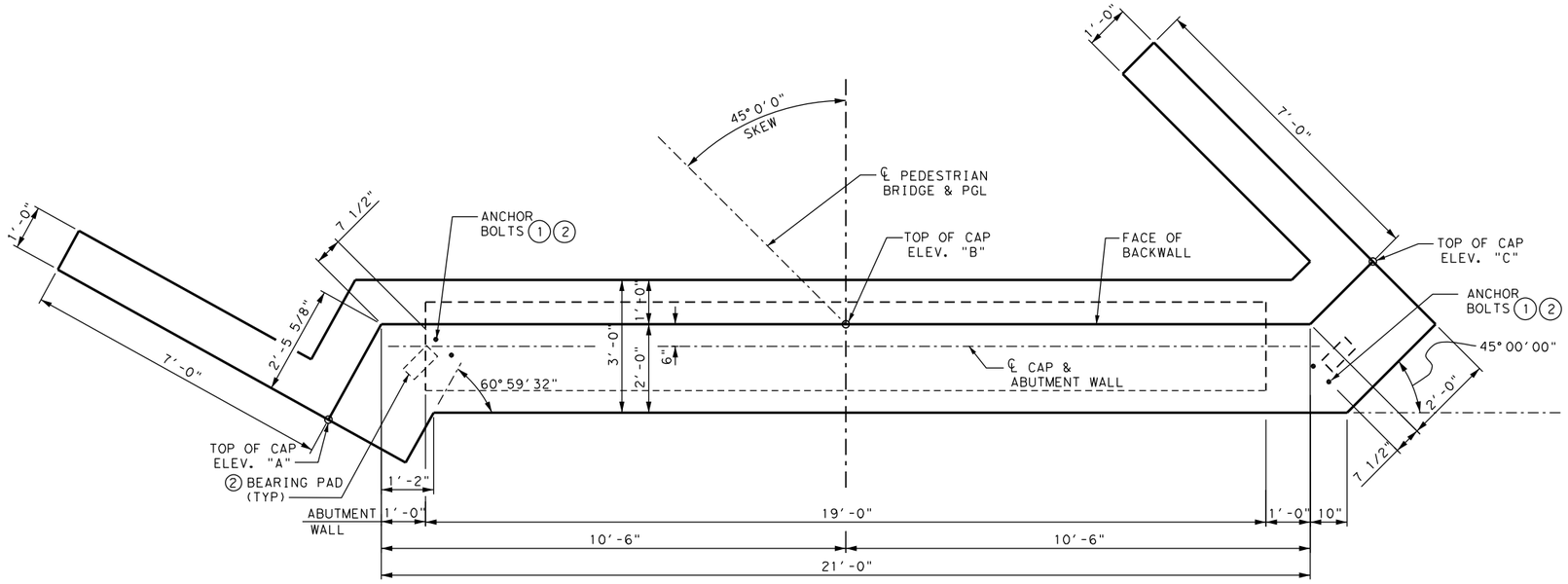
ABUTMENT 1

SHEET 2 OF 2

	PROJECT NO.: STP 1802 (205) TP		DATE: 7-27-18
DRWN.BY: AMH	DSGN.BY: MKL	CHKD.BY: AR	SHEET NO.: 72

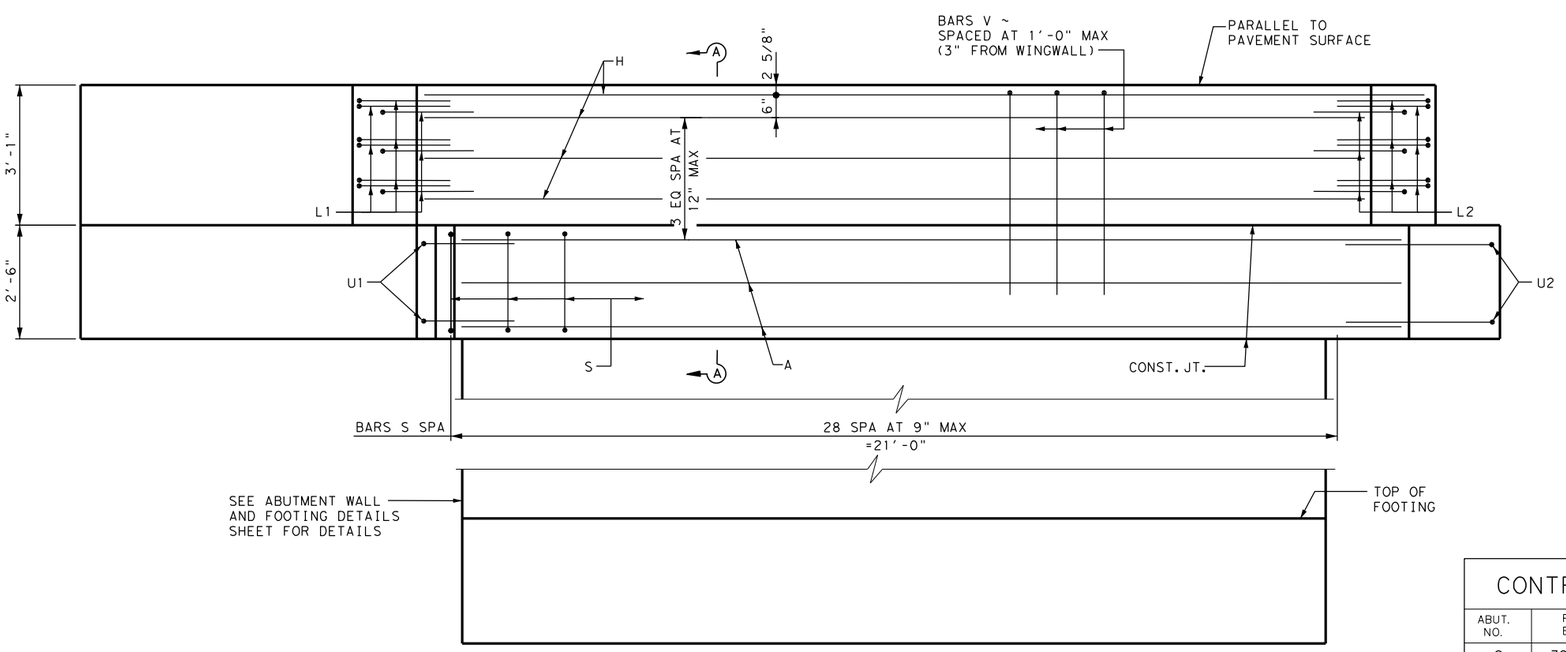
Plotted on: 7/31/2018

Design Filename: Z:\COMMERCIAL JOBS\18-152C - BrushyCreekProject\Bridge\5086700*ABT*DET*01-2.DGN

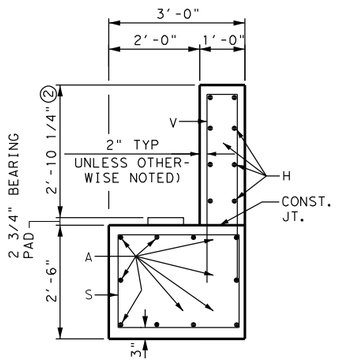


PLAN

(LOOKING STATIONWISE)



ELEVATION



SECTION A-A

GENERAL NOTES:

1. DESIGNED ACCORDING TO CURRENT AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
2. SEE ABUTMENT WALL AND FOOTING DETAILS SHEET FOR ALL FOUNDATION DETAILS AND NOTES NOT SHOWN.
3. CALCULATED BEARING PRESSURE = 5,972 PSF.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.
REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

MATERIAL NOTES:

CLASS "C" CONCRETE STRENGTH
F'c= 3,600 PSI.

PROVIDE GRADE 60 REINFORCING STEEL.

(1) 4 ~ 1" DIA. F1554 GRADE 105 ANCHOR BOLTS W/2~NUTS & 1 ~ 2 1/2" O.D. WASHER EACH. (SHALL BE VERIFIED BY BRIDGE MANUFACTURER.

(2) BACKWALL HEIGHT, WINGWALL HEIGHT, ANCHOR BOLT NUMBER, SIZE & LOCATION, TOP OF CAP ELEVATIONS, AS WELL AS OTHER RELATED INFORMATION SHALL BE VERIFIED BY CONTRACTOR AFTER A PREFABRICATED BRIDGE MANUFACTURER HAS BEEN CHOSEN.

CONTROL ELEVATIONS (2)

ABUT. NO.	PT "A" ELEV.	PT "B" ELEV.	PT "C" ELEV.
2	723.14'	723.14'	723.14'

STATE OF TEXAS
MELVIN K. LARA
91638
LICENSED
PROFESSIONAL ENGINEER

7-31-18

H10 AND PEDESTRIAN LOADING

REV. NO.	DATE	DESCRIPTION	BY

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
FIRM REGISTRATION NO. F-199

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
7800 SHOAL CREEK BLVD, STE 220 W | AUSTIN, TX 78757 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL

ABUTMENT 2

SHEET 1 OF 2

	PROJECT NO.: STP 1802 (205) TP		DATE: 7-27-18
DRWN.BY: AMH	DSGN.BY: MKL	CHKD.BY: AR	SHEET NO.: 73

Plotted on: 7/31/2018

Design Filename: Z:\COMMERCIAL JOBS\18-152C - BrushyCreekProject\Bridge\50867OO*ABT*04-2.DGN

Plotted on: 7/31/2018

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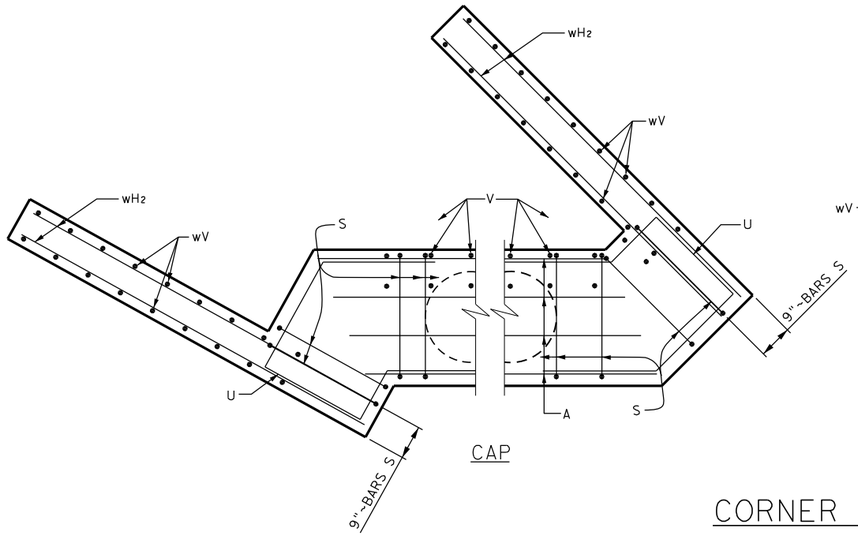
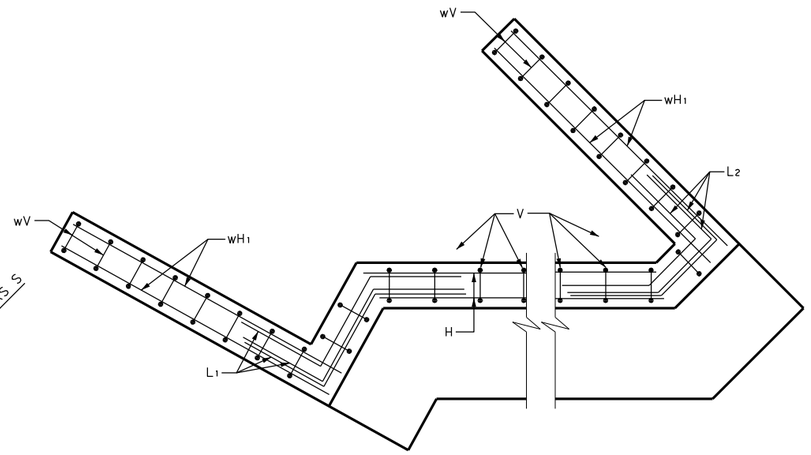


CAP



BACKWALL

CORNER DETAILS

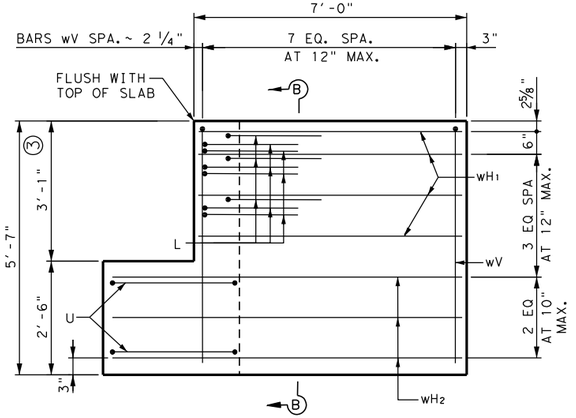
① TABLE OF ESTIMATED QUANTITIES

BAR	NO.	SIZE	LENGTH	WEIGHT
A	10	#11	21'-0"	1116
H	8	#6	21'-0"	252
L1	9	#6	6'-0"	81
L2	9	#6	5'-9"	78
S	33	#5	10'-4"	280
U1	2	#6	11'-1"	33
U2	2	#6	11'-1"	33
V	24	#5	9'-0"	225
wH1	16	#6	6'-7"	158
wH2	12	#6	8'-7"	155
wV	16	#5	11'-0"	184
REINFORCING STEEL ②			Lb	2,595
CLASS "C" CONCRETE			CY	12.6

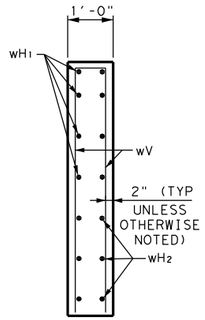
① QUANTITIES SHOWN ARE FOR ONE ABUTMENT ONLY

② FOR CONTRACTORS INFORMATION ONLY

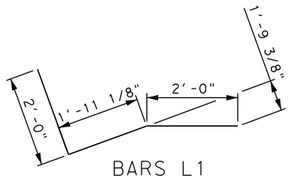
③ BACKWALL HEIGHT, WINGWALL HEIGHT, ANCHOR BOLT NUMBER, SIZE & LOCATION, TOP OF CAP ELEVATIONS, AS WELL AS OTHER RELATED INFORMATION SHALL BE VERIFIED BY CONTRACTOR AFTER A PREFABRICATED BRIDGE MANUFACTURER HAS BEEN CHOSEN.



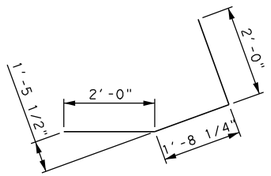
WINGWALL ELEVATION



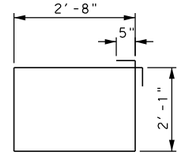
SECTION B-B



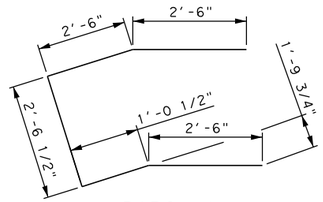
BARS L1



BARS L2



BARS S



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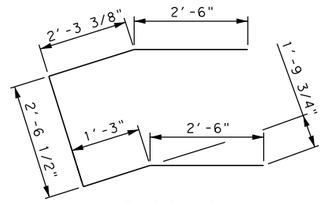

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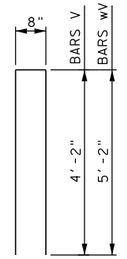
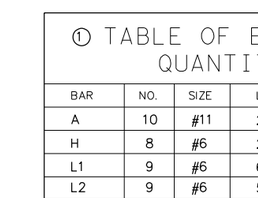


BARS V & wV



7-31-18

H10 AND PEDESTRIAN LOADING

REV. NO.	DATE	DESCRIPTION	BY

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
FIRM REGISTRATION NO. F-199

SCALE: 1" = 200'

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
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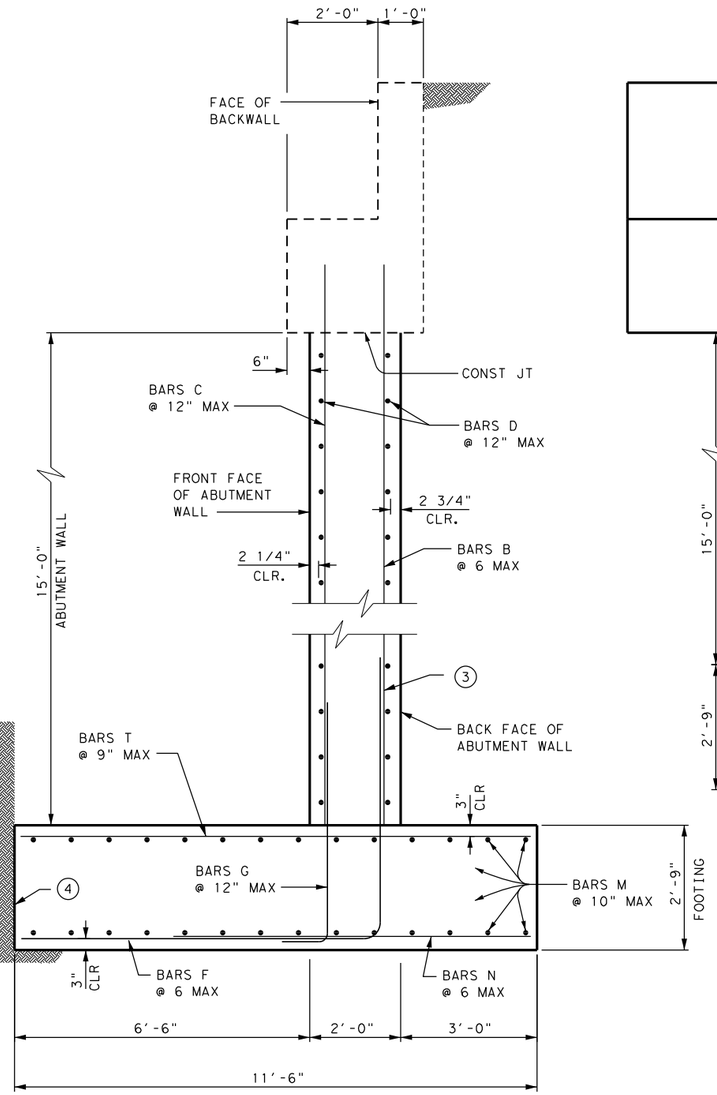
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL

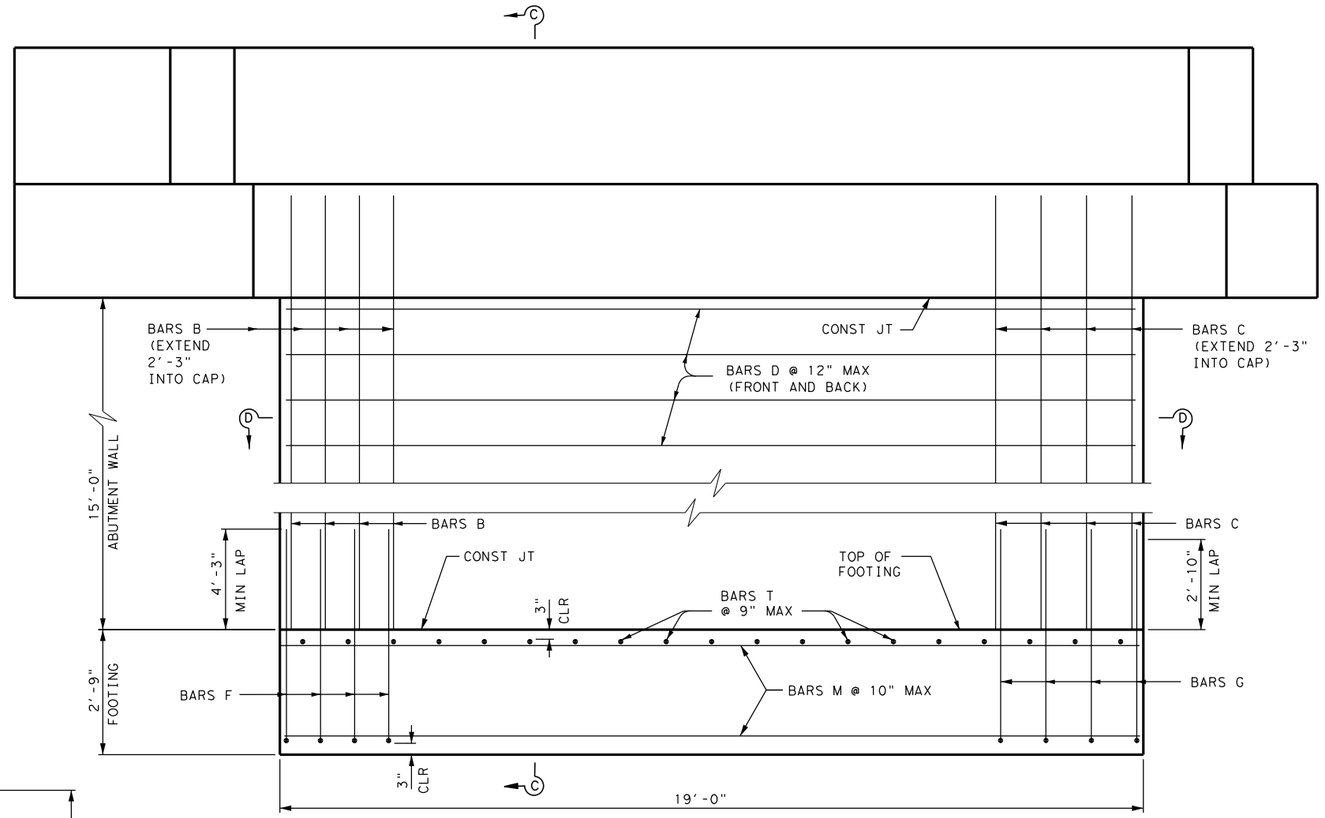
ABUTMENT 2

SHEET 2 OF 2

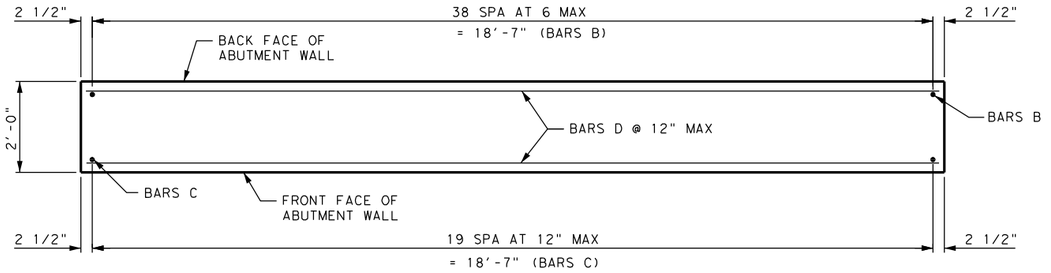
	PROJECT NO.: STP 1802 (205) TP		DATE: 7-27-18
DRWN.BY: AMH	DSGN.BY: MKL	CHKD.BY: AR	SHEET NO.: 74



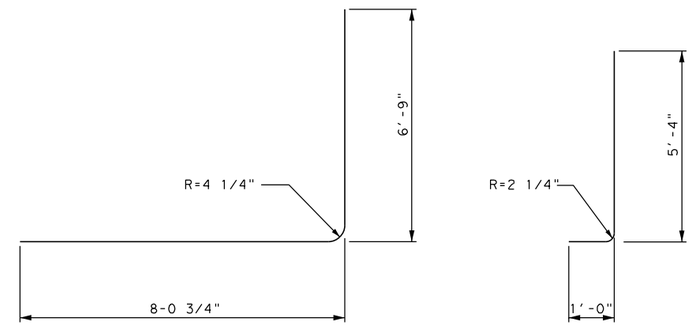
SECTION C-C



ELEVATION



SECTION D-D



GENERAL NOTES:

1. DESIGNED ACCORDING TO CURRENT AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
2. CALCULATED BEARING PRESSURE = 5,972 PSF.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.
REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

MATERIAL NOTES:

CLASS "C" CONCRETE STRENGTH
F'c= 3,600 PSI.

PROVIDE GRADE 60 REINFORCING STEEL.

① TABLE OF ESTIMATED QUANTITIES

BAR	NO.	SIZE	LENGTH	WEIGHT
B	39	#9	17'-3"	2,287
C	20	#6	17'-3"	518
D	32	#5	18'-8"	623
F	39	#9	14'-10"	1,967
G	20	#6	6'-4"	190
M	30	#5	18'-6"	579
N	39	#9	8'-0"	1,061
T	26	#6	11'-0"	430
REINFORCING STEEL (2)			Lb	7,655
CL C CONCRETE (MASS) (COLUMN)			Cy	21.1
CL C CONCRETE (MASS) (FOOTING)			Cy	22.3

H10 AND PEDESTRIAN LOADING

REV. NO.	DATE	DESCRIPTION	BY

STATE OF TEXAS
MELVIN K. LARA
91638
LICENSED PROFESSIONAL ENGINEER
7-31-18

1. QUANTITIES SHOWN ARE FOR ONE ABUTMENT WALL/FOOTING ONLY.
2. FOR CONTRACTORS INFORMATION ONLY.
3. PLACE VERTICAL BARS INSIDE OF HORIZONTAL BARS (TYP BOTH SIDES).
4. PLACE FOOTING TOE AGAINST UNDISTURBED SOIL.

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
FIRM REGISTRATION NO. F-199

PAPE-DAWSON ENGINEERS
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7800 SHOAL CREEK BLVD, STE 220 W | AUSTIN, TX 78757 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

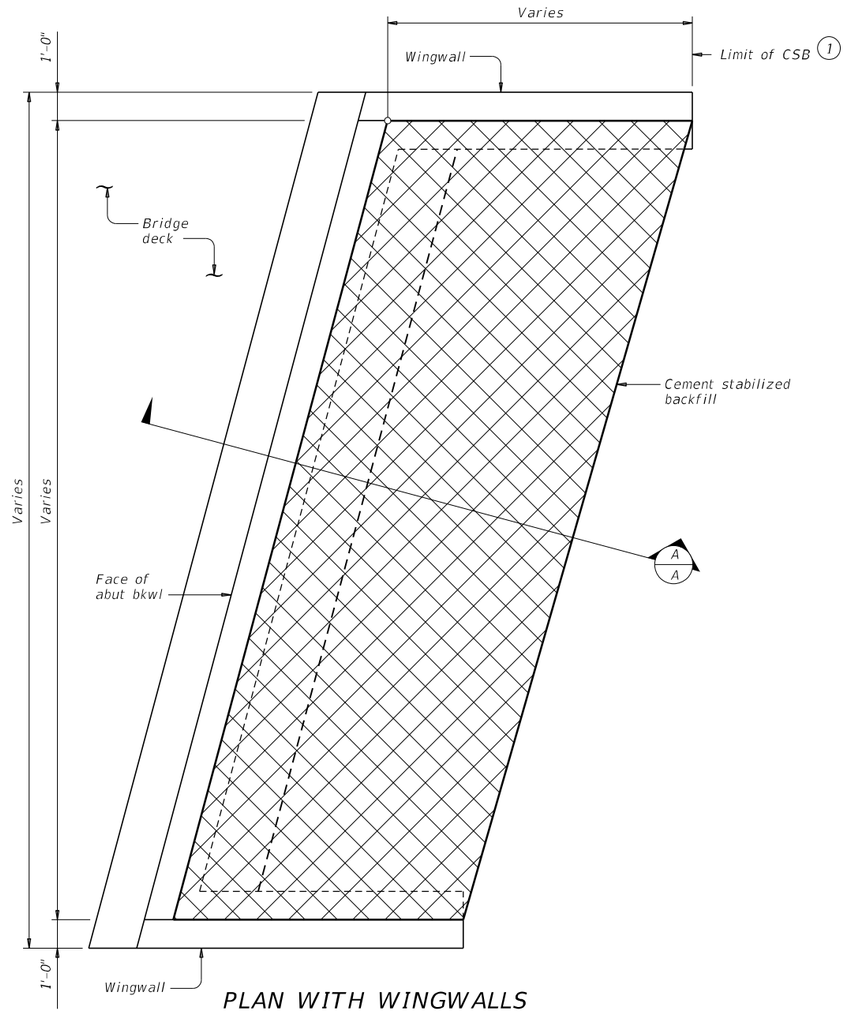
BRUSHY CREEK TRAIL

ABUTMENT WALL AND FOOTING DETAILS

SHEET 1 OF 1

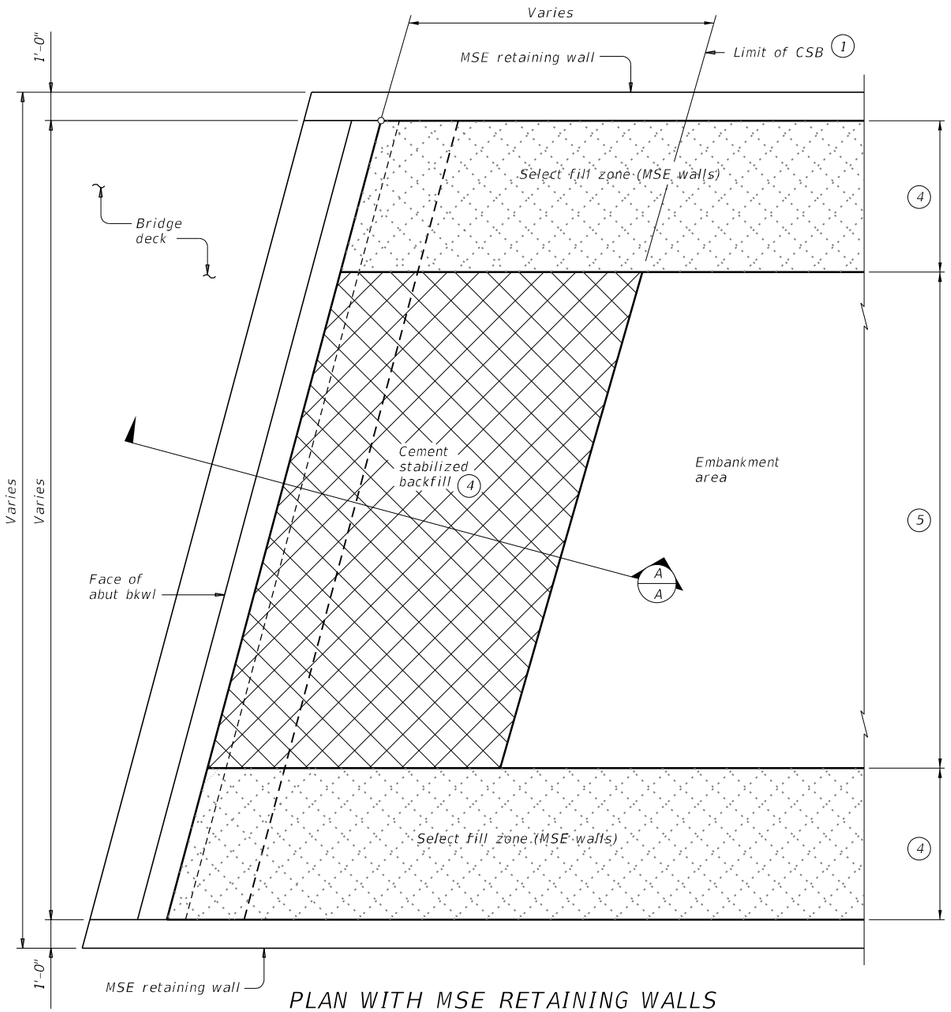
	PROJECT NO.: STP 1802 (205) TP		DATE: 7-27-18
DRWN.BY: AMH	DSGN.BY: MKL	CHKD.BY: AR	SHEET NO.: 75

DATE:
FILE:



PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



PLAN WITH MSE RETAINING WALLS

(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

(2) Bench backfill as shown with 12" (approximate) bench depths.

(3) Other materials can be used as a bond breaker if permitted by the Engineer. 2 layers of 30 Lb roofing felt or 2 layers of heavy mil polyethylene sheeting are examples.

(4) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

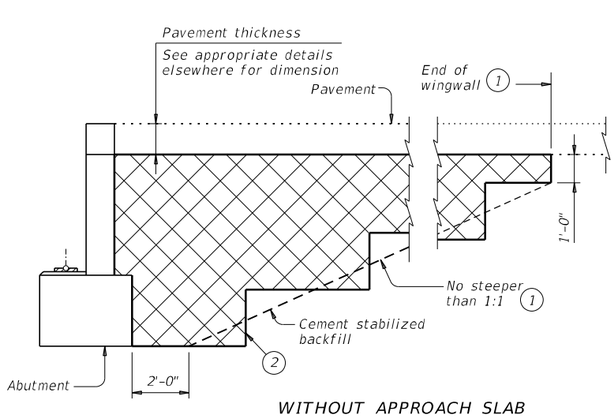
(5) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

GENERAL NOTES:

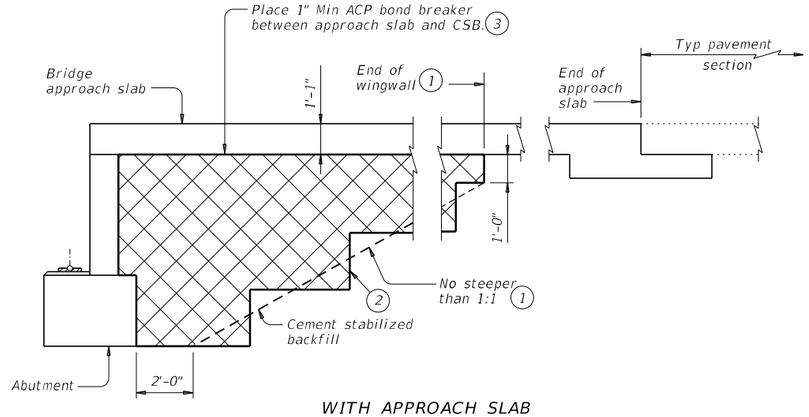
Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments.

Details are drawn showing left forward skew. See Bridge Layout for actual skew direction.

These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

SECTION A-A

Texas Department of Transportation

Bridge Division Standard

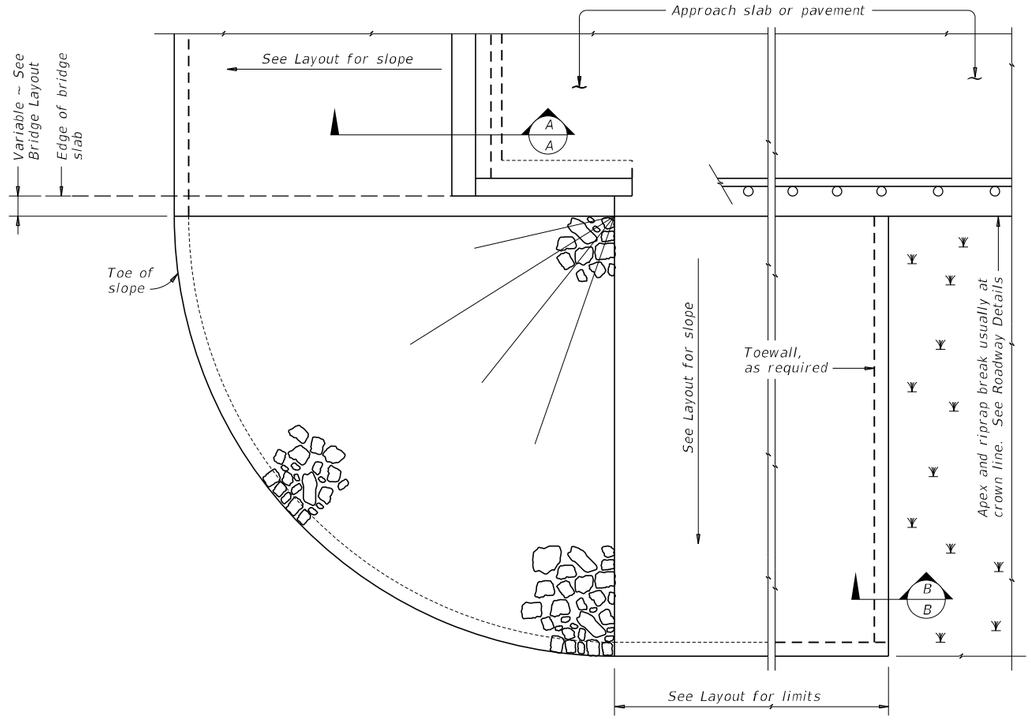
CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

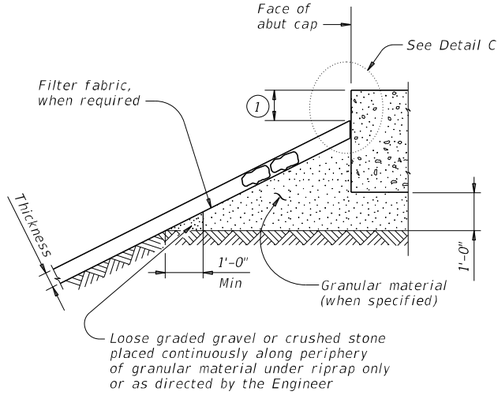
CSAB

FILE: csabstel.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2015	PROJECT NO:		HIGHWAY	
REVISIONS 01-16: Add MSE wall details.	STD 1502(205)TP			
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		76

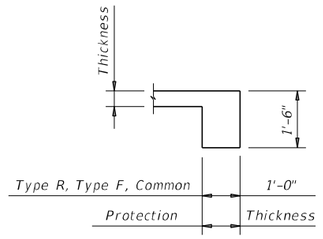
DATE:
FILE:



PLAN

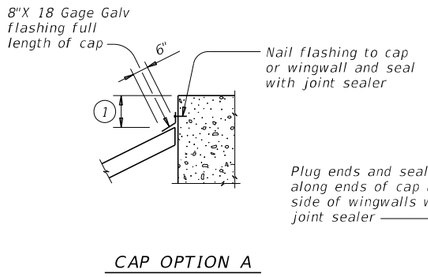


SECTION A-A AT CAP

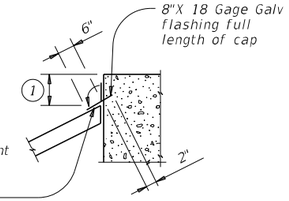


SECTION B-B

Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".

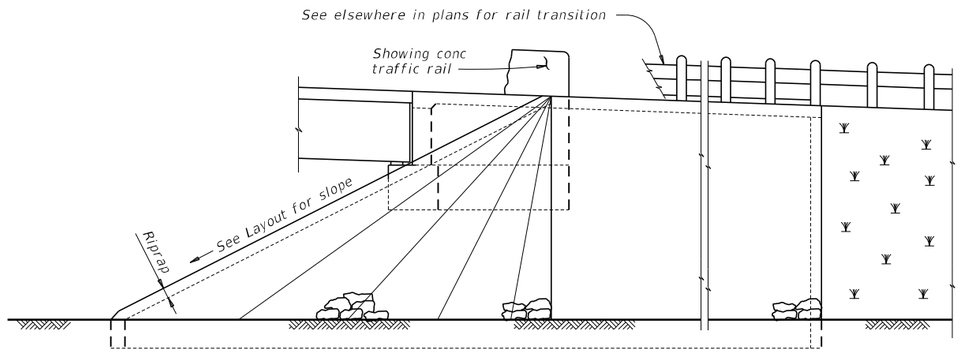


CAP OPTION A



CAP OPTION B

DETAIL C



ELEVATION

GENERAL NOTES:
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.
See elsewhere in plans for locations and details of shoulder drains.

(1) Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT January 2015	PROJECT NO:		HIGHWAY	
REVISIONS	STD 1502(205)TP			
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		77

DATE:
FILE:

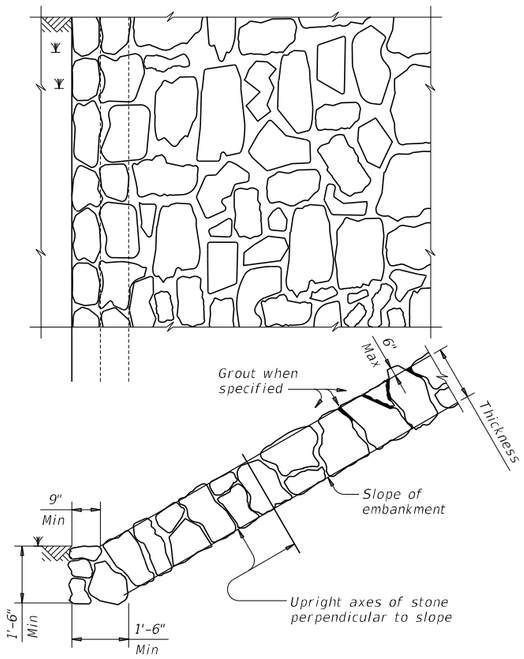


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

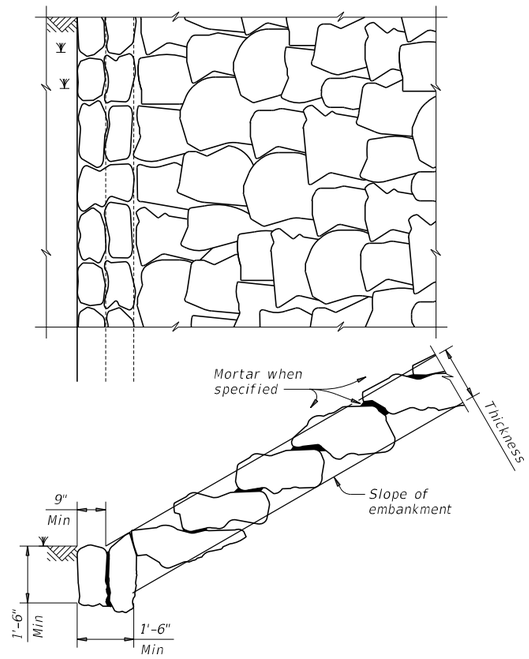


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

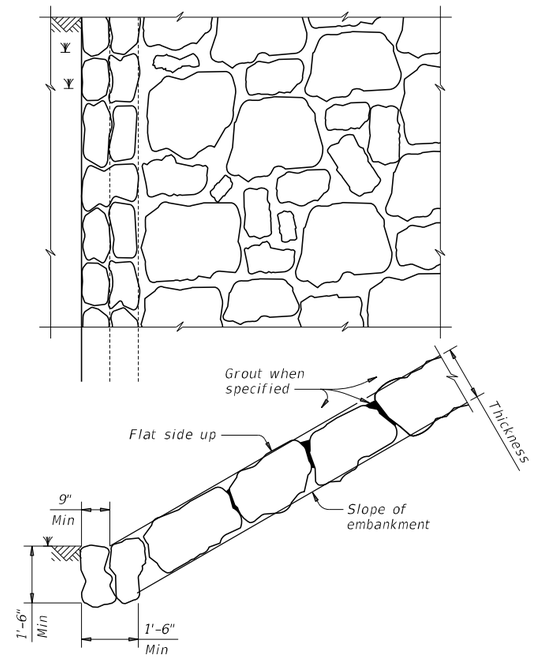


FIGURE 3 ~ TYPE F STONE RIPRAP

grouted

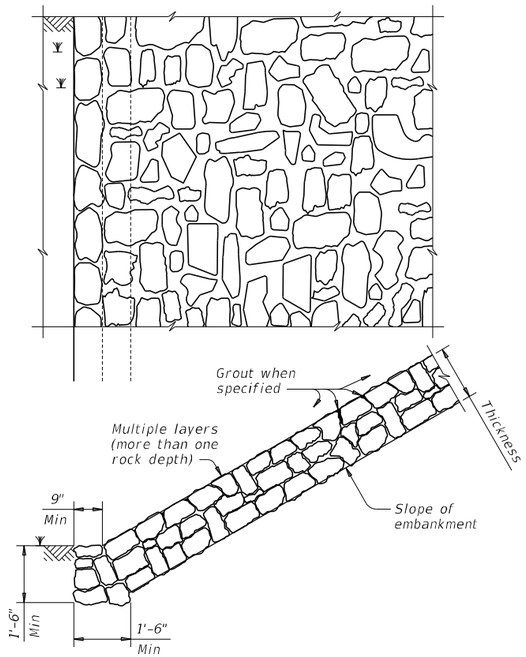


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

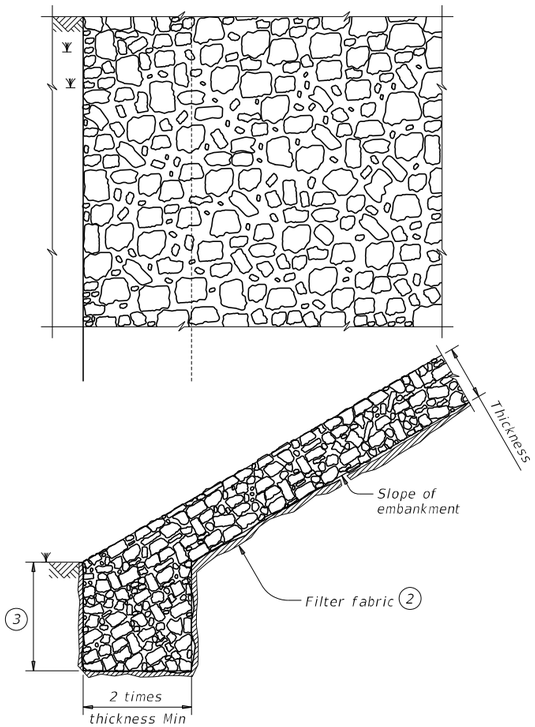


FIGURE 5 ~ PROTECTION STONE RIPRAP

(2) Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

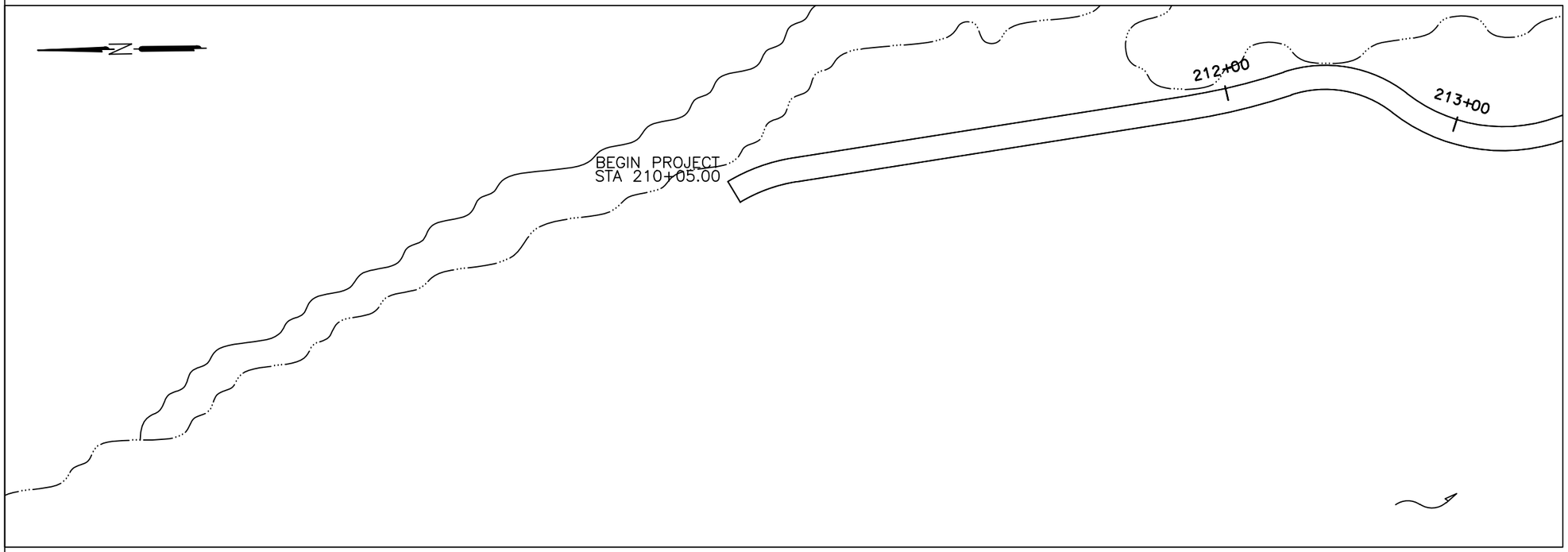
Texas Department of Transportation

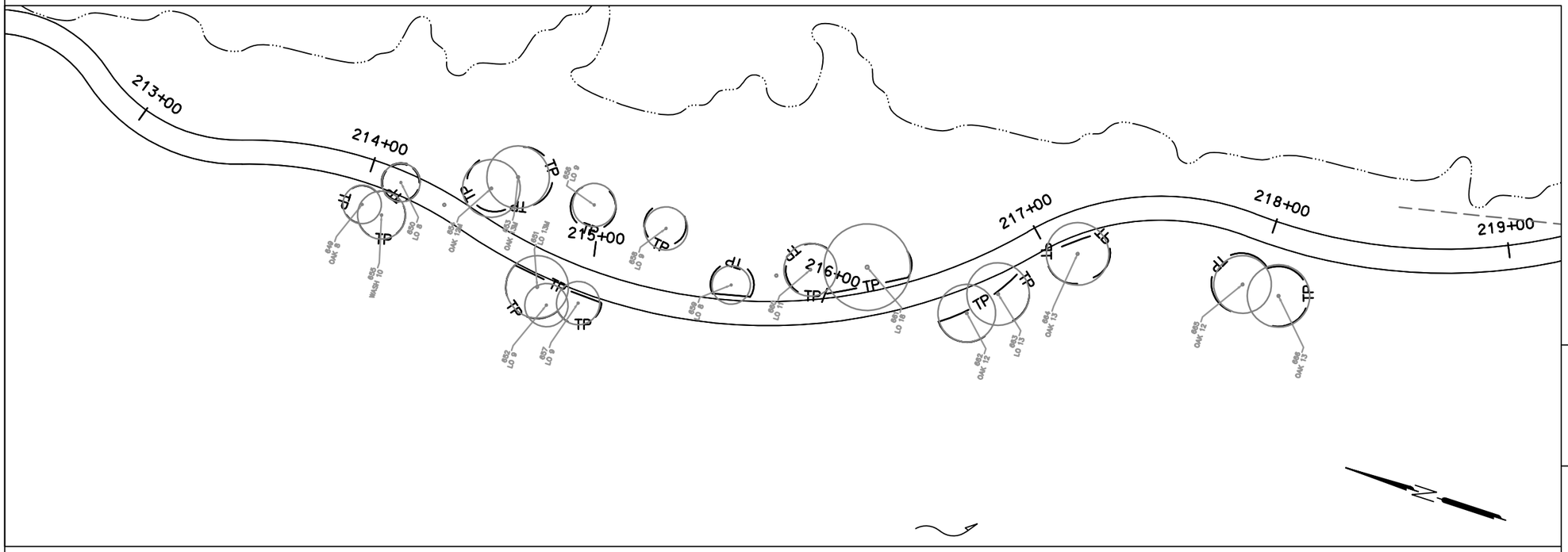
Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES	
©TxDOT January 2015	PROJECT NO:			HIGHWAY	
REVISIONS	STD 1502(205)TP				
	DIST	COUNTY		SHEET NO.	
	AUS	WILLIAMSON		78	





LEGEND

TREES REMOVAL

TREE PROTECTION

TP

FLOW ARROW

100 YR FLOODPLAIN LIMIT

CREEK FLOW DIRECTION

REGISTERED LANDSCAPE ARCHITECT
WILLIAM A. CARLL
2908
STATE OF TEXAS
6-21-2018

SCALE: 1"= 50'

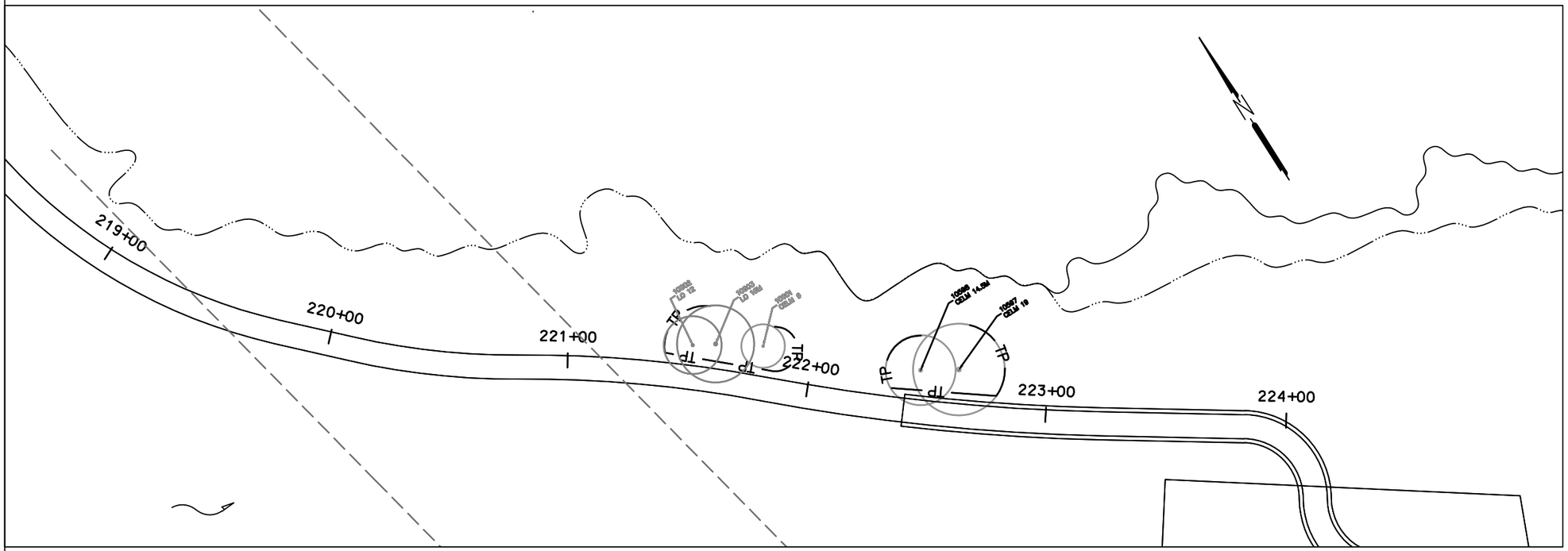
rvi
planning + landscape architecture
712 Congress Avenue, Suite 300
Austin, Texas 78701
(512) 480-0032

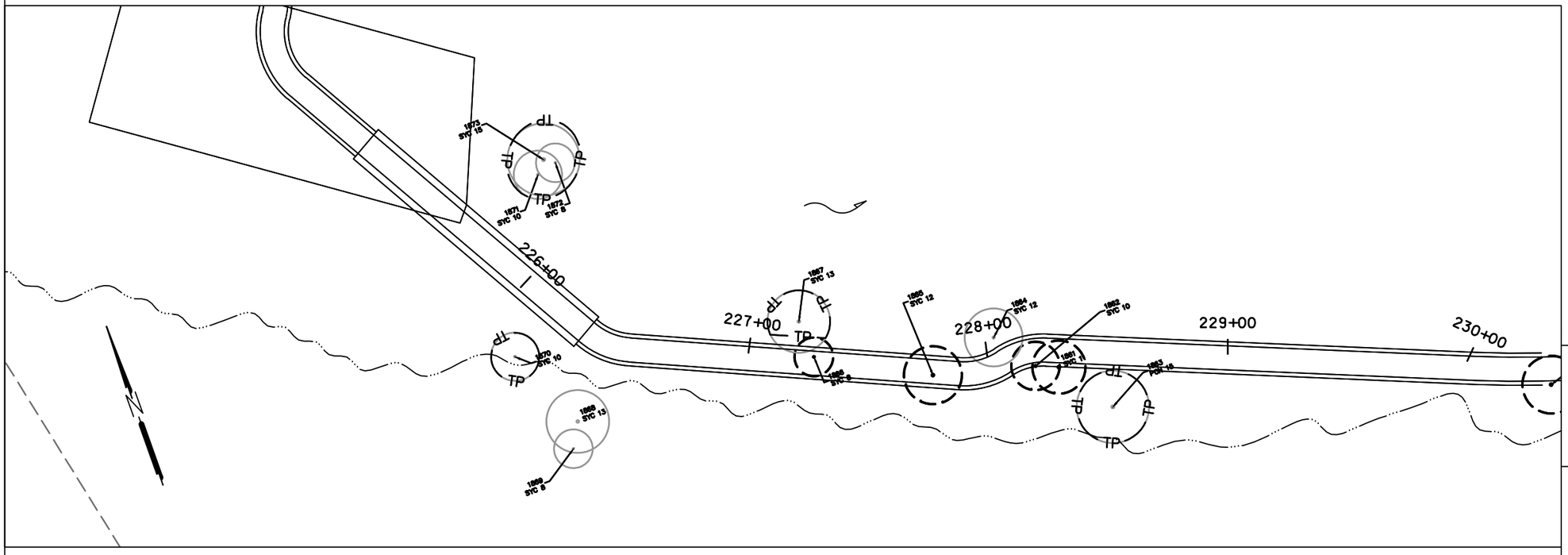
RVi PROJECT NO :144226

BRUSHY CREEK TRAIL
TREE PROTECTION AND REMOVAL PLAN

SHEET 1 OF 8

100%SUBMITTAL	PROJECT NO.50867-00		DATE:20180621
DRWN.BY: DC	DSGN.BY: DC	CHKD.BY: CL	SHEET NO.: 79





LEGEND

TREES REMOVAL

TREE PROTECTION

TP

FLOW ARROW

100 YR FLOODPLAIN LIMIT

CREEK FLOW DIRECTION

REGISTERED LANDSCAPE ARCHITECT
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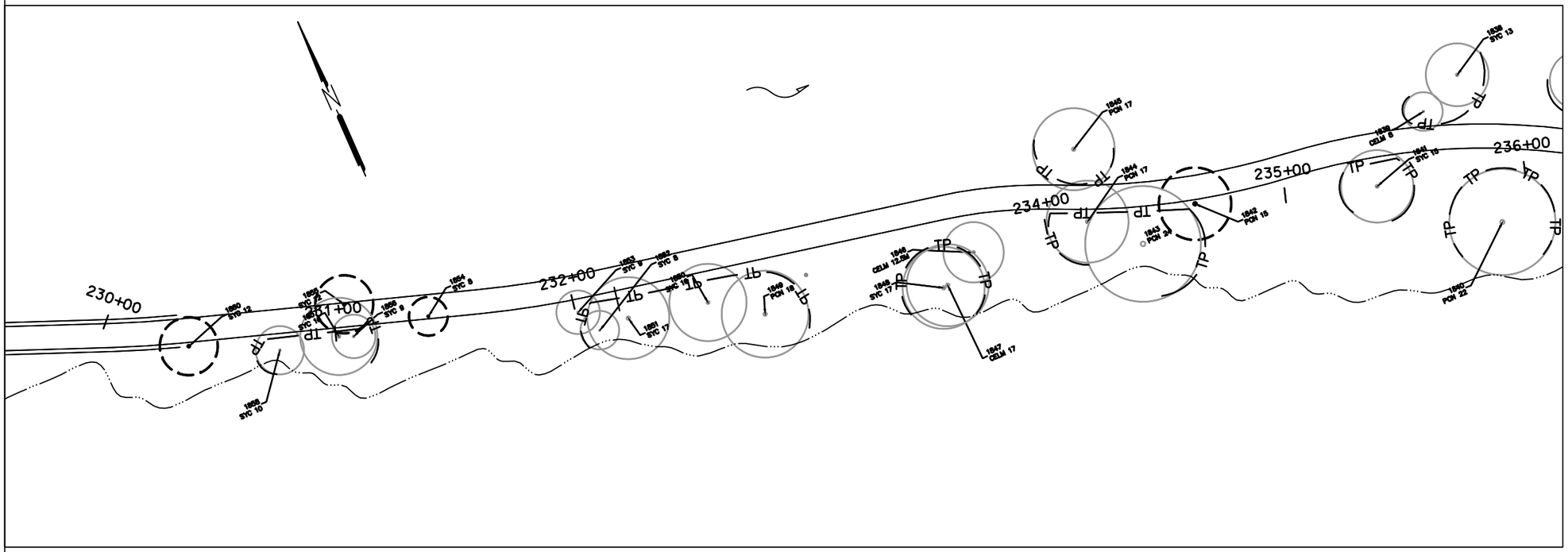
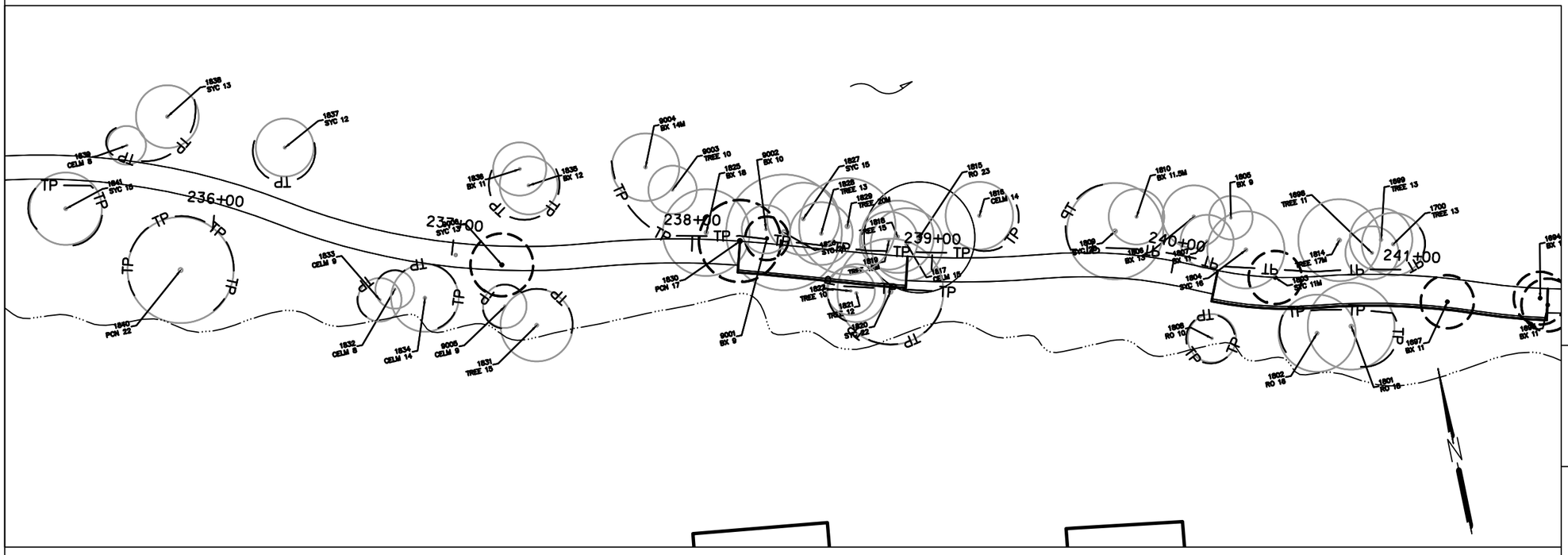
BRUSHY CREEK TRAIL
TREE PROTECTION AND REMOVAL PLAN

SHEET 2 OF 8

100%SUBMITTAL	PROJECT NO.50867-00		DATE:20180621
DRWN.BY: DC	DSGN.BY: DC	CHKD.BY: CL	SHEET NO.: 80





LEGEND

TREES REMOVAL

TREE PROTECTION

FLOW ARROW

100 YR FLOODPLAIN LIMIT

CREEK FLOW DIRECTION

REGISTERED LANDSCAPE ARCHITECT
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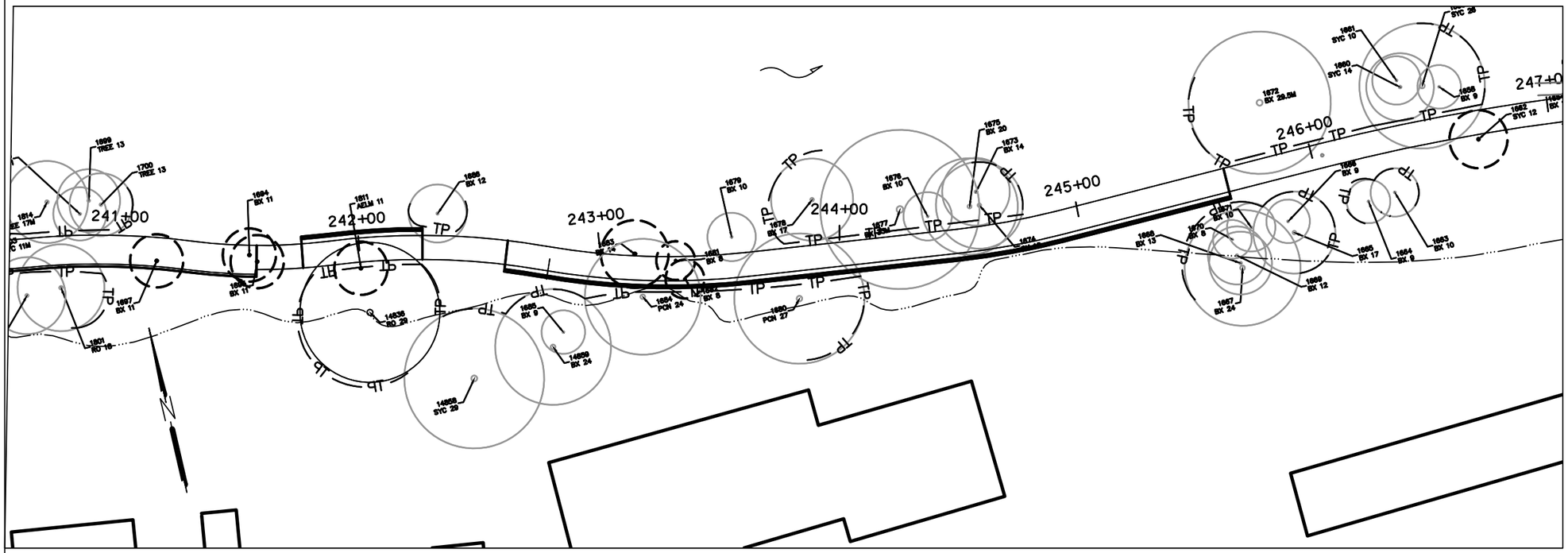
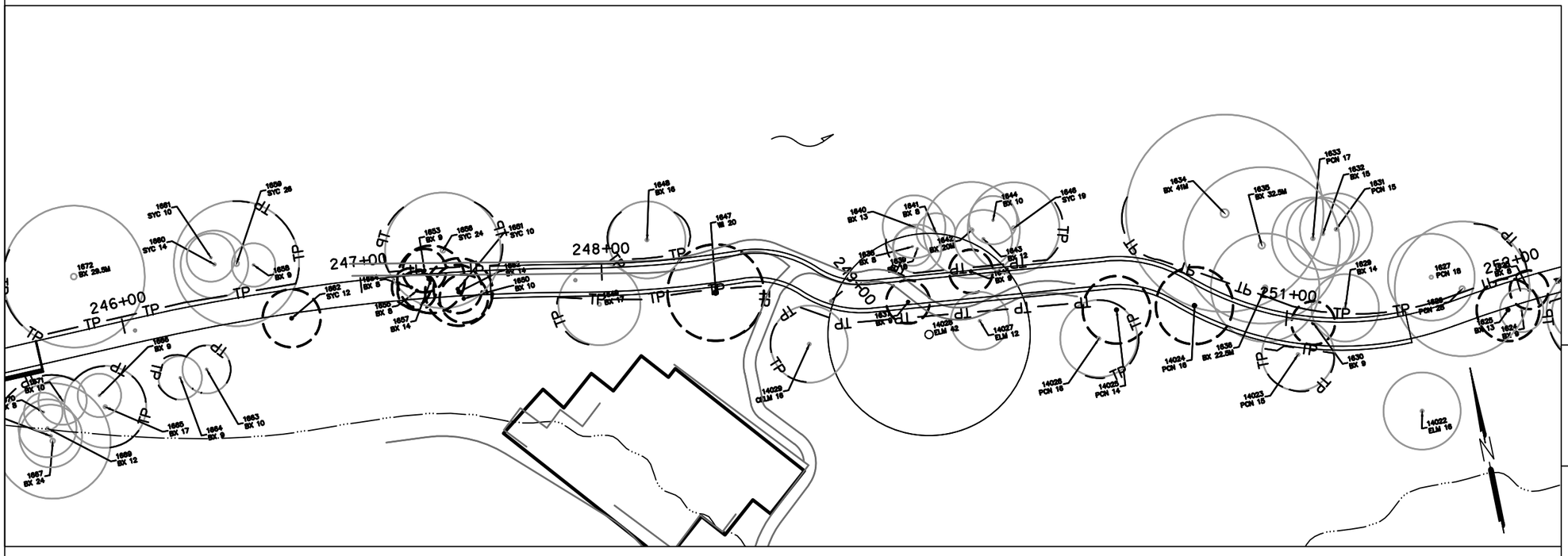
RVi PROJECT NO : 144226

BRUSHY CREEK TRAIL
TREE PROTECTION AND REMOVAL PLAN

SHEET 3 OF 8

100%SUBMITTAL	PROJECT NO.50867-00		DATE:20180621
DRWN.BY: DC	DSGN.BY: DC	CHKD.BY: CL	SHEET NO.: 81





LEGEND

TREES REMOVAL

TREE PROTECTION

FLOW ARROW

100 YR FLOODPLAIN LIMIT

CREEK FLOW DIRECTION

REGISTERED LANDSCAPE ARCHITECT
WILLIAM A. CARLL
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STATE OF TEXAS
6-21-2018

SCALE: 1" = 50'

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BRUSHY CREEK TRAIL
TREE PROTECTION AND REMOVAL PLAN

SHEET 4 OF 8

100%SUBMITTAL	PROJECT NO.50867-00		DATE:20180621
DRWN.BY: DC	DSGN.BY: DC	CHKD.BY: CL	SHEET NO.: 82

TREE LIST (FOR REFERENCE ONLY, SEE SURVEY, VERIFY TREES FOR REMOVAL WITH OWNER REP. PRIOR TO CONSTRUCTION)

TREE REMOVAL	TREE PROTECTION		
1607	1601	1678	1843
1610	1604	1680	1844
1611	1602	1679	1845
1617	1606	1684	1848
1623	1609	1685	1847
1625	1613	14859	1849
1630	1614	14858	1850
14024	1605	14836	1851
14025	14021	1686	1852
1645	1608	1801	1853
1637	1612	1802	1857
1647	1615	1700	1858
1650	1622	1699	1863
1652	1619	1998	1867
1651	1626	1804	1864
1656	1629	1807	1870
1653	14023	1806	1871
1654	1636	1810	1872
1655	1635	1809	1873
1657	1634	1816	10598
1662	14026	1820	10597
1682	1646	1821	10601
1681	1642	1822	10603
1683	1639	1817	10602
1811	1640	1829	666
1694	14027	1827	665
1695	14029	1826	664
1697	1648	1825	663
1803	1649	9003	662
9001	1656	9004	661
1830	1658	1835	660
9006	1659	1836	659
1842	1672	1831	658
1854	1663	9005	656
1855	1664	1834	651
1860	1665	1833	652
1861	1667	1832	657
1862	1671	1837	653
1866	1674	1840	654
650	1675	1841	655
	1676	1839	649
	1677	1838	

TREE REMOVAL -40

TREE PROTECTION -126

LEGEND

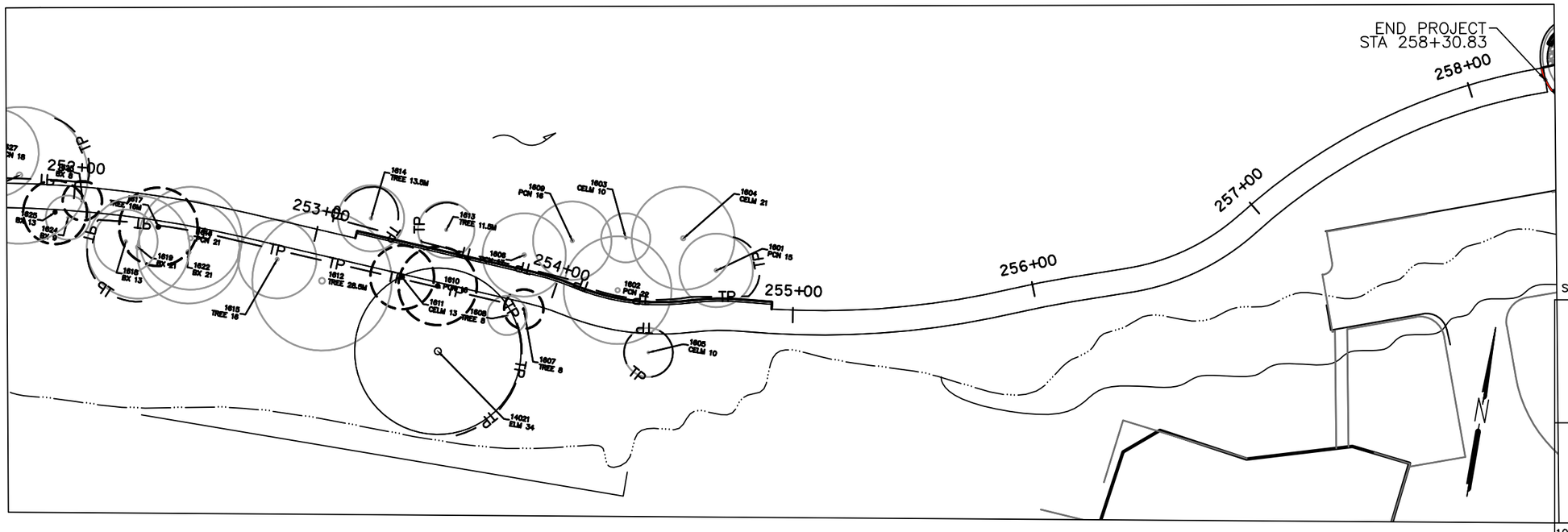
TREES REMOVAL

TREE PROTECTION

FLOW ARROW

100 YR FLOODPLAIN LIMIT

CREEK FLOW DIRECTION



SCALE: 1" = 50'

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RVi PROJECT NO :144226

BRUSHY CREEK TRAIL

TREE PROTECTION AND REMOVAL PLAN

SHEET 5 OF 8

100%SUBMITTAL	PROJECT NO.50867-00		DATE:20180621
DRWN.BY: DC	DSGN.BY: DC	CHKD.BY: CL	SHEET NO.: 83

1. ALL TREES NOT LOCATED WITHIN THE LIMITS OF CONSTRUCTION AND OUTSIDE OF DISTURBED AREAS SHALL BE PRESERVED. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTING ALL TREES TO BE PRESERVED FROM HIS ACTIVITIES.
2. ALL TREES SHOWN TO BE RETAINED WITHIN THE LIMITS OF CONSTRUCTION ON THE PLANS, SHALL BE PROTECTED DURING CONSTRUCTION WITH FENCING. SEE: TREE PROTECTION TREE WELLS (EC–02), TREE PROTECTION TREE LOCATION (EC–03) AND TREE PROTECTION FENCE–CHAIN LINK (EC–04).
3. TREE PROTECTION FENCES SHALL BE ERECTED ACCORDING TO CITY STANDARDS FOR TREE PROTECTION, INCLUDING TYPES OF FENCING AND SIGNAGE.
4. TREE PROTECTION FENCES SHALL BE INSTALLED PRIOR TO THE COMMENCEMENT OF ANY SITE PREPARATION WORK (CLEARING, GRUBBING, OR GRADING) AND SHALL BE MAINTAINED THROUGHOUT ALL PHASES OF THE CONSTRUCTION PROJECT.
5. EROSION AND SEDIMENTATION CONTROL BARRIERS SHALL BE INSTALLED OR MAINTAINED IN A MANNER WHICH DOES NOT RESULT IN SOIL BUILD–UP WITHIN TREE DRIPLINES.
6. FENCES SHALL COMPLETELY SURROUND THE TREE OR CLUSTERS OF TREES, LOCATED AT THE OUTERMOST LIMITS OF THE TREE BRANCHES (DRIPLINE) OR CRITICAL ROOT ZONE (CRZ), WHICHEVER IS GREATER; AND SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PROJECT IN ORDER TO PREVENT THE FOLLOWING:
   - 6A. SOIL COMPACTION IN CRZ AREA RESULTING FROM VEHICULAR TRAFFIC OR STORAGE OF EQUIPMENT OR MATERIAL.
   - 6B. CRZ DISTURBANCES DUE TO GRADE CHANGES OR TRENCHING NOT REVIEWED AND AUTHORIZED BY THE FORESTRY MANAGER.
   - 6C. WOUNDS TO EXPOSED ROOTS, TRUNK, OR LIMBS BY MECHANICAL EQUIPMENT
   - 6D. OTHER ACTIVITIES DETRIMENTAL TO TREES SUCH AS CHEMICAL STORAGE, CONCRETE TRUCK CLEANING, AND FIRES.
7. EXCEPTIONS TO INSTALLING TREE FENCES AT THE TREE DRIPLINES OR CRZ, WHICHEVER IS GREATER, MAY BE PERMITTED IN THE FOLLOWING CASES:
   - 7A. WHERE THERE IS TO BE AN APPROVED GRADE CHANGE, IMPERMEABLE PAVING SURFACE, OR TREE WELL;
   - 7B. WHERE PERMEABLE PAVING IS TO BE INSTALLED, ERECT THE FENCE AT THE OUTER LIMITS OF THE PERMEABLE PAVING AREA.
   - 7C. WHERE TREES ARE CLOSE TO PROPOSED BUILDINGS, ERECT THE FENCE NO CLOSER THAN 6 FEET TO THE BUILDING.
   - 7D. WHERE THERE ARE SEVERE SPACE CONSTRAINTS DUE TO TRACT SIZE, OR OTHER SPECIAL REQUIREMENTS, CONTACT THE FORESTRY MANAGER TO DISCUSS ALTERNATIVES.
8. WHERE ANY OF THE ABOVE EXCEPTIONS RESULT IN A FENCE THAT IS CLOSER THAN 5 FEET TO A TREE TRUNK, THE TRUNK SHALL BE PROTECTED BY STRAPPED–ON PLANKING TO A HEIGHT OF 8 FEET (OR TO THE LIMITS OF LOWER BRANCHING) IN ADDITION TO THE REDUCED FENCING PROVIDED.
9. WHERE ANY OF THE ABOVE EXCEPTIONS RESULT IN AREAS OF UNPROTECTED ROOT ZONES UNDER THE DRIPLINE OR CRZ, WHICHEVER IS GREATER, THOSE AREAS SHOULD BE COVERED WITH 4 INCHES OF ORGANIC MULCH TO MINIMIZE SOIL COMPACTION.
10. ALL GRADING WITHIN CRZ AREAS SHALL BE DONE BY HAND OR WITH SMALL EQUIPMENT TO MINIMIZE ROOT DAMAGE. PRIOR TO GRADING, RELOCATE PROTECTIVE FENCING TO 2 FEET BEHIND THE GRADE CHANGE AREA.
11. ANY ROOTS EXPOSED BY CONSTRUCTION ACTIVITY SHALL BE PRUNED FLUSH WITH THE SOIL AND BACKFILLED WITH GOOD QUALITY TOP SOIL WITHIN TWO DAYS. IF EXPOSED ROOT AREAS CANNOT BE BACKFILLED WITHIN 2 DAYS, AN ORGANIC MATERIAL WHICH REDUCES SOIL TEMPERATURE AND MINIMIZES WATER LOSS DUE TO EVAPORATION SHALL BE PLACED TO COVER THE ROOTS UNTIL BACKFILL CAN OCCUR.
12. PRIOR TO EXCAVATION OR GRADE CUTTING WITHIN TREE DRIPLINES, A CLEAN CUT SHALL BE MADE WITH A ROCK SAW OR SIMILAR EQUIPMENT, IN A LOCATION AND TO A DEPTH APPROVED BY THE FORESTRY MANAGER, TO MINIMIZE DAMAGE TO REMAINING ROOTS.
13. TREES MOST HEAVILY IMPACTED BY CONSTRUCTION ACTIVITIES WILL BE WATERED DEEPLY ONCE A WEEK DURING PERIODS OF HOT, DRY WEATHER. TREE CROWNS ARE TO BE SPRAYED WITH WATER PERIODICALLY TO REDUCE DUST ACCUMULATION ON LEAVES.
14. WHEN INSTALLING CONCRETE ADJACENT TO THE ROOT ZONE OF A TREE, A PLASTIC VAPOR BARRIER SHALL BE PLACED BEHIND THE CONCRETE TO PROHIBIT LEACHING OF LIME INTO THE CRZ.
15. ANY TRENCHING REQUIRED FOR THE INSTALLATION OF LANDSCAPE IRRIGATION SHALL BE PLACED AS FAR FROM EXISTING TREE TRUNKS AS POSSIBLE.
16. NO LANDSCAPE TOPSOIL DRESSING GREATER THAN FOUR (4) INCHES SHALL BE PERMITTED WITHIN THE DRIPLINE OR CRZ OF TREES, WHICHEVER IS GREATER. NO TOPSOIL IS PERMITTED ON ROOT FLARES OF ANY TREE.
17. PRUNING TO PROVIDE CLEARANCE FOR STRUCTURES, VEHICULAR TRAFFIC, AND CONSTRUCTION EQUIPMENT SHALL TAKE PLACE BEFORE CONSTRUCTION BEGINS. ALL PRUNING MUST BE DONE ACCORDING TO CITY STANDARDS AND AS OUTLINED IN LITERATURE PROVIDED BY THE INTERNATIONAL SOCIETY OF ARBORICULTURE (ISA PRUNING TECHNIQUES).
18. ALL OAK TREE CUTS, INTENTIONAL OR UNINTENTIONAL, SHALL BE SEALED WITH AN APPROVED PRUNING SEALER IMMEDIATELY (WITHIN 10 MINUTES). TREE PAINT MUST BE KEPT ON SITE AT ALL TIMES.
19. THE FORESTRY MANAGER HAS THE AUTHORITY TO REQUIRE ADDITIONAL TREE PROTECTION BEFORE OR DURING CONSTRUCTION.
20. TREES APPROVED FOR REMOVAL SHALL BE REMOVED IN A MANNER WHICH DOES NOT IMPACT TREES TO BE PRESERVED. REFER TO THE CITY OF ROUND ROUND ROCK TREE TECHNICAL MANUAL FOR APPROPRIATE REMOVAL METHODS.
21. PRIOR TO CONSTRUCTION, ALL LOWER TREE LIMBS OVER ROADWAYS MUST BE PRUNED TO A HEIGHT OF 14 FEET USING THE TECHNIQUES DESCRIBED IN THE CITY OF ROUND ROCK TREE TECHNICAL MANUAL.
22. DEVIATIONS FROM THE ABOVE REQUIREMENTS AND NEGLIGENT DAMAGE TO TREES MAY BE CONSIDERED AS ORDINANCE VIOLATIONS.

FOR QUESTIONS CONCERNING THIS DETAIL, PLEASE CONTACT THE FORESTRY MANAGER.

RECORD SIGNED COPY ON FILE AT PUBLIC WORKS

APPROVED

03–25–11

DATE

THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR THE APPROPRIATE USE OF THIS DETAIL. (NOT TO SCALE)

CITY OF ROUND ROCK

TREE PROTECTION NOTES

DRAWING NO: EC–01

ROUND ROCK, TEXAS
PURPOSE. PASSION. PROSPERITY.

REGISTERED LANDSCAPE ARCHITECT
WILLIAM A. CARMAN
2908
STATE OF TEXAS

6-21-201

SCALE: 1"= 50'

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712 Congress Avenue, Suite 300
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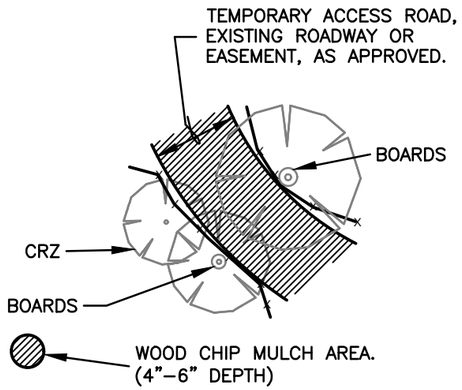
RVi PROJECT NO :144226

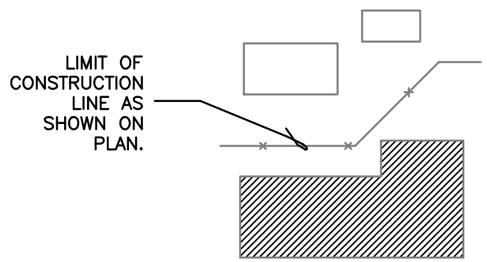
BRUSHY CREEK TRAIL
TREE PROTECTION AND REMOVAL PLAN

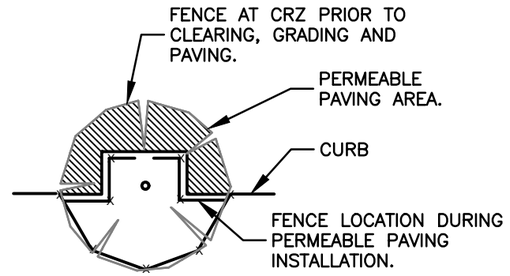
SHEET 6 OF 8

100%SUBMITTAL	PROJECT NO.50867–00		DATE:20180621
DRWN.BY: DC	DSGN.BY: DC	CHKD.BY: CL	SHEET NO.: 84

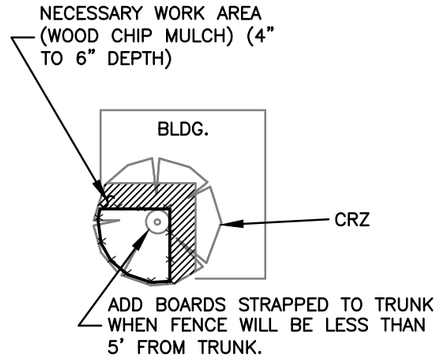


LINEAR CONSTRUCTION THROUGH TREES

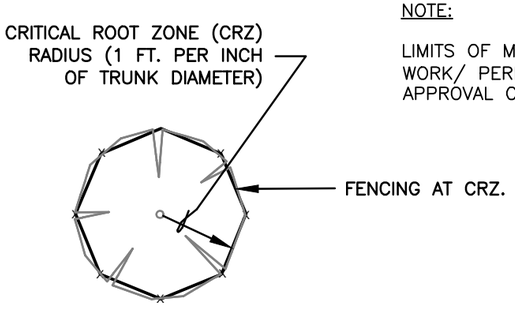




TREES IN PAVING AREA



NATURAL AREAS

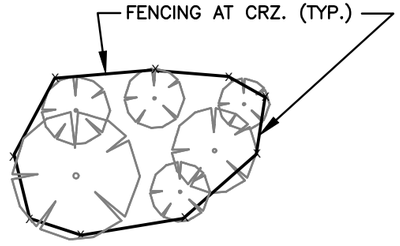


INDIVIDUAL TREE

TREES NEAR CONSTRUCTION ACTIVITY

NOTE:

LIMITS OF MULCH AREAS AND DISTANCE FROM TRUNKS TO WORK/ PERMEABLE PAVING AREAS SHALL BE SUBJECT TO THE APPROVAL OF THE FORESTRY MANAGER.



GROUP OF TREES

FOR QUESTIONS CONCERNING THIS DETAIL, PLEASE CONTACT THE FORESTRY MANAGER.

RECORD SIGNED COPY ON FILE AT PUBLIC WORKS

APPROVED

03-25-11

DATE

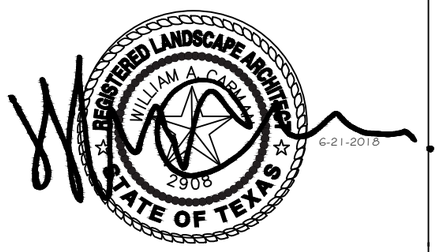
THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR THE APPROPRIATE USE OF THIS DETAIL. (NOT TO SCALE)

CITY OF ROUND ROCK

DRAWING NO: EC-03

TREE PROTECTION FENCE LOCATIONS

ROUND ROCK, TEXAS
PURPOSE. PASSION. PROSPERITY.



SCALE: 1"= 50'

rvi
planning + landscape architecture
712 Congress Avenue, Suite 300
Austin, Texas 78701
(512) 480-0032

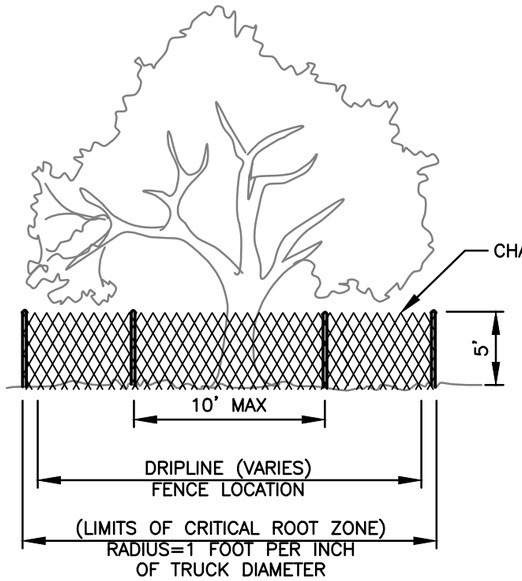
RVi PROJECT NO :144226

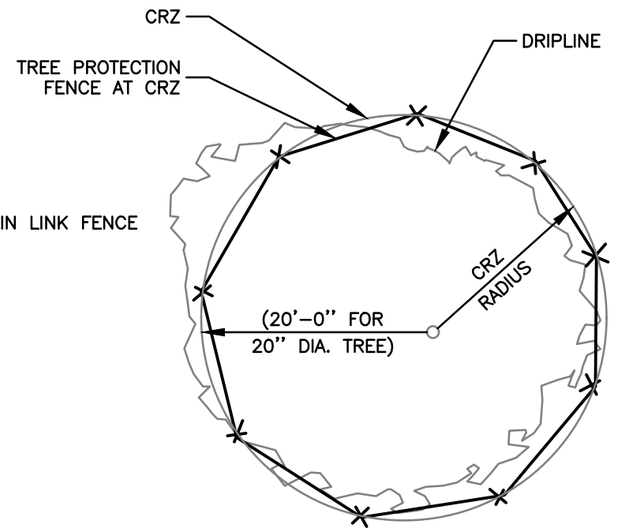
BRUSHY CREEK TRAIL

TREE PROTECTION AND REMOVAL PLAN

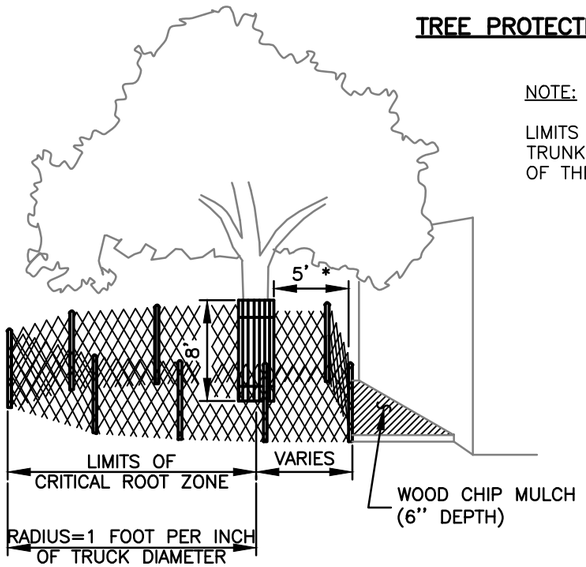
SHEET 7 OF 8

100%SUBMITTAL	PROJECT NO.50867-00		DATE:20180621
DRWN.BY: DC	DSGN.BY: DC	CHKD.BY: CL	SHEET NO.: 85





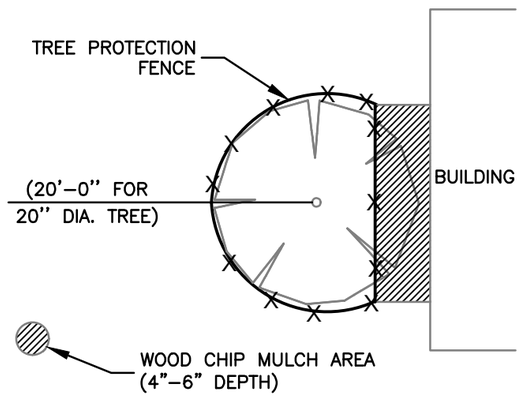
TREE PROTECTION FENCE – CHAIN LINK



*AS NEEDED TO PROVIDE NECESSARY WORK SPACE. IF LESS THAN 5', THEN ADD BOARDS STRAPPED TO TRUNK.

NOTE:

LIMITS OF WOOD CHIP MULCH AREA AND DISTANCE FROM TRUNK TO WORK AREA SHALL BE SUBJECT TO THE APPROVAL OF THE FORESTRY MANAGER.



TREE PROTECTION FENCE (MODIFIED) – CHAIN LINK

FOR QUESTIONS CONCERNING THIS DETAIL, PLEASE CONTACT THE FORESTRY MANAGER.

RECORD SIGNED COPY ON FILE AT PUBLIC WORKS

APPROVED

03-25-11

DATE

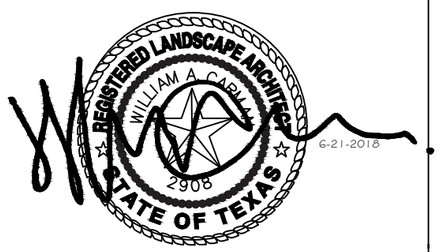
THE ARCHITECT/ENGINEER ASSUMES RESPONSIBILITY FOR THE APPROPRIATE USE OF THIS DETAIL. (NOT TO SCALE)

CITY OF ROUND ROCK

TREE PROTECTION FENCE CHAIN LINK

DRAWING NO: EC–04

ROUND ROCK, TEXAS
PURPOSE. PASSION. PROSPERITY



SCALE: 1"= 50'

rvi planning + landscape architecture
712 Congress Avenue, Suite 300
Austin, Texas 78701
(512) 480-0032

RVi PROJECT NO :144226

BRUSHY CREEK TRAIL
TREE PROTECTION AND REMOVAL PLAN

SHEET 8 OF 8

100%SUBMITTAL	PROJECT NO.50867–00		DATE:20180621
DRWN.BY: DC	DSGN.BY: DC	CHKD.BY: CL	SHEET NO.: 86

DATE: 8/8/2018
FILE: H:\projects\508\67\00\design\Civil\Standards\SW3P\epic.dgn

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.

2.

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☒ No Permit Required
☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
☐ Individual 404 Permit Required
☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1.

2.

3.

4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☐ Temporary Vegetation	☒ Silt Fence	☒ Vegetative Filter Strips
☒ Blankets/Matting	☒ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☐ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

☐ No Action Required ☒ Required Action

Action No.

1. The contractor's attention is directed to the fact that there is the possibility that migratory birds may be nesting in any woody vegetation or existing structures within the project limits. The contractor shall remove all woody vegetation, and old migratory bird nests from any structures, between September 16 and February 28 while any nests are not occupied by a bird. In addition, the contractor must be prepared to prevent migratory birds from re-nesting on any structures between March 1 and September 15. All methods must be approved by a qualified professional well in advance of planned use.
2. Implement Reptile, Freshwater Mussel and Water best management practices (BMP) during construction.
3. The contractor will be responsible for implementing the VCMs listed on the attached USFWS concurrence letter.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ☒ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☒ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☐ No Action Required ☒ Required Action

Action No.

1. The project is located within the Edwards Aquifer Recharge Zone; therefore prior to initiation of construction, a Water Pollution Abatement Plan (WPAP) must be approved by Texas Commission on Environmental Quality (TCEQ). Maintain application and TCEQ approval letter on site. Comply with conditions in approval letter.
2. SEE ITEM 7 IN GENERAL NOTES
3.

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
© TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS)	0914	05	191	NA
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY		SHEET NO.
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	AUS	WILLIAMSON		87

Note To Designer:
1. Do not alter Sheet Design or Font style, size or weight - match text attributes.
2. If additional space is needed for a numbered section, fence and adjust sections up or down as needed for proportioning and readability but do not relocate from it's relative position.

A. GENERAL SITE DATA

1. PROJECT LIMITS: *LIMITS: FROM HERITAGE TRAIL AT CREEKSIDE PLAZA TO 1.1 MI. NW ALONG BRUSHY CREEK TXDOT CSJ: 0914-05-191*

2. PROJECT SITE MAPS:
   - * *Project Latitude 30°30'44.4"N* *Project Longitude 97°41'29.5"W*
   - * *Project Location Map: Shown on Title Sheet*
   - * *Drainage Patterns: Shown on Drainage Area Maps* 68
   - * *Approx. Slopes Anticipated After Major Gradings and Areas of Soil Disturbance: Shown on Typical Sections* 18
   - * *Major Controls and Locations of Stabilization Practices: Shown on SW3P Sheets* 89 - 93
   - * *Project Specific Locations: Off-site waste, borrow, or storage areas are not part of this SW3P.*
   - * *Surface Waters and Discharge Locations: Shown on Drainage and Culvert Layout Sheets* 68

3. PROJECT DESCRIPTION: *CONSTRUCT 10' SHARED USE PATH WITH PEDESTRIAN BRIDGE*

   * *Joint-bid utilities are covered by this SW3P*
   Non-Joint Bid Utilities are not part of this SW3P.

4. FOR MAJOR SOIL DISTURBING ACTIVITIES SEQUENCE OF EVENTS:

   1. Install controls down-slope of work area and initiate inspection and maintenance activities.

   2. Begin phased construction with interim stabilization practices. Adjust erosion and sedimentation controls during construction to meet requirements and changing conditions and as directed/approved by the Engineer.

   3. Major soil disturbing activities may include but are not limited to: right-of-way preparation, cut and/or fill to improve roadway profile, final grading and placement of topsoil and the following (If marked):

   ____ *Placement of road base*
   ____ *Extensive ditch grading*
   ____ *Upgrading or replacing culverts or bridges*
   ____ *Temporary detour road(s)*
   _X_ *Other: CONSTRUCTION OF SIDEWALK, DRILL SHAFTS, AND BRIDGE ABUTMENTS*

5. EXISTING AND PROPOSED CONDITIONS:

   Description of existing vegetative cover: Ash, Juniper, Live Oak Floodplain Hardwood Forest
   Percentage of existing vegetative cover: 32%
   Existing vegetative cover: (mark one)
   ____ *Thick or uniformly established*
   _X_ *Thin and Patchy*
   ____ *None or minimal cover*
   Description of soils: Oakalla, Eckrant, and Edwards limestone
   Site Acreage: 3.32 *Acreage disturbed: 1.14*
   Site runoff coefficient (pre-construction): .64 *Site runoff coefficient (post-construction): .64*

6. RECEIVING WATERS: *(Mark all that apply)*

   ____ *A classified stream does not pass through project.*
   _X_ *A classified stream passes through project. Name BRUSHY CREEK Segment Number 1114428*
   Name of receiving waters that will receive discharges from disturbed areas of the project: BRUSHY CREEK

   Site is in a Municipal Separate Storm Sewer System (MS4).
   MS4 Operator (name): _____

B. BEST MANAGEMENT PRACTICES

General timing or sequence for implementation of BMPs shall be as required and/or as directed/approved by the Engineer to provide adequate controls. BMPs shown on plan sheets are to be considered "proposed" unless/until install date is shown. BMPs are to reduce sediments from road construction activities.

1. SOIL STABILIZATION PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

P	SEEDING	T&P	PRESERVATION OF NATURAL RESOURCES
____	MULCHING (Hay or Straw)	____	FLEXIBLE CHANNEL LINER
____	BUFFER ZONES	P	RIGID CHANNEL LINER
____	PLANTING	P	SOIL RETENTION BLANKET
____	COMPOST/MULCH FILTER BERM	P	COMPOST MANUFACTURED TOPSOIL
____	SODDING	____	OTHER: (Specify Practice)

2. STRUCTURAL PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

T	SILT FENCES
____	HAY BALES
T	ROCK FILTER DAMS
____	DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
____	DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
____	DIVERSION DIKE AND SWALE COMBINATIONS
____	PIPE SLOPE DRAINS
____	PAVED FLUMES
T	ROCK BEDDING AT CONSTRUCTION EXIT
____	TIMBER MATTING AT CONSTRUCTION EXIT
P	CHANNEL LINERS
____	SEDIMENT TRAPS
____	SEDIMENT BASINS
____	STORM INLET SEDIMENT TRAP
____	STONE OUTLET STRUCTURES
____	CURBS AND GUTTERS
____	STORM SEWERS
____	VELOCITY CONTROL DEVICES
____	OTHER: *(Specify Practice)*

STORM WATER MANAGEMENT:

3. *The proposed facility was designed in consideration of hydraulic design standards to convey stormwater in a manner that is protective of public safety and property. The control of erosion from the facility is inherent to the design. Additional factors affecting post-construction stormwater at the project location include: (mark all that apply)*

   _X_ *Existing or new vegetation provides natural filtration.*
   ____ *The design includes provisions for permanent erosion controls provided by strategically placed pervious and impervious surfaces.*
   ____ *Project includes permanent sedimentation controls (other than grass).*
   _X_ *Velocities do not require dissipation devices.*
   ____ *Velocity-dissipation devices included in the design.*
   ____ *Other : _____*
   _____

NON-STORM WATER DISCHARGES:

4. *Off-site discharges are prohibited except as follows:*
   1. Discharges from fire fighting activities and/or fire hydrant flushings.
   2. Vehicle, external building, and pavement wash water where detergents and soaps are not used and where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed).
   3. Plain water used to control dust.
   4. Plain water originating from potable water sources.
   5. Uncontaminated groundwater, spring water or accumulated stormwater.
   6. Foundation or footing drains where flows are not contaminated with process materials such as solvents.
   7. Other: _____

Concrete truck wash water discharges on the site should be prohibited or minimized. If allowed by the Engineer, they must be managed in a manner so as not to contaminate surface water. They must not be located in areas of concentrated flow. Concrete truck wash-out locations must be shown on the SW3P Layout and included in the inspections.

Hazardous material spill/leak shall be prevented or minimized. At a minimum, this includes asphalt products, fuels, oils, lubricants, solvents, paints, acids, concrete curing compounds and chemical additives for soil stabilization. BMPs shall be implemented to the storage areas of these products. All spills must be cleaned and disposed properly and reported to the Engineer. Report any release at or above the reportable quantity during a 24 hour period to the National Response Center at 1-800-424-8802.

C. OTHER REQUIREMENTS & PRACTICES

1. MAINTENANCE:
   All erosion and sediment controls shall be maintained in good working order. If a repair is necessary, it shall be performed before the next anticipated storm event but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from equipment. If maintenance prior to the next anticipated storm event is impracticable, maintenance must be scheduled and accomplished as soon as practicable. Disturbed areas on which construction activities have ceased, temporarily or permanently, shall be stabilized within 14 calendar days unless they are scheduled to and do resume within 21 calendar days. The areas adjacent to creeks and drainageways shall have priority followed by protecting storm sewer inlets.

2. INSPECTION:
   For areas of the construction site that have not been finally stabilized, areas used for storage of materials, structural control measures, and locations where vehicles enter or exit the site, personnel provided by the permittee and familiar with the SW3P must inspect disturbed areas at least once every fourteen (14) calendar days and within twenty four (24) hours of the end of a storm of 0.5 inches or greater. As an alternative to the above-described inspection schedule of once every fourteen (14) calendar days and within twenty four (24) hours of a storm of 0.5 inches or greater, the SW3P may be developed to require that these inspections will occur at least once every seven (7) calendar days. If this alternative schedule is developed, the inspection must occur on a specifically defined day, regardless of whether or not there has been rainfall since the previous inspection An inspection and Maintenance Report shall be prepared for each inspection and the controls shall be revised on the SW3P within seven (7) calendar days following the inspection.

3. WASTE MATERIALS:
   All non-hazardous municipal waste materials such as litter, rubbish, trash and garbage located on or originating from the project shall be collected and stored in a securely lidded metal dumpster, provided by the Contractor. The dumpster shall be emptied as necessary or as required by local regulation and the trash shall be hauled to a permitted disposal facility. The burying of non-hazardous municipal waste on the project shall not be permitted. Construction material waste sites, stockpiles and haul roads shall be constructed to minimize and control the amount of sediment that may enter receiving waters. Construction material waste sites shall not be located in any wetland, water body or stream bed. Construction staging areas and vehicle maintenance areas shall be constructed in a manner to minimize the runoff of pollutants.

4. OFFSITE VEHICLE TRACKING:
   Off-site vehicle tracking of sediments and the generation of dust must be minimized. Excess sediments on road shall be removed on a regular basis as directed/approved by the Engineer.

5. OTHER:
   See the EPIC sheet for additional environmental information.

PAPE-DAWSON ENGINEERS
AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
7800 SHOAL CREEK BLVD, STE 220 W | AUSTIN, TX 78757 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

 Texas Department of Transportation

DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 7/31/2018 DATE

REVIEW AND APPROVAL

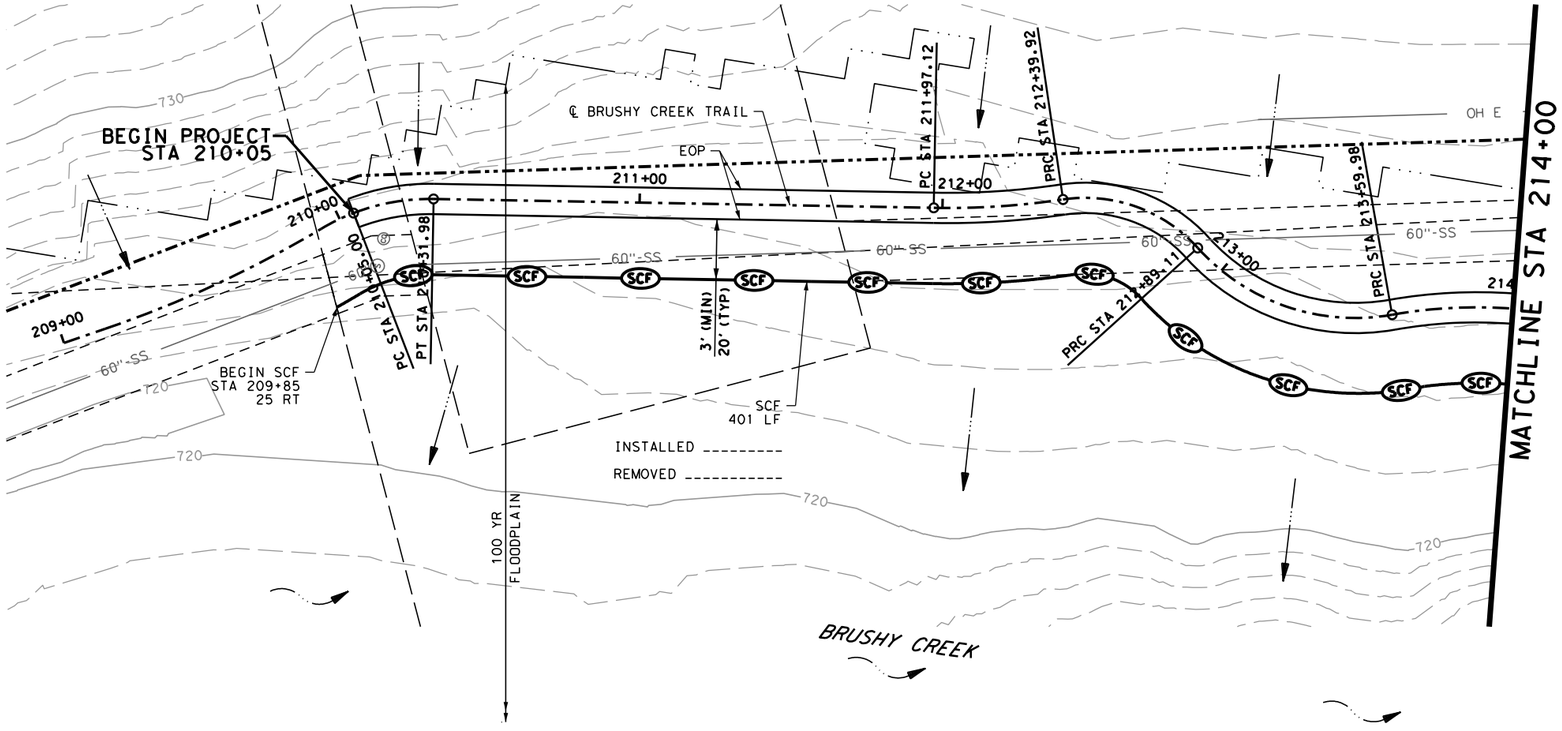
STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

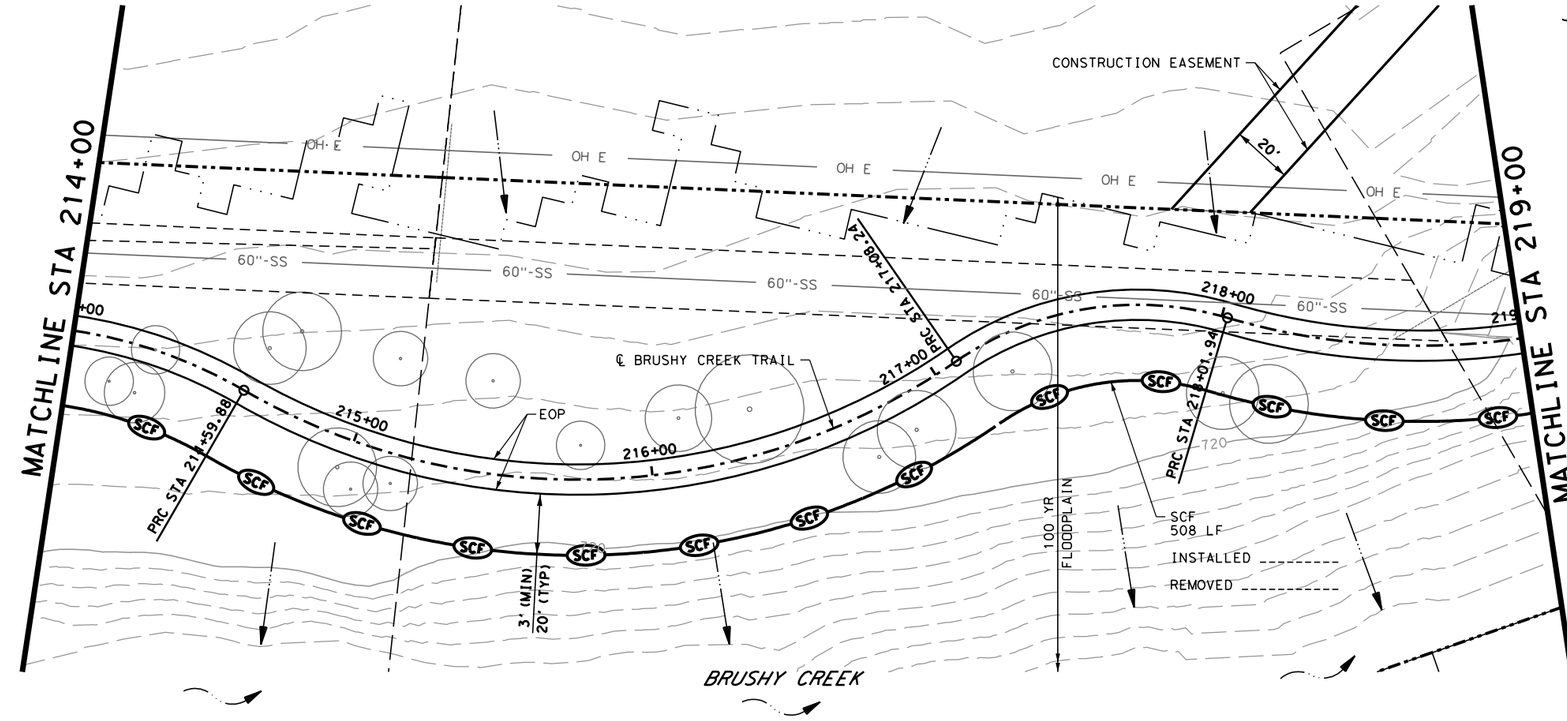
JAMES A. LUTZ, P.E. — 7/31/2018 DATE

STORM WATER POLLUTION PREVENTION PLAN (SW3P)

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			BRUSHY CREEK
STATE	DISTRICT	COUNTY	
TEXAS	SAT	WILLIAMSON	
CONTROL	SECTION	JOB	SHEET NO.
0914	05	191	88

ITEM	DESCRIPTION	UNIT	QTY
0506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	112
0506-6024	CONSTRUCTION EXITS (REMOVE)	SY	112
0506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	909
0506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	909





SW3P LEGEND

- SCF — SEDIMENT CONTROL FENCE
- RFD3 — ROCK FILTER DAM (TY 3)
- FLOW ARROW
- LIMITS OF CONSTRUCTION
- PROPERTY LINE
- EASEMENT LINE
- 100 YR FLOODPLAIN LIMIT
- CREEK FLOW DIRECTION
- TREE

SW3P NOTES

1. REFER TO TXDOT SW3P STANDARD SHEETS FOR DETAILS.
2. INSTALLED MEASURES SHALL REMAIN IN PLACE AND BE INSPECTED WEEKLY. ALL ITEMS SHALL BE MAINTAINED AND REPAIRED THROUGHOUT DURATION OF USE.
3. SW3P MEASURES SHOWN ARE MINIMUM REQUIREMENTS BASED UPON PROJECT DESIGN. INSTALLATION OF SW3P MEASURES WILL BE SHOWN AND MODIFIED TO ACCOMMODATE ACTUAL FIELD CONDITIONS.
4. TEMPORARY SEDIMENT CONTROL FENCE SHOULD BE TYPICALLY PLACED AT 20' FROM EDGE OF TRAIL PAVEMENT WHEREVER POSSIBLE. THERE IS A MINIMUM OFFSET OF 3' FOR CONSTRUCTION. TEMPORARY SEDIMENT CONTROL FENCE IS PURPOSELY SHOWN OFF-SET FROM SAID LINES FOR VISUAL CLARITY.

DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 8/3/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 8/3/2018 DATE

SCALE: 1"= 50'

PAPE-DAWSON ENGINEERS
AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS
7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
SW3P
(STA 210+05 TO STA 219+00)

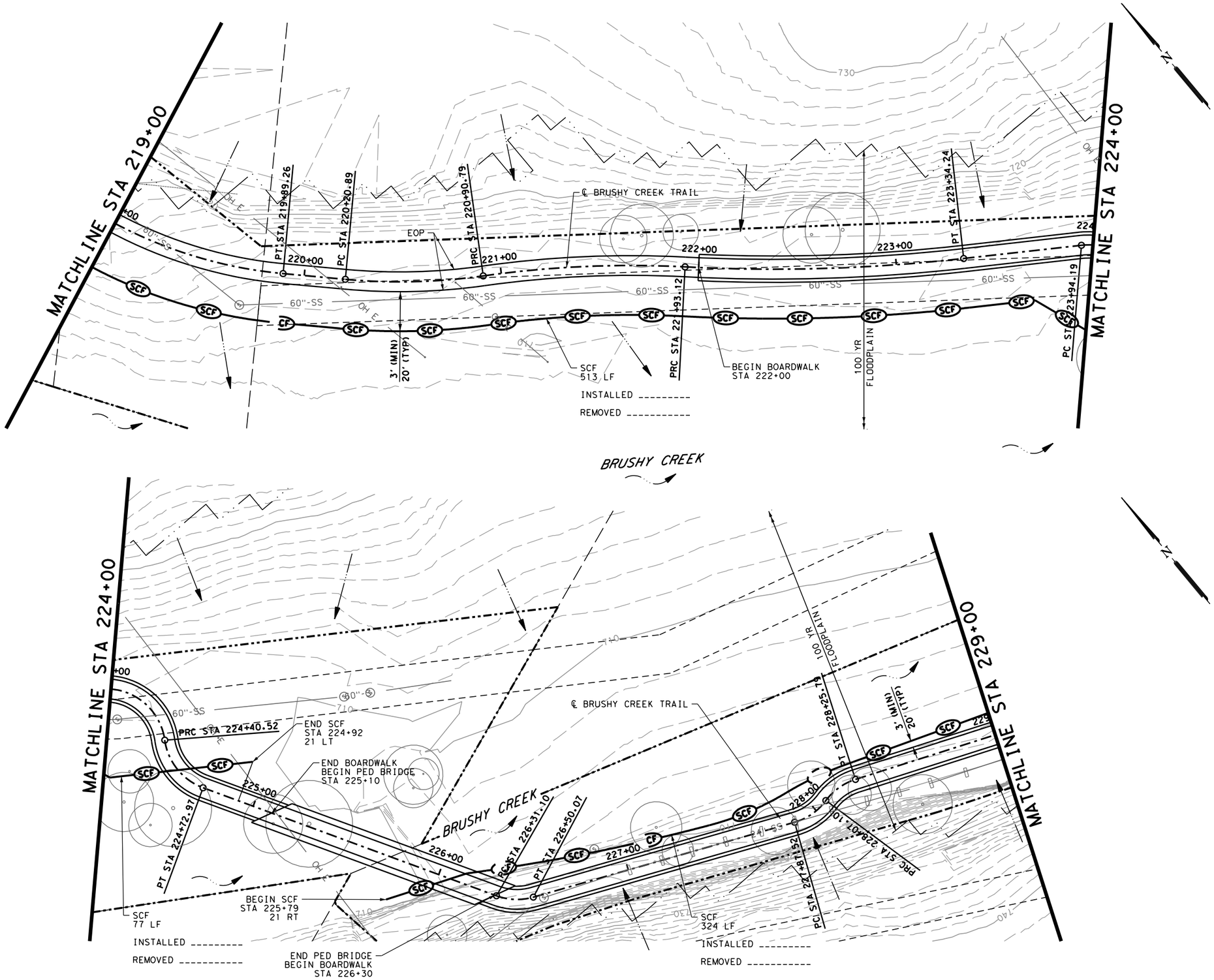
SHEET 1 OF 5

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 89

Plotted on: 8/3/2018

Design Filename: H:\projects\508\67\00\design\Civil\SW3P\5086700sw3b02.dgn

ITEM	DESCRIPTION	UNIT	QTY
0506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	914
0506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	914



SW3P LEGEND

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- FLOW ARROW
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1. REFER TO TXDOT SW3P STANDARD SHEETS FOR DETAILS.
2. INSTALLED MEASURES SHALL REMAIN IN PLACE AND BE INSPECTED WEEKLY. ALL ITEMS SHALL BE MAINTAINED AND REPAIRED THROUGHOUT DURATION OF USE.
3. SW3P MEASURES SHOWN ARE MINIMUM REQUIREMENTS BASED UPON PROJECT DESIGN. INSTALLATION OF SW3P MEASURES WILL BE SHOWN AND MODIFIED TO ACCOMMODATE ACTUAL FIELD CONDITIONS.
4. TEMPORARY SEDIMENT CONTROL FENCE SHOULD BE TYPICALLY PLACED AT 20' FROM EDGE OF TRAIL PAVEMENT WHEREVER POSSIBLE. THERE IS A MINIMUM OFFSET OF 3' FOR CONSTRUCTION. TEMPORARY SEDIMENT CONTROL FENCE IS PURPOSELY SHOWN OFF-SET FROM SAID LINES FOR VISUAL CLARITY.

DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 8/3/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 8/3/2018 DATE

SCALE: 1"= 50'

PAPE-DAWSON ENGINEERS

AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS

7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711

TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL

SW3P

(STA 219+00 TO STA 229+00)

SHEET 2 OF 5

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 90

Plotted on: 8/3/2018

Design Filename: H:\projects\508\67\00\design\Civil\SW3P\5086700sw3p03.dgn

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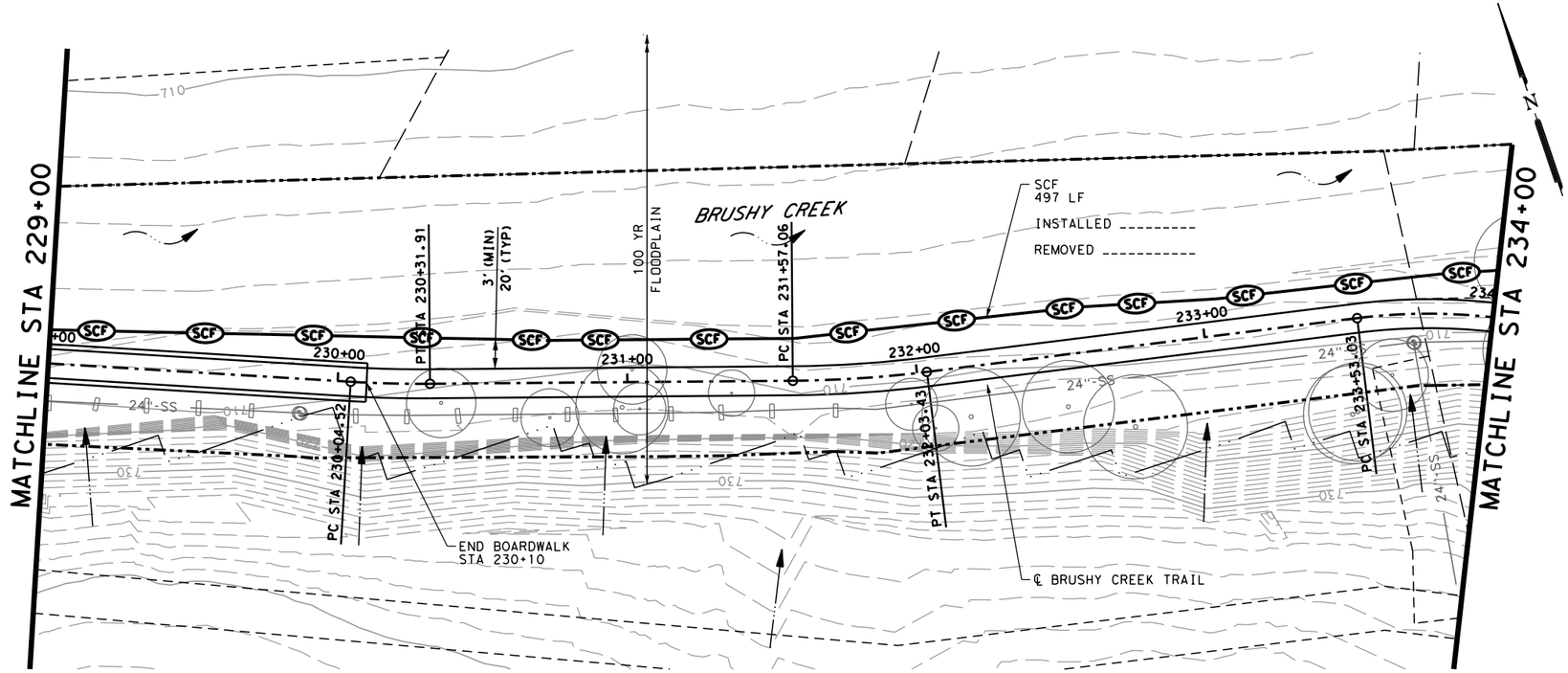
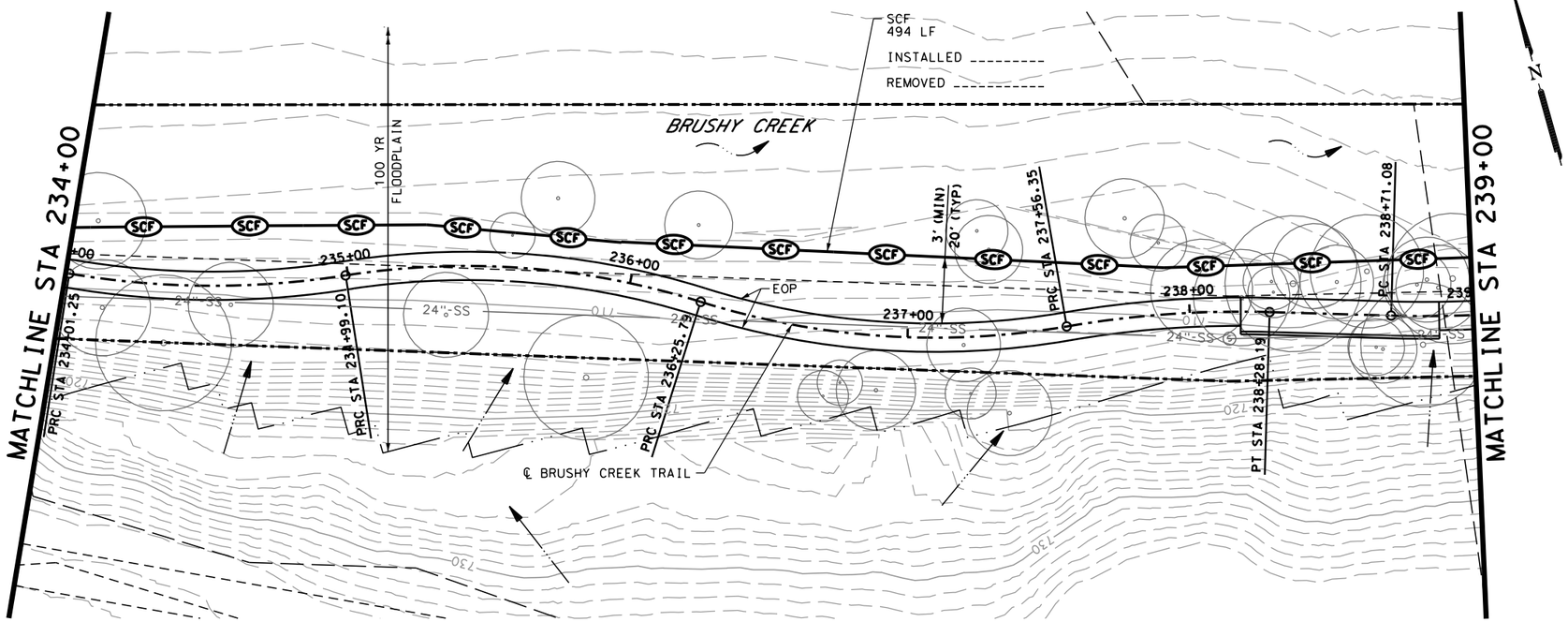
0506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	996





SW3P LEGEND

- SCF — SEDIMENT CONTROL FENCE
- RFD3 — ROCK FILTER DAM (TY 3)
- FLOW ARROW
- LIMITS OF CONSTRUCTION
- PROPERTY LINE
- EASEMENT LINE
- 100 YR FLOODPLAIN LIMIT
- CREEK FLOW DIRECTION
- TREE

SW3P NOTES

1. REFER TO TXDOT SW3P STANDARD SHEETS FOR DETAILS.
2. INSTALLED MEASURES SHALL REMAIN IN PLACE AND BE INSPECTED WEEKLY. ALL ITEMS SHALL BE MAINTAINED AND REPAIRED THROUGHOUT DURATION OF USE.
3. SW3P MEASURES SHOWN ARE MINIMUM REQUIREMENTS BASED UPON PROJECT DESIGN. INSTALLATION OF SW3P MEASURES WILL BE SHOWN AND MODIFIED TO ACCOMMODATE ACTUAL FIELD CONDITIONS.
4. TEMPORARY SEDIMENT CONTROL FENCE SHOULD BE TYPICALLY PLACED AT 20' FROM EDGE OF TRAIL PAVEMENT WHEREVER POSSIBLE. THERE IS A MINIMUM OFFSET OF 3' FOR CONSTRUCTION. TEMPORARY SEDIMENT CONTROL FENCE IS PURPOSELY SHOWN OFF-SET FROM SAID LINES FOR VISUAL CLARITY.

DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 8/3/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 8/3/2018 DATE

SCALE: 1"= 50'

PAPE-DAWSON ENGINEERS
AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS
7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
SW3P
(STA 229+00 TO STA 239+00)

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 91

Plotted on: 8/3/2018

Design Filename: H:\projects\508\67.00\design\Civil\SW3P\5086700sw3p04.dgn

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0506-6011	ROCK FILTER DAMS (REMOVE)	LF	35
0506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	826
0506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	826
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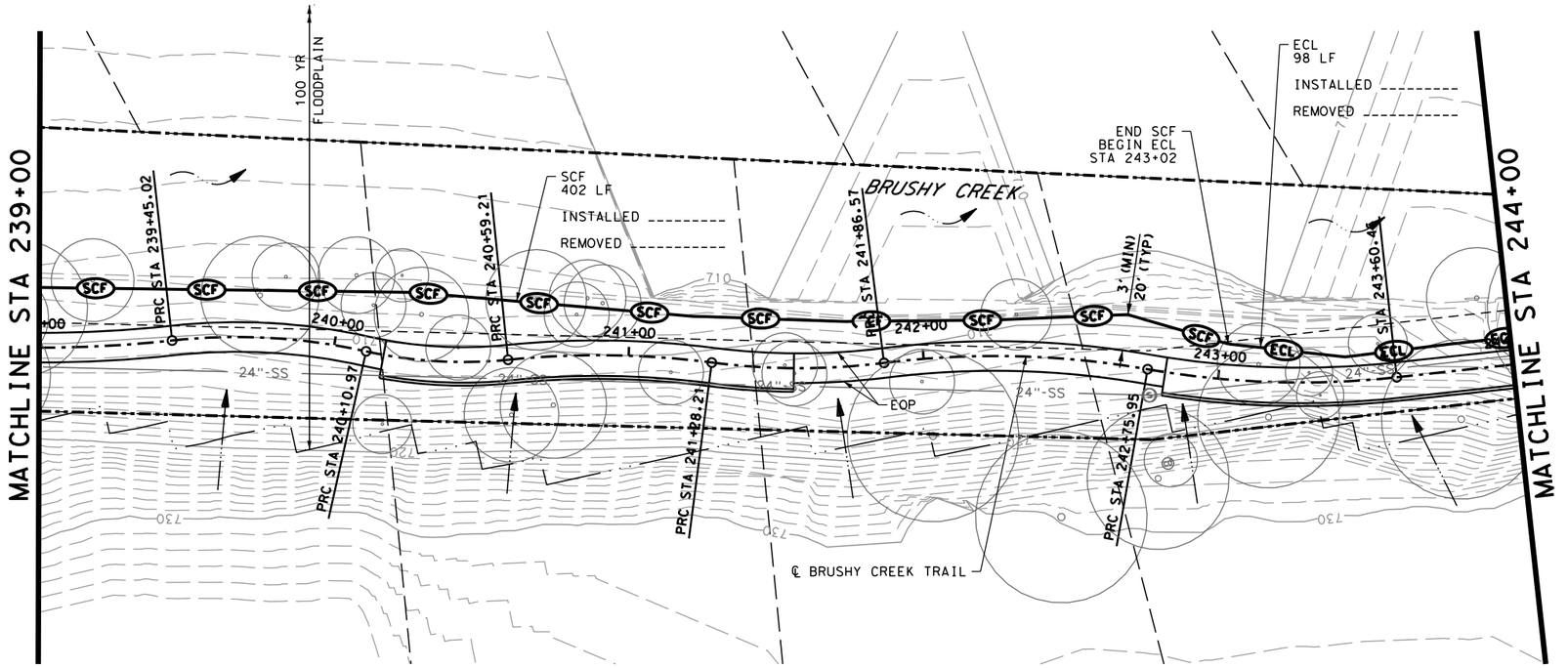
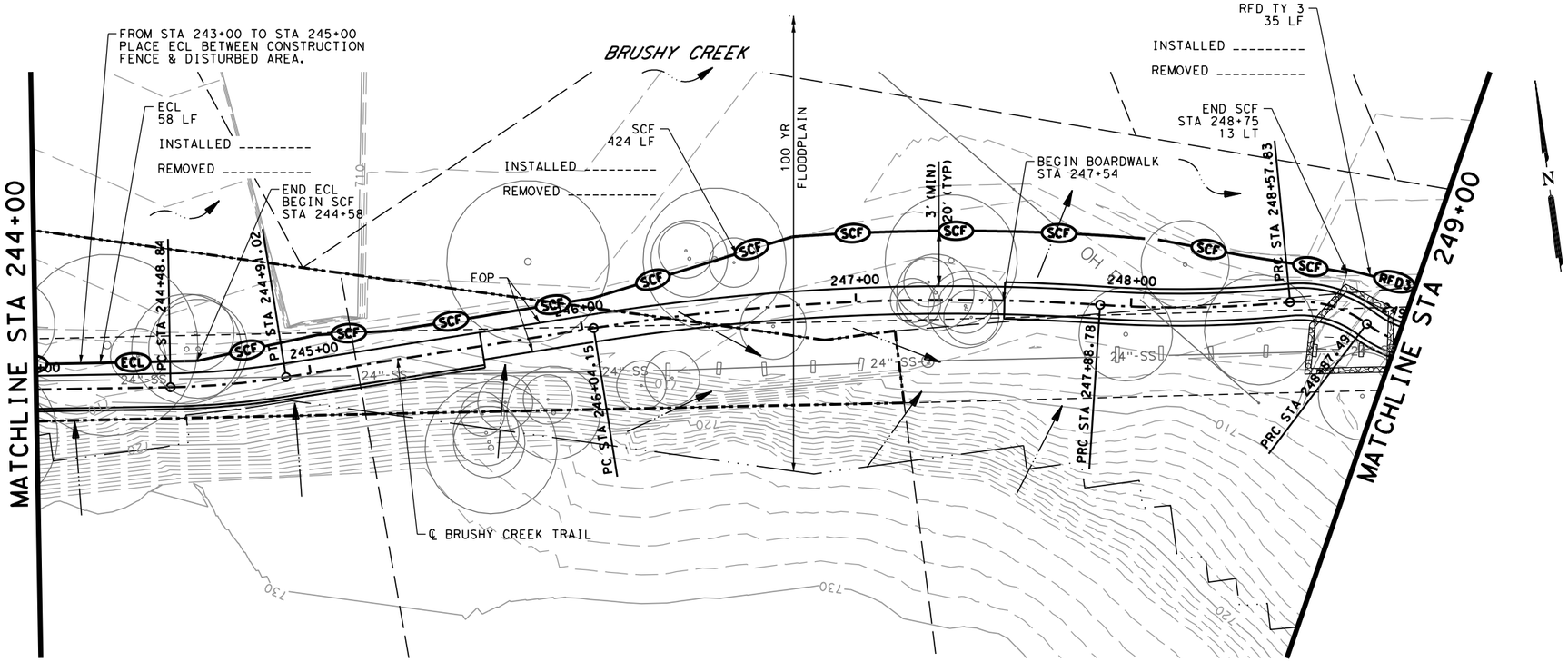
0506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	156





SW3P LEGEND

- SCF — SEDIMENT CONTROL FENCE
- RFD3 — ROCK FILTER DAM (TY 3)
- FLOW ARROW
- LIMITS OF CONSTRUCTION
- PROPERTY LINE
- EASEMENT LINE
- 100 YR FLOODPLAIN LIMIT
- CREEK FLOW DIRECTION
- TREE

SW3P NOTES

1. REFER TO TXDOT SW3P STANDARD SHEETS FOR DETAILS.
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DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 8/3/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 8/3/2018 DATE

SCALE: 1"= 50'

PAPE-DAWSON ENGINEERS
AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS
7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
SW3P
(STA 239+00 TO STA 249+00)

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 92

Plotted on: 8/3/2018
Design Filename: H:\projects\508\67\00\design\Civil\SW3P\5086700sw3p05.dgn

ITEM	DESCRIPTION	UNIT	QTY
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0506-6024	CONSTRUCTION EXITS (REMOVE)	SY	112
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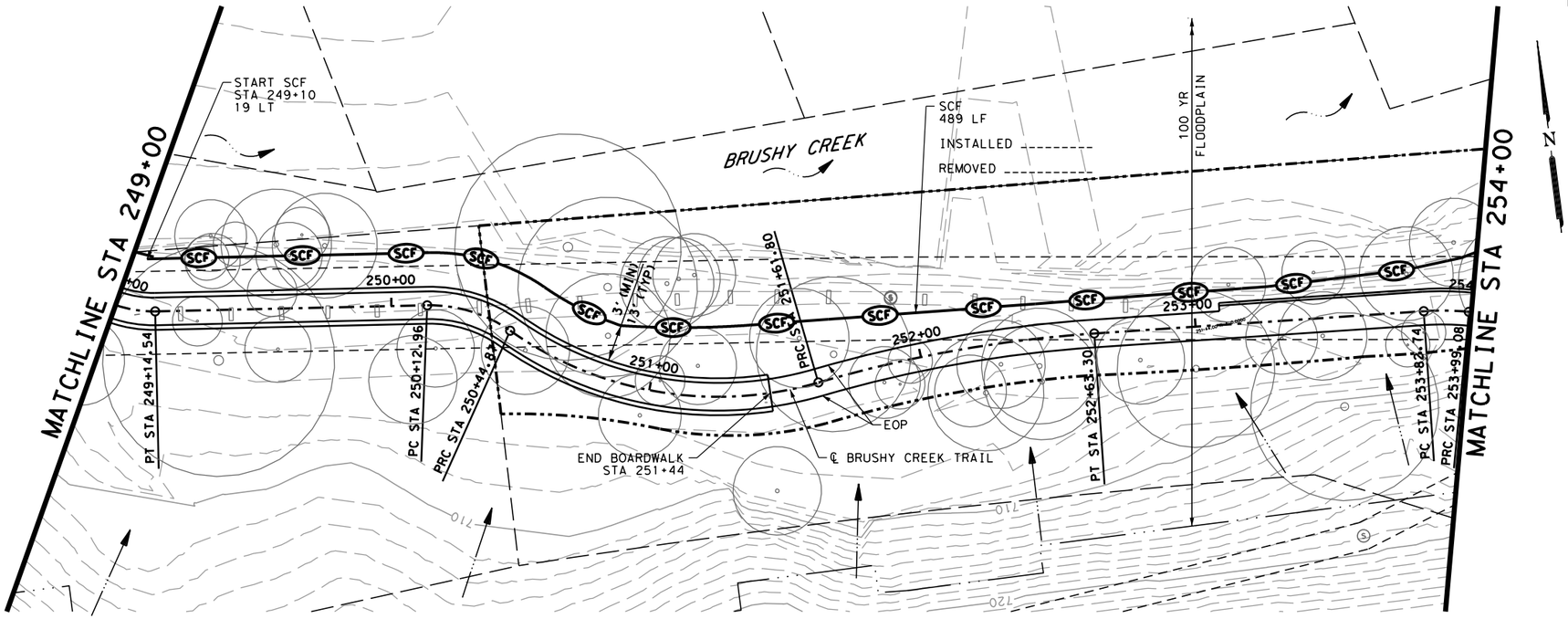
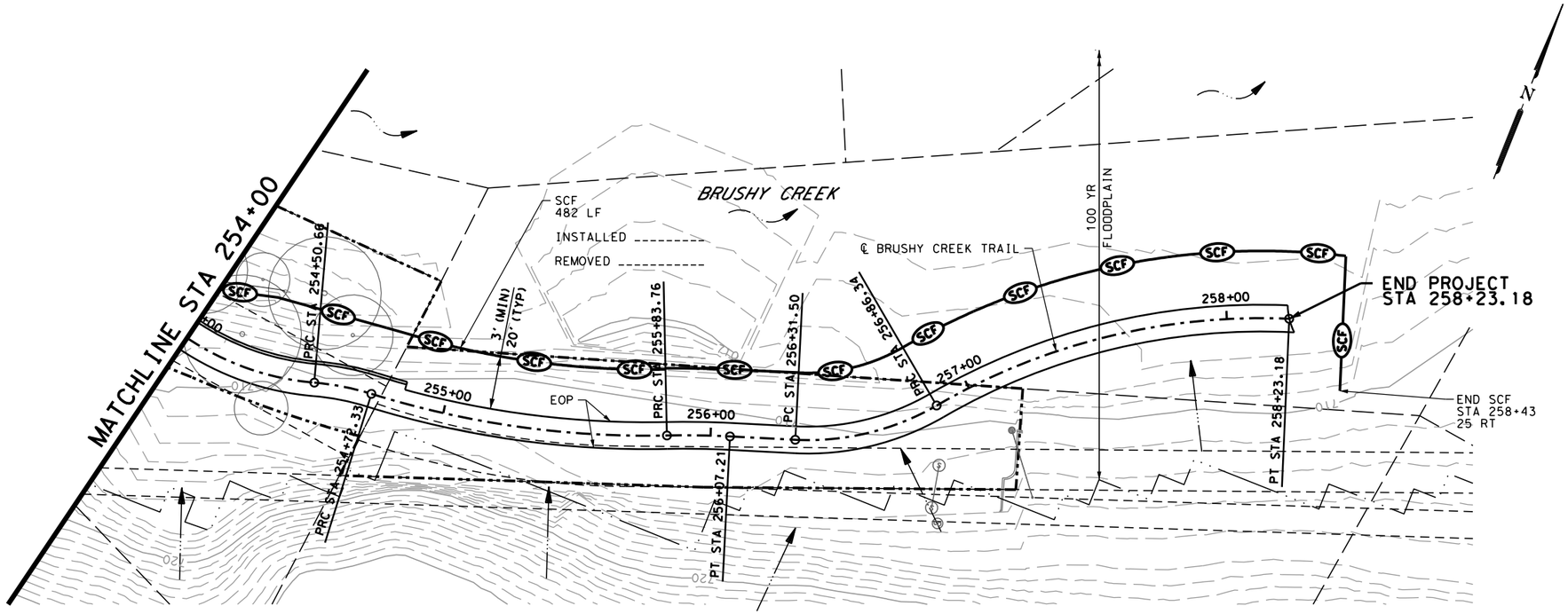
0506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	971





SW3P LEGEND

- SCF — SEDIMENT CONTROL FENCE
- RFD3 — ROCK FILTER DAM (TY 3)
- FLOW ARROW
- LIMITS OF CONSTRUCTION
- PROPERTY LINE
- EASEMENT LINE
- 100 YR FLOODPLAIN LIMIT
- CREEK FLOW DIRECTION
- TREE

SW3P NOTES

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DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 8/3/2018 DATE

REVIEW AND APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 8/3/2018 DATE

SCALE: 1"= 50'

PAPE-DAWSON ENGINEERS

AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS

7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711

TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

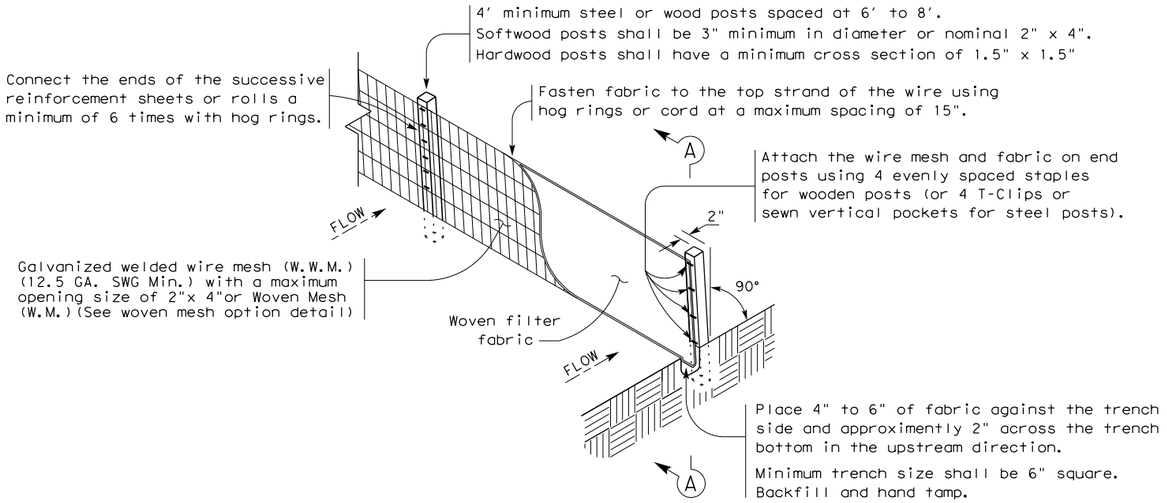
BRUSHY CREEK TRAIL
SW3P
(STA 249+00 TO END PROJECT)

SHEET 5 OF 5

100%SUBMITTAL	PROJECT NO.: STP 1802(205)TP		DATE: 8/3/2018
DRWN.BY: EG	DSGN.BY: EG	CHKD.BY: HM	SHEET NO.: 93

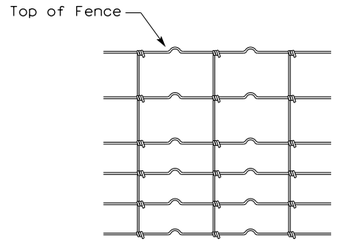
Plotted on: 8/3/2018

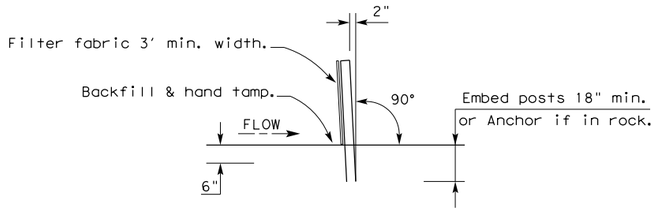
Design Filename: H:\projects\508\67\00\design\Civil\SW3P\5086700sw3p06.dgn



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

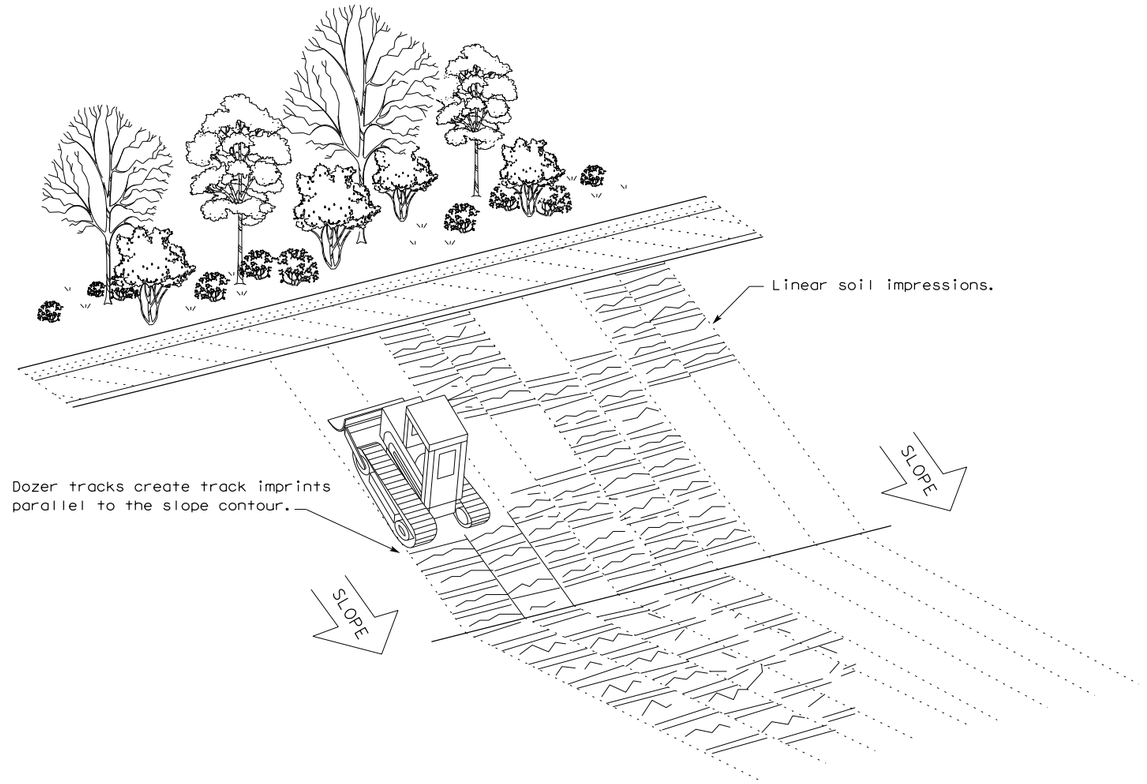
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	191	NA
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		94

7/20/2018
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DATE: 7/31/2018
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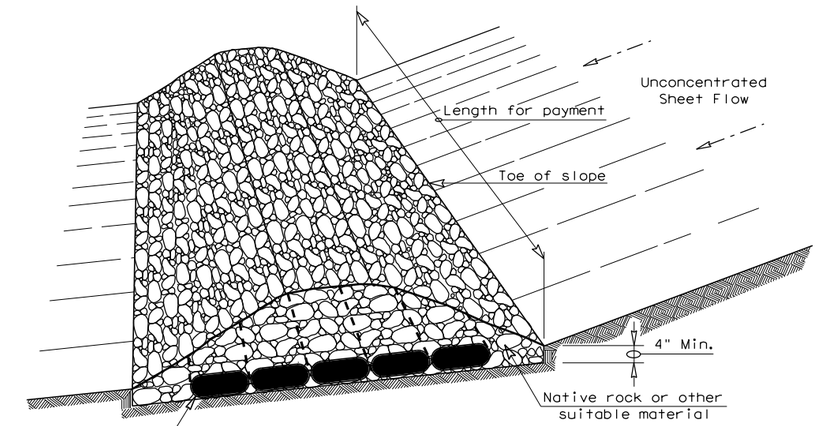
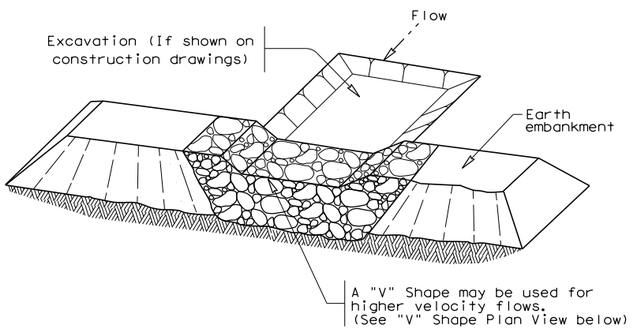


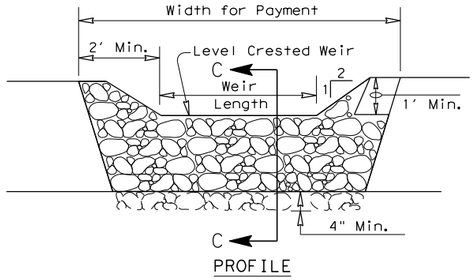
FILTER DAM AT TOE OF SLOPE

RFD1

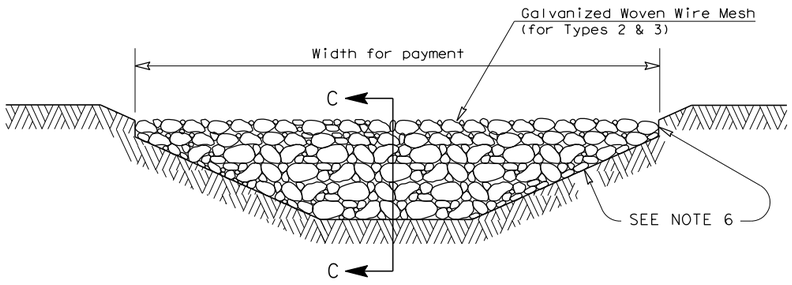


FILTER DAM AT SEDIMENT TRAP

RFD1 — OR — RFD2

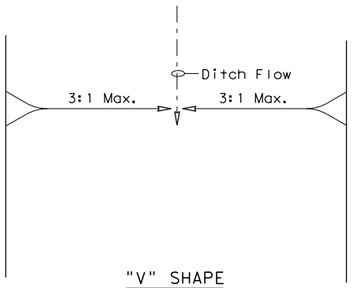


PROFILE

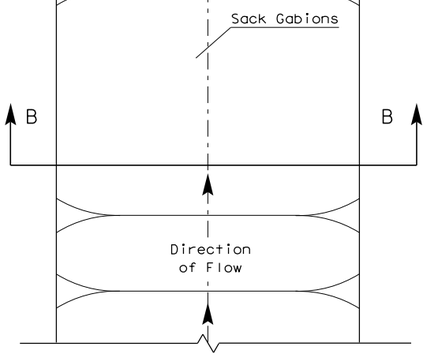


FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3



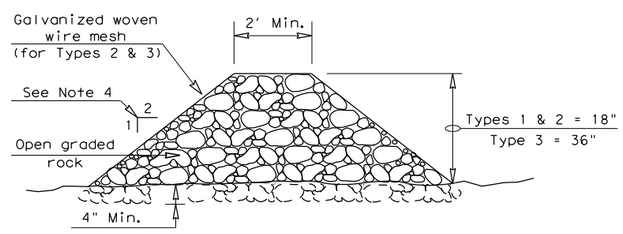
"V" SHAPE
PLAN VIEW



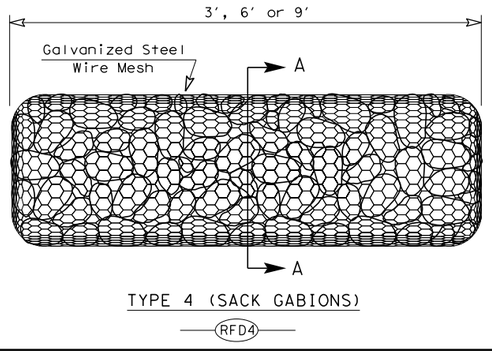
PLAN VIEW

¾" Dia.
Rebar Stakes

SECTION B-B

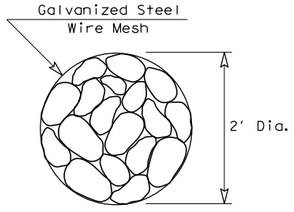


SECTION C-C



TYPE 4 (SACK GABIONS)

RFD4



SECTION A-A

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam — RFD1
Type 2 Rock Filter Dam — RFD2
Type 3 Rock Filter Dam — RFD3
Type 4 Rock Filter Dam — RFD4

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		95

DATE: 7/31/2018
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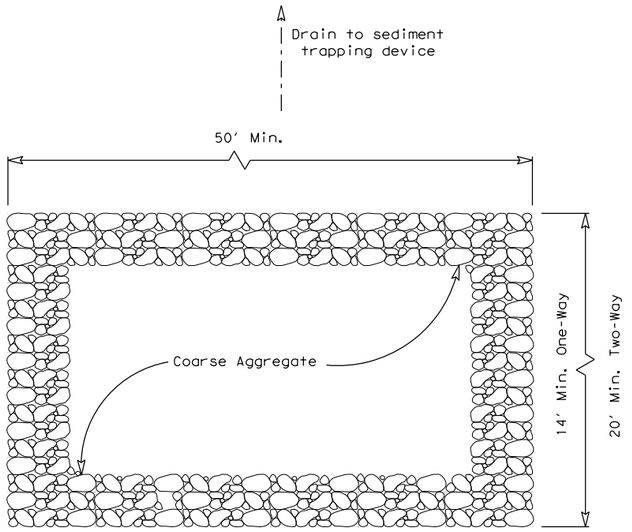
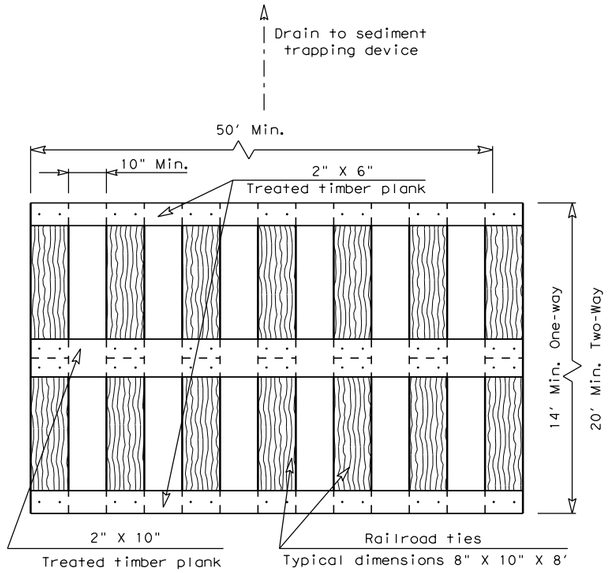
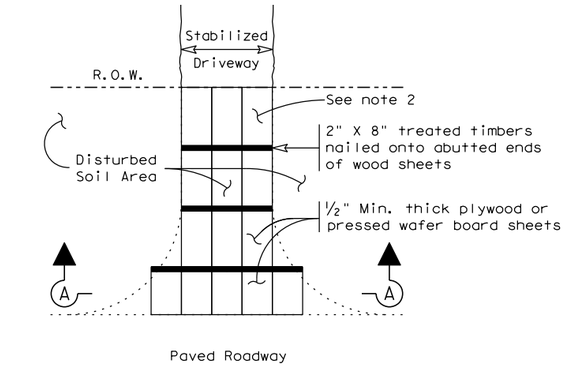


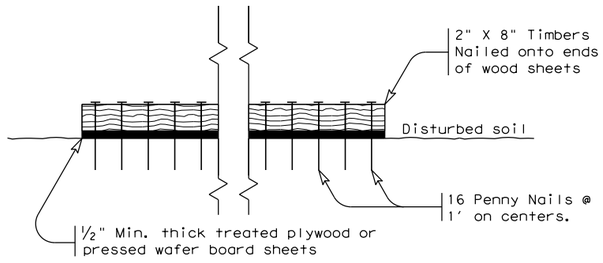
PLAN VIEW



PLAN VIEW



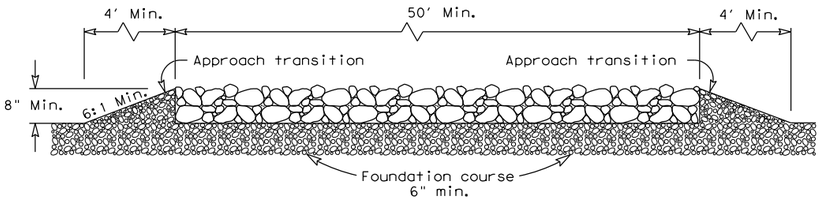
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

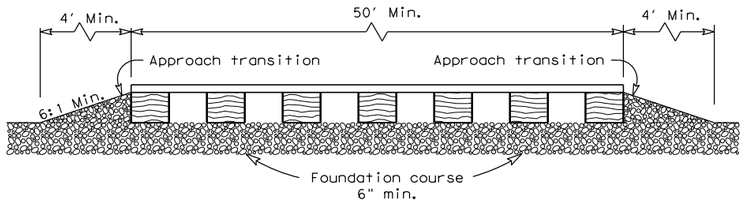
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50′.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50′.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

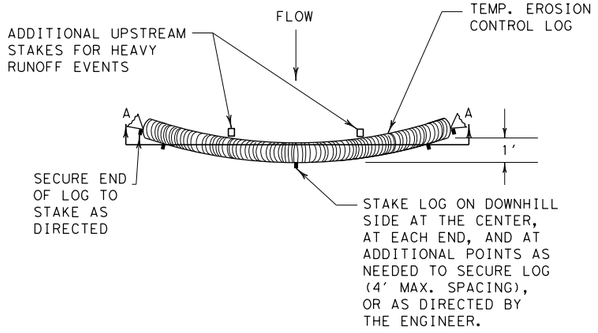
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

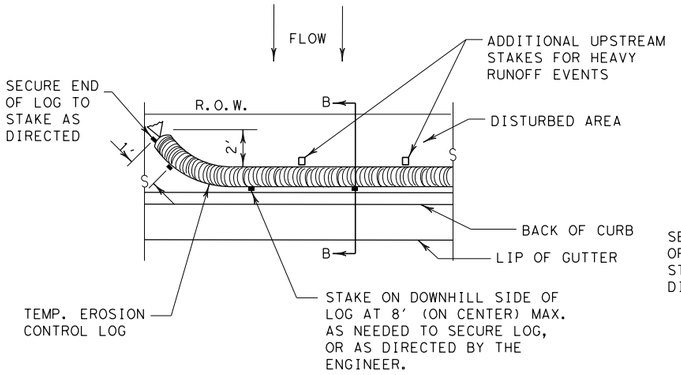
EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	191	NA
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		96

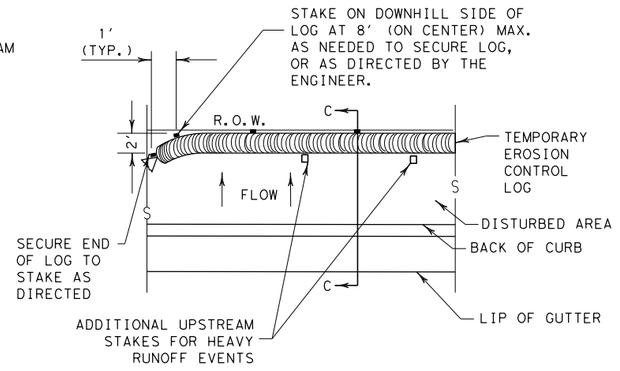
DATE: 8/1/2018
FILE: H:\projects\508\67\00\design\Civil\Standards\SW3P\ec916.dgn



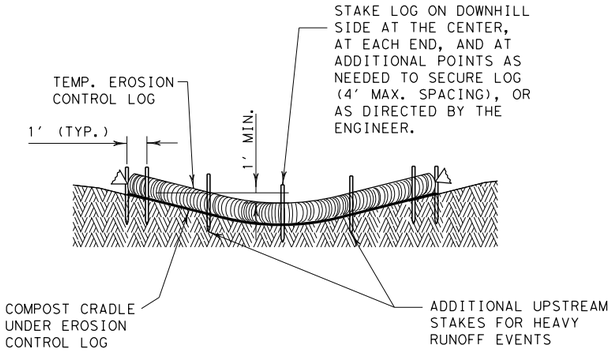
PLAN VIEW



PLAN VIEW



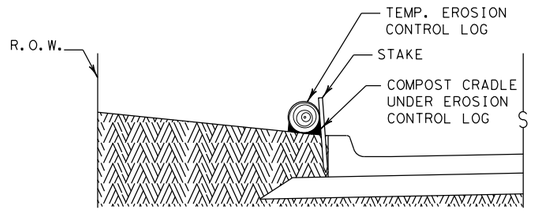
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

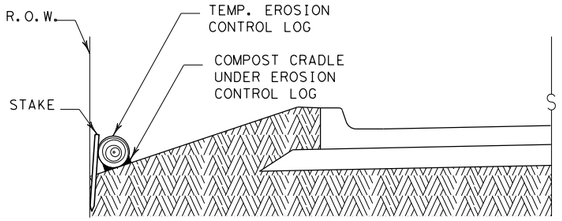
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

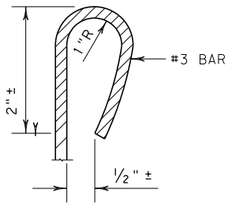
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

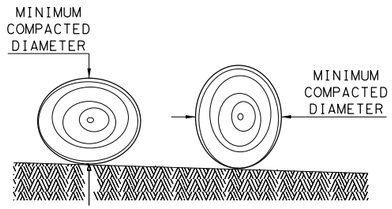
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation — Design Division Standard

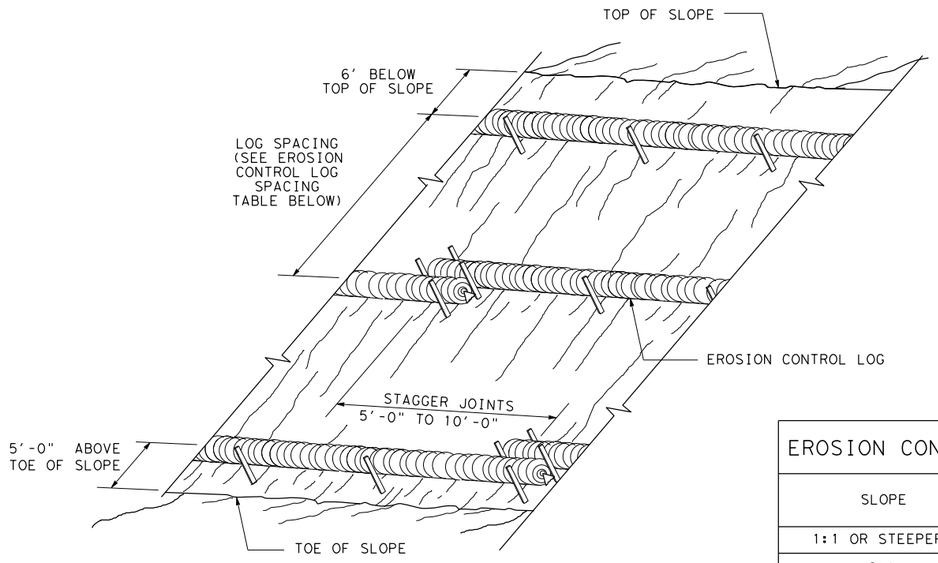
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

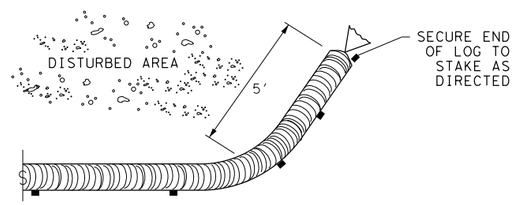
FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0914	05	191		NA		
	DIST	COUNTY					SHEET NO.
	AUS	WILLIAMSON					97

DATE: 8/1/2018
FILE: H:\projects\508\67\00\design\Civil\Standards\SW3P\ec916.dgn



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

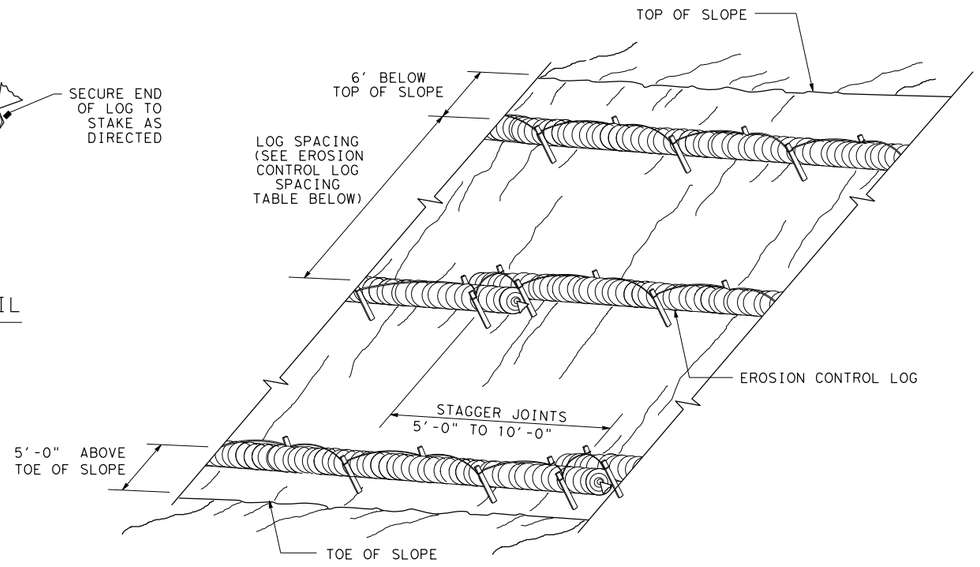
CL-SST



END SECTION RAP DETAIL

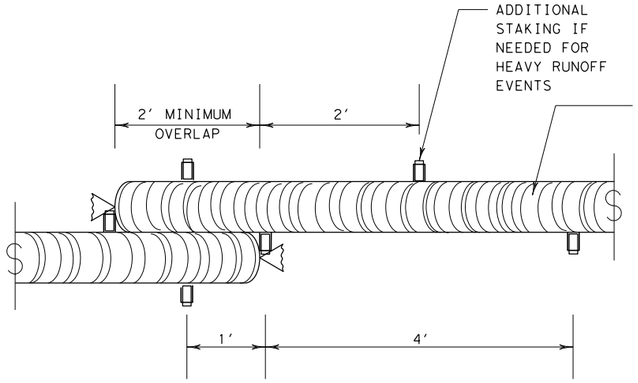
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

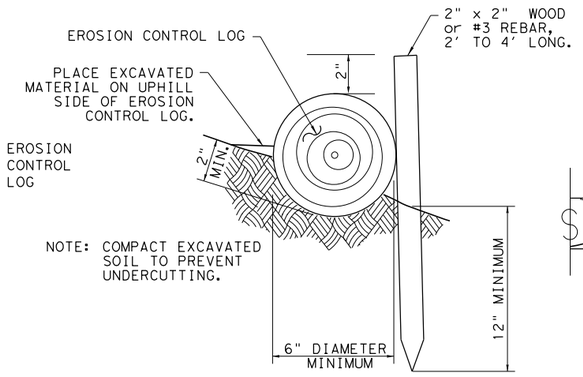
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

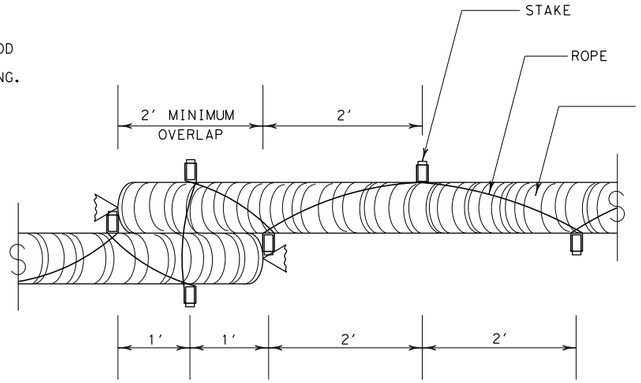


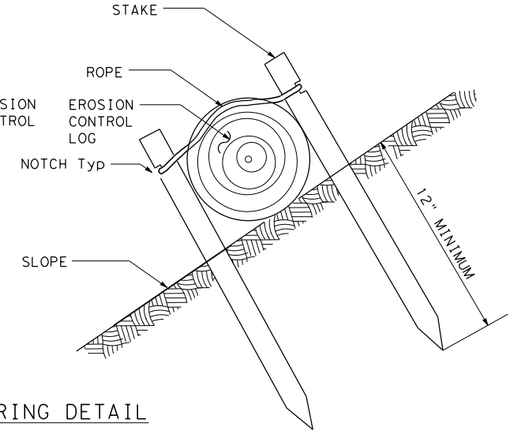


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

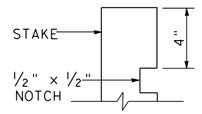
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation | Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0914	05	191	NA
	DIST	COUNTY		SHEET NO.
	AUS	WILLIAMSON		98

DATE: 8/1/2018
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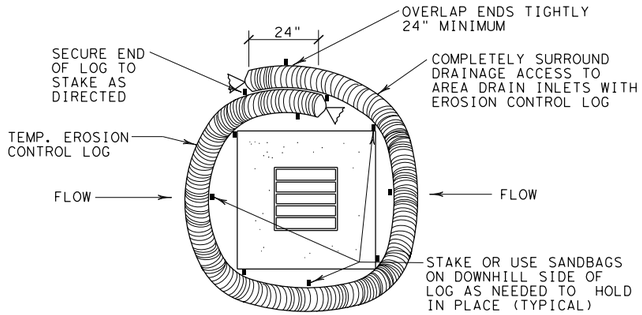
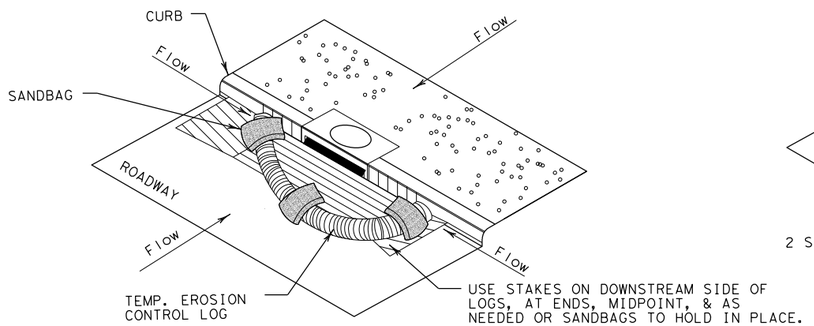


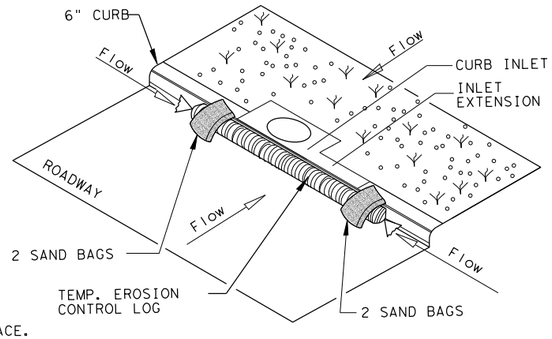
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

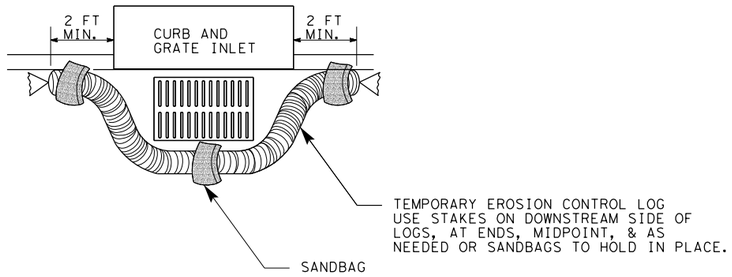
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

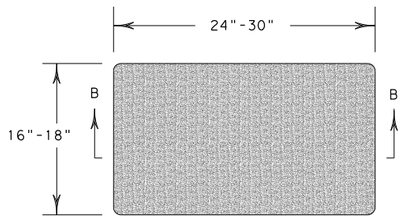
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

Texas Department of Transportation

Design Division Standard

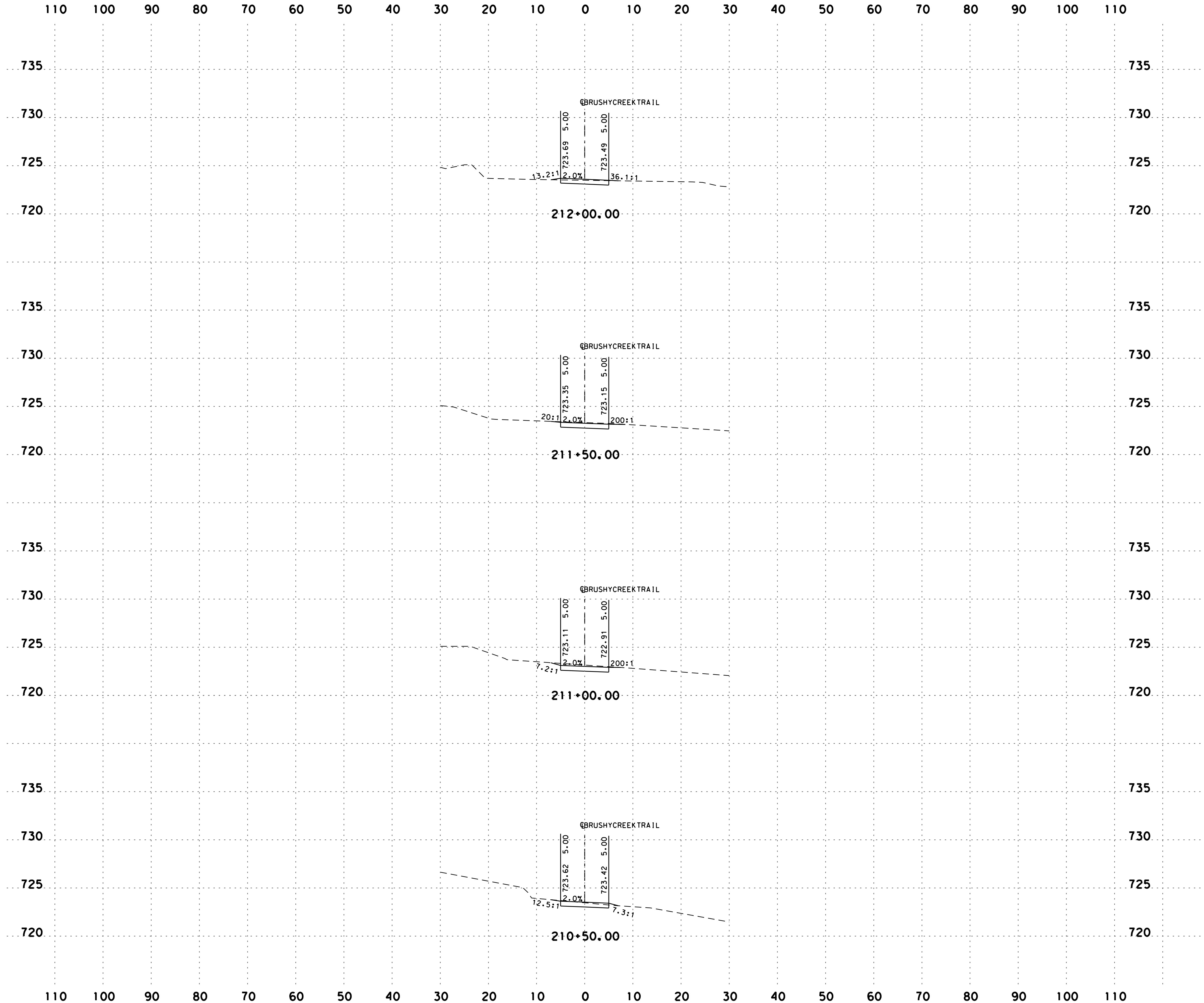
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0914	05	191		NA		
	DIST	COUNTY					SHEET NO.
	AUS	WILLIAMSON					99

Plotted on: 8/1/2018



THE LOCATION OF EXISTING UTILITIES SHOWN ARE TAKEN FROM THE BEST INFORMATION AVAILABLE. THEY ARE NOT GUARANTEED TO BE ACCURATE AND MUST BE VERIFIED BY CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.

SCALE: H: 1"= 20'
V: 1"= 10'

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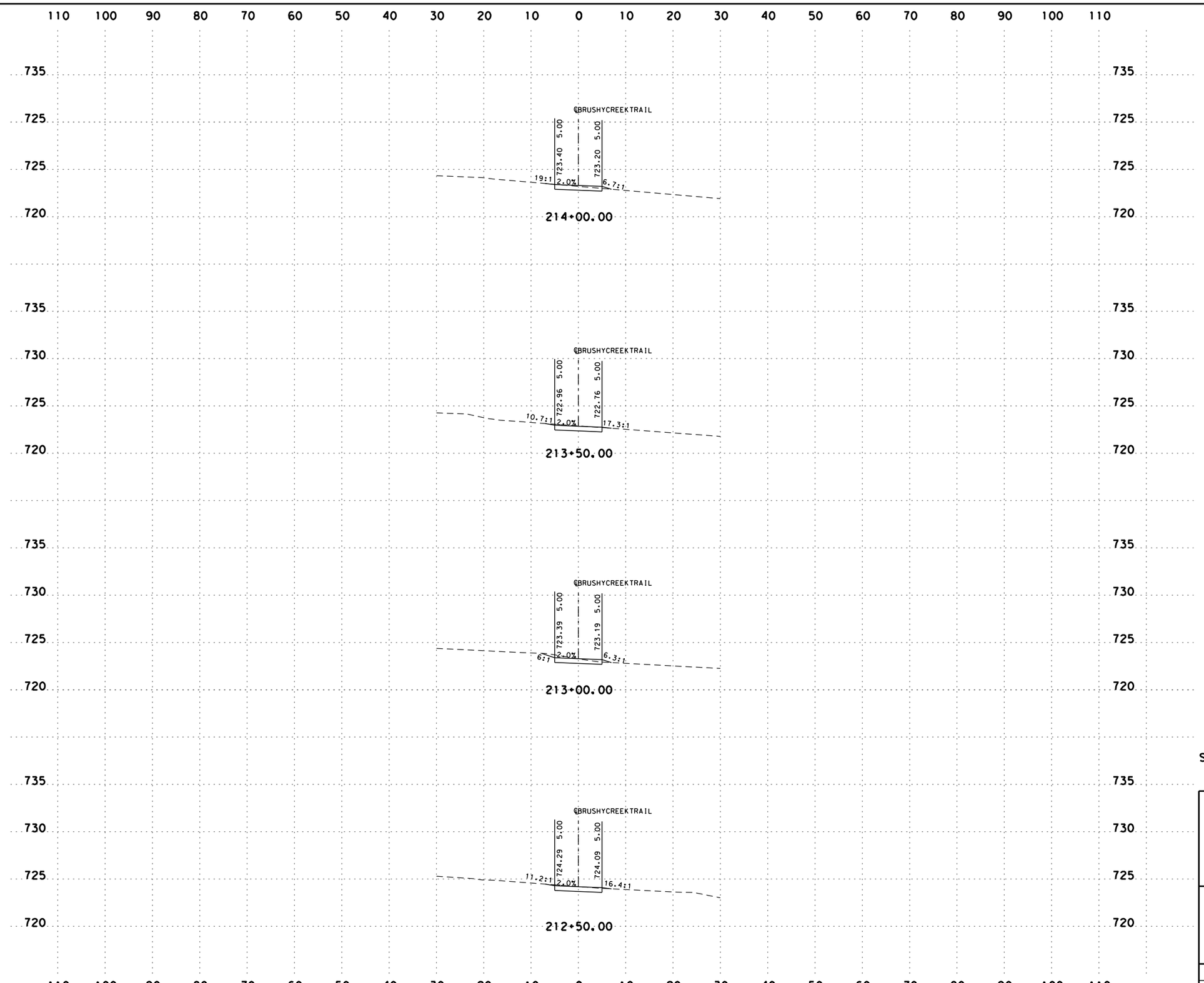
BRUSHY CREEK TRAIL
CROSS SECTIONS

SHEET 1 OF 26

90% SUBMITTAL	PROJECT NO.: 50867-01		DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM	SHEET NO.: 100

Design Filename: H:\projects\508\67\00\design\Civil\GeoPak\5086700XS_Sheets.dgn



THE LOCATION OF EXISTING UTILITIES SHOWN ARE TAKEN FROM THE BEST INFORMATION AVAILABLE. THEY ARE NOT GUARANTEED TO BE ACCURATE AND MUST BE VERIFIED BY CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.

SCALE: H: 1"= 20'
V: 1"= 10'

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BRUSHY CREEK TRAIL
CROSS SECTIONS

90% SUBMITTAL	PROJECT NO.: 50867-01		DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM	SHEET NO.: 101

Plotted on: 8/1/2018

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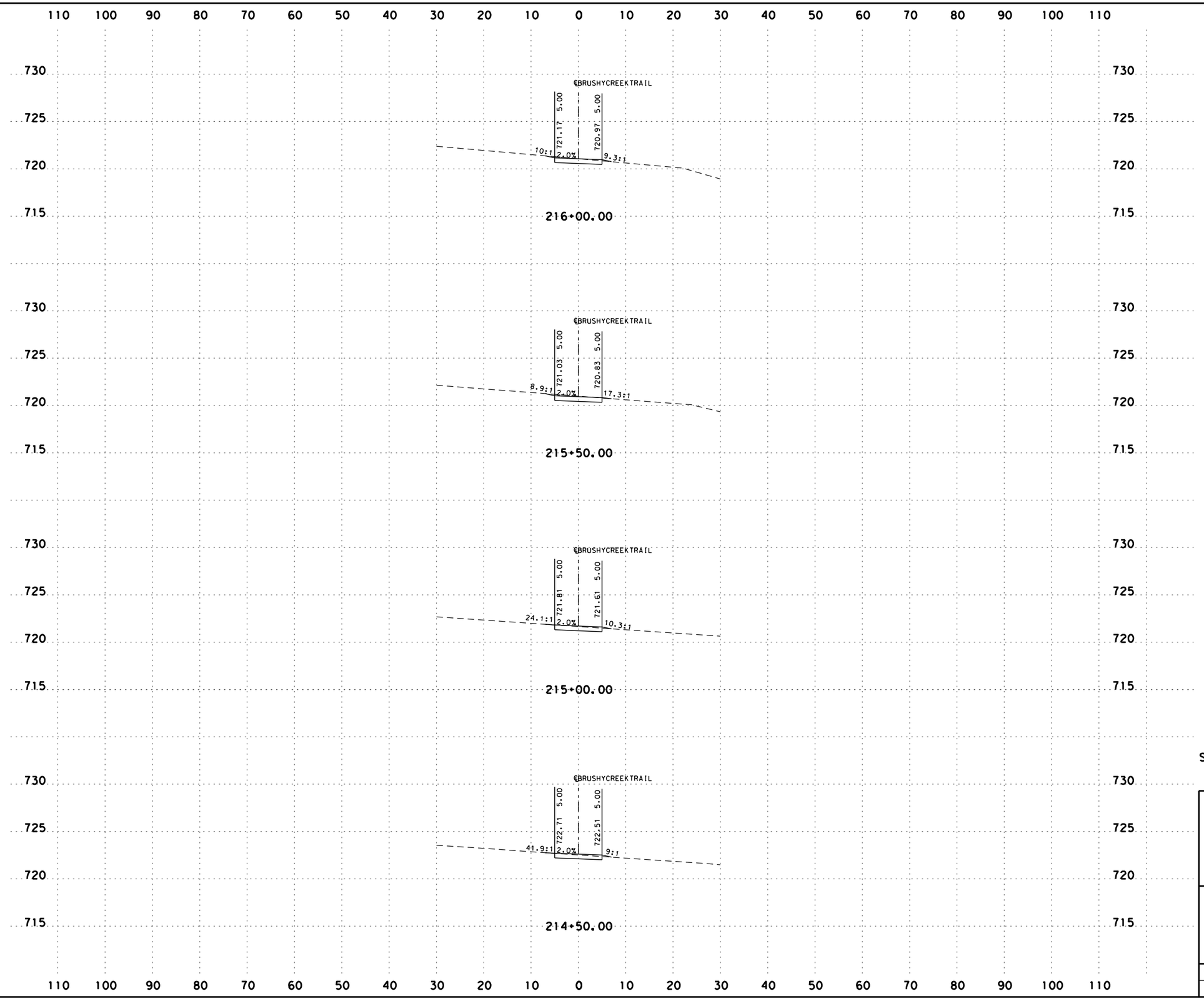

THE LOCATION OF EXISTING UTILITIES SHOWN ARE TAKEN FROM THE BEST INFORMATION AVAILABLE. THEY ARE NOT GUARANTEED TO BE ACCURATE AND MUST BE VERIFIED BY CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.

SCALE: H: 1"= 20'
V: 1"= 10'

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BRUSHY CREEK TRAIL
CROSS SECTIONS

SHEET 3 OF 26

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 102

Plotted on: 8/1/2018

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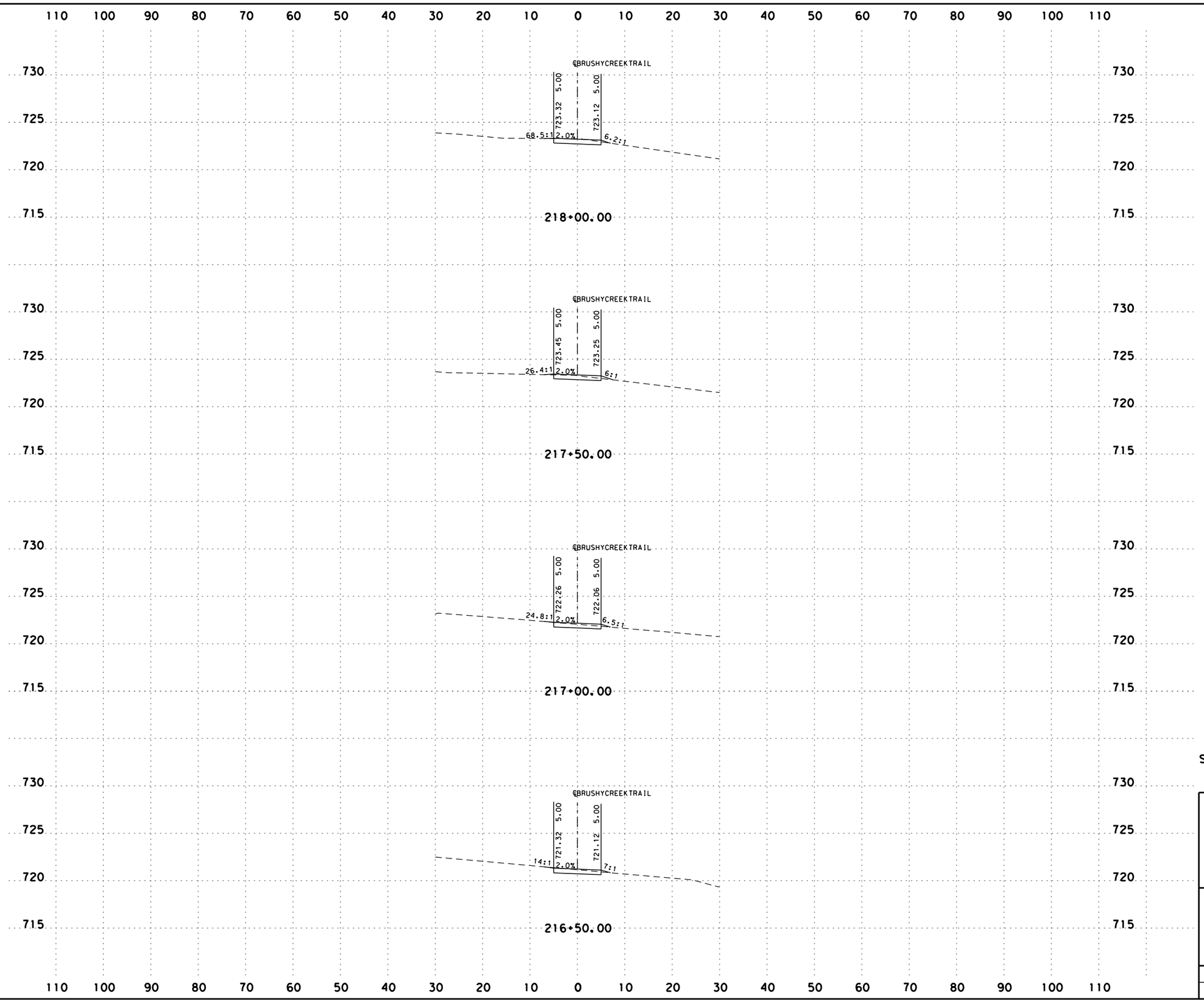

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SCALE: H: 1"= 20'
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BRUSHY CREEK TRAIL
CROSS SECTIONS

SHEET 4 OF 26

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 103

Plotted on: 8/1/2018

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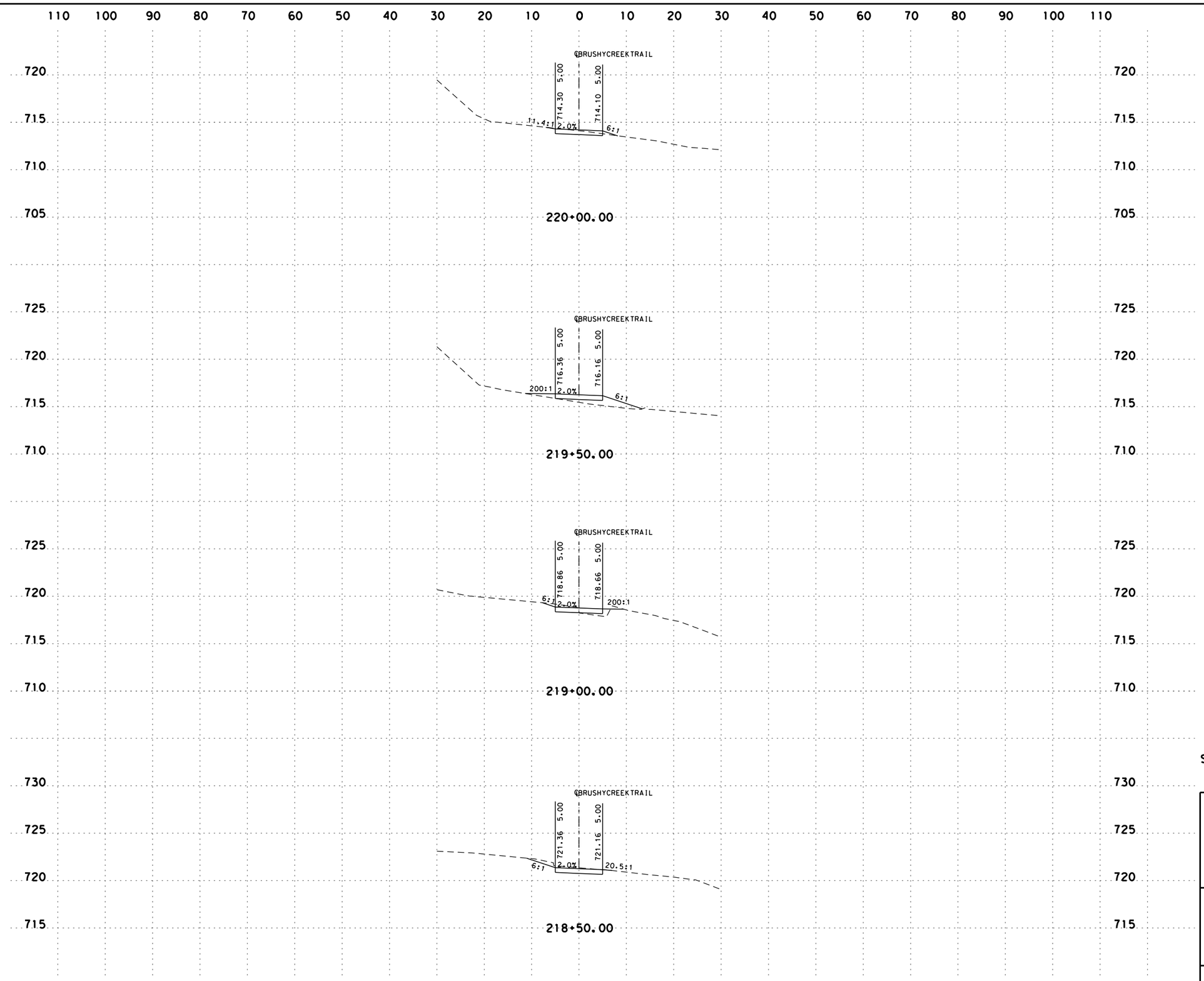

THE LOCATION OF EXISTING UTILITIES SHOWN ARE TAKEN FROM THE BEST INFORMATION AVAILABLE. THEY ARE NOT GUARANTEED TO BE ACCURATE AND MUST BE VERIFIED BY CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.

SCALE: H: 1"= 20'
V: 1"= 10'

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BRUSHY CREEK TRAIL
CROSS SECTIONS

SHEET 5 OF 26

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 104

Plotted on: 8/1/2018

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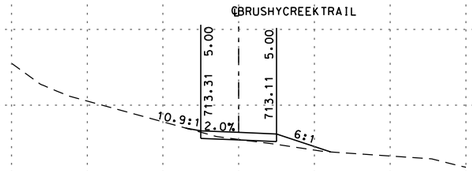

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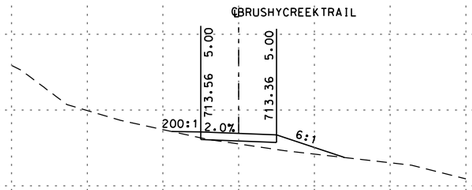

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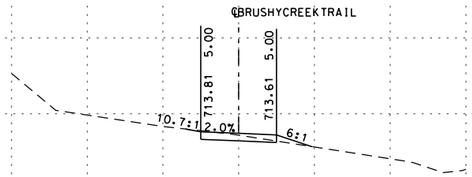

220+50.00

THE LOCATION OF EXISTING UTILITIES SHOWN ARE TAKEN FROM THE BEST INFORMATION AVAILABLE. THEY ARE NOT GUARANTEED TO BE ACCURATE AND MUST BE VERIFIED BY CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.

SCALE: H: 1"= 20'
V: 1"= 10'

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BRUSHY CREEK TRAIL
CROSS SECTIONS

SHEET 6 OF 26

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 105

Plotted on: 8/1/2018

Design Filename: H:\projects\508\67\00\design\Civil\GeoPak\5086700XS_Sheets.dgn

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SCALE: H: 1"= 20'
V: 1"= 10'

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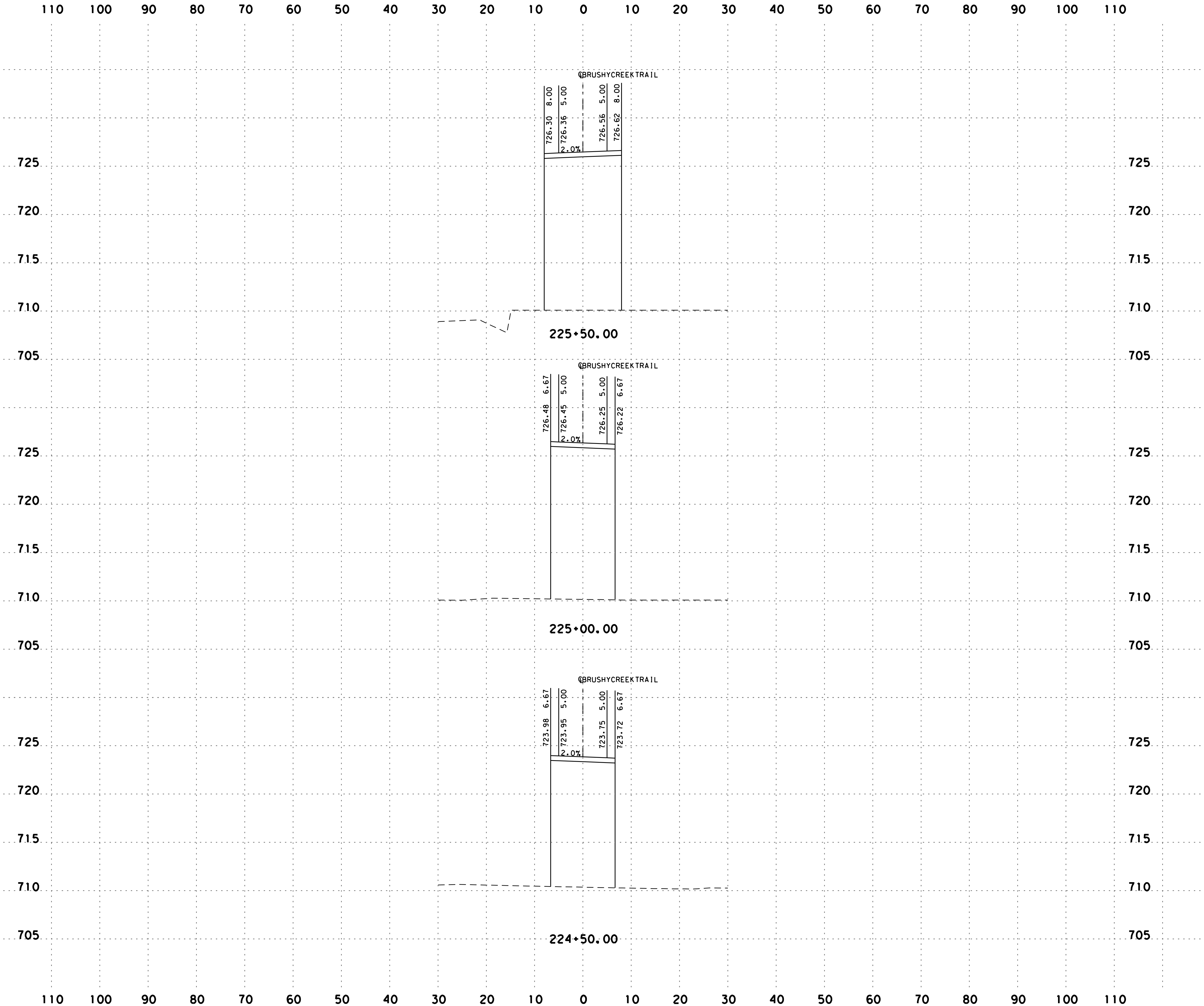
BRUSHY CREEK TRAIL
CROSS SECTIONS

SHEET 7 OF 26

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 106

Plotted on: 8/1/2018

Design Filename: H:\projects\508\67\00\design\Civil\GeoPak\5086700XS_Sheets.dgn



THE LOCATION OF EXISTING UTILITIES SHOWN ARE TAKEN FROM THE BEST INFORMATION AVAILABLE. THEY ARE NOT GUARANTEED TO BE ACCURATE AND MUST BE VERIFIED BY CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.

SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS

AUSTIN | SAN ANTONIO | HOUSTON | FORT WORTH | DALLAS
7800 SHOAL CREEK BLVD, STE 220 W | AUSTIN, TX 78757 | 512.454.8711
TBPE FIRM REGISTRATION #470 | TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
CROSS SECTIONS

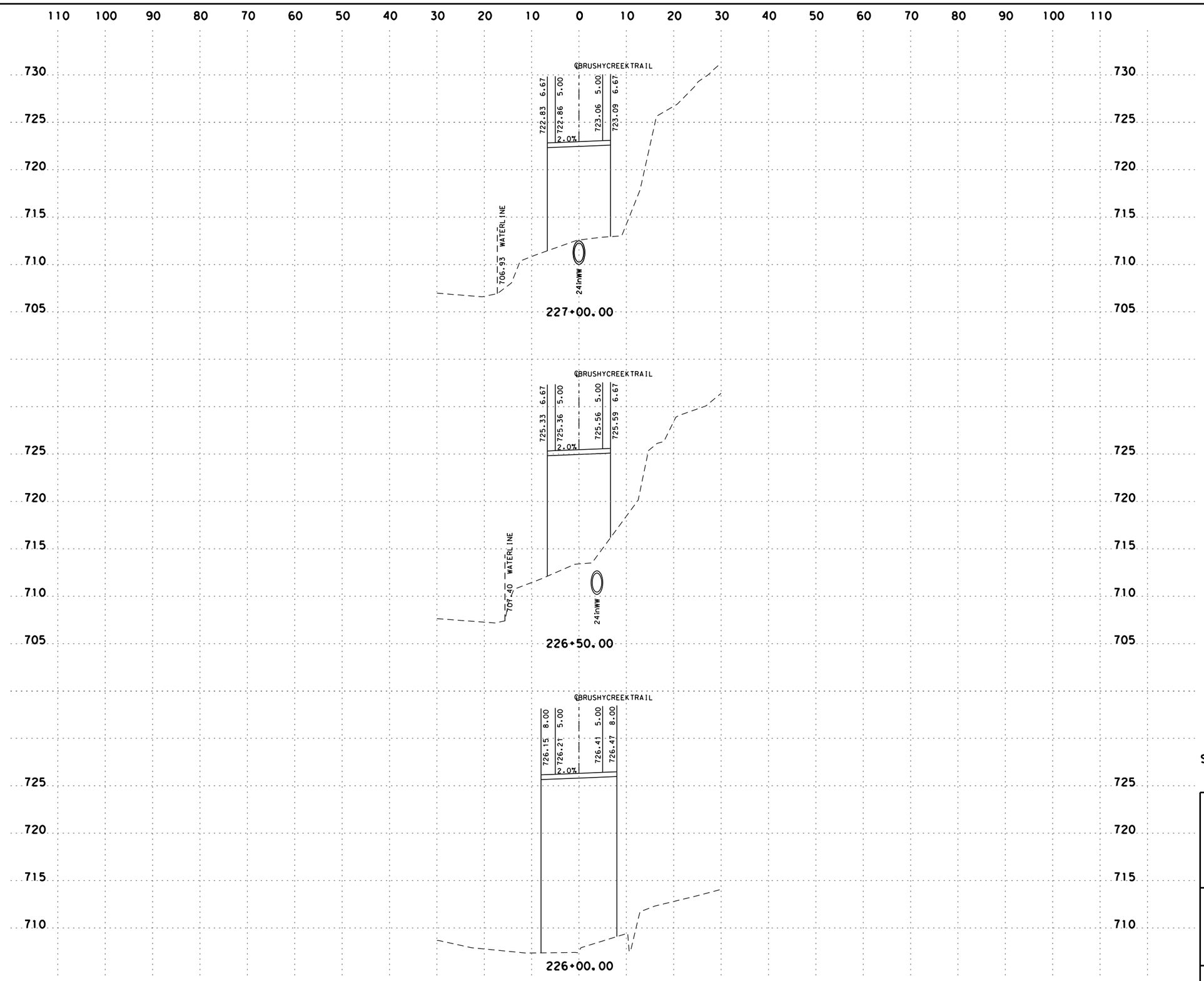
SHEET 8 OF 26

90% SUBMITTAL	PROJECT NO.: 50867-01	DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM

SHEET NO.: 107

Plotted on: 8/1/2018

Design Filename: H:\projects\508\67\00\design\Civil\GeoPak\5086700XS_Sheets.dgn



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7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
CROSS SECTIONS

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 108

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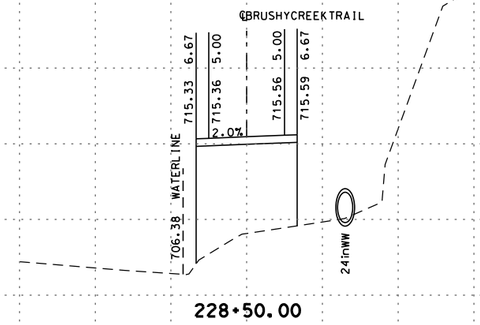
725 720 715 710 705



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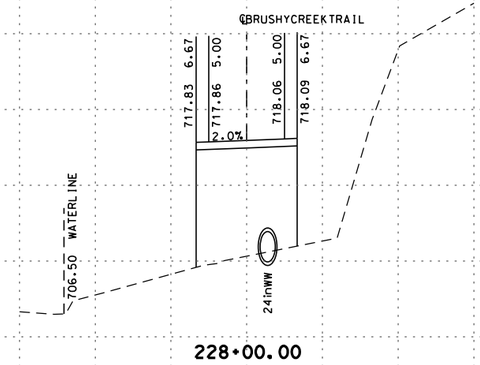

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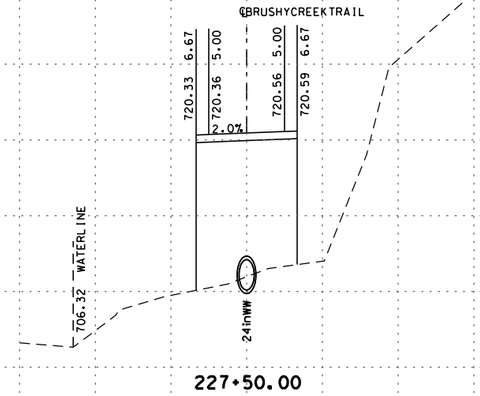

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BRUSHY CREEK TRAIL
CROSS SECTIONS

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 109

Plotted on: 8/1/2018

Design Filename: H:\projects\508\67\00\design\Civil\GeoPak\5086700XS_Sheets.dgn

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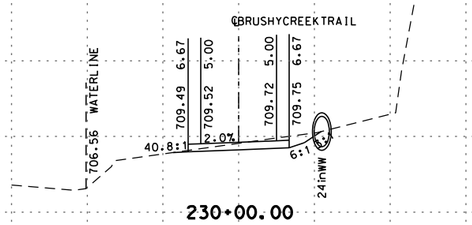
725 720 715 710 705



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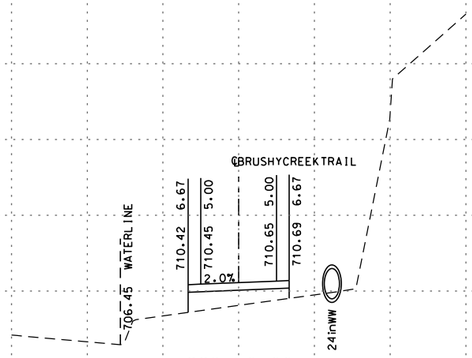

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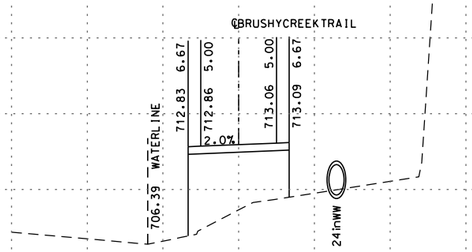

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BRUSHY CREEK TRAIL
CROSS SECTIONS

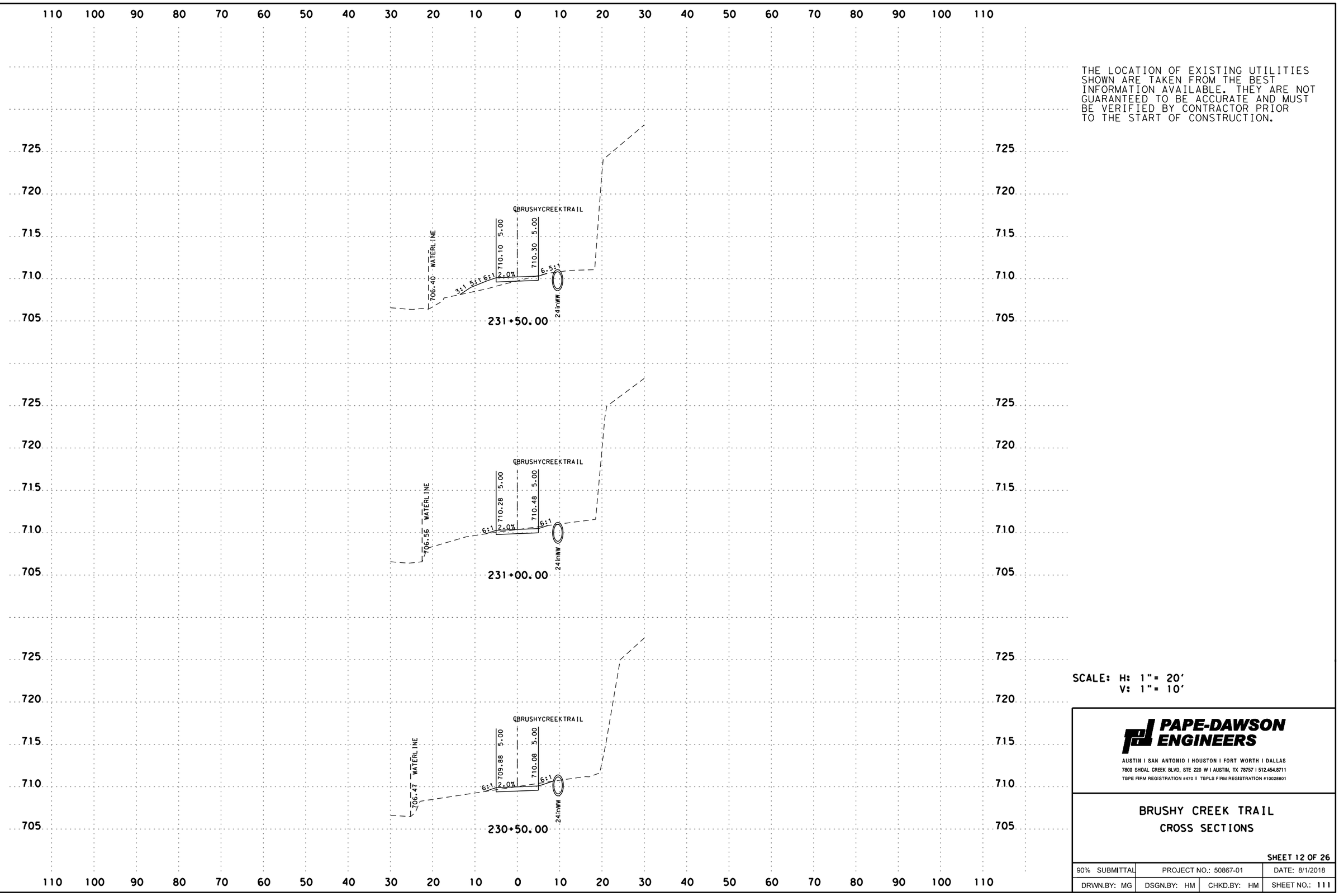
SHEET 11 OF 26

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 110

Plotted on: 8/1/2018

Design Filename: H:\projects\508\67\00\design\Civil\GeoPak\5086700XS_Sheets.dgn

THE LOCATION OF EXISTING UTILITIES SHOWN ARE TAKEN FROM THE BEST INFORMATION AVAILABLE. THEY ARE NOT GUARANTEED TO BE ACCURATE AND MUST BE VERIFIED BY CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.



SCALE: H: 1"= 20'
V: 1"= 10'

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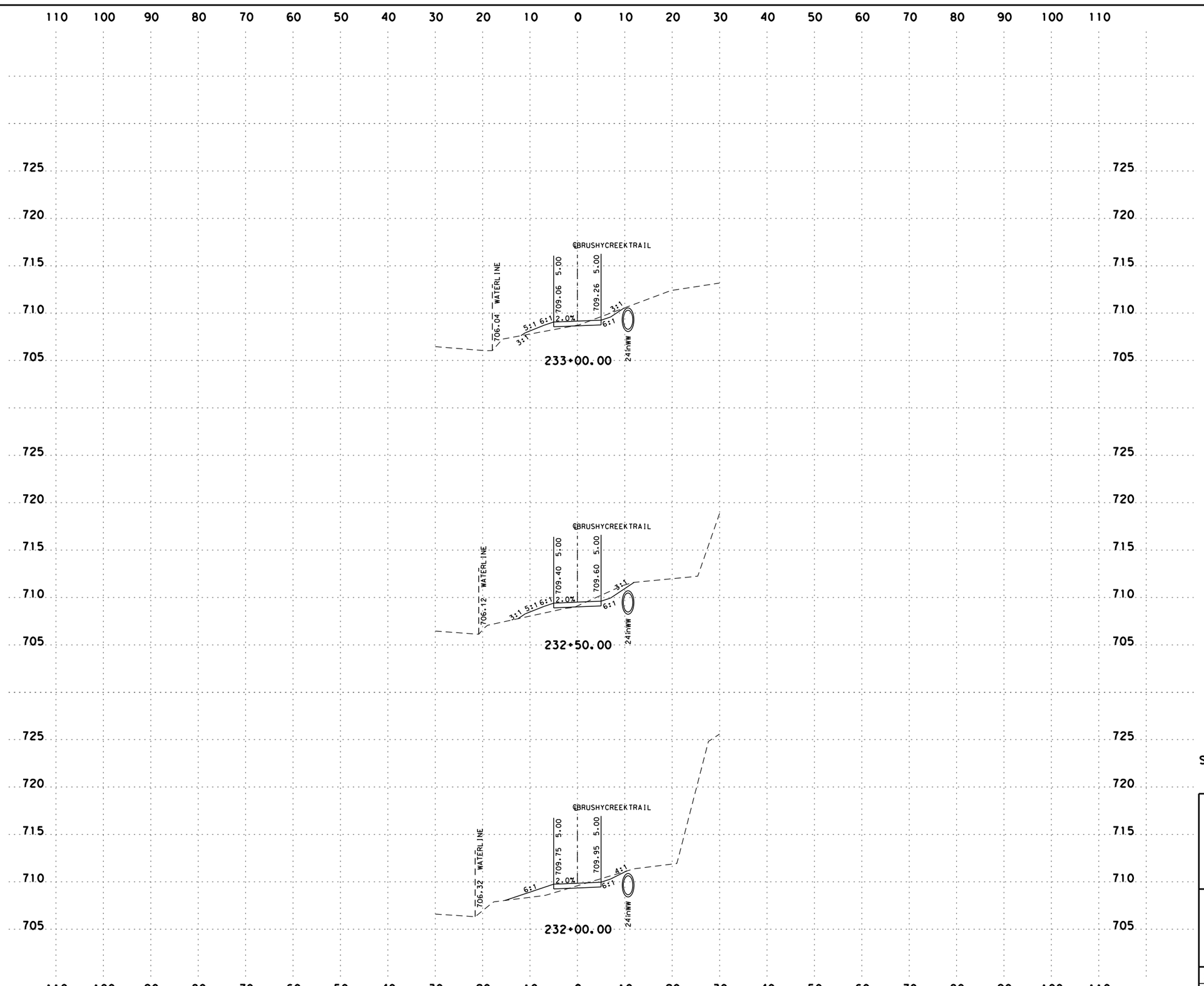
BRUSHY CREEK TRAIL
CROSS SECTIONS

SHEET 12 OF 26

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 111



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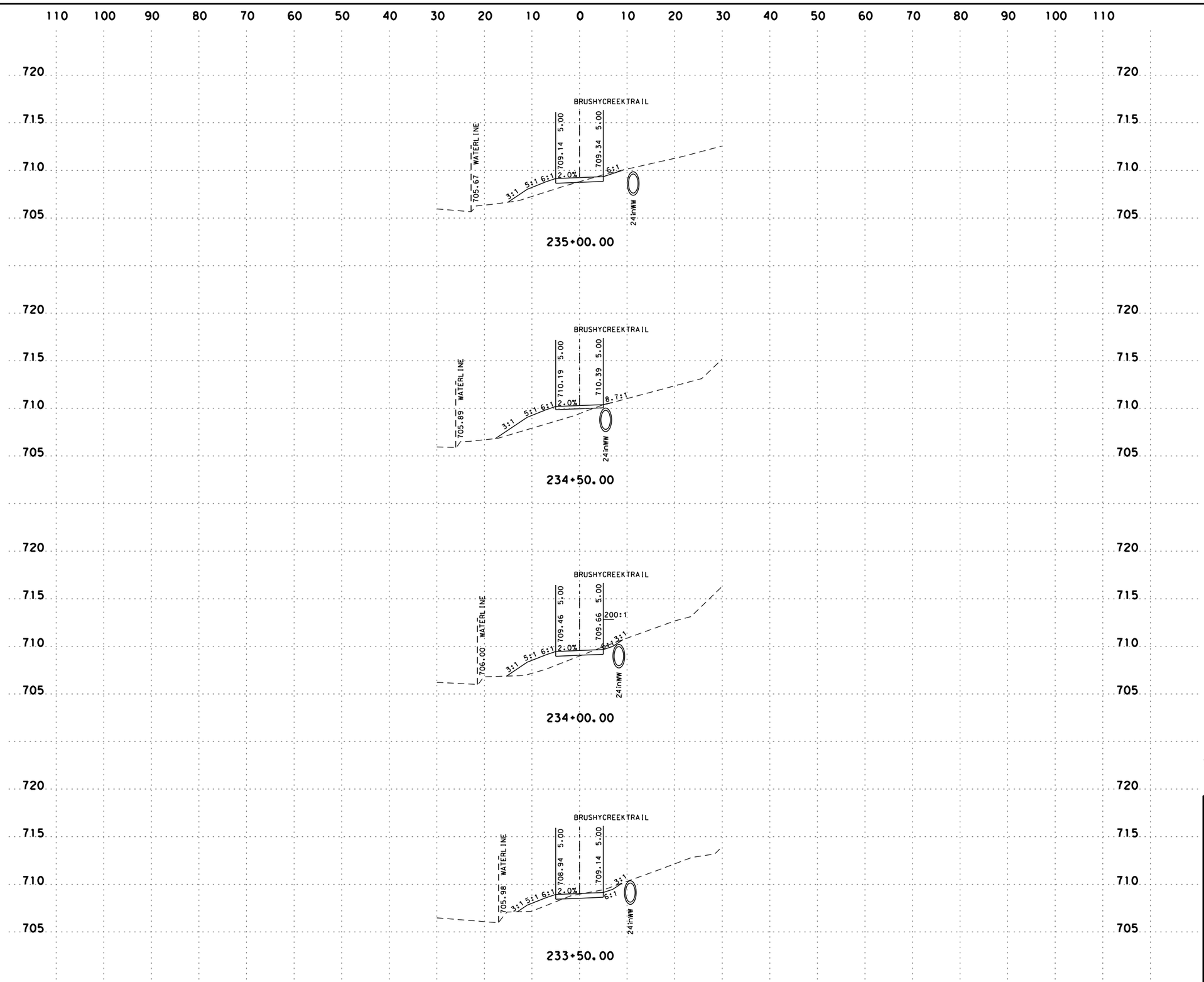
BRUSHY CREEK TRAIL
CROSS SECTIONS

SHEET 13 OF 26

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 112



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BRUSHY CREEK TRAIL
CROSS SECTIONS

SHEET 14 OF 26

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 113

Plotted on: 8/1/2018

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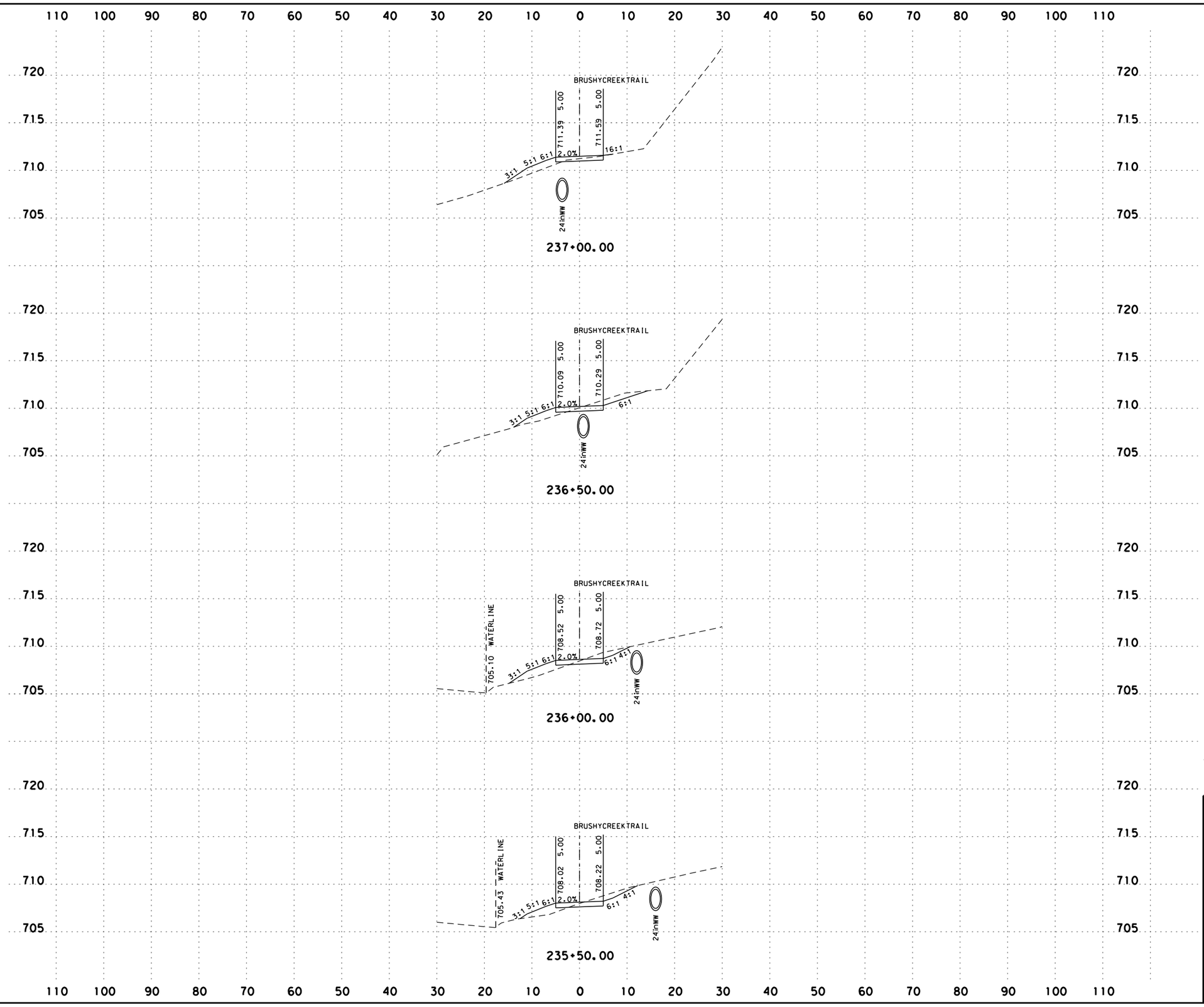

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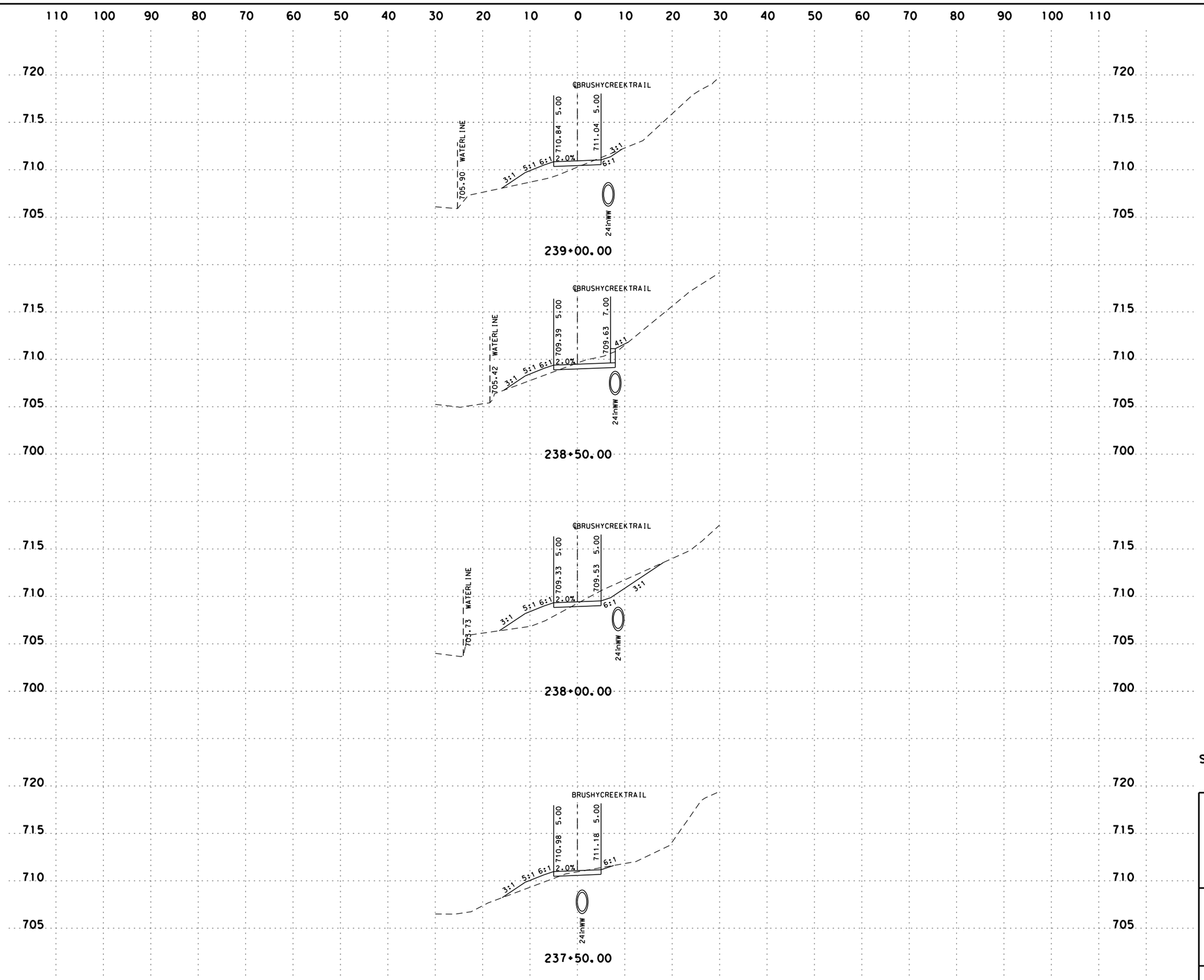
BRUSHY CREEK TRAIL
CROSS SECTIONS

SHEET 15 OF 26

90% SUBMITTAL	PROJECT NO.: 50867-01		DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM	SHEET NO.: 114

Plotted on: 8/1/2018

Design Filename: H:\projects\508\67\00\design\Civil\GeoPak\5086700XS_Sheets.dgn



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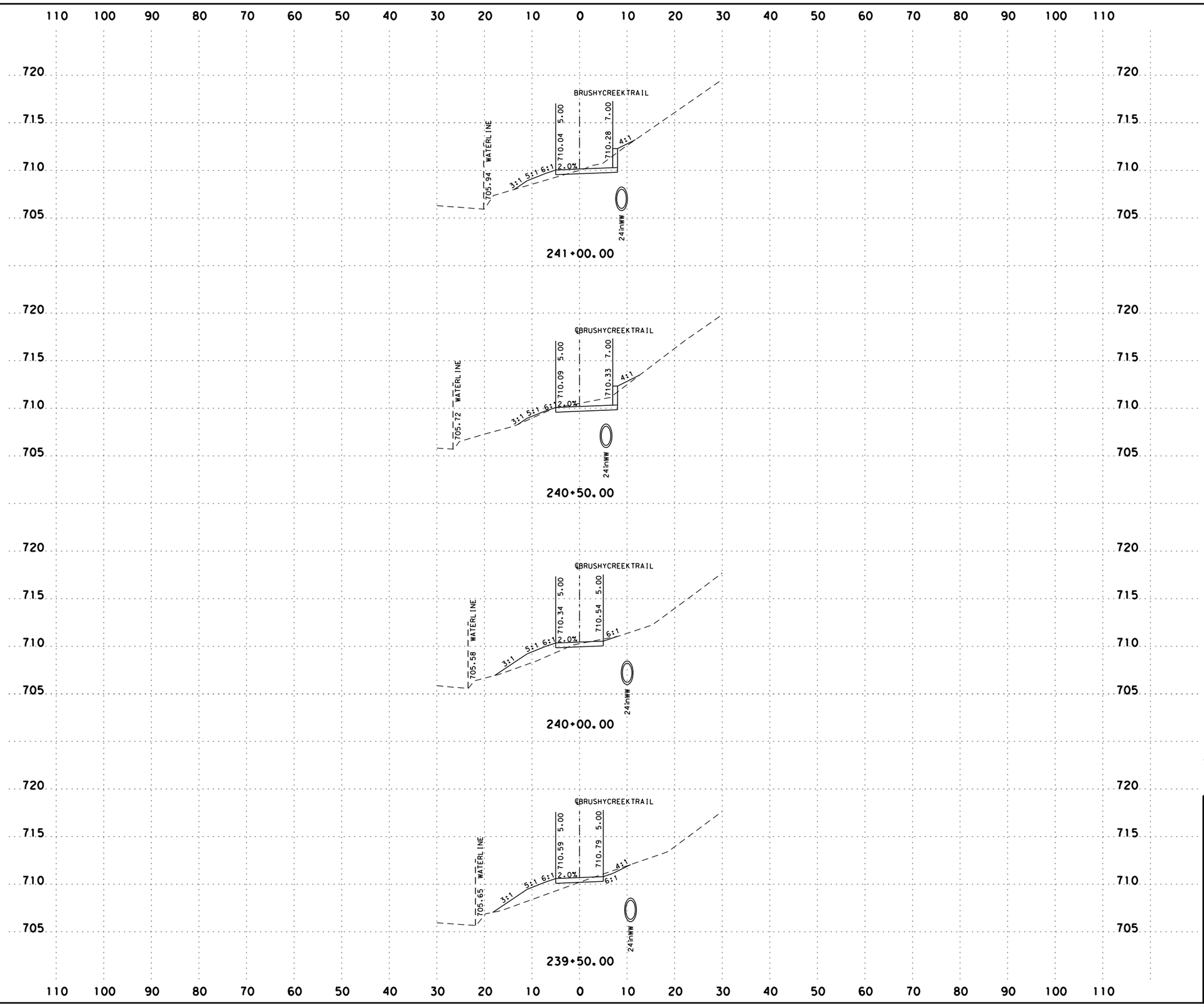
BRUSHY CREEK TRAIL
CROSS SECTIONS

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 115

Plotted on: 8/1/2018

Design Filename: H:\projects\508\67\00\design\Civil\GeoPak\5086700XS_Sheets.dgn



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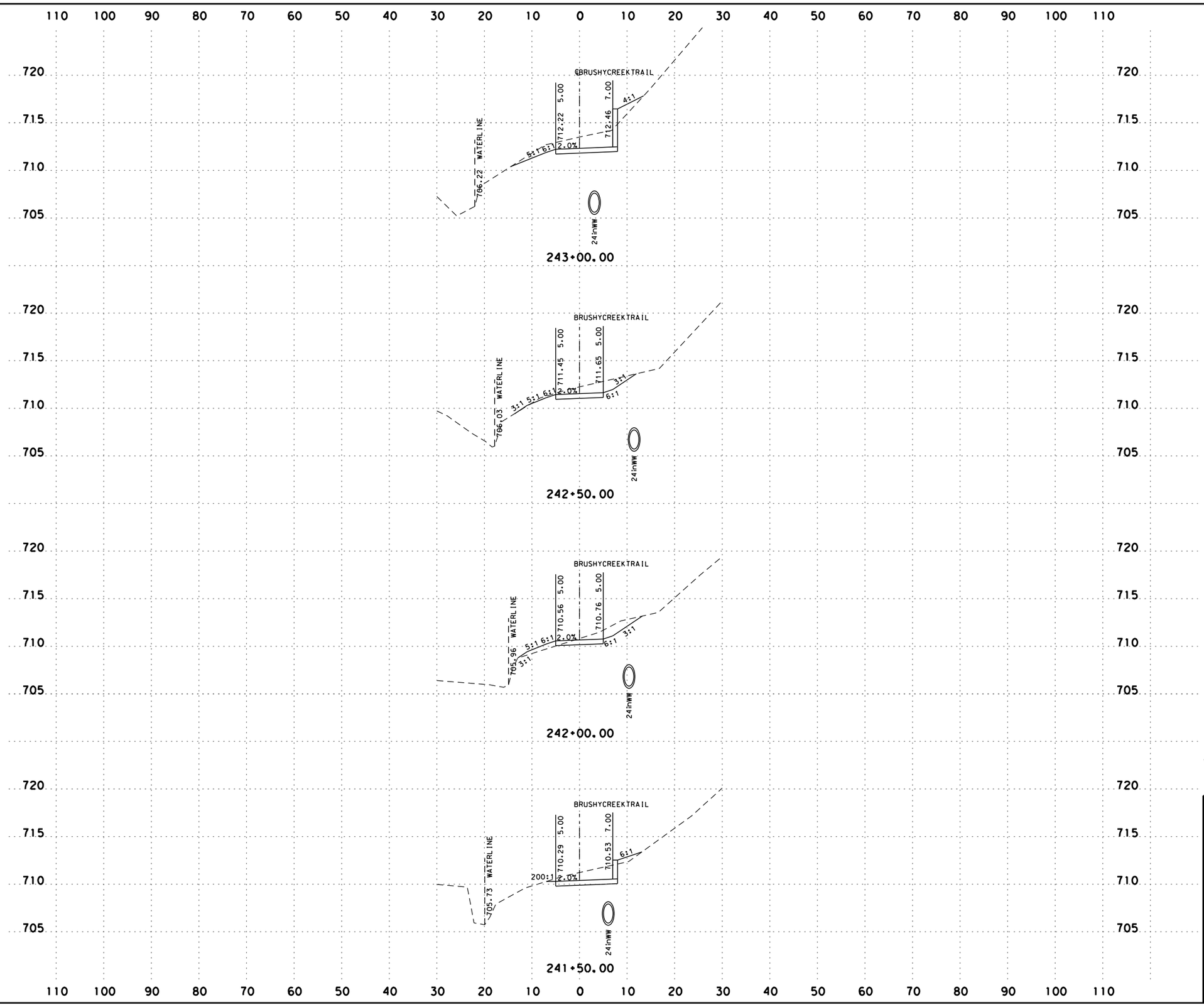
BRUSHY CREEK TRAIL
CROSS SECTIONS

SHEET 17 OF 26

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 116

Plotted on: 8/1/2018

Design Filename: H:\projects\508\67\00\design\Civil\GeoPak\50867OOXS_Sheets.dgn



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7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
CROSS SECTIONS

SHEET 18 OF 26

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 117

Plotted on: 8/1/2018

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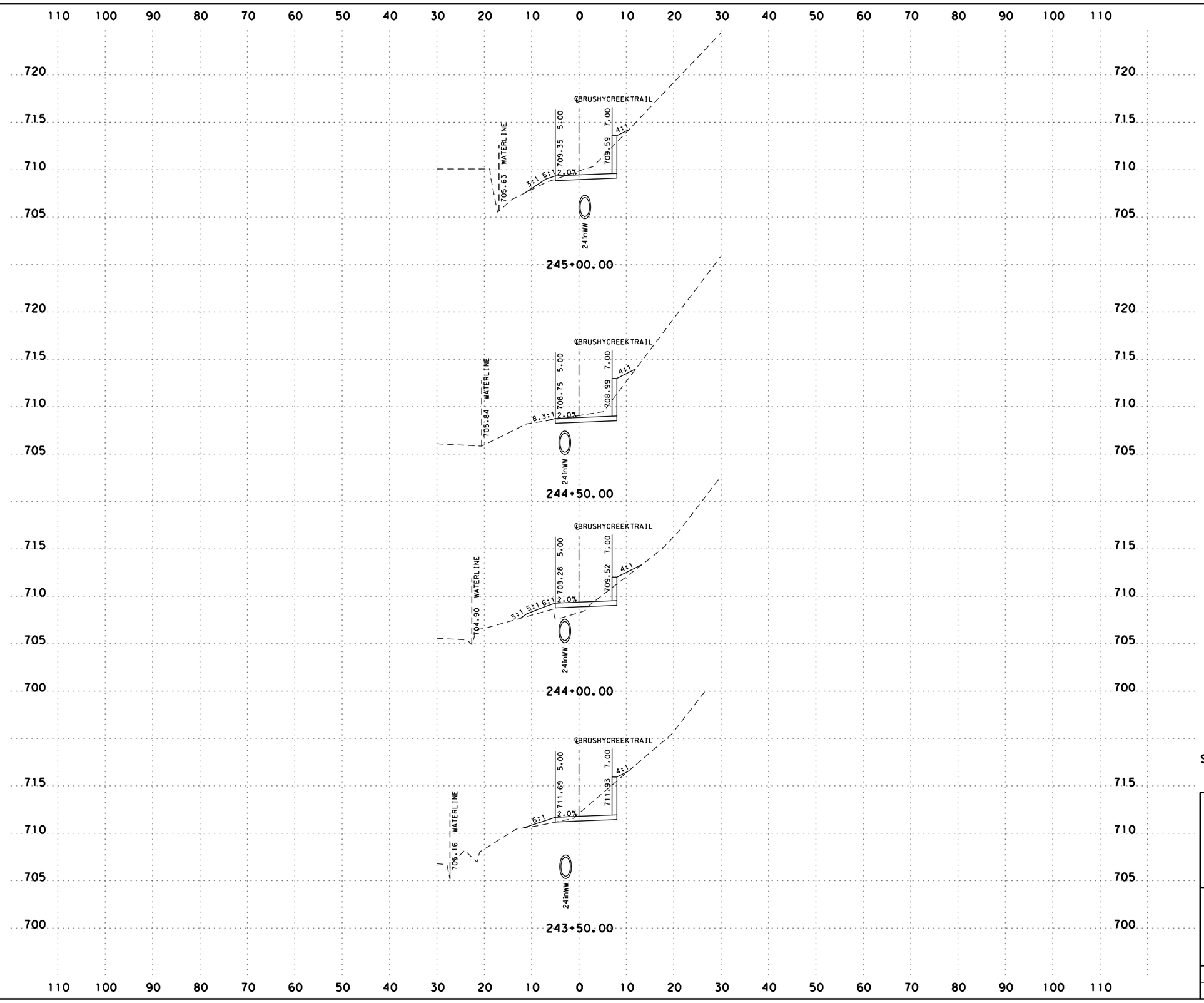

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BRUSHY CREEK TRAIL
CROSS SECTIONS

SHEET 19 OF 26

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 118

Plotted on: 8/1/2018

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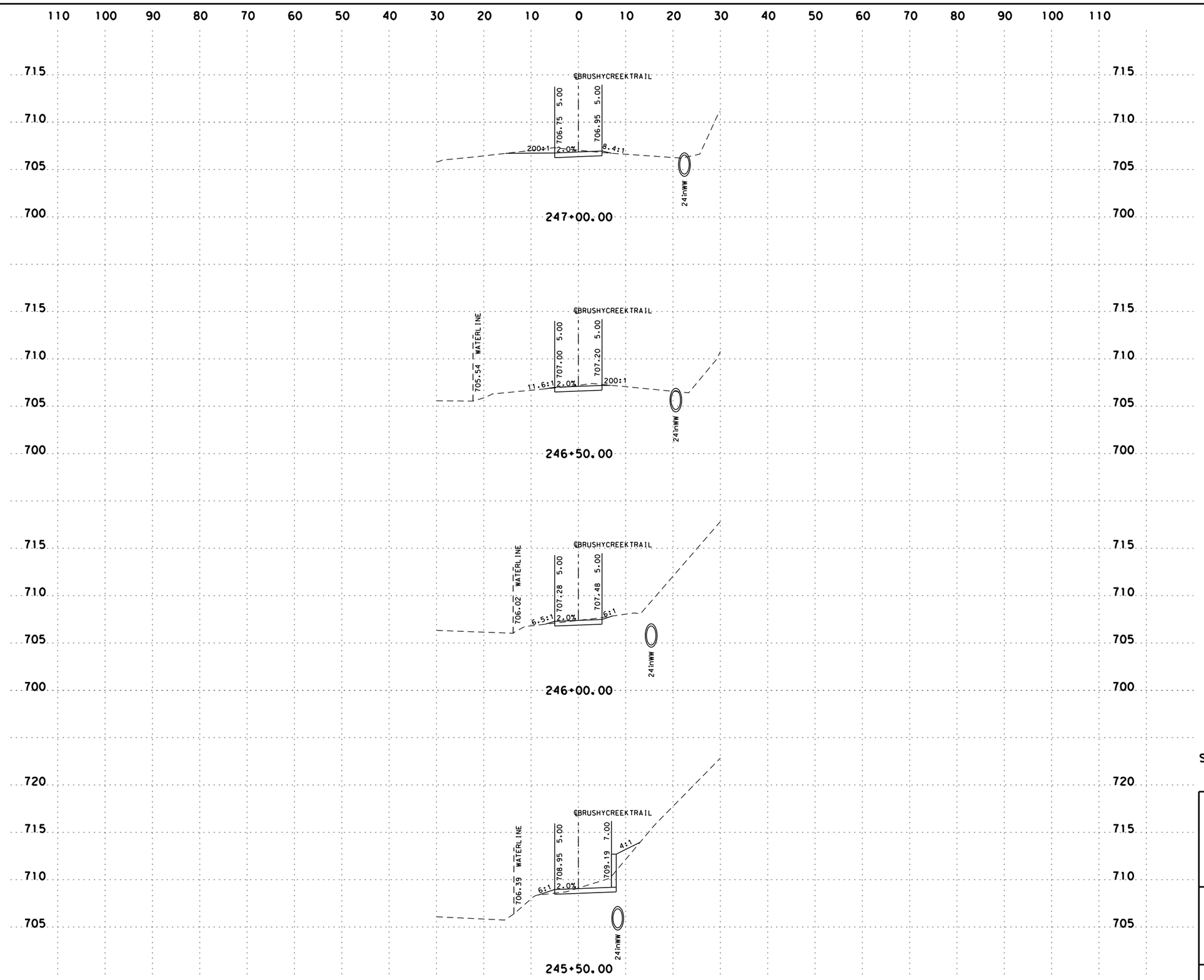

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BRUSHY CREEK TRAIL
CROSS SECTIONS

SHEET 20 OF 26

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 119

Plotted on: 8/1/2018

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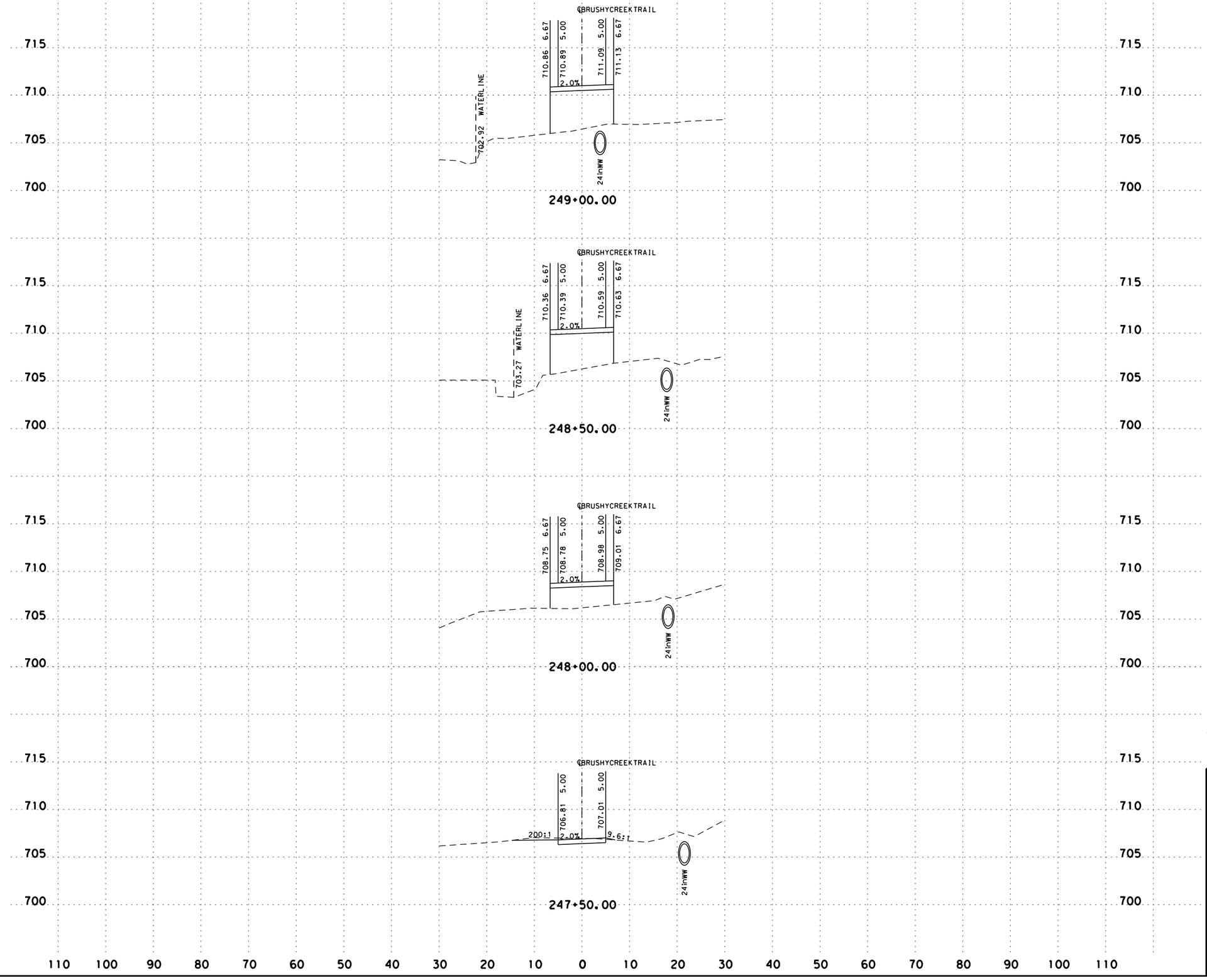

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AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS
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BRUSHY CREEK TRAIL
CROSS SECTIONS

SHEET 21 OF 26

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 120

Plotted on: 8/1/2018

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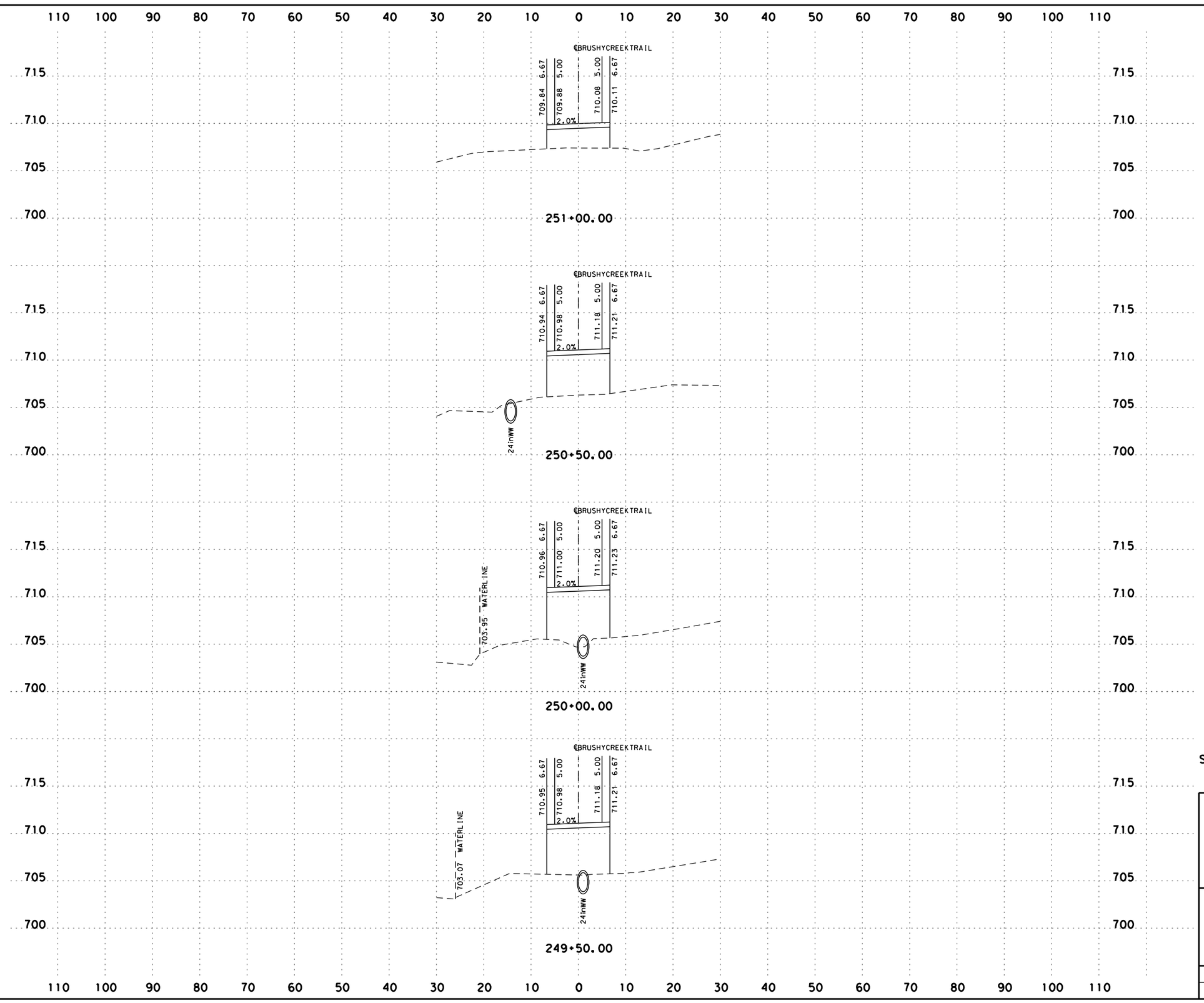

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BRUSHY CREEK TRAIL
CROSS SECTIONS

SHEET 22 OF 26

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 121

Plotted on: 8/1/2018
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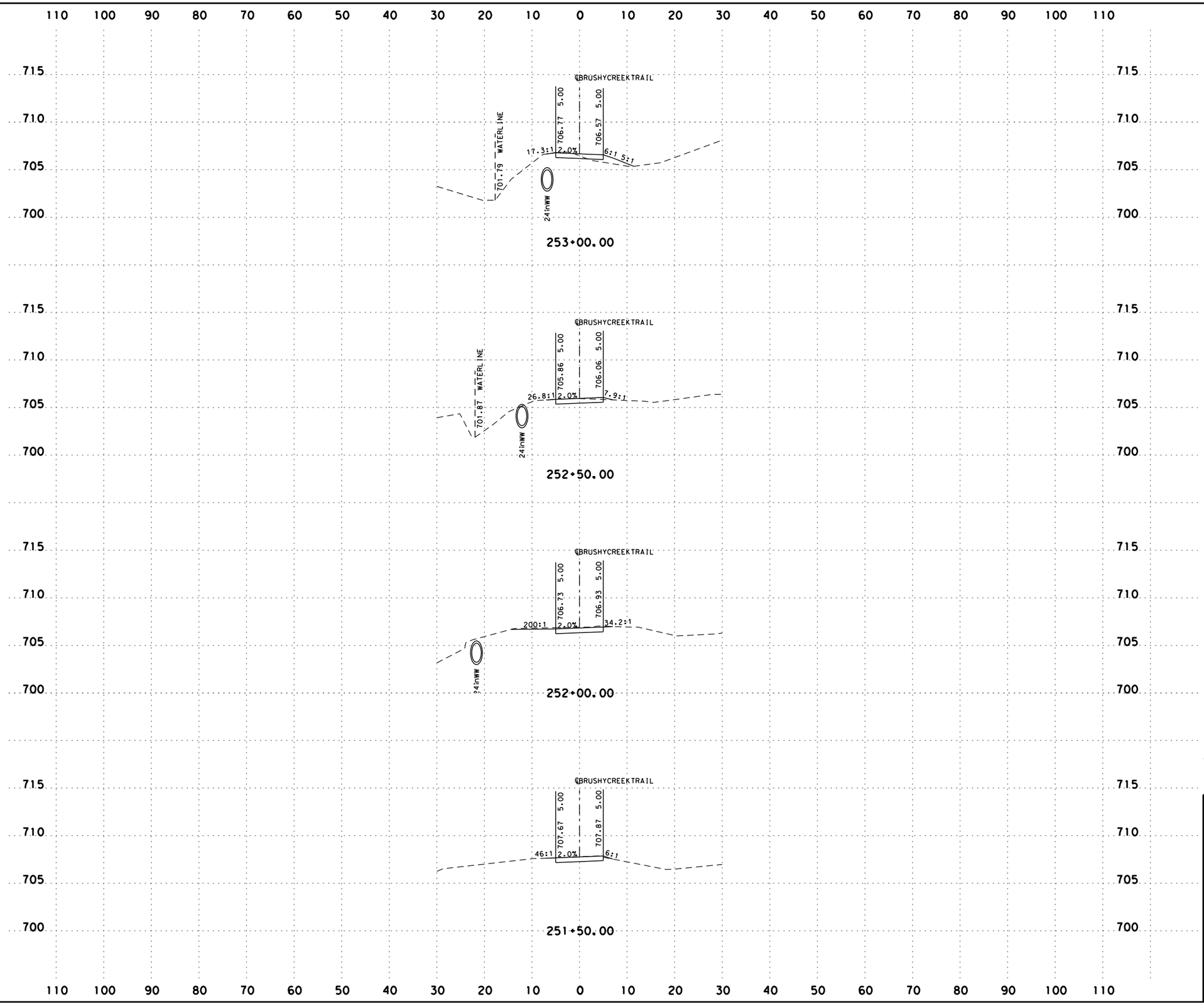

Plotted on: 8/1/2018

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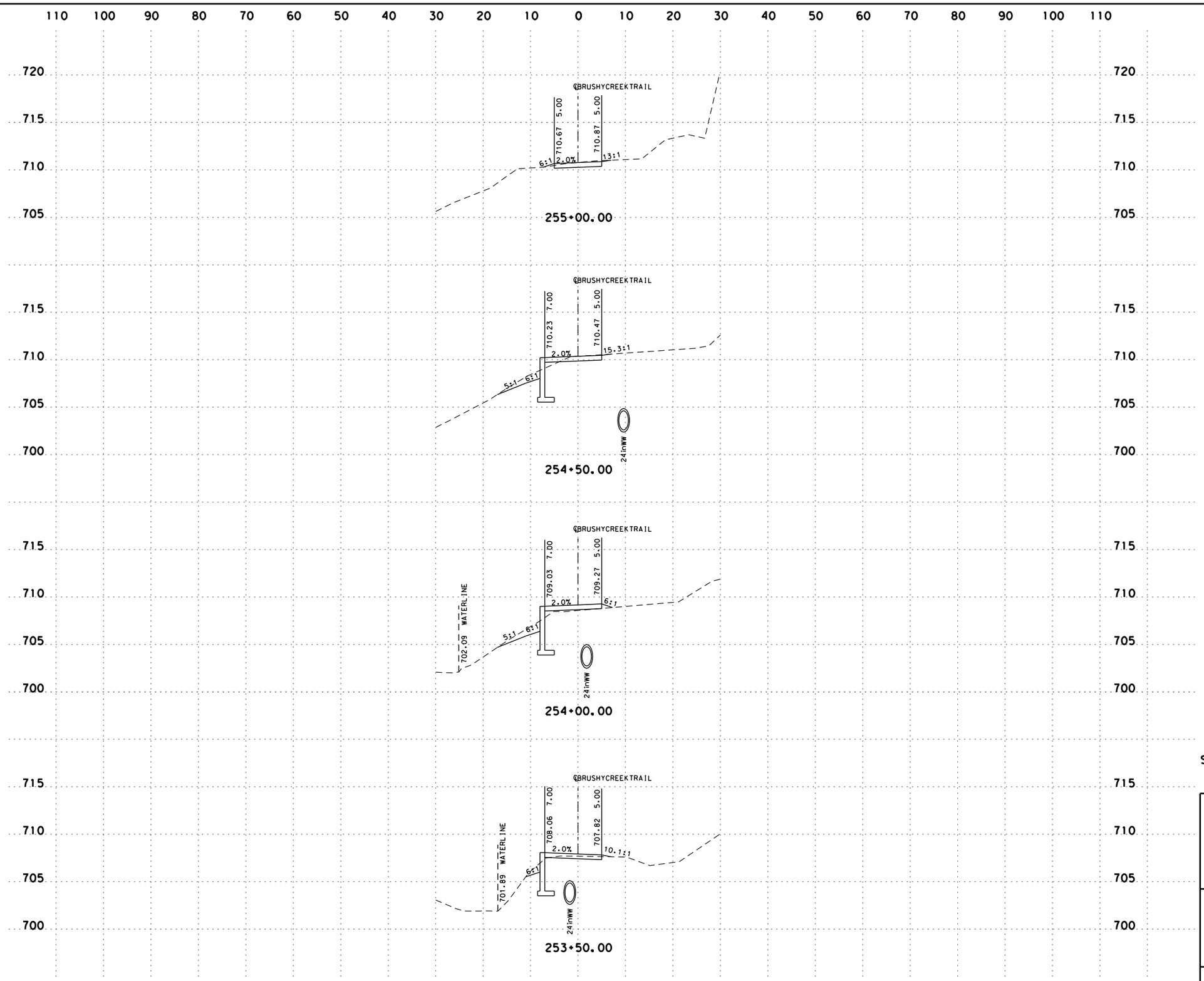
BRUSHY CREEK TRAIL
CROSS SECTIONS

SHEET 23 OF 26

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 122



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PAPE-DAWSON ENGINEERS
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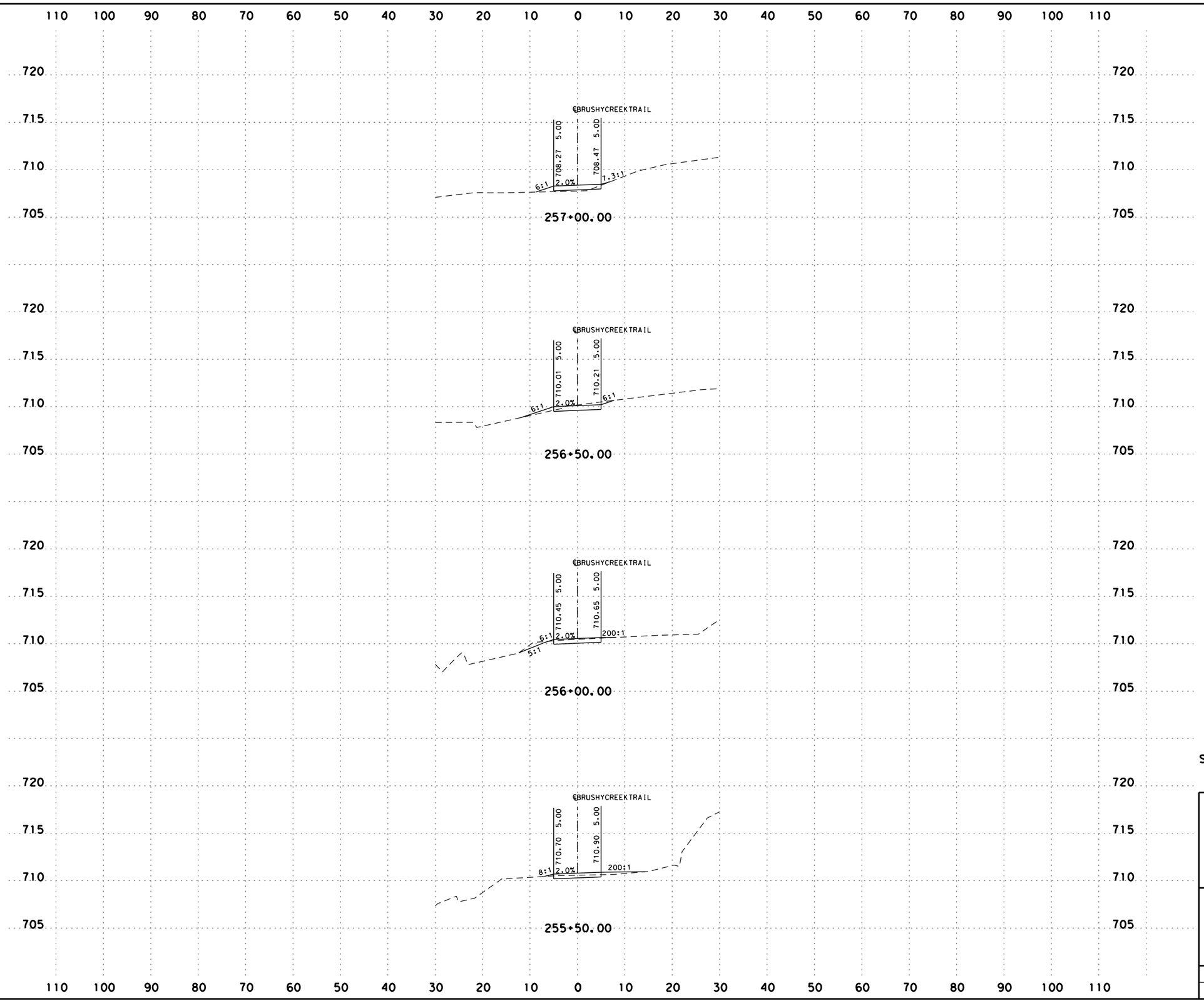
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
CROSS SECTIONS

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 123



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AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS
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BRUSHY CREEK TRAIL
CROSS SECTIONS

SHEET 25 OF 26

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 124

Plotted on: 8/1/2018

Design Filename: H:\projects\508\67.00\design\Civil\GeoPak\5086700XS_Sheets.dgn

110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110

715
710
705
700

℄BRUSHYCREEKTRAIL

5.00 706.63 2.0% 706.83 5.00

8.3:1 200:1

258+00.00

℄BRUSHYCREEKTRAIL

5.00 707.08 2.0% 707.28 5.00

200:1 200:1

257+50.00

THE LOCATION OF EXISTING UTILITIES SHOWN ARE TAKEN FROM THE BEST INFORMATION AVAILABLE. THEY ARE NOT GUARANTEED TO BE ACCURATE AND MUST BE VERIFIED BY CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.

SCALE: H: 1"= 20'
V: 1"= 10'

PAPE-DAWSON ENGINEERS
AUSTIN I SAN ANTONIO I HOUSTON I FORT WORTH I DALLAS
7800 SHOAL CREEK BLVD, STE 220 W I AUSTIN, TX 78757 I 512.454.8711
TBPE FIRM REGISTRATION #470 I TBPLS FIRM REGISTRATION #10028801

BRUSHY CREEK TRAIL
CROSS SECTIONS

SHEET 26 OF 26

90% SUBMITTAL	PROJECT NO.: 50867-01			DATE: 8/1/2018
DRWN.BY: MG	DSGN.BY: HM	CHKD.BY: HM		SHEET NO.: 125