CONSTRUCTION PLANS FOR

WOLF CREEK PHASE 1

33 SINGLE FAMILY LOTS
AN ADDITION TO THE CITY OF LUCAS
COLLIN COUNTY, TEXAS
45.96 AC.

WOLF CREEK - LUCAS, TEXAS

CAUTION!!!!!

EXISTING UTILITIES

EXISTING UTILITIES AND UNDERGROUND FACILITIES INDICATED ON THESE PLANS HAVE BEEN LOCATED FROM REFERENCE INFORMATION. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY BOTH HORIZONTALLY AND VERTICALLY THE LOCATION OF ALL EXISTING UTILITIES AND UNDERGROUND FACILITIES PRIOR TO CONSTRUCTION AND TO TAKE NECESSARY PRECAUTIONS IN ORDER TO PROTECT ALL FACILITIES ENCOUNTERED. THE CONTRACTOR SHALL PRESERVE AND PROTECT ALL EXISTING UTILITIES FROM DAMAGE DURING CONSTRUCTION.

North Texas Municipal Water District Notes

A. North Texas Municipal Water District (NTMWD's) 60-inch sanitary sewer trunk main is located within limits of construction.

B. Operation of heavy earthmoving equipment, compaction equipment or heavy construction equipment, such as concrete trucks, shall be restricted to specific crossing points across NTMWD easements, as approved by the NTMWD. The crossings shall be designated and verified to provide a minimum of five- feet of cover.

C. To assure that placing of significant loads over the NTMWD pipeline does not damage the existing pipeline, no materials shall be stockpiled on the NTMWD easement, without authorization from the NTMWD. If the contractor desires to use NTMWD's easement for stockpile of materials, contact NTMWD's Engineering Department at (972) 442-5405 so your plans for use of NTMWD's easement can be reviewed.

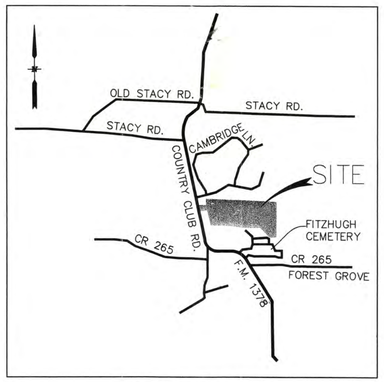
D. A minimum of three feet separation between the bottom of the pavement and top of NTMWD pipeline is required. In addition, if separation between the bottom of the pavement and the top of the pipeline is less than 3.5 feet, a thickened pavement section is required.

E. Crossing of the NTMWD easement with other utilities, such as TV cable, phone, gas and electric, shall be coordinated with the NTMWD to avoid damage to the NTMWD facilities.

F. Outdoor lighting, screening walls or other facilities shall not be installed in NTMWD easements without written approval of the NTMWD.

G. Unless otherwise shown or required a minimum of one-foot clearance shall be provided for all utilities crossing the NTMWD pipelines.

H. "The contractor shall contact NTMWD Engineering at (972) 442-5405 at least 48 hours prior to performing any work in the vicinity of the NTMWD facilities."



VICINITY MAP
N.T.S.

SHEET INDEX

OWNER/DEVELOPER

ZYLAND INVESTMENTS
2505 N. PLANO ROAD, SUITE 3000
RICHARDSON, TX. 75082
(972) 644–2400

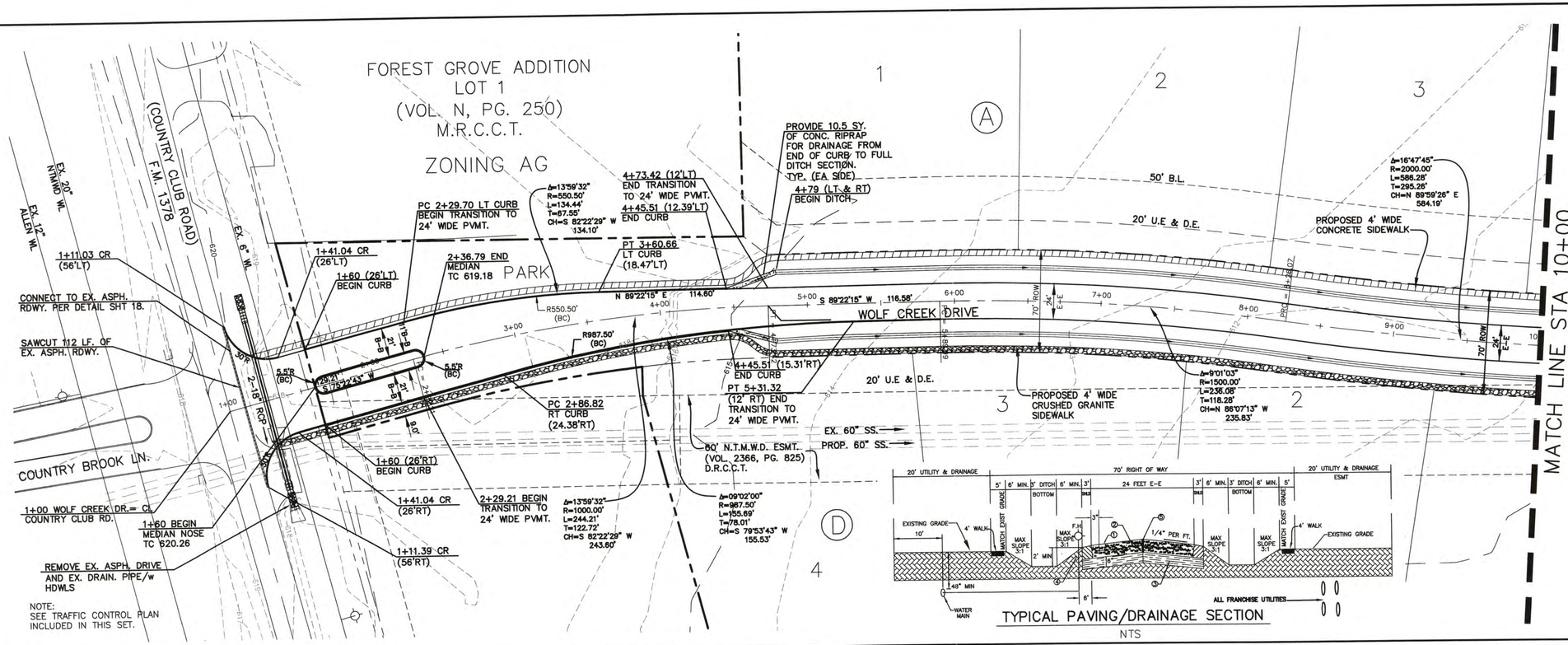
ENGINEERING CONCEPTS & DESIGN L.P.
LAND DEVELOPMENT SERVICES
ENGINEERING / SURVEYING / PROJECT MANAGEMENT
2505 N. PLANO ROAD STE #2400 RICHARDSON, TX 75082
(469) 916–6300 (469) 916–6301 FAX

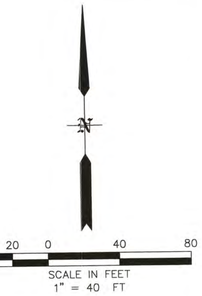
STATE OF TEXAS
TODD D. WINTERS
87085
REGISTERED PROFESSIONAL ENGINEER

"FOR REVIEW PURPOSES ONLY"

DATE: NOVEMBER, 2004

7508/dwg/7508 COVER.DWG





TYPICAL PAVING DETAIL

N.T.S.

1. PAVEMENT SHALL BE 6" THICK, 3600 PSI STRENGTH CONCRETE.
2. NO. 3 BARS ON 18" CENTERS BOTH WAYS.
3. SUBGRADE SHALL BE 6" THICK LIME STABILIZED (7%) AND COMPACTED TO 95 PERCENT OF STANDARD PROCTOR.
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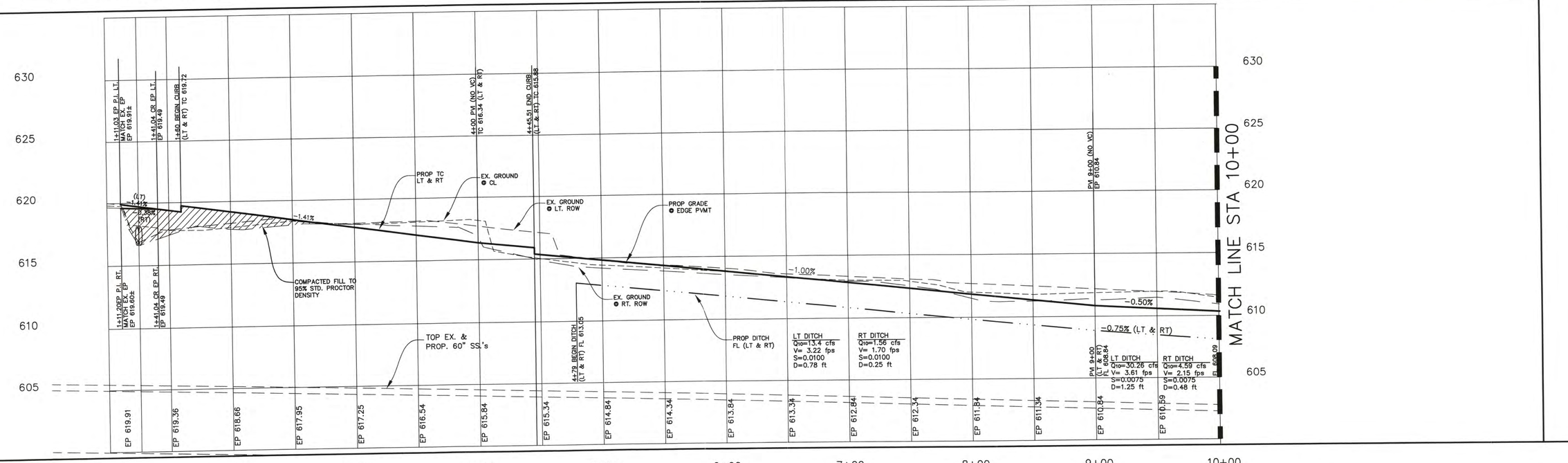
NOTE:
FOR CONSTRUCTION WITHIN N.T.M.W.D. ESMT. REFER TO N.T.M.W.D. NOTES ON COVER SHEET.

NOTE:
SIDEWALKS BETWEEN PAVING STATION 1+00 AND 4+75 TO BE CONSTRUCTED BY THE DEVELOPER. SIDEWALKS BEYOND STATION 4+75 TO BE CONSTRUCTED BY THE HOME BUILDER.

TYPICAL PAVING/DRAINAGE SECTION

NTS



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BENCHMARKS:
#1. SQUARE CHISELED IN WEST END OF HDWL LOCATED ON THE SOUTH SIDE OF COUNTRY BROOK LN. AND THE WEST SIDE OF F.M.1378
ELEV: 617.95

#2. SQUARE CHISELED IN WEST END OF HDWL LOCATED ON THE EAST SIDE OF F.M. 1378 ON BRIDGE OVER WHITE ROCK CREEK (EAST) FEMA RM133
ELEV: 590.08

ENGINEERINGCONCEPTS & DESIGN, L.P.
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2505 NORTH PLANO ROAD, SUITE 2400
RICHARDSON, TEXAS 75082
469-916-6300 FAX: 469-916-6301 WWW.ECDLP.COM

REVISIONS:

DRAWN: ECD DATE: NOVEMBER, 2004
CHECKED: TW DATE: NOVEMBER, 2004
PROJECT NO.: 07508
DWG FILE NAME: 7508 PAV.DWG

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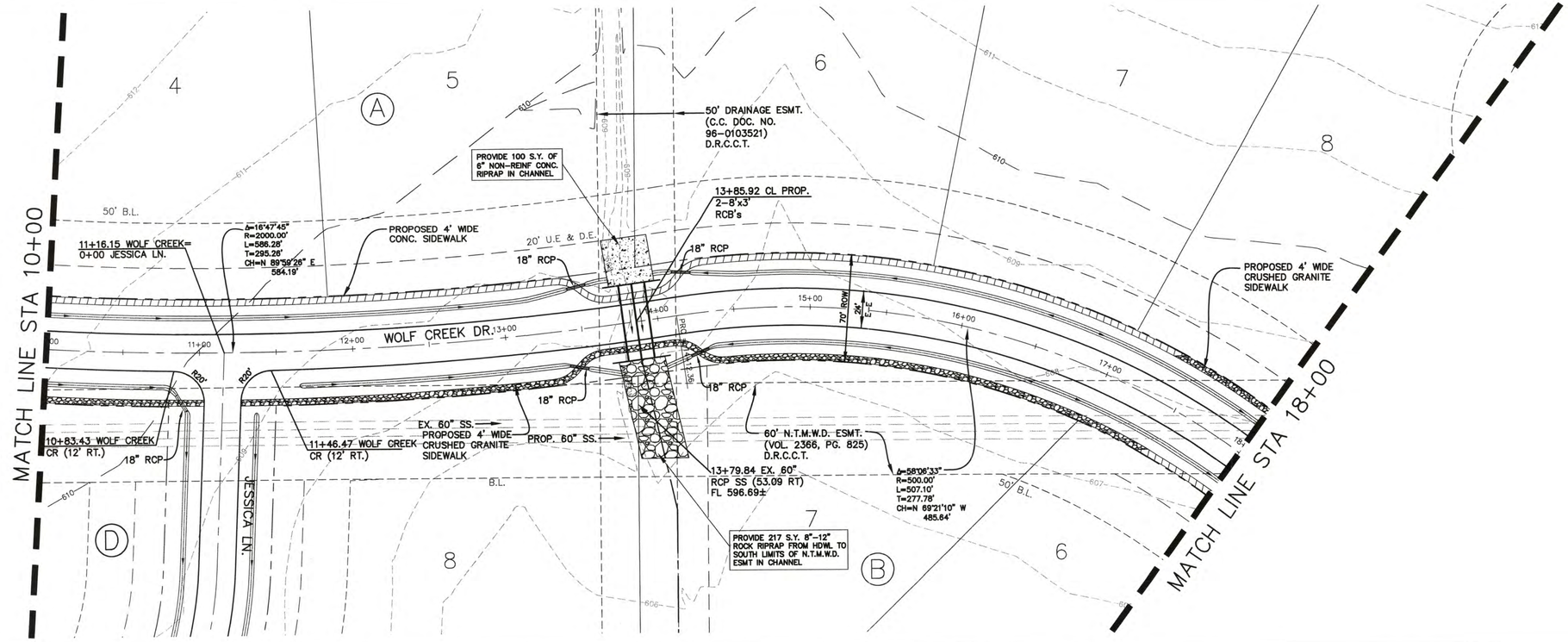
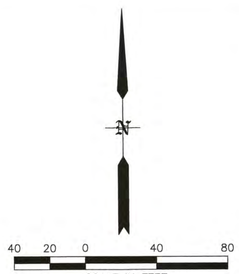
STATE OF TEXAS — TODD D. WINTTERS — 87085 — REGISTERED PROFESSIONAL ENGINEER

PAVING PLAN AND PROFILE
WOLF CREEK DRIVE 1+00 - 10+00
WOLF CREEK
CITY OF LUCAS, COLLIN COUNTY, TEXAS

SHEET 3 OF 26





NOTE:
ALL SIDEWALK CULVERTS TO BE 12 L.F. OF 18" RCP LAID ON DITCH GRADE

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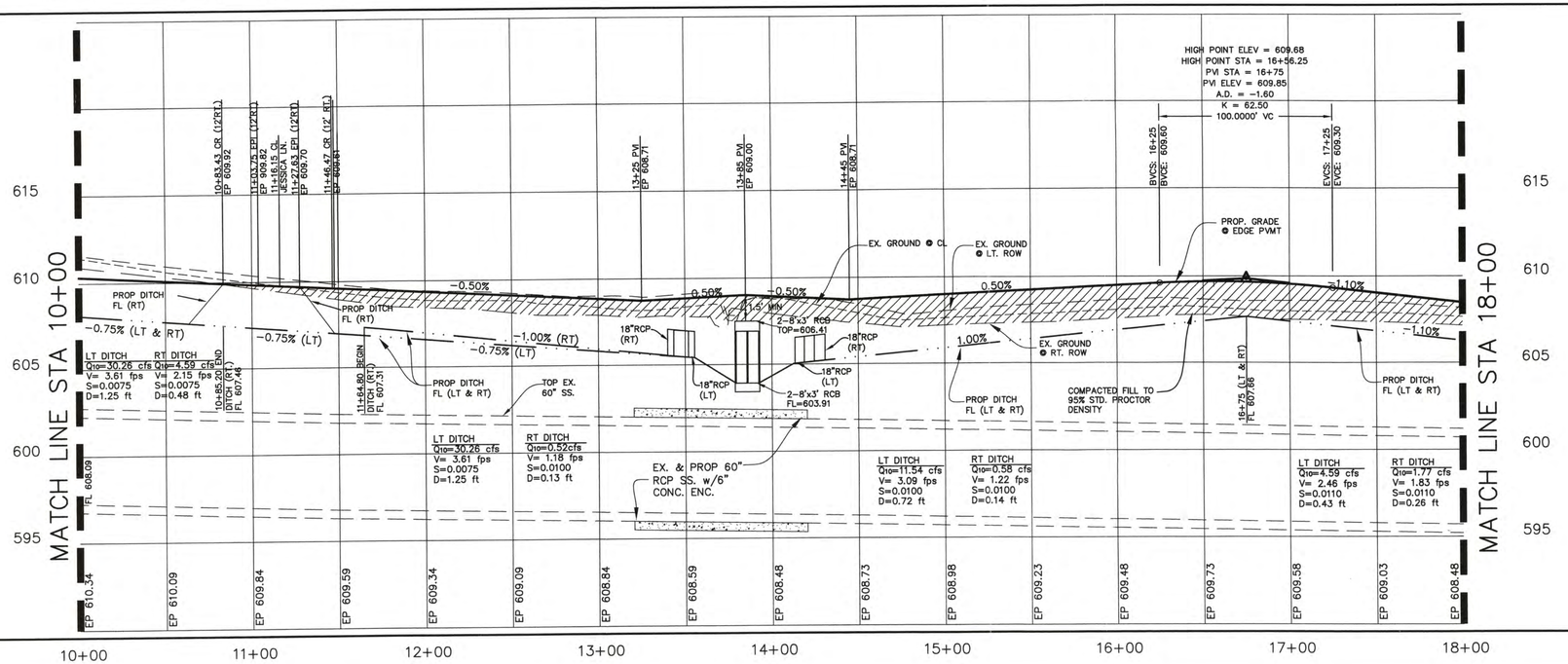

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STATE OF TEXAS
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PAVING PLAN AND PROFILE
WOLF CREEK DRIVE 10+00 - 18+00
WOLF CREEK
CITY OF LUCAS, COLLIN COUNTY, TEXAS

SHEET 4 OF 26

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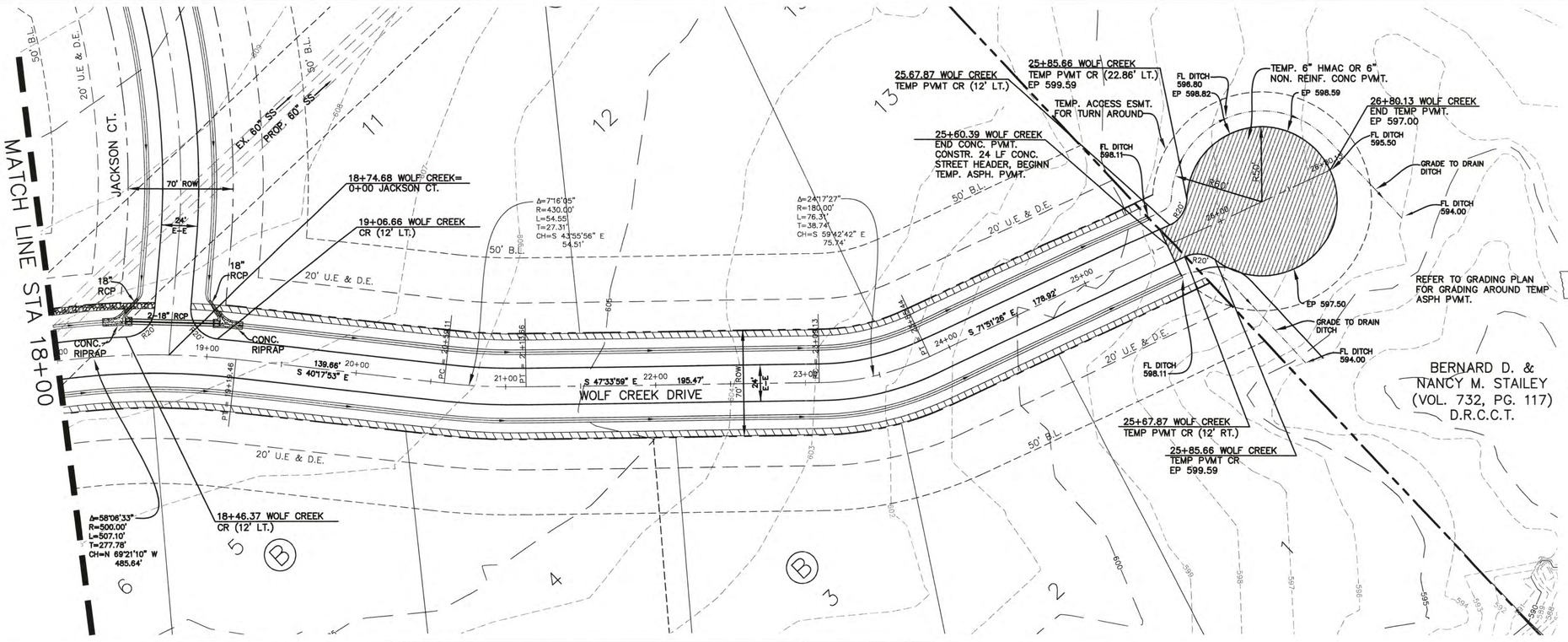

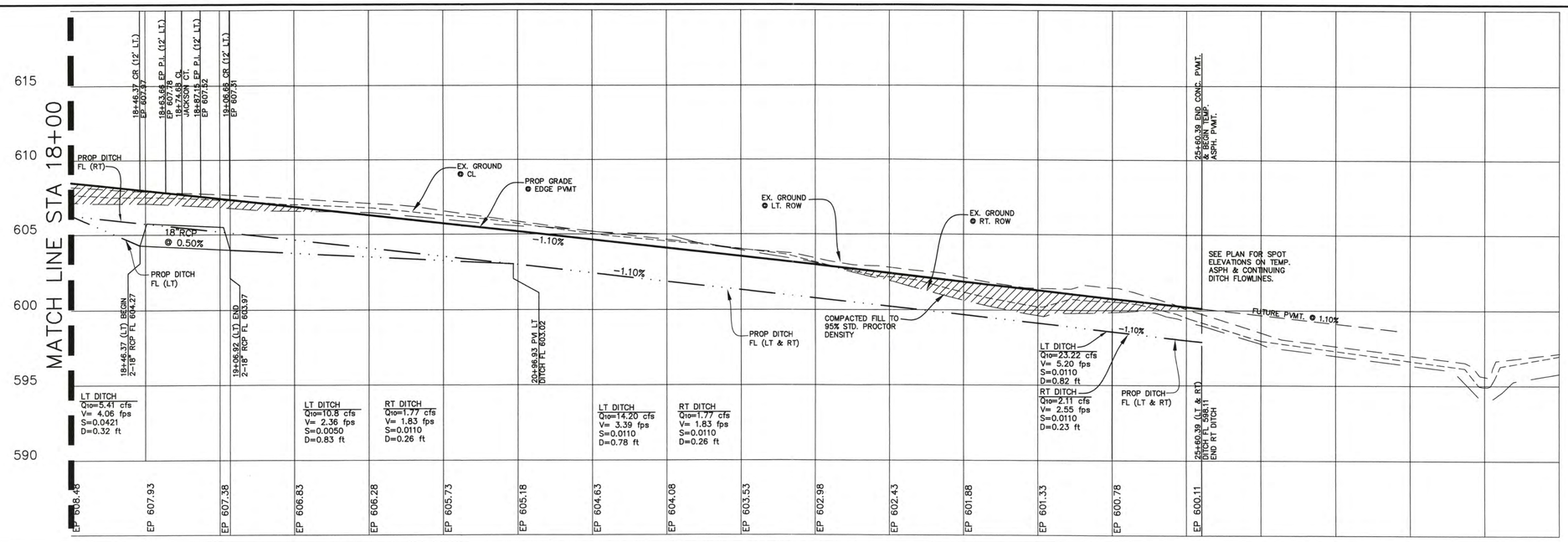

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PAVING PLAN AND PROFILE WOLF CREEK DRIVE 18+00 - END WOLF CREEK

CITY OF LUCAS, COLLIN COUNTY, TEXAS

SHEET 5 OF 26

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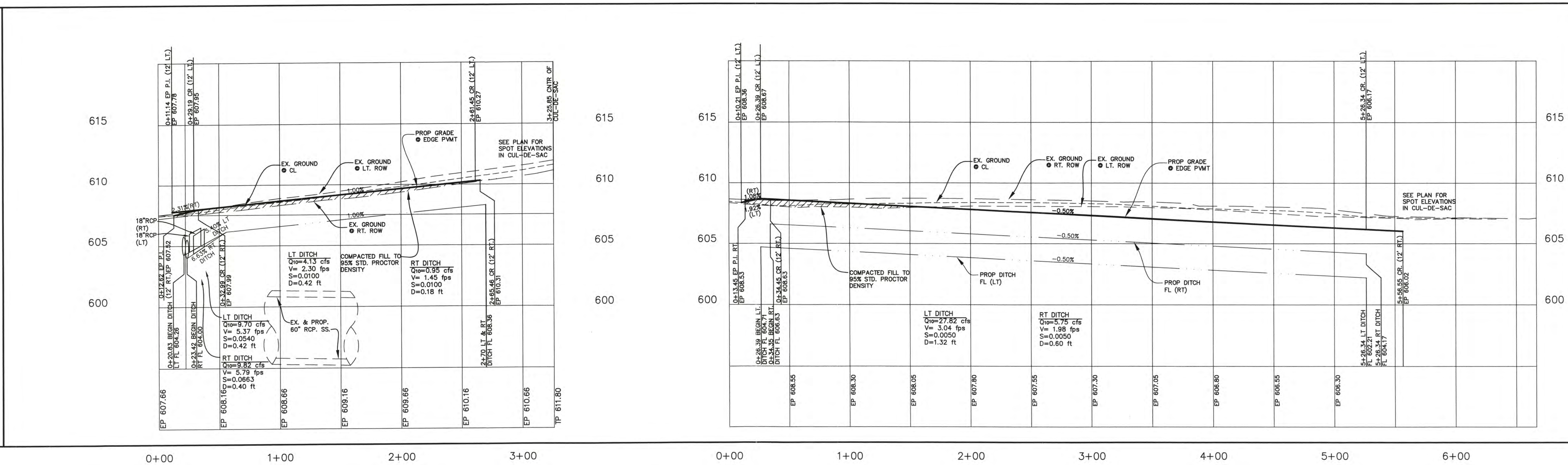
SCALE IN FEET
1" = 40 FT



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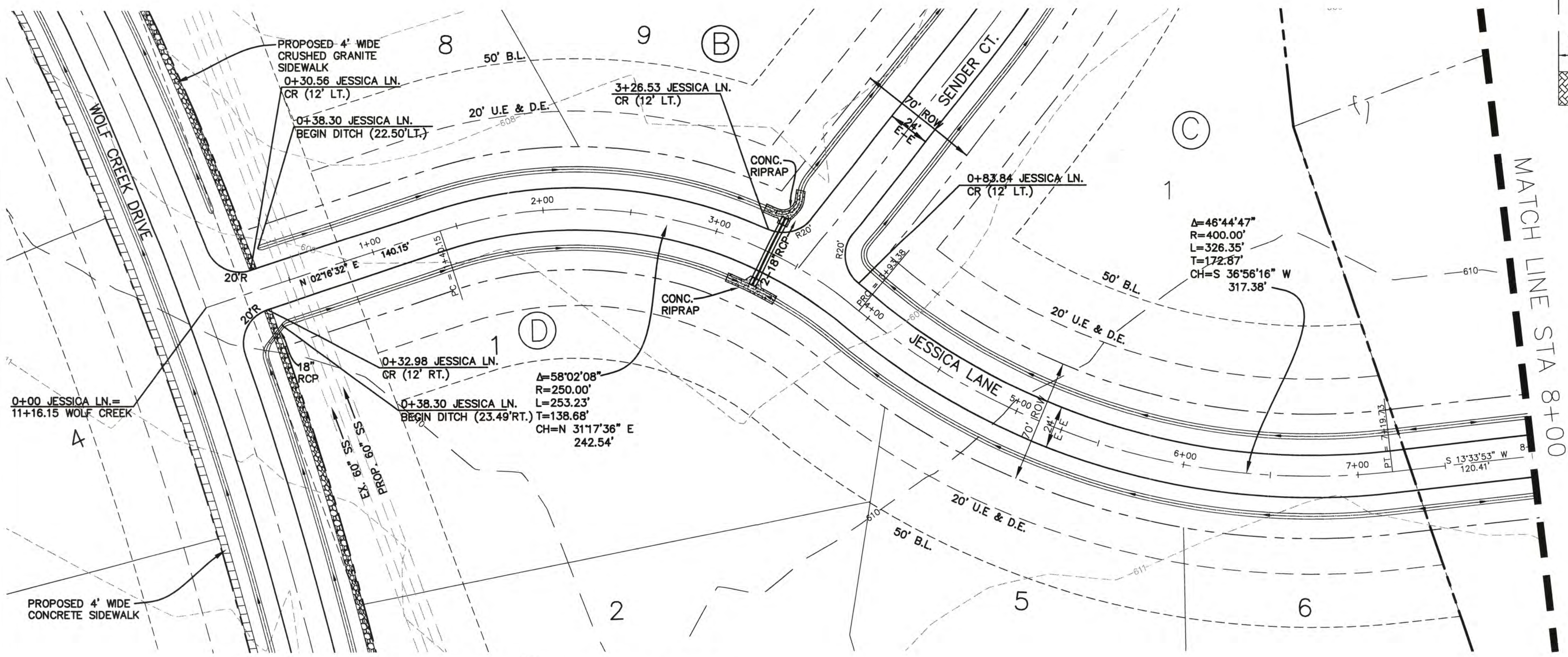
PAVING PLAN AND PROFILE JACKSON CT. AND SENDER CT. WOLF CREEK

CITY OF LUCAS, COLLIN COUNTY, TEXAS

SHEET 6 OF 26



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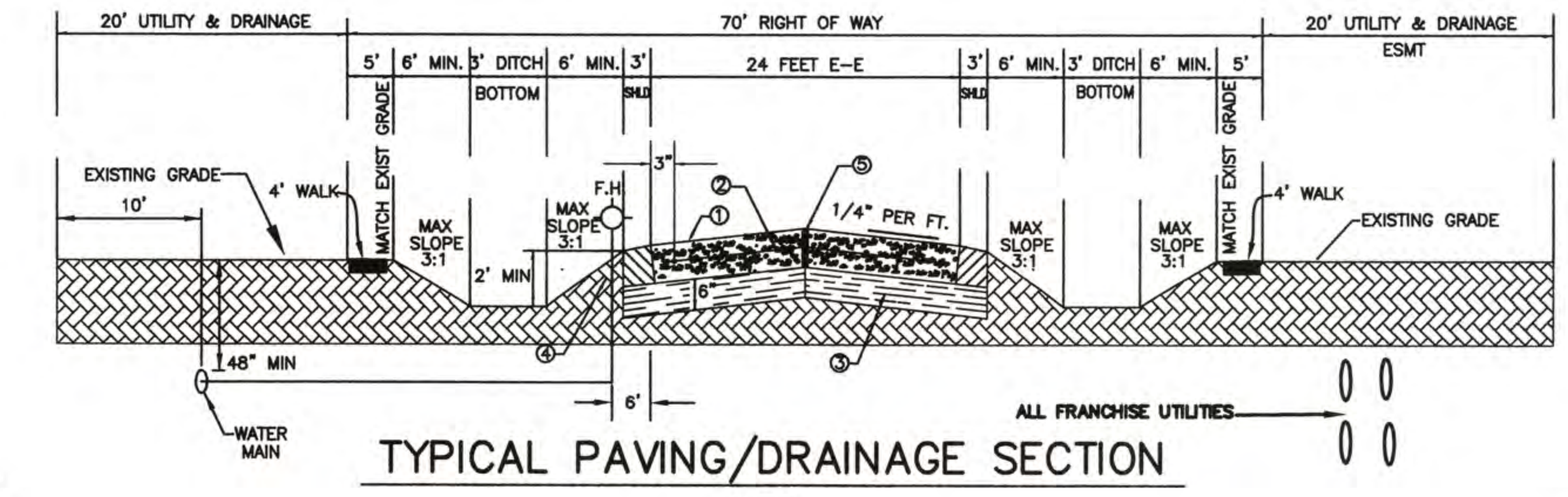

TYPICAL PAVING/DRAINAGE SECTION
NTS

TYPICAL PAVING DETAIL
N.T.S.

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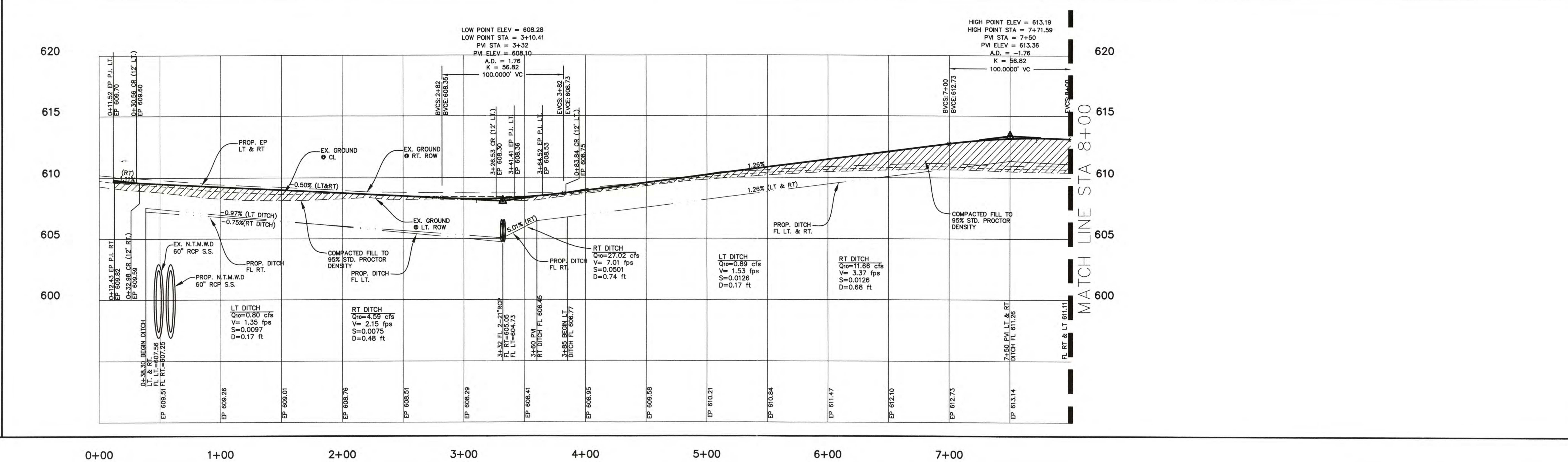

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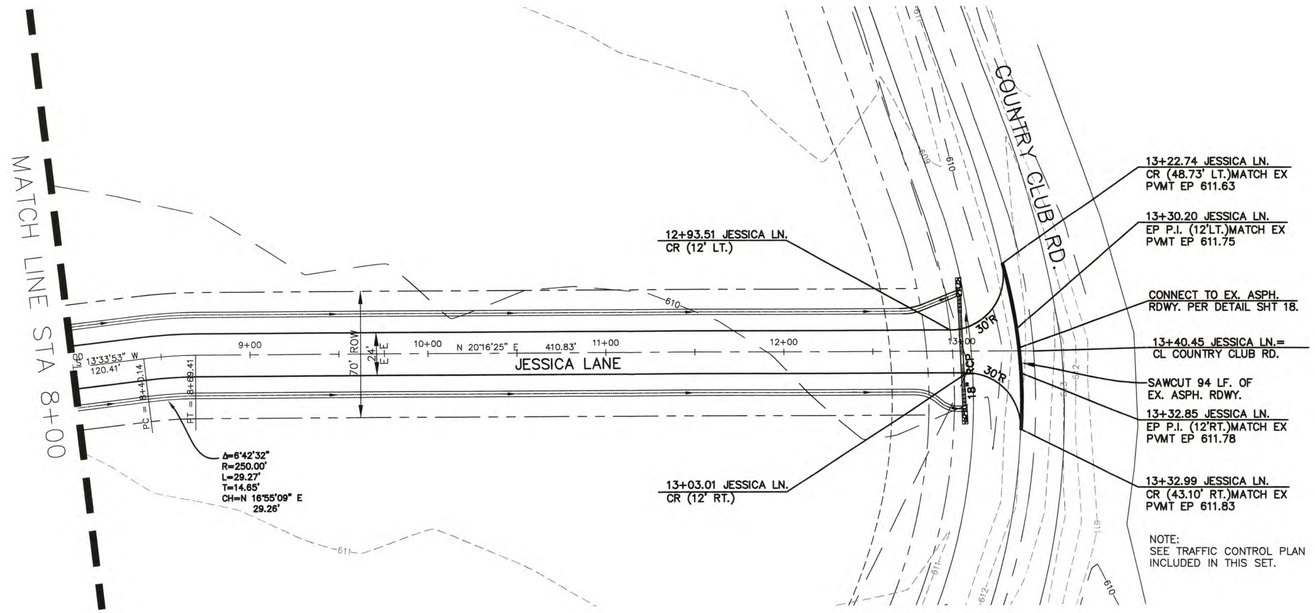
STATE OF TEXAS TODD D. WINTTERS 87085 REGISTERED PROFESSIONAL ENGINEER

PAVING PLAN AND PROFILE
JESSICA LANE
WOLF CREEK
CITY OF LUCAS, COLLIN COUNTY, TEXAS



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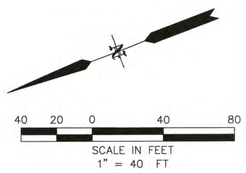

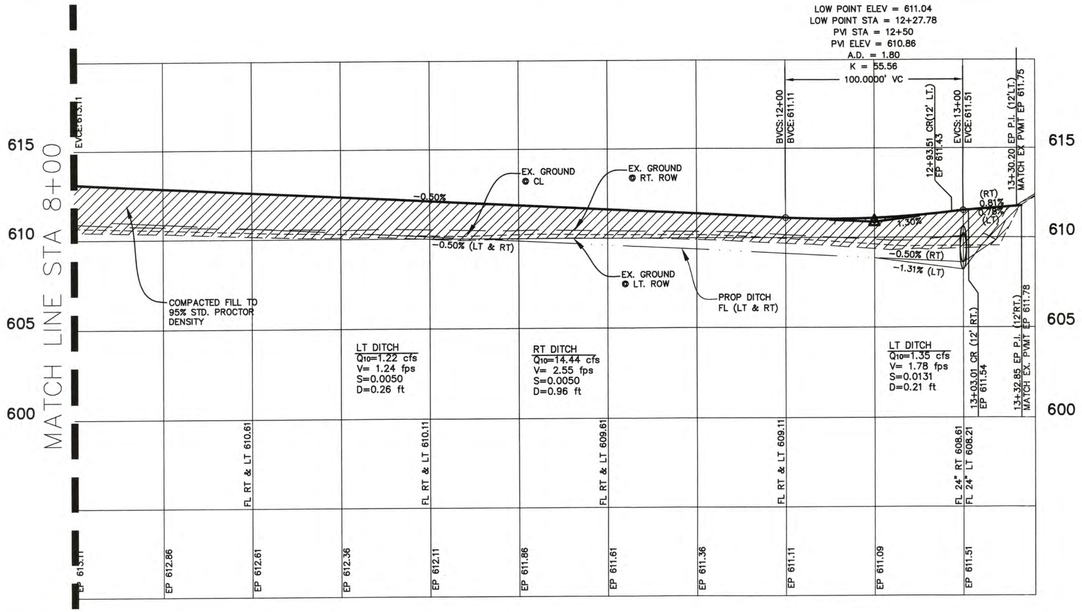

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PAVING PLAN AND PROFILE
JESSICA LANE 8+00 - END
WOLF CREEK
CITY OF LUCAS, COLLIN COUNTY, TEXAS

SHEET 8 OF 26

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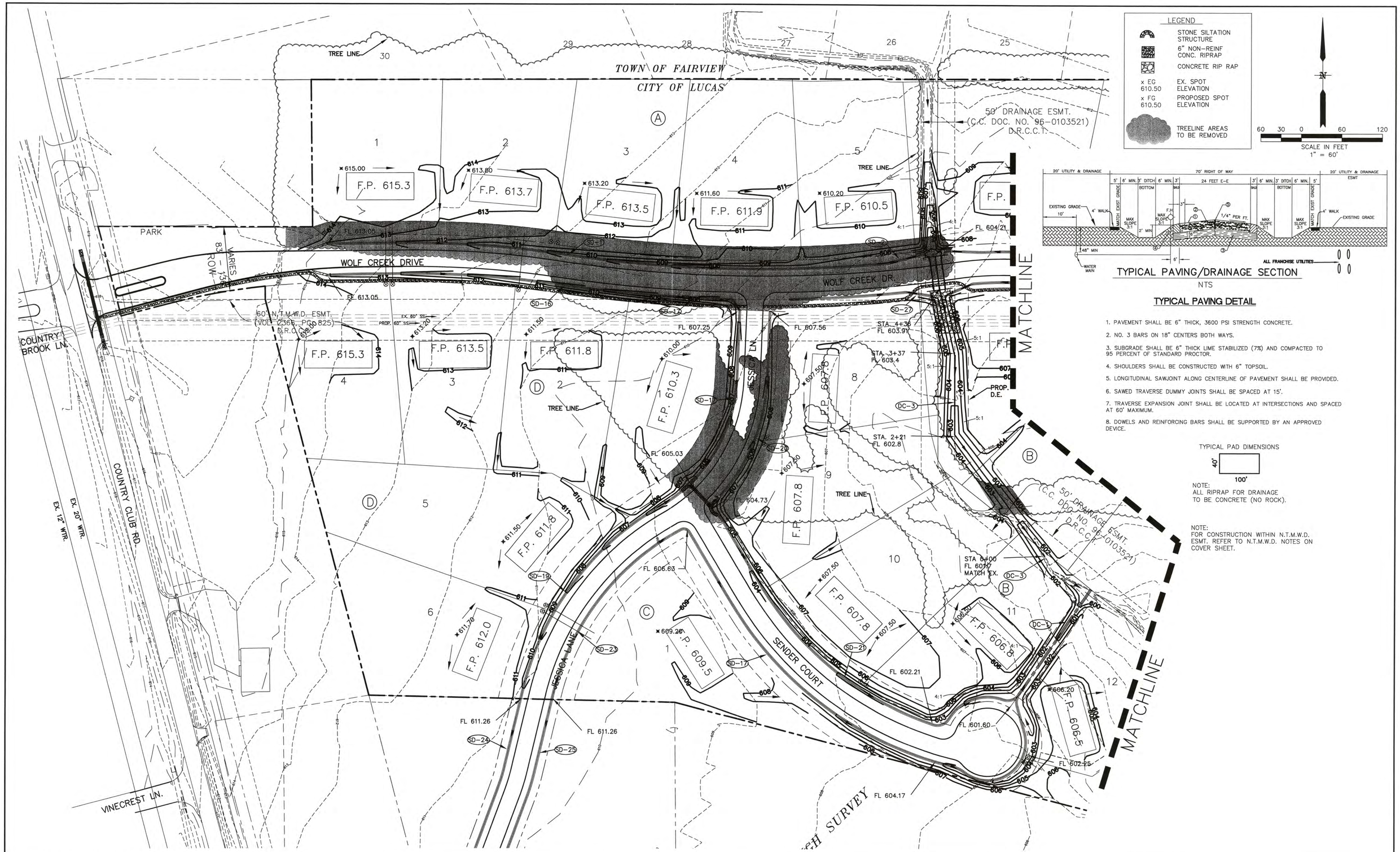

LEGEND

- STONE SILTATION STRUCTURE
- 6" NON-REINF CONC. RIPRAP
- CONCRETE RIP RAP
- x EG 610.50 — EX. SPOT ELEVATION
- x FG 610.50 — PROPOSED SPOT ELEVATION
- TREELINE AREAS TO BE REMOVED

N

60 30 0 60 120

SCALE IN FEET
1" = 60'

TYPICAL PAVING/DRAINAGE SECTION

NTS

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TYPICAL PAD DIMENSIONS

40' × 100'

NOTE:
ALL RIPRAP FOR DRAINAGE TO BE CONCRETE (NO ROCK).

NOTE:
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BENCHMARKS:

#1. SQUARE CHISELED IN WEST END OF HDWL LOCATED ON THE SOUTH SIDE OF COUNTRY BROOK LN. AND THE WEST SIDE OF F.M.1378
ELEV: 617.95

#2. SQUARE CHISELED IN WEST END OF HDWL LOCATED ON THE EAST SIDE OF F.M. 1378 ON BRIDGE OVER WHITE ROCK CREEK (EAST) FEMA RM133
ELEV: 590.08

ENGINEERINGCONCEPTS & DESIGN, L.P.
ENGINEERING / SURVEYING / PROJECT MANAGEMENT
2505 NORTH PLANO ROAD, SUITE 2400
RICHARDSON, TEXAS 75082
469-916-6300 FAX: 469-916-6301 WWW.ECDLP.COM

REVISIONS:

DRAWN: ECD	DATE: NOVEMBER, 2004
CHECKED: TW	DATE: NOVEMBER, 2004
PROJECT NO.: 07508	
DWG FILE NAME: 7508 GRADING.DWG	

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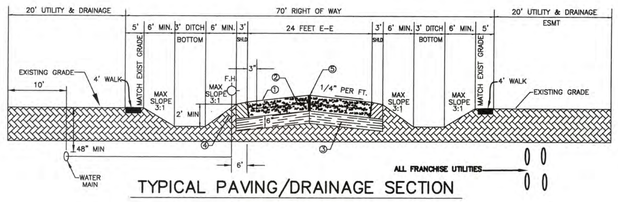
STATE OF TEXAS — TODD D. WINTTERS — 87085 — REGISTERED PROFESSIONAL ENGINEER

GRADING PLAN
SHEET 1
WOLF CREEK
CITY OF LUCAS, COLLIN COUNTY, TEXAS

SHEET 9 OF 26

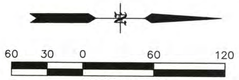
TYPICAL PAVING DETAIL



TYPICAL PAVING/DRAINAGE SECTION

NTS

1. PAVEMENT SHALL BE 6" THICK, 3600 PSI STRENGTH CONCRETE.
2. NO. 3 BARS ON 18" CENTERS BOTH WAYS.
3. SUBGRADE SHALL BE 6" THICK LIME STABILIZED (7%) AND COMPACTED TO 95 PERCENT OF STANDARD PROCTOR.
4. SHOULDERS SHALL BE CONSTRUCTED WITH 6" TOPSOIL.
5. LONGITUDINAL SAWJOINT ALONG CENTERLINE OF PAVEMENT SHALL BE PROVIDED.
6. SAWED TRAVERSE DUMMY JOINTS SHALL BE SPACED AT 15'.
7. TRAVERSE EXPANSION JOINT SHALL BE LOCATED AT INTERSECTIONS AND SPACED AT 60' MAX.
8. DOWELS AND REINFORCING BARS SHALL BE SUPPORTED BY AN APPROVED DEVICE.



LEGEND

- STONE SILTATION STRUCTURE
- 6" NON-REINF CONC. RIPRAP
- CONCRETE RIP RAP
- x EG 610.50 — EX. SPOT ELEVATION
- x FG 610.50 — PROPOSED SPOT ELEVATION
- TREELINE AREAS TO BE REMOVED

TYPICAL PAD DIMENSIONS

40' × 100'

NOTE:
ALL RIPRAP FOR DRAINAGE OUTSIDE OF N.T.M.W.D. ESMT TO BE CONCRETE (NO ROCK).

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GRADING PLAN
SHEET 2
WOLF CREEK

CITY OF LUCAS, COLLIN COUNTY, TEXAS

SHEET 10 OF 26

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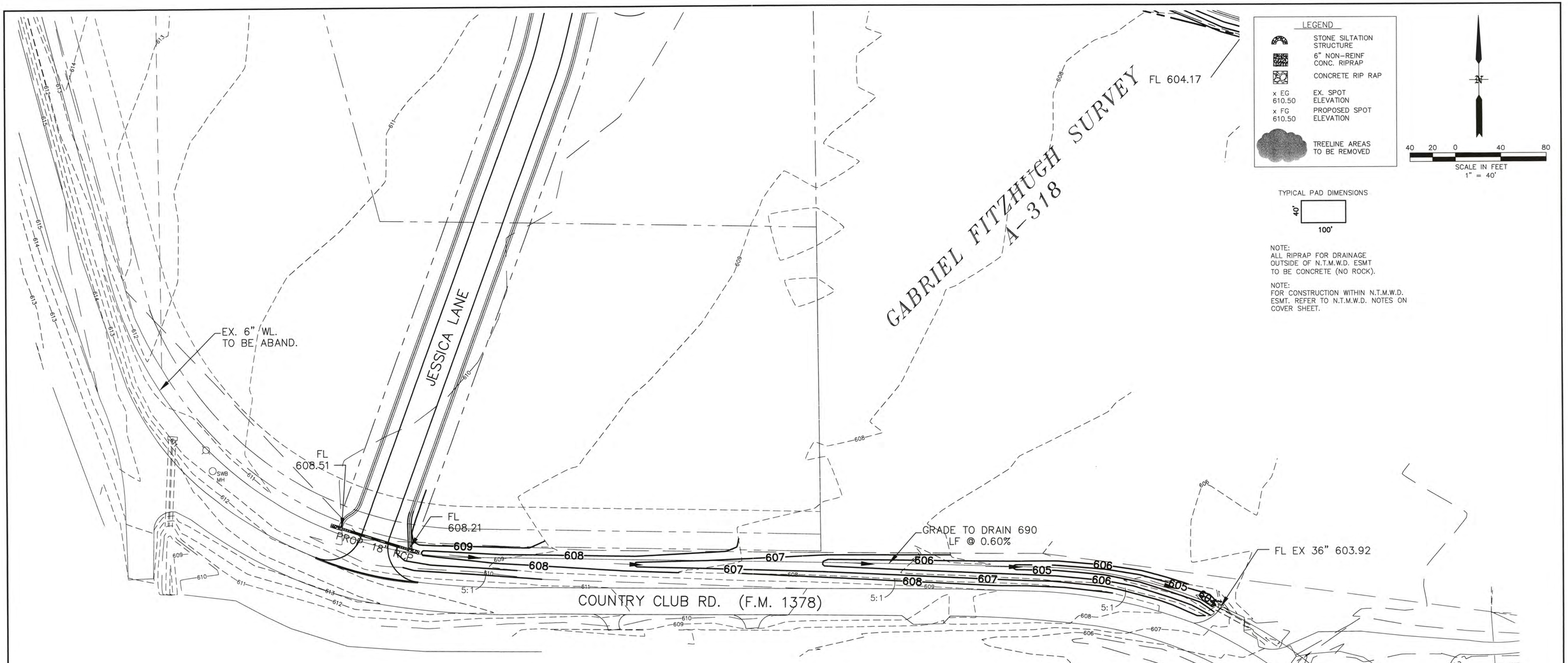

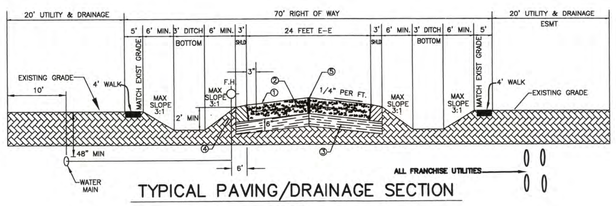

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87085
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GRADING PLAN
SHEET 3
WOLF CREEK
CITY OF LUCAS, COLLIN COUNTY, TEXAS

SHEET 11 OF 26

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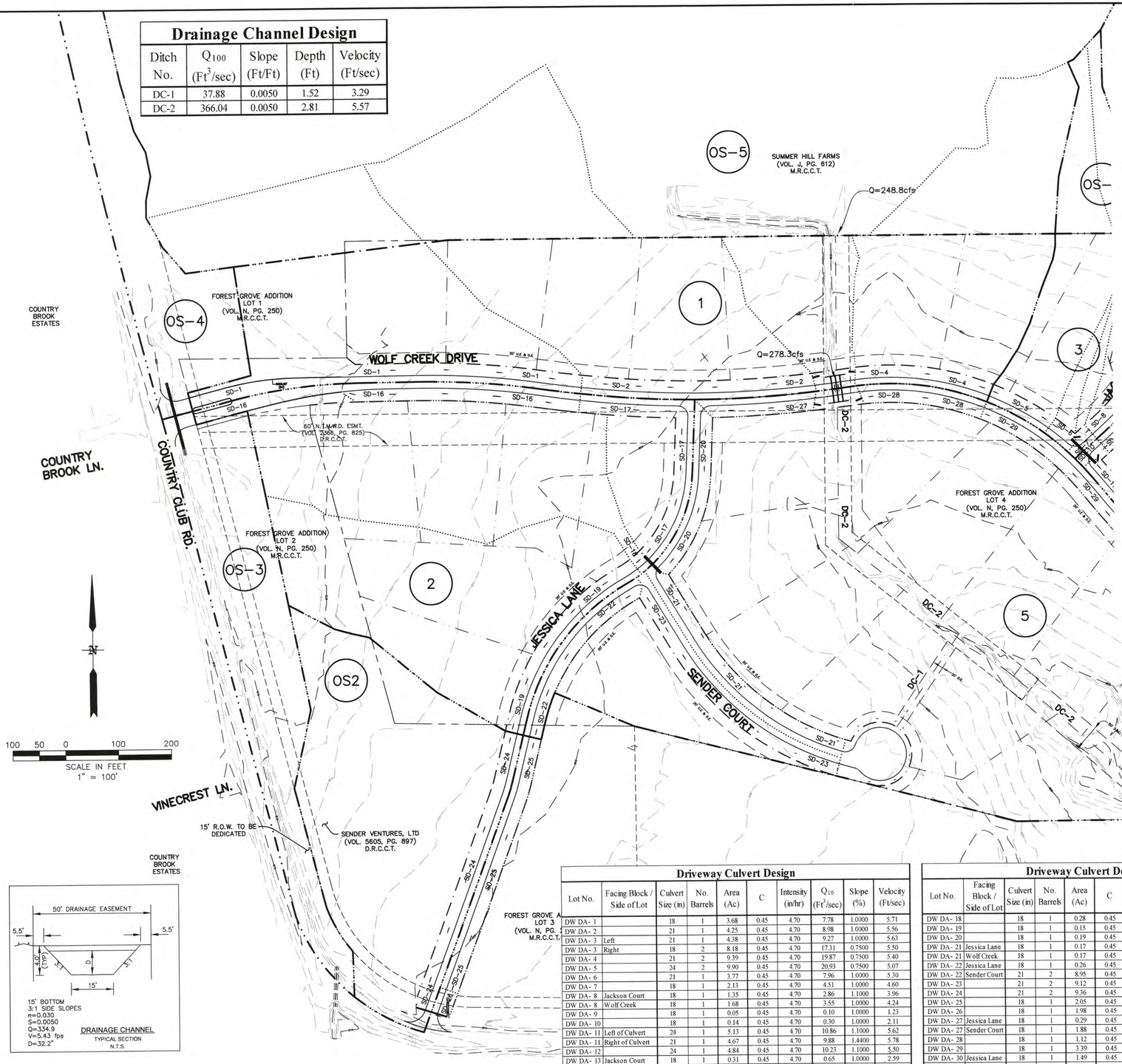
Drainage Channel Design

Ditch No.	Q_{100} (Ft^3/sec)	Slope (Ft/Ft)	Depth (Ft)	Velocity (Ft/sec)
DC-1	37.88	0.0050	1.52	3.29
DC-2	366.04	0.0050	2.81	5.57



Driveway Culvert Design

Block-Lot	Facing Block / Side of Lot	Culvert Size (in)	No. Barrels
A- 1		18	1
A- 2		21	1
A- 3	Left	21	1
A- 3	Right	18	2
A- 4		21	2
A- 5		24	2
A- 6		21	1
A- 7		18	1
A- 8	Wolf Creek Drive	18	1
A- 9		18	1
A- 10		18	1
A- 11	Wolf Creek Drive	21	1
A- 12		24	1
A- 13	Wolf Creek Drive	24	1
B- 1		18	1
B- 2		18	1
B- 3		18	1
B- 4		18	1
B- 5		18	1

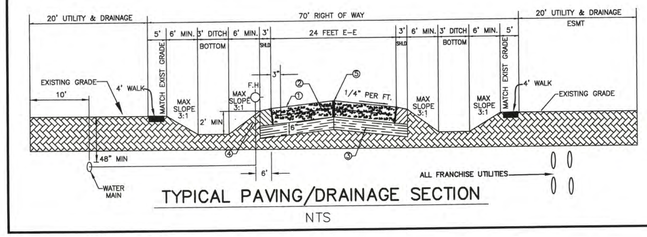
Driveway Culvert Design

Block-Lot	Facing Block / Side of Lot	Culvert Size (in)	No. Barrels
B- 6		18	1
B- 7		18	1
B- 8	Jessica Lane	18	1
B- 8	Wolf Creek Drive	18	1
B- 9	Jessica Lane	18	1
B- 9	Robert Sender Court	21	2
B- 10		21	2
B- 11		21	2
B- 12		18	1
B- 13		18	1
C- 1	Jessica Lane	18	1
C- 1	Robert Sender Court	18	1
D- 1	Jessica Lane	18	1
D- 1	Wolf Creek Drive	18	1
D- 2		18	1
D- 3		18	1
D- 4		18	1
D- 5		18	1
D- 6		18	1

Area	T_c (min)	C	I_{100} (In/hr)	Q_{100} (cfs)	Cum Q_{100} (cfs)
	20	0.45	6.80	29.44	278.28
	20	0.45	6.80	27.02	
	20	0.45	6.80	6.92	9.73
	20	0.45	6.80	20.99	48.47
	20	0.45	6.80	60.74	366.04
	20	0.45	6.80	27.48	
	20	0.45	6.80	14.44	
	20	0.45	6.80	8.45	20.93
	20	0.45	6.80	12.48	
	20	0.45	6.80	248.84	
	20	0.45	6.80	2.82	

ide Road Ditch Design

Q_{100} (Ft^3/sec)	Slope (Ft/Ft)	Depth (Ft)	Velocity (Ft/sec)
13.40	0.0100	0.78	3.22
30.26	0.0075	1.25	3.61
11.54	0.0100	0.72	3.09
4.59	0.0110	0.43	2.46
5.14	0.0421	0.32	4.06
9.70	0.0540	0.42	5.37
4.13	0.0100	0.42	2.30
0.95	0.0100	0.18	1.45
9.82	0.0663	0.40	5.79
10.80	0.0050	0.83	2.36
57.25	0.0110	1.66	4.94
1.56	0.0100	0.25	1.70
4.59	0.0075	0.48	2.15
27.02	0.0501	0.74	7.01
11.66	0.0126	0.68	3.37
0.80	0.0097	0.17	1.35
27.82	0.0050	1.32	3.04
0.89	0.0126	0.17	1.53
5.75	0.0050	0.60	1.98
14.44	0.0050	0.96	2.55
1.22	0.0050	0.26	1.24
SD-26	1.35	0.0131	0.21	1.78
SD-27	0.52	0.0100	0.13	1.18
SD-28	0.58	0.0100	0.14	1.22
SD-29	2.20	0.0110	0.35	2.07



Driveway Culvert Design

Lot No.	Facing Block / Side of Lot	Culvert Size (in)	No. Barrels	Area (Ac)	C	Intensity (in/hr)	Q_{10} (Ft^3/sec)	Slope (%)	Velocity (Ft/sec)
DW DA- 1		18	1	3.68	0.45	4.70	7.78	1.0000	5.71
DW DA- 2		21	1	4.25	0.45	4.70	8.98	1.0000	5.56
DW DA- 3	Left	21	1	4.38	0.45	4.70	9.27	1.0000	5.63
DW DA- 3	Right	18	2	8.18	0.45	4.70	17.31	0.7500	5.50
DW DA- 4		21	2	9.39	0.45	4.70	19.87	0.7500	5.40
DW DA- 5		24	2	9.90	0.45	4.70	20.93	0.7500	5.07
DW DA- 6		21	1	3.77	0.45	4.70	7.96	1.0000	5.30
DW DA- 7		18	1	2.13	0.45	4.70	4.51	1.0000	4.60
DW DA- 8	Jackson Court	18	1	1.35	0.45	4.70	2.86	1.1000	3.96
DW DA- 8	Wolf Creek	18	1	1.68	0.45	4.70	3.55	1.0000	4.24
DW DA- 9		18	1	0.05	0.45	4.70	0.10	1.0000	1.23
DW DA- 10		18	1	0.14	0.45	4.70	0.30	1.0000	2.11
DW DA- 11	Left of Culvert	24	1	5.13	0.45	4.70	10.86	1.1000	5.62
DW DA- 11	Right of Culvert	21	1	4.67	0.45	4.70	9.88	1.4400	5.78
DW DA- 12		24	1	4.84	0.45	4.70	10.23	1.1000	5.50
DW DA- 13	Jackson Court	18	1	0.31	0.45	4.70	0.65	1.0000	2.59
DW DA- 13	Wolf Creek	21	1	3.84	0.45	4.70	8.12	1.1000	5.34
DW DA- 14		18	1	2.91	0.45	4.70	6.14	1.1000	5.16
DW DA- 15		18	1	0.62	0.45	4.70	1.31	1.1000	3.14
DW DA- 16		18	1	0.55	0.45	4.70	1.15	1.1000	3.03
DW DA- 17		18	1	0.43	0.45	4.70	0.90	1.1000	2.83

Driveway Culvert Design

Lot No.	Facing Block / Side of Lot	Culvert Size (in)	No. Barrels	Area (Ac)	C	Intensity (in/hr)	Q_{10} (Ft^3/sec)	Slope (%)	Velocity (Ft/sec)
DW DA- 18		18	1	0.28	0.45	4.70	0.60	1.1000	2.54
DW DA- 19		18	1	0.15	0.45	4.70	0.31	1.1000	1.78
DW DA- 20		18	1	0.19	0.45	4.70	0.40	1.0000	2.28
DW DA- 21	Jessica Lane	18	1	0.17	0.45	4.70	0.36	1.0000	2.22
DW DA- 21	Wolf Creek	18	1	0.17	0.45	4.70	0.36	0.9700	2.22
DW DA- 22	Jessica Lane	18	1	0.26	0.45	4.70	0.56	0.9700	0.34
DW DA- 22	Sender Court	21	2	8.95	0.45	4.70	18.93	0.5000	4.86
DW DA- 23		21	2	9.12	0.45	4.70	19.29	0.5000	4.96
DW DA- 24		21	2	9.36	0.45	4.70	19.79	0.5000	5.08
DW DA- 25		18	1	2.05	0.45	4.70	4.33	0.5000	3.28
DW DA- 26		18	1	1.98	0.45	4.70	4.19	0.5000	3.17
DW DA- 27	Jessica Lane	18	1	0.29	0.45	4.70	0.62	0.5000	2.13
DW DA- 27	Sender Court	18	1	1.88	0.45	4.70	3.97	1.2600	3.19
DW DA- 28		18	1	1.12	0.45	4.70	2.36	1.2600	2.76
DW DA- 29		18	1	3.39	0.45	4.70	7.17	1.2600	4.25
DW DA- 30	Jessica Lane	18	1	1.49	0.45	4.70	3.16	0.7500	3.24
DW DA- 30	Wolf Creek	18	1	0.65	0.45	4.70	1.38	0.7500	1.97
DW DA- 31		18	1	0.51	0.45	4.70	1.07	1.0000	2.46
DW DA- 32		18	1	0.40	0.45	4.70	0.84	1.0000	2.17
DW DA- 33		18	1	0.24	0.45	4.70	0.52	1.0000	1.63

NOTE:
CITY OF LUCAS HAS THE AUTHORITY TO REVIEW AND APPROVE SLOPE TREATMENTS AT DRIVEWAYS.

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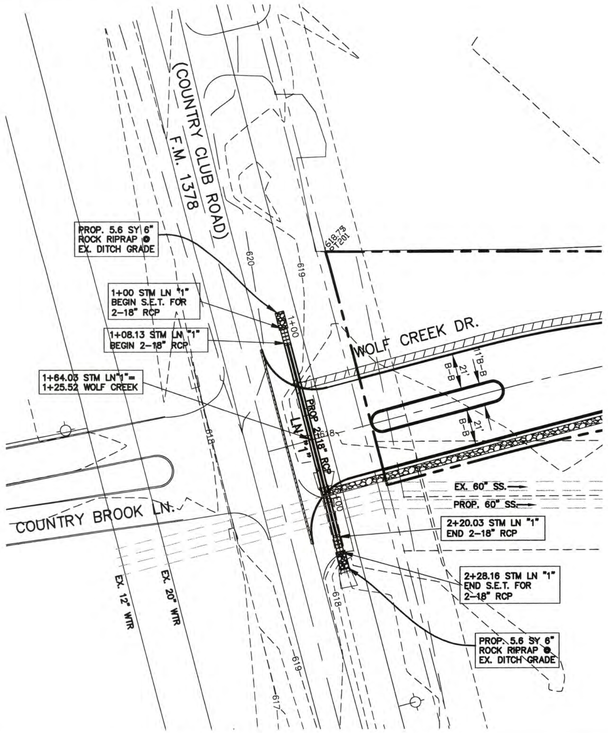
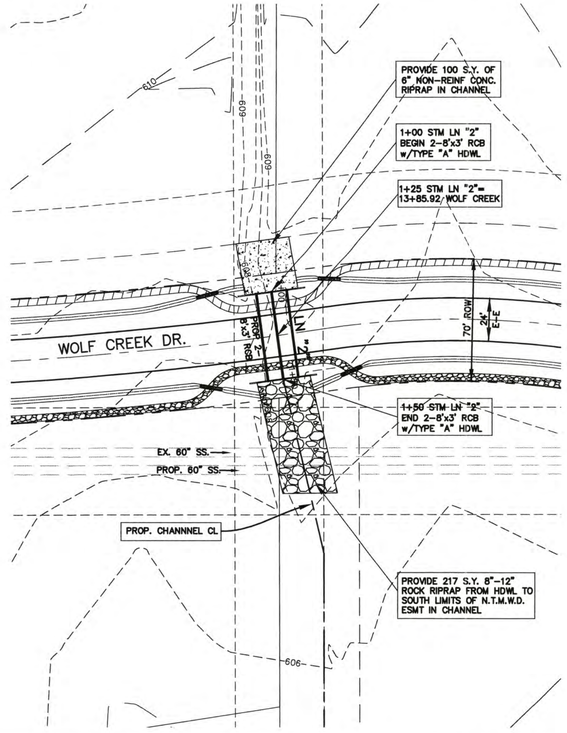
DRAINAGE AREA MAP

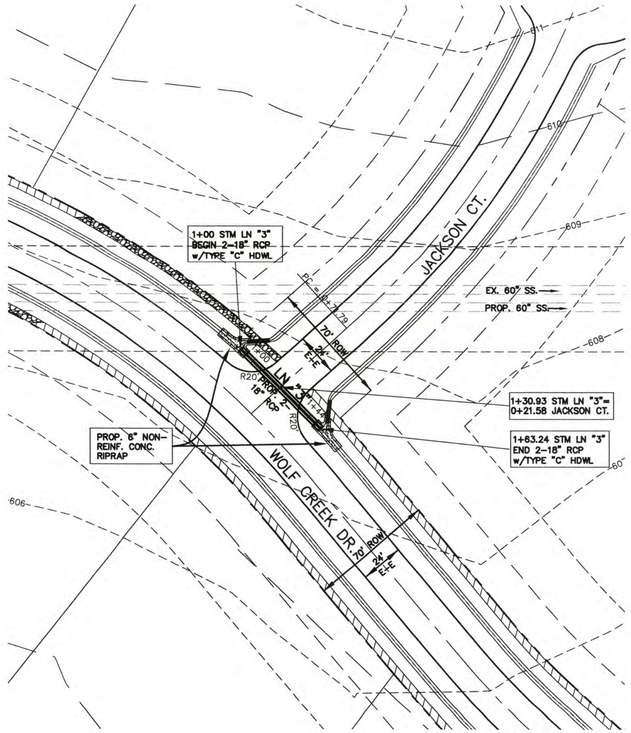
WOLF CREEK

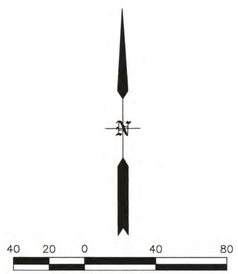
CITY OF LUCAS, COLLIN COUNTY, TEXAS

SHEET 12 OF 26









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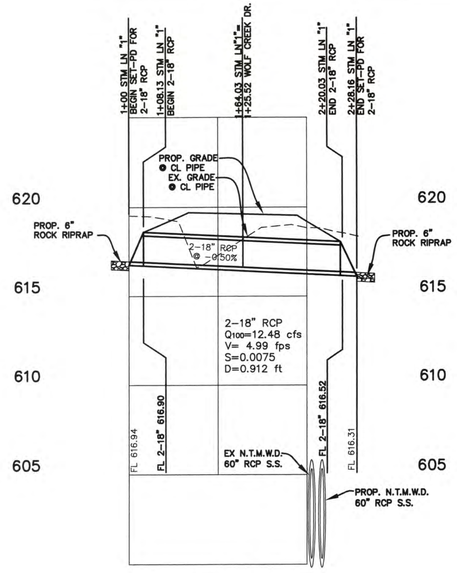

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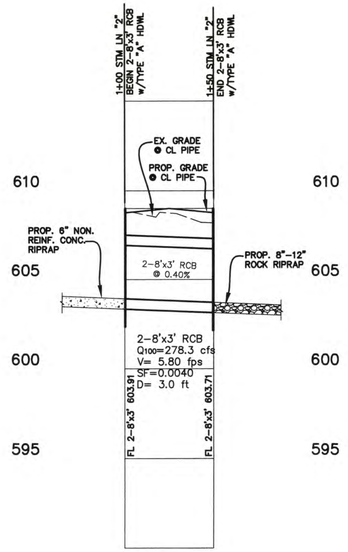

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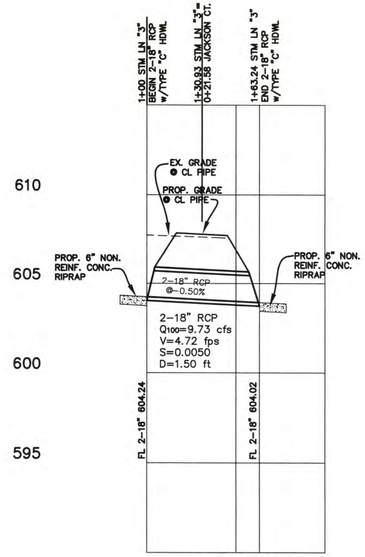

LINE "3"

1+00 2+00 1+00 1+00

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STATE OF TEXAS · TODD D. WINTTERS · 87085 · REGISTERED PROFESSIONAL ENGINEER

STORM SEWER PLAN & PROFILES LINES "1.0", "2.0", & "3.0" WOLF CREEK

CITY OF LUCAS, COLLIN COUNTY, TEXAS

SHEET 13 OF 26

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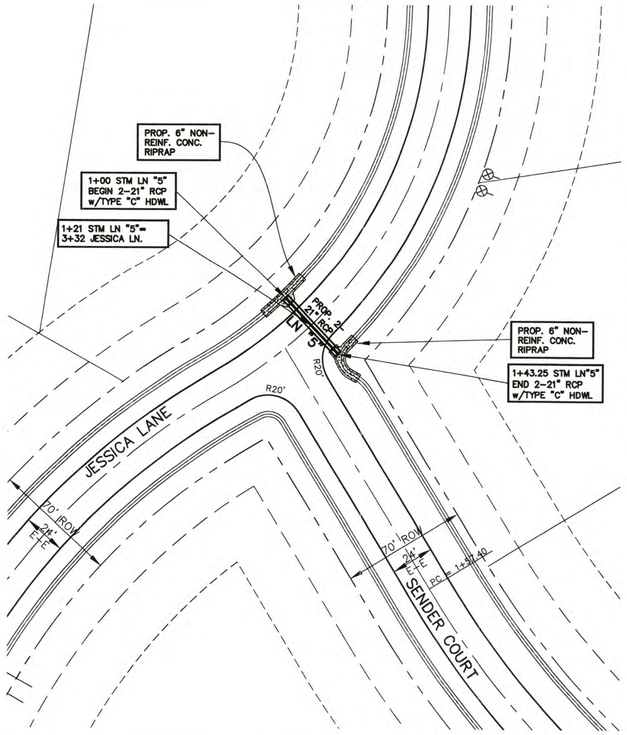

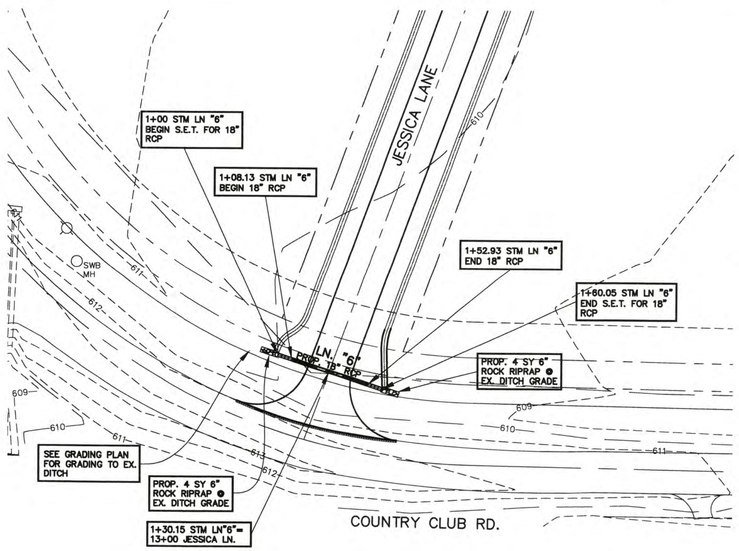

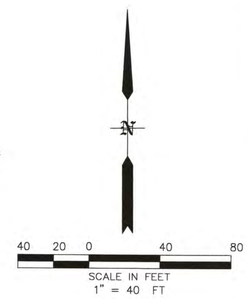

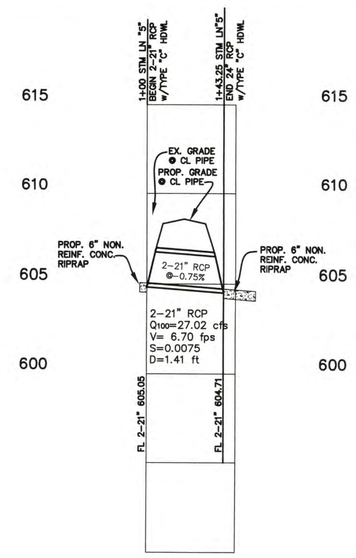

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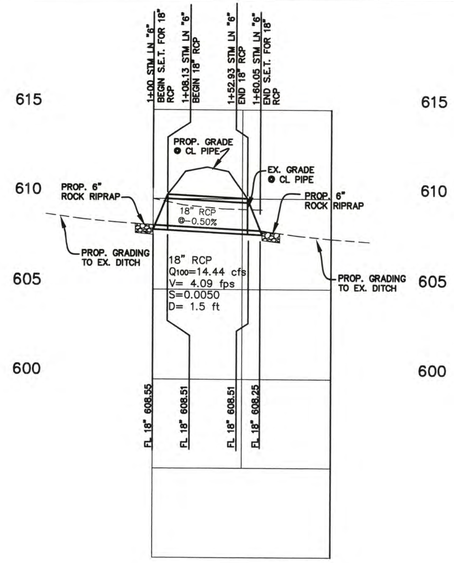

LINE "6"

1+00

1+00 2+00

CAUTION! EXISTING UTILITIES

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BENCHMARKS:

#1. SQUARE CHISELED IN WEST END OF HDWL LOCATED ON THE SOUTH SIDE OF COUNTRY BROOK LN. AND THE WEST SIDE OF F.M.1378
ELEV: 617.95

#2. SQUARE CHISELED IN WEST END OF HDWL LOCATED ON THE EAST SIDE OF F.M. 1378 ON BRIDGE OVER WHITE ROCK CREEK (EAST) FEMA RM133
ELEV: 590.08

ENGINEERINGCONCEPTS & DESIGN, L.P.
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RICHARDSON, TEXAS 75082
469-916-6300 FAX: 469-916-6301 WWW.ECDLP.COM

REVISIONS:

DRAWN:	ECD	DATE:	NOVEMBER, 2004
CHECKED:	TW	DATE:	NOVEMBER, 2004
PROJECT NO.:	07508		
DWG FILE NAME:	7508 PAV.DWG		

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STATE OF TEXAS
TODD D. WINTTERS
87085
REGISTERED PROFESSIONAL ENGINEER

STORM SEWER PLAN & PROFILES LINES "5.0" & "6.0" WOLF CREEK

CITY OF LUCAS, COLLIN COUNTY, TEXAS

SHEET 14 OF 26

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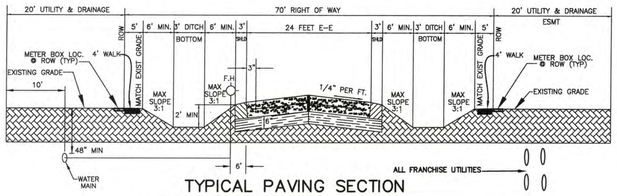


TYPICAL PAVING SECTION

NTS

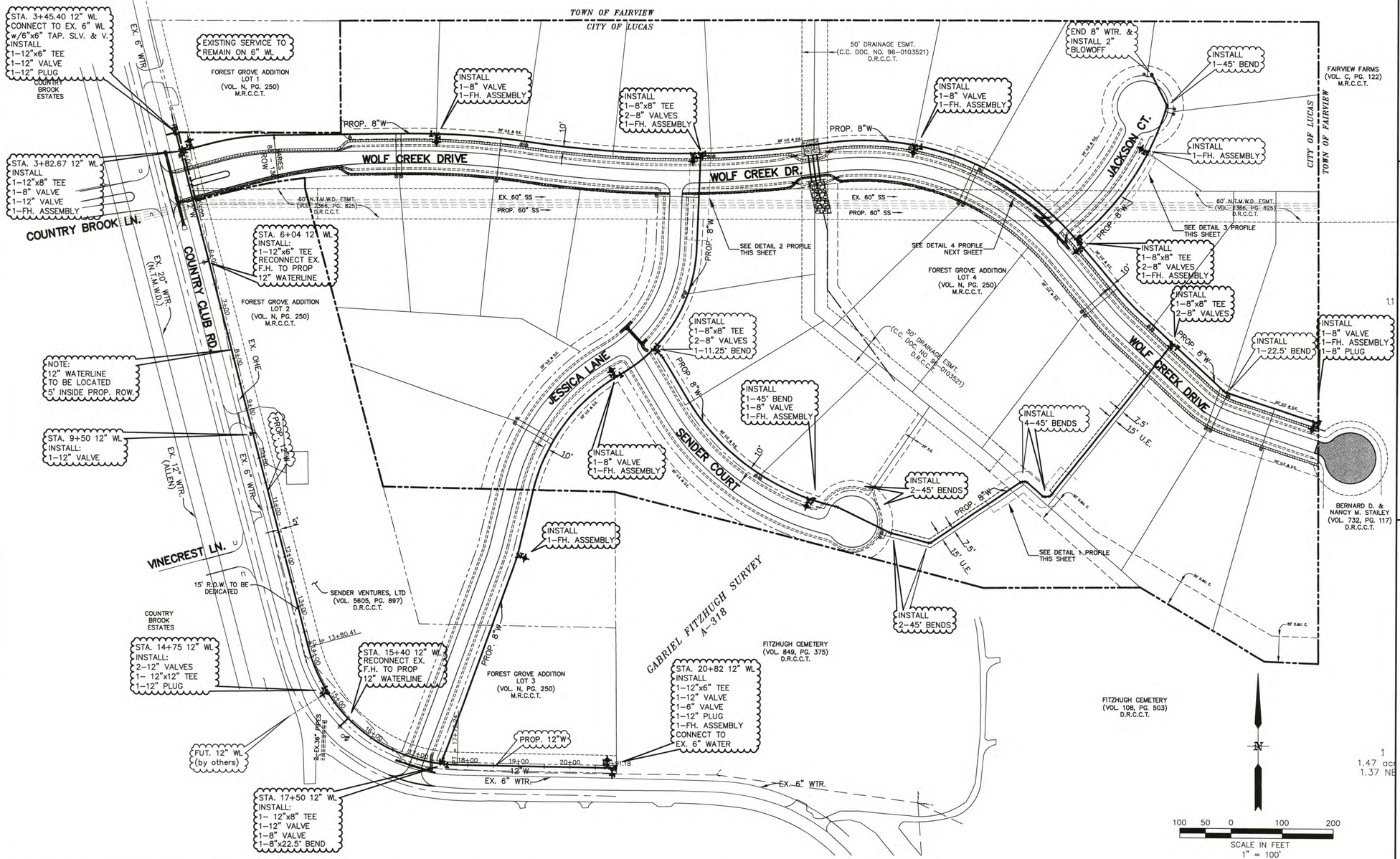
NOTE
1. A BLUE STIMSONITE, FIRE-LITE REFLECTOR (OR APPROVED EQUAL) SHALL BE PLACED IN THE CENTER OF THE DRIVE LANE ON THE SIDE OF THE FIRE HYDRANT.
2. VALVES 12" AND UNDER TO BE GATE VALVES MEETING REQUIREMENTS OF AWWA C500 OR AWWA C509 (NCTOG ITEM 2.13.1) WITH NON-RISING STEMS.

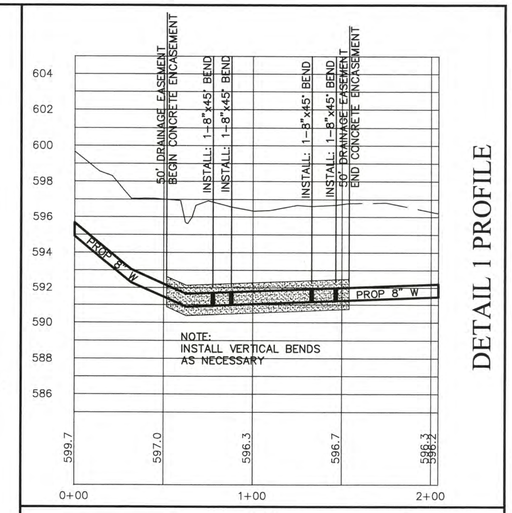
LEGEND

- WATER VALVE
- FIRE HYDRANT (COMPLETE W/ VALVE AND ASSEMBLY)
- PROPOSED WATER METER
- PROPOSED WATER LINE
- DIRECTION OF FLOW
- EXISTING WATER LINE
- PROPOSED CONC. WALK
- PROPOSED CRUSHED GRANITE WALK

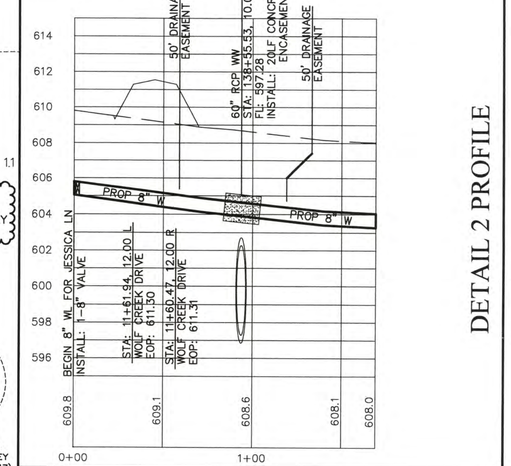
NOTES:

1. CONTRACTOR TO FIELD VERIFY HORIZONTAL & VERTICAL LOCATION OF EX. 6" WATERLINE ALONG COUNTRY CLUB RD. BEFORE MAKING CONNECTION TO PROPOSED 12" WATERLINE AND NOTIFY E.C.D. OF ANY DISCREPENCIES. (469) 916-6300
2. FOR CONSTRUCTION WITHIN N.T.M.W.D. EASEMENT REFER TO N.T.M.W.D. NOTES ON COVER SHEET.
3. ALL WATERLINES TO BE 8" PVC C-900 UNLESS NOTED OTHERWISE.
4. ALL FH.'s TO BE MEULLER, LOCATED 6' FROM E.P.
5. MEGALUG TO BE USED ON ALL CAST IRON FITTINGS.

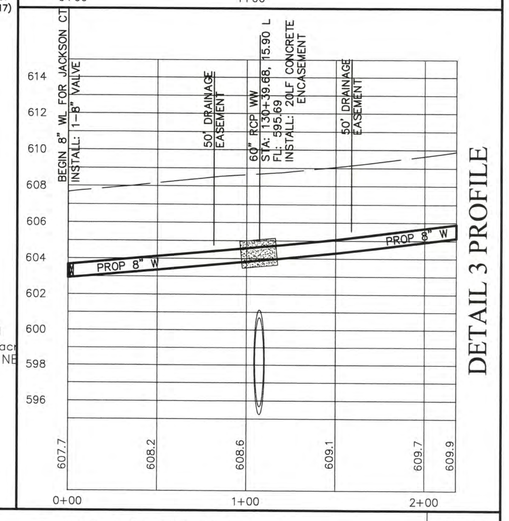




DETAIL 1 PROFILE



DETAIL 2 PROFILE



DETAIL 3 PROFILE

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WATER PLAN

WOLF CREEK

CITY OF LUCAS, COLLIN COUNTY, TEXAS

SHEET 15 OF 26

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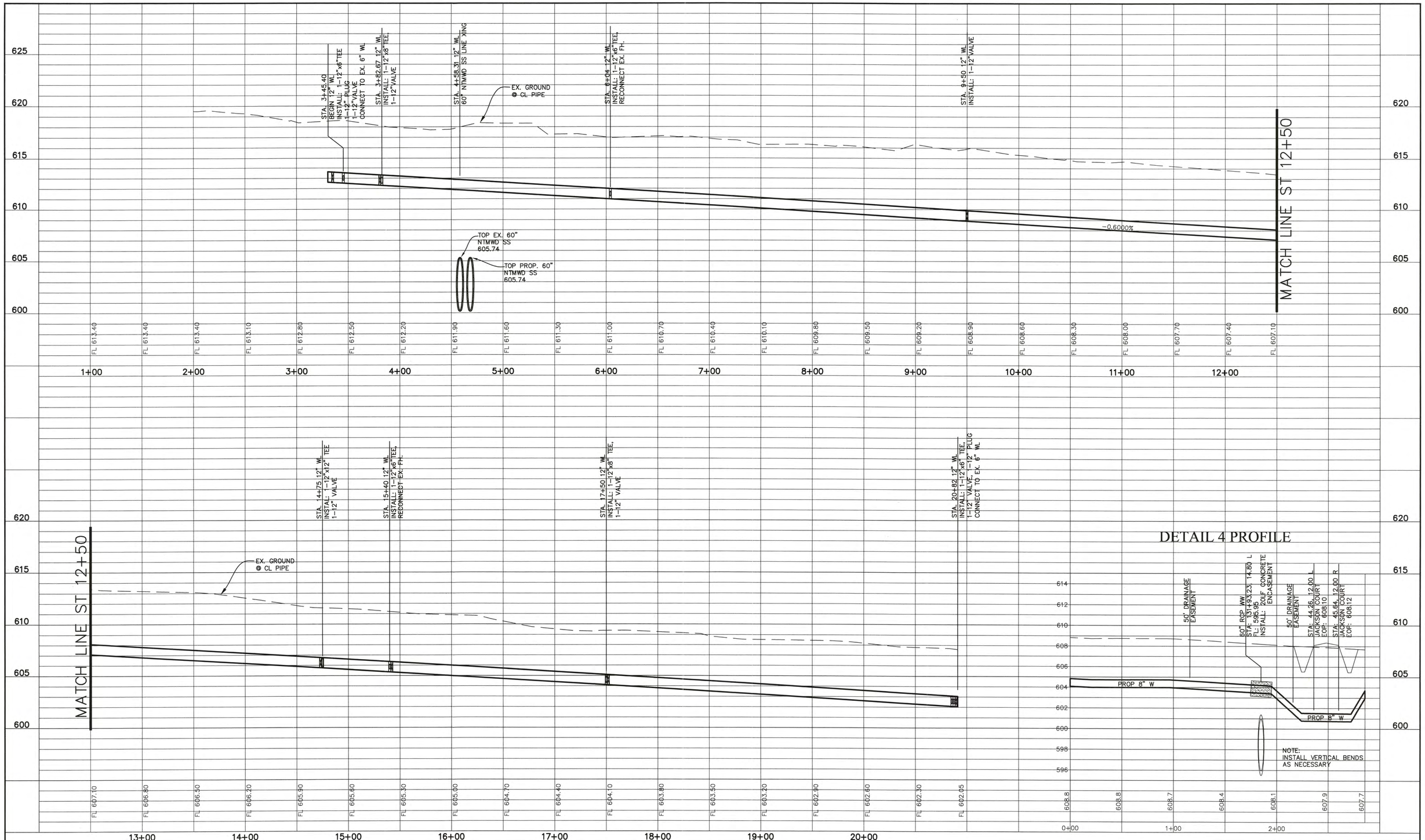

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PROFESSIONAL ENGINEER

12" WATERLINE PROFILE

WOLF CREEK

CITY OF LUCAS, COLLIN COUNTY, TEXAS

SHEET 16 OF 26

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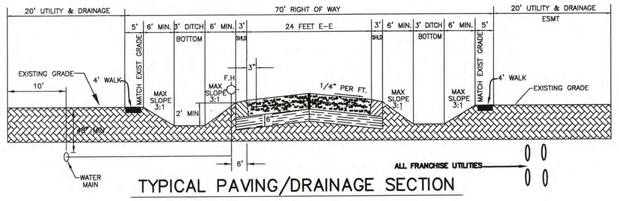
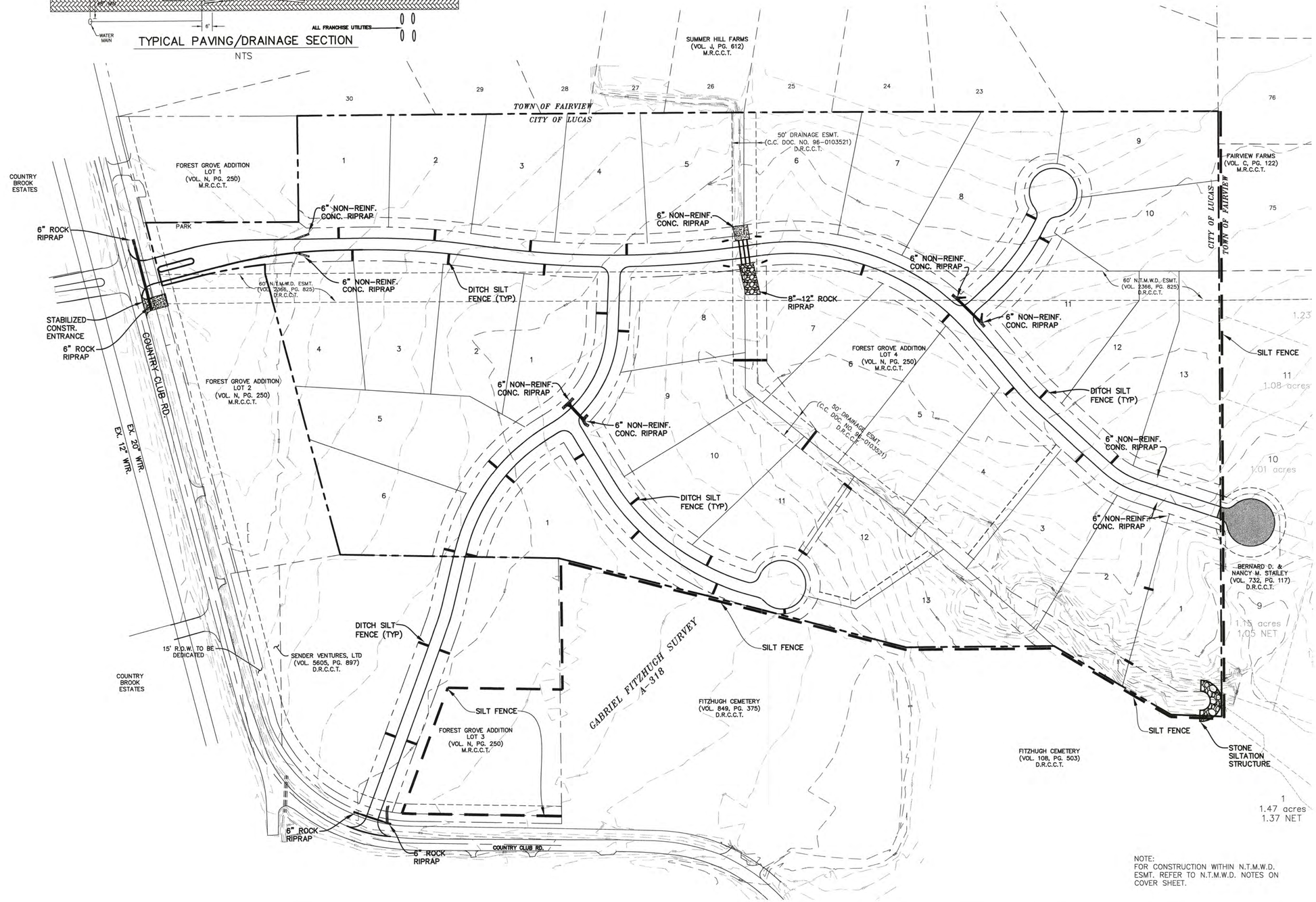


TYPICAL PAVING/DRAINAGE SECTION

NTS



NOTE:
FOR CONSTRUCTION WITHIN N.T.M.W.D. ESMT. REFER TO N.T.M.W.D. NOTES ON COVER SHEET.

N

100 50 0 100 200

SCALE IN FEET
1" = 100'

LEGEND

- SILT FENCE
- STONE SILTATION STRUCTURE
- ROCK RIP RAP
- 6" NON-REINF CONC. RIPRAP
- CONSTRUCTION ENTRANCE

NOTES:

1. A STORM WATER POLLUTION PREVENTION PLAN (S.W.P.P.P.) INCLUDING NOTICE OF INTENT (N.O.I.) WILL BE PREPARED BY THE GENERAL CONTRACTOR FOR THIS PROJECT IN ACCORDANCE WITH THE REQUIREMENTS OF THE N.P.D.E.S. GENERAL PERMIT FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION.
2. ALL CONTRACTORS WILL COMPLY WITH THE REQUIREMENTS AND INTENT OF THE N.P.D.E.S. GENERAL PERMIT FOR STORM WATER DISCHARGES.
3. EACH CONTRACTOR SHALL SUBMIT A NOTICE OF INTENT (N.O.I.) FOR STORM WATER DISCHARGE PERMIT COVERAGE. THIS SUBMITTAL SHALL BE COORDINATED WITH THE OWNER AND SHALL OCCUR NO LESS THAN 48 HOURS PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION ACTIVITY.
4. EACH CONTRACTOR SHALL OBTAIN AND SUBMIT TO THE OWNER A POLLUTION PREVENTION CERTIFICATION FROM EACH SUBCONTRACTOR WHOSE WORK IMPACTS THE STORM WATER POLLUTION PREVENTION PLAN (S.W.P.P.P.) PRIOR TO THE PERFORMANCE OF ANY WORK BY SAID SUBCONTRACTOR. THESE CERTIFICATIONS SHALL BECOME A PART OF THE STORM WATER POLLUTION PREVENTION PLAN.
5. CONTRACTOR SHALL INSTALL EROSION CONTROL MEASURES, AS INDICATED ON THE PLANS AND AS FIELD CONDITIONS WARRANT, PRIOR TO COMMENCING ANY CONSTRUCTION ACTIVITY. REPAIRS OR MODIFICATIONS TO THE MEASURES WILL BE MADE BY THE CONTRACTOR IF THE CONTROL MEASURES PROVE INEFFECTIVE OR IF ADDITIONAL CONTROL MEASURES ARE NECESSARY.
6. CONTRACTOR SHALL TAKE APPROPRIATE MEASURES TO PREVENT TRACKING OF MUD AND/OR SOILS ONTO EXISTING AND/OR NEW PAVEMENT. ANY TRACKING THAT OCCURS SHALL BE REMOVED IMMEDIATELY BY THE CONTRACTOR.
7. CONTRACTOR SHALL CONSTRUCT INLET PROTECTION FOR ALL INCOMPLETE CURB INLETS AND SHALL TAKE EVERY MEASURE TO KEEP SOILS AND SEDIMENTS FROM ENTERING THE STORM SEWER SYSTEM.
8. CONTRACTOR SHALL CONSTRUCT INLET PROTECTION FOR ALL COMPLETED CURB INLETS AND SHALL TAKE EVERY MEASURE TO KEEP SOILS AND SEDIMENTS FROM ENTERING THE STORM SEWER SYSTEM.
9. CONTRACTOR SHALL INSTALL APPROPRIATE INLET PROTECTION AT ALL AREA DRAINS.
10. AT A MINIMUM, PERIMETER CONTROLS SUCH AS SILT FENCE OR STRAW BALES SHALL BE INSTALLED AT ALL DOWN SLOPE BOUNDARIES AND AS WARRANTED WHERE PAVEMENT REMOVAL, UTILITY CONSTRUCTION, GRADING, OR OTHER CONSTRUCTION ACTIVITIES ARE TO BE PERFORMED. THE CONTRACTOR SHALL AT ALL TIMES TAKE SUCH MEASURES AS NECESSARY TO MINIMIZE OFFSITE TRACKING OR TRANSPORT OF SEDIMENT AND DEBRIS.
11. DAMAGE TO ADJACENT PROPERTY AND/OR TO RECEIVING WATERS CAUSED BY IMPROPERLY INSTALLED OR POORLY MAINTAINED EROSION CONTROL MEASURES WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.
12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL AND DISPOSAL OF ANY SILTATION CAUSED BY HIS OPERATIONS AND/OR FAILURE OF THE EROSION CONTROL MEASURES.
13. CONTRACTOR SHALL REMOVE AND PROPERLY DISPOSE OF ACCUMULATED SILT AND SEDIMENT FROM EROSION CONTROL MEASURES WHEN IT REACHES A DEPTH OF SIX (6) INCHES OR IMPAIRS THE EFFECTIVENESS OF THE MEASURES.
14. THE CONTRACTORS REPRESENTATIVE WILL INSPECT THE PROJECT EVERY SEVEN DAYS, AT A MINIMUM, AND AFTER EVERY RAINFALL OF ONE-HALF INCHES OR GREATER TO DETERMINE THE INTEGRITY AND EFFECTIVENESS OF THE EROSION CONTROL MEASURES. A WRITTEN INSPECTION REPORT WILL BE FILED WITH THE POLLUTION PREVENTION PLAN. THIS INSPECTION DOES NOT RELIEVE THE CONTRACTOR'S RESPONSIBILITY FOR INSPECTION AND MAINTENANCE OF THE EROSION CONTROL MEASURES OR HIS DUTY TO COMPLY WITH THE INTENT AND CONDITIONS OF THE N.P.D.E.S. GENERAL PERMIT.
15. ALL STOCKPILED SOILS WILL BE SURROUNDED BY A STRAW BALE DIKE, SILT FENCE, SEDIMENT CONTROL SWALE, OR EQUIVALENT MEASURE TO PROPERLY CONTROL SEDIMENT RUNOFF, AS APPROVED BY THE OWNER.
16. CONTRACTOR SHALL STABILIZE ANY AREA WHERE CONSTRUCTION ACTIVITY IS TO BE TEMPORARILY OR PERMANENTLY CEASED FOR MORE THAN 14 DAYS.

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EROSION CONTROL PLAN

WOLF CREEK

CITY OF LUCAS, COLLIN COUNTY, TEXAS

SHEET 17 OF 26

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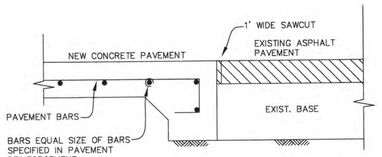
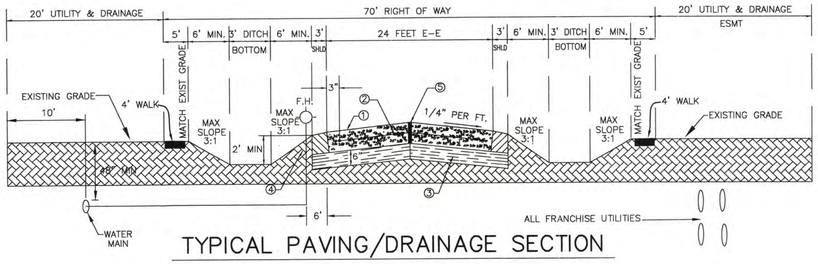


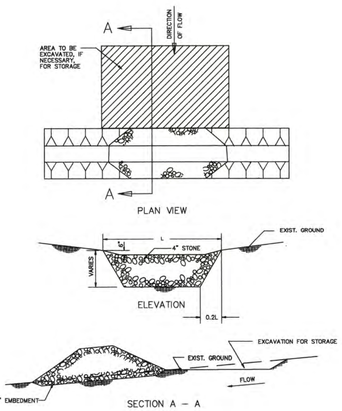
CONNECTION TO EXISTING ASPHALT PAVEMENT

N.T.S.



TYPICAL PAVING/DRAINAGE SECTION

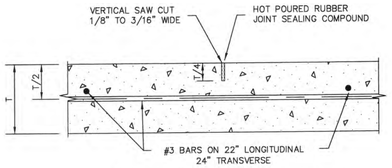
NTS



STONE SILTATION STRUCTURE

N.T.S.

Stone Siltation Structure To Be Installed Prior To Beginning Work On Site.

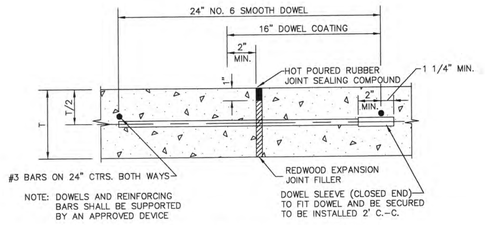


SAWED DUMMY JOINT DETAIL

TYPICAL PAVING DETAIL

N.T.S.

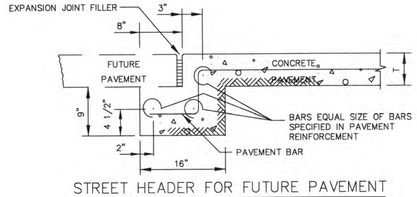
1. PAVEMENT SHALL BE 6" THICK, 3600 PSI STRENGTH CONCRETE.
2. NO. 3 BARS ON 18" CENTERS BOTH WAYS.
3. SUBGRADE SHALL BE 6" THICK LIME STABILIZED (7%) AND COMPACTED TO 95 PERCENT OF STANDARD PROCTOR.
4. SHOULDERS SHALL BE CONSTRUCTED WITH 6" TOPSOIL.
5. LONGITUDINAL SAWJOINT ALONG CENTERLINE OF PAVEMENT SHALL BE PROVIDED.
6. SAWED TRAVERSE DUMMY JOINTS SHALL BE SPACED AT 15'.
7. TRAVERSE EXPANSION JOINT SHALL BE LOCATED AT INTERSECTIONS AND SPACED AT 60' MAXIMUM.
8. DOWELS AND REINFORCING BARS SHALL BE SUPPORTED BY AN APPROVED DEVICE.



NOTE: DOWELS AND REINFORCING BARS SHALL BE SUPPORTED BY AN APPROVED DEVICE

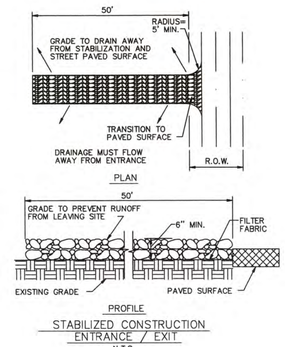
TRANSVERSE EXPANSION JOINT DETAIL

NOTE: SPACE 600' O.C., LOCATE AT INTERSECTIONS



STREET HEADER FOR FUTURE PAVEMENT

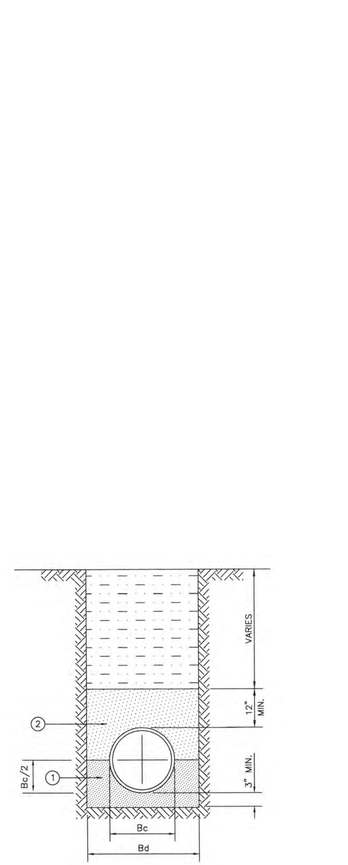
N.T.S.



STABILIZED CONSTRUCTION ENTRANCE / EXIT

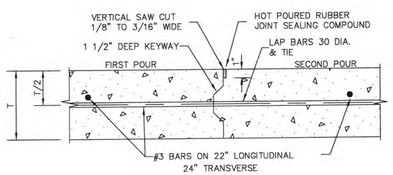
N.T.S.

NCTCOG 02270.G
STORM WATER QUALITY BEST MANAGEMENT PRACTICES FOR CONSTRUCTION ACTIVITIES

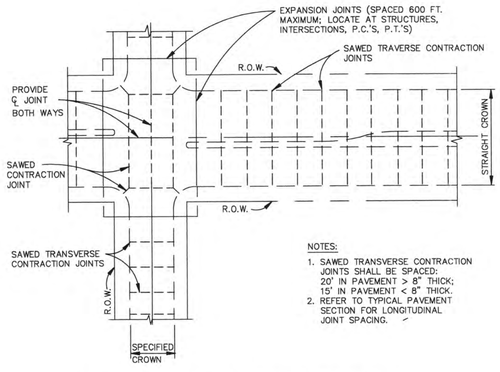


1. FINE GRADATION CRUSHED STONE – TOP LAYER IS TO BE PLACED TO GRADE TO PROVIDE UNIFORM SUPPORT OF PIPE BARREL. EXCAVATE BELL HOLES.
2. SELECT MATERIAL FREE OF ROCKS, CLUMPS OR DEBRIS LARGER THAN 6" IN GREATEST DIMENSION. COMPACT TO 90% STANDARD PROCTOR DENSITY. UNDER STRUCTURES, ROADWAYS AND PAVEMENT, EXCLUDE MATERIAL WITH LL>50 AND COMPACT TO 95% STANDARD PROCTOR DENSITY. GRANULAR BACKFILL MATERIAL SHALL BE WELL GRADED.

STORM SEWER R.C.P. EMBEDMENT



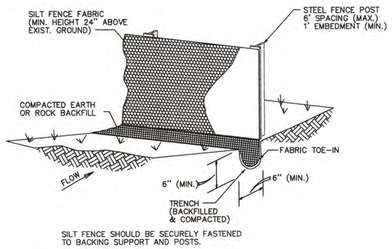
CONSTRUCTION JOINT DETAIL



NOTES:
1. SAWED TRANSVERSE CONTRACTION JOINTS SHALL BE SPACED: 20' IN PAVEMENT > 8" THICK; 15' IN PAVEMENT < 8" THICK.
2. REFER TO TYPICAL PAVEMENT SECTION FOR LONGITUDINAL JOINT SPACING.

SPACING DIAGRAM FOR TRANSVERSE JOINTS

N.T.S.



SILT FENCE SHOULD BE SECURELY FASTENED TO BACKING SUPPORT AND POSTS.

SILT FENCE

N.T.S.

NCTCOG 02270.B
STORM WATER QUALITY BEST MANAGEMENT PRACTICES FOR CONSTRUCTION ACTIVITIES

ENGINEERINGCONCEPTS & DESIGN, L.P.
ENGINEERING / SURVEYING / PROJECT MANAGEMENT
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REVISIONS:		
DRAWN: ECD	DATE:	NOVEMBER, 2004
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PROJECT NO.: 07508		
DWG FILE NAME: 7508 DETAILS.DWG		

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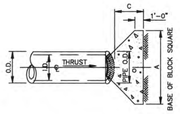
STATE OF TEXAS — TODD D. WINTTERS 87085 — REGISTERED PROFESSIONAL ENGINEER

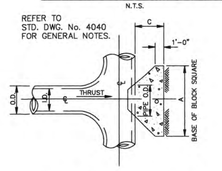
PAVING,DRAINAGE & EROSION CONTROL DETAILS WOLF CREEK

CITY OF LUCAS, COLLIN COUNTY, TEXAS

SHEET 18 OF 26



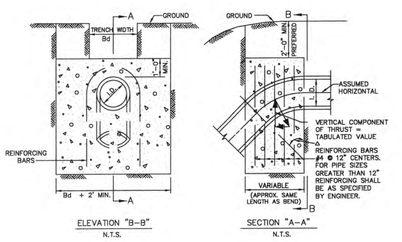
PLAN OF PLUG THRUST BLOCK
N.T.S.



PLAN OF TEE THRUST BLOCK
N.T.S.

I.D. (IN.)	T (IN.)	Δ = 11.25° (FT.)	Δ = 22.50° (FT.)	E (FT.)
4,6,8	0.4	1.5	1.5	0.9
10,12	0.5	1.5	1.5	1.2
16,18	0.6	1.5	1.5	1.6
20	0.7	1.5	1.5	1.8
24	0.9	1.5	1.5	2.1
30	2.9	1.5	1.9	2.6
36	4.5	1.5	2.3	3.3
42	5.0	1.8	2.6	3.8
48	5.5	2.0	3.0	4.3
54	6.0	2.3	3.4	4.8
60	6.5	2.5	3.8	5.3
66	6.8	2.8	4.1	5.7
72	7.5	3.0	4.5	6.3
78	7.5	3.3	4.9	6.7
84	8.0	3.5	5.3	7.2
90	8.5	3.8	5.6	7.7
96	9.0	4.0	6.0	8.2

			Δ = 30°					Δ = 45°				
			EARTH		ROCK				EARTH		ROCK	
I.D. (IN.)	G (FT.)	THRUST (TONS)	A (FT.)	B (FT.)	A (FT.)	B (FT.)	VOL. (C.Y.)	I.D. (IN.)	G (FT.)	THRUST (TONS)	A (FT.)	B (FT.)	VOL. (C.Y.)	A (FT.)	B (FT.)	VOL. (C.Y.)
4,6,8	1.0	2.6	2.0	1.5	0.2	1.0	1.5	0.1	4,6,8	1.5	3.9	2.0	2.0	0.2	1.5	1.5	0.1
10,12	1.5	5.9	2.5	2.5	0.3	2.0	1.5	0.2	10,12	2.2	8.7	3.5	2.5	0.5	2.0	2.5	0.3
16,18	2.2	13.2	3.5	4.0	0.8	2.5	3.0	0.4	16,18	3.2	19.5	4.5	4.5	1.2	3.0	3.5	0.6
20	2.4	18.3	4.5	4.0	1.0	3.0	3.0	0.5	20	3.6	24.1	5.5	4.5	1.5	3.5	3.5	0.7
24	2.9	23.4	6.0	4.0	1.4	3.5	3.5	0.7	24	4.3	34.8	8.0	4.5	2.3	4.5	4.0	1.1
30	3.6	27.5	6.5	5.0	1.9	3.5	4.0	0.9	30	5.4	40.6	8.5	5.0	3.2	5.5	4.0	1.6
36	4.4	39.5	7.0	6.0	3.4	4.5	4.5	1.6	36	6.5	58.5	10.0	6.0	5.3	6.5	4.5	2.6
42	5.1	53.8	8.0	7.0	5.1	5.5	5.0	2.5	42	7.5	79.8	11.5	7.0	8.1	8.0	5.0	4.2
48	5.8	70.3	9.0	8.0	7.4	6.0	6.0	3.7	48	8.6	104.0	13.0	8.0	11.9	9.0	6.0	6.3
54	6.5	89.0	10.0	9.0	10.3	7.0	6.5	5.3	54	9.7	131.5	15.0	9.0	17.1	10.5	6.5	8.9
60	7.3	110.0	11.0	10.0	13.9	7.5	7.5	7.3	60	10.7	162.4	16.5	10.0	23.1	11.0	7.5	12.0
66	8.0	132.9	12.5	11.0	18.9	8.5	8.0	9.6	66	11.8	196.5	18.0	11.0	30.1	12.0	8.5	16.2
72	8.7	158.2	13.5	12.0	24.0	9.0	9.0	12.3	72	12.9	233.9	19.5	12.0	38.6	14.0	8.5	20.7
78	9.4	185.6	14.5	13.0	30.0	10.0	9.5	15.6	78	13.9	274.5	21.5	13.0	49.8	14.5	9.5	25.9
84	10.1	215.3	15.5	14.0	37.1	10.5	10.5	19.5	84	15.0	318.4	23.0	14.0	61.2	15.5	10.5	32.6
90	10.9	247.1	16.5	15.0	45.0	11.5	11.0	23.9	90	16.1	365.5	24.5	15.0	74.5	17.5	10.5	39.6
96	11.6	281.2	18.0	16.0	55.5	12.5	11.5	28.9	96	17.1	415.6	26.0	16.0	89.5	18.5	11.5	48.5

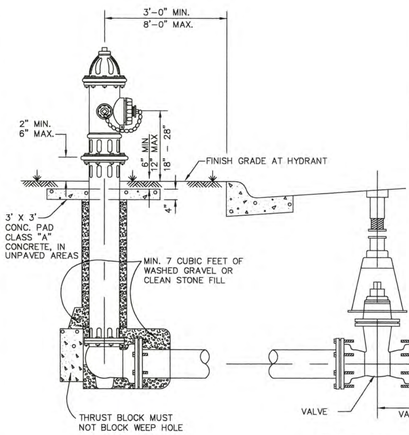


			EARTH			ROCK				EARTH			ROCK		
I.D. (IN.)	THRUST (TONS)	C (FT.)	A (FT.)	VOL. (C.Y.)	A (FT.)	VOL. (C.Y.)	I.D. (IN.)	C (FT.)	THRUST (TONS)	A (FT.)	B (FT.)	VOL. (C.Y.)	A (FT.)	B (FT.)	VOL. (C.Y.)
4,6,8	5.1	1.5	2.5	0.3	2.5	0.2	4,6,8	0.8	2.0	1.5	1.5	0.1	1.0	1.0	0.1
10,12	11.3	1.5	3.5	0.6	2.5	0.3	10,12	1.1	4.4	2.0	2.5	0.3	1.5	1.5	0.1
16,18	25.5	2.0	5.5	1.6	4.0	0.9	16,18	1.6	9.9	3.0	3.5	0.6	2.0	2.5	0.3
20	31.5	2.0	6.0	1.9	4.0	0.8	20	1.8	12.3	3.5	3.5	0.7	2.0	3.0	0.4
24	45.2	2.5	7.0	3.1	5.5	1.7	24	2.2	17.7	4.0	4.5	1.0	3.0	3.5	0.5
30	53.0	3.0	7.5	4.1	5.5	2.4	30	2.7	20.7	5.0	4.5	1.5	3.0	4.0	0.8
36	76.3	4.0	9.0	7.3	6.5	4.2	36	3.3	29.8	5.5	5.5	2.3	4.0	4.0	1.3
42	104.0	4.5	10.5	11.0	7.5	6.2	42	3.8	40.5	7.0	6.0	3.9	4.5	5.0	2.1
48	135.9	5.0	12.0	15.5	8.5	8.7	48	4.4	52.9	8.0	7.0	5.7	4.5	6.0	2.8
54	172.0	5.5	13.5	21.4	9.5	11.9	54	4.9	67.0	9.0	8.0	8.0	6.0	6.0	4.1
60	212.0	6.0	15.0	28.4	10.5	15.7	60	5.5	82.7	9.5	9.0	10.6	6.0	7.0	5.3
66	257.0	6.5	16.5	36.8	11.5	20.5	66	6.0	100.1	10.5	10.0	14.1	6.5	8.0	7.2
72	305.0	7.5	17.5	47.2	12.5	27.2	72	6.6	119.1	11.0	11.0	17.8	7.5	8.0	9.1
78	358.0	8.0	19.0	58.3	13.5	33.7	78	7.1	139.8	12.0	12.0	22.5	8.0	9.0	11.7
84	416.0	8.5	20.5	72.3	14.0	41.9	84	7.6	162.1	13.0	12.5	27.2	8.5	10.0	14.8
90	477.0	9.0	22.0	87.7	15.5	49.7	90	8.2	186.1	14.0	13.5	33.7	9.5	10.0	17.7
96	543.0	9.5	23.5	104.8	16.5	61.0	96	8.7	211.7	15.0	14.5	41.2	10.0	11.0	21.8

TABLES OF DIMENSIONS AND QUANTITIES

			Δ = 67.50°					Δ = 90°				
			EARTH		ROCK				EARTH		ROCK	
I.D. (IN.)	G (FT.)	THRUST (TONS)	A (FT.)	B (FT.)	A (FT.)	B (FT.)	VOL. (C.Y.)	I.D. (IN.)	G (FT.)	THRUST (TONS)	A (FT.)	B (FT.)	VOL. (C.Y.)	A (FT.)	B (FT.)	VOL. (C.Y.)
4,6,8	2.1	5.8	3.0	2.0	0.3	2.0	1.5	0.2	4,6,8	2.7	7.1	5.0	1.5	0.4	2.0	2.0	0.2
10,12	3.1	12.6	5.5	2.5	0.8	3.5	2.0	0.4	10,12	4.0	16.0	6.5	2.5	1.0	3.5	2.5	0.5
16,18	4.7	28.3	7.5	4.0	1.9	5.5	3.0	0.9	16,18	6.0	36.0	9.0	4.0	2.4	4.5	4.0	1.0
20	5.2	34.9	9.0	4.0	2.3	5.5	3.5	1.2	20	6.6	44.4	10.0	4.5	3.1	6.0	4.0	1.5
24	6.2	50.3	11.5	4.5	3.5	6.5	4.0	1.6	24	7.9	64.0	14.5	4.5	5.0	8.0	4.0	2.1
30	7.8	58.9	12.0	5.0	4.8	7.5	4.0	2.2	30	9.9	75.0	15.0	5.0	7.1	10.0	4.0	3.3
36	9.4	84.9	14.5	6.0	8.2	9.5	4.5	3.8	36	11.9	108.0	18.0	6.0	11.4	12.0	4.5	5.3
42	10.9	115.5	17.0	7.0	12.8	11.0	5.5	6.3	42	13.9	147.0	21.0	7.0	17.8	14.0	5.5	8.7
48	12.5	150.9	19.0	8.0	18.4	13.0	6.0	9.2	48	15.9	192.0	24.0	8.0	26.2	16.0	6.0	12.4
54	14.0	191.0	21.5	9.0	26.0	15.0	6.5	12.9	54	17.9	243.0	27.0	9.0	36.9	18.0	7.0	18.1
60	15.6	235.8	24.0	10.0	35.6	16.0	7.5	17.6	60	19.9	299.8	30.0	10.0	50.3	20.0	7.5	24.0
66	17.1	285.3	26.0	11.0	46.0	18.0	8.0	23.0	66	21.8	362.8	33.0	11.0	66.2	22.0	8.5	32.5
72	18.7	339.5	28.5	12.0	57.8	19.0	9.0	28.4	72	23.8	431.8	36.0	12.0	85.6	24.0	9.0	41.0
78	20.2	398.5	31.0	13.0	75.7	21.0	9.5	37.4	78	25.7	506.7	39.0	13.0	108.2	26.0	10.0	53.2
84	21.8	462.1	33.5	14.0	94.7	22.0	10.5	46.5	84	27.7	587.7	42.0	14.0	134.4	28.0	10.5	64.8
90	23.3	530.5	35.5	15.0	114.4	24.5	11.0	58.2	90	29.0	674.6	45.0	15.0	164.9	30.0	11.5	81.2
96	24.9	603.6	38.0	16.0	138.9	25.5	12.0	70.0	96	31.6	767.5	48.0	16.0	199.0	32.0	12.0	95.1

TABLES OF DIMENSIONS AND QUANTITIES



FIRE HYDRANT INSTALLATION

NOTES:

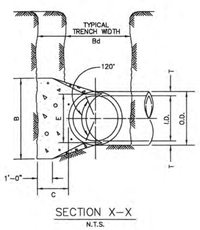
1. IN GENERAL, ALL FIRE HYDRANTS SHALL CONFORM TO AWWA STANDARD SPECIFICATIONS FOR FIRE HYDRANTS FOR ORDINARY WATER WORKS SERVICE, C-502. FIRE HYDRANTS SHALL HAVE A 5 1/4" MIN. VALVE OPENING AND A BARREL APPROXIMATELY 7" INSIDE DIAMETER. ALL HYDRANTS SHALL BE EQUIPPED WITH A BREAKAWAY FLANGE.
2. ALL JOINTS SHALL BE MECHANICAL JOINTS.
3. TYPICAL VALVE: ACTUAL VALVE LOCATION WILL DEPEND ON LOCATION OF WATER MAIN.
4. F.H. NO CLOSER THAN 18" TO EXISTING OR PROPOSED SIDEWALKS. (USUAL)
5. STANDARD BURY DEPTH 5' FEET
6. SET FIRE HYDRANT ON THE LOT LINE EXTENDED WHEN POSSIBLE.
7. F.H. SHALL BE LOCATED MINIMUM 1 FT. OUTSIDE OF THE AREA BETWEEN THE P.C.'S OF THE CORNER TURNING RADII AT INTERSECTIONS. (SEE PLAN VIEW)

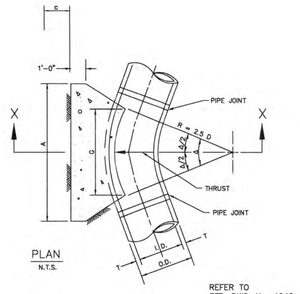
NOTE:

IN UNPAVED AREAS, INSTALL 2' x 2' x 6" CONCRETE VALVE PAD FLUSH WITH THE TOP OF VALVE BOX. REINFORCE WITH #3 BARS ON 6" CENTERS BOTH WAYS.

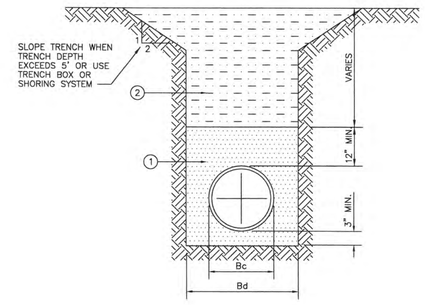
Δ	11.25° THRUST (TONS)	11.25° VOL. (C.Y.)	22.50° THRUST (TONS)	22.50° VOL. (C.Y.)	30° THRUST (TONS)	30° VOL. (C.Y.)	45° THRUST (TONS)	45° VOL. (C.Y.)	67.50° THRUST (TONS)	67.50° VOL. (C.Y.)	90° THRUST (TONS)	90° VOL. (C.Y.)	Δ I.D. (IN.)
4,6,8	1.0	0.5	2.0	1.0	2.5	1.3	3.6	1.8	4.6	2.3	5.0	2.5	4,6,8
10,12	2.2	1.1	4.3	2.2	5.7	2.8	8.0	4.0	10.5	5.2	11.3	5.7	10,12
16,18	5.0	2.5	9.7	4.9	12.7	6.4	18.0	9.0	23.5	11.8	25.5	12.7	16,18
20	6.1	3.1	12.0	6.0	15.7	7.9	22.2	11.1	29.2	14.5	31.4	15.7	20
24	8.2	4.4	17.3	8.7	22.6	11.3	32.0	16.0	41.8	20.9	45.2	22.6	24
30	10.5	5.2	20.3	10.1	26.5	13.3	37.5	18.8	49.0	24.5	53.1	26.5	30
36	14.9	7.5	29.2	14.6	38.2	19.1	54.0	27.0	70.5	35.3	76.4	38.2	36
42	20.3	10.1	39.8	19.9	52.0	26.0	73.5	36.7	96.0	48.0	104.0	52.0	42
48	26.5	13.2	51.9	26.0	67.9	33.9	96.0	48.0	126.0	62.7	136.0	67.9	48
54	33.5	16.8	65.7	32.9	85.9	42.9	122.0	60.7	159.0	79.4	172.0	85.9	54
60	41.4	20.7	81.2	40.6	106.0	53.0	150.0	75.0	196.0	98.0	212.0	106.0	60
66	50.1	25.0	98.2	49.1	128.0	64.2	182.0	90.7	237.0	119.0	257.0	128.0	66
72	59.6	29.8	117.0	58.4	153.0	76.3	216.0	108.0	282.0	141.0	305.0	153.0	72
78	69.9	35.0	137.0	68.6	179.0	90.0	254.0	127.0	331.0	166.0	358.0	179.0	78
84	81.1	40.5	159.0	79.5	208.0	104.0	294.0	147.0	384.0	192.0	416.0	208.0	84
90	93.1	46.5	183.0	91.3	239.0	119.0	337.0	169.0	441.0	221.0	477.0	239.0	90
96	106.0	53.0	208.0	104.0	272.0	136.0	384.0	192.0	502.0	251.0	543.0	272.0	96

VERTICAL THRUST BLOCK
AT PIPE BEND



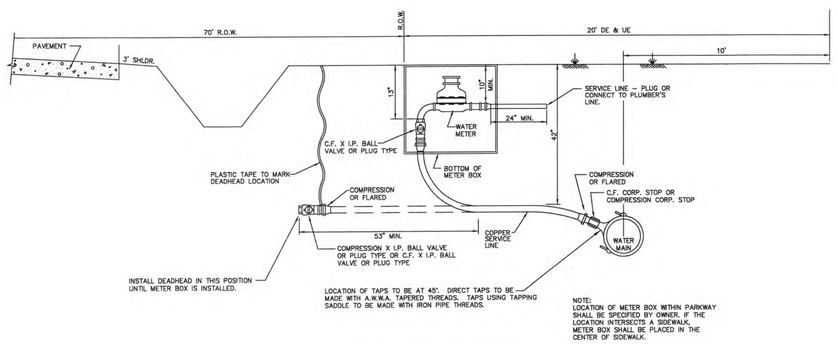


REFER TO
STD. DWG. No. 4040
FOR GENERAL NOTES.



① GRANULAR MATERIAL (SAND) COMPACTED TO 95% STANDARD PROCTOR DENSITY.

② SELECT MATERIAL FREE OF ROCKS, CLUMPS OR DEBRIS LARGER THAN 6" IN GREATEST DIMENSION. COMPACT TO 90% STANDARD PROCTOR DENSITY. UNDER STRUCTURES, ROADWAYS AND PAVEMENT, EXCLUDE MATERIAL WITH LL >50 COMPACT TO 95% STANDARD PROCTOR DENSITY. GRANULAR MATERIAL MUST BE WELL GRADED



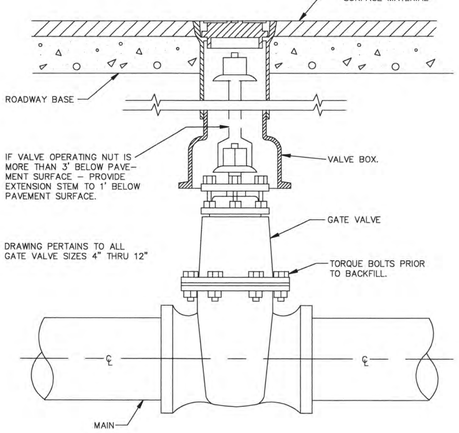
WATER SERVICE INSTALLATION
3/4" OR 1" LINE

GENERAL NOTES FOR ALL THRUST BLOCKS:

1. CONCRETE FOR BLOCKING SHALL BE CLASS "B".
2. ALL CALCULATIONS ARE BASED ON INTERNAL PRESSURE OF 200 PSI FOR DUCTILE IRON, P.V.C., AND 150 PSI FOR CONCRETE PIPE.
3. VOLUMES OF THRUST BLOCKS ARE NET VOLUMES OF CONCRETE TO BE FURNISHED. THE CORRESPONDING WEIGHT OF THE CONCRETE (CLASS "B") IS EQUAL TO OR GREATER THAN THE VERTICAL COMPONENT OF THE THRUST ON THE VERTICAL BEND.
4. WALL THICKNESS (T) ASSUMED HERE FOR ESTIMATING PURPOSES ONLY.
5. POUR CONCRETE FOR BLOCK AGAINST UNDISTURBED EARTH.
6. DIMENSIONS MAY BE VARIED AS REQUIRED BY FIELD CONDITIONS WHERE AND AS DIRECTED BY THE ENGINEER. THE VOLUME OF CONCRETE BLOCKING SHALL NOT BE LESS THAN SHOWN HERE.
7. THE SOIL BEARING PRESSURES ARE BASED ON 1000 LBS./S.F. IN SOIL AND 2000 LBS./S.F. IN ROCK.
8. USE POLYETHYLENE WRAP OR EQUAL BETWEEN CONCRETE AND BEND, TEE, OR PLUG TO PREVENT THE CONCRETE FROM STICKING TO IT.
9. CONCRETE SHALL NOT EXTEND BEYOND JOINTS.

SIZE OF PIPE IN INCHES DIA.	KIND OF PIPE	EXTERNAL DIA. (Bc) IN INCHES	TRENCH WIDTH (Bd) IN INCHES
6"	PVC SEWER PIPE	6.28	24
8"	PVC SEWER PIPE	8.16	24
10"	PVC SEWER PIPE	10.2	26

WATER EMBEDMENT
CLASS "B-3"



GATE VALVE BOX AND
EXTENSION STEM
N.T.S.

ENGINEERINGCONCEPTS & DESIGN, L.P.
ENGINEERING / SURVEYING / PROJECT MANAGEMENT
2505 NORTH PLANO ROAD, SUITE 2400
RICHARDSON, TEXAS 75082
469-916-6300 FAX: 469-916-6301 WWW.ECDLP.COM

REVISIONS:	
DRAWN: ECD	DATE: NOVEMBER, 2004
CHECKED: TW	DATE: NOVEMBER, 2004
PROJECT NO.: 07508	
DWG FILE NAME: 7508 DETAILS.DWG	

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STATE OF TEXAS · TODD D. WINTTERS · 87085 · REGISTERED PROFESSIONAL ENGINEER

WATER DETAILS

WOLF CREEK

CITY OF LUCAS, COLLIN COUNTY, TEXAS

SHEET 19 OF 26

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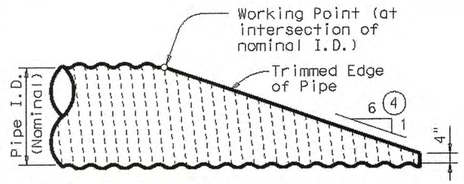
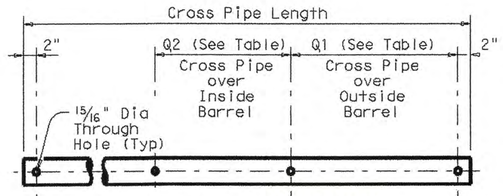


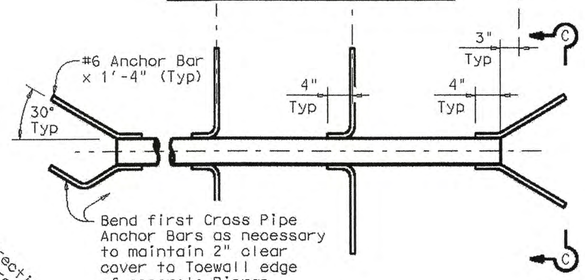
NOTE: All Cross Pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

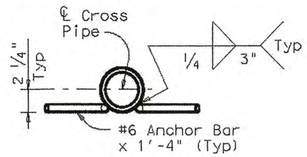
(Showing Corrugated Metal Pipe Culvert.)
(Details at Concrete Pipe Culvert are similar.)



PIPE W/ BOLTED ANCHOR

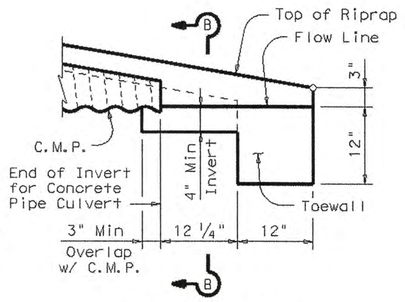


PIPE W/ ANCHOR BARS



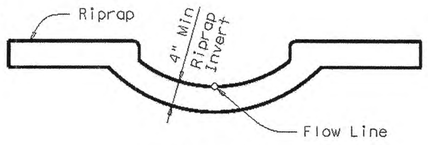
SECTION C-C

CROSS PIPE DETAILS



DETAIL "A"

(Showing Invert with Corrugated Metal Pipe Culvert. Concrete Pipe Culvert details are similar. Cross Pipes not shown for clarity.)



SECTION B-B

(Cross Pipes not shown for clarity.)

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, & RIPRAP QUANTITIES (2)

Nominal Culvert I.D.	Conc Riprap (CY) (6)	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for use of Cross Pipes	Cross Pipe Size
12"	0.6	9"	N/A	2'- 1"	1'- 9"	3 or more Pipe Culverts	3" Std (3.500" O.D.)
15"	0.7	11"	N/A	2'- 5"	2'- 2"		
18"	0.8	1'- 2"	N/A	2'-10"	2'- 8"		
21"	0.9	1'- 4"	N/A	3'- 2"	3'- 1"		
24"	0.9	1'- 7"	N/A	3'- 6"	3'- 7"		
27"	1.0	1'- 8"	N/A	3'-10"	3'-11"	3 or more Pipe Culverts	3 1/2" Std (4.000" O.D.)
30"	1.1	1'-10"	N/A	4'- 2"	4'- 4"	2 or more Pipe Culverts	
33"	1.2	1'-11"	4'- 2"	4'- 5"	4'- 8"	All Pipe Culverts	
36"	1.3	2'- 1"	4'- 5"	4'- 9"	5'- 1"	All Pipe Culverts	4" Std (4.500" O.D.)
42"	1.5	2'- 4"	4'-11"	5'- 5"	5'-10"		
48"	1.7	2'- 7"	5'- 5"	6'- 0"	6'- 7"	All Pipe Culverts	5" Std (5.563" O.D.)
54"	2.0	3'- 0"	5'-11"	6'- 9"	7'- 6"		
60"	2.2	3'- 3"	6'- 5"	7'- 4"	8'- 3"		
66"	2.4	3'- 3"	6'-11"	7'-10"	8'- 9"		
72"	2.7	3'- 4"	7'- 5"	8'- 5"	9'- 4"		

(1) The proper installation of the first Cross Pipe is critical for vehicle safety. The top of the first Cross Pipe must be placed at no more than 6" above the flow line.

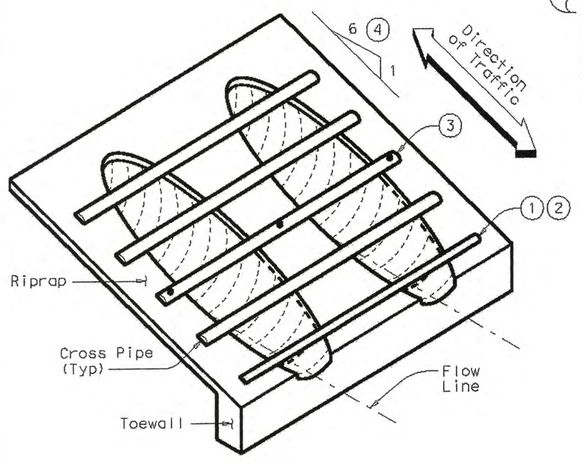
(2) Size of Cross Pipes, except the first bottom pipe, shall be as shown in the PIPE SIZE table. The first bottom pipe shall be 3 1/2" Standard Pipe (4" O.D.).

(3) The third Cross Pipe from the bottom of the Culvert shall always be installed using a bolted connection. Care shall be taken to ensure that Riprap concrete does not flow into the Cross Pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, all other Cross Pipes may also be installed using the bolted connection details.

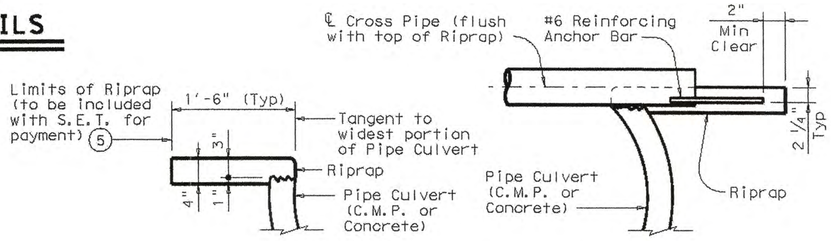
(4) Match Cross Slope as shown elsewhere in the plans. Cross Slope of 6:1 or flatter is required for vehicle safety.

(5) Riprap placed beyond the limits shown will be paid as Concrete Riprap in accordance with Item 432, "Riprap".

(6) Quantities shown are for one end of one reinforced Concrete Pipe Culvert. For multiple pipe culverts or for Corrugated Metal Pipe Culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

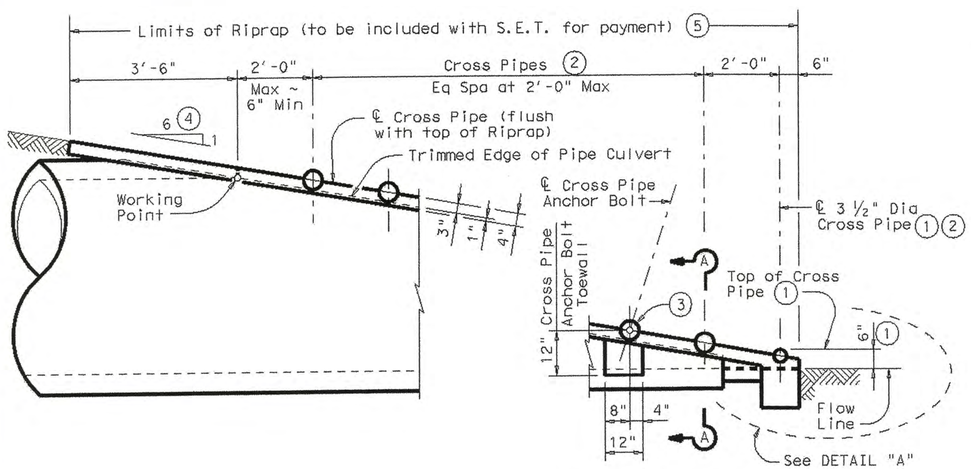


ISOMETRIC VIEW OF TYPICAL INSTALLATION



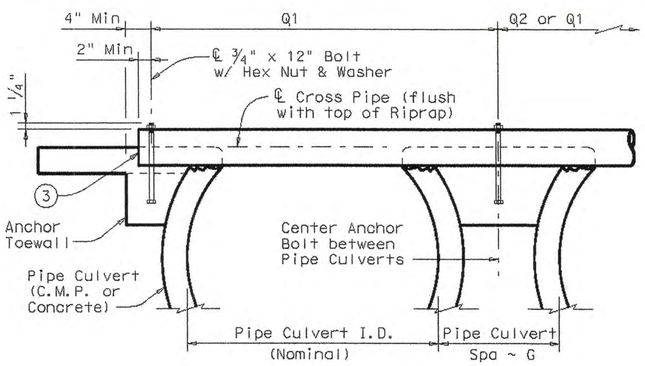
SHOWING TYPICAL PIPE CULVERT & RIPRAP

SHOWING CROSS PIPE WITH ANCHOR BAR



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing Concrete Pipe Culvert.)
(Details at Corrugated Metal Pipe Culvert are similar.)



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

GENERAL NOTES:

Cross Pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Safety End Treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the Cross Pipes.

Riprap and all necessary inverts shall be Concrete Riprap conforming to the requirements of Item 432, "Riprap".

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.

Cross Pipes shall conform to the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Bolts and nuts shall conform to ASTM A307.

All steel components, except concrete reinforcing, shall be galvanized after fabrication. Galvanizing damaged during transport or construction shall be repaired in accordance with the specifications.

ACC:
LEVELS DISPLAYED
1

Texas Department of Transportation
Bridge Division

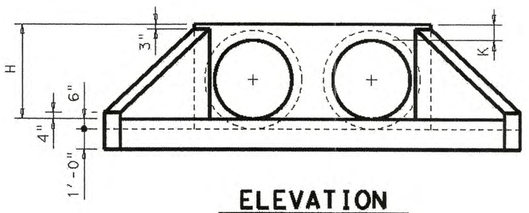
SAFETY END TREATMENT
FOR 12" DIA TO 72" DIA PIPE CULVERTS
TYPE II ~ PARALLEL DRAINAGE

SETP-PD

FILE: setppdse.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT December 2003	DISTRICT	FEDERAL AID PROJECT		SHEET
REVISIONS				20
	COUNTY	CONTROL	SECT	JOB	HIGHWAY

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

SLOPE	DIA OF PIPE, D	Values for one Pipe W	X	Y	L	Reinf (Lbs)	Conc (CY) (1)	Values to be added for each addt'l Pipe X and W	Reinf (Lbs)	Conc (CY) (1)
2:1	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
3:1	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
4:1	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
6:1	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



ELEVATION
Showing dimensions

(1) Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.

(2) 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.

(3) Provide a 1'-0" footing as shown where required to maintain 4" Min cover for pipes.

(4) Quantities shown are for one structure end only (one headwall).

(5) Min Length = $6" + 3" \times \left(\frac{12 \times H - 7}{12 \times L}\right)$

Max Length = $12 \times H - 3" \times \left(\frac{12 \times H - 7}{12 \times L}\right) - 1"$

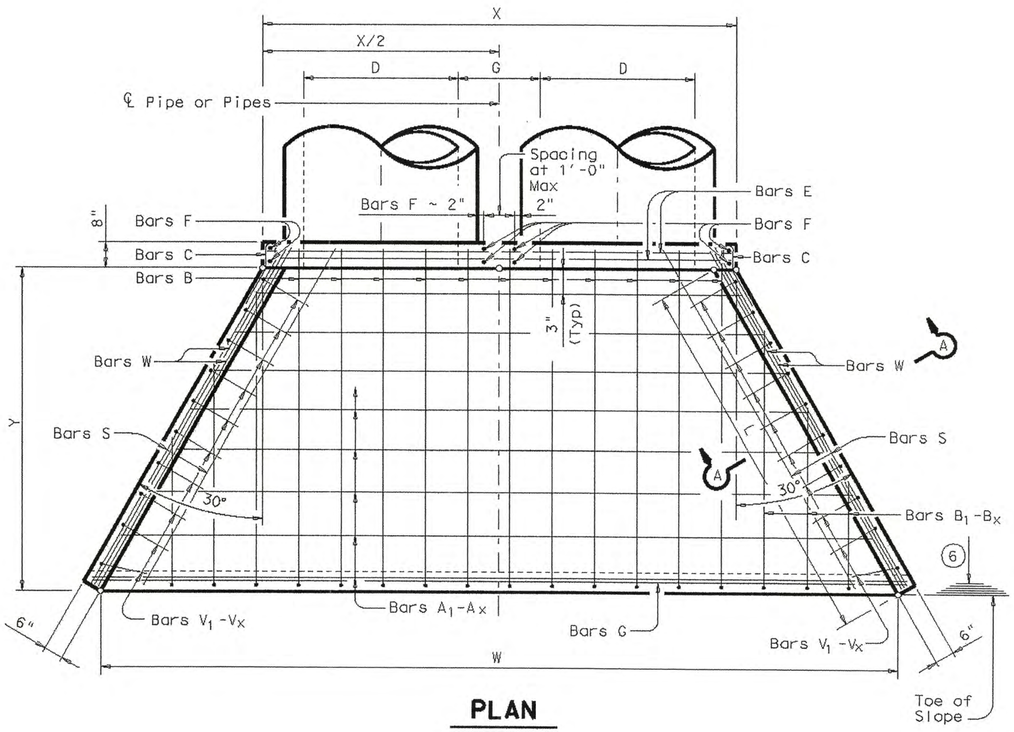
(6) Lengths of wings based on SL:1 Slope along this line.

TABLE OF REINFORCING STEEL (4)

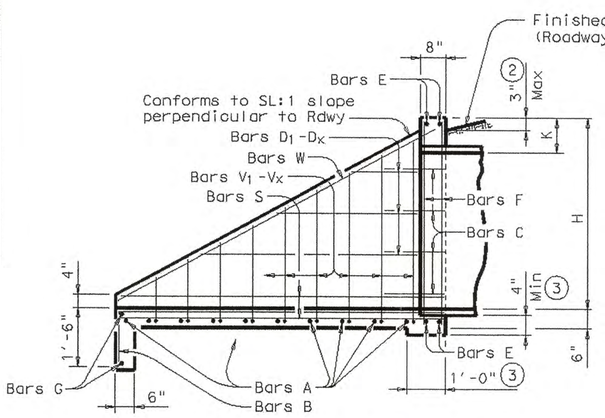
Bar	Size	Spa	No.
A	# 4	1'-0"	~
B	# 3	1'-6"	~
C	# 4	1'-0"	~
D	# 3	1'-0"	~
E	# 5	~	4
F	# 5	~	~
G	# 3	~	2
S	# 4	~	6
V	# 4	1'-0"	~
W	# 5	~	4

TABLE OF CONSTANT DIMENSIONS

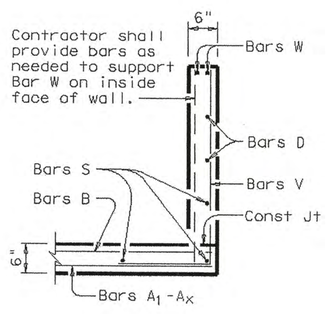
DIA OF PIPE, D	G	K	H
12"	9"	1'- 0"	2'- 0"
15"	11"	1'- 0"	2'- 3"
18"	1'- 2"	1'- 0"	2'- 6"
21"	1'- 4"	1'- 0"	2'- 9"
24"	1'- 7"	1'- 0"	3'- 0"
27"	1'- 8"	1'- 0"	3'- 3"
30"	1'-10"	1'- 0"	3'- 6"
33"	1'-11"	1'- 0"	3'- 9"
36"	2'- 1"	1'- 0"	4'- 0"
42"	2'- 4"	1'- 0"	4'- 6"
48"	2'- 7"	1'- 3"	5'- 3"
54"	3'- 0"	1'-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



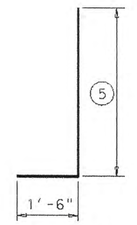
PLAN



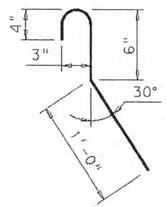
TYPICAL WING ELEVATION



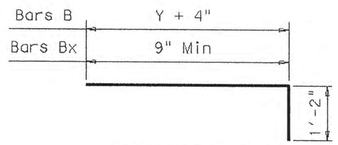
SECTION A-A



BARS V



BARS C
(2'-0" long)



BARS B & B1-Bx

GENERAL NOTES:

Designed according to current AASHTO Standard and Interim 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.

Texas Department of Transportation
Bridge Division

CONCRETE HEADWALLS WITH FLARED WINGS FOR 0° SKEW PIPE CULVERTS

CH-FW-0

FILE: chfw00se.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: GAF
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REVISIONS	COUNTY	CONTROL	SECT	JOB	HIGHWAY

LEVELS DISPLAYED
ACC:
1

COMMENTS:

LEVELS DISPLAYED

TABLE OF DIMENSIONS & REINFORCING STEEL
(Wings for One Structure End)

Dimensions					Variable Reinforcing				③ Estimated Quantities per ft of wing length (2~Wings)	
					Bars J1		Bars J2			
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'- 8"	1'- 9"	1'- 3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'- 2"	2'- 0"	1'- 6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'- 8"	2'- 3"	1'- 9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'- 2"	2'- 6"	2'- 0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'- 8"	2'- 9"	2'- 3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'- 2"	3'- 0"	2'- 6"	9"	#7	6"	#5	6"	162.29	0.721
13'-0"	6'- 8"	3'- 3"	2'- 9"	11"	#7	6"	#5	6"	178.80	0.856
14'-0"	7'- 2"	3'- 6"	3'- 0"	1'- 0"	#8	6"	#5	6"	216.78	0.959
15'-0"	7'- 8"	4'- 0"	3'- 0"	1'- 1"	#9	6"	#6	6"	283.06	1.068
16'-0"	8'- 2"	4'- 6"	3'- 0"	1'- 3"	#9	6"	#6	6"	297.02	1.234

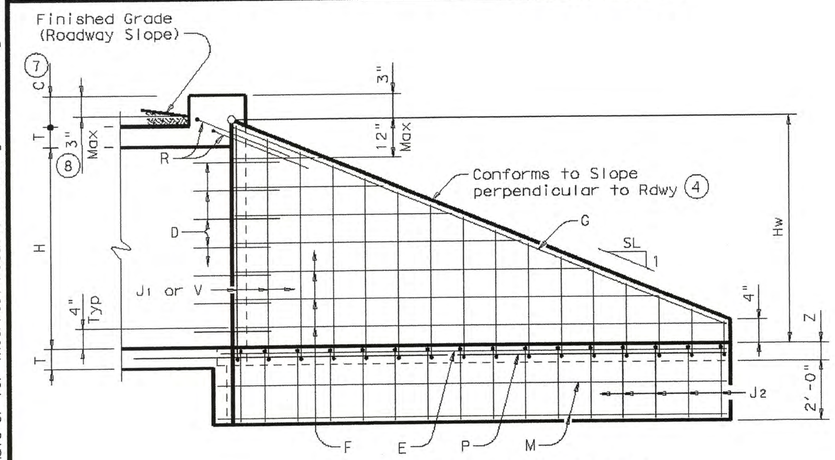
TABLE OF WINGWALL REINFORCING (2~Wings)

Bar	Size	No.	Spa
D	#5	~	1'-0"
E	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	4	~
M	#4	4	~
P	#4	~	1'-0"
R	#5	6	~
V	#4	~	1'-0"

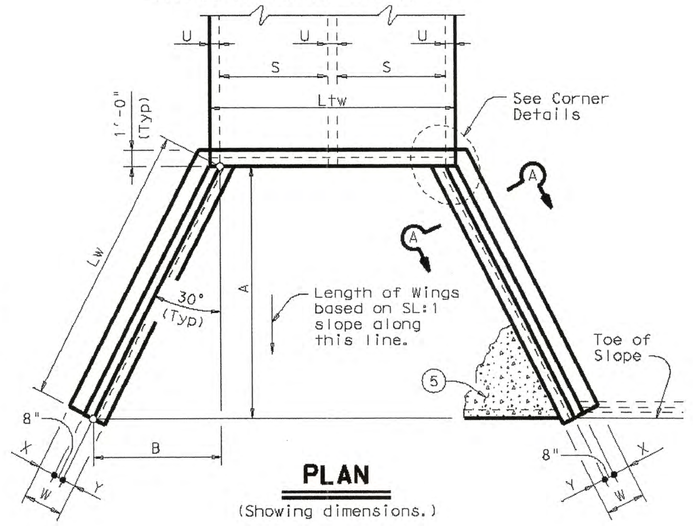
TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

Bar	Size	No.	Spa
L	#4	~	1'-6"
Q	#4	1	~
Reinf (Lb/Ft)			2.45
Conc (CY/Ft)			0.037

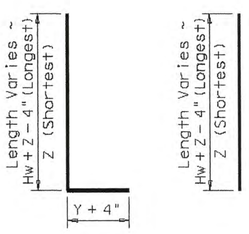
1. Extend Bars P 3'-0" minimum into bottom slab of Box Culvert.
2. Adjust to fit as necessary to maintain 1 1/4" clear cover and 4" minimum between bars.
3. Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings multiply the tabulated values by Lw.
4. Recommended values of Slope are: 2:1, 3:1, 4:1, & 6:1.
5. When shown elsewhere on the plans, a 5" deep concrete riprap shall be constructed. Unless otherwise shown on the plans or directed by the Engineer, the riprap shall have a 6" wide by 1'-6" deep reinforced concrete toewall along all edges adjacent to natural ground; the toewall shall be reinforced by extending typical riprap reinforcing into the toewall; construction joints or grooved joints, oriented in the direction of flow, shall extend across the full distance of the riprap, at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B will not be required. Payment for riprap shall be as required by the pertinent Item.
6. At Contractor's option, Culvert Toewall may be ended flush with Wingwall Toewall. Adjust reinforcing from that shown as necessary.
7. 0" min to 5'-0" max. For T6 or C6 Rail, see T6-CM standard for additional details. For curbs without rail and greater than 1'-0" high, see ECD standard for additional details. Estimated curb heights are shown elsewhere in the plans.
8. For vehicle safety, curb heights and wall heights shall be reduced, if necessary, to provide a maximum 3" projection above finished grade. No changes will be made in quantities and no additional compensation will be allowed for this work.



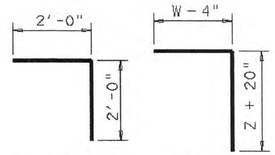
INSIDE ELEVATION
(Showing reinforcing. Culvert and Culvert Toewall reinforcing not shown for clarity.)



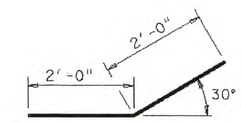
PLAN
(Showing dimensions.)



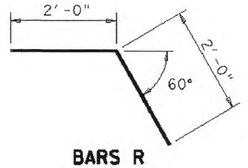
BARS J1 **BARS V**



BARS L **BARS J2**



BARS D



BARS R

WING DIMENSION CALCULATIONS:

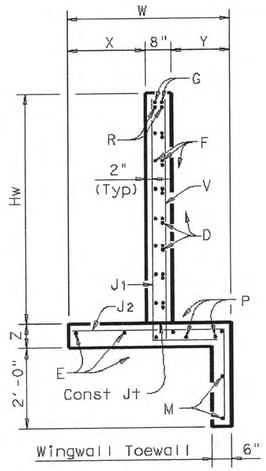
Formulas: (All values are in Feet)
Hw = H + T + C - 0.250'
A = (Hw - 0.333') (SL)
B = (A) Tangent (30°)
Lw = (A) ÷ Cosine (30°)
For Cast-in-place culverts:
Ltw = (N) (S) + (N+1) (U)
For Precast culverts:
Ltw = (N) (2U+S) + (N-1) (0.500')
Total Wingwall Area (Two Wings ~ S.F.) = (Hw + 0.333') (Lw)

Hw = Height of Wingwall
SL:1 = Side Slope Ratio (Horizontal:1 Vertical)
Lw = Length of Wingwall
Ltw = Culvert Toewall Length
N = Number of Culvert Spans

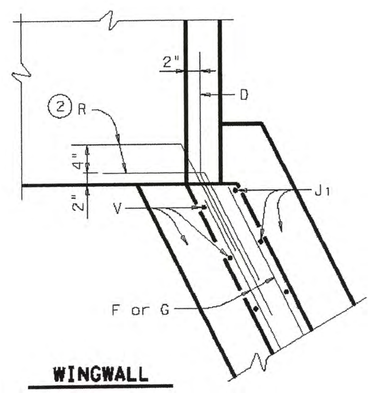
See applicable box culvert standard for H, S, T, and U values.

GENERAL NOTES:

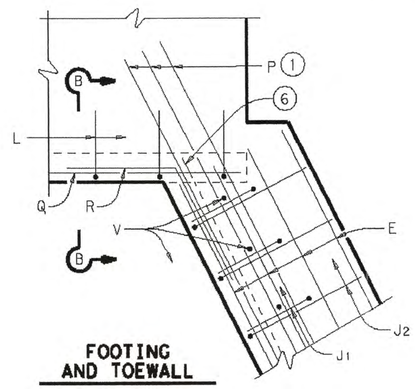
Designed according to current AASHTO Standard and Interim Specifications.
All reinforcing steel shall be Grade 60.
All concrete shall be Class "C" and shall have a minimum 28 day compressive strength of 3600 psi.
All reinforcing bars shall be adjusted to provide a minimum of 1 1/4" clear cover.
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.
See BCS sheet for additional dimensions and information.
The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for Contractor's information only.



SECTION A-A

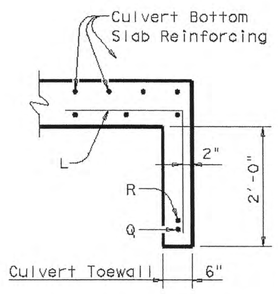


WINGWALL



FOOTING AND TOEWALL

CORNER DETAILS
(Culvert and Culvert Toewall reinforcing not shown for clarity.)



SECTION B-B ⑤

Texas Department of Transportation
Bridge Division

FLARED WINGS
FOR 0° SKEW BOX CULVERTS

FW-0

FILE: fw-0std.de.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: GAF
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ACC:

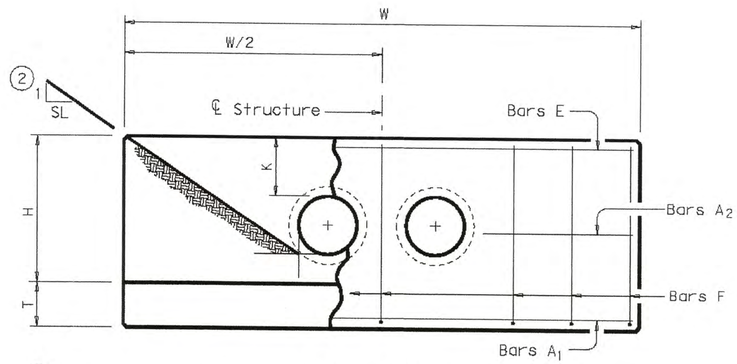
LEVELS DISPLAYED

1

TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL

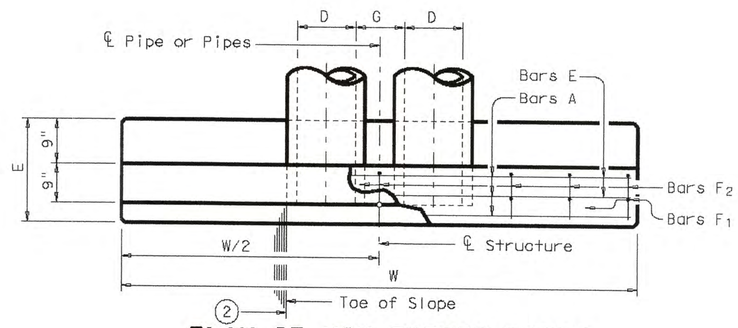
SLOPE	DIA OF PIPE, D	Values for one Pipe			Values to be added for each addt'l Pipe		
		W	Reinf (Lbs)	Conc (CY) (1)	W	Reinf (Lbs)	Conc (CY) (1)
2:1	12"	9'- 0"	122	1.1	1'- 9"	15	0.2
	15"	10'- 3"	136	1.3	2'- 2"	16	0.2
	18"	11'- 6"	163	1.5	2'- 8"	19	0.3
	21"	12'- 9"	200	1.8	3'- 1"	31	0.4
	24"	14'- 0"	217	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

(1) Quantities increase slightly for metal pipe installations.

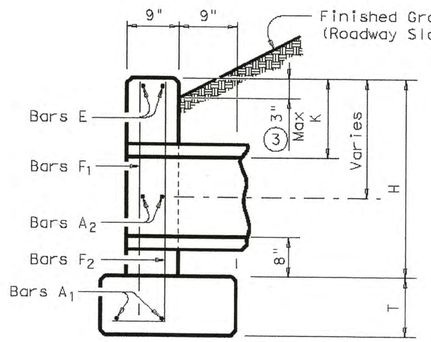


(2) Indicated slope is perpendicular to ℄ Pipe or Pipes

ELEVATION



PLAN OF NON-SKEWED PIPES



℄ SECTION

(3) For vehicle safety, curb heights and wall heights shall be reduced, if necessary, to provide a maximum 3" projection above finished grade. No changes will be made in quantities and no additional compensation will be allowed for this work.

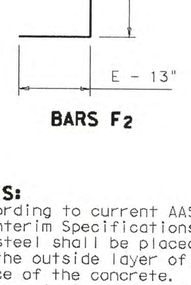
TABLE OF CONSTANT DIMENSIONS

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"

(4) TABLE OF REINFORCING STEEL

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

(4) Quantities shown are for one structure end. (One headwall)



BARS F_2

GENERAL NOTES:

Designed according to current AASHTO Standard and Interim 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 28 day compressive strength of 3600 psi.

Texas Department of Transportation
Bridge Division

CONCRETE HEADWALLS WITH PARALLEL WINGS FOR NON-SKEWED PIPE CULVERTS

CH-PW-0

FILE: chpw0ste.dgn	DN: GAF	CK: CAT	DW: BWH	CK: CAT
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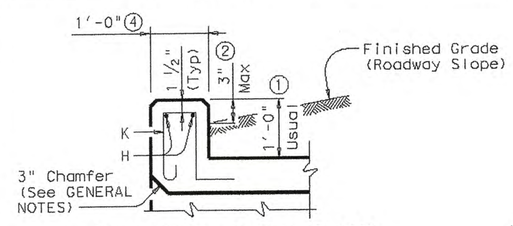
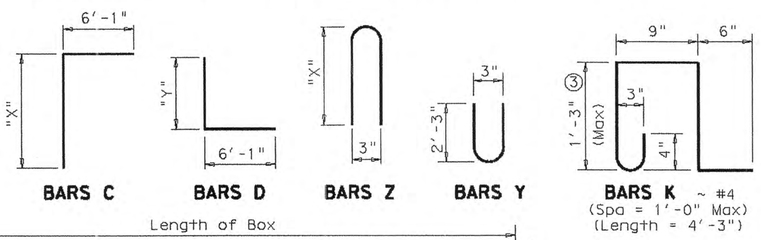
BILLS OF REINFORCING STEEL (For Box Length = 40 feet)

NUMBER OF SPANS	SECTION DIMENSIONS				Bars B					Bars C & D									Bars E					Bars F_1 ~#4				Bars F_2 ~#4 at 1'-6" Max			Bars M~#4 at 1'-6" Max			Bars Y & Z~#4 at 10" Max					Bars H 4~#4		Bars K		QUANTITIES					
													Bar C		Bar D																													Per foot of Barrel		Curb		Total	
	S	H	T	U	No.	Size	Spa	Length	Wt	No.	Size	Spa	Length	Wt	Length	Wt	No.	Size	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Length	Wt	No.	Spa	Length	Wt	No.	Length	Wt	No.	Bar Y Length	Bar Y Wt	Bar Z Length	Bar Z Wt	Length	Weight	No.	Weight	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)
2	8'-0"	4'-0"	8"	7"	162	#5	6"	17'- 6"	2,957	194	#4	5"	10'- 7"	1,372	8'- 4"	1,080	194	#6	5"	8'-10"	2,574	22	9"	39'-9"	584	56	39'-9"	1,487	56	4'- 0"	150	49	4'- 8"	153	9'- 2"	300	17'- 6"	47	38	108	1.136	266.4	1.3	155	46.7	10,812
3	8'-0"	4'-0"	8"	7"	162	#5	6"	26'- 1"	4,407	194	#4	5"	10'- 7"	1,372	8'- 4"	1,080	194	#6	5"	17'- 5"	5,075	36	8"	39'-9"	956	80	39'-9"	2,124	56	4'- 0"	150	98	4'- 8"	305	9'- 2"	600	26'- 1"	70	54	153	1.646	401.7	2.0	223	67.8	16,292
4	8'-0"	4'-0"	8"	7"	162	#5	6"	34'- 8"	5,857	194	#4	5"	10'- 7"	1,372	8'- 4"	1,080	194	#6	5"	26'- 0"	7,576	48	8"	39'-9"	1,275	104	39'-9"	2,762	56	4'- 0"	150	147	4'- 8"	458	9'- 2"	900	34'- 8"	93	72	204	2.156	535.8	2.6	297	88.8	21,727
5	8'-0"	4'-0"	8"	7"	162	#5	6"	43'- 3"	7,308	194	#4	5"	10'- 7"	1,372	8'- 4"	1,080	194	#6	5"	34'- 7"	10,077	60	8"	39'-9"	1,593	128	39'-9"	3,399	56	4'- 0"	150	196	4'- 8"	611	9'- 2"	1,200	43'- 3"	116	90	256	2.667	669.8	3.2	372	109.9	27,162
6	8'-0"	4'-0"	8"	7"	162	#5	6"	51'-10"	8,758	194	#4	5"	10'- 7"	1,372	8'- 4"	1,080	194	#6	5"	43'- 2"	12,578	72	8"	39'-9"	1,912	152	39'-9"	4,036	56	4'- 0"	150	245	4'- 8"	764	9'- 2"	1,500	51'-10"	138	106	301	3.177	803.8	3.9	439	131.0	32,589
2	8'-0"	5'-0"	8"	7"	194	#5	5"	17'- 6"	3,541	194	#4	5"	11'- 7"	1,501	8'- 4"	1,080	194	#6	5"	8'-10"	2,574	22	9"	39'-9"	584	62	39'-9"	1,646	56	5'- 0"	187	49	4'- 8"	153	11'- 2"	366	17'- 6"	47	38	108	1.201	290.8	1.3	155	49.3	11,787
3	8'-0"	5'-0"	8"	7"	194	#5	5"	26'- 1"	5,278	194	#4	5"	11'- 7"	1,501	8'- 4"	1,080	194	#6	5"	17'- 5"	5,075	36	8"	39'-9"	956	88	39'-9"	2,337	56	5'- 0"	187	98	4'- 8"	305	11'- 2"	731	26'- 1"	70	54	153	1.733	436.3	2.0	223	71.3	17,673
4	8'-0"	5'-0"	8"	7"	194	#5	5"	34'- 8"	7,015	194	#4	5"	11'- 7"	1,501	8'- 4"	1,080	194	#6	5"	26'- 0"	7,576	48	8"	39'-9"	1,275	114	39'-9"	3,027	56	5'- 0"	187	147	4'- 8"	458	11'- 2"	1,097	34'- 8"	93	72	204	2.264	580.4	2.6	297	93.2	23,513
5	8'-0"	5'-0"	8"	7"	194	#5	5"	43'- 3"	8,751	194	#4	5"	11'- 7"	1,501	8'- 4"	1,080	194	#6	5"	34'- 7"	10,077	60	8"	39'-9"	1,593	140	39'-9"	3,717	56	5'- 0"	187	196	4'- 8"	611	11'- 2"	1,462	43'- 3"	116	90	256	2.796	724.5	3.2	372	115.0	29,351
6	8'-0"	5'-0"	8"	7"	194	#5	5"	51'-10"	10,488	194	#4	5"	11'- 7"	1,501	8'- 4"	1,080	194	#6	5"	43'- 2"	12,578	72	8"	39'-9"	1,912	166	39'-9"	4,408	56	5'- 0"	187	245	4'- 8"	764	11'- 2"	1,828	51'-10"	138	106	301	3.328	868.7	3.9	439	137.0	35,185
2	8'-0"	6'-0"	8"	7"	194	#5	5"	17'- 6"	3,541	194	#4	5"	12'- 7"	1,631	8'- 4"	1,080	194	#6	5"	8'-10"	2,574	22	9"	39'-9"	584	68	39'-9"	1,806	56	6'- 0"	224	49	4'- 8"	153	13'- 2"	431	17'- 6"	47	38	108	1.265	300.6	1.3	155	51.9	12,179
3	8'-0"	6'-0"	8"	7"	194	#5	5"	26'- 1"	5,278	194	#4	5"	12'- 7"	1,631	8'- 4"	1,080	194	#6	5"	17'- 5"	5,075	36	8"	39'-9"	956	96	39'-9"	2,549	56	6'- 0"	224	98	4'- 8"	305	13'- 2"	862	26'- 1"	70	54	153	1.819	449.0	2.0	223	74.8	18,183
4	8'-0"	6'-0"	8"	7"	194	#5	5"	34'- 8"	7,015	194	#4	5"	12'- 7"	1,631	8'- 4"	1,080	194	#6	5"	26'- 0"	7,576	48	8"	39'-9"	1,275	124	39'-9"	3,293	56	6'- 0"	224	147	4'- 8"	458	13'- 2"	1,293	34'- 8"	93	72	204	2.372	596.1	2.6	297	97.5	24,142
5	8'-0"	6'-0"	8"	7"	194	#5	5"	43'- 3"	8,751	194	#4	5"	12'- 7"	1,631	8'- 4"	1,080	194	#6	5"	34'- 7"	10,077	60	8"	39'-9"	1,593	152	39'-9"	4,036	56	6'- 0"	224	196	4'- 8"	611	13'- 2"	1,724	43'- 3"	116	90	256	2.926	743.2	3.2	372	120.2	30,099
6	8'-0"	6'-0"	8"	7"	194	#5	5"	51'-10"	10,488	194	#4	5"	12'- 7"	1,631	8'- 4"	1,080	194	#6	5"	43'- 2"	12,578	72	8"	39'-9"	1,912	180	39'-9"	4,780	56	6'- 0"	224	245	4'- 8"	764	13'- 2"	2,155	51'-10"	138	106	301	3.479	890.3	3.9	439	143.1	36,051
2	8'-0"	7'-0"	8"	7"	194	#5	5"	17'- 6"	3,541	194	#4	5"	13'- 7"	1,760	8'- 4"	1,080	194	#6	5"	8'-10"	2,574	22	9"	39'-9"	584	68	39'-9"	1,806	56	7'- 0"	262	49	4'- 8"	153	15'- 2"	496	17'- 6"	47	38	108	1.330	306.4	1.3	155	54.5	12,411
3	8'-0"	7'-0"	8"	7"	194	#5	5"	26'- 1"	5,278	194	#4	5"	13'- 7"	1,760	8'- 4"	1,080	194	#6	5"	17'- 5"	5,075	36	8"	39'-9"	956	96	39'-9"	2,549	56	7'- 0"	262	98	4'- 8"	305	15'- 2"	993	26'- 1"	70	54	153	1.905	456.5	2.0	223	78.2	18,481
4	8'-0"	7'-0"	8"	7"	194	#5	5"	34'- 8"	7,015	194	#4	5"	13'- 7"	1,760	8'- 4"	1,080	194	#6	5"	26'- 0"	7,576	48	8"	39'-9"	1,275	124	39'-9"	3,293	56	7'- 0"	262	147	4'- 8"	458	15'- 2"	1,489	34'- 8"	93	72	204	2.480	605.2	2.6	297	101.8	24,505
5	8'-0"	7'-0"	8"	7"	194	#5	5"	43'- 3"	8,751	194	#4	5"	13'- 7"	1,760	8'- 4"	1,080	194	#6	5"	34'- 7"	10,077	60	8"	39'-9"	1,593	152	39'-9"	4,036	56	7'- 0"	262	196	4'- 8"	611	15'- 2"	1,986	43'- 3"	116	90	256	3.056	753.9	3.2	372	125.4	30,528
6	8'-0"	7'-0"	8"	7"	194	#5	5"	51'-10"	10,488	194	#4	5"	13'- 7"	1,760	8'- 4"	1,080	194	#6	5"	43'- 2"	12,578	72	8"	39'-9"	1,912	180	39'-9"	4,780	56	7'- 0"	262	245	4'- 8"	764	15'- 2"	2,482	51'-10"	138	106	301	3.631	902.7	3.9	439	149.1	36,545
2	8'-0"	8'-0"	8"	7"	194	#5	5"	17'- 6"	3,541	162	#5	6"	14'- 7"	2,464	8'- 9"	1,478	194	#6	5"	8'-10"	2,574	22	9"	39'-9"	584	74	39'-9"	1,965	56	8'- 0"	299	49	4'- 8"	153	17'- 2"	562	17'- 6"	47	38	108	1.395	340.5	1.3	155	57.1	13,775
3	8'-0"	8'-0"	8"	7"	194	#5	5"	26'- 1"	5,278	162	#5	6"	14'- 7"	2,464	8'- 9"	1,478	194	#6	5"	17'- 5"	5,075	36	8"	39'-9"	956	104	39'-9"	2,762	56	8'- 0"	299	98	4'- 8"	305	17'- 2"	1,124	26'- 1"	70	54	153	1.992	493.5	2.0	223	81.7	19,964
4	8'-0"	8'-0"	8"	7"	194	#5	5"	34'- 8"	7,015	162	#5	6"	14'- 7"	2,464	8'- 9"	1,478	194	#6	5"	26'- 0"	7,576	48	8"	39'-9"	1,275	134	39'-9"	3,558	56	8'- 0"	299	147	4'- 8"	458	17'- 2"	1,686	34'- 8"	93	72	204	2.588	645.2	2.6	297	106.1	26,106
5	8'-0"	8'-0"	8"	7"	194	#5	5"	43'- 3"	8,751	162	#5	6"	14'- 7"	2,464	8'- 9"	1,478	194	#6	5"	34'- 7"	10,077	60	8"	39'-9"	1,593	164	39'-9"	4,355	56	8'- 0"	299	196	4'- 8"	611	17'- 2"	2,248	43'- 3"	116	90	256	3.185	796.9	3.2	372	130.6	32,248
6	8'-0"	8'-0"	8"	7"	194	#5	5"	51'-10"	10,488	162	#5	6"	14'- 7"	2,464	8'- 9"	1,478	194	#6	5"	43'- 2"	12,578	72	8"	39'-9"	1,912	194	39'-9"	5,151	56	8'- 0"	299	245	4'- 8"	764	17'- 2"	2,809	51'-10"	138	106	301	3.782	948.6	3.9	439	155.2	38,382

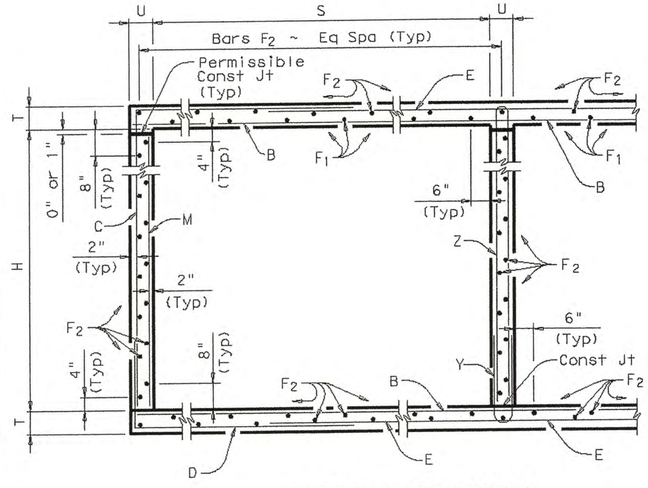
H	Bar Dimensions "X"	"Y"
4'-0"	4'-6"	2'-3"
5'-0"	5'-6"	2'-3"
6'-0"	6'-6"	2'-3"
7'-0"	7'-6"	2'-3"
8'-0"	8'-6"	2'-8"



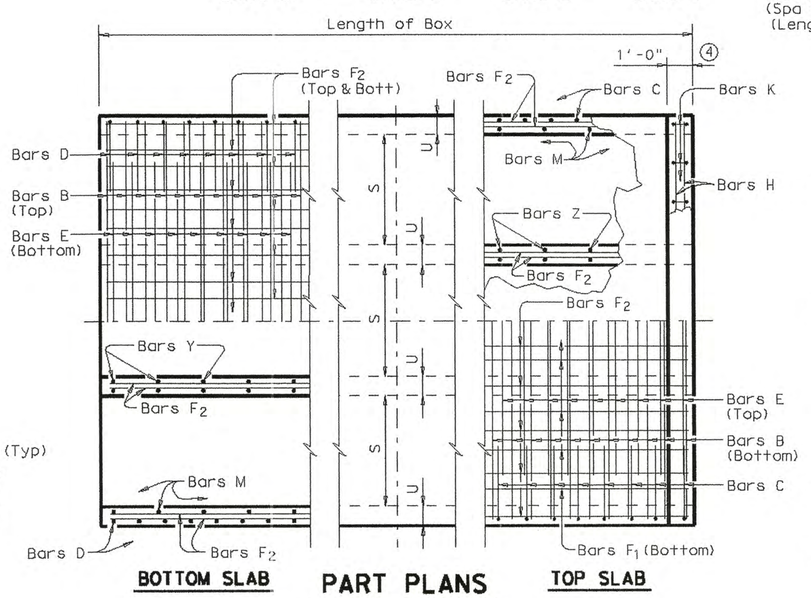
SECTION THRU CURB



BARS C BARS D BARS Z BARS Y BARS K ~ #4 (Spa = 1'-0" Max) (Length = 4'-3")



TYPICAL SECTION



BOTTOM SLAB PART PLANS TOP SLAB

GENERAL NOTES:

Designed according to current AASHTO Standard and Interim Specifications.
Designed to the maximum fill height shown.
All reinforcing steel shall be Grade 60.
All concrete shall be Class "C" with these exceptions: use Class "S" for top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface.
Class "C" concrete shall have a minimum compressive strength of 3600 psi.
Class "S" concrete shall have a minimum compressive strength of 4000 psi.
The bottom edge of the top slab shall be chamfered 3" at the entrance.
Reinforcing bars shall be adjusted to provide a minimum of 1 1/4" clear cover.
Construction joints shown at the flow line may be raised a maximum of 6" at the Contractor's option. If this option is used, Bars M may be cut off or raised, Bars C and D may be reversed, and Bars Y and Z may be reversed.
See standard MC-MD for skewed ends, angle sections and lengthening details.

① 0" min to 5'-0" max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to ECD standard. For structures with T6 bridge rail, refer to T6-CM standard. For structures with bridge rail, other than T6, refer to RAC standard.

② For vehicle safety, the following requirements must be met:
- For structures without bridge rail, curbs shall project no more than 3" above finished grade.
- For structures with bridge rail, curbs shall be flush with finished grade.

Curb heights shall be reduced, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

③ For curbs less than 1'-0" high, tilt bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, bars K may be omitted.

④ 1'-0" typical. 2'-0" when RAC standard is referred to elsewhere in the plans.

HS20 LOADING

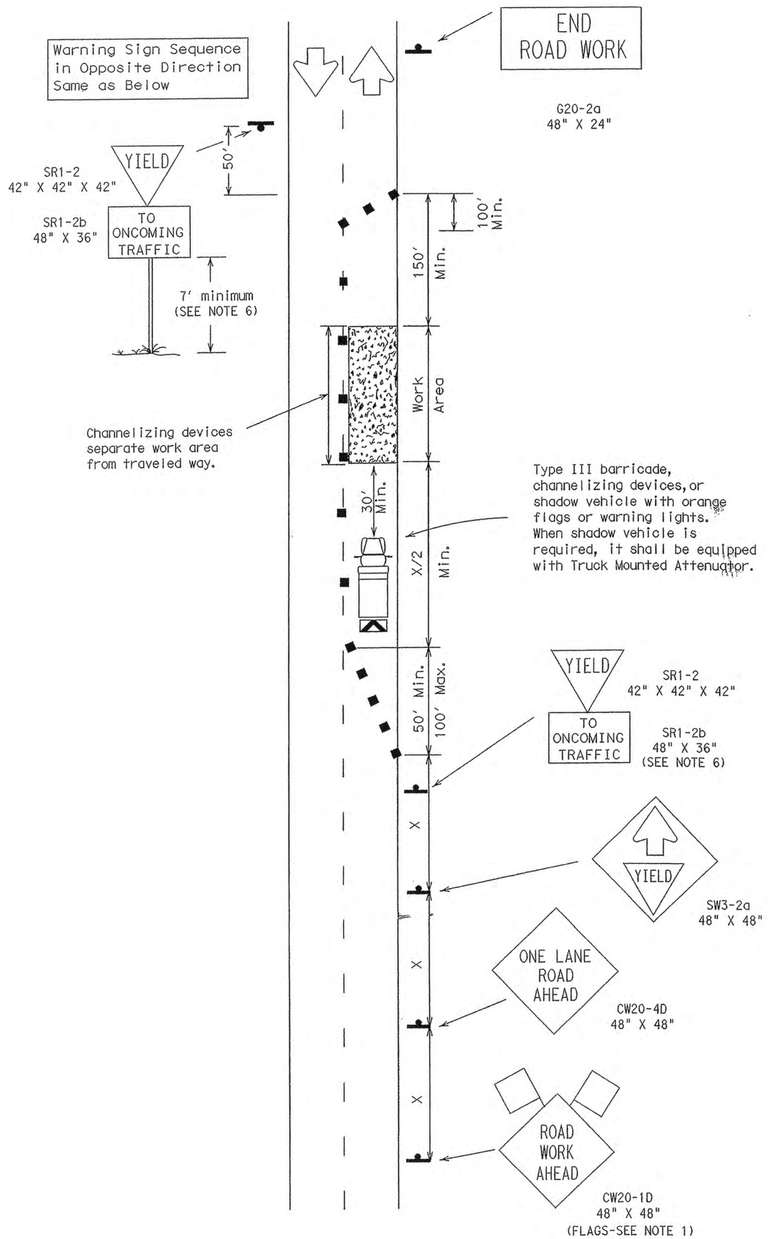
Texas Department of Transportation
Bridge Division

MULTIPLE BOX CULVERTS CAST-IN-PLACE 8'-0" SPAN 0' TO 13' FILL

MC-8-13

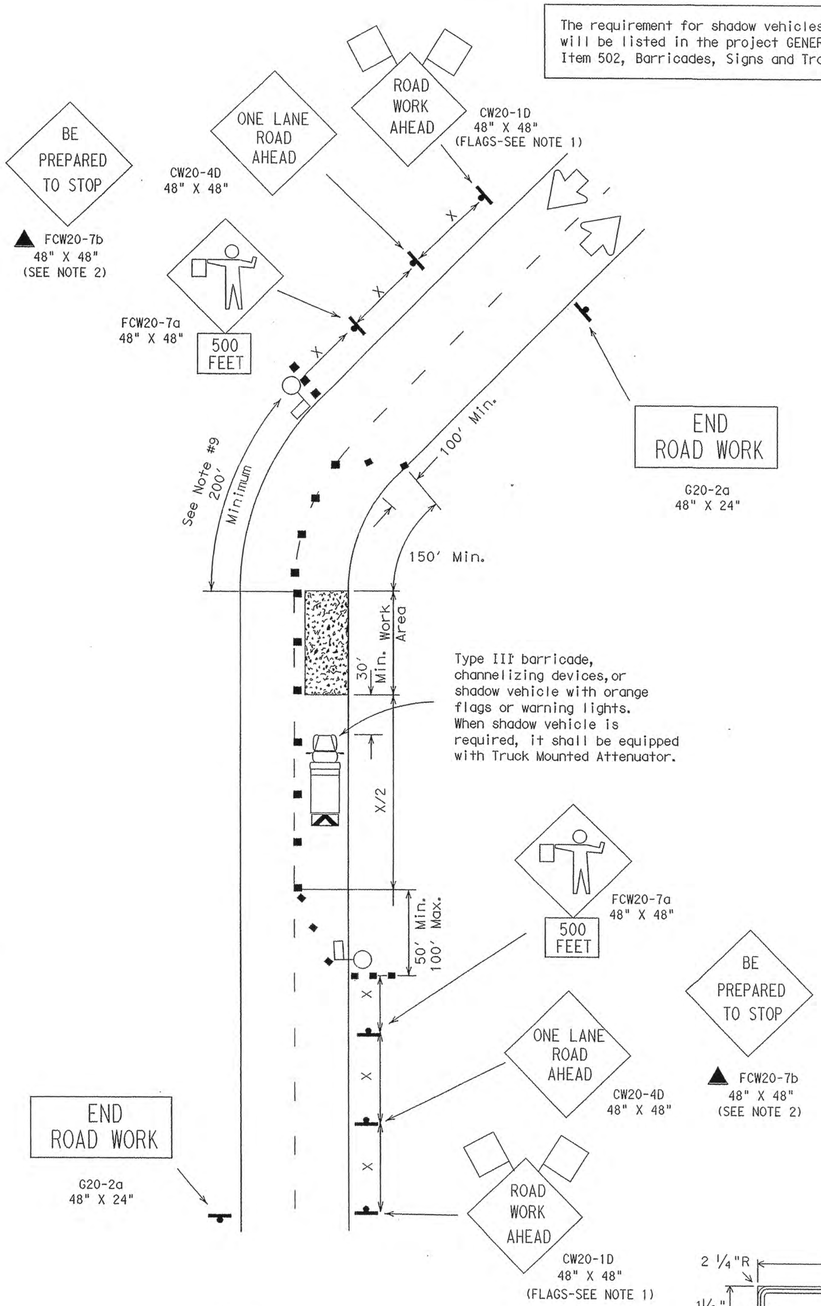
FILE: mc813ste.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT December 2003	DISTRICT	FEDERAL AID PROJECT		SHEET
REVISIONS				
	COUNTY	CONTROL	SECT	JOB	HIGHWAY

ACC:
LEVELS DISPLAYED
1



TCP (1-2a)

One Lane Closed
Adequate Field of View



TCP (1-2b)

One Lane Closed
Inadequate Field of View

LEGEND

Type III Barricade | Channelizing Devices | Flag
Heavy Work Vehicle | Truck Mounted Attenuator
Trailer Mounted Flashing Arrow Panel | Portable Changeable Message Sign
Flagger | Sign Post

Posted Speed*	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Device On a Taper	On a Tangent	Minimum Sign Spacing X Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'-75'	120'
35		205'	225'	245'	35'	70'-90'	160'
40		265'	295'	320'	40'	80'-100'	240'
45	L=WS	450'	495'	540'	45'	90'-110'	320'
50		500'	550'	600'	50'	100'-125'	400'
55		550'	605'	660'	55'	110'-140'	500'
60		600'	660'	720'	60'	120'-150'	*600'
65		650'	715'	780'	65'	130'-165'	*700'
70		700'	770'	840'	70'	140'-175'	*800'

* Conventional Roads Only

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

TYPICAL USAGE:				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
	✓	✓		

GENERAL NOTES:

1. Flags attached to signs are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
3. The BE PREPARED TO STOP sign may be installed after the ONE LANE ROAD AHEAD sign, but proper sign spacing shall be maintained.
4. ROAD WORK AHEAD sign may be repeated if the visibility of the work zone is less than 1500'.

TCP(1-2a)

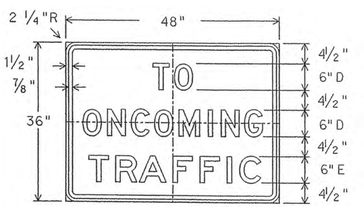
5. YIELD sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work zones should be no longer than one half city block. In rural areas on roadways with less than 4000 ADT, work areas should be no longer than 400'.
6. YIELD TO ONCOMING TRAFFIC sign shall be placed on a support at a 7' minimum mounting height.

TCP(1-2b)

7. Flaggers should use two-way radios or other methods of communication to control traffic.
8. Length of work area should be based on the ability of flaggers to communicate.
9. Distance along curve of work area should be adequate length for motorists to identify and react to flagger signals.

Only pre-qualified products shall be used. A list of compliant products and their sources may be obtained by writing or faxing:

Standards Engineer
Traffic Operations Division - TE
Texas Department of Transportation
125 East 11th Street
Austin, Texas 78701-2483
Phone (512) 416-3335
Fax (512) 416-3161
E-mail TRF-STANDARD@mailgw.dot.state.tx.us



SR1-2b
48" x 36"

Letters - Black
Background - White
Reflective

STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION
Traffic Operations Division

TRAFFIC CONTROL PLAN

TCP(1-2)-98

©TxDOT December 1985	DN:-LR	CK:-MT	DW:-DN	CK:-MT	REQ NO.:

REVISIONS	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
4-90		6		
2-94	COUNTY	CONTROL	SECTION	JOB	HIGHWAY
1-97					
4-98					

LEVELS DISPLAYED
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
33 34 35 45 53 57 58 59 40 41 42 43 44 45 46 47 48
49 50 51 52 54 55 56 65 75 85 96 61 62 63

DATE:
ACC:
FILE:
DN:
CK:
DW:
CK:

GENERAL NOTES

1. Additional details may be provided in the plans concerning sign size, type of channelization devices, sequence of work details, and required measures needed to control traffic during changes in the sequence of work.
2. All traffic control devices shall conform with the Texas "Manual on Uniform Traffic Control Devices for Streets and Highways" (TMUTCD), and shall be maintained as directed by the Engineer. Additional guidelines for traffic control devices may be found in the TMUTCD.
3. All distance and spacing shown on the TCP Standards are approximate.
4. All traffic control devices used during nighttime shall be reflectorized, illuminated from within or externally illuminated.
5. Additional information for fabrication, erection and usage of the following traffic control devices is found in the (TMUTCD) and Barricade and Construction (BC) Standards:

BARRICADES	BC(2) and BC(3)
CONES	BC(6)
BARRIER DELINEATION	WZ(BD)
DRUMS	BC(5)
PAVEMENT MARKINGS	BC(5), BC(7) and BC(8) WZ(STPM) or TCP(7-1) if applicable
SIGNS	BC(1), BC(2), BC(3), BC(4), BC(9), BC(9A), BC(9B) and BC(9C)

6. Work area operations are defined as follows:
   Long-term stationary - Work that occupies a location more than 3 days.
   Intermediate-term stationary - Work that occupies a location overnight to 3 days.
   Short-term stationary - Daytime work that occupies a location from 1 to 12 hours.
   Short Duration - Work that occupies a location up to 1 hour.
   Mobile - Work that moves intermittently or continuously.

SIGNS

1. Selection of sign size should be based on Table 1.
2. Flashing warning lights, channelizing devices and/or flags may be required to call attention to the advance warning signs.
3. The words UTILITY, SIGNAL, BRIDGE, LIGHTING, SIGN, STREET or RAMP may be substituted for ROAD in all signs where applicable.
4. Advisory speed plaques, if used in conjunction with warning signs, speeds shall be determined in the field by the Engineer.
5. Regulatory signs shall be mounted at 7 foot minimum mounting height.
6. Warning signs may be mounted on the approved types of supports at the minimum mounting heights as stated on BC(4):

CHANNELIZING DEVICES

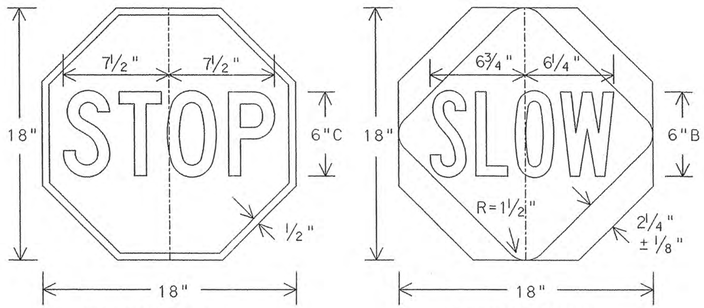
1. The maximum spacing between channelizing devices in a taper should be approximately equal in feet to the speed limit (S).
2. For intermediate term situations, when it is not feasible to remove and restore pavement markings, the channelization must be made dominant by using a very close spacing. This is especially important in locations of conflicting information, such as where traffic is directed over a double yellow centerline. In such locations a maximum channelizing device spacing of 10 feet is recommended. The 10 foot channelizing device spacing recommendation is intended for the area of conflicting information and not the entire work zone.
3. Channelizing device spacing should be reduced when placed on curves, hills or next to potential hazards. At least three channelizing devices should be in view at all times.
4. MERGING taper (lane closure with merging traffic) =L
   SHIFTING taper (traffic diverted to adjacent lane) =1/2 L
   SHOULDER taper (shoulder closed to traffic) =1/3 L
5. DOWNSTREAM taper usage is optional. When used it should be 100 foot minimum length per lane. Devices should be spaced at approximately 20 foot intervals.
6. ONE LANE, TWO-WAY taper is intended for a portion of the road controlled by STOP, YIELD traffic signals or flagger and used alternately by traffic in each direction. It should be 50-100 foot length with devices spaced at approximately 20 foot intervals.
7. Arrow panels used on two-way, two-lane roadways should flash in the four corner CAUTION display.

WORKER SAFETY

1. Workers exposed to traffic should wear orange safety vests.
2. Work vehicles within 30 feet of the traveled way should have strobe lights or rotating beacons in use.
3. When work vehicles are used to shadow the work area, the vehicle should be parked 30 feet or more from the work area, transmission in gear (or set in PARK), emergency brake set on, and front wheels turned away from work area. Shadow vehicles shall be equipped with truck mounted attenuators.
4. Inactive work vehicles, including workers' private vehicles, should be parked away from the work area and as close to the right-of-way line as possible.

FLAGGER CONTROL

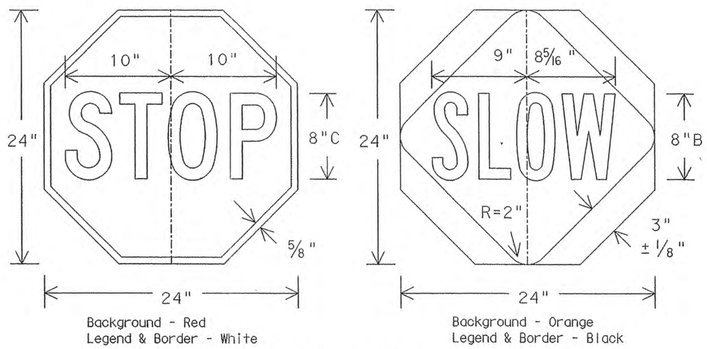
1. Flagger shall wear orange safety vests. Flaggers should wear saftey hats to provide a professional image to the motorist and to protect the head from flying objects.
2. STOP/SLOW paddles shall be used as the primary method to control traffic by flaggers. The STOP/SLOW paddle minimum size is 18" x 18". Paddles may be attached to a 60 inch staff for easier handling. The larger size (24" x 24") should be attached to a 60 inch staff.
3. The 24" paddle should be used when the posted speed is 45 MPH or greater.
4. Flags are only used to control traffic for emergency situations and the STOP/SLOW paddles are not available. Flags shall be 24" square and securely fastened to a staff approximately 3 feet long.
5. Flaggers may carry hand held air horns to alert workers of an emergency condition.
6. For one lane two-way traffic control, one or more flaggers should be used where traffic density, road conditions or motorists' sight distance justify their use. If flaggers are used, the taper should be reduced to 50-100 feet. When flaggers are used to control traffic, the FLAGGER symbol sign (FCW20-7a) shall be used. When flaggers are used, the BE PREPARED TO STOP sign (CW20-7b) should be used. Proper spacing between signs should be maintained.
7. When flaggers are used to draw attention to traffic control devices, the FLAGGER symbol sign should be used. Proper spacing should be maintained.
8. When more than one flagger is used, a chief flagger should be assigned the responsibility of making decisions concerning traffic control.
9. The contractor has the option to use a flashing Stop/Slow Paddle conforming to Departmental Materials Specification D-9-8620.



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

18" STOP-SLOW PADDLE



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

24" STOP-SLOW PADDLE

Only pre-qualified products shall be used. A list of compliant products and their sources may be obtained by writing or faxing:

Standards Engineer
Traffic Operations Division - TE
Texas Department of Transportation
125 East 11th Street
Austin, Texas 78701-2483
Phone (512) 416-3335
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Table I

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

Roadway Classification	Posted Speed	Sign Spacing "X" ▲	Long-term Stationary Or Intermediate-term Stationary Approach Warning Signs CW20 Series And CW22-1 Sign		Short-term Stationary Or Short Duration Approach Warning Signs CW21 Series		Other Warning Signs
	MPH	Ft. (Apprx.)	Standard Inches	Minimum[4] Inches	Standard Inches[7]	Minimum[4] Inches[7]	Standard Inches[7]
Conven.	30	120	48X48	36X36	30X30 or 36x36	24X24 or 30x30	30X30 or 36x36
	35	160		↓	↓	↓	↓
	40	240					
	45	320		Use Standard Size		Use Standard Size	
	50	400					
	55	500[2]					
	60	600[2]			48x48		48x48
	65	700[2]			↓		↓
	70	800[2]					
Exp or Frwy	*	* [3]	↓		**	**	**

* For typical sign spacings on expressways and freeways, see TMUTCD typical application diagrams or TCP Standard Sheets.

▲ Minimum distance from work area to 1st Advance Warning sign and/or distance between each additional sign.

** Smaller sign sizes may be used where sign designs have not been included in the "Standard Highway Sign Design for Texas" manual.

General Notes:

1. Special or larger size signs may be used as may be necessary.
2. Distance between signs should be increased as required to have 1500' advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. For use only on secondary roads or city streets where speeds are low.
5. Only diamond shaped warning sign sizes are indicated.
6. See sign size listing in TMUTCD, Appendix A for complete list of all available sign design sizes.
7. Where two sizes are listed, see sign size listing in TMUTCD, Appendix A for proper size.

STANDARD PLANS
TEXAS DEPARTMENT OF TRANSPORTATION
Traffic Operations Division

TRAFFIC CONTROL PLAN

TCP NOTES-98

©TxDOT Feburary 1994	DN: MT	CK: -	DW: DN	CK: DM	MEG NO.:
REVISIONS	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT		SHEET
8-95		6			
1-97	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
4-98						

DN: CK: DW: CK:
DATE: ACC: FILE:

LEVELS DISPLAYED
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
49 50 51 52 53 54 55 56 57 58 59 60 61 62 63