

SAN AUGUSTINE COUNTY, TEXAS CITY OF SAN AUGUSTINE FEMA CULVERT REPAIRS

SEPTEMBER 2019

MAYOR

LEROY HUGHES

CITY COUNCIL

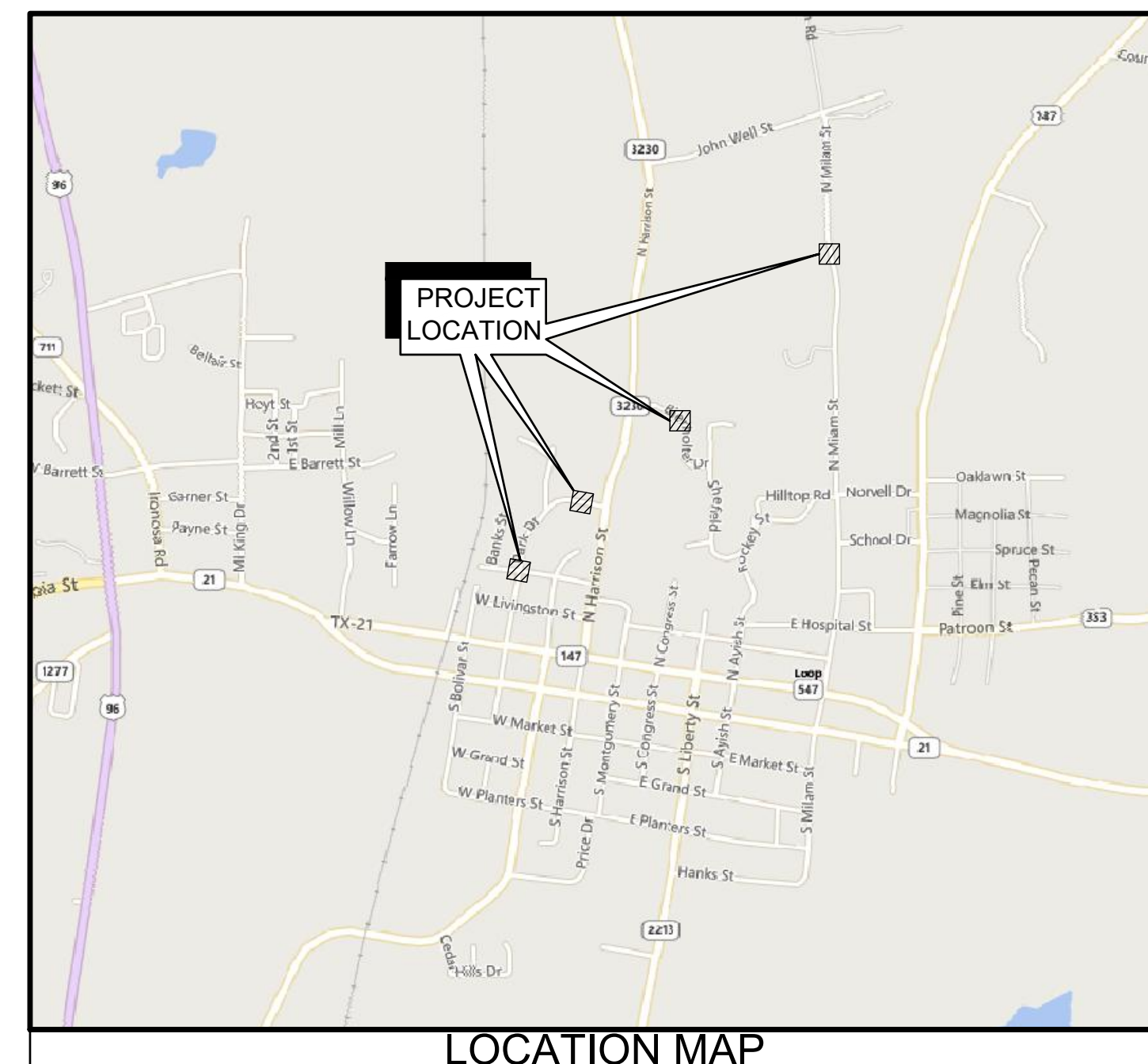
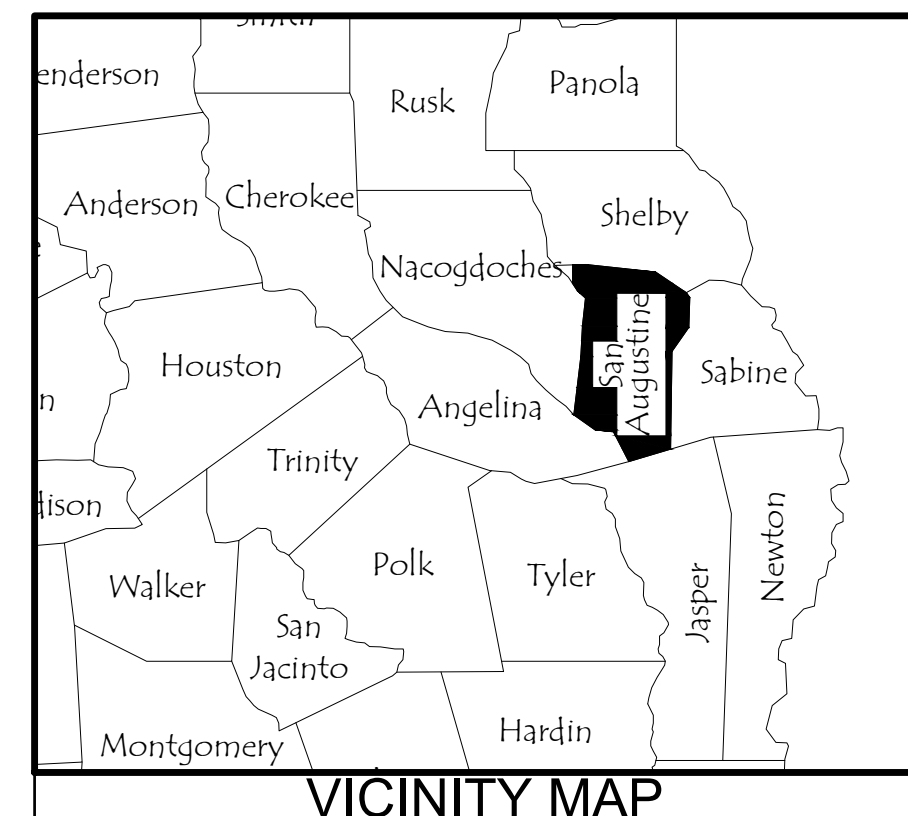
DAN FUSSELL - MAYOR PRO TEM

MARCUS J. HAFFORD

PAMELA TEEL

STACY WATTS

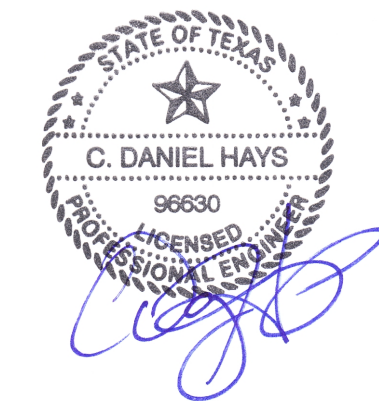
MARK LIEPMAN



RECOMMENDED BY:

KSA

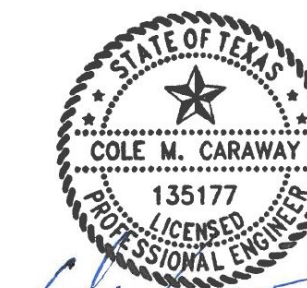
TBPE FIRM REGISTRATION No. F-1356



C. Daniel Hays

C. DANIEL "DANNY" HAYS, P.E.
PROJECT MANAGER

09/20/2019
DATE



Cole M. Caraway

COLE M. CARAWAY, P.E.
PROJECT ENGINEER

9/20/2019
DATE



211 E. Shepherd Ave., Suite 205
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www.ksaeng.com

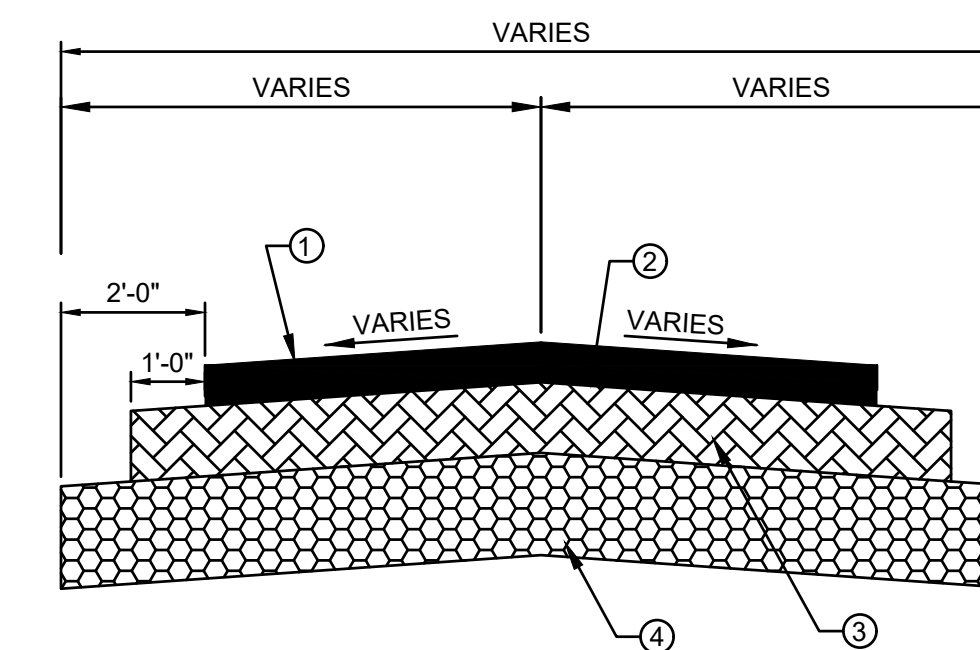
GENERAL CONSTRUCTION

- EXISTING UTILITY LOCATIONS SHOWN ON THE PLANS ARE APPROXIMATE. THE CONTRACTOR IS HEREBY NOTIFIED THAT ALL EXISTING BURIED UTILITIES MAY OR MAY NOT BE SHOWN AND THAT THE CONTRACTOR IS RESPONSIBLE FOR LOCATING AND REPAIRING ANY UTILITIES DAMAGED AS A RESULT OF CONSTRUCTION OPERATIONS.
- THE INFORMATION SHOWN ON THESE DRAWINGS CONCERNING TYPE AND LOCATION OF EXISTING UNDERGROUND AND OTHER UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL-INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATIONS AS TO THE TYPE AND LOCATION OF ALL UNDERGROUND AND OTHER UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. ANY DAMAGE TO EXISTING STRUCTURES, UTILITIES AND PIPING SHALL BE RESTORED AT NO ADDITIONAL COST TO THE OWNER. THE CONTRACTOR SHALL CONTACT THE FOLLOWING AT LEAST 72 HOURS PRIOR TO EXCAVATION:
TEXAS ONE-CALL: 811
CITY OF SAN AUGUSTINE: 936-275-2121
- PRIOR TO BEGINNING CONSTRUCTION, CONTRACTOR SHALL PREPARE, OR OBTAIN A COPY OF, A STORMWATER POLLUTION PREVENTION PLAN (SWPPP), IF NECESSARY, IN ACCORDANCE WITH UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (USEPA) REQUIREMENTS, FILE A NOTICE OF INTENT (NOI), APPLICATION, AND FEE TO THE TEXAS COMMISSION ON ENVIRONMENTAL QUALITY (TCEQ). CONTRACTOR SHALL MAINTAIN THE SWPPP NOTEBOOK AND WEEKLY REPORTS ONSITE AT ALL TIMES IN COMPLIANCE WITH USEPA AND TCEQ REQUIREMENTS. MAINTENANCE OF EROSION CONTROL MEASURES AND REQUIRED REPORTING SHALL BE CONTINUOUS THROUGHOUT CONSTRUCTION. PREPARATION OF THE SWPPP AND MAINTENANCE OF THE EROSION CONTROL MEASURES SHALL BE SUBSIDIARY TO THE OVERALL PROJECT COST UNLESS PROVIDED FOR OTHERWISE.
- CONTRACTOR SHALL SEED AND FERTILIZE ALL AREAS DISTURBED BY CONSTRUCTION IN ORDER TO ESTABLISH PERMANENT VEGETATION IN ACCORDANCE WITH THE STORMWATER POLLUTION PREVENTION PLAN (IF REQUIRED) AND THE TECHNICAL SPECIFICATIONS. CONTRACTOR SHALL RESTORE CONSTRUCTION LIMITS TO ORIGINAL OR BETTER CONDITION TO ENSURE PROPER DRAINAGE.
- CONTRACTOR SHALL INCORPORATE THE USE OF A TRENCH BOX OR OTHER ACCEPTABLE SAFETY SYSTEM IN ANY TRENCH OR EXCAVATION THAT EXCEEDS FIVE (5) FEET IN DEPTH. THE BOX OR SAFETY SYSTEM SHALL MEET ALL OSHA REQUIREMENTS.
- CONTRACTOR SHALL USE CARE WHEN WORKING ON PRIVATE PROPERTY TO NOT DAMAGE GRASS, TREES, SHRUBS, ETC. OUTSIDE THE IMMEDIATE WORKING AREA OF THE PROPOSED CONSTRUCTION. ALL ITEMS DAMAGED OR REMOVED BY THE CONTRACTOR AS A RESULT OF CONSTRUCTION PROCEDURES SHALL BE REPLACED AND ALL COSTS SHALL BE BORNE BY THE CONTRACTOR.
- ALL IMPROVED ROADWAYS/DRIVEWAYS SURFACED WITH GRAVEL, OILED SAND OR CRUSHED STONE THAT ARE DAMAGED SHALL BE REPAIRED WITH LIKE MATERIALS. AS A MINIMUM, THE REPAIRED SECTION SHALL CONTAIN AT LEAST 6" OF COMPACTED LIKE MATERIAL.
- CONTRACTOR ON JOB SITE MUST HAVE A COPY OF ALL TEXAS DEPARTMENT OF TRANSPORTATION (TXDOT) CONSTRUCTION PERMIT(S), WHEN APPLICABLE, AND BE FULLY AWARE OF THE REQUIREMENTS CONTAINED THEREIN WHEN WORKING WITHIN STATE HIGHWAY RIGHT-OF-WAY.
- CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL, LIGHTS, BARRICADES, SIGNAGE, ETC. AND PROTECT OPEN TRENCHES OR EXCAVATIONS IN ACCORDANCE WITH TXDOT'S MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), LATEST REVISION.
- OPERATIONS ALONG HIGHWAYS OR PUBLIC STREETS SHALL BE PERFORMED IN SUCH A MANNER THAT ALL EXCAVATED MATERIALS BE KEPT OFF THE PAVEMENT AT ALL TIMES, AS WELL AS ALL OPERATING EQUIPMENT.
- CONTRACTOR SHALL SAWCUT ALL PAVEMENT SURFACES ENCOUNTERED, WITH THE EXCEPTION OF THOSE LOCATED WITHIN TXDOT RIGHT-OF-WAY, UNLESS SHOWN OTHERWISE. CONTRACTOR SHALL ONLY REMOVE THAT PORTION OF PAVED AREA REQUIRED TO INSTALL THE PROPOSED IMPROVEMENTS. CUTTING, REMOVAL, DISPOSAL, REPAIR, AND REPLACEMENT SHALL BE CONSIDERED SUBSIDIARY TO OVERALL PROJECT COST UNLESS PROVIDED FOR OTHERWISE. PAVED SURFACES WITHIN TXDOT RIGHT-OF-WAY SHALL BE BORED UNLESS DIRECTED OTHERWISE BY THE ENGINEER.
- WHERE OPEN TRENCH OPERATIONS CAUSE TRAFFIC FLOW PROBLEMS, THE CONTRACTOR SHALL NOTIFY ALL AREA BUSINESS AND RESIDENTIAL PROPERTY OWNERS AT LEAST 48 HOURS PRIOR TO BEGINNING CONSTRUCTION.
- CONTRACTOR SHALL PROVIDE ACCESS ACROSS TRENCH(ES) TO ALL BUSINESS AND RESIDENTIAL PROPERTIES AT ALL TIMES.
- ANY AND ALL DRIVEWAYS DAMAGED DUE TO CONSTRUCTION OPERATIONS SHALL BE REPAIRED IMMEDIATELY.

- DURING CONSTRUCTION, ALL EXISTING UTILITIES (MAINS, LATERALS, AND SERVICE CONNECTIONS) ARE TO REMAIN IN SERVICE. IF THERE IS A CONFLICT BETWEEN THE GRADES OF EXISTING AND PROPOSED IMPROVEMENTS, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER OF THE CONFLICT.
- THE CONTRACTOR SHALL PROVIDE DEWATERING OF ALL EXCAVATIONS WHEN REQUIRED.

STORM SEWER CONSTRUCTION

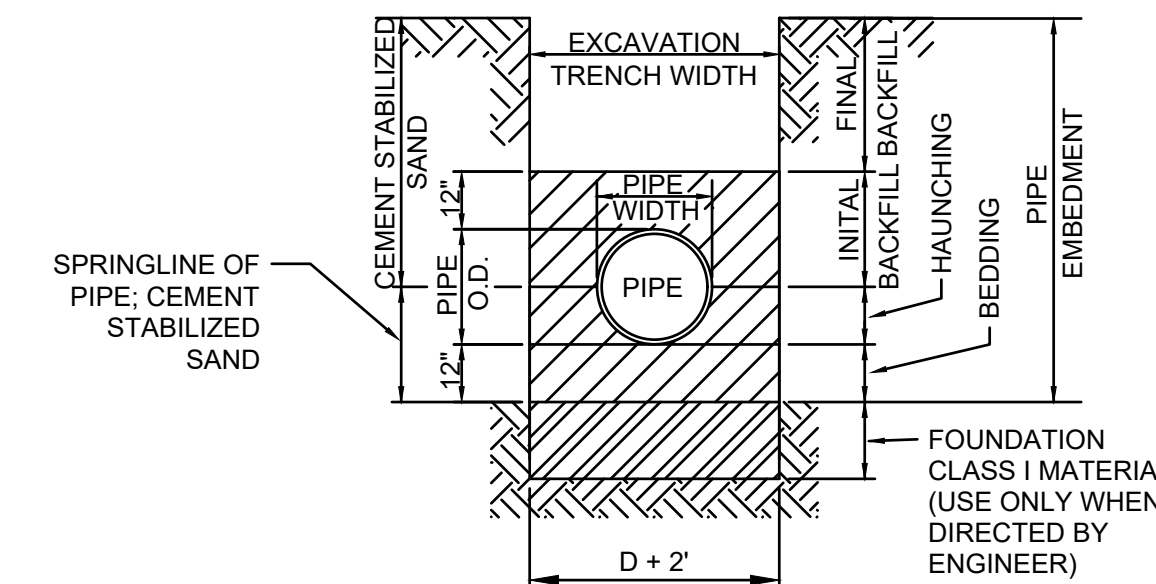
- ALL PIPE STORM SEWERS SHALL BE INSTALLED, BEDDED, AND BACKFILLED IN ACCORDANCE WITH DETAIL DRAWINGS.
- ALL CEMENT STABILIZED SAND (C.S.S.) SHALL BE 1-1/2 SK PER CUBIC YD. AND MEET MINIMUM C.S.S. STANDARDS COMPACTED TO 95%.
- ALL STORM SEWERS UNDER AND WITHIN TWO (2) FOOT OF PROPOSED OR FUTURE PAVEMENTS SHALL BE BACKFILLED AND COMPACTED WITH 1-1/2 SK C.S.S. TO BOTTOM OF SUBGRADE.
- CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING LOCATION OF ALL EXISTING UTILITIES PRIOR TO EXCAVATION. DURING THE COURSE OF ANY AND ALL CLEARING, GRUBBING, FILL, GRADING, EXCAVATION OR OTHER CONSTRUCTION, CONTRACTOR SHALL ENSURE THAT STORM DRAINAGE PATHWAYS ARE MAINTAINED AND REMAIN OPEN TO ENSURE POSITIVE DRAINAGE AND THAT SUCH CONVEYANCES ARE NOT IMPEDED OR BLOCKED IN ANY WAY. STORM SEWER INLETS SHALL BE PROTECTED FROM ENTRY OF SILT, TRASH, DEBRIS AND ANY SUBSTANCES DELETERIOUS TO THE STORM SEWER SYSTEM AND/OR WATERWAYS RECEIVING STORM WATER RUNOFF. CONTRACTOR SHALL AT COMPLETION OF WORK, FILL LOW SPOTS AND GRADE ALL RIGHTS-OF-WAY AND UTILITY EASEMENTS AND REGRADE/RESTORE DITCHES AS NECESSARY TO MAINTAIN AND/OR ESTABLISH POSITIVE DRAINAGE.
- CONTRACTOR TO PROVIDE A MINIMUM OF 6-INCHES CLEARANCE AT UTILITY CROSSINGS AND A MINIMUM OF TWELVE (12) INCHES AT SANITARY SEWER CROSSING.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING, MAINTAINING, AND RESTORING ANY BACKSLOPE DRAINAGE SYSTEM DISTURBED AS A RESULT OF HIS WORK.
- ALL DITCHES SHALL BE RESTORED TO PROPOSED ELEVATIONS TO INSURE PROPER DRAINAGE. ALL OUTFALLS SHALL BE COMPACTED AND ALL DISTURBED AREAS SHALL BE RESEEDDED OR RESODDED WITHIN 10 WORKING DAYS OF EACH OCCURRENCE (NO SEPARATE PAY).
- THE UTILITY CONTRACTOR SHALL ROUGH CUT ALL ROADSIDE SWALES IN PROPER ALIGNMENT AND SLOPE TO WITHIN 0.2 FT. OF FINISH GRADE. THE PAVING CONTRACTOR, UPON COMPLETION OF PAVING, SHALL COMPLETE FINAL GRADING ALIGNMENT OF SWALES AND RESTORE ALL AREAS WITHIN RIGHT-OF-WAY FOR SEEDING OR SODDING AND FERTILIZATION.
- ALL STORM SEWERS MUST BE CLEAN/FREE OF DIRT AND DEBRIS AT THE TIME AND INITIAL AND FINAL ACCEPTANCE.
- CONTRACTOR SHALL LOCATE ANY CONFLICTS BETWEEN SANITARY SEWER SERVICES AND STORM SEWER PIPE. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY AND ALL CONFLICTS. THIS WORK SHALL BE SUBSIDIARY TO THE REINFORCED CONCRETE PIPE INSTALLATION.
- A CONFLICT BOX SHALL BE INSTALLED, WITH APPROVAL FROM ENGINEER, AT EACH LOCATION WHERE A CONFLICT HAS BEEN IDENTIFIED.



- 3" HOT MIX ASPHALTIC CONCRETE TYPE "D" (TXDOT ITEM 340). MATERIAL SHALL BE COMPACTED TO 95% OF LABORATORY MOLDED DENSITY.
- PRIME COAT (MC-30) APPLIED AT APPROXIMATELY 0.30 GAL./S.Y. APPLICATION RATE TO BE APPROVED BY ENGINEER IN FIELD.
- 9" CRUSHED LIMESTONE BASE COURSE (TXDOT ITEM TX-247; TYPE "A", GRADE 2). THIS ITEM OF WORK SHALL BE ACCOMPLISHED IN TWO (2) LIFTS.
- 8" OF ROAD-MIX LIME-FLYASH TREATED SUBGRADE (TXDOT ITEM TX-265). LIME APPLICATION RATE SHALL BE 13 LBS. PER SQUARE YARD AND FLYASH APPLICATION RATE SHALL BE 53 LBS. PER SQUARE YARD. THIS ITEM OF WORK TO BE ACCOMPLISHED IN ONE (1) LIFT.

TYPICAL SECTION
N.T.S.

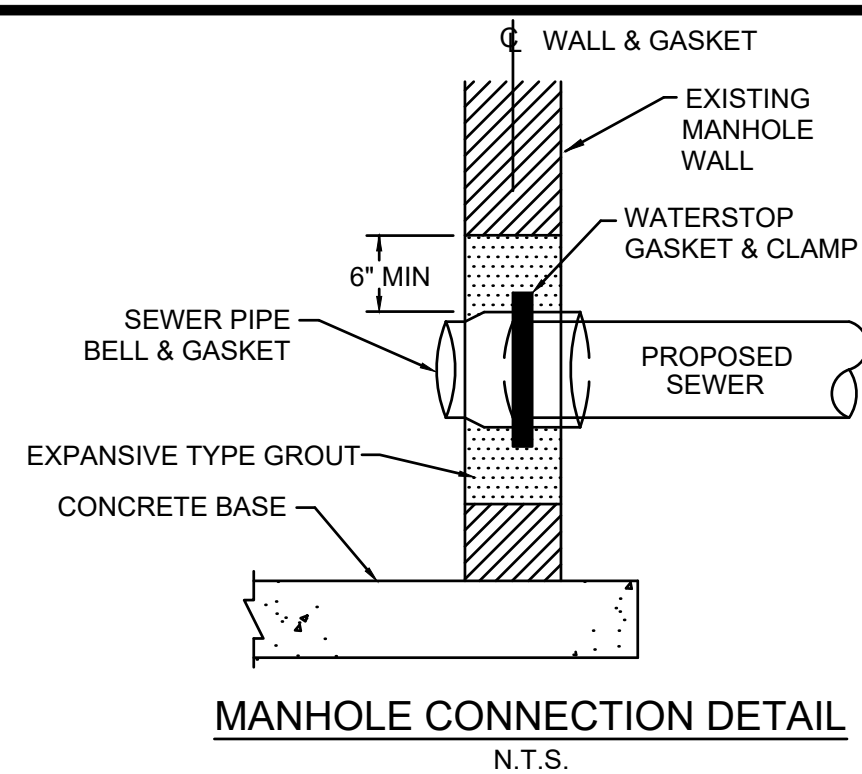
NOTE: SEWER MAIN SHALL HAVE A MINIMUM 3' - 4' COVER TO TOP OF PIPE. FOLLOW PROFILES AS SHOWN ON PLANS.



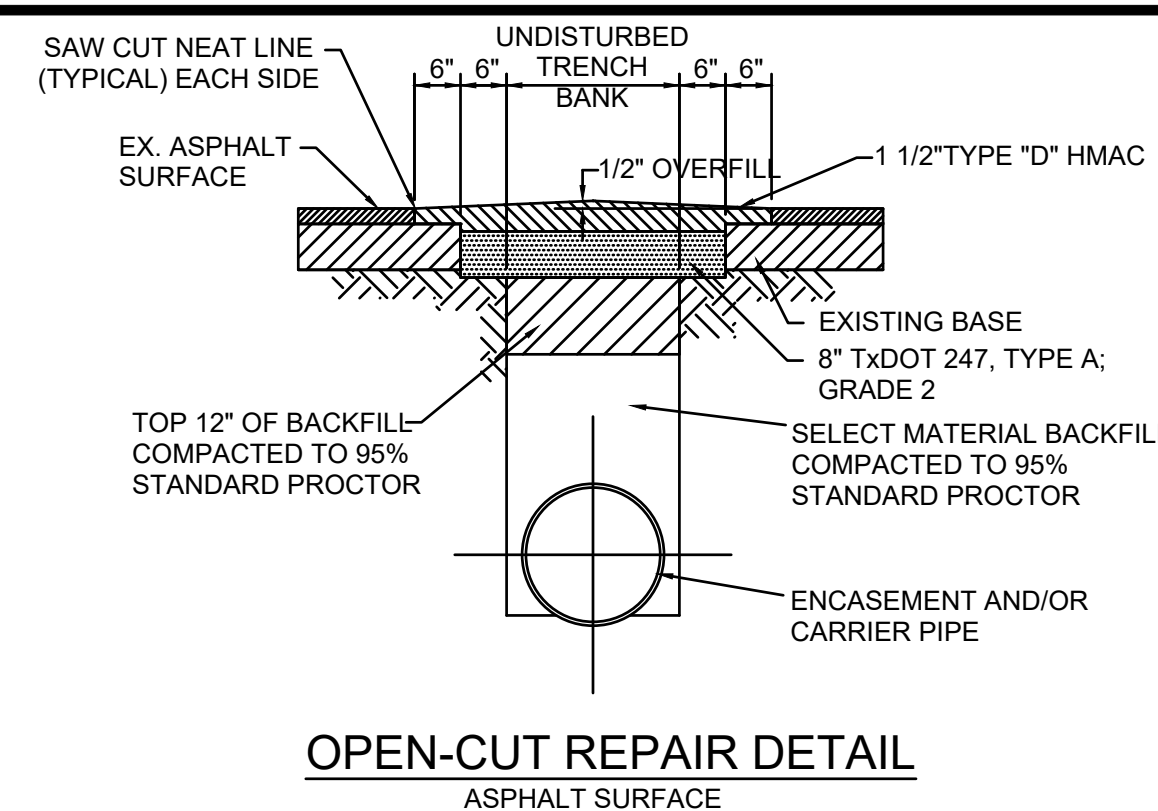
CEMENT STABILIZED SAND SHALL MEET TXDOT AGGREGATE SPECIFICATIONS APPROVED BY ENGINEER.

CEMENT STABILIZED SAND SEWER PIPE EMBEDMENT DETAIL

NOTE: ALL OPEN-CUT ROAD CROSSINGS WILL REQUIRE CEMENT STABILIZED SAND BEDDING TO THE BOTTOM OF THE PROPOSED BASE COURSE AND SHALL BE MECHANICALLY COMPACTED TO 95% STANDARD PROCTOR.



MANHOLE CONNECTION DETAIL
N.T.S.



OPEN-CUT REPAIR DETAIL
ASPHALT SURFACE

ISSUED FOR CONSTRUCTION	9/20/19	DATE
MARK	REVISION	DATE
0		

SHEET INDEX, GENERAL NOTES, TYPICAL SECTIONS AND DETAILS

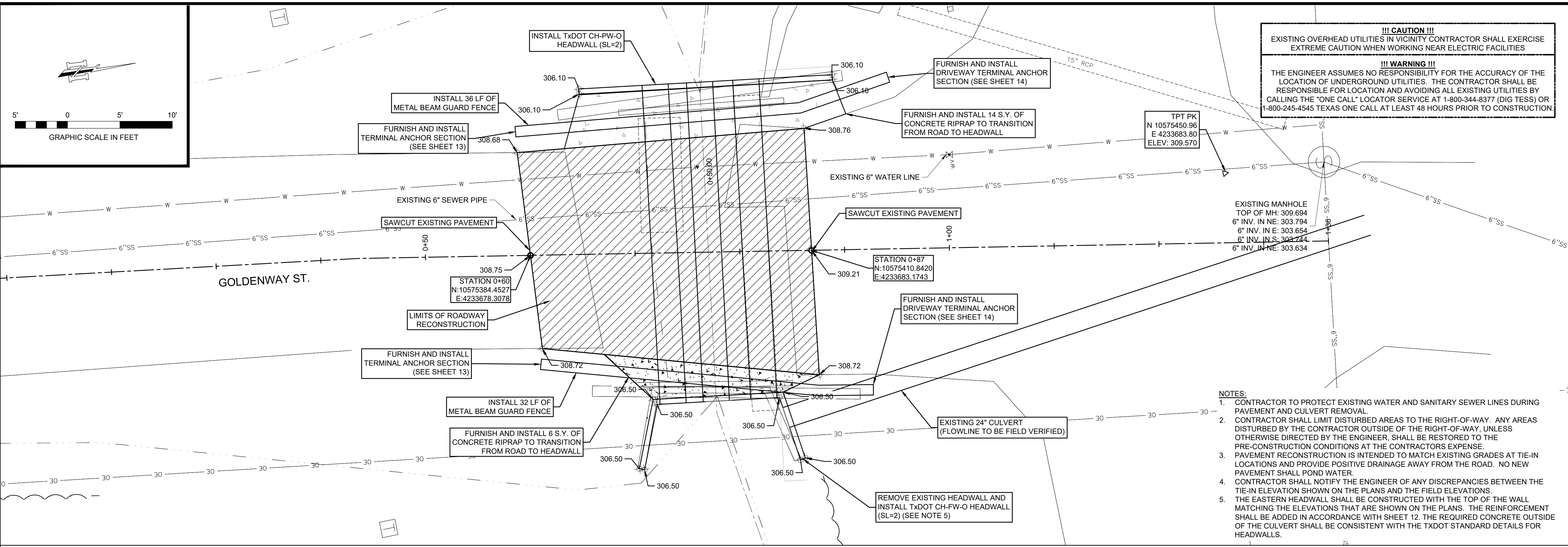
**CITY OF SAN AUGUSTINE
FEMA CULVERT REPAIRS
SAN AUGUSTINE COUNTY,
TEXAS**

DRAWN BY:	SANGLIN	DESIGNED BY:	CMC
LATEST REVISION:	9/17/2019	ISSA JOB NO.:	SAL009

SEAL: TBPE Firm Registration No. F-1356
SHEET NO.

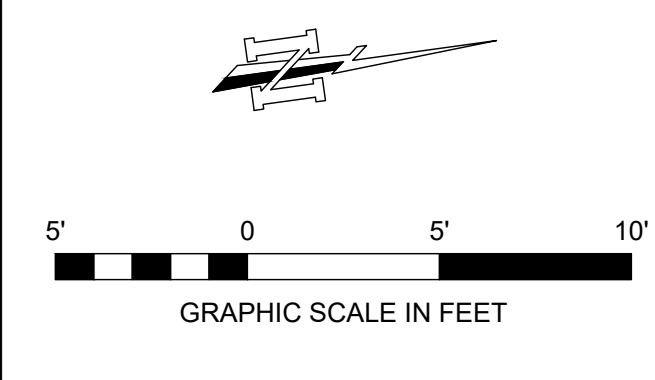
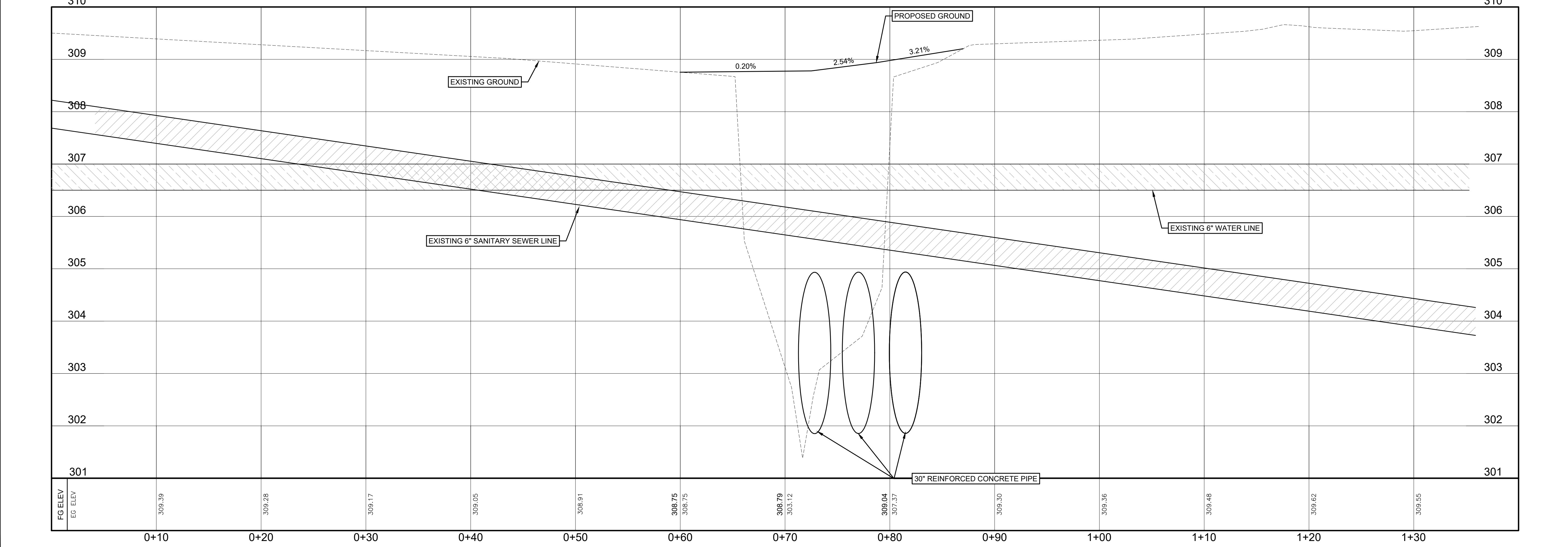
SHEET LIST TABLE	
SHEET NUMBER	SHEET TITLE
--	COVER SHEET
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3	LEGEND, ABBREVIATIONS AND LOCATION MAP
4	GOLDENWAY ST. PROPOSED SITE
5	GOLDENWAY ST. PROPOSED DRAINAGE
6	PARK DR. PROPOSED DRAINAGE
7	BIERHOLTER ST. PROPOSED DRAINAGE
8	MILAM ST. PROPOSED SITE
9	MILAM ST. PROPOSED DRAINAGE
10	CONCRETE HEADWALLS WITH PARALLEL WINGS**
11	CONCRETE HEADWALLS WITH SKEWED PARALLEL WINGS**
12	CONCRETE HEADWALLS WITH FLARED WINGWALLS**
13	METAL BEAM GUARD RAILS**
14	WORK ZONE ROAD CLOSURE DETAILS**

STANDARD SHEETS IDENTIFIED BY ** AFTER SHEET NAME HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.



!!! CAUTION !!!
 EXISTING OVERHEAD UTILITIES IN VICINITY CONTRACTOR SHALL EXERCISE EXTREME CAUTION WHEN WORKING NEAR ELECTRIC FACILITIES

!!! WARNING !!!
 THE ENGINEER ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF UNDERGROUND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATION AND AVOIDING ALL EXISTING UTILITIES BY CALLING THE "ONE CALL" LOCATOR SERVICE AT 1-800-344-8377 (DIG TESS) OR 1-800-245-4545 TEXAS ONE CALL AT LEAST 48 HOURS PRIOR TO CONSTRUCTION.



ISSUED FOR CONSTRUCTION	9/20/19
MARK	REVISION
DATE	DATE

PROJECT TITLE: --- CITY XX, TEXAS

GOLDENWAY ST. PROPOSED ROAD REPAIR

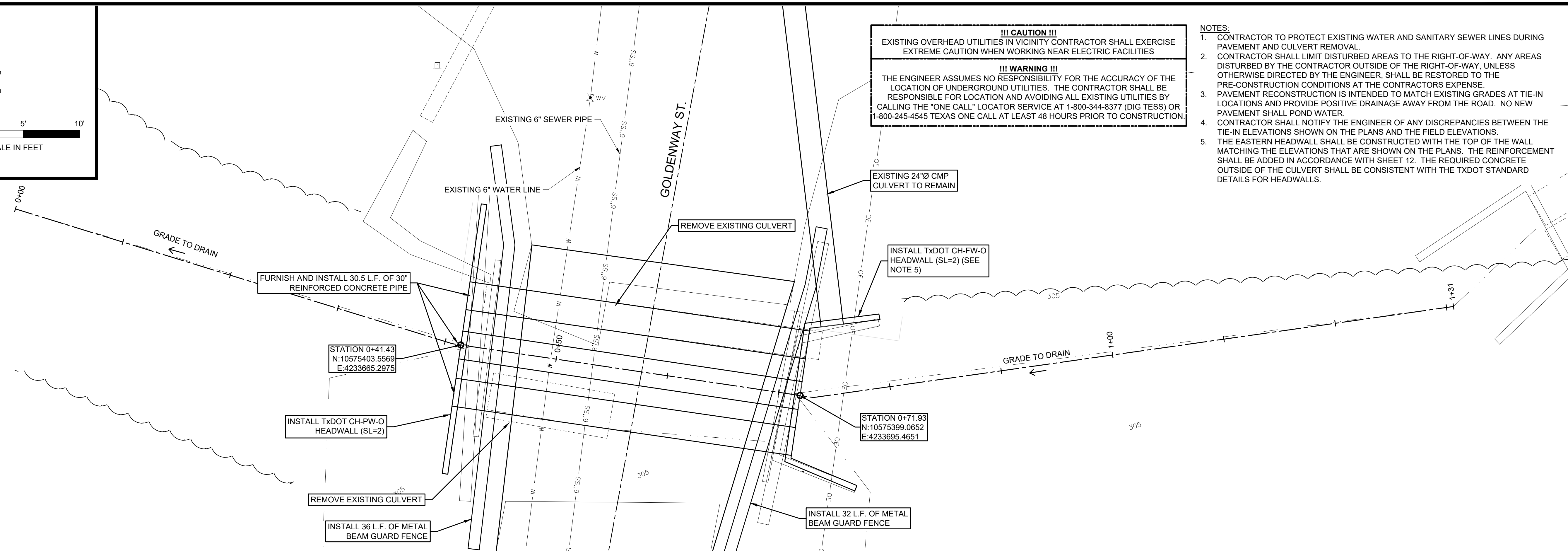
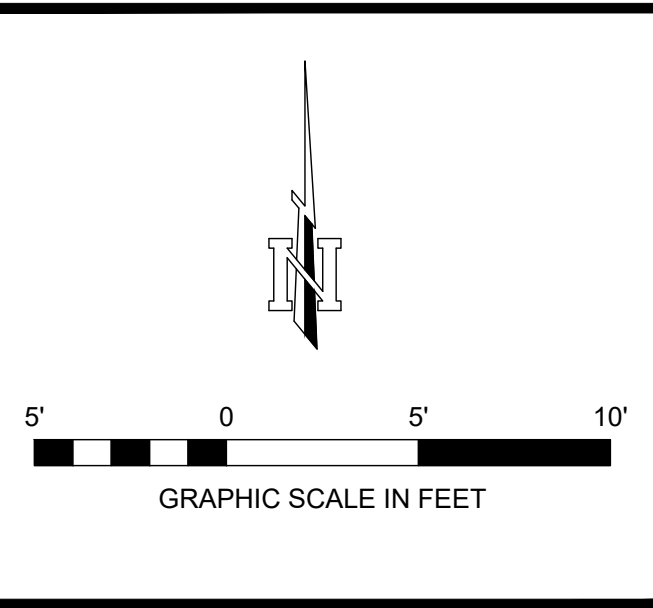
CITY OF SAN AUGUSTINE FEMA CULVERT REPAIRS SAN AUGUSTINE COUNTY, TEXAS

DRAWN BY:	SANGLIN
DESIGNED BY:	CMC
LATEST REVISION:	9/19/2019
KSA JOB NO.:	SAL009

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STATE OF TEXAS
 COLE M. CARAWAY
 135177
 LICENSED PROFESSIONAL ENGINEER

SEAL: TBPE Firm Registration No. F-1356
 SHEET NO. **4**



!!! CAUTION !!!
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- NOTES:**
- CONTRACTOR TO PROTECT EXISTING WATER AND SANITARY SEWER LINES DURING PAVEMENT AND CULVERT REMOVAL.
 - CONTRACTOR SHALL LIMIT DISTURBED AREAS TO THE RIGHT-OF-WAY. ANY AREAS DISTURBED BY THE CONTRACTOR OUTSIDE OF THE RIGHT-OF-WAY, UNLESS OTHERWISE DIRECTED BY THE ENGINEER, SHALL BE RESTORED TO THE PRE-CONSTRUCTION CONDITIONS AT THE CONTRACTOR'S EXPENSE.
 - PAVEMENT RECONSTRUCTION IS INTENDED TO MATCH EXISTING GRADES AT TIE-IN LOCATIONS AND PROVIDE POSITIVE DRAINAGE AWAY FROM THE ROAD. NO NEW PAVEMENT SHALL POND WATER.
 - CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES BETWEEN THE TIE-IN ELEVATIONS SHOWN ON THE PLANS AND THE FIELD ELEVATIONS.
 - THE EASTERN HEADWALL SHALL BE CONSTRUCTED WITH THE TOP OF THE WALL MATCHING THE ELEVATIONS THAT ARE SHOWN ON THE PLANS. THE REINFORCEMENT SHALL BE ADDED IN ACCORDANCE WITH SHEET 12. THE REQUIRED CONCRETE OUTSIDE OF THE CULVERT SHALL BE CONSISTENT WITH THE TXDOT STANDARD DETAILS FOR HEADWALLS.

MARK	REVISION	DATE
0	ISSUED FOR CONSTRUCTION	9/20/19

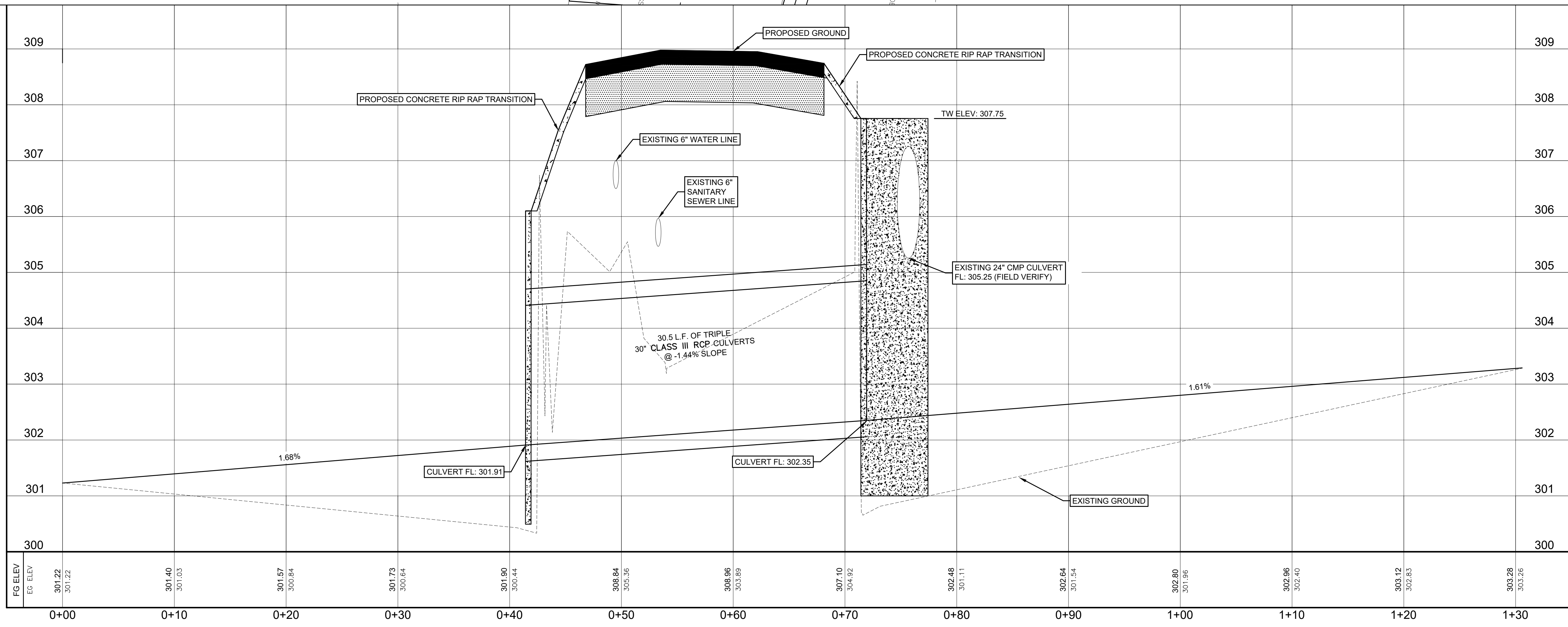
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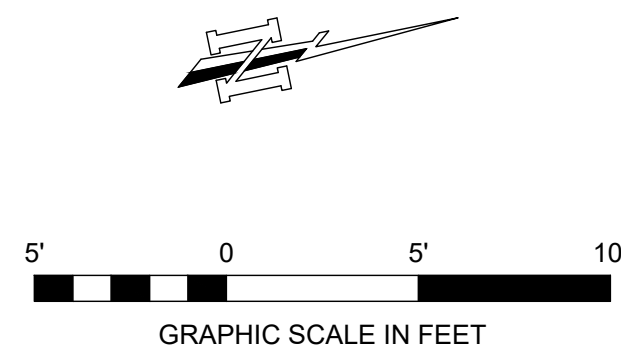
**GOLDENWAY ST.
PROPOSED CULVERT
REPLACEMENT**

**CITY OF SAN AUGUSTINE
FEMA CULVERT REPAIRS
SAN AUGUSTINE COUNTY,
TEXAS**

DRAWN BY:	SANGLIN
DESIGNED BY:	CMC
LATEST REVISION:	9/19/2019
KSA JOB NO.:	SAU009

SEAL: TBPE Firm Registration No. F-1356
SHEET NO.





BP: STA 0+00.00
N = 10576095.49
E = 4234242.39

ELEV: 351.086
TPT PK
N: 10576139.67
E: 4234234.45
ELEV: 351.086

INSTALL TxDOT CH-PW-O
HEADWALL (SL=2)

LIMITS OF PAVEMENT
REMOVAL AND REPAIR FOR
CULVERT REPLACEMENT
(MATCH EXISTING GRADE)

EXISTING CMP
(TO BE REMOVED)

INSTALL TxDOT CH-PW-O
HEADWALL (SL=2)

PI: STA 0+33.76
N = 10576125.86
E = 4234257.11

PI: STA 0+41.20
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PI: STA 0+67.39
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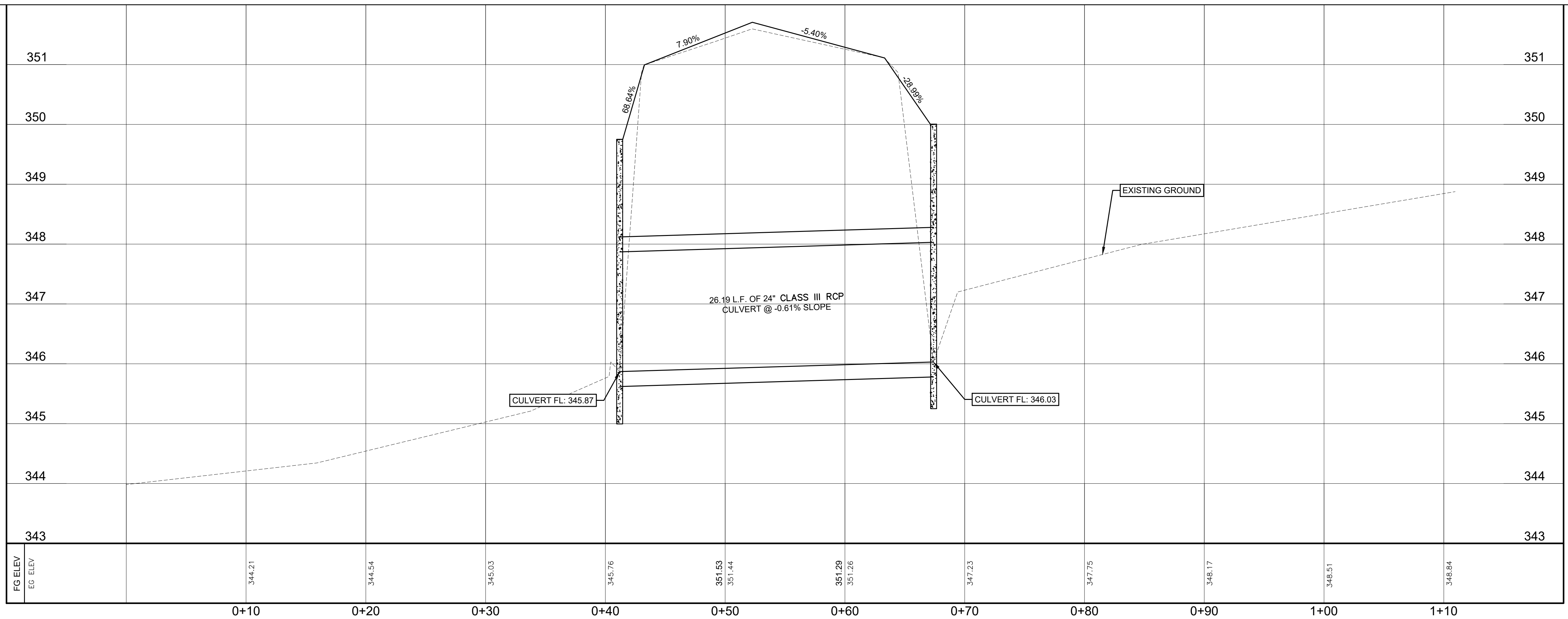
FURNISH AND INSTALL 26 LF OF
24" REINFORCED CONCRETE PIPE

PARK DR.

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WARNING!!!
UNDERGROUND AND OVERHEAD UTILITIES IN AREA.
CONTRACTOR TO CONTACT AREA UTILITY
REPRESENTATIVE 48 HOURS PRIOR TO EXCAVATION.

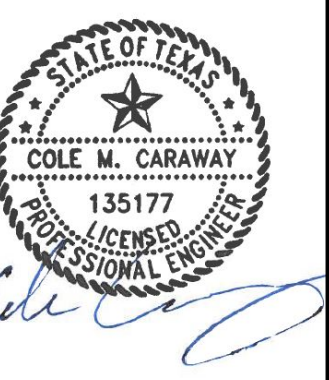
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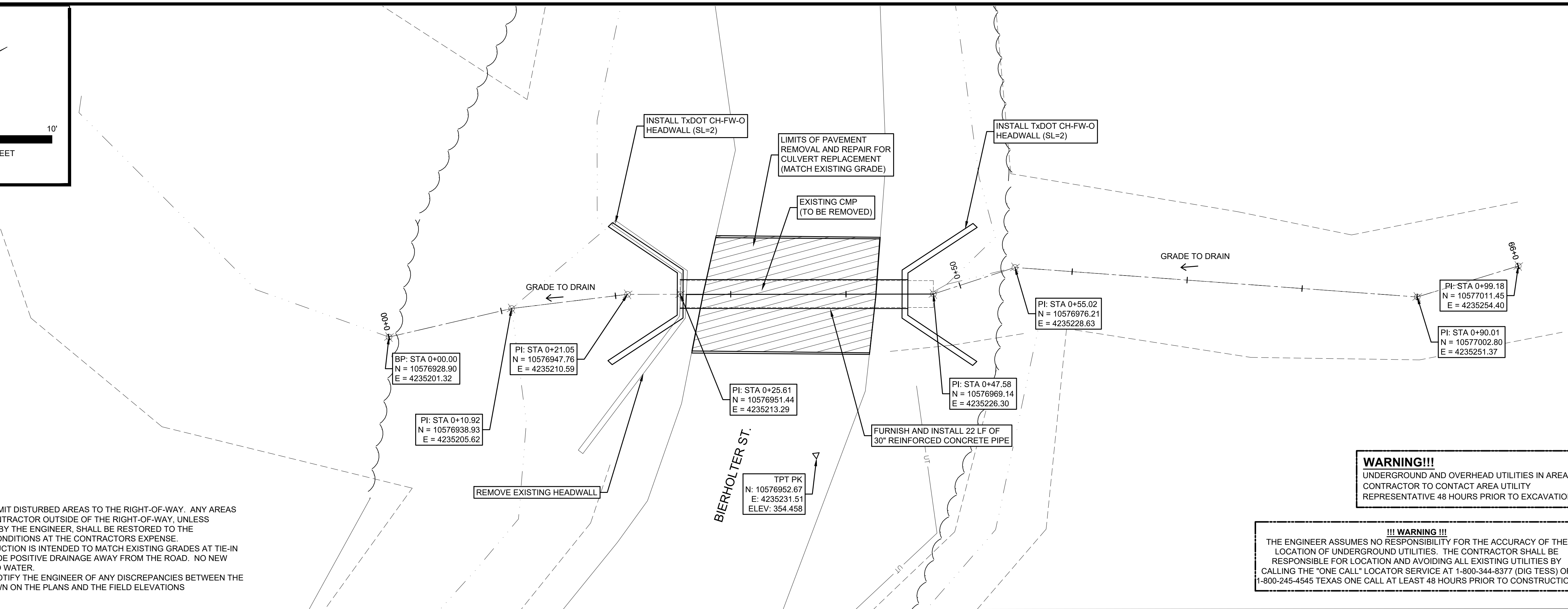
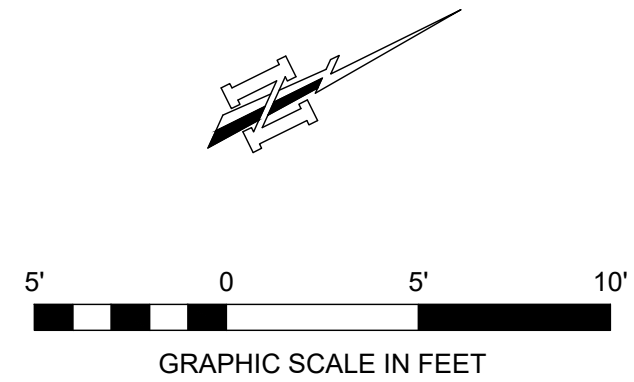
PARK DR. PROPOSED
CULVERT
REPLACEMENT

CITY OF SAN AUGUSTINE
FEMA CULVERT REPAIRS
SAN AUGUSTINE COUNTY,
TEXAS

DRAWN BY:	SANGLIN
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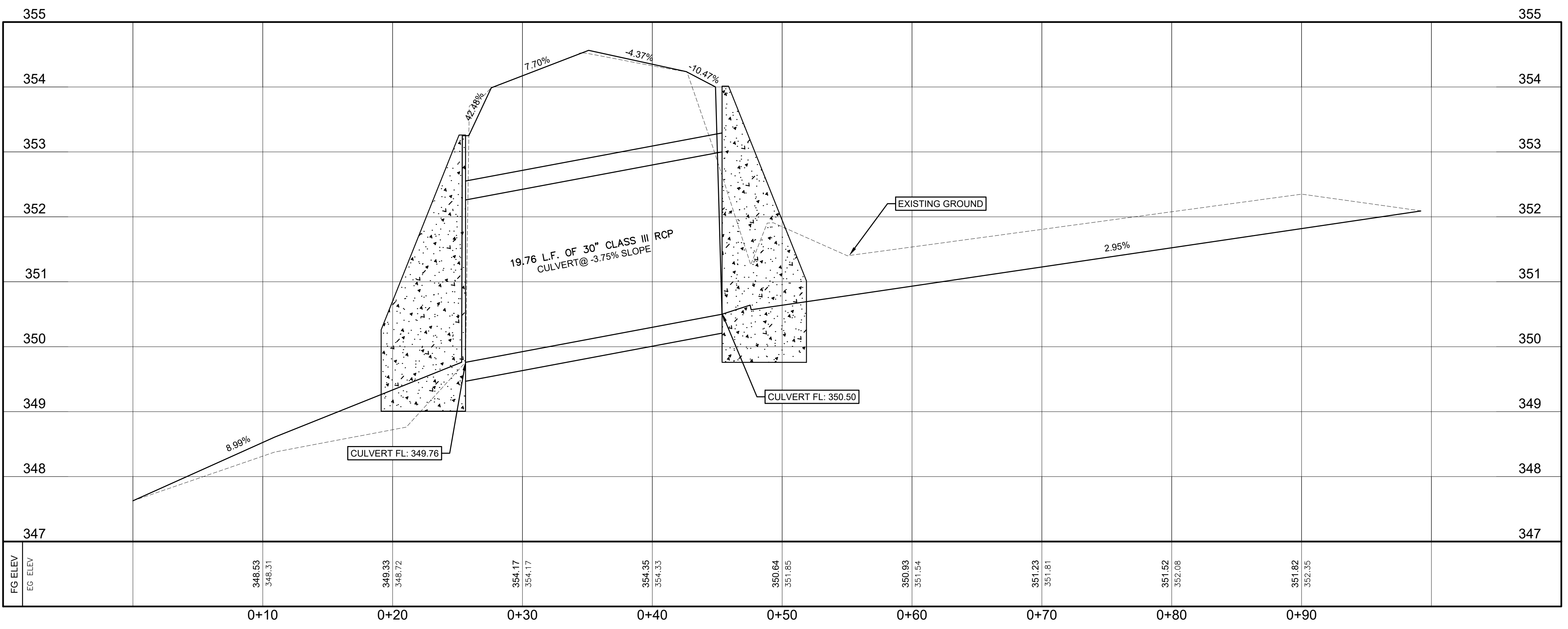
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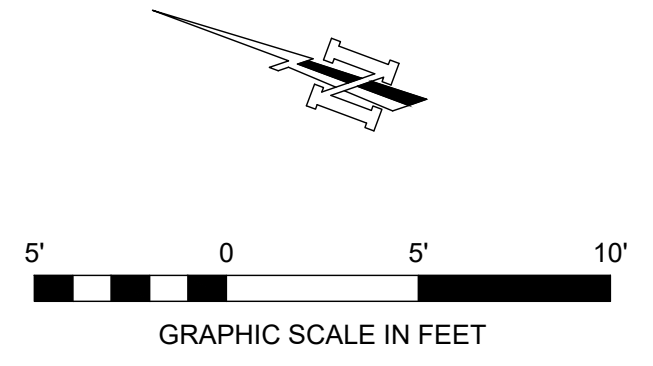
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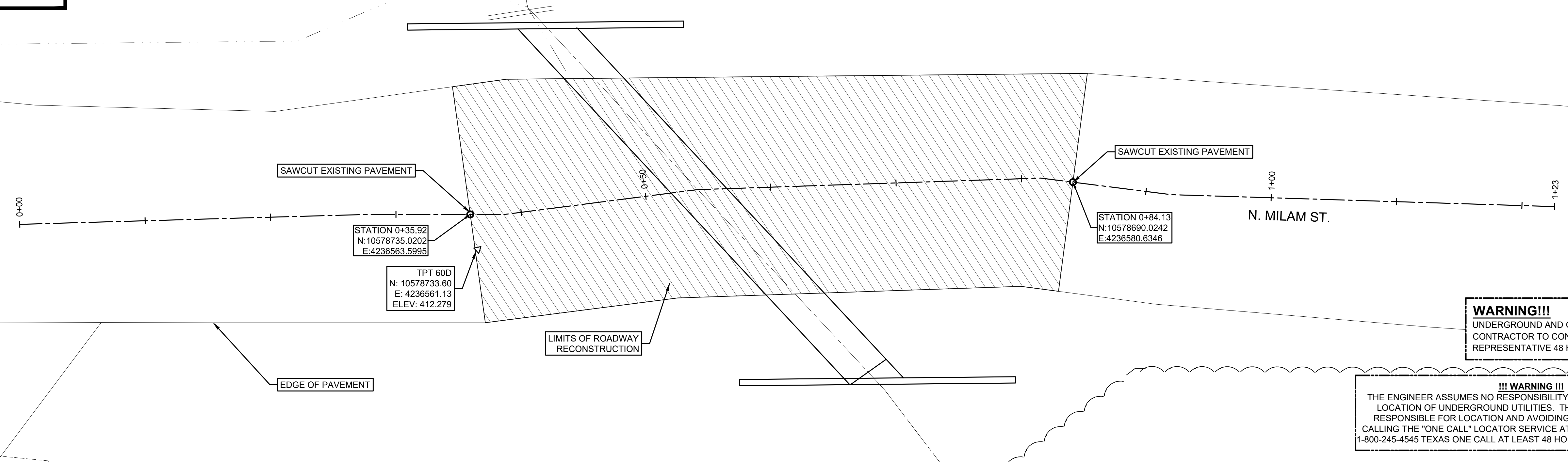
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ISSUED FOR CONSTRUCTION	0	REVISION		DATE	9/20/19	PROJECT TITLE: --- CITY XX, TEXAS			
<p style="text-align: center;">BIERHOLTER ST. PROPOSED CULVERT REPLACEMENT</p> <p style="text-align: center;">CITY OF SAN AUGUSTINE FEMA CULVERT REPAIRS, SAN AUGUSTINE COUNTY, TEXAS</p>									
DESIGNED BY:	SANGLIN	DESIGNED BY:	CMC	LATEST REVISION:	9/19/2019	PROJECT NAME: SAU009			
<p>KSA 211 E. Shepherd Ave., Suite 205 Lufkin, Texas 75901 T: 936-637-6061 F: 888-224-9418 www.kasang.com</p>									
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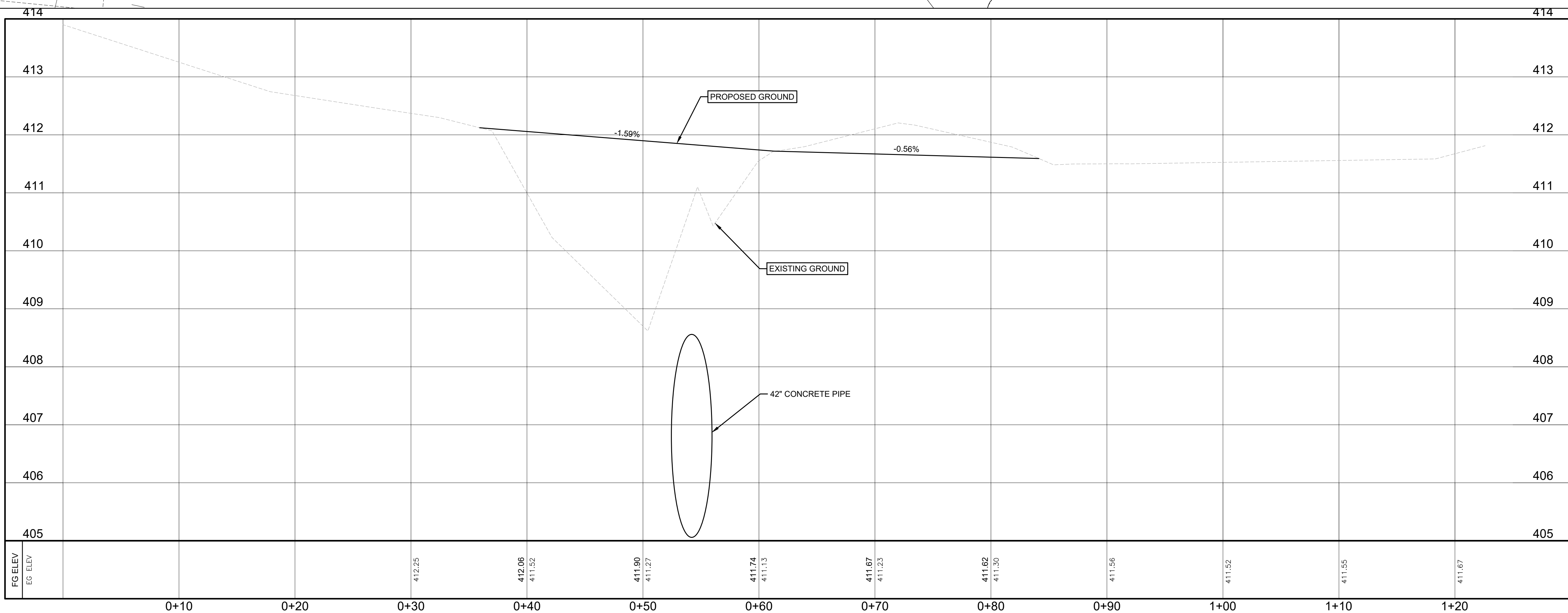


- NOTES:**
1. CONTRACTOR TO PROTECT EXISTING WATER AND SANITARY SEWER LINES DURING PAVEMENT AND CULVERT REMOVAL.
 2. CONTRACTOR SHALL LIMIT DISTURBED AREAS TO THE RIGHT-OF-WAY. ANY AREAS DISTURBED BY THE CONTRACTOR OUTSIDE OF THE RIGHT-OF-WAY, UNLESS OTHERWISE DIRECTED BY THE ENGINEER, SHALL BE RESTORED TO THE PRE-CONSTRUCTION CONDITIONS AT THE CONTRACTORS EXPENSE.
 3. PAVEMENT RECONSTRUCTION IS INTENDED TO MATCH EXISTING GRADES AT TIE-IN LOCATIONS AND PROVIDE POSITIVE DRAINAGE AWAY FROM THE ROAD. NO NEW PAVEMENT SHALL POND WATER.
 4. CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES BETWEEN THE TIE-IN ELEVATION SHOWN ON THE PLANS AND THE FIELD ELEVATIONS.



WARNING!!!
UNDERGROUND AND OVERHEAD UTILITIES IN AREA. CONTRACTOR TO CONTACT AREA UTILITY REPRESENTATIVE 48 HOURS PRIOR TO EXCAVATION.

!!! WARNING !!!
THE ENGINEER ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF UNDERGROUND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATION AND AVOIDING ALL EXISTING UTILITIES BY CALLING THE "ONE CALL" LOCATOR SERVICE AT 1-800-344-8377 (DIG TESS) OR 1-800-245-4545 TEXAS ONE CALL AT LEAST 48 HOURS PRIOR TO CONSTRUCTION.



MARK	REVISION	DATE
0	ISSUED FOR CONSTRUCTION	9/20/19

ISSUED FOR CONSTRUCTION 9/20/19

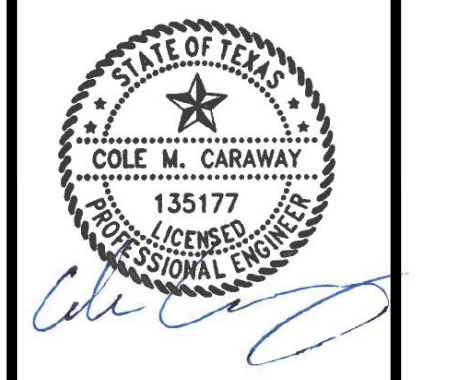
MARK 0 REVISION DATE

PROJECT TITLE: --- CITY XX, TEXAS

MILAM ST. PROPOSED ROAD REPAIR

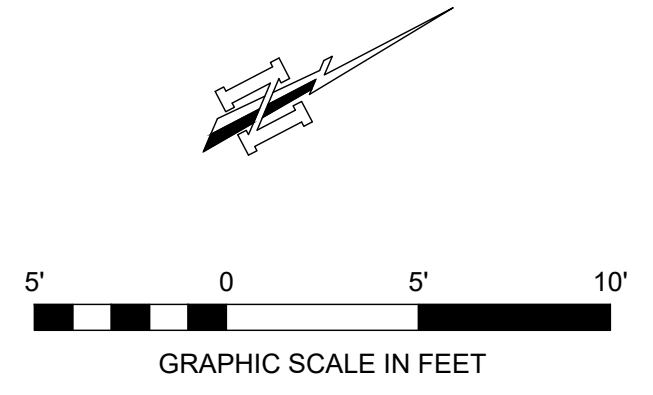
**CITY OF SAN AUGUSTINE
FEMA CULVERT REPAIRS
SAN AUGUSTINE COUNTY,
TEXAS**

DRAWN BY:	SANGLIN
DESIGNED BY:	CMC
LATEST REVISION:	9/19/2019
KSA JOB NO.:	SAL009

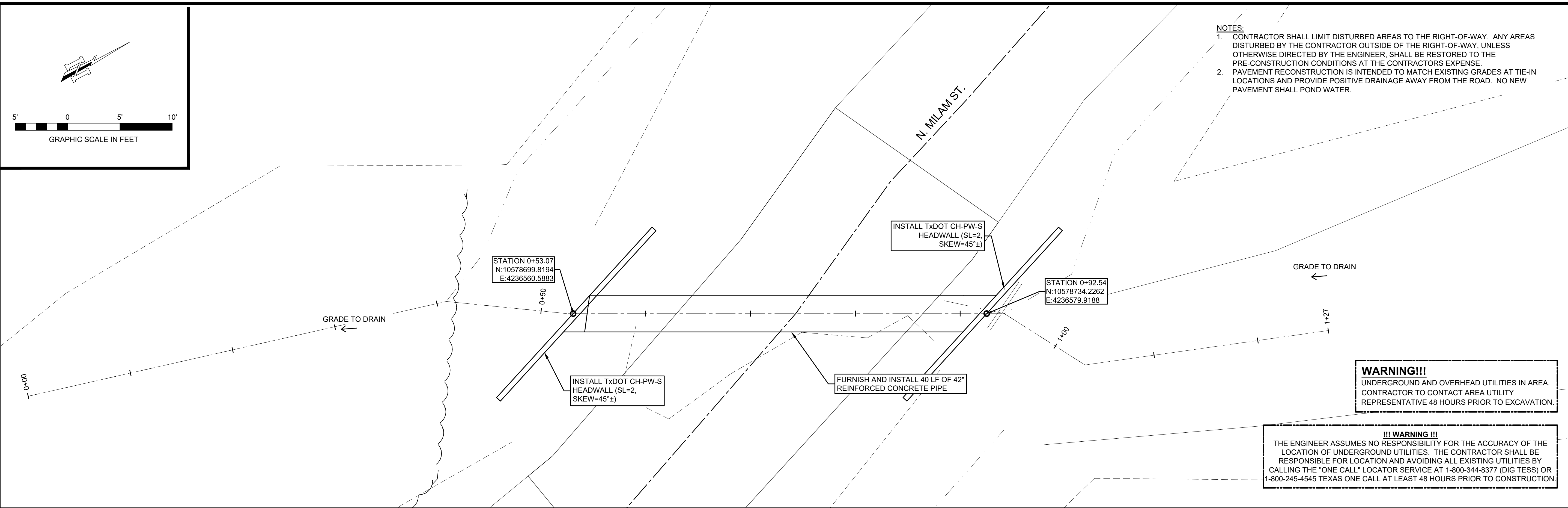


SEAL: TBPE Firm Registration No. F-1356

SHEET NO. 8

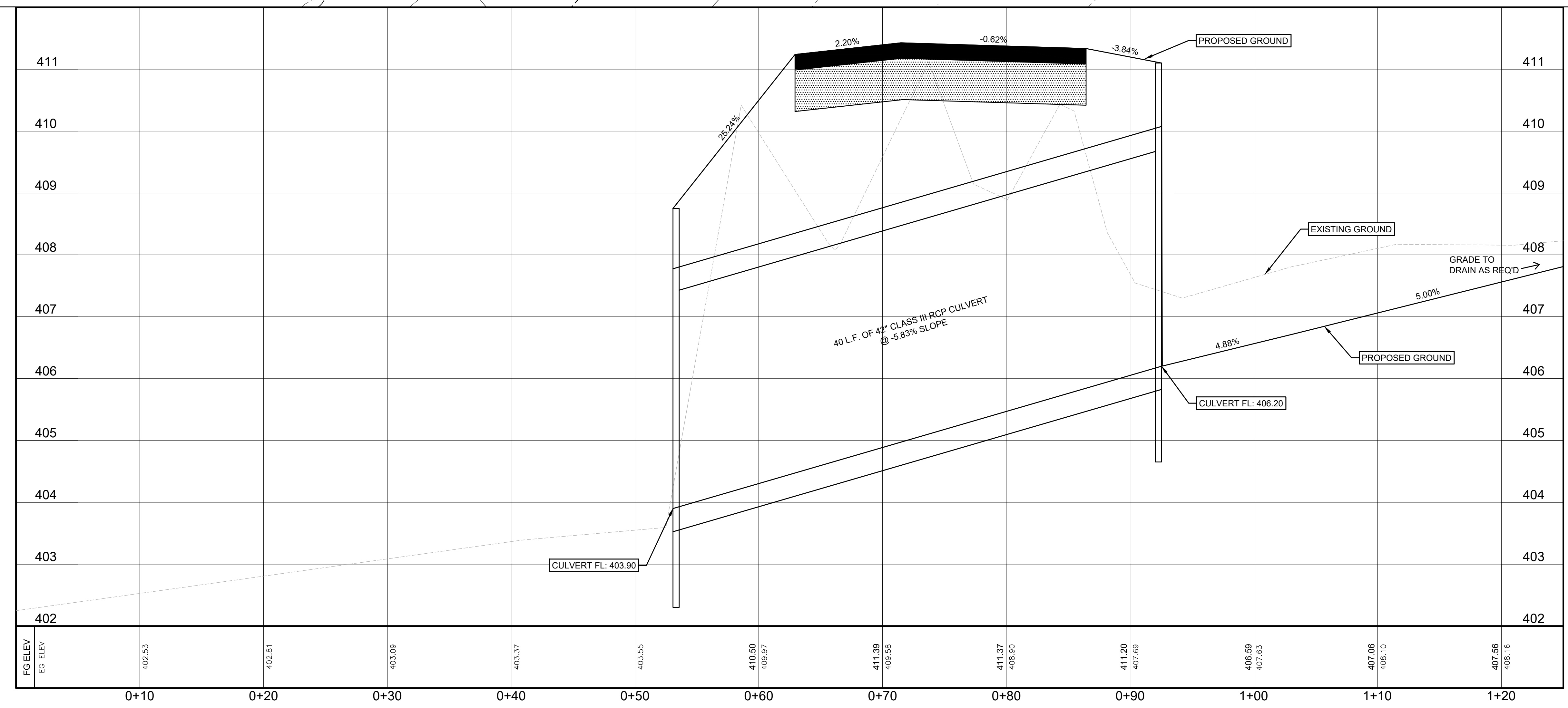


- NOTES:**
- CONTRACTOR SHALL LIMIT DISTURBED AREAS TO THE RIGHT-OF-WAY. ANY AREAS DISTURBED BY THE CONTRACTOR OUTSIDE OF THE RIGHT-OF-WAY, UNLESS OTHERWISE DIRECTED BY THE ENGINEER, SHALL BE RESTORED TO THE PRE-CONSTRUCTION CONDITIONS AT THE CONTRACTORS EXPENSE.
 - PAVEMENT RECONSTRUCTION IS INTENDED TO MATCH EXISTING GRADES AT TIE-IN LOCATIONS AND PROVIDE POSITIVE DRAINAGE AWAY FROM THE ROAD. NO NEW PAVEMENT SHALL POND WATER.



WARNING!!!
UNDERGROUND AND OVERHEAD UTILITIES IN AREA. CONTRACTOR TO CONTACT AREA UTILITY REPRESENTATIVE 48 HOURS PRIOR TO EXCAVATION.

!!! WARNING !!!
THE ENGINEER ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OF THE LOCATION OF UNDERGROUND UTILITIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATION AND AVOIDING ALL EXISTING UTILITIES BY CALLING THE "ONE CALL" LOCATOR SERVICE AT 1-800-344-8377 (DIG TESS) OR 1-800-245-4545 TEXAS ONE CALL AT LEAST 48 HOURS PRIOR TO CONSTRUCTION.

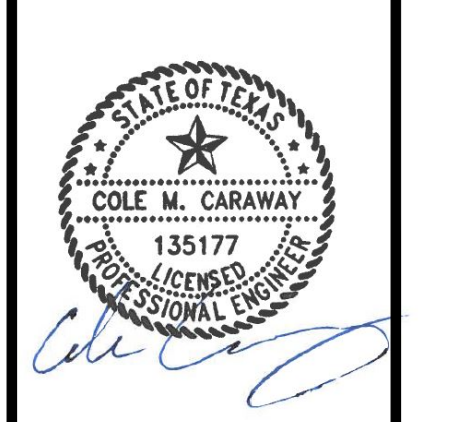


MARK	REVISION	DATE
0	ISSUED FOR CONSTRUCTION	9/20/19

**MILAM ST. PROPOSED
CULVERT
REPLACEMENT**

**CITY OF SAN AUGUSTINE
FEMA CULVERT REPAIRS
SAN AUGUSTINE COUNTY,
TEXAS**

DRAWN BY: SANGLIN	DESIGNED BY: CMC	LATEST REVISION: 9/19/2019	KSA JOB NO.:	SHEET NO.:
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SEAL:
TBPE Firm Registration No. F-1356
SHEET NO.
9

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DATE:
FILE:

TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (4)

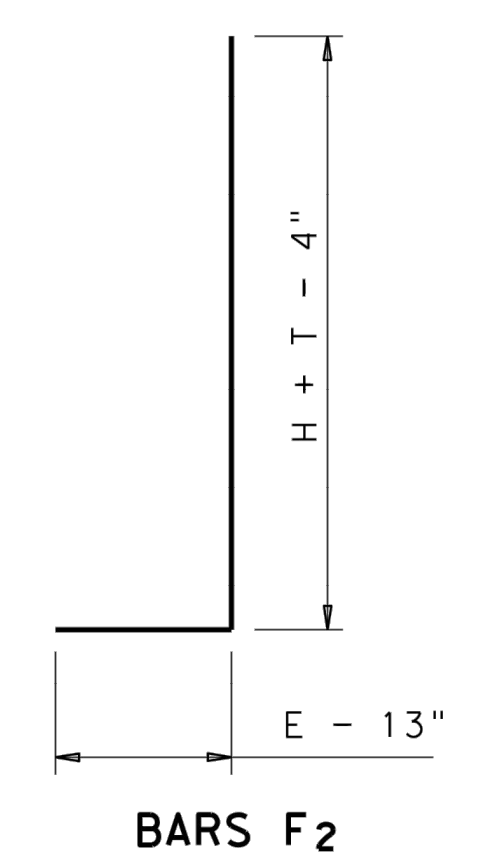
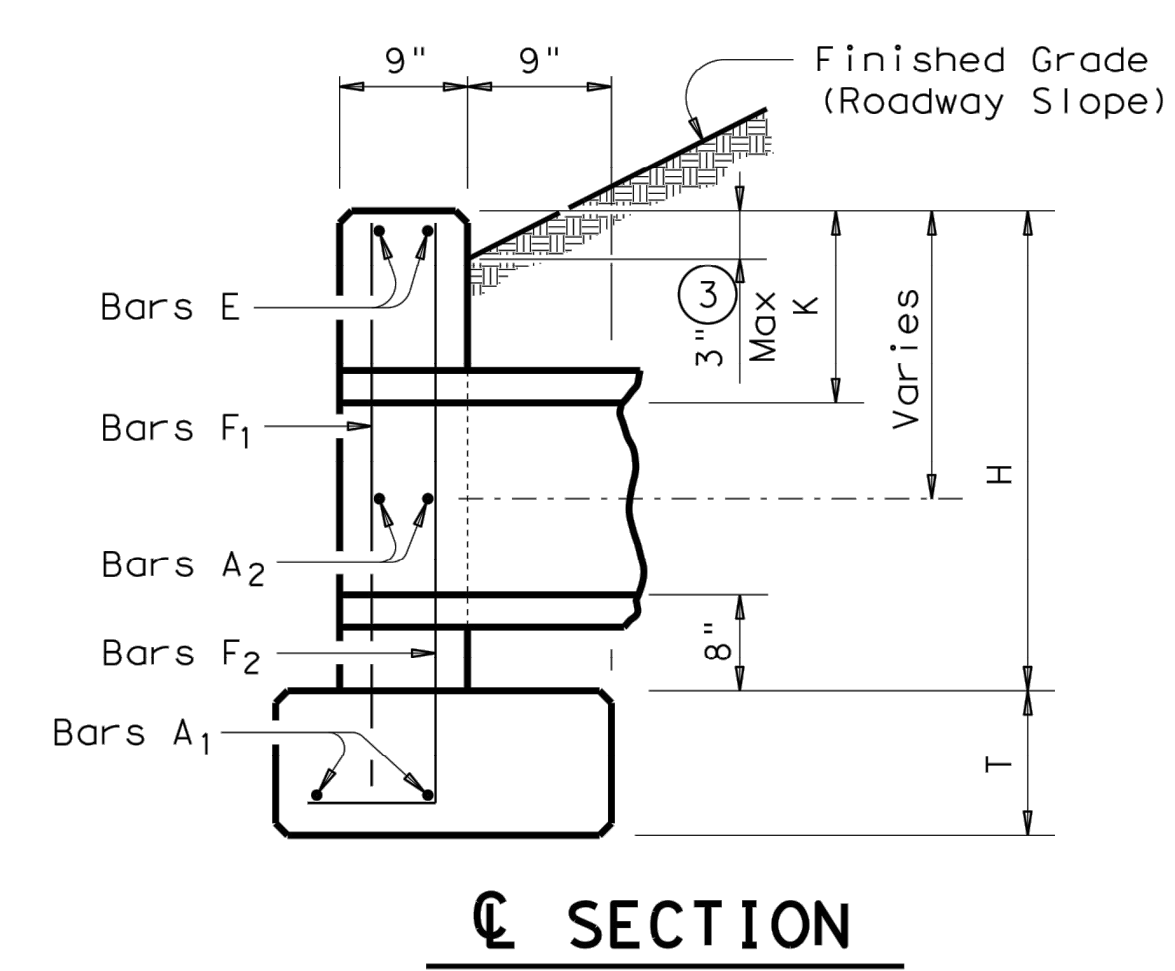
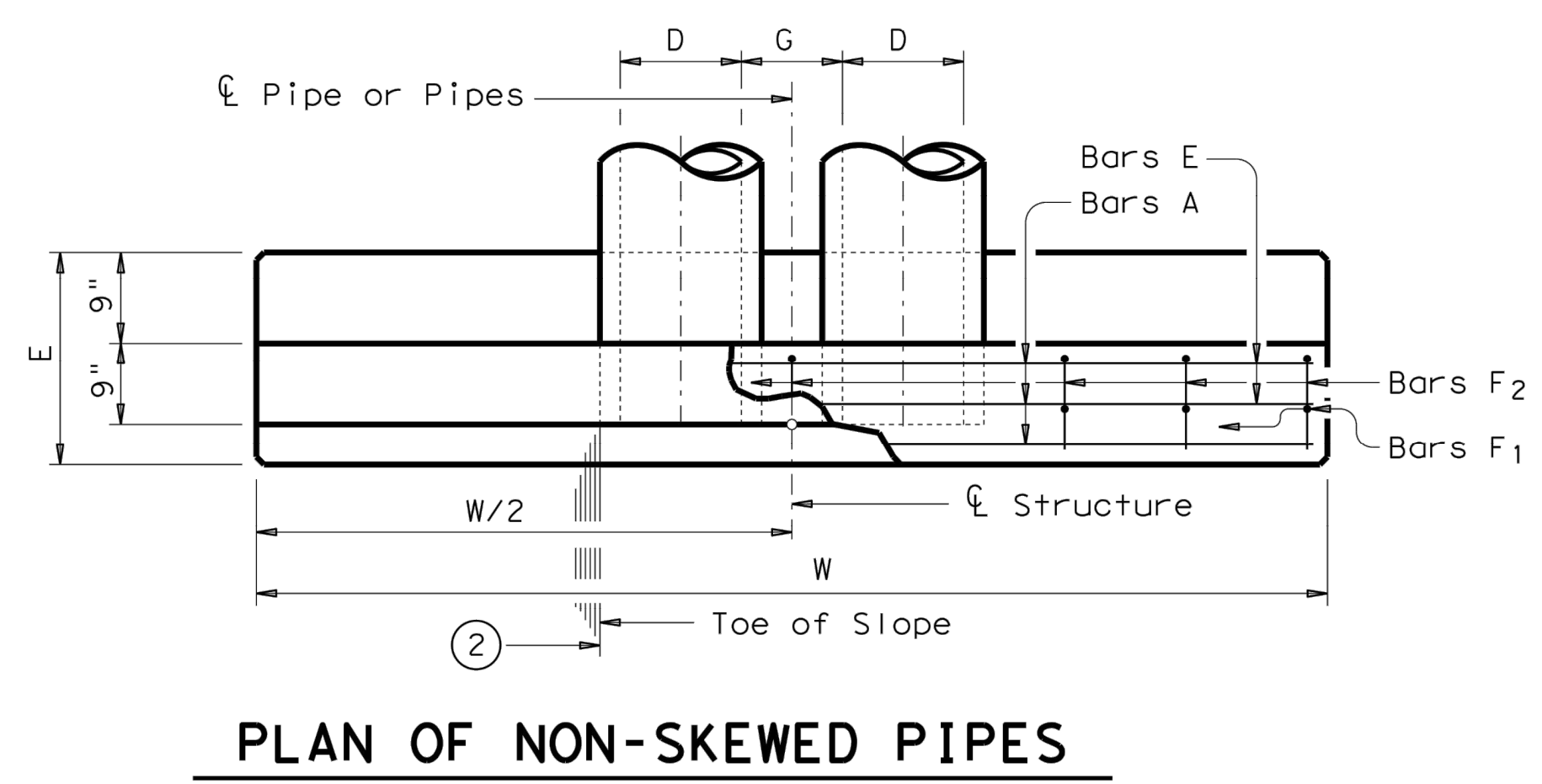
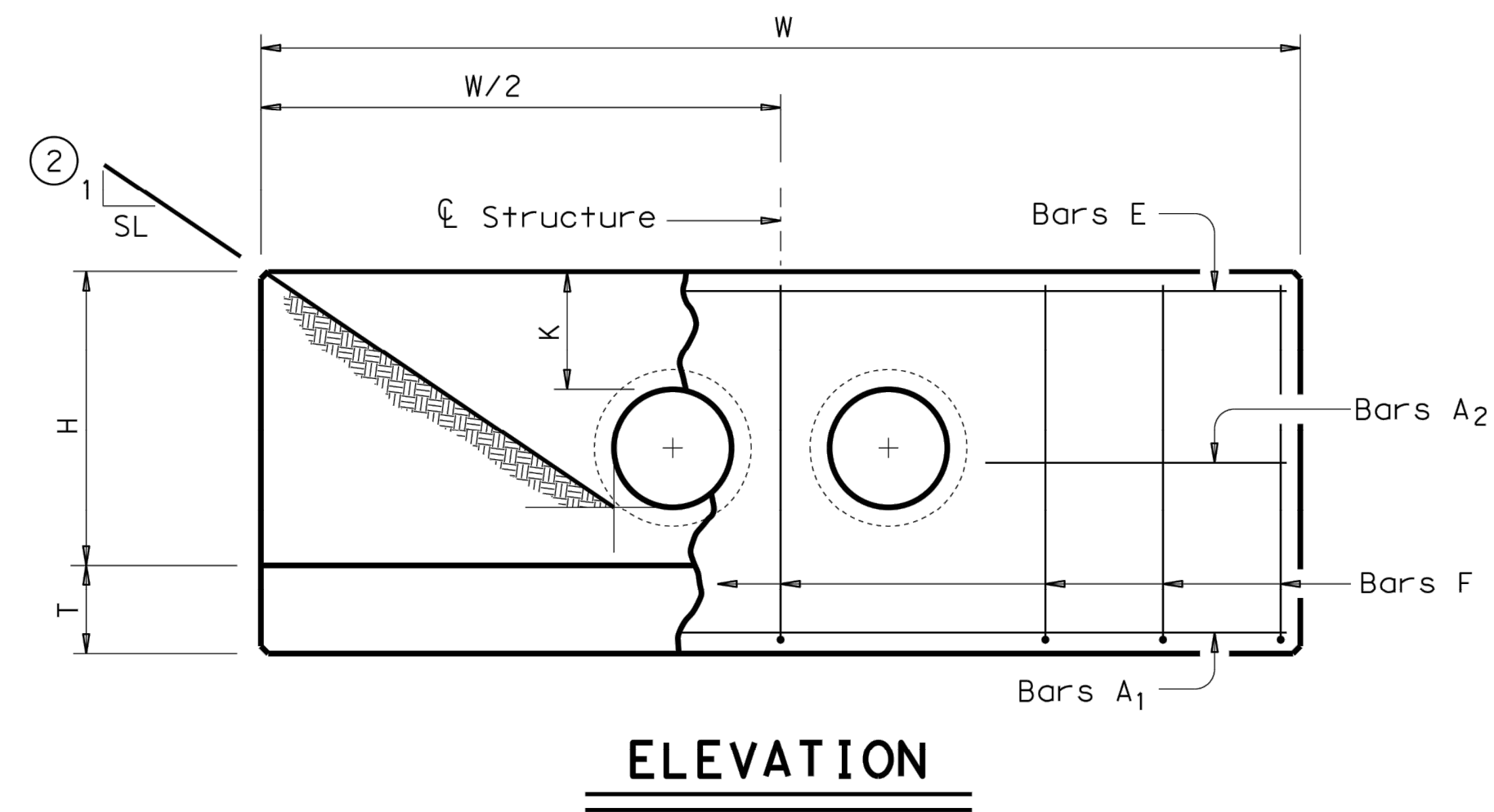
SLOPE	Values for one Pipe			Values to be added for each add'l Pipe			
	W	Reinf (Lbs)	Conc (CY)	W	Reinf (Lbs)	Conc (CY)	
2:1	12"	9'-0"	122	1.1	1'-9"	15	0.2
	15"	10'-3"	136	1.3	2'-2"	16	0.2
	18"	11'-6"	163	1.5	2'-8"	19	0.3
	21"	12'-9"	200	1.8	3'-1"	31	0.4
	24"	14'-0"	217	2.1	3'-7"	34	0.4
	27"	15'-3"	254	2.4	3'-11"	37	0.5
	30"	16'-6"	272	2.7	4'-4"	40	0.6
	33"	17'-9"	314	3.1	4'-8"	43	0.6
	36"	19'-0"	371	3.9	5'-1"	46	0.8
	42"	21'-6"	442	4.9	5'-10"	52	1.0
	48"	25'-0"	569	6.4	6'-7"	59	1.3
	54"	27'-6"	701	7.5	7'-6"	82	1.6
60"	30'-0"	794	8.8	8'-3"	90	1.8	
66"	32'-6"	894	10.2	8'-9"	96	2.0	
72"	35'-0"	1055	11.7	9'-4"	103	2.3	
3:1	12"	13'-0"	175	1.6	1'-9"	14	0.2
	15"	14'-9"	193	1.9	2'-2"	17	0.2
	18"	16'-6"	228	2.2	2'-8"	19	0.3
	21"	18'-3"	299	2.6	3'-1"	31	0.4
	24"	20'-0"	323	3.0	3'-7"	33	0.4
	27"	21'-9"	371	3.5	3'-11"	37	0.5
	30"	23'-6"	415	4.0	4'-4"	40	0.5
	33"	25'-3"	469	4.6	4'-8"	43	0.6
	36"	27'-0"	556	5.7	5'-1"	46	0.8
	42"	30'-6"	675	7.1	5'-10"	52	1.0
	48"	35'-6"	837	9.2	6'-7"	59	1.3
	54"	39'-0"	1015	11.0	7'-6"	84	1.6
60"	42'-6"	1171	12.9	8'-3"	91	1.8	
66"	46'-0"	1298	14.9	8'-9"	98	2.0	
72"	49'-6"	1561	17.1	9'-4"	103	2.3	
4:1	12"	17'-0"	229	2.0	1'-9"	15	0.2
	15"	19'-3"	266	2.4	2'-2"	17	0.2
	18"	21'-6"	308	2.9	2'-8"	19	0.3
	21"	23'-9"	382	3.5	3'-1"	31	0.3
	24"	26'-0"	430	3.9	3'-7"	34	0.4
	27"	28'-3"	486	4.7	3'-11"	37	0.5
	30"	30'-6"	539	5.2	4'-4"	40	0.6
	33"	32'-9"	603	6.0	4'-8"	42	0.6
	36"	35'-0"	738	7.5	5'-1"	47	0.8
	42"	39'-6"	881	9.3	5'-10"	52	1.0
	48"	46'-0"	1102	12.1	6'-7"	61	1.3
	54"	50'-6"	1364	14.4	7'-6"	84	1.6
60"	55'-0"	1547	16.9	8'-3"	91	1.8	
66"	59'-6"	1741	19.5	8'-9"	98	2.0	
72"	64'-0"	2069	22.4	9'-4"	102	2.3	
6:1	12"	25'-0"	336	3.0	1'-9"	14	0.2
	15"	28'-3"	384	3.6	2'-2"	17	0.2
	18"	31'-6"	452	4.2	2'-8"	19	0.3
	21"	34'-9"	581	5.1	3'-1"	31	0.4
	24"	38'-0"	644	5.8	3'-7"	34	0.4
	27"	41'-3"	737	6.9	3'-11"	37	0.5
	30"	44'-6"	807	7.7	4'-4"	39	0.6
	33"	47'-9"	912	8.9	4'-8"	44	0.6
	36"	51'-0"	1108	11.0	5'-1"	48	0.8
	42"	57'-6"	1318	13.7	5'-10"	54	1.0
	48"	67'-0"	1674	17.9	6'-7"	59	1.3
	54"	73'-6"	2064	21.3	7'-6"	83	1.6
60"	80'-0"	2343	24.9	8'-3"	89	1.8	
66"	86'-6"	2635	28.9	8'-9"	96	2.0	
72"	93'-0"	3123	33.1	9'-4"	101	2.3	

TABLE OF CONSTANT DIMENSIONS

DIA OF PIPE, D	G	K	H	T	E
12"	9"	1'-0"	2'-8"	9"	1'-9"
15"	11"	1'-0"	2'-11"	9"	1'-9"
18"	1'-2"	1'-0"	3'-2"	9"	1'-9"
21"	1'-4"	1'-0"	3'-5"	9"	2'-0"
24"	1'-7"	1'-0"	3'-8"	9"	2'-0"
27"	1'-8"	1'-0"	3'-11"	9"	2'-3"
30"	1'-10"	1'-0"	4'-2"	9"	2'-3"
33"	1'-11"	1'-0"	4'-5"	9"	2'-6"
36"	2'-1"	1'-0"	4'-8"	1'-0"	2'-6"
42"	2'-4"	1'-0"	5'-2"	1'-0"	2'-9"
48"	2'-7"	1'-3"	5'-11"	1'-0"	3'-0"
54"	3'-0"	1'-3"	6'-5"	1'-0"	3'-3"
60"	3'-3"	1'-3"	6'-11"	1'-0"	3'-6"
66"	3'-3"	1'-3"	7'-5"	1'-0"	3'-9"
72"	3'-4"	1'-3"	7'-11"	1'-0"	4'-0"

TABLE OF REINFORCING STEEL (4)

Bar	Size	Spa	No.
A1	# 5	~	2
A2	# 5	1'-6"	~
E	# 5	~	2
F	# 5	1'-0"	~



GENERAL NOTES:
Designed according to AASHTO LRFD Specifications.
Reinforcing steel shall be placed with the center of the outside layer of bars 2" from the surface of the concrete.
All reinforcing steel shall be Grade 60.
All concrete shall be Class "C" and shall have a minimum compressive strength of 3600 psi.
No bridge rails of any type may be mounted directly to these culvert headwalls.

- ① Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.
- ② Indicated slope is perpendicular to centerline Pipe or Pipes.
- ③ For vehicle safety, curbs shall project no more than 3" above finished grade. Curb heights shall be reduced, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
- ④ Quantities shown are for one structure end only (one headwall).

Texas Department of Transportation Bridge Division Standard

CONCRETE HEADWALLS WITH PARALLEL WINGS FOR NON-SKEWED PIPE CULVERTS

CH-PW-0

FILE: chpw0ste.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: GAF
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST		COUNTY	SHEET NO.

TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (4)

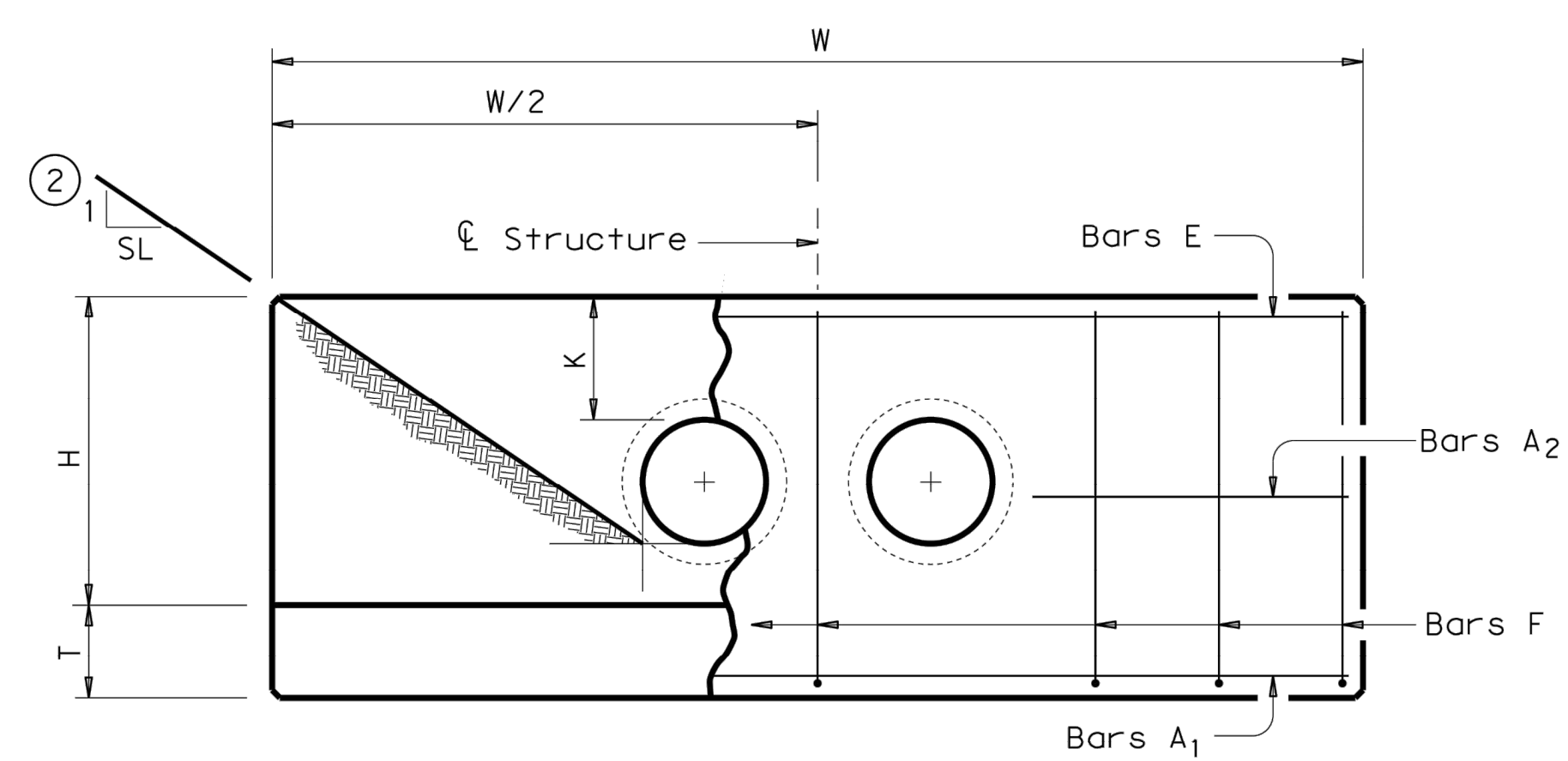
SLOPE DIA OF PIPE, D	15 Degrees						30 Degrees						45 Degrees						
	Values for one Pipe			Values to be added for each add'l Pipe			Values for one Pipe			Values to be added for each add'l Pipe			Values for one Pipe			Values to be added for each add'l Pipe			
	W	Reinf (Lbs)	Conc (CY)	W	Reinf (Lbs)	Conc (CY)	W	Reinf (Lbs)	Conc (CY)	W	Reinf (Lbs)	Conc (CY)	W	Reinf (Lbs)	Conc (CY)	W	Reinf (Lbs)	Conc (CY)	
2:1	12"	9'-4"	124	1.1	1'-9 3/4"	15	0.2	10'-5"	130	1.2	2'-0"	16	0.2	12'-9"	159	1.5	2'-5 3/4"	17	0.3
	15"	10'-7"	136	1.3	2'-3"	17	0.2	11'-10"	159	1.5	2'-6"	18	0.2	14'-6"	191	1.8	3'-0 3/4"	20	0.3
	18"	11'-11"	165	1.5	2'-9"	19	0.3	13'-3"	174	1.7	3'-1"	29	0.3	16'-3"	207	2.1	3'-9 1/4"	33	0.4
	21"	13'-2"	203	1.9	3'-2 1/4"	31	0.4	14'-9"	233	2.1	3'-6 3/4"	33	0.4	18'-0"	276	2.6	4'-4 1/4"	36	0.5
	24"	14'-6"	240	2.1	3'-8 1/4"	34	0.4	16'-2"	251	2.4	4'-1 3/4"	36	0.5	19'-10"	318	2.9	5'-0 3/4"	39	0.6
	27"	15'-9"	258	2.5	4'-0 3/4"	38	0.5	17'-7"	292	2.8	4'-6 1/4"	39	0.6	21'-7"	342	3.4	5'-6 1/4"	44	0.7
	30"	17'-1"	297	2.8	4'-5 3/4"	40	0.6	19'-1"	311	3.1	5'-0"	42	0.6	23'-4"	388	3.8	6'-1 3/4"	47	0.8
	33"	18'-5"	320	3.3	4'-9 3/4"	43	0.6	20'-6"	358	3.6	5'-4 3/4"	46	0.7	25'-1"	439	4.4	6'-7 1/4"	51	0.9
	36"	19'-8"	401	4.0	5'-3"	47	0.9	21'-11"	422	4.5	5'-10 3/4"	50	0.9	26'-10"	517	5.5	7'-2 1/4"	55	1.2
	42"	22'-3"	476	5.0	6'-0 3/4"	53	1.1	24'-10"	528	5.6	6'-8 3/4"	56	1.2	30'-5"	634	6.9	8'-3"	76	1.4
	48"	25'-11"	577	6.6	6'-9 3/4"	60	1.3	28'-10"	637	7.3	7'-7 1/4"	79	1.5	35'-4"	791	9.0	9'-3 3/4"	88	1.8
	54"	28'-6"	711	7.8	7'-9"	83	1.6	31'-9"	781	8.7	8'-8"	87	1.8	38'-11"	958	10.7	10'-7 1/4"	97	2.2
	60"	31'-1"	805	9.2	8'-6 1/4"	91	1.9	34'-8"	881	10.2	9'-6 1/4"	97	2.1	42'-5"	1113	12.5	11'-8"	124	2.6
	66"	33'-8"	907	10.6	9'-0 3/4"	98	2.1	37'-6"	1028	11.8	10'-1 1/4"	102	2.4	46'-0"	1235	14.5	12'-4 1/4"	132	2.9
	72"	36'-3"	1071	12.1	9'-8"	105	2.4	40'-5"	1207	13.5	10'-9 1/4"	110	2.6	49'-6"	1446	16.6	13'-2 1/4"	141	3.2
3:1	12"	13'-6"	178	1.6	1'-9 3/4"	15	0.2	15'-0"	189	1.8	2'-0"	15	0.2	18'-5"	237	2.2	2'-5 3/4"	17	0.2
	15"	15'-3"	212	1.9	2'-3"	17	0.2	17'-0"	223	2.1	2'-6"	17	0.3	20'-10"	276	2.6	3'-0 3/4"	20	0.3
	18"	17'-1"	231	2.3	2'-9"	19	0.3	19'-1"	259	2.5	3'-1"	29	0.3	23'-4"	318	3.1	3'-9 1/4"	32	0.4
	21"	18'-11"	306	2.7	3'-2 1/4"	31	0.4	21'-1"	339	3.0	3'-6 3/4"	33	0.4	25'-10"	413	3.7	4'-4 1/4"	36	0.5
	24"	20'-8"	345	3.1	3'-8 3/4"	35	0.4	23'-1"	384	3.5	4'-1 3/4"	36	0.5	28'-3"	462	4.2	5'-0 3/4"	40	0.6
	27"	22'-6"	376	3.7	4'-0 3/4"	38	0.5	25'-1"	438	4.1	4'-6 1/4"	39	0.6	30'-9"	522	5.0	5'-6 1/4"	44	0.7
	30"	24'-4"	422	4.1	4'-5 3/4"	40	0.6	27'-2"	466	4.6	5'-0"	42	0.6	33'-3"	578	5.6	6'-1 3/4"	47	0.8
	33"	26'-2"	476	4.8	4'-10"	43	0.6	29'-2"	522	5.3	5'-4 3/4"	46	0.7	35'-9"	644	6.5	6'-7 1/4"	51	0.9
	36"	27'-11"	590	5.9	5'-3 1/4"	47	0.8	31'-2"	645	6.6	5'-10 3/4"	50	0.9	38'-2"	787	8.0	7'-2 1/4"	56	1.2
	42"	31'-7"	684	7.3	6'-0 1/4"	53	1.1	35'-3"	776	8.2	6'-8 3/4"	56	1.2	43'-2"	933	10.0	8'-3"	79	1.4
	48"	36'-9"	880	9.6	6'-9 3/4"	61	1.3	41'-0"	953	10.7	7'-7 1/4"	81	1.5	50'-2"	1166	13.1	9'-3 3/4"	88	1.8
	54"	40'-5"	1065	11.4	7'-9"	85	1.6	45'-0"	1185	12.7	8'-8"	89	1.8	55'-2"	1435	15.5	10'-7 1/4"	97	2.2
	60"	44'-0"	1224	13.3	8'-6 1/4"	93	1.9	49'-1"	1356	14.8	9'-6 1/4"	96	2.1	60'-1"	1627	18.2	11'-8"	124	2.6
	66"	47'-7"	1357	15.4	9'-1"	98	2.1	53'-1"	1497	17.2	10'-1 1/4"	103	2.3	65'-1"	1834	21.1	12'-4 1/4"	130	2.9
	72"	51'-3"	1624	17.7	9'-8"	105	2.3	57'-2"	1787	19.7	10'-9 1/4"	109	2.6	70'-0"	2210	24.1	13'-2 1/4"	139	3.2
4:1	12"	17'-7"	232	2.1	1'-9 3/4"	15	0.2	19'-8"	259	2.4	2'-0"	16	0.2	24'-0"	314	2.9	2'-5 3/4"	18	0.2
	15"	19'-11"	272	2.5	2'-3"	17	0.2	22'-3"	301	2.8	2'-6"	18	0.3	27'-3"	361	3.5	3'-0 3/4"	21	0.3
	18"	22'-3"	313	3.0	2'-9"	19	0.3	24'-10"	344	3.3	3'-1"	29	0.3	30'-5"	427	4.0	3'-9 1/4"	32	0.4
	21"	24'-7"	407	3.6	3'-2 1/4"	31	0.4	27'-5"	446	4.0	3'-6 3/4"	33	0.4	33'-7"	549	4.9	4'-4 1/4"	36	0.5
	24"	26'-11"	455	4.1	3'-8 3/4"	35	0.4	30'-0"	499	4.5	4'-1 3/4"	36	0.5	36'-9"	609	5.6	5'-0 3/4"	40	0.6
	27"	29'-3"	514	4.8	4'-0 3/4"	38	0.5	32'-7"	562	5.4	4'-6 1/4"	40	0.6	39'-11"	703	6.6	5'-6 1/4"	43	0.7
	30"	31'-7"	568	5.4	4'-5 3/4"	40	0.6	35'-3"	620	6.0	5'-0"	42	0.6	43'-2"	768	7.4	6'-1 3/4"	49	0.8
	33"	33'-11"	634	6.2	4'-10"	43	0.7	37'-10"	710	7.0	5'-4 3/4"	46	0.7	46'-4"	848	8.5	6'-7 1/4"	52	0.9
	36"	36'-3"	776	7.7	5'-3"	48	0.9	40'-5"	868	8.6	5'-10 3/4"	49	0.9	49'-6"	1058	10.6	7'-2 1/4"	56	1.1
	42"	40'-11"	921	9.6	6'-0 1/4"	53	1.0	45'-7"	1022	10.7	6'-8 3/4"	57	1.2	55'-10"	1262	13.1	8'-3"	78	1.4
	48"	47'-7"	1152	12.6	6'-10"	61	1.3	53'-1"	1268	14.0	7'-7 1/4"	80	1.5	65'-1"	1579	17.2	9'-3 3/4"	86	1.8
	54"	52'-3"	1416	14.9	7'-9 1/4"	86	1.6	58'-4"	1589	16.6	8'-8"	89	1.8	71'-5"	1916	20.4	10'-7 1/4"	95	2.2
	60"	56'-11"	1606	17.5	8'-6 3/4"	92	1.9	63'-6"	1798	19.5	9'-6 1/4"	95	2.1	77'-9"	2184	23.9	11'-8"	122	2.6
	66"	61'-7"	1811	20.2	9'-0 3/4"	97	2.1	68'-8"	2011	22.5	10'-1 1/4"	101	2.4	84'-2"	2464	27.6	12'-4 1/4"	131	2.9
	72"	66'-3"	2142	23.2	9'-8"	104	2.4	73'-11"	2371	25.9	10'-9 1/4"	108	2.6	90'-6"	2929	31.7	13'-2 1/4"	138	3.2
6:1	12"	25'-11"	342	3.1	1'-9 3/4"	15	0.2	28'-10"	374	3.5	2'-0"	16	0.2	35'-4"	456	4.3	2'-5 3/4"	17	0.2
	15"	29'-3"	390	3.7	2'-3"	17	0.2	32'-7"	442	4.2	2'-6"	18	0.2	39'-11"	549	5.1	3'-0 3/4"	20	0.3
	18"	32'-7"	459	4.4	2'-9"	20	0.3	36'-4"	515	4.9	3'-1"	29	0.3	44'-7"	629	6.0	3'-9 1/4"	33	0.4
	21"	36'-0"	608	5.3	3'-2 1/4"	31	0.4	40'-2"	660	5.9	3'-6 3/4"	33	0.4	49'-2"	823	7.2	4'-4 1/4"	38	0.5
	24"	39'-4"	672	6.0	3'-8 3/4"	35	0.4	43'-11"	748	6.7	4'-1 3/4"	36	0.5	53'-9"	920	8.2	5'-0 3/4"	42	0.6
	27"	42'-8"	770	7.1	4'-0 3/4"	38	0.5	47'-8"	852	8.0	4'-6 1/4"	41	0.5	58'-4"	1039	9.7	5'-6 1/4"	45	0.7
	30"	46'-1"	839	8.0	4'-5 3/4"	40	0.6	51'-5"	949	8.9	5'-0"	44	0.6	62'-11"	1154	10.9	6'-1 3/4"	48	0.8
	33"	49'-5"	947	9.2	4'-10"	45	0.7	55'-2"	1040	10.3	5'-4 3/4"	48	0.7	67'-6"	1284	12.6	6'-7 1/4"	50	0.9
	36"	52'-10"	1151	11.4	5'-3"	49	0.8	58'-11"	1287	12.7	5'-10 3/4"	51	1.0	72'-1"	1575	15.6	7'-2 1/4"	55	1.1
	42"	59'-6"	1365	14.2	6'-0 1/4"	55	1.0	66'-5"	1522	15.8	6'-8 3/4"	57	1.2	81'-4"	1867	19.4	8'-3"	76	1.4
	48"	69'-4"	1729	18.5	6'-10"	59	1.3	77'-4"	1934	20.7	7'-7 1/4"	79	1.5	94'-9"	2360	25.3	9'-3 3/4"	86	1.8
	54"	76'-1"	2130	22.0	7'-9 1/4"	83	1.6	84'-10"	2370	24.6	8'-8"	87	1.8	103'-11"	2904	30.1	10'-7 1/4"	95	2.2
	60"	82'-10"	2414	25.8	8'-6 3/4"	90	1.9	92'-5"	2673	28.8	9'-6 1/4"	94	2.1	113'-2"	3286	35.3	11'-8"	122	2.6
	66"	89'-7"	2712	29.9	9'-0 3/4"	96	2.1	99'-11"	3030	33.3	10'-1 1/4"	101	2.4	122'-4"	3689	40.8	12'-4 1/4"	130	2.9
	72"	96'-3"	3210	34.2	9'-8"	102	2.4	107'-5"	3572	38.2	10'-9 1/4"	108	2.6	131'-6"	4364	46.8	13'-2 1/4"	139	3.2

TABLE OF CONSTANT DIMENSIONS

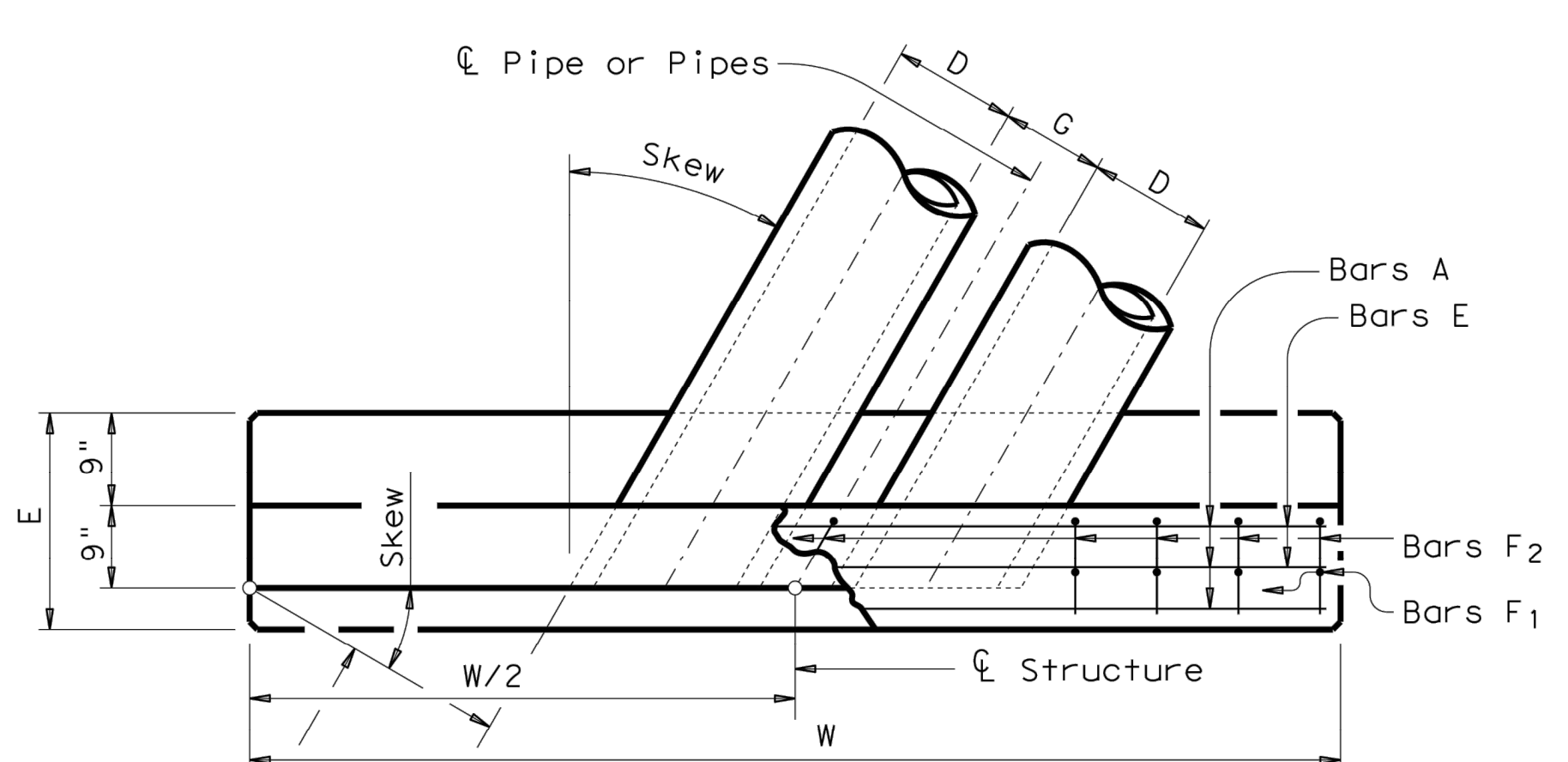
DIA OF PIPE, D	G	K	H	T	E
12"	9"	1'-0"	2'-8"	9"	1'-9"
15"	11"	1'-0"	2'-11"	9"	1'-9"
18"	1'-2"	1'-0"	3'-2"	9"	1'-9"
21"	1'-4"	1'-0"	3'-5"	9"	2'-0"
24"	1'-7"	1'-0"	3'-8"	9"	2'-0"
27"	1'-8"	1'-0"	3'-11"	9"	2'-3"
30"	1'-10"	1'-0"	4'-2"	9"	2'-3"
33"	1'-11"	1'-0"	4'-5"	9"	2'-6"
36"	2'-1"	1'-0"	4'-8"	1'-0"	2'-6"
42"	2'-4"	1'-0"	5'-2"	1'-0"	2'-9"
48"	2'-7"	1'-3"	5'-11"	1'-0"	3'-0"
54"	3'-0"	1'-3"	6'-5"	1'-0"	3'-3"
60"	3'-3"	1'-3"	6'-11"	1'-0"	3'-6"
66"	3'-3"	1'-3"	7'-5"	1'-0"	3'-9"
72"	3'-4"	1'-3"	7'-11"	1'-0"	4'-0"

TABLE OF REINFORCING STEEL (4)

Bar	Size	Spa	No.
A1	# 5	~	2
A2	# 5	1'-6"	~
E	# 5	~	2
F	# 5	1'-0"	~



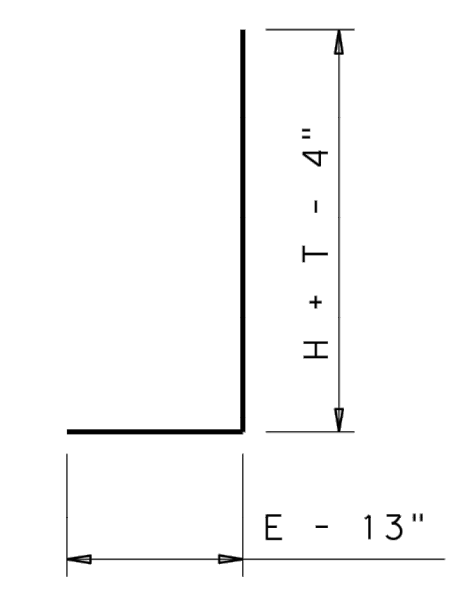
ELEVATION



PLAN OF SKEWED PIPES

Showing 30° Skew

Lengths of wings based on SL:1 Slope along this line.



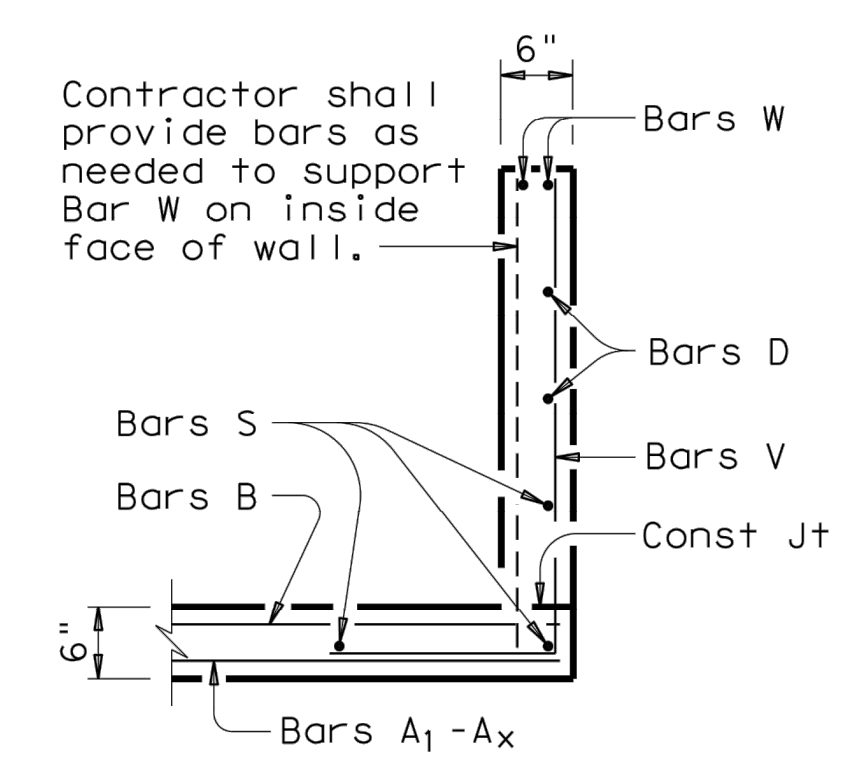
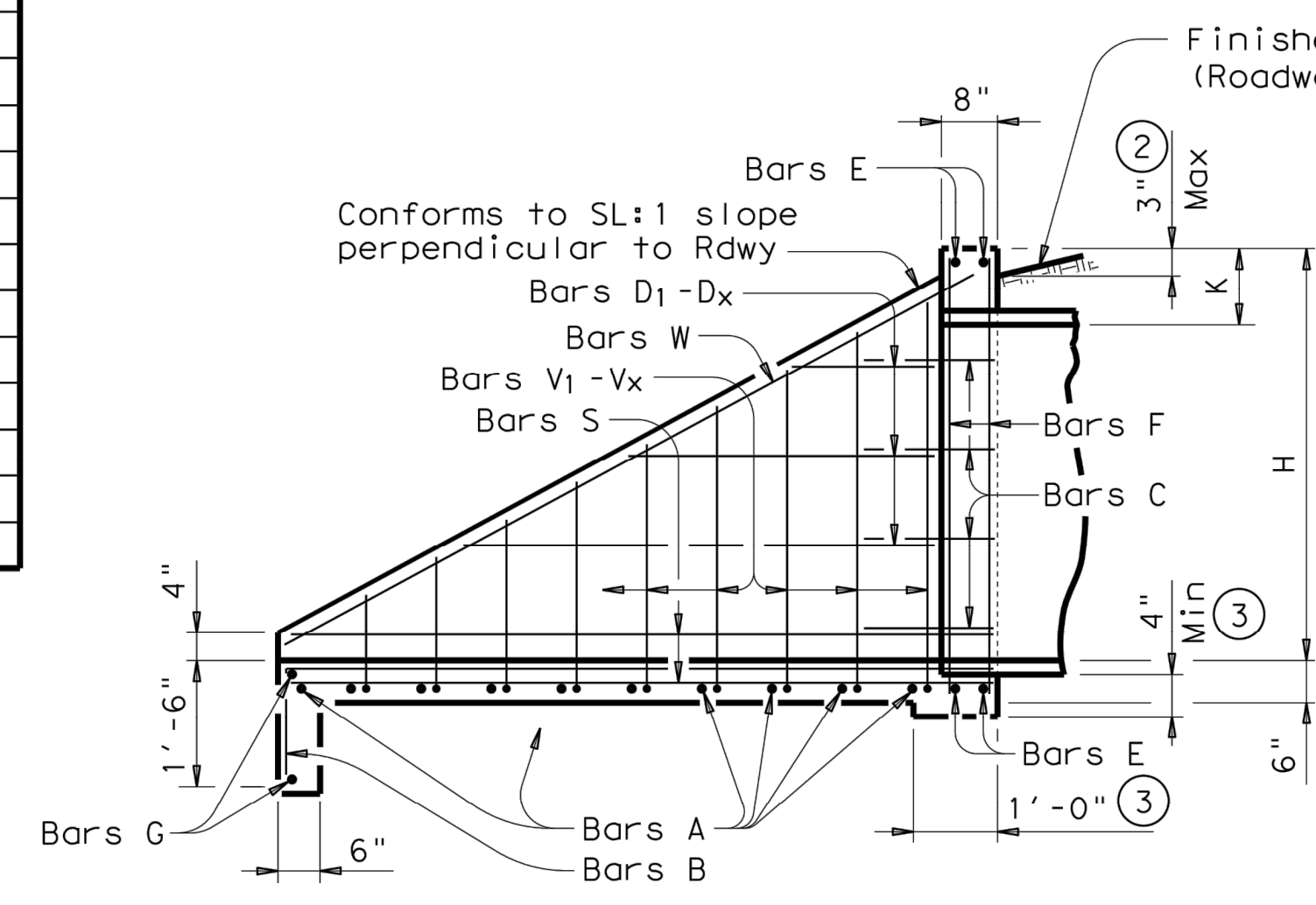
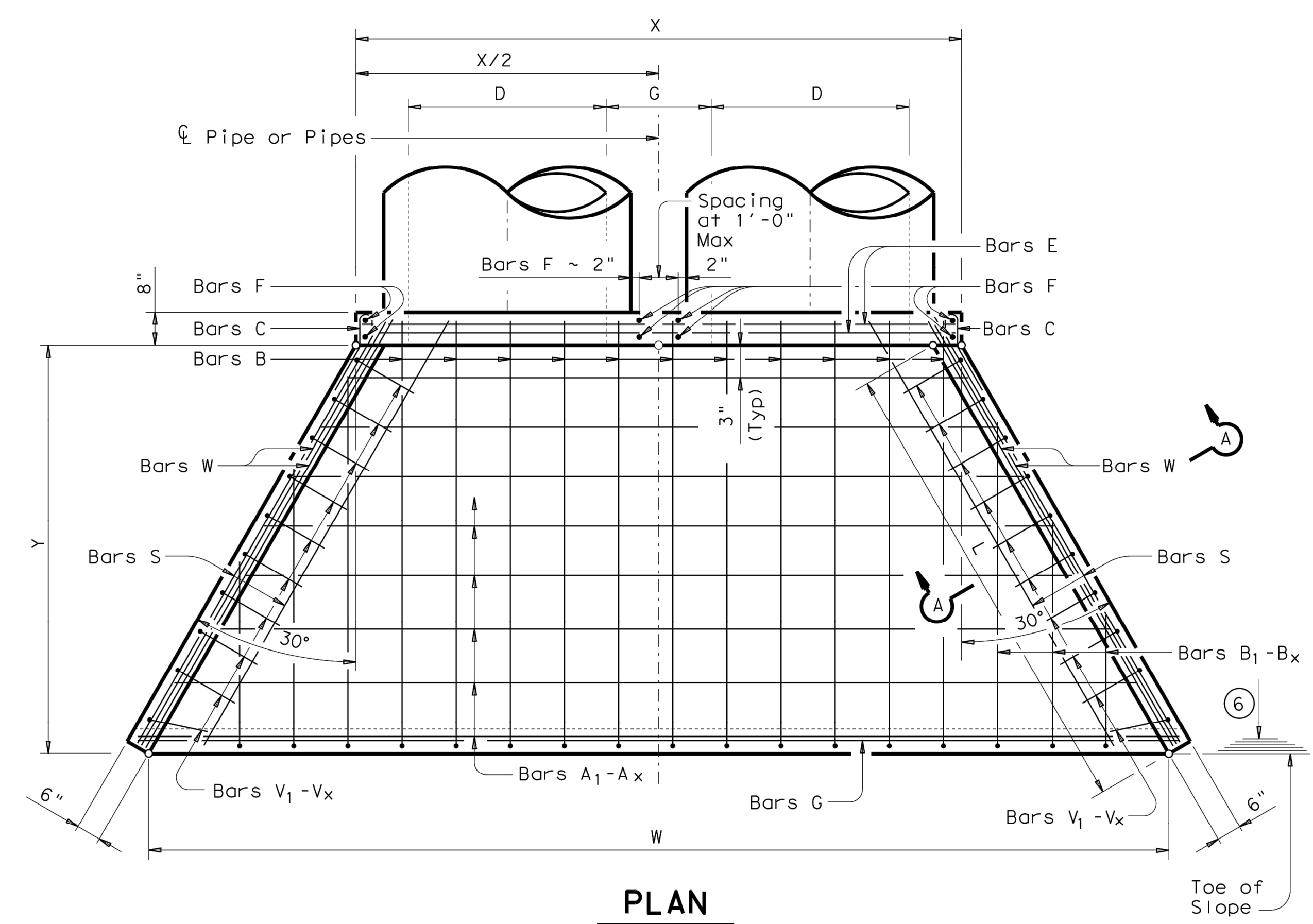
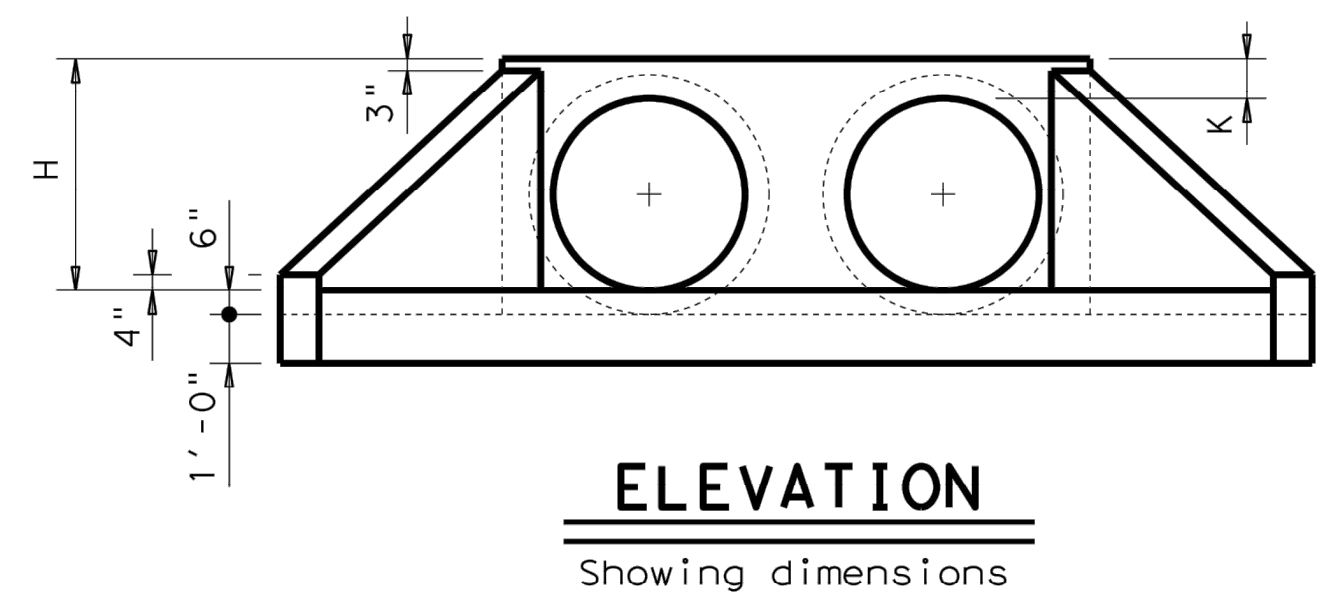
BARS F2

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DATE: FILE:

TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (4)

SLOPE DIA OF PIPE, D	Values for one Pipe					Values to be added for each add'l Pipe				
	W	X	Y	L	Reinf (Lbs)	Conc (CY) (1)	X and W	Reinf (Lbs)	Conc (CY) (1)	
12"	4'-7 1/2"	2'-6"	2'-10"	3'-3 1/4"	84	0.6	1'-9"	20	0.2	
15"	5'-5 3/4"	2'-9 1/2"	3'-4"	3'-10 1/4"	99	0.7	2'-2"	24	0.3	
18"	6'-4 1/4"	3'-1"	3'-10"	4'-5"	120	0.9	2'-8"	32	0.3	
21"	7'-2 3/4"	3'-4 1/2"	4'-4"	5'-0"	137	1.1	3'-1"	43	0.4	
24"	8'-2 1/2"	3'-9 1/2"	4'-10"	5'-7"	158	1.3	3'-7"	50	0.5	
27"	9'-1"	4'-1"	5'-4"	6'-2"	173	1.5	3'-11"	56	0.6	
30"	9'-11 1/2"	4'-4 1/2"	5'-10"	6'-8 3/4"	197	1.7	4'-4"	65	0.8	
33"	10'-10"	4'-8"	6'-4"	7'-3 3/4"	216	2.0	4'-8"	71	0.9	
36"	11'-8 1/4"	4'-11 1/2"	6'-10"	7'-10 3/4"	241	2.2	5'-1"	81	1.0	
42"	13'-5 1/4"	5'-6 1/2"	7'-10"	9'-0 1/2"	290	2.8	5'-10"	97	1.3	
48"	15'-9"	6'-1 1/2"	9'-4"	10'-9 1/4"	350	3.8	6'-7"	117	1.7	
54"	17'-5 3/4"	6'-8 1/2"	10'-4"	11'-11 1/4"	415	4.5	7'-6"	151	2.1	
60"	19'-2 3/4"	7'-3 1/2"	11'-4"	13'-1"	469	5.3	8'-3"	174	2.5	
66"	20'-11 1/2"	7'-10 1/2"	12'-4"	14'-3"	530	6.2	8'-9"	194	2.9	
72"	22'-8 1/2"	8'-5 1/2"	13'-4"	15'-4 3/4"	587	7.1	9'-4"	213	3.3	
12"	6'-3"	2'-6"	4'-3"	4'-11"	114	0.8	1'-9"	22	0.2	
15"	7'-5"	2'-9 1/2"	5'-0"	5'-9 1/4"	133	1.1	2'-2"	28	0.3	
18"	8'-6 3/4"	3'-1"	5'-9"	6'-7 3/4"	166	1.3	2'-8"	37	0.5	
21"	9'-8 3/4"	3'-4 1/2"	6'-6"	7'-6"	189	1.6	3'-1"	48	0.6	
24"	11'-0"	3'-9 1/2"	7'-3"	8'-4 1/2"	221	2.0	3'-7"	58	0.7	
27"	12'-2"	4'-1"	8'-0"	9'-2 3/4"	245	2.3	3'-11"	67	0.8	
30"	13'-4"	4'-4 1/2"	8'-9"	10'-1 1/4"	287	2.7	4'-4"	77	1.0	
33"	14'-5 3/4"	4'-8"	9'-6"	10'-11 3/4"	310	3.1	4'-8"	84	1.2	
36"	15'-7 3/4"	4'-11 1/2"	10'-3"	11'-10"	343	3.5	5'-1"	96	1.4	
42"	17'-11 1/2"	5'-6 1/2"	11'-9"	13'-6 3/4"	424	4.5	5'-10"	119	1.7	
48"	21'-1 3/4"	6'-1 1/2"	14'-0"	16'-2"	527	6.1	6'-7"	146	2.3	
54"	23'-5 1/2"	6'-8 1/2"	15'-6"	17'-10 3/4"	618	7.3	7'-6"	186	2.9	
60"	25'-9 1/4"	7'-3 1/2"	17'-0"	19'-7 1/2"	707	8.7	8'-3"	219	3.4	
66"	28'-1"	7'-10 1/2"	18'-6"	21'-4 1/4"	797	10.1	8'-9"	242	3.9	
72"	30'-4 3/4"	8'-5 1/2"	20'-0"	23'-1 1/4"	910	11.7	9'-4"	272	4.4	
12"	7'-10 3/4"	2'-6"	5'-8"	6'-6 1/2"	144	1.1	1'-9"	24	0.3	
15"	9'-4"	2'-9 1/2"	6'-8"	7'-8 1/2"	177	1.5	2'-2"	32	0.4	
18"	10'-9 1/2"	3'-1"	7'-8"	8'-10 1/4"	217	1.9	2'-8"	42	0.5	
21"	12'-2 3/4"	3'-4 1/2"	8'-8"	10'-0"	254	2.3	3'-1"	57	0.7	
24"	13'-9 1/2"	3'-9 1/2"	9'-8"	11'-2"	295	2.8	3'-7"	67	0.9	
27"	15'-3"	4'-1"	10'-8"	12'-3 3/4"	328	3.3	3'-11"	77	1.0	
30"	16'-8 1/4"	4'-4 1/2"	11'-8"	13'-5 3/4"	379	3.8	4'-4"	89	1.3	
33"	18'-1 3/4"	4'-8"	12'-8"	14'-7 1/2"	417	4.5	4'-8"	101	1.4	
36"	19'-7"	4'-11 1/2"	13'-8"	15'-9 1/4"	464	5.1	5'-1"	115	1.7	
42"	22'-5 3/4"	5'-6 1/2"	15'-8"	18'-1"	575	6.5	5'-10"	141	2.1	
48"	26'-6 1/4"	6'-1 1/2"	18'-8"	21'-6 3/4"	720	8.9	6'-7"	175	2.8	
54"	29'-5"	6'-8 1/2"	20'-8"	23'-10 1/4"	863	10.7	7'-6"	226	3.6	
60"	32'-3 3/4"	7'-3 1/2"	22'-8"	26'-2"	984	12.7	8'-3"	264	4.3	
66"	35'-2 1/2"	7'-10 1/2"	24'-8"	28'-5 3/4"	1126	14.9	8'-9"	300	4.9	
72"	38'-1 1/4"	8'-5 1/2"	26'-8"	30'-9 1/2"	1283	17.3	9'-4"	334	5.6	
12"	11'-2"	2'-6"	8'-6"	9'-9 3/4"	220	1.9	1'-9"	28	0.4	
15"	13'-2 1/4"	2'-9 1/2"	10'-0"	11'-6 1/2"	264	2.5	2'-2"	37	0.5	
18"	15'-2 1/2"	3'-1"	11'-6"	13'-3 1/4"	326	3.2	2'-8"	50	0.7	
21"	17'-2 3/4"	3'-4 1/2"	13'-0"	15'-0 1/4"	381	3.9	3'-1"	69	0.9	
24"	19'-4 1/2"	3'-9 1/2"	14'-6"	16'-9"	447	4.8	3'-7"	80	1.2	
27"	21'-4 3/4"	4'-1"	16'-0"	18'-5 3/4"	506	5.7	3'-11"	96	1.4	
30"	23'-5 1/4"	4'-4 1/2"	17'-6"	20'-2 1/2"	587	6.7	4'-4"	110	1.7	
33"	25'-5 1/2"	4'-8"	19'-0"	21'-11 1/4"	667	7.8	4'-8"	127	2.0	
36"	27'-5 3/4"	4'-11 1/2"	20'-6"	23'-8"	727	9.0	5'-1"	144	2.3	
42"	31'-6 1/4"	5'-6 1/2"	23'-6"	27'-1 1/2"	914	11.5	5'-10"	179	3.0	
48"	37'-3 1/2"	6'-1 1/2"	28'-0"	32'-4"	1181	15.9	6'-7"	231	4.0	
54"	41'-4 1/4"	6'-8 1/2"	31'-0"	35'-9 1/2"	1412	19.2	7'-6"	300	5.0	
60"	45'-4 3/4"	7'-3 1/2"	34'-0"	39'-3"	1619	22.9	8'-3"	353	6.0	



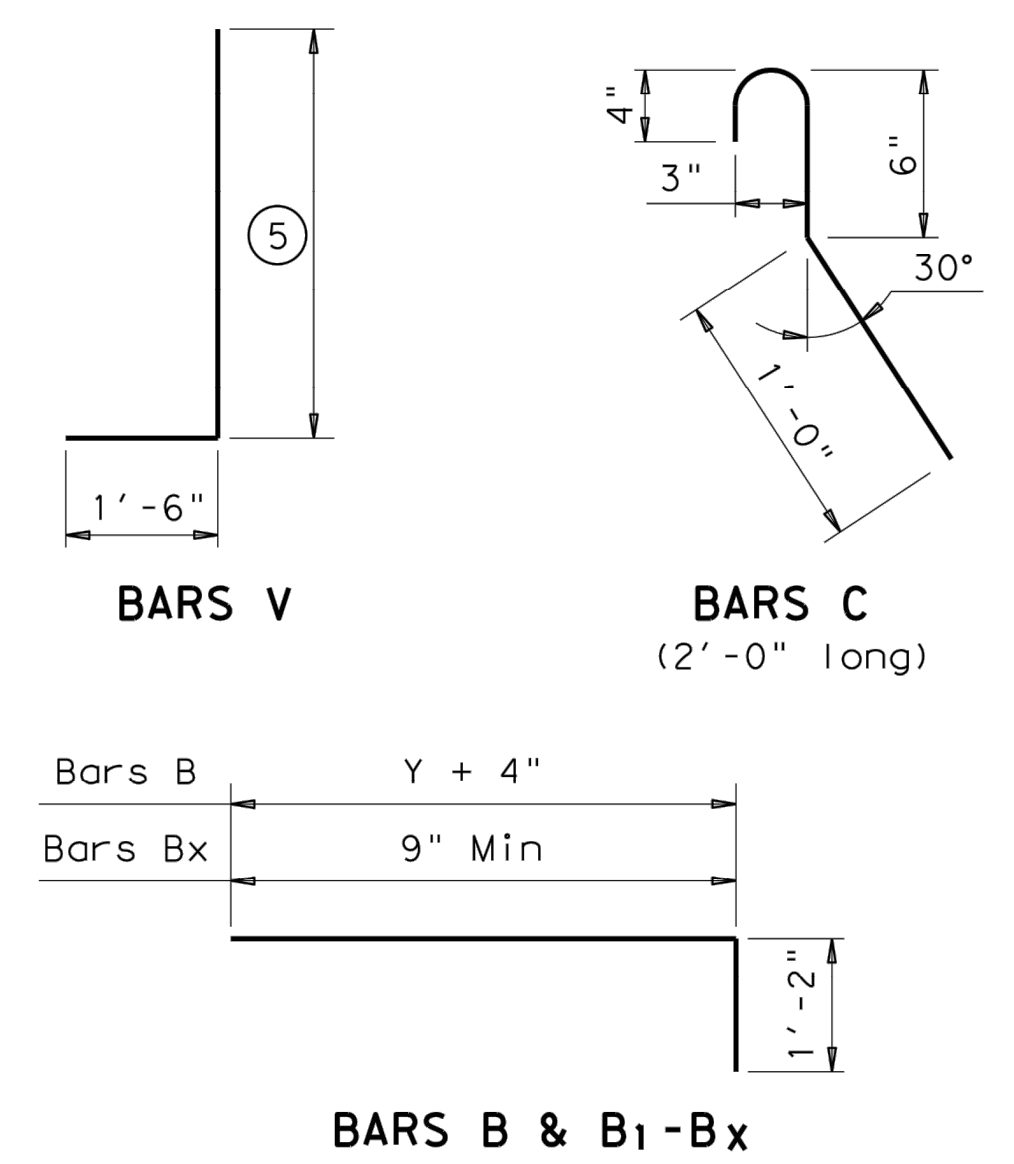
- Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.
- For vehicle safety, curbs shall project no more than 3" above finished grade. Curb heights shall be reduced, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
- Provide a 1'-0" footing as shown where required to maintain 4" Min cover for pipes.
- Quantities shown are for one structure end only (one headwall).
- Min Length = $6" + 3" \times \left(\frac{12 \times H - 7}{12 \times L}\right)$
Max Length = $12 \times H - 3" \times \left(\frac{12 \times H - 7}{12 \times L}\right) - 1"$
- Lengths of wings based on SL:1 Slope along this line.

TABLE OF REINFORCING STEEL (4)

Bar	Size	Spa	No.
A	# 4	1'-0"	~
B	# 3	1'-6"	~
C	# 4	1'-0"	~
D	# 3	1'-0"	~
E	# 5	~	4
F	# 5	~	~
G	# 3	~	2
S	# 4	~	6
V	# 4	1'-0"	~
W	# 5	~	4

TABLE OF CONSTANT DIMENSIONS

DIA OF PIPE, D	G	K	H
12"	9"	1'-0"	2'-0"
15"	11"	1'-0"	2'-3"
18"	1'-2"	1'-0"	2'-6"
21"	1'-4"	1'-0"	2'-9"
24"	1'-7"	1'-0"	3'-0"
27"	1'-8"	1'-0"	3'-3"
30"	1'-10"	1'-0"	3'-6"
33"	1'-11"	1'-0"	3'-9"
36"	2'-1"	1'-0"	4'-0"
42"	2'-4"	1'-0"	4'-6"
48"	2'-7"	1'-3"	5'-3"
54"	3'-0"	1'-3"	5'-9"
60"	3'-3"	1'-3"	6'-3"
66"	3'-3"	1'-3"	6'-9"
72"	3'-4"	1'-3"	7'-3"



GENERAL NOTES:
 Designed according to AASHTO LRFD Specifications.
 Reinforcing steel shall be placed with the center of the outside layer of bars 2" from the surface of the concrete.
 All reinforcing steel shall be Grade 60.
 All concrete shall be Class "C" and shall have a minimum compressive strength of 3600 psi.
 No bridge rails of any type may be mounted directly to these culvert headwalls.

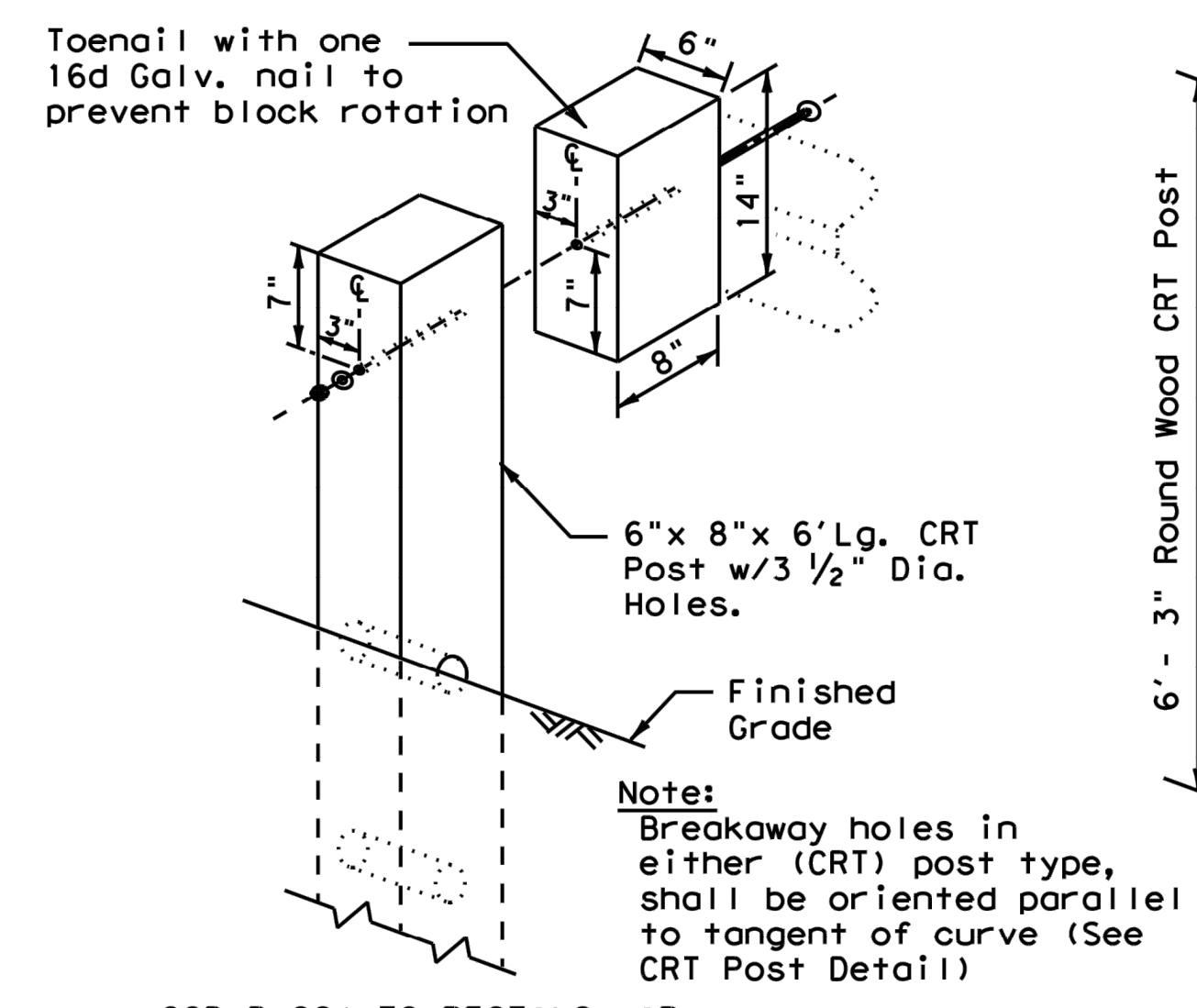
Bridge Division Standard

CONCRETE HEADWALLS WITH FLARED WINGS FOR 0° SKEW PIPE CULVERTS

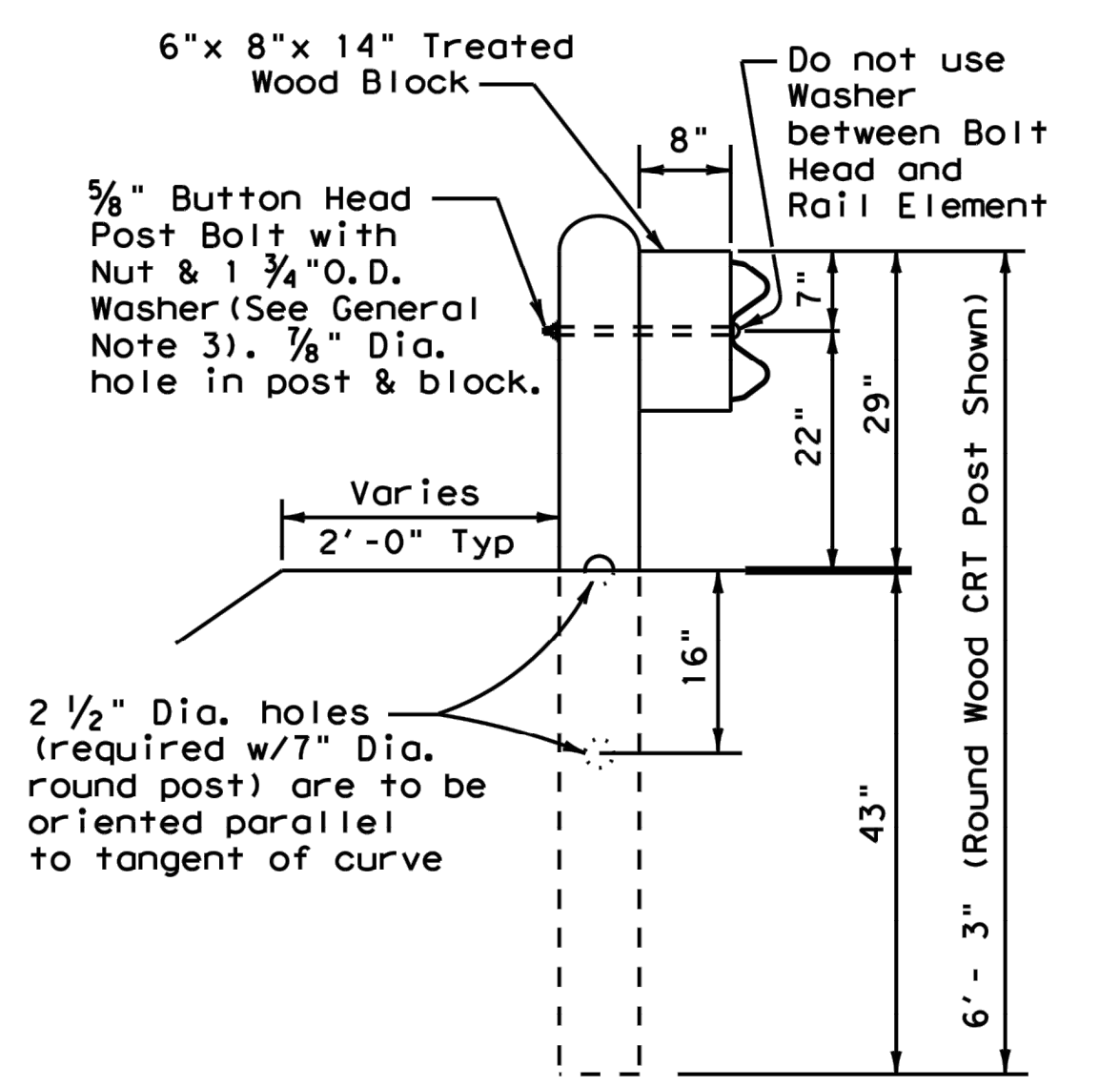
CH-FW-0

FILE: chfw00se.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: GAF
©TxDOT February 2010 REVISIONS	CONT	SECT	JOB	HIGHWAY
	DIST	COUNTY	SHEET NO.	

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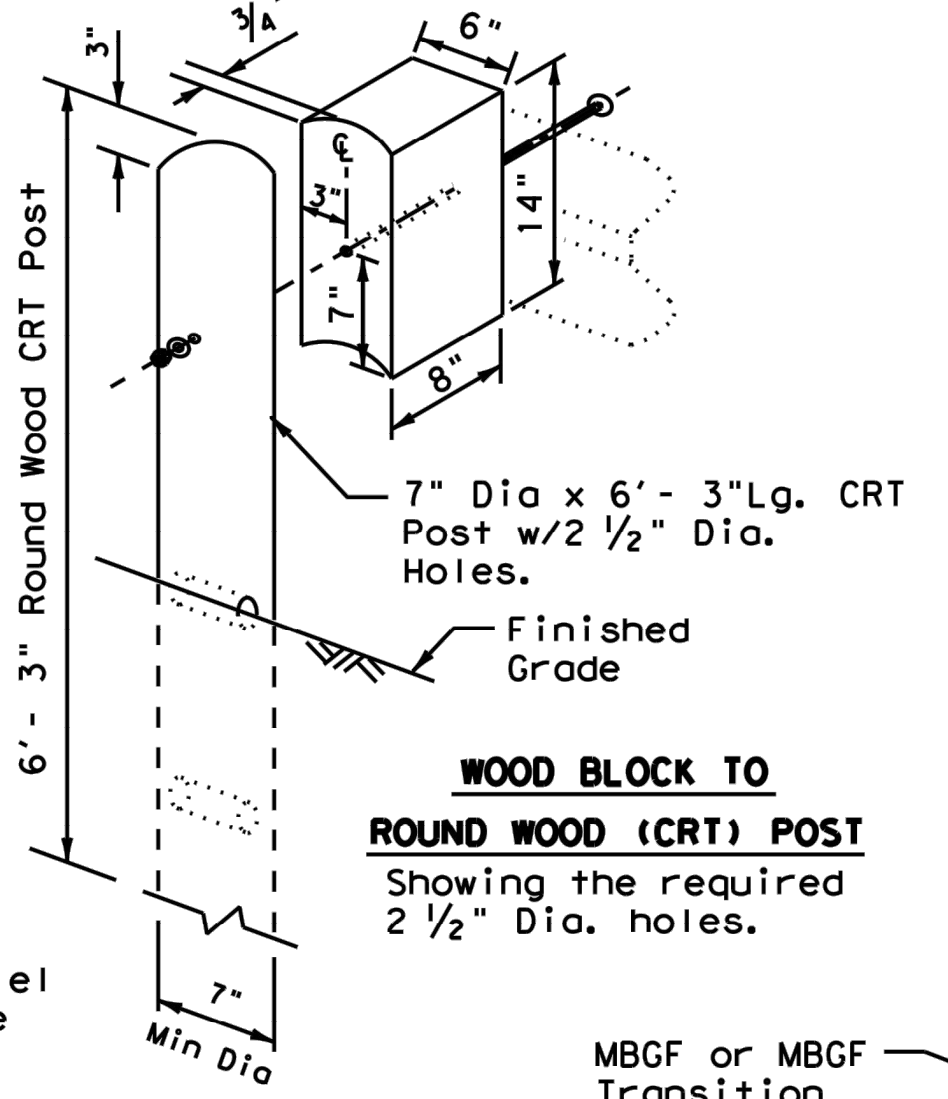


WOOD BLOCK TO RECTANGULAR WOOD (CRT) POST
Showing the required 3 1/2" Dia. holes.

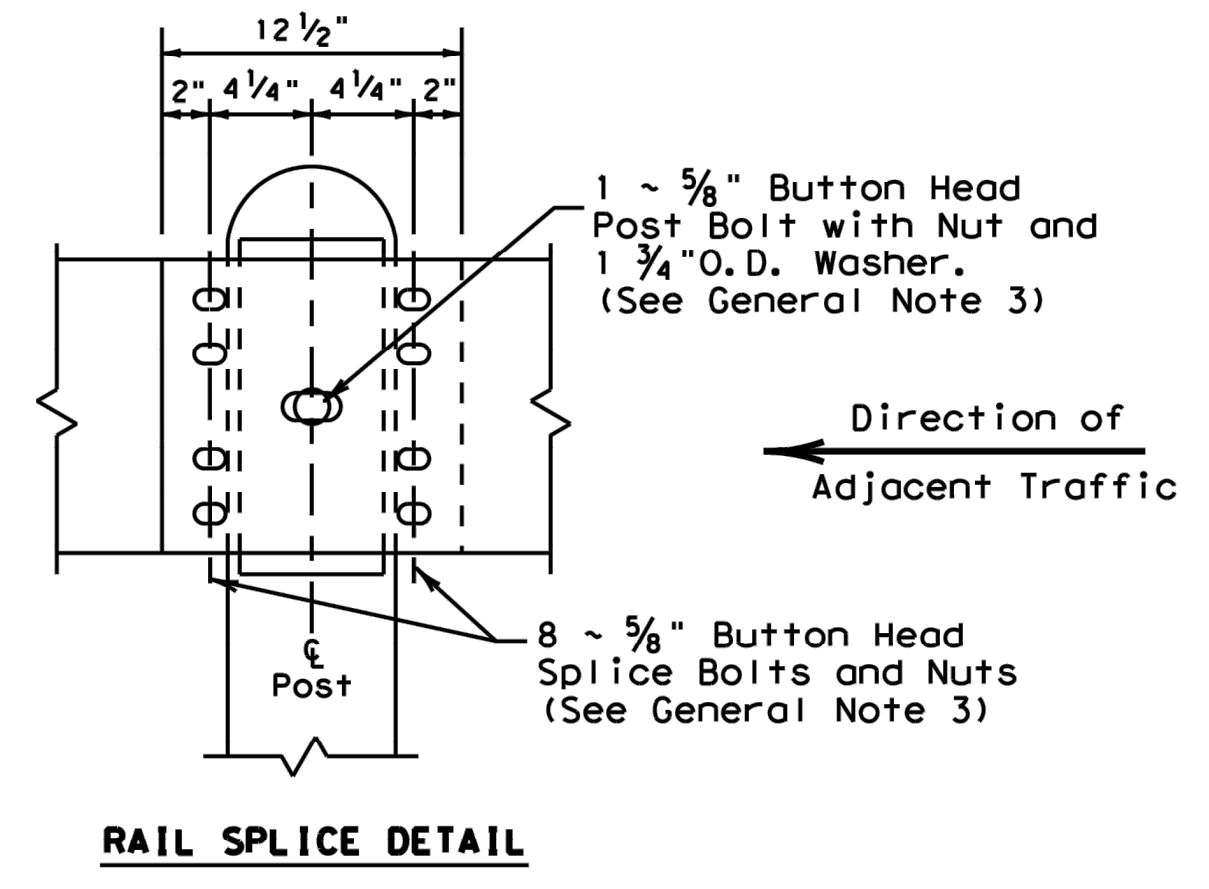


(CRT) POST DETAIL CONTROLLED RELEASE TERMINAL POST

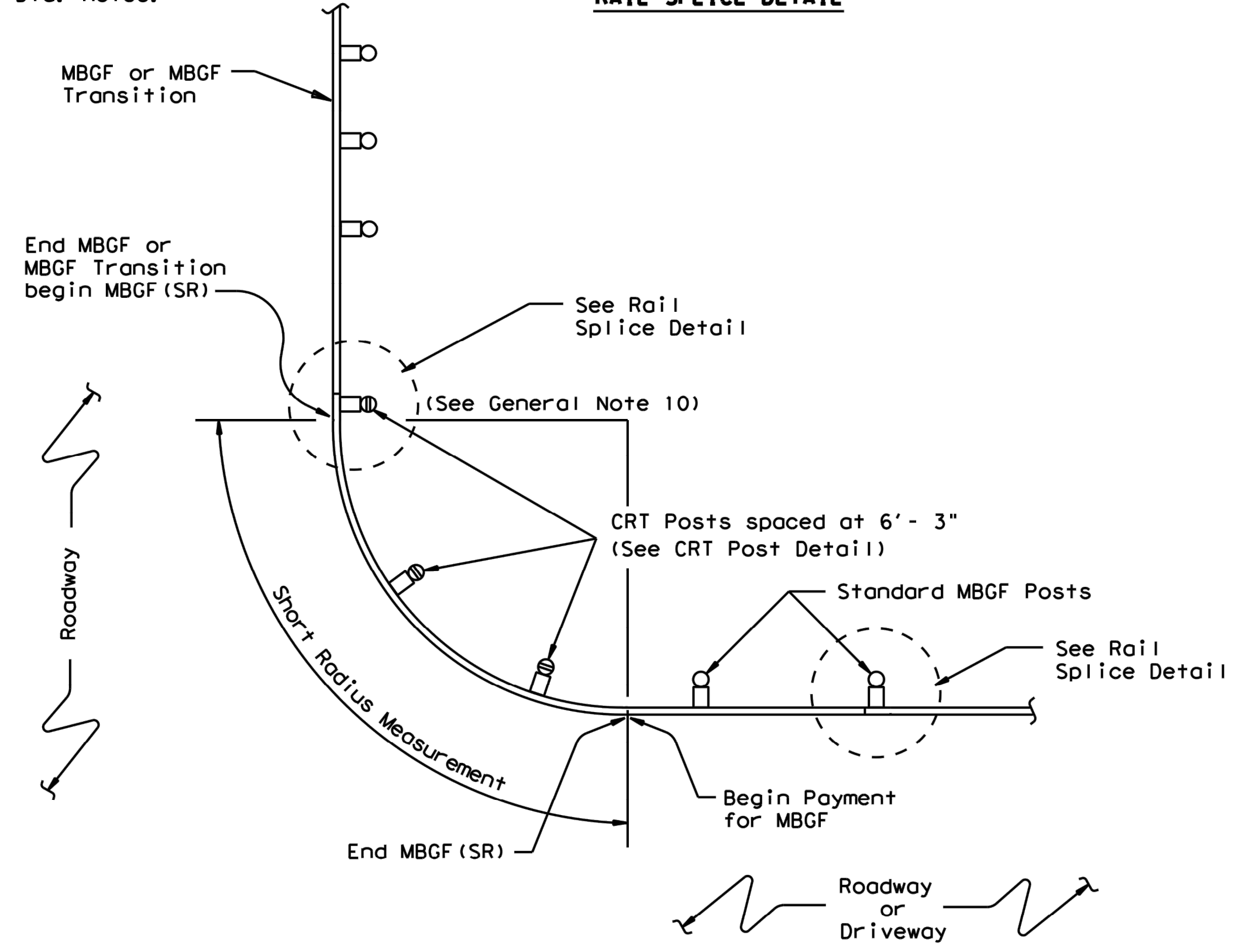
Two or more wood CRT post(s) are required at any radius installation located at intersecting roadways or driveways.



WOOD BLOCK TO ROUND WOOD (CRT) POST
Showing the required 2 1/2" Dia. holes.



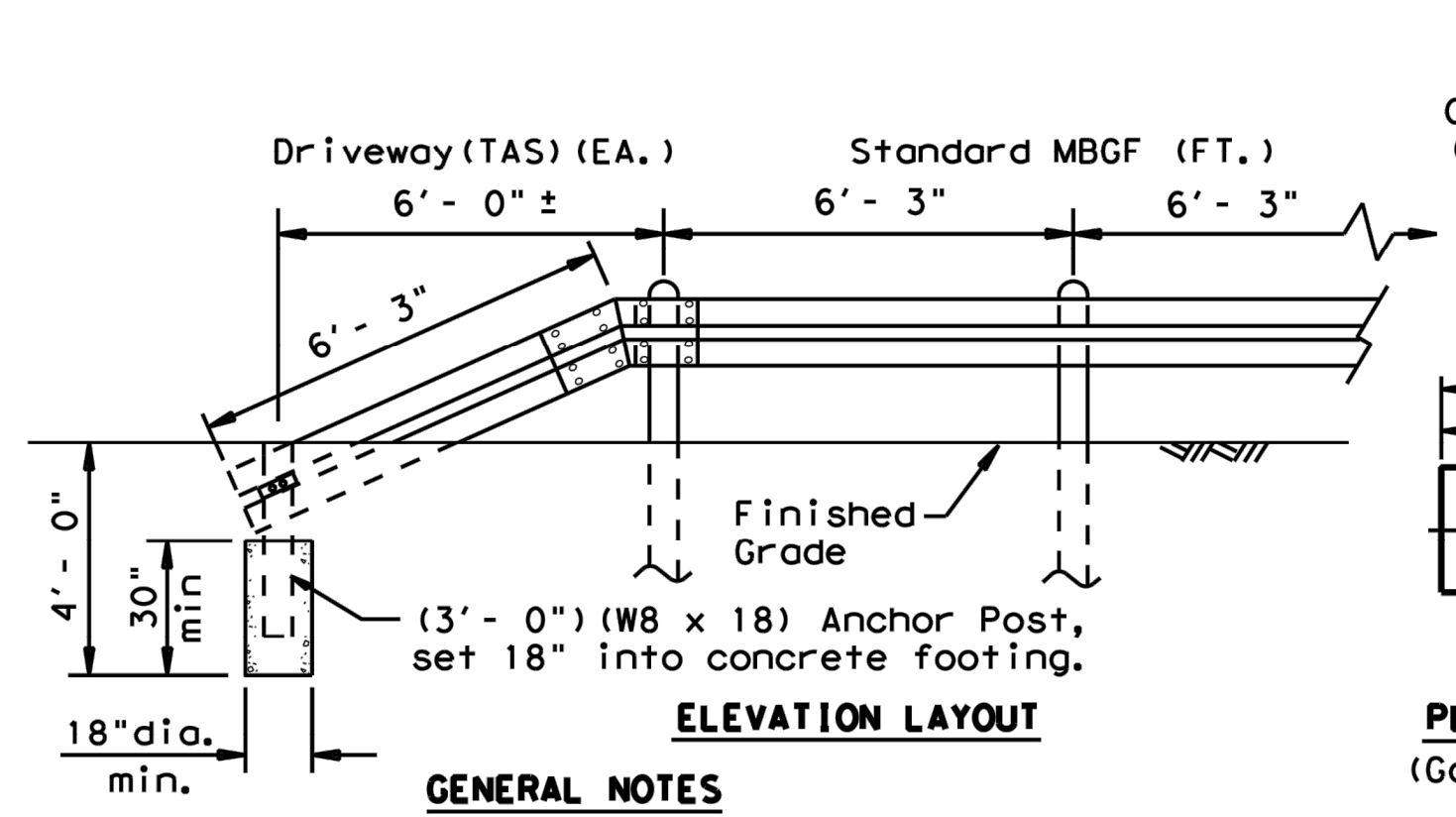
RAIL SPLICE DETAIL



PLAN VIEW SHOWING TYPICAL RADIUS

The required radius is shown elsewhere on the plans.

- GENERAL NOTES**
- The type of (CRT) post (round wood post, or rectangular wood post) will be shown elsewhere in the plans. The exact position of MBGF shall be shown elsewhere in the plans or as directed by the Engineer.
 - Steel posts are not permitted at CRT post positions.
 - Rail element shall meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified on the plans. The Contractor may furnish rail elements of 12 1/2 or 25 foot nominal lengths.
 - Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and Type A (1 3/4" O.D.) washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are 5/8" x 1 1/4" (or 2" long at triple rail splices) with a 5/8" double recessed nut (ASTM A563).
 - Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
 - Crown shall be widened to accommodate the Metal Beam Guard Fence.
 - The lateral approach to the guard fence, shall have a slope rate of not more than 1V:10H.
 - Unless otherwise shown in the plans, guard fence placed in the vicinity of curbs shall be positioned so that the face of curb is located directly below or behind the face of the block. Rail placed over curbs shall be installed so that the post bolt is located approximately 21 inches above the gutter pan or roadway surface.
 - If solid rock is encountered within 0 to 18" of the finished grade, drill a 22" dia. hole, 24" into the rock, or drill two 12" dia. front to back overlapping holes, 24" into the rock or to the standard embedment depth, whichever is less. Any excess post length, after meeting these depths, may be field cut to ensure proper guardrail mounting height. Backfill with a cohesionless material.
 - Guardrail posts shall not be set in concrete, of any depth.
 - Special rail fabrication will be required at installations having a curvature of less than 150 ft. radius. The required radius shall be shown on the plans.
 - The terminal anchor section (TAS) post shall be set in Class A concrete (unless otherwise shown in the plans) in accordance with Item 421, "Hydraulic Cement Concrete." Concrete shall be subsidiary to the bid item requiring construction of the terminal anchor section (TAS). Terminal anchor post to be galvanized in accordance with Item 445, "Galvanizing."
 - Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL can furnish composite material posts and/or blocks.

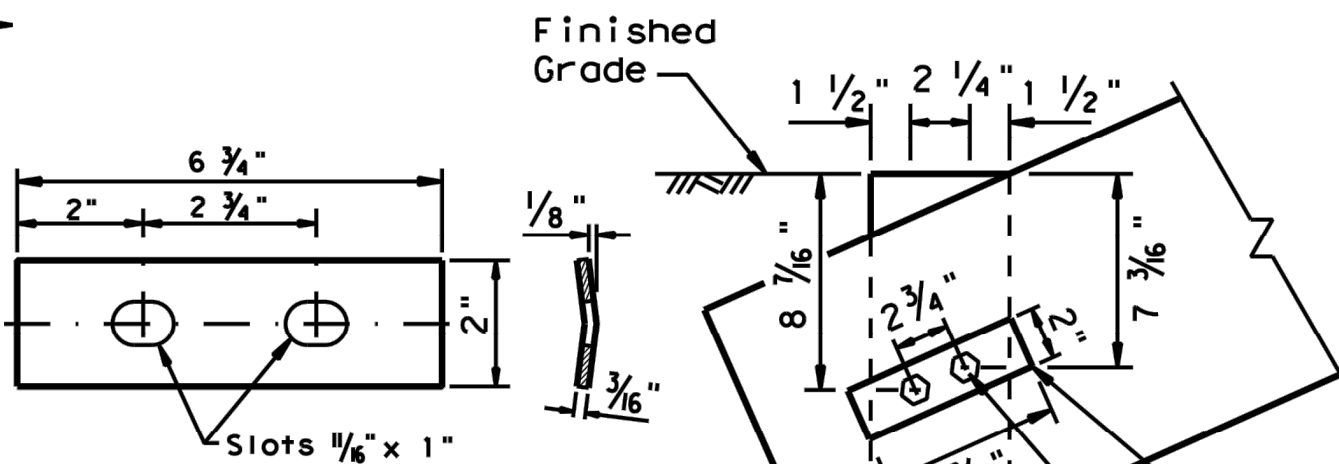


ELEVATION LAYOUT

- GENERAL NOTES**
- The "Driveway" Terminal Anchor Section is ONLY to be used within driveway locations, where the ROW is limited and a standard 25 ft. (TAS) Terminal Anchor Section, is too long.
 - Terminal anchor post shall be set in Class A concrete.
 - All steel shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."

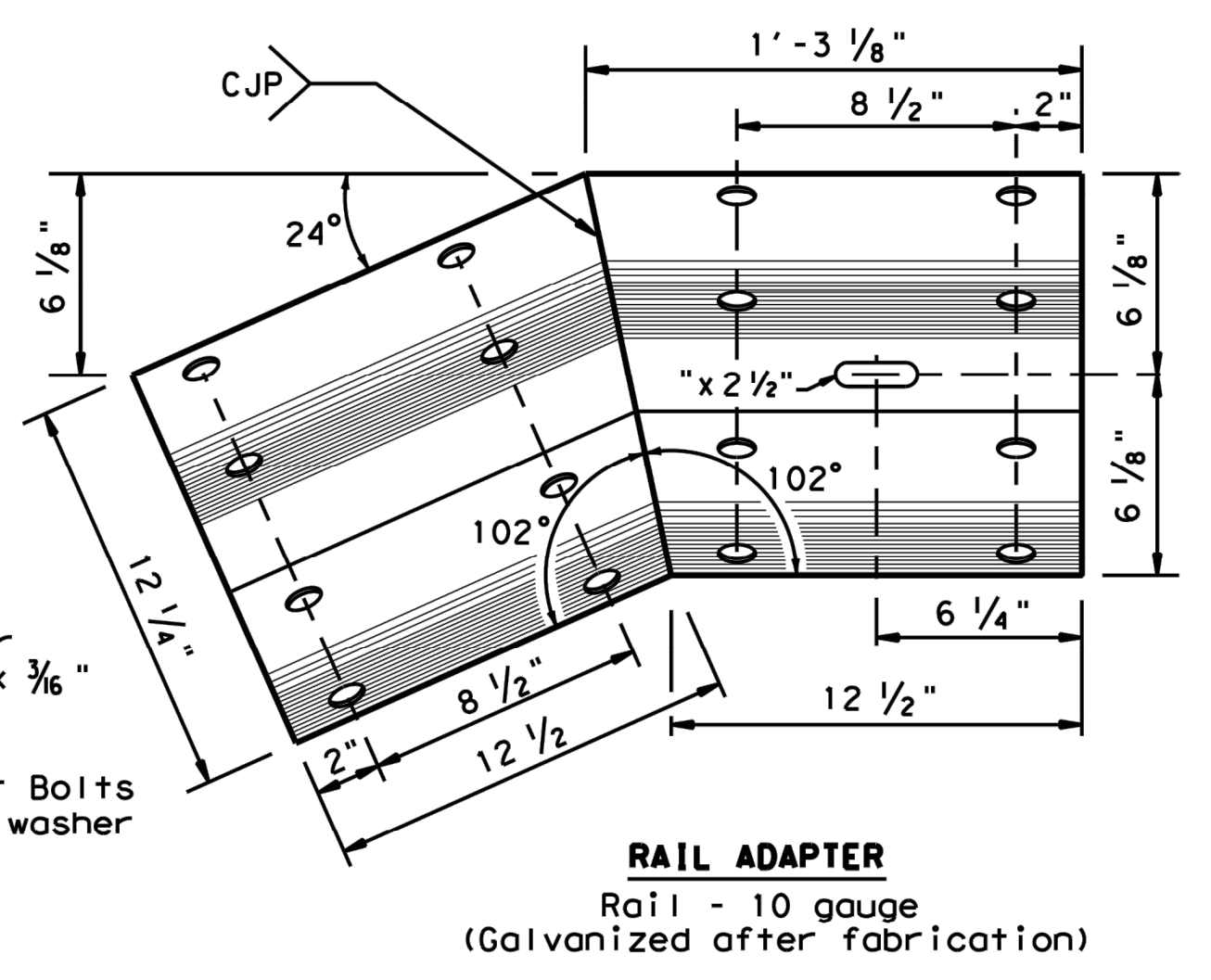
"DRIVEWAY" TERMINAL ANCHOR SECTION

Only for use within driveway locations, where a standard (TAS) Terminal Anchor Section can not be installed.



ANCHOR POST

PLATE WASHER FOR METAL BEAM (Galvanized after fabrication)
Plate Washer 2" x 6 3/4" x 3/16"



RAIL ADAPTER
Rail - 10 gauge (Galvanized after fabrication)

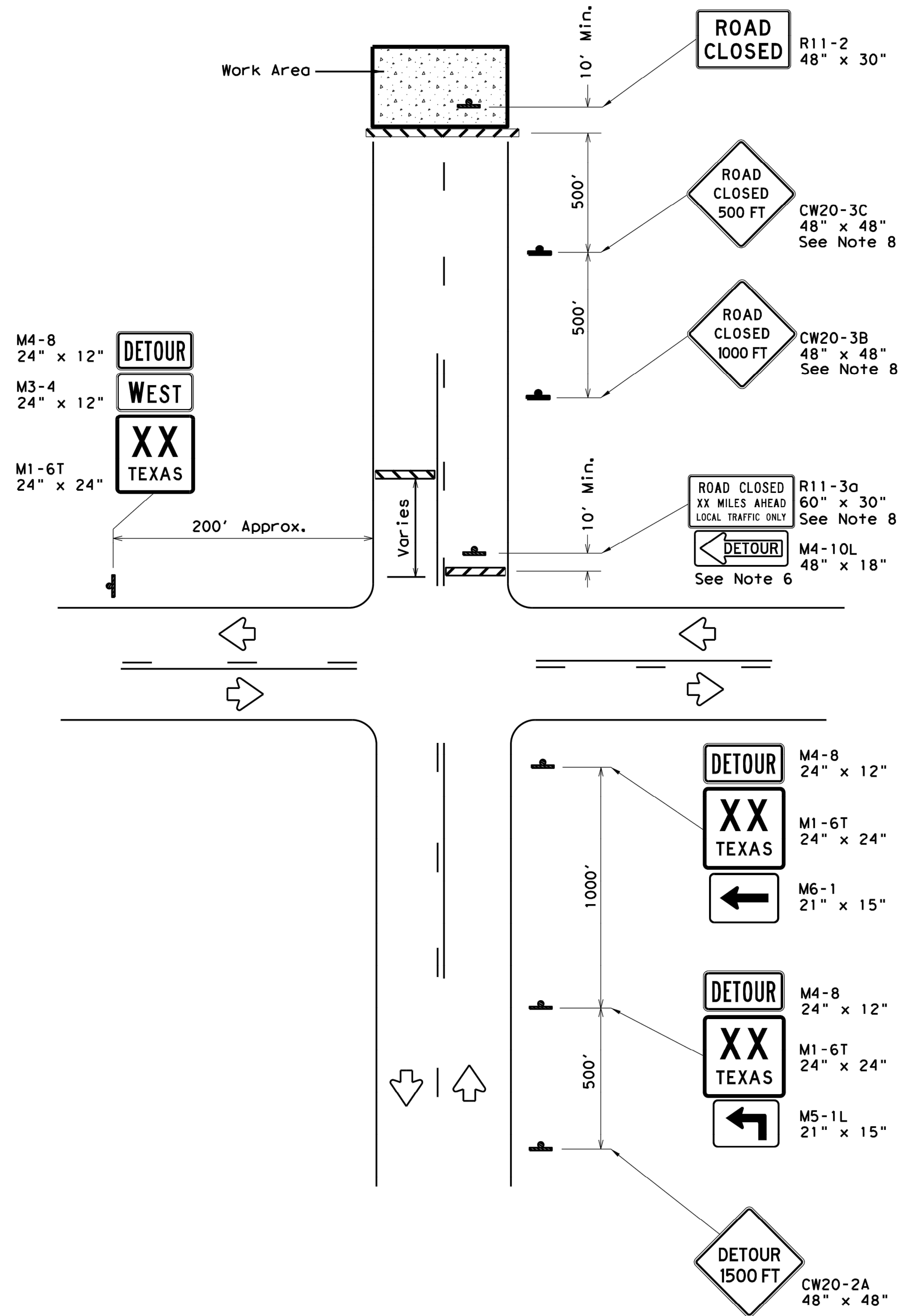
METAL BEAM GUARD FENCE (SHORT RADIUS) MBGF (SR) - 11

FILE: mbgfsr11.dgn		DN: TxDOT	CK: AM	DW: BD	CK: VP
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REVISIONS		DIST		COUNTY	SHEET NO.

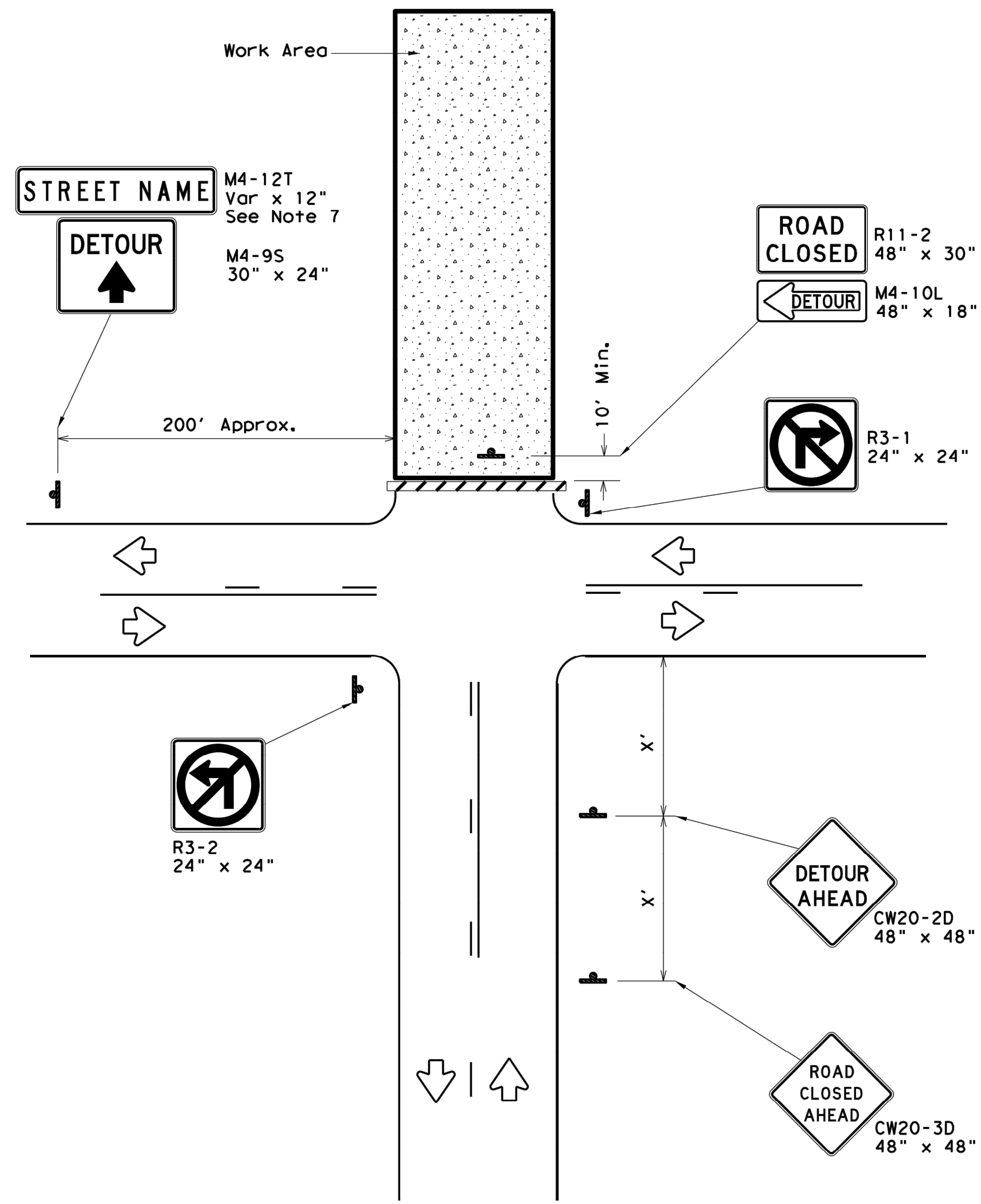
DATE: FILE:

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ROAD CLOSURE BEYOND THE INTERSECTION
Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION
Signing for an Un-numbered Route with an Off-Site Detour

LEGEND	
	Type 3 Barricade
	Sign

Posted Speed *	Minimum Sign Spacing "x" Distance
30	120'
35	160'
40	240'
45	320'
50	400'
55	500'
60	600'
65	700'
70	800'
75	900'

* Conventional Roads Only

GENERAL NOTES

1. This sheet is intended to provide details for temporary work zone road closures. For permanent road closure details see the D&OM standards.
2. Barricades used shall meet the requirements shown on Barricade and Construction Standard BC(10) and listed on the Compliant Work Zone Traffic Control Devices List (CWZTCD).
3. Stockpiled materials shall not be placed on the traffic side of barricades.
4. Barricades at the road closure should extend from pavement edge to pavement edge.
5. Detour signing shown is intended to illustrate the type of signing that is appropriate for numbered routes or un-numbered routes as labeled. It does not indicate the full extent of detour signing required. Detour routes should be signed as shown elsewhere in the plans.
6. If the road is open for a significant distance beyond the intersection or there are significant origin/destination points beyond the intersection, the signs and barricades at this location should be located at the edge of the traveled way.
7. The Street Name (M4-12T) sign is to be placed above the DETOUR (M4-9S) sign.
8. For urban areas where there is a shorter distance between the intersection and the actual closure location, the ROAD CLOSED XX MILES AHEAD (R11-3a) sign may be replaced with a ROAD CLOSED TO THRU TRAFFIC (R11-4) sign. If adequate space does not exist between the intersection and the closure a single ROAD CLOSED AHEAD (CW20-3D) sign spaced as per the table above may replace the ROAD CLOSED 1000 FT (CW20-3B) and ROAD CLOSED 500 FT (CW20-3C) signs.
9. Signs and barricades shown shall be subsidiary to Item 502. Locations where these details will be required shall be as shown elsewhere in the plans.



WORK ZONE ROAD CLOSURE DETAILS

WZ (RCD) - 13

15	FILE: wzrcd-13.dgn	DN: TxDOT	CR: TxDOT	DW: TxDOT	CK: TxDOT
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	REVISIONS				
1-97 4-98 7-13	DIST	COUNTY	SHEET NO.		
2-98 3-03					