CONSTRUCTION PLANS FOR

BARRY RANCH

AN ADDITION TO THE CITY OF LUCAS
COLLIN COUNTY, TEXAS
8 SINGLE FAMILY LOTS, 17.677 ACRES

CONTACT INFORMATION:

City of Lucas – (972) 912–1208
Engineer – Stanton Foerster, P.E.
Development Services Director – Joe Hilbourn

Lovejoy ISD – (469) 742–8017
Dennis Womack

Grayson–Collin Electric – (903) 482–7183
Michael Lauer

TXU Energy – (214) 812–4600
Brian Neitzel

North Texas Municipal Water District – (972) 442–5402
Bob Quinn

Co–Serve – (940) 321–7862
Lance Ehler

VICINITY MAP
N.T.S.

SHEET INDEX

APPROVED
CITY OF LUCAS
CITY ENGINEER DATE
12-8-15

FOR CONSTRUCTION
DECEMBER 02, 2015
ENGINEERINGCONCEPTS & DESIGN, L.P.
BARRY RANCH
CITY OF LUCAS, COLLIN COUNTY, TEXAS

CAUTION! EXISTING UTILITIES

CONTRACTOR SHOULD CALL 1-800-DIG-TESS PRIOR TO BEGINNING ANY CONSTRUCTION ACTIVITIES FOR EXISTING UTILITY LOCATIONS. 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.

BENCHMARK:
RM 133 per FEMA Panel No. 48085C0455 G (January 19, 1996)
Elev.=590.08'

Square cut on east headwall of west end of bridge at White Rock Creek & FM 1378

OWNER / DEVELOPER
M CHRISTOPHER AND COMPANY
550 SOUTH SH 5
FAIRVIEW, TX, 75069
(972) 974–2777
FAX (972) 529–1078

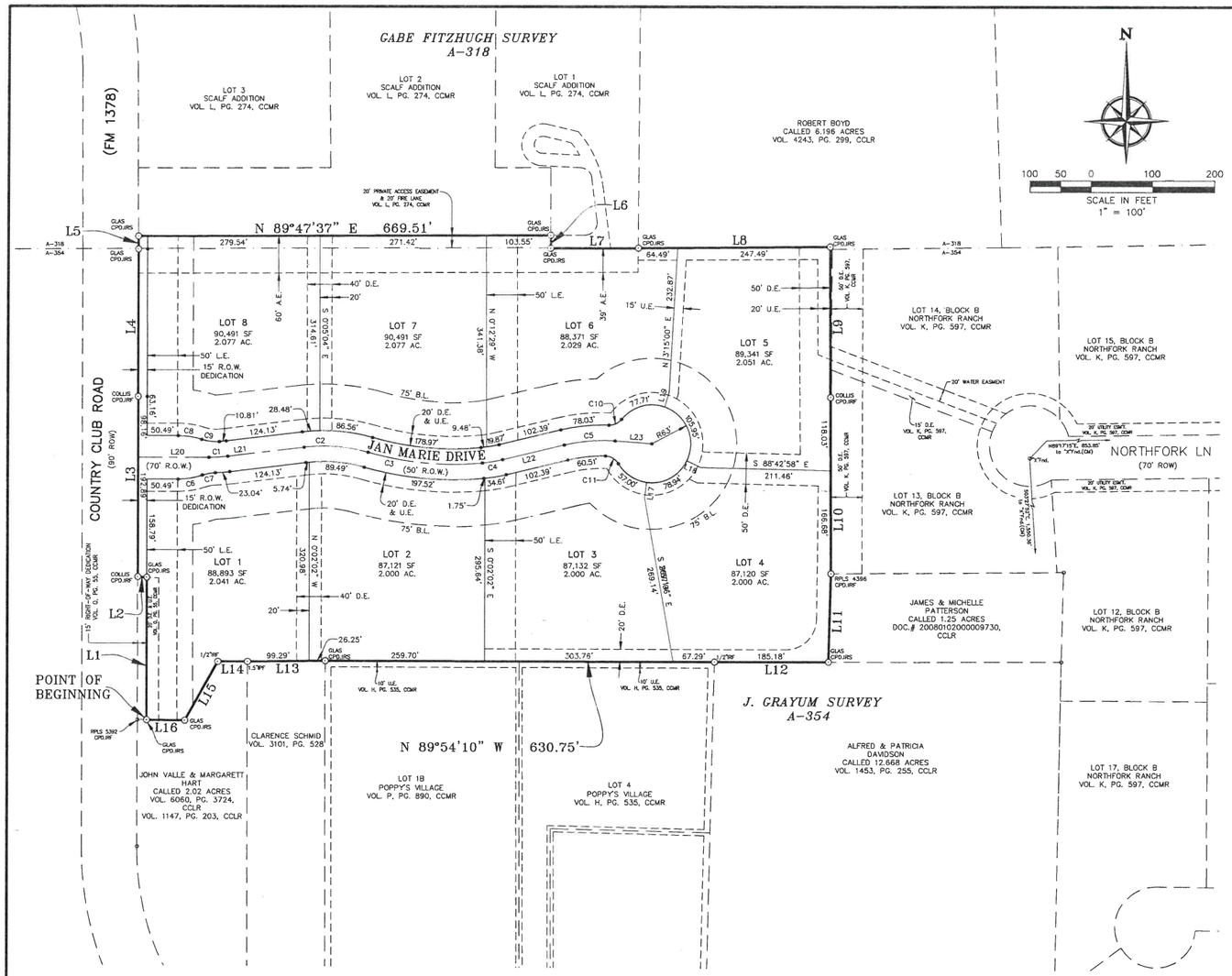
ENGINEERINGCONCEPTS & DESIGN, L.P.
ENGINEERING / PROJECT MANAGEMENT /
CONSTRUCTION SERVICES FIRM REG # F-001145
201 WINDCO CIR, SUITE 200 WYLIE, TEXAS 75098
972-941-8400 FAX: 972-941-8401 WWW.ECDLP.COM

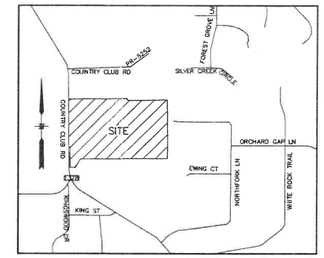
REVISIONS:

DATE: DECEMBER 02, 2015
PROJECT NO.: 8315
DWG FILE NAME: COVER.dwg

THIS DOCUMENT IS RELEASED FOR THE PURPOSE OF CONSTRUCTION.

STATE OF TEXAS
CODY D. MINTERS
87085
REGISTERED PROFESSIONAL ENGINEER
12-2-15



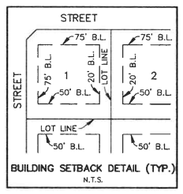


VICINITY MAP
N.T.S.

LEGEND	
D.E.	DRAINAGE EASEMENT
U.E.	UTILITY EASEMENT
B.L.	BUILDING SETBACK LINE
A.E.	ACCESS EASEMENT
D.E.	DRAINAGE EASEMENT
L.E.	LANDSCAPE EASEMENT
IPF	IRON PIPE FOUND
IRF	IRON ROD FOUND
CPD.IRF	CAPPED IRON ROD FOUND
CPD.IRS	CAPPED IRON ROD SET
(CM)	CONTROL MONUMENT
CCLR	COLLIN COUNTY LAND RECORDS
CCMR	COLLIN COUNTY MAP RECORDS

NOTES:

1. By graphical plotting, the parcel described hereon does not lie within a Special Flood Hazard Area, as delineated on the Collin County, Texas and Incorporated Areas, Flood Insurance Rate Map, Map Number 48085C0405 J, dated June 02, 2009, as published by the Federal Emergency Management Agency. The above flood statement does not imply that the property and/or structures will be free from flooding or flood damage. On occasion, greater floods can and will occur and flood heights may be increased by man-made or natural causes. The above flood statement shall not create liability on the part of the surveyor.
2. Source bearing is based on Texas State Plane Coordinate System. Projection: State Plane NAD83 Texas North Central Zone 4202, Lambert Conformal Conic (TX83-NCF).
3. Property owners to maintain property including drainage and utility easements to the edge of pavement.
4. Only wrought iron fences permitted within drainage easements.
5. A 1/2-inch iron rod with yellow cap stamped ""GLAS" will be set at all boundary corners, lot corners, points of curvature, points of tangency and angle points in public rights-of-way unless otherwise shown or noted in this drawing after development is completed.
6. Selling a portion of any lot within this addition by metes and bounds is a violation of state law and city ordinance and is subject to fines and withholding of utilities and building permits.
7. Benchmark: An "x" cut in south end of a concrete headwall on the west side of Stinson Road at Muddy Creek. Elev. 569.65'
8. The 20' building line, the 40' building line & the 35' building line shown on the James Patterson addition (Vol 0, Pg.55) are hereby abandoned.



BUILDING SETBACK DETAIL (TYP.)
N.T.S.

EXISTING ZONING: R2.0
PROPOSED ZONING: R2.0
8 RESIDENTIAL LOTS
DENSITY: 1 LOT PER 2.210 ACRES GROSS
AVG. LOT SIZE: 2.003 ACRE
MIN. LOT SIZE: 2.000 ACRE
MAX.LOT SIZE: 2.025 ACRE

LAND SURVEYOR
GLAS LAND SURVEYING
2114 FM 1563
WOLFE CITY, TX 75496
OFFICE (903) 496-2084
FAX (469) 547-0826
www.glaslandsurveying.com
TBPLS Firm No. 10193970

OWNER / DEVELOPER
M CHRISTOPHER AND COMPANY
550 SOUTH SH 5
FAIRVIEW, TX, 75069
(972) 974-2777
FAX (972) 529-1078

PRELIMINARY/FINAL PLAT

BARRY RANCH

LOTS 1-8, BLOCK A
8 RESIDENTIAL LOTS

BEING 17.669 ACRES
SITUATED IN THE
GABE FITZHUGH SURVEY, ABSTRACT NO. 318
J. GRAYUM SURVEY, ABSTRACT NO. 354
CITY OF LUCAS, COLLIN COUNTY, TEXAS

ENGINEERING CONCEPTS & DESIGN, L.P.
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TEXAS FIRM REG. NO. 001145
201 WINDCO CIRCLE, SUITE 200, WYLIE TEXAS 75098
(972) 941-8400 FAX (972) 941-8401

DATE: NOVEMBER 30, 2015

08314\DWG\8314 Final Plat.dwg

OWNER'S CERTIFICATE & DEDICATION

STATE OF TEXAS
COUNTY OF COLLIN

WHEREAS, M. CHRISTOPHER & COMPANY, BEING a 17.669 acre tract of land situated in the State of Texas, County of Collin, and City of Lucas, being part of the Gabe Fitzhugh Survey, Abstract No. 318 and the J. Grayum Survey, Abstract No. 354, being part of Lot 2 of Scalf Addition, an addition to the City of Lucas as recorded in Volume L, Page 274 of the Collin County Map Records (CCMR), part of a called 10.00 acre tract as recorded in Volume 5599, Page 2887 of the Collin County Land Records (CCLR), part of a called 11.79 acre tract as recorded in Volume 5599, Page 2891, CCLR, and all of Lot 1 of James Patterson Addition, an addition to the City of Lucas as recorded in Volume O, Page 55, CCMR with said premises being more particularly described as follows:

BEGINNING at a Glas capped iron rod set in the east right-of-way line of F.M. Highway No. 1378, marking the southwest corner of Lot 1, the most southerly southwest corner of said premises, and being in a north line of a called 2.02 acre tract as recorded in Volume 6060, Page 3724 and Volume 1147, Page 203, CCLR, from which an RPLS 5392 capped iron rod found marking the northwest corner of said 2.02 acre tract bears North 89°17'01" West, 15.00 feet;

THENCE with the east right-of-way line of F.M. Highway No. 1378, partway with the west line of Lot 1, partway with the west line of said 11.79 acre tract, partway with the west line of said 10.00 acre tract, partway with the west line of Lot 2, and with the west line of said premises as follows:

- North 00°01'34" West, 230.32 feet to a point for corner marking the northwest corner of Lot 1 and being in a south line of said 11.79 acre tract;
- North 86°36'37" West, 15.03 feet to a Collis capped iron rod found marking the most westerly southwest corner of said 11.79 acre tract;
- North 00°01'34" West, 291.05 feet to a Collis capped iron rod found marking the northwest corner of said 11.79 acre tract and the southwest corner of said 10.00 acre tract;
- North 00°05'03" West, 238.01 feet to a 1/2-inch iron rod found marking the southwest corner of Lot 2;
- North 00°16'18" West, 21.00 feet to a Glas capped iron rod set marking the northwest corner of said premises;

THENCE with the north line of said premises, being 21.00 feet north of and parallel to the south line of Lot 2, North 89°47'37" East, 669.51 feet to a Glas capped iron rod set marking the northeast corner of said premises, being in the east line of Lot 2, in an east line of said 10.00 acre tract, and being in the west line of Lot 1 of said Scalf Addition;

THENCE with the east line of Lot 2, an east line of said 10.00 acre tract, the east line of said premises, and the west line of said Lot 1, South 00°00'46" West, 21.00 feet to a Glas capped iron rod set marking the southeast corner of Lot 2, an interior ell-corner of said premises, an interior ell-corner of said 10.00 acre tract, and the southwest corner of said Lot 1;

THENCE with a north line of said 10.00 acre tract, a north line of said premises, and the south line of said Lot 1, North 89°47'39" East, 140.55 feet to a 1/2-inch iron rod found marking the southeast corner of said Lot 1 and the southwest corner of a called 6.196 acre tract as recorded in Volume 4243, Page 299, CCLR, and continuing North 89°32'56" East, 311.98 feet along the south line of said 6.196 acre tract to a ½-inch iron rod found marking the most easterly northeast corner of said 10.00 acre tract, and the most easterly northeast corner of said premises;

THENCE partway with the east line of said 10.00 acre tract, partway with the east line of said premises, partway with the west line of a called 1.25 acre tract as recorded under Document No. 20080102000009730, CCLR, and with the east line of said premises as follows:

South 00°20'44" East, 243.12 feet to a Collis capped iron rod found marking the southeast corner of said 10.00 acre tract and the most northerly northeast corner of said 11.79 acre tract;
South 00°12'24" East, 284.71 feet to an RPLS 4396 capped iron rod found marking an interior ell-corner of said 11.79 acre tract, the southwest corner of Lot 13, Block B of Northfork Ranch, an addition to the City of Lucas as recorded in Volume K, Page 597, CCMR, and being the northwest corner of said 1.25 acre tract;
South 01°32'18" West, 142.81 feet to a Glas capped iron rod set in the south line of said 11.79 acre tract marking the southeast corner of said premises, the southwest corner of said 1.25 acre tract, and being in the north line of a called 12.668 acre tract as recorded in Volume 1453, Page 255, CCLR;

THENCE with the south line of said 11.79 acre tract, the south line of said premises, partway with the north line of said 12.668 acre tract, partway with the north line of Poppy's Village, an addition to the City of Lucas as recorded in Volume H, Page 535 and Volume P, Page 890, CCMR, partway with the north line of the Schmid tract as recorded in Volume 3101, Page 528, CCLR, and partway with the north line of a called 2.02 acre tract as recorded in Volume 6060, Page 3724 and Volume 1147, Page 203, CCLR as follows:

South 89°57'51" West, 185.18 feet to a 1/2-inch iron rod found marking the northwest corner of said 12.668 acre tract and the northeast corner of Poppy's Village;
North 89°54'10" West, 630.75 feet to a point for corner marking the northwest corner of Poppy's Village and the northeast corner of said Schmid tract;
South 89°18'55" West, 125.54 feet to a 1.5-inch iron pipe found marking the northwest corner of said Schmid tract and the northeast corner of said 2.02 acre tract;
South 89°59'00" West, 47.89 feet to a 1/2-inch iron rod found marking the southwest corner of said 11.79 acre tract, an interior ell-corner of said premises, the most northerly northwest corner of said 2.02 acre tract, and being in the east line of Lot 1;

THENCE with the east line of Lot 1, an east line of said premises, and a west line of said 2.02 acre tract, South 29°26'51" West, 109.40 feet to a 1/2-inch iron rod found marking the southeast corner of Lot 1, the most southerly southeast corner of said premises, and a northwest corner of said 2.02 acre tract;

THENCE with the south line of Lot 1, the south line of said premises, and a north line of said 2.02 acre tract, North 89°17'01" West, 61.87 feet to the point of beginning and containing 17.669 acres of land.

NOW THEREFORE KNOW ALL MEN BY THESE PRESENTS:

THAT, M. CHRISTOPHER & COMPANY, does hereby adopt this plat designating the herein described property as BARRY RANCH, an addition to the City of Lucas, Texas, and does hereby dedicate to the City of Lucas, the roads, rights-of-way and easements shown thereon. The streets and alleys are dedicated for street purposes. The Easements and public use areas, as shown, are dedicated, to the City of Lucas forever, for the purposes indicated on this plat. No buildings, fences, trees, shrubs or other improvements or growths shall be constructed or placed upon, over or across the Easements as shown. In addition, Utility Easements may also be used for the mutual use and accommodation of all public utilities desiring to use or using the same unless the easement limits the use to particular utilities, said use by public utilities being subordinate to the Public's and City of Lucas's use thereof. The City of Lucas and public utility entities shall have the right to remove and keep removed all or parts of any buildings, fences, trees, shrubs or other improvements or growths which may in any way endanger or interfere with the systems in said Easements. The City of Lucas and public utility entities shall at all times have the full right of Ingress and Egress to or from their respective easements for the purpose of constructing, reconstructing, inspecting, patrolling, maintaining, and adding to or removing all or parts of their respective systems without the necessity at any time procuring the permission from anyone.

This plat approved subject to all platting ordinances, rules, regulations and resolution of the City of Lucas, Texas.

FOR: M. CHRISTOPHER & COMPANY

BY: _____

STATE OF TEXAS
COUNTY OF COLLIN

Before me, the undersigned authority, a Notary Public in and for the State of Texas, on this day personally appeared _____, known to me to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that he executed the same for the purposes and considerations therein expressed.

Given under my hand and seal of office, this ____ day of _____, 2015.

_____
Notary Public in and for the State of Texas
My Commission Expires: _____

CITY APPROVAL CERTIFICATE

This plat is hereby approved by the Planning and Zoning Commission of the City of Lucas, Texas.

_____ _____
Chairman, Planning and Zoning Commission Date

ATTEST:

_____ _____
Signature Date

_____ _____
Name Date

The The Director of Public Works of the City of Lucas, Texas hereby certifies that to the best of his/her knowledge or belief, this subdivision plat conforms to all requirements of the Code of Ordinances and with engineering construction standards and processes adopted by the City of Lucas, Texas as to which his/her approval is required.

_____ _____
Director of Public Works Date

The Director of Planning and Community Development of the City of Lucas, Texas hereby certifies that to the best of his/her knowledge or belief, this subdivision plat conforms to all requirements of the Code of Ordinances, or as may have been amended or modified, as allowed, by the Planning and Zoning Commission as to which his/her approval is required.

_____ _____
Director of Planning and Community Development Date

SURVEYOR'S CERTIFICATION

KNOW ALL MEN BY THESE PRESENTS:

That I, John Glas, hereby certify, that I prepared this plat was made from an actual on the ground survey of the land as described and that the corner monuments shown thereon were properly placed under my personal supervision in accordance with the Platting Rules and Regulations of the City of Lucas Planning and Zoning Commission

FOR FINAL PLAT
REVIEW PURPOSES ONLY

_____
JOHN GLAS
REGISTERED PROFESSIONAL
LAND SURVEYOR NO. 6081

STATE OF TEXAS
COUNTY OF COLLIN

Before me, the undersigned authority, a Notary Public in and for the State of Texas, on this day personally appeared John Glas, known to me to be the person whose name is subscribed to the foregoing instrument and acknowledged to me that he executed the same for the purpose and considerations therein expressed.

Given under my hand and seal of office, this _____ day of _____, 20__.

_____
Notary Public in and for the State of Texas
My Commission Expires:

ON-SITE SEWAGE FACILITIES (OSSF) NOTES:

1. All lots must utilize alternative type On-Site Sewage Facilities.
2. All lots must maintain state-mandated setback of all On-Site Sewage Facility components from any/all easements and drainage areas, water distribution lines, sharp breaks and/or creeks/rivers/ponds, etc. (Per State regulations).
3. Tree removal and/or grading for OSSF may be required on individual lots.
4. Individual site evaluations and OSSF design plans (meeting all State and County requirements) must be submitted to and approved by Collin County for each lot prior to construction of any OSSF system.

HEALTH DEPARTMENT CERTIFICATION:

I hereby certify that the on-site sewage facilities described on this plat conform to the applicable OSSF laws of the State of Texas, that site evaluations have been submitted representing the site conditions in the area in which on-site sewage facilities are planned to be used.

_____
Registered Sanitarian or Designated Representative
Collin County Development Services

PRELIMINARY/FINAL PLAT

BARRY RANCH

LOTS 1-8, BLOCK A
8 RESIDENTIAL LOTS

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GENERAL NOTES:

1. All work and materials shall conform to the City of LUCAS Engineering Design Manual and the "Standard Specifications for Public Works Construction" published by the North Central Texas Council of Governments (NCTCOG), latest edition. In the event of conflict, duplication, or variance, the City Engineer shall have the final decision on all construction materials, methods, and procedures.

2. Prior to construction, the contractor shall familiarize himself with the contract documents and specifications, the plans including all notes and any other applicable standards or specifications relevant to the proper completion of the work specified. Failure on the part of the contractor to familiarize himself with all standards or specifications pertaining to this work shall in no way relieve the contractor of responsibility for performing the work in accordance with all such applicable standards and specifications.

3. Contractor shall have in his possession, prior to construction, all-necessary permits, licenses, etc. Contractor shall have at least one set of approved engineering plans and specifications on site at all time.

4. Any item of work called for by the plans and/or specification and not included, as a bid item shall be subsidiary to the construction of the various bid items.

5. Construction inspection will be performed by representatives of the owner, engineer, city, geotechnical engineer, and reviewing authorities and agencies. Unrestricted access shall be provided to them at all times. Contractor is responsible for scheduling required inspections as required by contract documents.

6. Any item requiring inspection by the City, must be performed between the hours of 8am–5pm Monday thru Friday.

7. The contractor and all subcontractors must confine their activities to the work area. Any damage resulting from construction activities, shall be the contractor's responsibility.

8. It will be the responsibility of each contractor to protect all existing public and private utilities throughout the construction of this project. Contractor shall contact the appropriate utility companies for line locations prior to commencement of construction and shall assume full liability to those companies for any damages caused to their facilities. Location of utilities are taken from the City of LUCAS and Utility Company records. Contractor shall field verify to determine exact location of utilities.

9. Trench safety design will be the responsibility of the contractor. The contractor shall abide by all applicable federal, state, and local laws governing excavation. Trench side slopes shall meet OSHA standards. Benching, shoring, and bracing shall be required when side slope standards are not meet. A pull box, meeting OSHA standards will be acceptable. The contractor shall submit detailed plans to the City Engineer for review showing how OSHA Standards for excavation shall be met prior to the start of any utility construction. The plans shall be sealed by an Engineer registered by the State of Texas.

10. Contractor shall stockpile salvage materials for inspection. All items not salvaged by the owner shall be removed from the site at the contractor's expense. The owner will transport salvaged materials away from the site at the owner's expense. Salvage, stockpile, and removal of materials shall be considered subsidiary to the various bid items and shall not be paid for directly unless such items are specifically included in the bid items.

11. The contractor shall be responsible for providing and maintaining all necessary warning and safety work, material, and operations needed to provide for the health and safety of the public until all work has been completed, including maintenance bond periods, and to be accepted by the City of LUCAS in writing.

12. All construction and materials testing unless otherwise indicated, shall be performed by an Engineering Testing Laboratory employed by the Contractor. The testing laboratory shall be approved by the City of LUCAS. The testing laboratory shall make tests necessary to insure that construction is in accordance with the approved plans and specifications. Re-testing required due to construction not being performed in accordance with the plans and specifications shall be at the expense of the contractor. The testing laboratory shall submit testing reports to the City Engineer and Design Engineer.

13. Any additional excavated material shall be placed as directed by the Owner.

14. All fill areas to be density and moisture controlled. Fill should be compacted to 95% of standard proctor density at a minimum of 2% above optimum moisture content.

CLEARING AND GRADING NOTES:

1. All grading shall conform to the City of LUCAS standards.

2. Site Preparation: All surface vegetation and the foreign materials such as roots, grass, etc., shall be stripped to a minimum depth of 4 inches and removed. All cleared and grubbed materials shall be removed off-site in accordance with local, state, and federal regulations.

3. Scarifying Area to be Filled: In areas where fills are desired, the stripped surface shall be scarified to a depth of at least 6 inches for uniform compaction. The scarified surface shall be such that it is free from lumps and uneven surfaces.

4. Compacting Area to be Filled: After clearing and scarifying the area to be filled, the soils shall be brought to a moisture content of −2% to +4% of the optimum moisture value and compacted, in 6 inch maximum lifts, mechanically to at least 95% of Standard Proctor maximum dry density (ASTM D 698). R.O.W. areas to be filled shall be brought to moisture content of 0% to +4% of the optimum moisture value and compacted, in 6 inch maximum lifts, mechanically to at least 95% of Standard Proctor maximum dry density (ASTM D 698)

5. Fill Material: On-site soil and/or rock could be used as random fill provided such material is free from vegetation and other deleterious substances. No fill material shall contain rocks or lumps having a diameter of 6 inches or greater.

6. Depth and Mixing of Fill Layers: The fill materials shall be placed in level, uniform layers. Each layer shall be thoroughly blade mixed during spreading to insure uniform compaction. These materials shall be placed in loose lifts with density and moisture content shall conform to that specified herein.

7. Compaction of Fill Layer: Compaction equipment shall be capable of compacting all fill soils to the specified density. Compaction of all fill shall be accomplished with the material at the specified moisture content. Each fill layer shall be compacted uniformly with sufficient effort to achieve the specified degree of compaction.

8. Amount of Compaction: After each fill layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted to a minimum 95% of the Standard Proctor density (ASTM D 698).

9. Moisture Content: All fill material shall be compacted at the appropriate moisture content as defined for the particular soil type. Each layer shall be brought to a moisture content of −2% to +4% of the optimum moisture value as determined by ASTM D 698. The compaction moisture content of limestone or other rock-like materials is not considered crucial, provided the proper degree of compaction is attained. R.O.W. areas to be filled shall be brought to moisture content of 0% to +4% of the optimum moisture value and compacted, in 6 inch maximum lifts, mechanically to at least 95% of Standard Proctor maximum dry density (ASTM D 698

10. Slope Control: In areas where cut of fill slopes exceed 3 feet in depth/height, a slope ratio of one (vertical) to 4 (horizontal) shall not be exceeded. Compaction operations of fill slopes shall be continued until the slopes are stable.

11. Field Density: Field density tests of fill and/or backfill shall be controlled by an Engineering Testing Laboratory. Density tests shall be taken in the compacted material below the disturbed surface. When these tests indicate that the density or any layer of fill is below the required density, the particular soil or rock layer shall be reworked until the proper density and/or moisture content is achieved. Re-testing of reworked areas shall be at contractors expense.

12. Tolerance for Rough Grading: Streets shall be rough graded within 0.2' of plan grades prior to utility construction. Utility contractor shall return street to within 0.2' of plan grade prior to street paving.

13. Supervision: Supervision by the Soils Engineer shall be of such continuity during the grading operations that he can adequately describe the work done and evaluate that work in comparison with the specifications. Actual supervision shall be the Contractor's Supervisor.

14. Reports: The Testing Laboratory shall send 1 copy of each test, inspection, or evaluation report to the Public Works Department, Owner, and Design Engineer.

15. All excess earth shall be used on-site or taken to an area designated by the Engineer at the Contractor's expense.

PAVING NOTES

1. Concrete street pavement shall be NCTCOG Class "C", 3,600 PSI compressive strength. Air content shall be 3%–5%. Pavement thickness and reinforcing steel shall be as indicated on construction plans and conforming with current City of LUCAS Standards.

2. The subgrade shall be treated 6 inches deep, minimum, with lime slurry. Lime slurry shall be Type B Grade 1 and applied in accordance with the City Standard Specifications. Lime shall be applied at a rate of 6.0% of the dry weight soil and have a P.I. of less than 15. Compaction of the lime stabilized subgrade shall be to 95% Standard Proctor density. Stabilization shall extend 1' ft. beyond edge of pavement (refer to typical paving section).

3. All dimensions are to edge of pavement unless otherwise noted. Elevations are edge of pavement unless otherwise noted.

4. Water meters and/or services shown to be in conflict with proposed paving or drainage facilities are to be relocated by the Contractor, subject to review by the Public Works Department, prior to commencement of construction of paving and drainage.

5. Power and telephone poles shown to be in conflict with proposed paving to be relocated by appropriate utility prior to paving.

6. It will be the responsibility of the paving contractor to protect all public utilities of this project. All valve boxes, fire hydrants, etc., must be adjusted to proper line and grade by the paving contractor prior to and after the placing of permanent paving.

7. Expansion or construction joints should be placed at 600 feet maximum spacing or the final pour of the construction day. Transverse contraction joints shall be placed on 20 feet maximum spacing. Refer to City of LUCAS Standard Details.

8. Contraction joints shall be formed by sawing. Joint depth shall be equal to one-fourth (1/4) of slab thickness. Sawing of joints shall begin as soon as the concrete has hardened sufficiently to permit sawing without excessive raveling. All joints should be completed before uncontrolled shrinkage cracking occurs. Joints should be continuous across the slab and extend completely through the curb. All joint openings to be cleaned and sealed with hot poured rubber joint sealing compound prior to opening to traffic.

9. Any excess earth shall be taken to an area, to be designated by the Engineer at the contractors expense.

10. Back fill shall be placed behind all pavement. Back fill material shall be free of earthwork debris such as muck, rock, refuse, stumps, concrete, asphalt, or other unsuitable materials and shall consist of soil suitable for sodding.

11. Topsoil to stripped and placed on parkways and yards on lots.

12. City will water test streets upon completion. Any standing water must be remedied before acceptance.

WATER SYSTEM IMPROVEMENTS NOTES

1. All work and materials shall be in accordance with City of LUCAS standard specifications.

2. Fire Hydrants shall be Waterous or approved equal, 3-way breakaway type, no less than 5¼ inches in size and shall conform to the provisions of the latest AWWA Standard C502, and shall have a bury depth of five feet. Valves shall be placed on all fire hydrant leads and shall be F x M.J.. Fire hydrants shall be located so that breakaway point is no less than 2-inches and no greater than 6-inches above the grade surface and a minimum of 2-feet and a maximum of 6-feet behind the edge of pavement. The fire hydrant shall be installed so the steamer connection will face the street, or as directed by the fire department. 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.

3. Fire hydrant Bonnets shall be painted according to the capacity of the main to which it is attached. See chart below. The remainder of the hydrant above ground shall be painted aluminum.

8" Waterline — Blue

4. 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. Contractor shall also mark curb with "V" at location of valve.

5. Water Mains — All water mains, fittings, and valves shall meet AWWA specifications. All water lines to be C900 DR-18 (NCTCOG item 2.12.2). Minimum cover over water mains shall be 6" dia. and under, 3.5-feet, 8" dia., 4-feet, 12" dia. 4.5 feet–5 feet. DR-18 water mains to be tested at 150 psi for a continuous period of four (4) hours. Leakage rate shall not exceed 25 gallons per inch of normal diameter per mile of pipe over test period. Contractor shall flush and sterilize lines and prove lines to be free of conforms organisms by obtaining samples for laboratory tests for contamination. The Contractor shall reflush and resterilize until samples for test are free from contamination. Jetting of backfill will not be permitted.

6. All water services shall be 1" poly. Meter boxes shall comply with current City of LUCAS Standards and Specifications.

7. Contractor shall tie a 1" piece of blue plastic flagging to the water service and shall leave a minimum of 36" of flagging exposed after backfill. Contractor shall also mark pavement with "W" at location of water service.

8. Contractor shall furnish a maintenance bond to the City of LUCAS to run for two years from the date of acceptance for 10% of construction cost.

9. The source of water supply for this addition will be from the City of LUCAS.

10. Valve boxes shall be furnished and set on each gate valve. After the final clean-up and alignment has been completed, the Contractor (utility) shall pour a concrete block 6" x 18" x 18" around all valves box tops so the finished grade is level with the finished parkway.

11. Water lines shall be pressure tested and disinfected in accordance with AWWA C601.

12. Water valves deeper than 4' shall have extentions in accordance with City of LUCAS Details.

13. All embedment to be class B+ or better as detailed in the NTCOG Construction Standards.

Texas Commission on Environmental Quality
Chapter 290 — Public Drinking Water
Subchapter D: Rules And Regulations For Public Water Systems
§290.44. Water Distribution.
(e) Location of waterlines
(4) Where the nine-foot separation distance cannot be achieved, the following criteria shall apply.
(A) New waterline installation — parallel lines.
(i) Where a new potable waterline parallels an existing, non-pressure or pressure rated wastewater main or lateral and the licensed professional engineer licensed in the State of Texas is able to determine that the existing wastewater main or lateral is not leaking, the new potable waterline shall be located at least two feet above the existing wastewater main or lateral, measured vertically, and at least four feet away, measured horizontally, from the existing wastewater main or lateral. Every effort shall be exerted not to disturb the bedding and backfill of the existing wastewater main or lateral.
(ii) Where a new potable waterline parallels an existing pressure rated wastewater main or lateral and it cannot be determined by the licensed professional engineer if the existing line is leaking, the existing wastewater main or lateral shall be replaced with at least 150 psi pressure rated pipe. The new potable waterline shall be located at least two feet above the new wastewater line, measured vertically, and at least four feet away, measured horizontally, from the replaced wastewater main or lateral.
(iii) Where a new potable waterline parallels a new wastewater main, the wastewater main or lateral shall be constructed of at least 150 psi pressure rated pipe. The new potable waterline shall be located at least two feet above the wastewater main or lateral, measured vertically, and at least four feet away, measured horizontally, from the wastewater main or lateral.
(B) New waterline installation — crossing lines.
(i) Where a new potable waterline crosses an existing, non-pressure rated wastewater main or lateral, one segment of the waterline pipe shall be centered over the wastewater main or lateral such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater main or lateral. The potable waterline shall be at least two feet above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. If the existing wastewater main or lateral is disturbed or shows signs of leaking, it shall be replaced for at least nine feet in both directions (18 feet total) with at least 150 psi pressure rated pipe.
(ii) Where a new potable waterline crosses an existing, pressure rated wastewater main or lateral, one segment of the waterline pipe shall be centered over the wastewater main or lateral such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater main or lateral. The potable waterline shall be at least six inches above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. If the existing wastewater main or lateral shows signs of leaking, it shall be replaced for at least nine feet in both directions (18 feet total) with at least 150 psi pressure rated pipe.
(iii) Where a new potable waterline crosses a new, non-pressure rated wastewater main or lateral and the standard pipe segment length of the wastewater main or lateral is at least 18 feet, one segment of the waterline pipe shall be centered over the wastewater main or lateral such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the centerline of the wastewater main or lateral. The potable waterline shall be at least two feet above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. The wastewater pipe shall have a minimum pipe stiffness of 115 psi at 5.0% deflection. The wastewater main or lateral shall be embedded in cement stabilized sand (see clause (vi) of this subparagraph) for the total length of one pipe segment plus 12 inches beyond the joint on each end.
(iv) Where a new potable waterline crosses a new, non-pressure rated wastewater main or lateral and a standard length of the wastewater pipe is less than 18 feet in length, the potable water pipe segment shall be centered over the wastewater line. The materials and method of installation shall conform with one of the following options.
(I) Within nine feet horizontally of either side of the waterline, the wastewater pipe and joints shall be constructed with pipe material having a minimum pressure rating of at least 150 psi. An absolute minimum vertical separation distance of two feet shall be provided. The wastewater main or lateral shall be located below the waterline.
(II) All sections of wastewater main or lateral within nine feet horizontally of the waterline shall be encased in an 18-foot (or longer) section of pipe. Flexible encasing pipe shall have a minimum pipe stiffness of 115 psi at 5.0% deflection. The encasing pipe shall be centered on the waterline and shall be at least two nominal pipe diameters larger than the wastewater main or lateral. The space around the carrier pipe shall be supported at five-foot (or less) intervals with spacers or be filled to the springline with washed sand. Each end of the casing shall be sealed with watertight non-shrink cement grout or a manufactured watertight seal. An absolute minimum separation distance of six inches between the encasement pipe and the waterline shall be provided. The wastewater line shall be located below the waterline.
(III) When a new waterline crosses under a wastewater main or lateral, the waterline shall be encased as described for wastewater mains or laterals in subclause (II) of this clause or constructed of ductile iron or steel pipe with mechanical or welded joints as appropriate. An absolute minimum separation distance of one foot between the waterline and the wastewater main or lateral shall be provided. Both the waterline and wastewater main or lateral must pass a pressure and leakage test as specified in AWWA C600 standards.
(v) Where a new potable waterline crosses a new, pressure rated wastewater main or lateral, one segment of the waterline pipe shall be centered over the wastewater line such that the joints of the waterline pipe are equidistant and at least nine feet horizontally from the center line of the wastewater main or lateral. The potable waterline shall be at least six inches above the wastewater main or lateral. Whenever possible, the crossing shall be centered between the joints of the wastewater main or lateral. The wastewater pipe shall have a minimum pressure rating of at least 150 psi. The wastewater main or lateral shall be embedded in cement stabilized sand (see clause (vi) of this subparagraph) for the total length of one pipe segment plus 12 inches beyond the joint on each end.
(vi) Where cement stabilized sand bedding is required, the cement stabilized sand shall have a minimum of 10% cement per cubic yard of cement stabilized sand mixture, based on loose dry weight volume (at least 2.5 bags of cement per cubic yard of mixture). The cement stabilized sand bedding shall be a minimum of six inches above and four inches below the wastewater main or lateral. The use of brown coloring in cement stabilized sand for wastewater main or lateral bedding is recommended for the identification of pressure rated wastewater mains during future construction.

NOTE:

All backfill for utilities and pavement including lime stabilized subgrade to be +2% or higher of optimum moisture.

STORM WATER DISCHARGE AUTHORIZTION:

1. Contractor shall submit a Notice of Intent (NOI) to TCEQ no less than 2 days prior to commencement of construction activities. All grading activities shall conform to the Erosion Control Plan included in the approved construction plans.

2. All contractors and subcontractors providing services related to the SWPPP shall sign a Contractor Certification statement acknowledging their responsibilities as specified in the SWPPP.

3. A copy of the SWPPP, Including Contractor Certifications and any Revisions, shall be submitted to the CITY OF LUCAS Engineer and Design Engineer and filed with the construction plans, and shall be retained on-site during construction.

4. A Notice of Termination (NOT) shall be submitted to TCEQ when the site has 100% of the disturbed areas stabilized and the site no longer has storm water discharges associated with industrial activities (construction), or the NOI permittee or co-permittee no longer holds operational control of the construction.

STORM WATER POLLUTION PROTECTION PLAN:

1. This site shall be reviewed by owner or his representative weekly and after any major storm. Adjustments/repairs to the erosion control will then be made as needed.

EROSION CONTROL SPECIFICATIONS:

1. The Grading Contractor shall provide and maintain all erosion control devices in the areas indicated on the Erosion Control Plan and any other areas as directed by the Engineer.

2. The Utility Contractor shall provide and maintain all erosion control device around all openings into the storm sewer system to protect completion and as directed by the Engineer.

3. The paving Contractor shall provide and maintain all erosion control devices as indicated on the Erosion Control Plan and as directed by the Engineer.

4. Upon completion of fine grading, all street parkways shall be seeded, fertilized, and maintained by the Paving Contractor in accordance with the CITY OF LUCAS specifications.

5. The Electrical Utility, Natural Gas, Telephone, and Cable TV Contractor shall re-establish any previously established erosion control measure or device that is disturbed by their construction, including vegetative cover.

6. Site entry and exit locations shall be maintained in a condition which will prevent tracking or flowing of sediment onto public roadways. All sediment spilled, dropped, washed, or tracked into a public roadway must be removed immediately. When washing is required to remove sediment prior to entrance to a public roadway, it shall be done on an area stabilized with crushed stone which drains into an approved sediment basin. All fines imposed for tracking onto public roads shall be paid by the Contractor.

7. Temporary seeding or other methods of stabilization shall be initiated within 14 days of the last disturbance on any area of the site, unless additional construction on the area is expected within 21 days of the last disturbance.

8. Seeding for permanent vegetative cover shall be initiated upon completion of fine grading by Paving and Grading Contractor, see Final Stabilization.

9. Erosion control devices may be added or reduced in the field as directed by the Engineer.

10. INSPECTION — The Contractor shall conduct inspections of all erosion controls provided in the SWPPP at a minimum of once every 7 calendar days. When field inspection reveals an inadequacy in erosion control measures, the SWPPP shall be revised and erosion control measures shall be upgraded within 7 days.

11. MAINTENANCE — Erosion controls shall be repaired or replaced as inspection deems necessary or as directed by the Engineer. Accumulated silt at any erosion control device shall be removed when it reaches a depth of 6", and shall be distributed on site in a manner not contributing to additional siltation.

12. The Contractor is responsible for re-establishing any erosion control device which he disturbs. Each Contractor shall notify the Engineer of any deficiencies in the established erosion control measures which may lead to unauthorized discharge of storm water pollution, sedimentation, or other surface or ground water pollutants, and excessive dust or other airborne pollutants. Unauthorized pollutants include, but are not limited to, excess concrete dumping or concrete residue, paints and other overspray, solvents, greases, fuel and lube oil, pesticides, and solid waste materials.

13. FINAL STABLIZATION — Upon completion of all soil disturbing construction, all areas not paved or covered by permanent structures or equivalent permanent stabilization measures shall be stabilized with a uniform perennial vegetative cover. For termination of industrial status of the construction site, the vegetative cover must meet a minimum density of 70% as determined by the Engineer. All temporary erosion control measures must be removed.

STORM SEWER NOTES:

1. The developer will be held responsible for notifying builders and lot owner of proper driveway culvert sizes (shown on the plat) and ensuring the properly sized culvert is installed with appropriate concrete headwalls.

2. Concrete, wherever mentioned in these regulations, shall be Class A concrete as defined in TxDOT, Item 421, Concrete materials, placement methods, placement temperatures, curing, etc., shall be in accordance with TxDOT, Items 420 and 421.

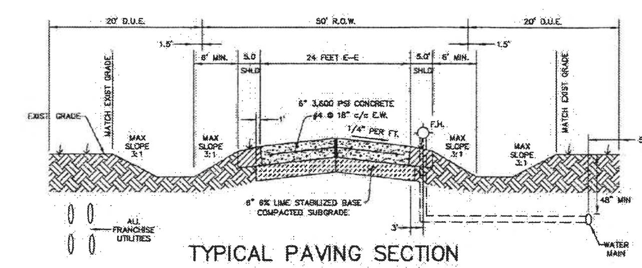
3. Pipe culverts must be reinforced concrete pipe.

4. Driveway culverts must have concrete headwalls.

5. All concrete shall have a minimum compressive strength of 3,600 psi at 28 days unless otherwise on the approved plans.

6. All reinforcing steel for concrete shall be ASTM Grade 60

7. Embedment for drainage pipe shall be incidental to pipe installation and will not be a separate pay item.



TYPICAL PAVING SECTION
(31 E-E CONCRETE STREET)

CULVERT TABLE

LOT	Q100	SIZE
1	73.0 cfs	2-2'x3' RCB
2	2.5 cfs	12"
3	4.4 cfs	15"
4	11.7 cfs	21"
5	2.8 cfs	12"
6	2.8 cfs	12"
7	2.3 cfs	12"
8	3.5 cfs	12"

BENCHMARK:
RM 133 per FEMA Panel No. 48085C0455 G (January 19, 1996)
Elev.=590.08'

Square cut on east headwall of west end of bridge at White Rock Creek & FM 1378

ENGINEERINGCONCEPTS & DESIGN, L.P.
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201 WINDCO CIR. STE 200, WYLIE, TX 75098
972-941-8400 FAX: 972-941-8401 WWW.ECDLP.COM

REVISIONS:

DRAWN: JIM | DATE: DECEMBER 02, 2015
CHECKED: TW | DATE:
PROJECT NO.: 08315
DWG FILE NAME: COVER.DWG

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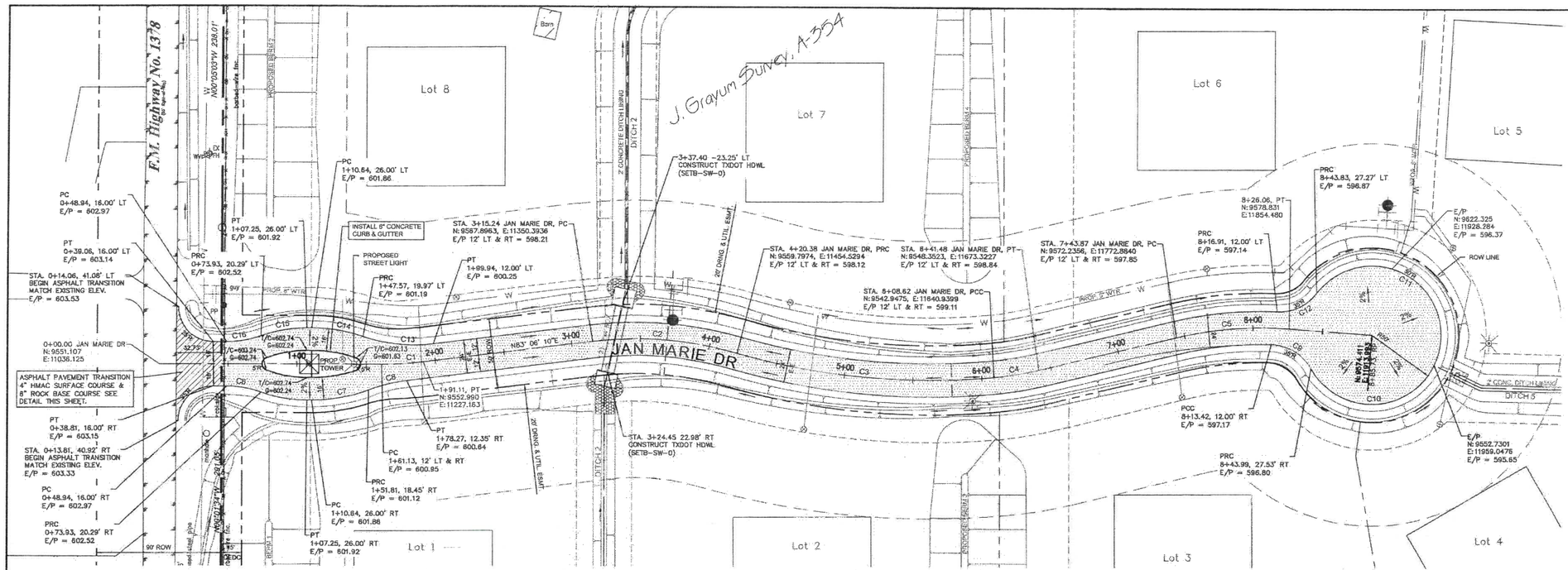
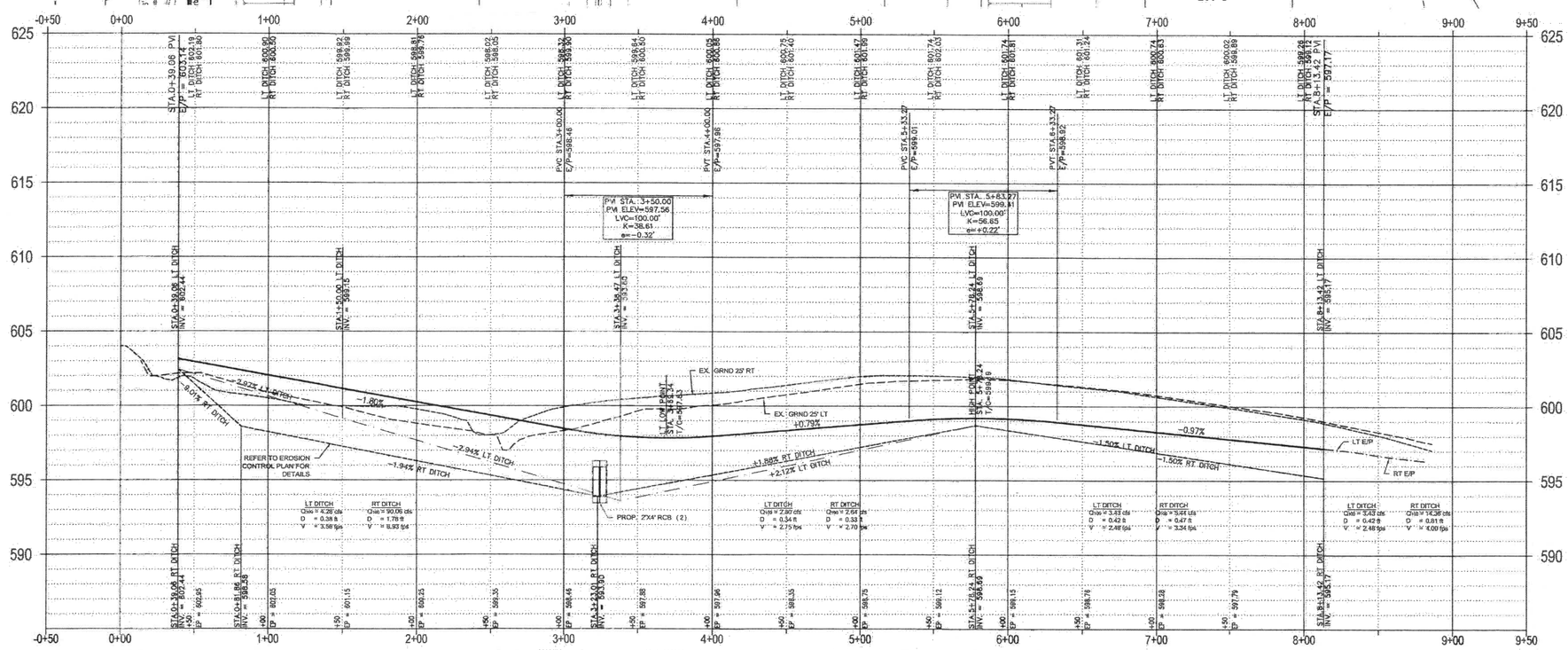
STATE OF TEXAS — TODD J. WINTERS — 87085 — REGISTERED PROFESSIONAL ENGINEER
12-2-15

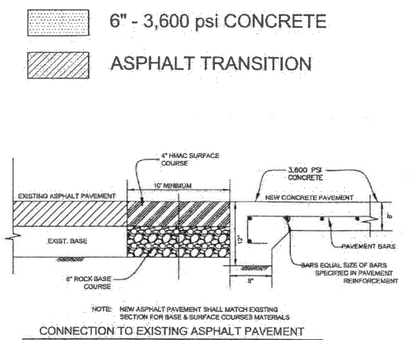
GENERAL NOTES
BARRY RANCH
CITY OF LUCAS, COLLIN COUNTY TEXAS

SHEET 03 OF 15



CURVE TABLE						
No.	Δ	RADIUS	TANGENT	LENGTH	CHORD BEARING	CHORD LENGTH
C1	6° 52' 16"	250.00'	15.01'	29.98'	N 86° 32' 18" E	29.96'
C2	22° 41' 19"	265.50'	53.27'	105.14'	S 85° 33' 10" E	104.45'
C3	21° 15' 10"	507.50'	95.22'	188.25'	S 84° 50' 06" E	187.17'
C4	8° 01' 41"	234.50'	16.46'	32.86'	N 80° 31' 28" E	32.83'
C5	17° 44' 13"	265.50'	41.43'	82.19'	N 85° 22' 44" E	81.86'
C6	19° 27' 47"	75.00'	12.86'	25.48'	S 80° 17' 41" E	25.35'
C7	20° 47' 18"	116.00'	21.28'	42.06'	N 79° 34' 47" E	41.86'
C8	13° 55' 02"	116.00'	14.16'	28.18'	N 76° 08' 39" E	28.11'
C9	59° 19' 15"	34.00'	19.36'	35.20'	S 58° 49' 11" E	33.65'
C10	125° 08' 34"	50.00'	96.34'	109.21'	N 88° 16' 09" E	88.76'
C11	166° 23' 50"	50.00'	492.12'	146.95'	S 58° 30' 03" E	99.49'
C12	54° 58' 22"	34.00'	17.69'	32.62'	N 84° 47' 13" E	31.38'
C13	25° 25' 56"	116.00'	26.18'	51.49'	S 84° 10' 52" E	51.07'
C14	18° 33' 40"	116.00'	18.98'	37.58'	S 80° 44' 44" E	37.41'
C15	19° 27' 47"	100.00'	17.15'	33.97'	N 80° 14' 33" E	33.81'
C16	19° 27' 47"	75.00'	12.86'	25.48'	N 80° 14' 33" E	25.35'





BENCHMARK:
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Elev.=590.08'

Square cut on east headwall of west end of bridge at White Rock Creek & FM 1378

ENGINEERINGCONCEPTS & DESIGN, L.P.
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REVISIONS:

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CHECKED: TW | DATE:
PROJECT NO.: 08315
DWG FILE NAME:

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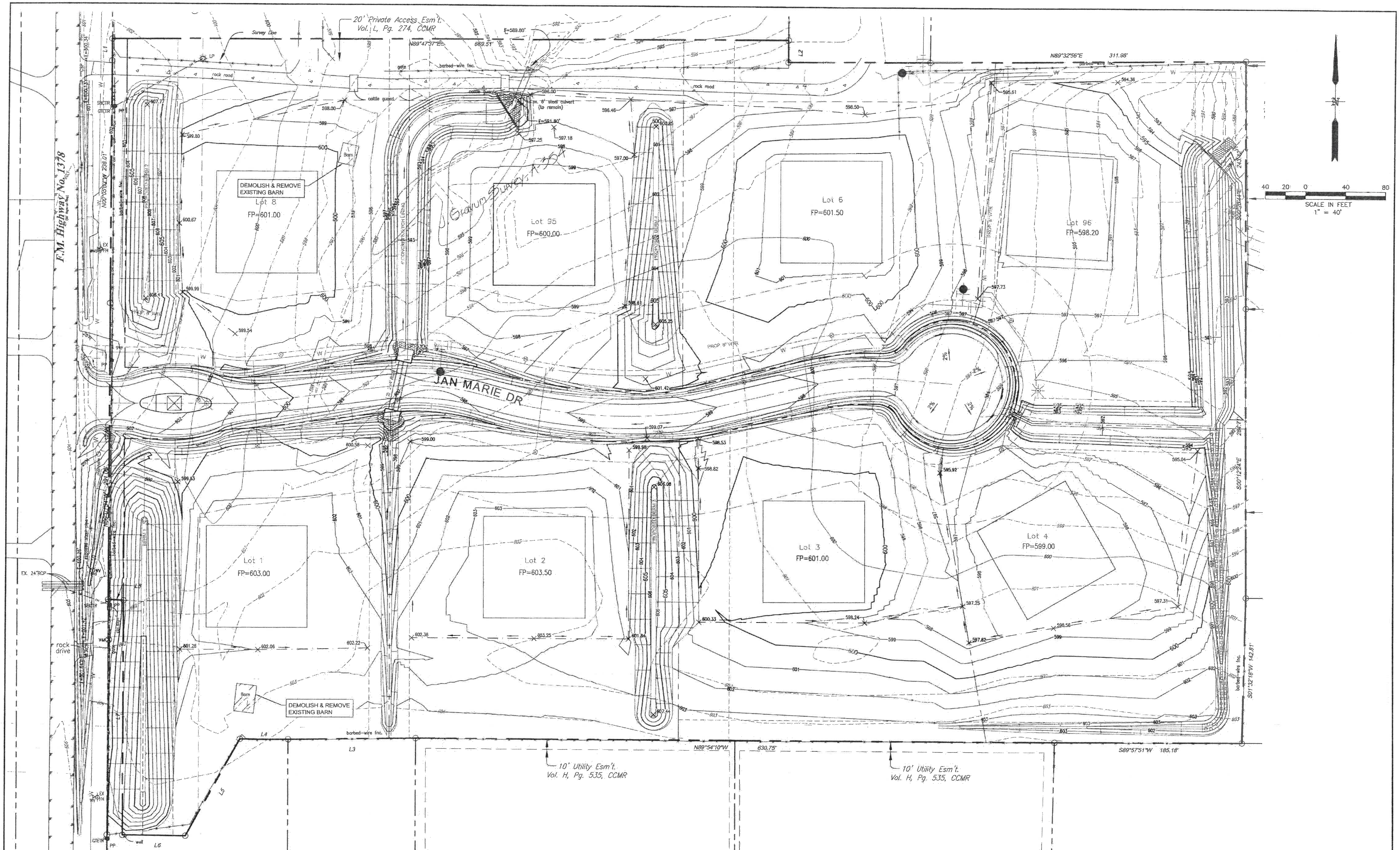
STATE OF TEXAS TODD C. WHITTERS 87085 REGISTERED PROFESSIONAL ENGINEER 12-2-15

PAVING PLAN
JAN MARIE DRIVE
BARRY RANCH
CITY OF LUCAS

SHEET 04 OF 15



BENCHMARK:
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Elev.=590.08'

Square cut on east headwall of west end of bridge at White Rock Creek & FM 1378

ENGINEERING CONCEPTS & DESIGN, L.P.

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STATE OF TEXAS — TODD D. WINTERS — 87085 — REGISTERED PROFESSIONAL ENGINEER — 12-2-15

GRADING PLAN

BARRY RANCH

CITY OF LUCAS

SHEET 05 OF 15

DITCH 2 (NORTH) DETENTION POND

DETENTION POND VOLUME CALCULATOR
MODIFIED RATIONAL METHOD
10 YEAR FREQUENCY
DETENTION REQUIRED

Area, acre 43.04

Present Conditions		Proposed Conditions	
C	[illegible]	C	0.39
Tc	[illegible]	Tc	15.00
I(100)	[illegible]	I(100)	6.60
Q(100)	85.86	Q(100)	110.78

Time	Inflow	Outflow	Storage (cf)	Tc	Intensity
5	50860	51519	-659	5	10.1
10	78557	64399	14158	10	7.8
15	99706	77278	22428	15	6.6
20	114814	90158	24655	20	5.7
30	135963	115517	20446	30	4.5
40	153085	141677	11408	40	3.8
50	166177	167436	-1259	50	3.3
60	169199	193196	-23997	60	2.9
70	182299	218955	-36656	70	2.6
80	193370	244715	-51345	80	2.4
90	199413	270474	-71061	90	2.2

DETENTION POND VOLUME CALCULATOR
MODIFIED RATIONAL METHOD
25 YEAR FREQUENCY
DETENTION REQUIRED

Area, acre 43.04

Present Conditions		Proposed Conditions	
C	[illegible]	C	0.39
Tc	[illegible]	Tc	15.00
I(100)	[illegible]	I(100)	7.70
Q(100)	100.93	Q(100)	129.25

Time	Inflow	Outflow	Storage (cf)	Tc	Intensity
5	60428	60557	-129	5	13.0
10	93664	75627	17957	10	9.3
15	116324	90836	25488	15	7.7
20	134956	105875	28931	20	6.7
30	160135	138254	23881	30	5.2
40	177256	166533	10723	40	4.4
50	193366	198821	-5455	50	3.9
60	205456	227090	-21634	60	3.4
70	218549	257368	-38830	70	3.1
80	225598	287647	-62049	80	2.8
90	235670	317926	-82256	90	2.5

DETENTION POND VOLUME CALCULATOR
MODIFIED RATIONAL METHOD
100 YEAR FREQUENCY
DETENTION REQUIRED

Area, acre 43.04

Present Conditions		Proposed Conditions	
C	0.35	C	0.39
Tc	20.00	Tc	15.00
I(100)	8.30	I(100)	9.60
Q(100)	125.03	Q(100)	161.14

Time	Inflow	Outflow	Storage (cf)	Tc	Intensity
5	75032	75019	13	5	14.9
10	116864	93773	23091	10	11.6
15	145028	112528	32500	15	9.6
20	167155	131283	35872	20	8.3
30	199413	168792	30621	30	6.6
40	221570	206301	15269	40	5.5
50	241713	243811	-2098	50	4.8
60	259841	281310	-21469	60	4.3
70	267899	318830	-50931	70	3.8
80	281898	356239	-74341	80	3.5
90	290055	393848	-103793	90	3.2

C=(26.79*0.35) +(1.13*0.35)+(1.24*0.55)+(0.65*0.55)+(0.50*0.55)+(0.81*0.55)+(0.53*0.55)+(1.69*0.55)+(1.44*0.55)+(6.61*0.35)+(1.65*0.55) / 43.04

C = 0.39

Detention Pond Volume Calculations
Ditch 2 (North Pond)

Edge of Gravel Elevation = 597.70
100yr Water Surface Elevation = 596.31
INVERT ELEVATION 591.88

Contour Elevation	Surface Area (sf)	Average Area	Cumulative Volume (cf)
591.90	10		
		99	
592.00	187		10
		2,104	
593.00	4,021		2,114
		6,335	
594.00	8,649		8,449
		9,939	
595.00	11,229		18,388
		12,745	
596.00	14,262		31,133
		15,420	
596.40	16,577	-	37,301

Outlet Structure Calculations
10 Year Discharge @ Max Water Surface

$Q_{existing}$ = 85.86 cfs

Bypass = (0.39*1.44*6.6)-(0.35*1.44*5.7) = 0.83
Q total = 85.86 - 0.83 = 85.03 cfs
Storage Elevation = 595.49
Invert = 591.88
Width = 3.75

WEIR
$Q=CL(H)^{3/2}$
C= 3.333
H= 3.61 {H = Storage elev. minus FL of weir}
L= 3.75
Q= 85.73cfs

Weir opening 3.75 feet x 3.81'@ FL 595.49

Outlet Structure Calculations
25 Year Discharge @ Max Water Surface

$Q_{existing}$ = 100.93 cfs

Bypass = (0.39*1.44*7.7)-(0.35*1.44*8.7) = 0.95
Q total = 100.93 - 0.95 = 99.98 cfs
Storage Elevation = 595.83
Invert = 591.88
Width = 3.75

WEIR
$Q=CL(H)^{3/2}$
C= 3.333
H= 3.95 {H = Storage elev. minus FL of weir}
L= 3.75
Q= 98.12cfs

Weir opening 3.75 feet x 3.95'@ FL 595.83

Outlet Structure Calculations
100 Year Discharge @ Max Water Surface

$Q_{existing}$ = 125.03 cfs

Bypass = (0.39*1.44*9.6)-(0.35*1.44*8.3) = 1.21
Q total = 125.03 - 1.21 = 123.82
Storage Elevation = 596.31
Invert = 591.88
Width = 3.75

WEIR
$Q=CL(H)^{3/2}$
C= 3.333
H= 4.43 {H = Storage elev. minus FL of weir}
L= 3.75
Q= 118.54cfs

Weir opening 3.75 feet x 4.43'@ FL 596.31

DITCH 4 DETENTION POND

DETENTION POND VOLUME CALCULATOR
MODIFIED RATIONAL METHOD
10 YEAR FREQUENCY
DETENTION REQUIRED

Area, acre 16.49

Present Conditions		Proposed Conditions	
C	0.35	C	0.45
Tc	20.00	Tc	15.00
I(100)	5.70	I(100)	6.60
Q(100)	32.90	Q(100)	48.98

Time	Inflow	Outflow	Storage (cf)	Tc	Intensity
5	23484	13759	9746	5	10.1
10	34728	24673	10055	10	7.8
15	43078	28608	14470	15	6.6
20	50756	34542	16214	20	5.7
30	60106	44412	15694	30	4.5
40	67675	54281	13394	40	3.8
50	73463	64150	9313	50	3.3
60	74799	74019	779	60	2.8
70	81032	83889	-2857	70	2.6
80	85484	93758	-8274	80	2.4
90	88156	103627	-15472	90	2.2

DETENTION POND VOLUME CALCULATOR
MODIFIED RATIONAL METHOD
25 YEAR FREQUENCY
DETENTION REQUIRED

Area, acre 16.49

Present Conditions		Proposed Conditions	
C	0.35	C	0.45
Tc	20.00	Tc	15.00
I(100)	6.70	I(100)	7.70
Q(100)	38.67	Q(100)	57.14

Time	Inflow	Outflow	Storage (cf)	Tc	Intensity
5	36714	33201	3512	5	13.0
10	41406	29002	13455	10	9.3
15	51434	34802	16632	15	7.7
20	[illegible]	[illegible]	[illegible]	20	[illegible]
30	70792	52203	18589	30	5.3
40	78360	63804	14557	40	4.4
50	84594	75409	9185	50	3.9
60	90627	87005	3622	60	3.4
70	96615	98606	-1991	70	3.1
80	99732	110207	-10475	80	2.8
90	104184	121808	-17624	90	2.6

DETENTION POND VOLUME CALCULATOR
MODIFIED RATIONAL METHOD
100 YEAR FREQUENCY
DETENTION REQUIRED

Area, acre 16.49

Present Conditions		Proposed Conditions	
C	[illegible]	C	0.45
Tc	20.00	Tc	15.00
I(100)	[illegible]	I(100)	9.60
Q(100)	47.90	Q(100)	71.24

Time	Inflow	Outflow	Storage (cf)	Tc	Intensity
5	33170	28742	4428	5	14.9
10	51647	35928	15719	10	11.6
15	64113	43113	21000	15	9.6
20	[illegible]	[illegible]	[illegible]	20	8.4
30	89136	64670	23485	30	6.6
40	97951	79031	18920	40	5.5
50	106855	93412	13443	50	4.8
60	114869	107783	7087	60	4.3
70	118431	122154	-3723	70	3.8
80	124664	136525	-11860	80	3.5
90	128226	150896	-22670	90	3.2

C = (5.05*0.35) +(3.50*0.35) +(0.57*0.55) +(1.03*0.55) +(1.69*0.55) +(2.89*0.55) +(1.76*0.55) / 16.49

C = 0.45

Detention Pond Volume Calculations
Ditch 4

100yr Water Surface Elevation = 594.00
INVERT ELEVATION 590.24

Contour Elevation	Surface Area (sf)	Average Area	Cumulative Volume (cf)
590.30	234		
		1,804	
591.00	3,375		1,804
		5,915	
592.00	8,455		7,719
		10,591	
593.00	12,728		18,310
		14,166	
594.00	15,604		32,476

Outlet Structure Calculations
10 Year Discharge @ Max Water Surface

Q = 32.90 cfs
Pass Thru = (5.05+3.50)*0.35*5.7 = 17.06cfs
Bypass = (1.76*0.55*6.6)-(0.35*1.76*5.7) = 2.88
Q total = 32.90 + 17.06 - 2.88 = 47.08cfs
Storage Elevation = 592.80
Invert = 590.24
Width = 3.50

WEIR
$Q=CL(H)^{3/2}$
C= 3.333
H= 2.56 {H = Storage elev. minus FL of weir}
L= 3.50
Q= 47.78cfs

Weir opening 3.50 feet x 2.56'@ FL 592.80

Outlet Structure Calculations
25 Year Discharge @ Max Water Surface

Q = 38.67 cfs
Pass Thru = (5.05+3.50)*0.35*6.7 = 20.05cfs
Bypass = (1.76*0.55*7.7)-(0.35*1.76*6.7) = 3.33
Q total = 38.67 + 20.05 - 3.33 = 55.39cfs
Storage Elevation = 593.05
Invert = 590.24
Width = 3.50

WEIR
$Q=CL(H)^{3/2}$
C= 3.333
H= 2.81 {H = Storage elev. minus FL of weir}
L= 3.50
Q= 54.95cfs

Weir opening 3.50 feet x 2.81'@ FL 593.05

Outlet Structure Calculations
100 Year Discharge @ Max Water Surface

Q = 47.90 cfs
Pass Thru = (5.05+3.50)*0.35*8.3 = 24.84cfs
Bypass = (1.76*0.55*9.6)-(0.35*1.76*8.3) = 4.18
Q total = 47.90 + 24.84 - 4.18 = 68.56cfs
Storage Elevation = 593.37
Invert = 590.24
Width = 3.50

WEIR
$Q=CL(H)^{3/2}$
C= 3.333
H= 3.13 {H = Storage elev. minus FL of weir}
L= 3.50
Q= 64.60cfs

Weir opening 3.50 feet x 3.13'@ FL 593.37

BENCHMARK:
RM 133 per FEMA Panel No. 48085C0455 G (January 19, 1996)
Elev.=590.08'

Square cut on east headwall of west end of bridge at White Rock Creek & FM 1378

ENGINEERING CONCEPTS & DESIGN, L.P.
ENGINEERING / PROJECT MANAGEMENT / CONSTRUCTION SERVICES - FIRM REG. #F-001145
201 WINDCO CIR, STE 200, WYLIE, TX 75098
972-941-8400 FAX: 972-941-8401 WWW.ECDLP.COM

REVISIONS:
DRAWN: JIM | DATE: DECEMBER 02, 2015
CHECKED: TW | DATE:
PROJECT NO.: 08315
DWG FILE NAME:

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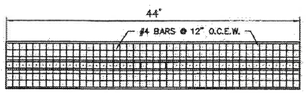
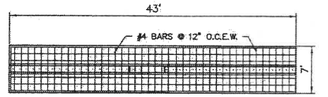
STATE OF TEXAS — TODD D. WINTTERS — 87065 — REGISTERED PROFESSIONAL ENGINEER — 12-2-15

DETENTION CALCULATIONS
BARRY RANCH
CITY OF LUCAS

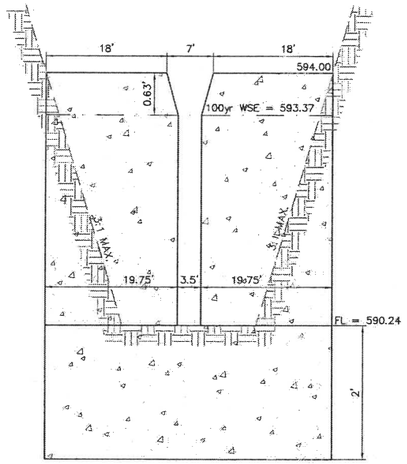
SHEET 6A OF 15

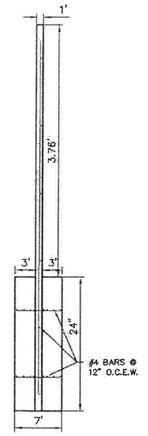


DITCH 2 (NORTH) DETENTION POND WEIR



NOTE:
CONSTRUCT WEIR WITH
3,000 psi CONCRETE





DITCH 4 DETENTION POND WEIR

BENCHMARK:
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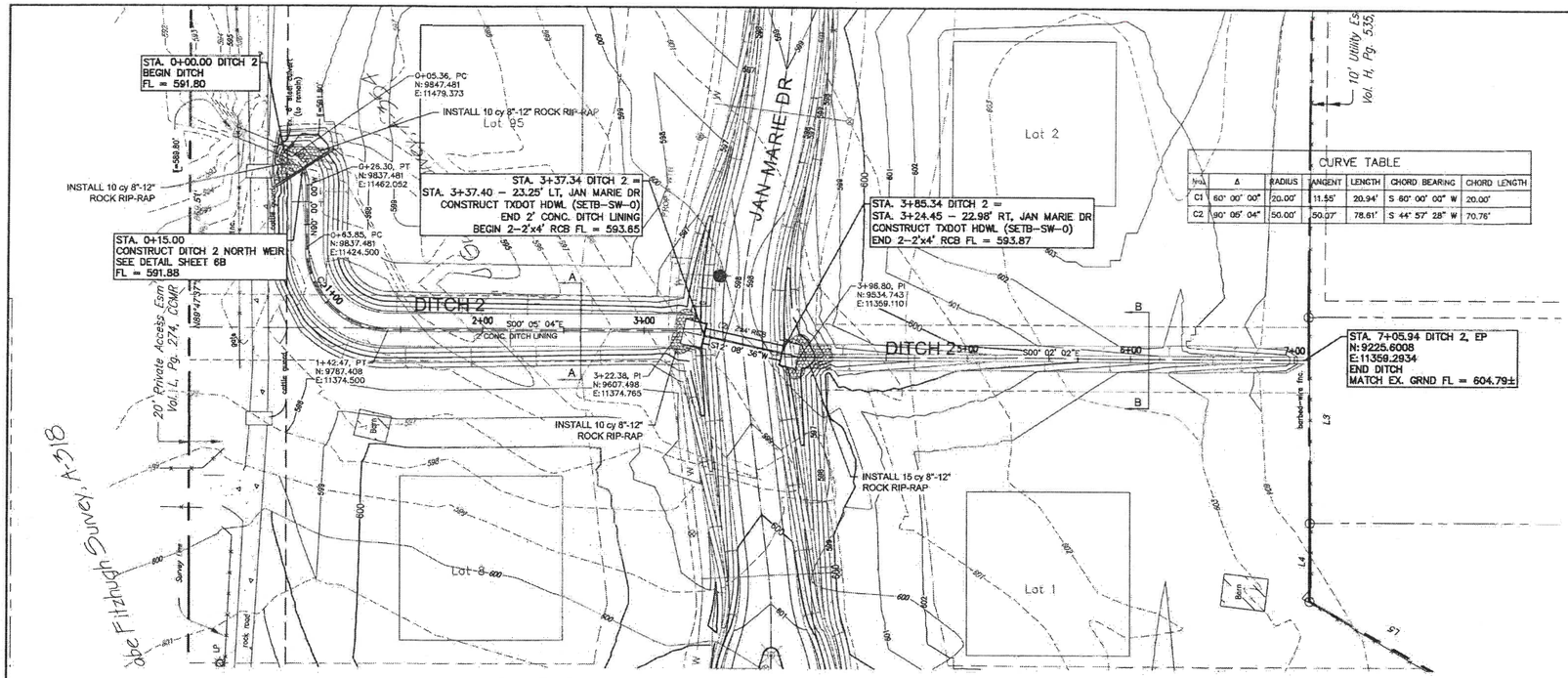
STATE OF TEXAS
TODD D. WHITTERS
87085
REGISTERED
PROFESSIONAL ENGINEER
12.2.15

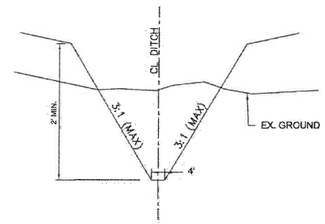
WIER DETAILS

BARRY RANCH
CITY OF LUCAS

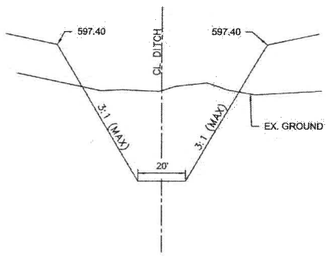
SHEET 6B OF 15



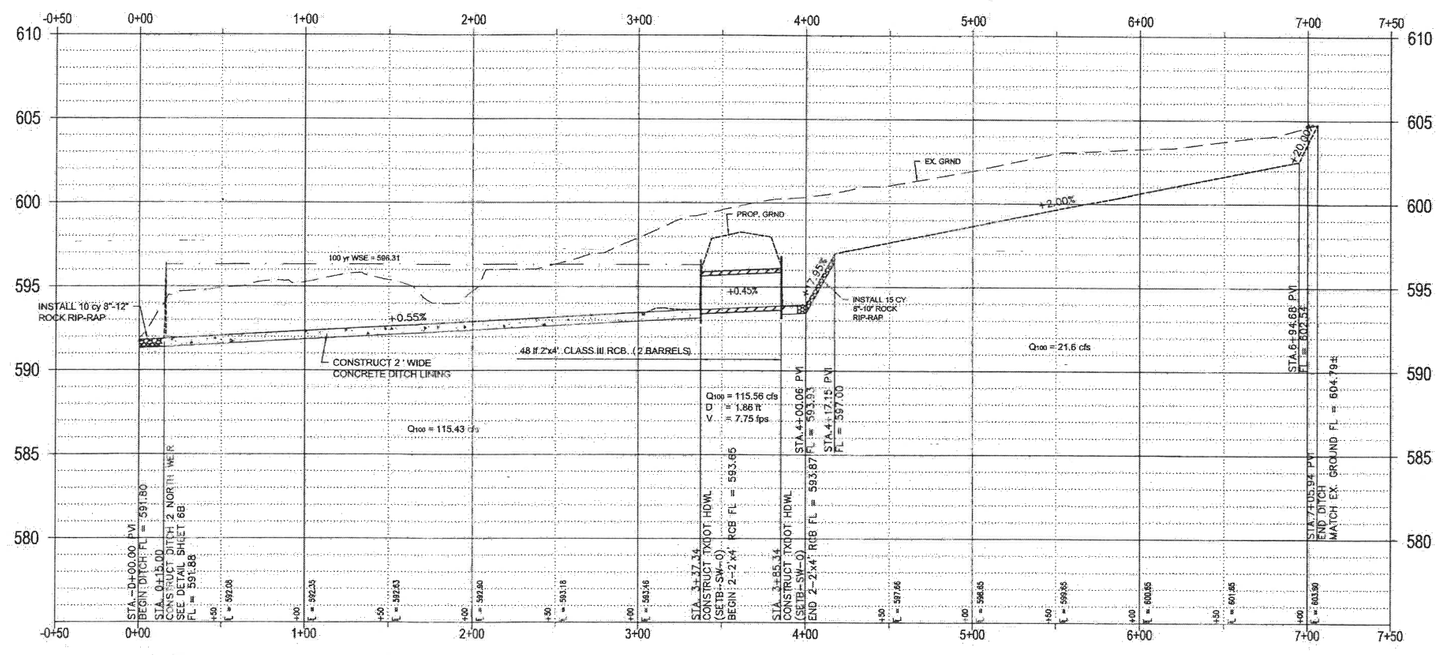
CURVE TABLE						
No.	Δ	RADIUS	TANGENT	LENGTH	CHORD BEARING	CHORD LENGTH
C1	60° 00' 00"	20.00'	11.55'	20.94'	S 60° 00' 00" W	20.00'
C2	90° 05' 04"	50.00'	50.07'	78.61'	S 44° 57' 28" W	70.76'

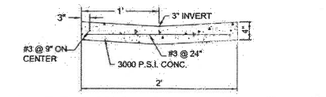


DITCH SECTION (B–B)
N.T.S.



POND SECTION (A–A)
N.T.S.





2' CONCRETE DITCH LINING (A–A)
N.T.S.

BENCHMARK:
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Elev.=590.08'

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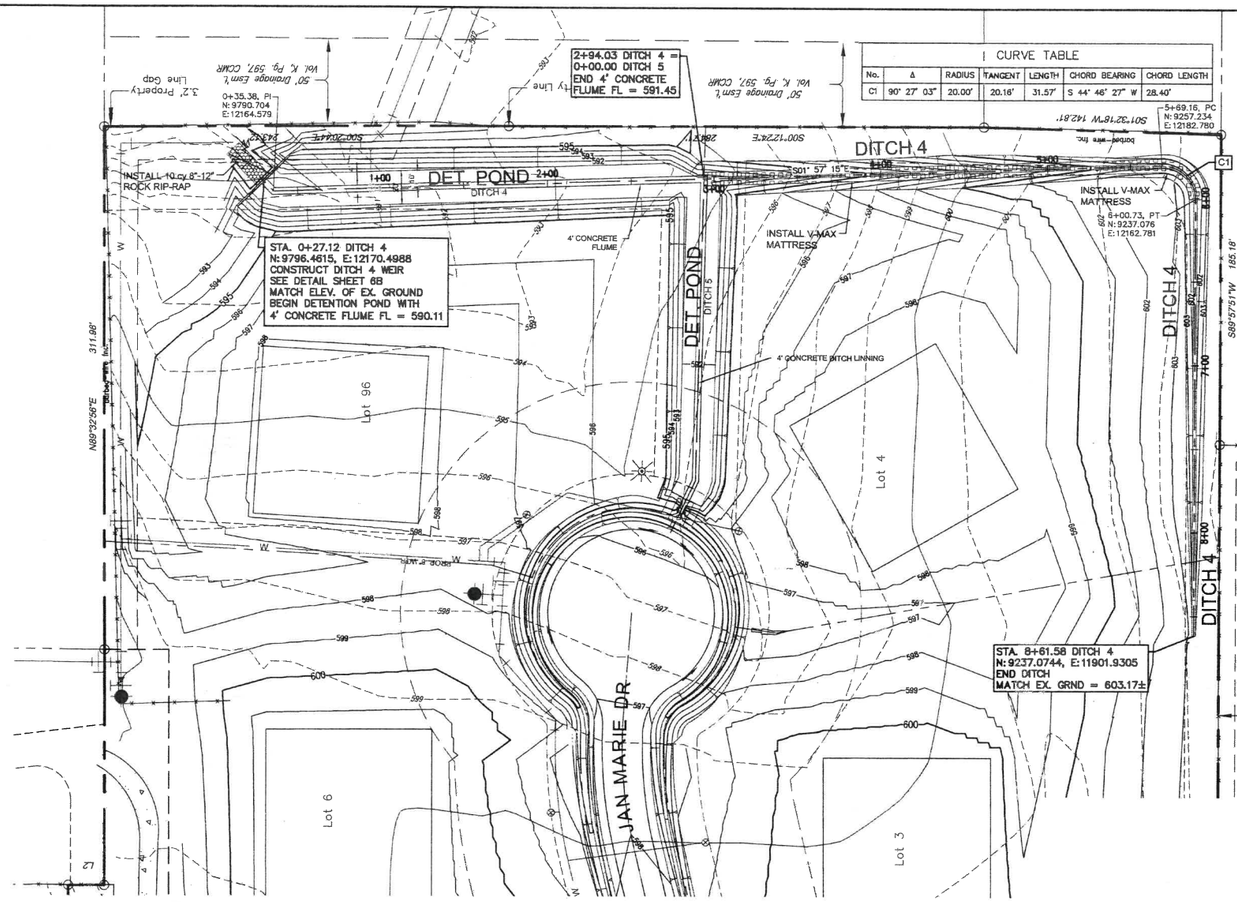
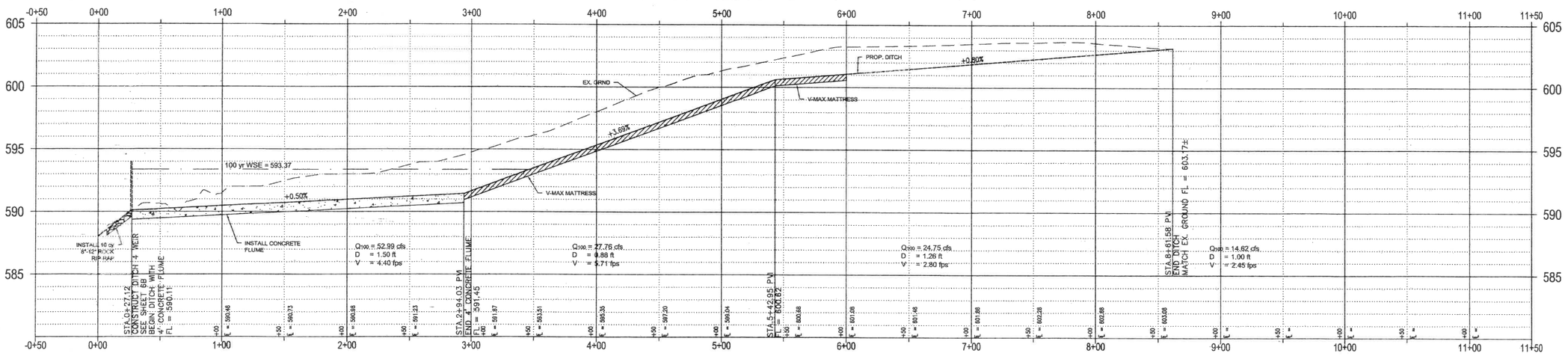
DRAINAGE PLAN & PROFILE

BARRY RANCH
CITY OF LUCAS

SHEET 07 OF 15





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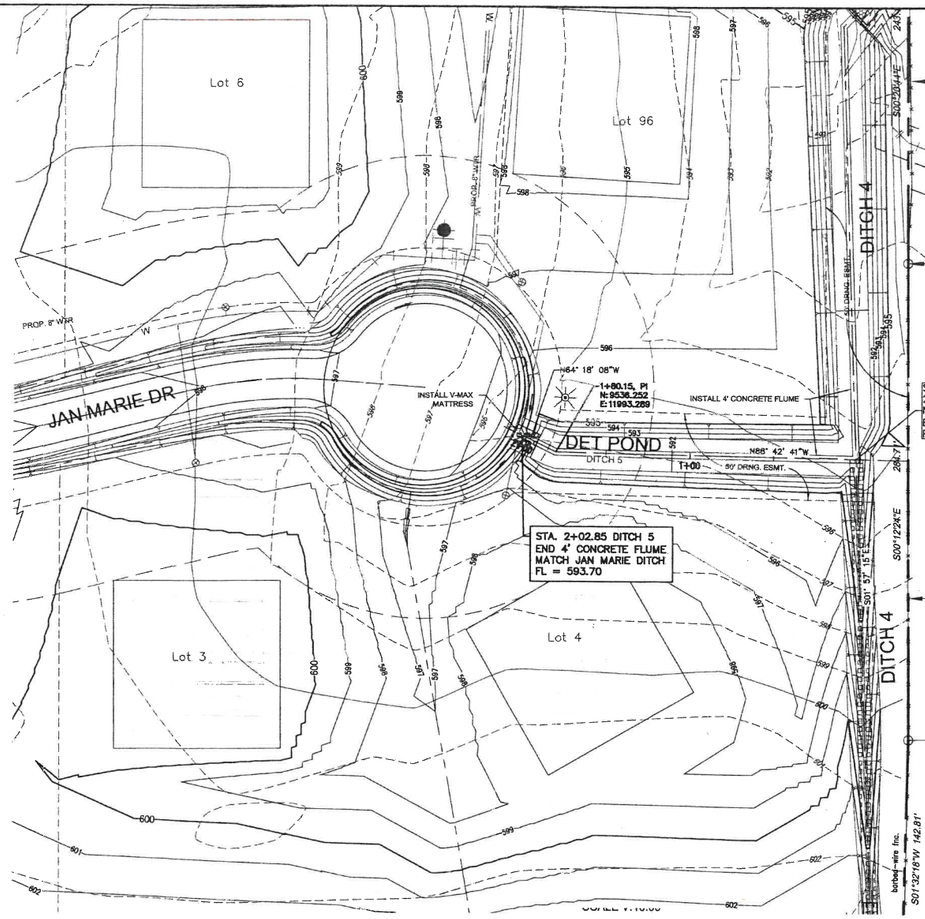
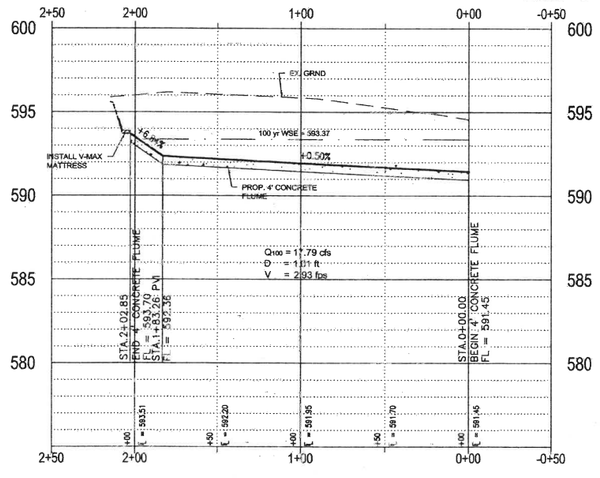
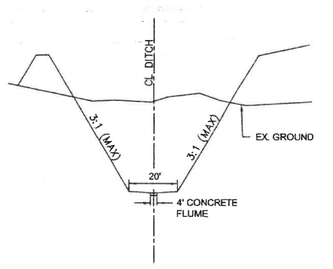
DRAINAGE PLAN & PROFILE
DITCH 4
BARRY RANCH
CITY OF LUCAS

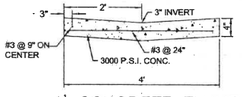
SHEET 08 OF 15







POND SECTION
N.T.S.



4' CONCRETE FLUME
N.T.S.

BENCHMARK:
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DWG FILE NAME:

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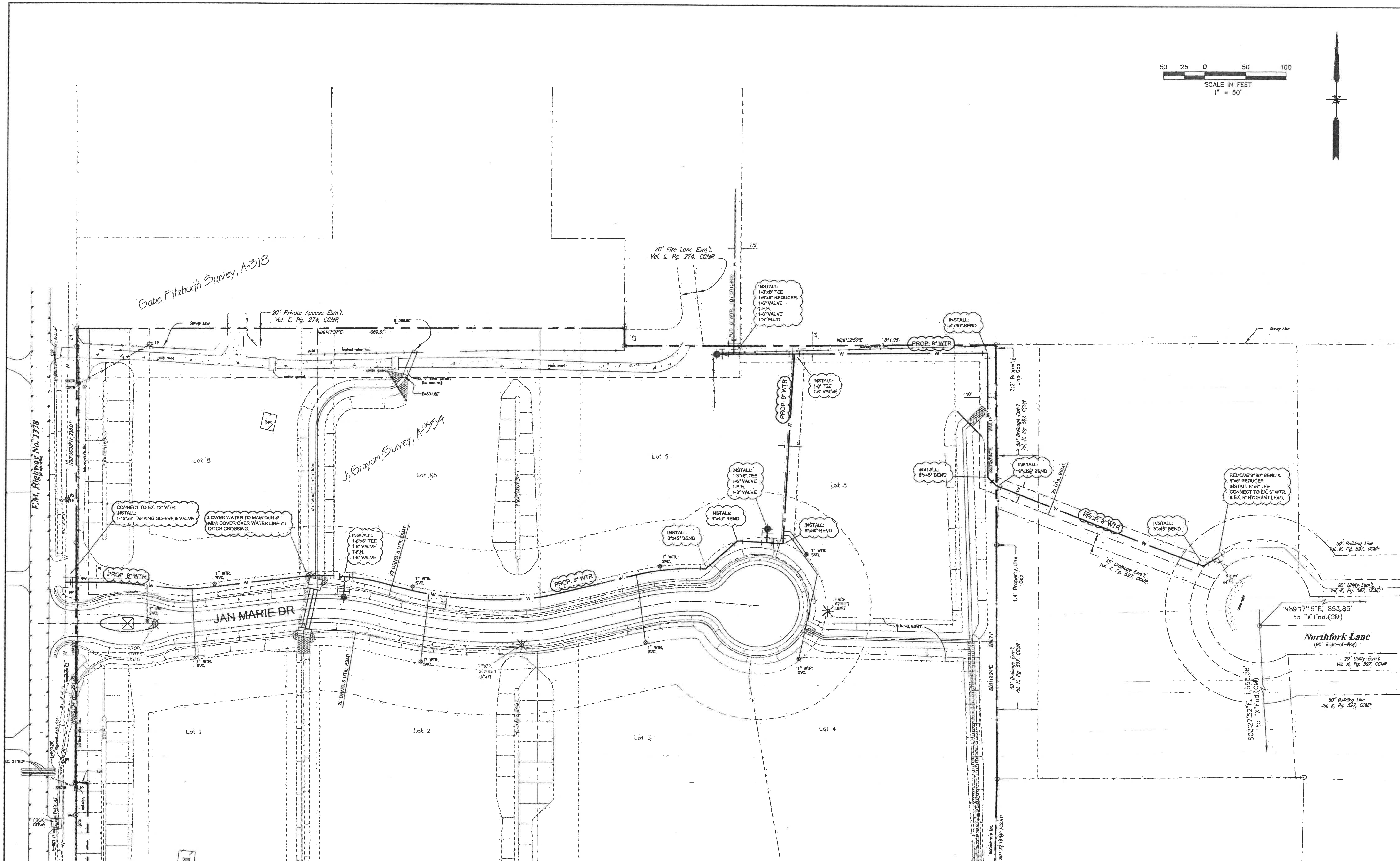
DRAINAGE PLAN & PROFILE
DITCH 5
BARRY RANCH
CITY OF LUCAS

SHEET 09 OF 15



BENCHMARK:
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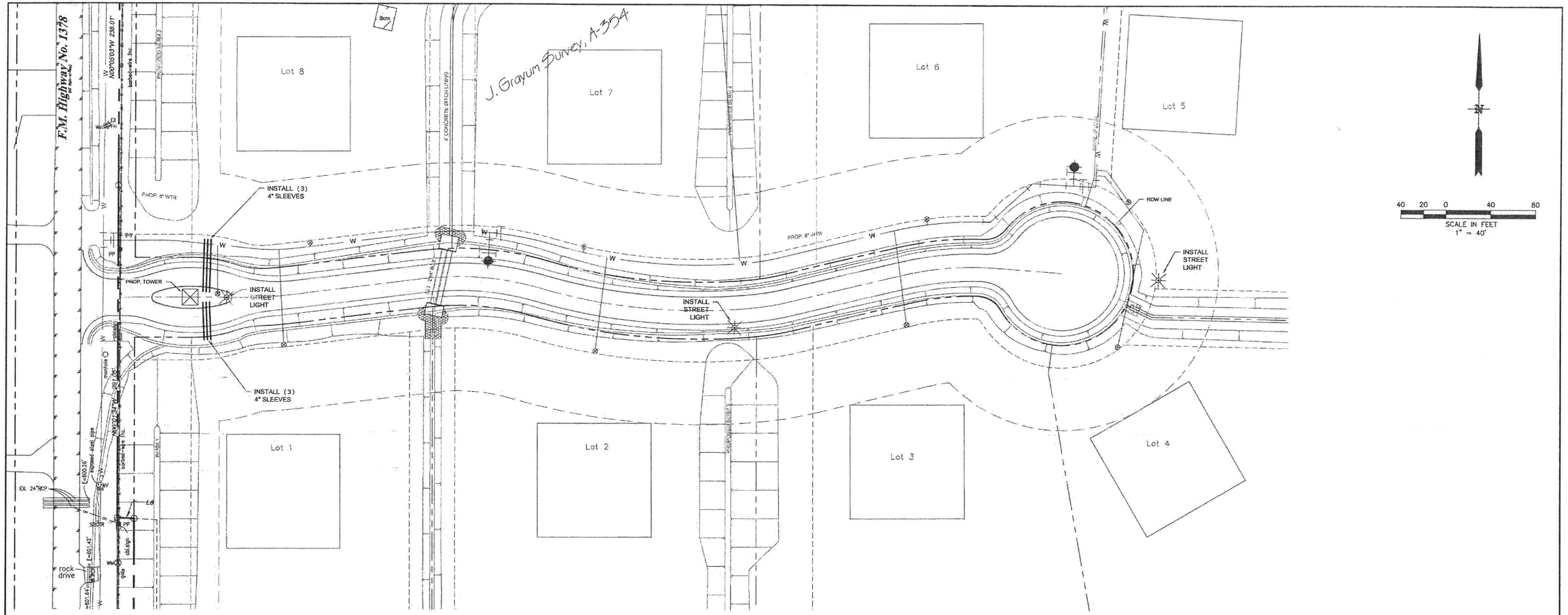
STATE OF TEXAS
TODD D. WINTERS
87085
REGISTERED PROFESSIONAL ENGINEER
12-2-15

UTILITY PLAN

BARRY RANCH

CITY OF LUCAS

SHEET 10 OF 15



BENCHMARK:
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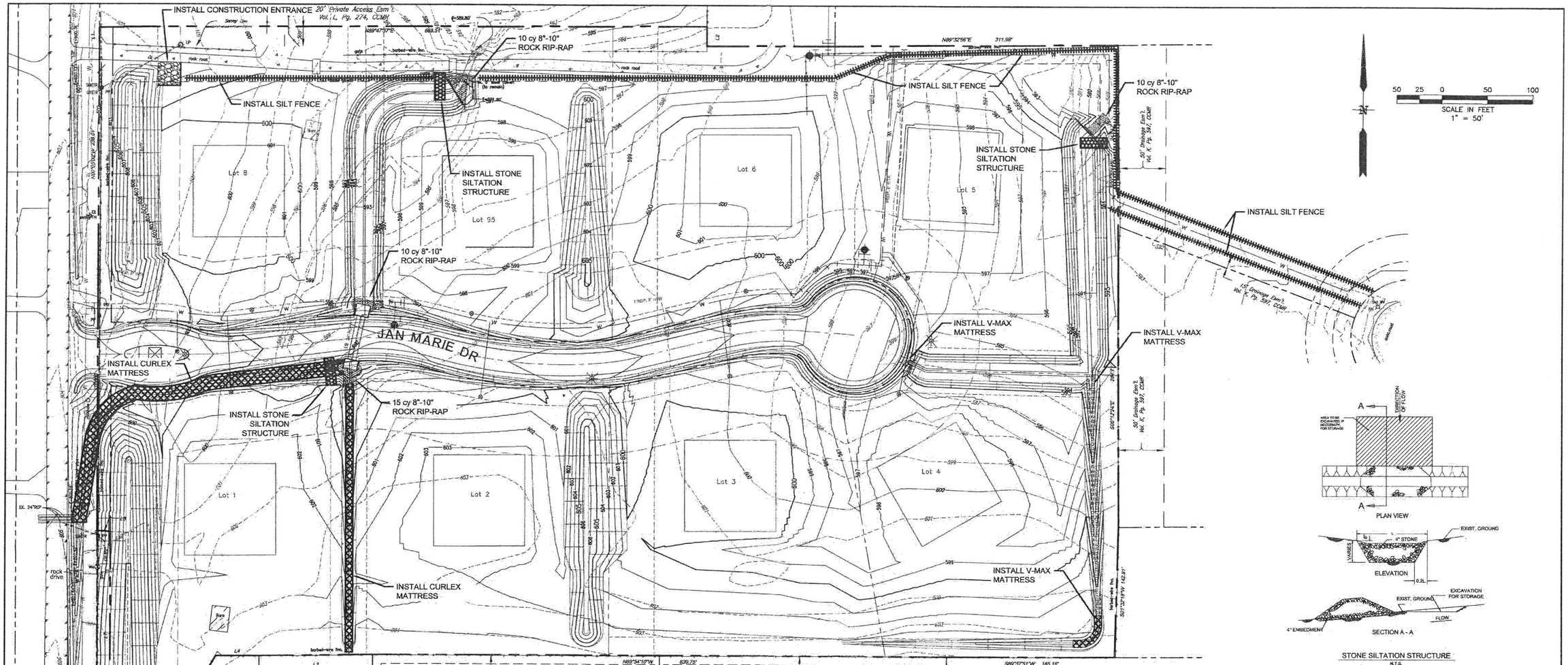
LIGHTING & SLEEVING PLAN

BARRY RANCH

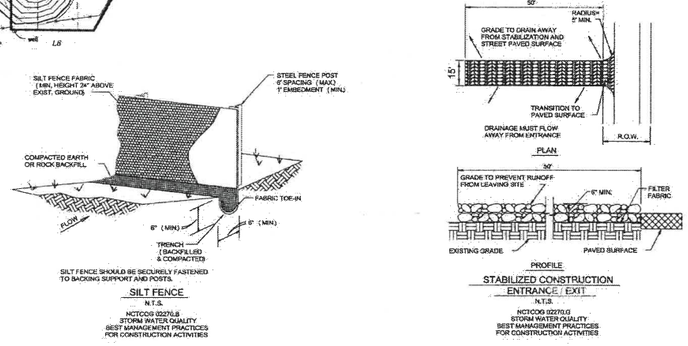
CITY OF LUCAS

SHEET 11 OF 15



STONE SILTATION STRUCTURE
N.T.S.

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



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

SILT FENCE
N.T.S.

NCTCOG (02270.8
STORM WATER QUALITY
BEST MANAGEMENT PRACTICES
FOR CONSTRUCTION ACTIVITIES

PROFILE

STABILIZED CONSTRUCTION ENTRANCE / EXIT
N.T.S.

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

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. 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.
8. 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.
9. 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.
10. 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.
11. 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 CONTRACTORS 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.
12. ALL STOCKPILED SOILS WILL BE SURROUNDED BY A SILT FENCE, SEDIMENT CONTROL SWALE, OR EQUIVALENT MEASURE TO PROPERLY CONTROL SEDIMENT RUNOFF, AS APPROVED BY THE OWNER.
13. CONTRACTOR SHALL STABILIZE ANY AREA WHERE CONSTRUCTION ACTIVITY IS TO BE TEMPORARILY OR PERMANENTLY CEASED FOR MORE THAN 14 DAYS.
14. ALL DISTURBED AREAS TO BE SEEDED AND STABILIZED UNTIL GRASS IS ESTABLISHED.
15. CONTRACTOR TO INSTALL 4' CURLEX MATTRESS ALONG EDGE OF PAVING AT COMPLETION OF PAVING ACTIVES.

LEGEND:

- CURLEX MATTRESS
- SILT FENCE
- STONE SILTATION STRUCTURE
- CONSTRUCTION ENTRANCE
- V-MAX MATTRESS

BENCHMARK:
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Elev.=590.08'

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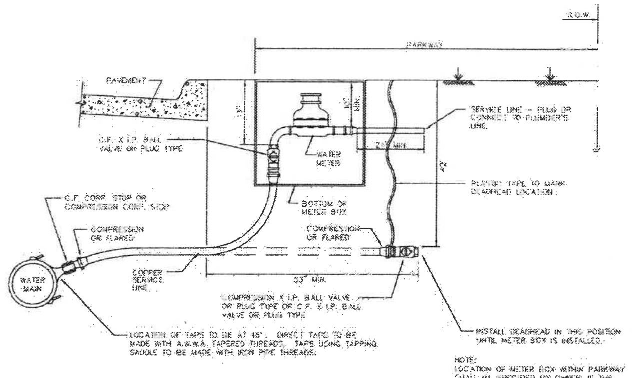
EROSION CONTROL PLAN

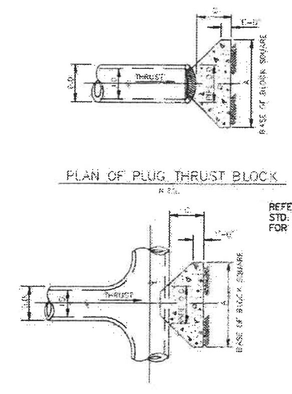
BARRY RANCH

CITY OF LUCAS

SHEET 12 OF 15



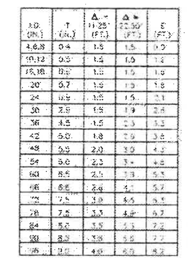
WATER SERVICE INSTALLATION
(1" LINE)

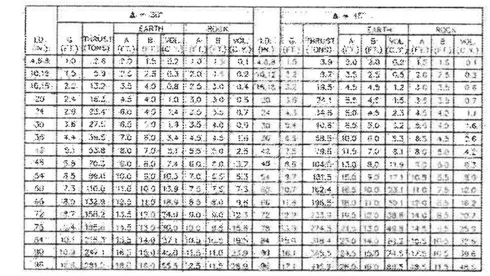


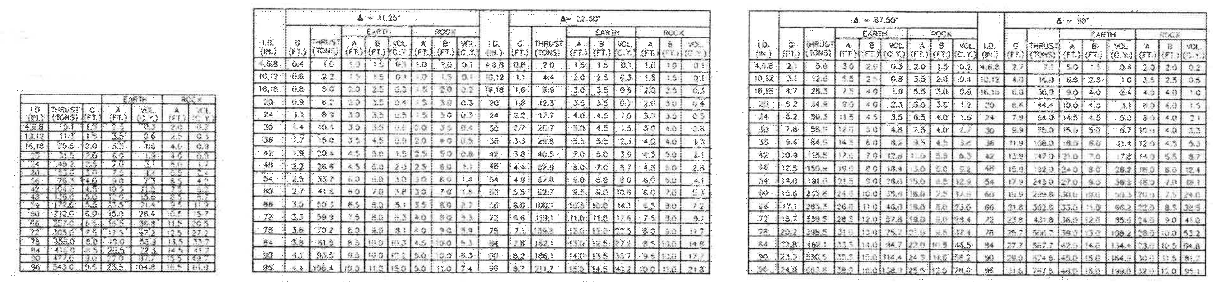
PLAN OF PLUG THRUST BLOCK
N.T.S.

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

PLAN OF TEE THRUST BLOCK
N.T.S.

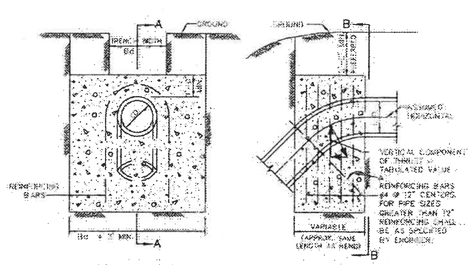


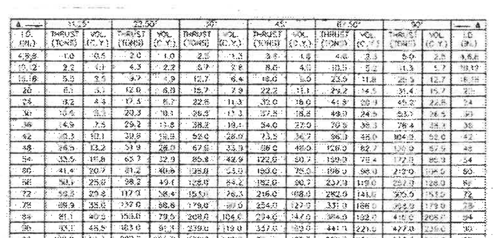




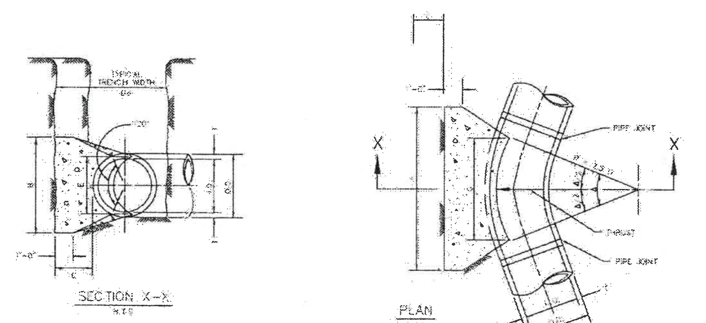
TABLES OF DIMENSIONS AND QUANTITIES

TABLES OF DIMENSIONS AND QUANTITIES





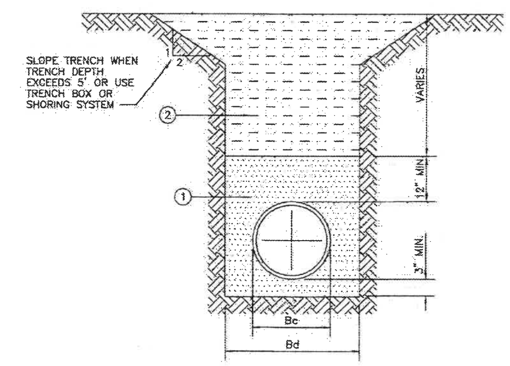
VERTICAL THRUST BLOCK
AT PIPE BEND



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

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.



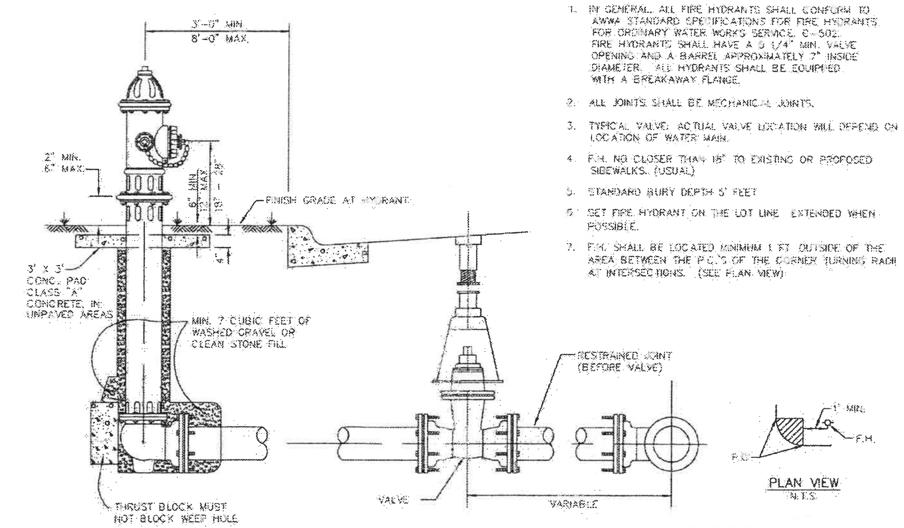
① GRANULAR MATERIAL (SAND) COMPACTED TO 95% STANDARD PROCTOR DENSITY.

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.

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+"

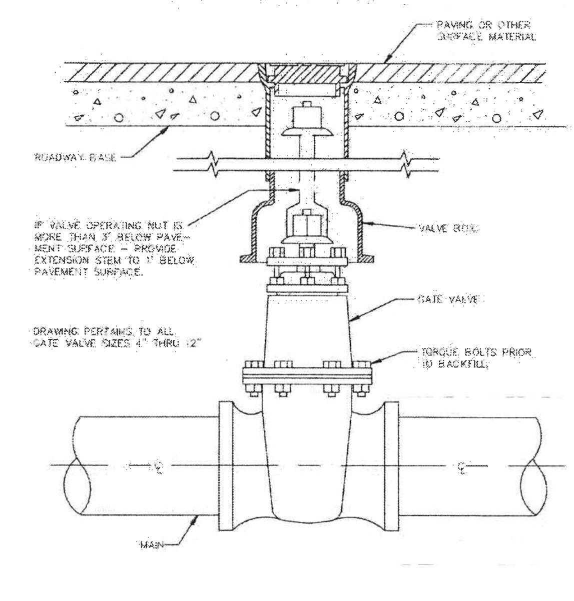


NOTES:

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)

FIRE HYDRANT
INSTALLATION

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.



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

BENCHMARK:
RM 133 per FEMA Panel No. 48085C0455 G (January 19, 1996)
Elev.=590.08'

Square cut on east headwall of west end of bridge at White Rock Creek & FM 1378

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REVISIONS:

DRAWN: JIM	DATE: DECEMBER 02, 2015
CHECKED: TW	DATE: 2-Dec-15
PROJECT NO.: 08315	
DWG FILE NAME: COVER.DWG	

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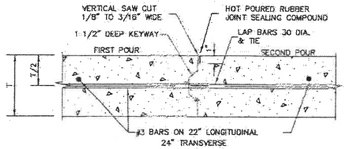
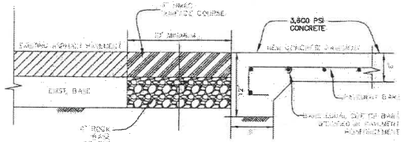
STATE OF TEXAS
TODD D. WINTTERS
87085
REGISTERED PROFESSIONAL ENGINEER
12-2-15

WATER DETAILS
BARRY RANCH
CITY OF LUCAS, COLLIN COUNTY TEXAS

SHEET 13 OF 15



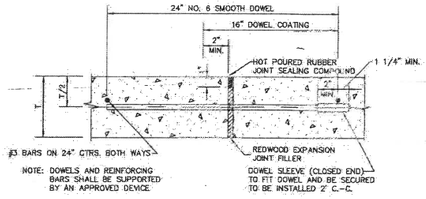
CONSTRUCTION JOINT DETAIL



NOTE: NEW ASPHALT PAVEMENT SHALL MATCH EXISTING SECTION FOR BASE & SURFACE COURSES OR EXCEED

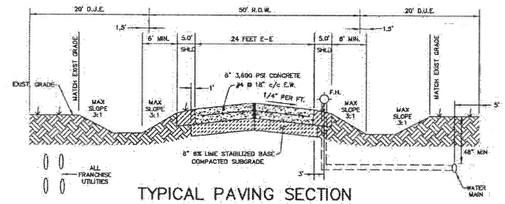
CONNECTION TO EXISTING ASPHALT PAVEMENT

N.T.S.



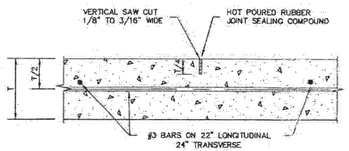
TRANSVERSE EXPANSION JOINT DETAIL

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

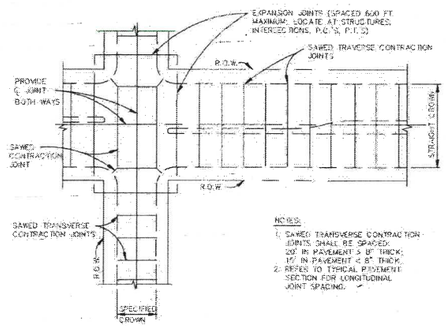


TYPICAL PAVING SECTION

(31 E-E CONCRETE STREET)

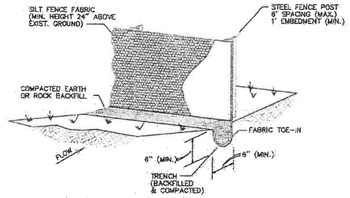


SAWED DUMMY JOINT DETAIL



SPACING DIAGRAM FOR TRANSVERSE JOINTS

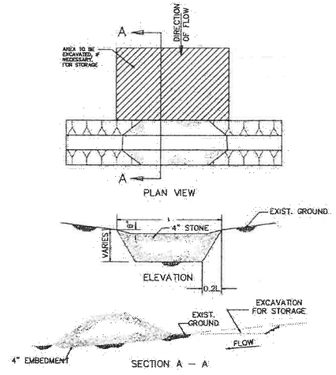
N.T.S.



SILT FENCE

N.T.S.

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



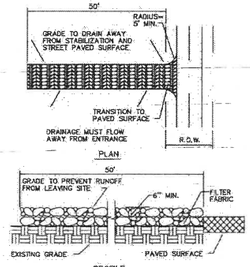
STONE SILTATION STRUCTURE

N.T.S.

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

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. 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.
8. 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.
9. 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.
10. 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.
11. 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.
12. 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.
13. CONTRACTOR SHALL STABILIZE ANY AREA WHERE CONSTRUCTION ACTIVITY IS TO BE TEMPORARILY OR PERMANENTLY CEASED FOR MORE THAN 14 DAYS.
13. ALL DISTURBED AREAS TO BE SEEDED AND STABILIZED UNTIL GRASS IS ESTABLISHED.



PROFILE

STABILIZED CONSTRUCTION ENTRANCE / EXIT

N.T.S.

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

BENCHMARK:
RM 133 per FEMA Panel No. 48085C0455 G (January 19, 1996)
Elev.=590.08'

Square cut on east headwall of west end of bridge at White Rock Creek & FM 1378

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TODD D. WINTERS
87085
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BARRY RANCH
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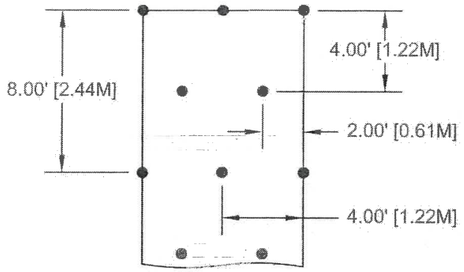
STAPLE PATTERN GUIDE
8' (2.4 M) WIDE ROLLS

PARA EL ENGRAPADO
8' (2.4 M) ROLLE ANCHO

Ⓐ

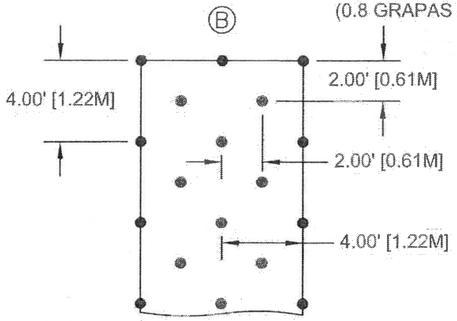


0.7 STAPLES PER SQ. YD.
(0.8 STAPLES PER SQ. M)

0.7 GRAPAS POR YD CUAD
(0.8 GRAPAS POR M CUAD)

Recommended Staples per Roll on 8 ft. (2.4 m) Wide x 112 ft. (34.14 m) Long Rolls (100 sq. yd. / 83.61 sq. m)	
PATTERN	QUANTITY
A	70
B	130
C	170
D	340
E	360

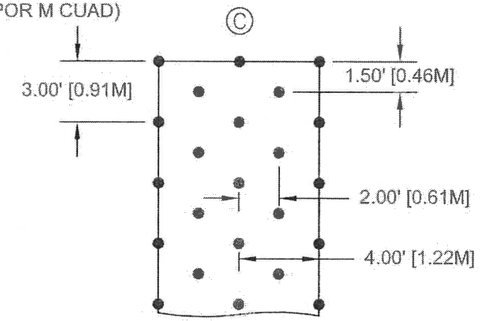
Ⓑ



1.3 STAPLES PER SQ. YD.
(1.5 STAPLES PER SQ. M)

1.3 GRAPAS POR YD CUAD
(1.5 GRAPAS POR M CUAD)

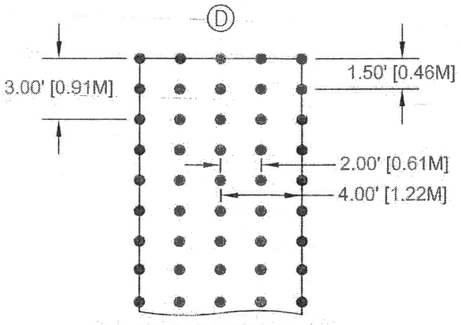
Ⓒ



1.7 STAPLES PER SQ. YD.
(2.0 STAPLES PER SQ. M)

1.7 GRAPAS POR YD CUAD
(2.0 GRAPAS POR M CUAD)

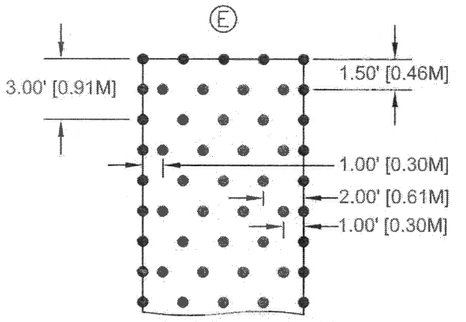
Ⓓ



3.4 STAPLES PER SQ. YD.
(4.1 STAPLES PER SQ. M)

3.4 GRAPAS POR YD CUAD
(4.1 GRAPAS POR M CUAD)

Ⓔ



3.6 STAPLES PER SQ. YD.
(4.3 STAPLES PER SQ. M)

3.6 GRAPAS POR YD CUAD
(4.3 GRAPAS POR M CUAD)

REV. 4/07

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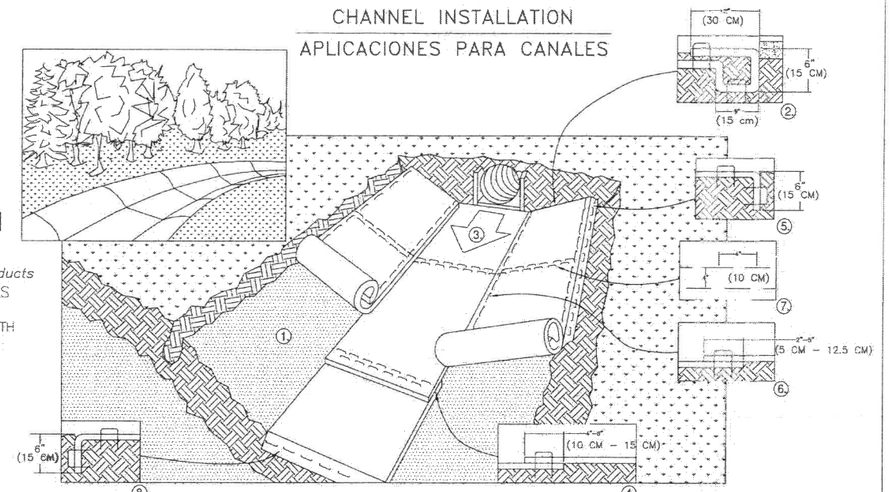
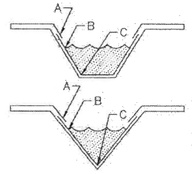
CHANNEL INSTALLATION
APLICACIONES PARA CANALES



1. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECP's), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED. NOTE: WHEN USING CELL–O–SEED DO NOT SEED PREPARED AREA. CELL–O–SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE CHANNEL BY ANCHORING THE RECP's IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH WITH APPROXIMATELY 12" (30 CM) OF RECP's EXTENDED BEYOND THE UP–SLOPE PORTION OF THE TRENCH. ANCHOR THE RECP's WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMAPCT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30 CM) PORTION OF RECP's BACK OVER SEED AND COMPACTED SOIL. SECURE RECP's OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30 CM) ACROSS THE WIDTH OF THE RECP's.
3. ROLL CENTER RECP's IN DIRECTION OF WATER FLOW IN BOTTOM OF CHANNEL. RECP's WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECP's MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING THE DOT SYSTEM™, STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. PLACE CONSECUTIVE RECP's END OVER END (SHINGLE STYLE) WITH A 4" – 6" (10 CM –15 CM) OVERLAP. USE A DOUBLE ROW OF STAPLES STAGGERED 4" (10 CM) APART AND 4" (10 CM) ON CENTER TO SECURE RECP's.
5. FULL LENGTH EDGE OF RECP's AT TOP OF SIDE SLOPES MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
6. ADJACENT RECP's MUST BE OVERLAPPED APPROXIMATELY 2" – 5" (5 CM –12.5 CM) (DEPENDING ON RECP's TYPE) AND STAPLED.
7. IN HIGH FLOW CHANNEL APPLICATIONS, A STAPLE CHECK SLOT IS RECOMMENDED AT 30 TO 40 FOOT (9 M – 12 M) INTERVALS. USE A DOUBLE ROW OF STAPLES STAGGERED 4" (10 CM) APART AND 4" (10 CM) ON CENTER OVER ENTIRE WIDTH OF THE CHANNEL.
8. THE TERMINAL END OF THE RECP's MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30 CM) APART IN A 6" (15 CM) DEEP X 6" (15 CM) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.

NOTE:
* IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15 CM) MAY BE NECESSARY TO PROPERLY ANCHOR THE RECP's.



CRITICAL POINTS
A. OVERLAPS AND SEAMS
B. PROJECTED WATER LINE
C. CHANNEL BOTTOM/SIDE SLOPE VERTICES

NOTE:
* HORIZONTAL STAPLE SPACING SHOULD BE ALTERED IF NECESSARY TO ALLOW STAPLES TO SECURE THE CRITICAL POINTS ALONG THE CHANNEL SURFACE.

** IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15 cm) MAY BE NECESSARY TO PROPERLY ANCHOR THE RECP's.

PUNTOS CRITICOS
A. TRASLAPES Y JUNTAS
B. LINEAS DE AGUA PROYECTADA
C. FONDO DEL CANAL/VERTICES DE LAS PENDIENTES LATERALES

NOTA:
* LA SEPARACION HORIZONTAL DE LAS GRAPAS SE DEBE ALTERAR SI SE NECESITA, PARA PERMITIR QUE LAS GRAPAS ASEGUREN LOS PUNTOS CRITICOS A LO LARGO DE LA SUPERFICIE DEL CANAL.

** EN CONDICIONES DE SUELO SUELTO, PUEDE QUE SE NECESITEN GRAPAS O ESTACAS DE MAS DE 6" (15 CM) DE LARGO PARA ASEGURAR LAS MANTAS CORRECTAMENTE.

1. PREPARE EL SUELO DE COLOCAR LAS MANTAS, INCLUYENDO LA APLICASION DE CAL, FERTILIZANTE SEMILLA. NOTA: CUANDO ESTE USANDO CELL–O–SEED NO SIEMBRE EL AREA PREPARADA. CELL–O–SEED TIENE QUE INSTALARSE CON EL LADO DE PAPEL HACIA ABAJO.
2. COMIENCE EN LA CABECERA DEL CANAL SUJETANDO LA MANTA EN UNA ZANJA DE 6" (15 CM) DE PROFUNDIDAD POR 6" (15 CM). DE ANCHO CON APROXIMADAMENTE 12" (30 CM) DE LA MANTA EXTENDIDA MAS ALLA DE LA PENDIENTE ALTA DE LA ZANJA. SUJETE RELLENE Y COMPACTE LA ZANJA DESPUES DEL ENGRAPE. RIEGUE LA SEMILLA EN EL SUELO COMPACTADO Y DOBLE LAS 12" (30 CM) REMANENTES DE MANTA SOBRE LA SEMILLA Y EL SUELO COMPACTADO. ASEGURE LA MANTA SOBRE EL SUELO CON UNA LINEADE GRAPAS O ESTACAS APROXIMADAMENTE 12" (30 CM) UNA DE LA OTRA A TRAVES DEL ANCHO DE LA MANTA.
3. DESENROLLE LA MANTA DEL MEDIO EN EL FONDO DEL CANAL Y EN LA DIRECCION DEL FLUJO DE AGUA CON EL LADO APROPIADO HACIA LA SUPERFICIE DEL SUELO. TODAS LAS MANTAS DEBERAN ASEGURARSE A LA SUPERFICIE DEL SUELO POR MEDIO DE GRAPAS O ESTACAS EN LUGARESAPROPIADOS TAL Y COMO SE INDICA EN EL PATRON GUIA DE ENGRAPADO. CUANDO ESTE USANDO EL DOT SYSTEM™. LAS GRAPAS O ESTACAS DEBEN COLOCARSE A TRAVES DE CADA UNO DE LOS PUNTOS CON COLOR CORRESPONDIENTES AL PATRON DE ENGRAPADO APROPIADO.
4. COLOQUE LAS MANTAS CONSECUTIVAS BORDE SOBRE BORDE (TIPO ESCALONADO) CON UN TRASLAPE DE 4" – 6" (10 CM – 15 CM). USE UNA LINEA DOBLE DE GRAPAS ESCALONADAS, SEPARADAS POR 4" (10 CM) Y CADA 4" (10 CM) SOBRE EL CENTRO PARA ASEGURAR LAS MANTAS.
5. EN EL TOPE DE LAS DOS PENDIENTES LATERALES DEL CANAL, SE DEBE SUJETAR TODO EL LARGO DE LA ORILLA DE LAS MANTAS CON UNA LINEA DE GRAPAS O ESTACAS APROXIMADAMENTE CADA 12" (30 CM) UNA DE LA OTRA EN UNA ZANJA DE 6" (15 CM) DE PROFUNDIDAD POR 6" (15 CM) DE ANCHO. RELLENE Y COMPACTE LA ZANJA DESPUES DEL ENGRAPE.
6. LAS MANTAS ADYACENTES DEBEN TRASLAPARSE APROXIMADAMENTE DE 2" – 5" (5 CM– 12.5 CM) (DEPENDIENDO DEL TIPO DE. MANTA) Y ENGRAPPARSE.
7. EN APLICACIONES PARA CANALES DE FLUJO ALTO, SE RECOMIENDA DEJAR UNA RANURA PARA EL CHEQUEO DE LAS GRAPAS A INTERVALOS DE 30 A 40 PIES (9 M – 12 M). USE UNA LINEA DOBLE DE PRAPAS ESCALONADAS, SEPARADAS POR 4" (10 CM) Y CADA 4" (10 CM) SOBRE EL CENTRO A TRAVES DE TODO EL ANCHO DEL CANAL.
8. LOS BORDES FINALES DE LAS MANTAS DEBEN SUJETARSE CON UNA LINEA DE GRAPAS O ESTACAS APROXIMADAMENTE CADA 12" 30 CM) UNA DE LA OTRA EN UNA ZANJA DE 6" (15 CM) DE PROFUNDIDAD POR 6" (15 CM) DE ANCHO. RELLENE Y COMPACTE DESPUES DEL ENGRAPADO.

NOTA:
* EN CONDICIONES DE SUELTO, PUEDE QUE SE NECESITEN GRAPAS O ESTACAS DE MAS DE 6" (15 CM) DE LARGO PARA ASEGURAR LAS MANTAS CORRECTAMENTE.

REV. 01/05

NOTE:
CONTRACTOR TO INSTALL (C–350) V–MAX MATTRESS USING STAPLE PATTERN "B" UNLESS OTHERWISE NOTED.

V-MAX MATTRESS DETAILS

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

LEVELS DISPLAYED | ACC:

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

Maximum Wingwall Height Hw (9)	W	X	Y	Z	Variable Reinforcing Bars J1 Size	Bars J1 Spa	Bars J2 Size	Bars J2 Spa	Estimated (3) Quantities per ft of wing length (2~Wings) 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

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

TABLE OF ESTIMATED ANCHOR TOEWALL QUANTITIES

Bar	Size	No.	Spa
K	#4	~	1'-0"
N	#5	6	~
OL	#4	6	~
Reinf (Lb/Ft)			9.82
Conc (CY/Ft)			0.074

(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: 3:1, 4:1, & 6:1. Slope shall be 3:1 or flatter.

(5) When shown elsewhere on the plans, a 5" deep concrete riprap shall be constructed. Payment for riprap shall be as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, construction joints or grooved joints, oriented in the direction of flow, and 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.

(6) At Contractor's option, Culvert Toewall may be ended flush with Wingwall Toewall. Adjust reinforcing from that shown as necessary.

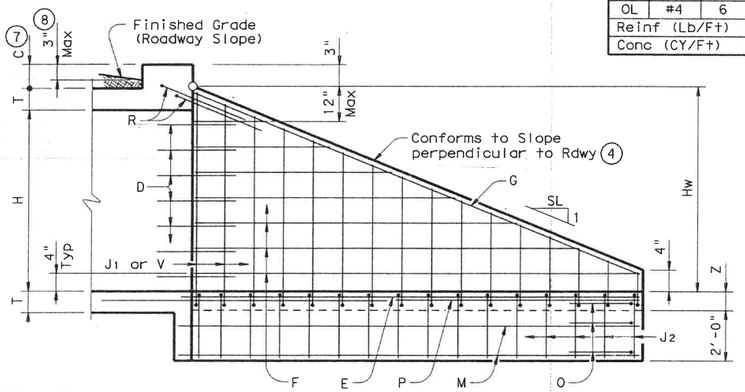
(7) 3" min to 5'-0" max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to ECD standard.

(8) 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.

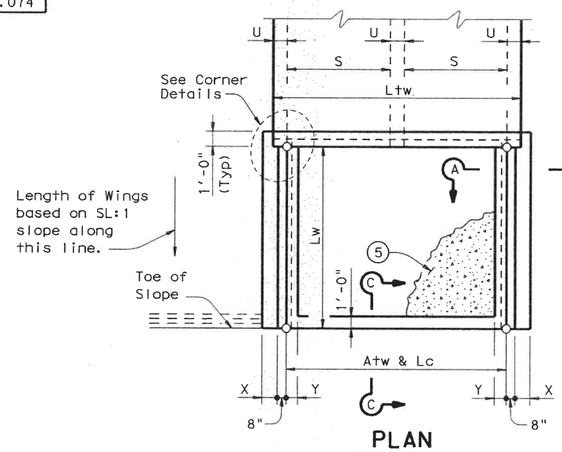
(9) See "Table Of Maximum Wing Heights" for various slopes. Height is limited based on a 33'-6" maximum safety pipe runner length.

TABLE OF MAXIMUM (9) WING HEIGHTS (Hw max)

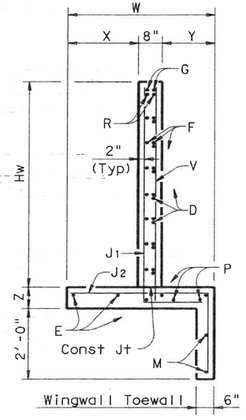
Side Slope	Hw max
3:1	11'- 5"
4:1	8'-10"
6:1	6'- 1"



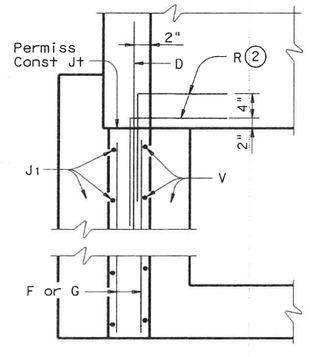
INSIDE ELEVATION OF WINGWALL
(Showing reinforcing. Culvert and Culvert Toewall reinforcing not shown for clarity.)



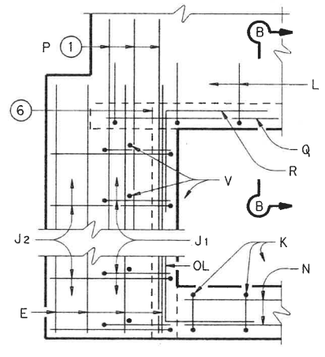
PLAN
(Showing Dimensions)



SECTION A-A

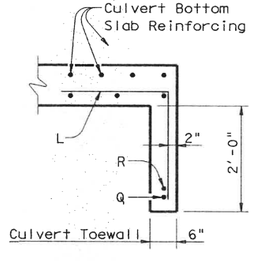


WINGWALL

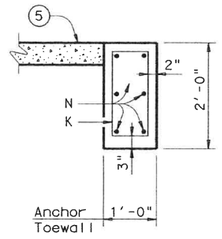


FOOTING AND TOEWALL

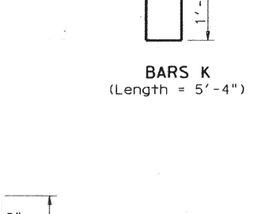
CORNER DETAILS
(Culvert and Culvert Toewall reinforcing not shown for clarity.)



SECTION B-B (5)



SECTION C-C



WING DIMENSION CALCULATIONS:

Formulas: (All values are in Feet)
Hw = H + T + C - 0.250' (9)
Lw = (Hw - 0.333') (SL)

For Cast-in-place culverts:
Ltw = (N) (S) + (N + 1) (U)
For Precast culverts:
Ltw = (N) (2U + S) + (N - 1) (0.500')

Lc = (Ltw) - (2U)
Atw = Lc
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
Lc = Culvert Curb between Wings
Atw = Anchor Toewall Length
N = Number of Culvert Spans

See applicable box culvert standard for H, S, T, and U values. See Table of Maximum Wall Heights for limits on Hw.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

The 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 Pipe Runners.

Pipe Runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

All reinforcing steel shall be Grade 60.

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

All concrete shall be Class "C" and shall have a minimum 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.

All bolts, nuts, washers, brackets, angles, and pipe runners are considered parts of the Safety End Treatment for payment.

Pipe Runners 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. Steel plates shall conform to ASTM A36. All steel components, except reinforcing, shall be galvanized. Galvanizing damaged during transport or construction shall be repaired in accordance with the specifications.

The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for Contractor's information only.

SHEET 1 OF 3

Texas Department of Transportation
Bridge Division

SAFETY END TREATMENT WITH STRAIGHT WINGS

FOR 0° SKEW BOX CULVERTS TYPE I ~ CROSS DRAINAGE

SETB-SW-0

FILE: setbs0se.dgn	DN: CAF	CK: CAT	DW: JRP	CK: GAF
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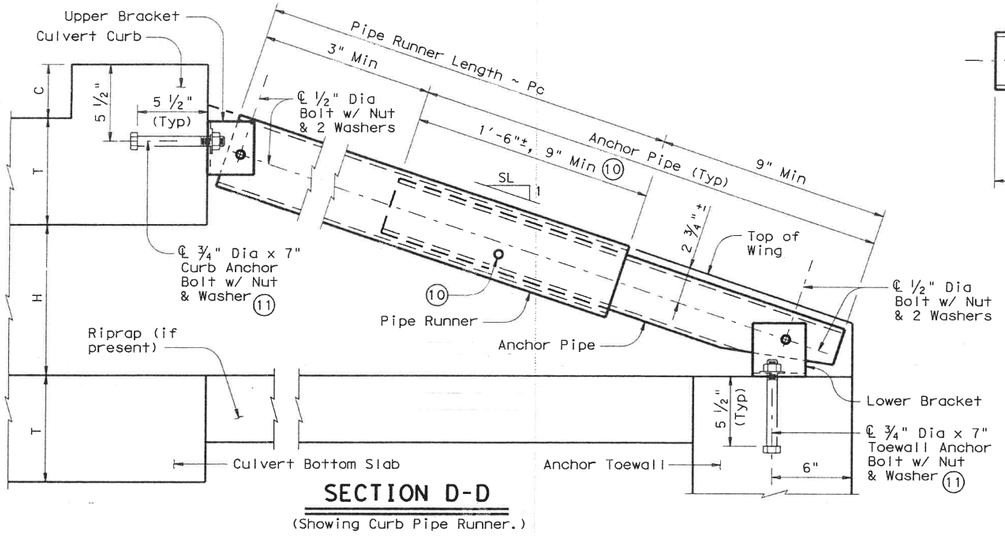
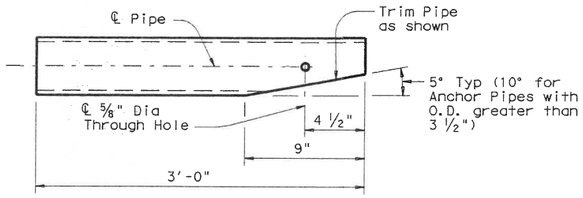
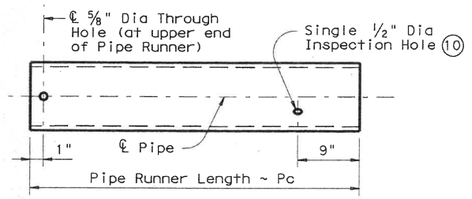
REVISIONS				
11-10: Add note for synthetic fibers.	COUNTY		CONTROL SECT	JOB HIGHWAY



SECTION D-D
(Showing Curb Pipe Runner.)



ANCHOR PIPE DETAILS



PIPE RUNNER DETAILS

MAXIMUM PIPE RUNNER LENGTHS & REQUIRED PIPE RUNNER AND ANCHOR PIPE SIZES

Maximum Pipe Runner Length (Pc)	Required Pipe Runner Size			Required Anchor Pipe Size		
	Pipe Size	Pipe O.D.	Pipe I.D.	Pipe Size	Pipe O.D.	Pipe I.D.
9'-4"	3" STD	3.500"	3.068"	2" STD	2.375"	2.067"
19'-0"	4" STD	4.500"	4.026"	3" STD	3.500"	3.068"
33'-6"	5" STD	5.563"	5.047"	4" STD	4.500"	4.026"

(10) After installation of Pipe Runner, the ½" inspection hole shall be utilized to ensure that the lap of the Anchor Pipe with the Pipe Runner is adequate.

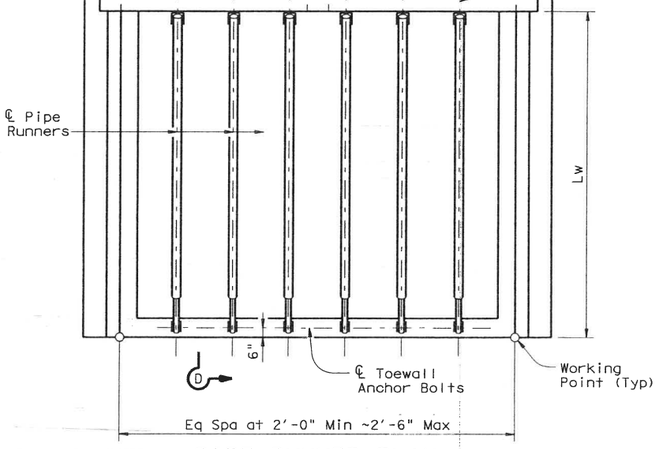
(11) At Contractor's option, an epoxy anchorage system may be used. Anchorage system chosen must be able to achieve an ultimate tensile resistance of 20 kips. Anchor diameter shall be ¾". The Contractor must provide evidence to the Engineer that this can be achieved. Evidence of adequate tensile resistance can be based on the manufacturer's published values of ultimate tensile strength (anchor spacing and edge distance must be accounted for). Anchor installation, including hole size, drilling, and clean-out, must be in accordance with the manufacturer's recommendations.

PIPE RUNNER DIMENSION CALCULATIONS:

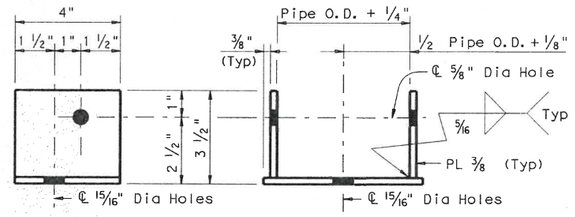
Formulas:
Pc = (Lw) (K) - (1.688)

Pc = Pipe Runner Length
K = Constant Values for use in formulas

Slope SL:1	K
3:1	~ 1.054
4:1	~ 1.031
6:1	~ 1.014



PIPE RUNNER PLAN



SIDE VIEW ELEVATION

Note: Upper and Lower Brackets shall match the required pipe diameters as shown in the table.

UPPER & LOWER BRACKET DETAILS

Texas Department of Transportation
Bridge Division

SAFETY END TREATMENT WITH STRAIGHT WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-SW-0

FILE: setbs0se.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
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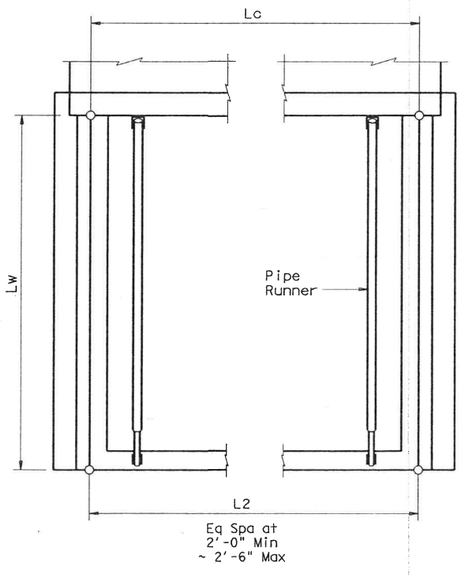
REVISIONS				
11-10: Add note for synthetic fibers.	COUNTY	CONTROL	SECT	JOB	HIGHWAY

LEVELS DISPLAYED
ACC:
1

Culvert Station and/or Creek name followed by applicable end (Lt, Rt or Both) (12)	Lc	L2			Pipe Runner (Pc)				3'-0" Anchor Pipe	
	(Ft)	No. Spa	Spa at (Ft)	Overall Length (Ft)	No.	Length (Ft)	Size (3",4" or 5")	Total Length (Ft) (12)	Size (2",3" or 4")	Total Length (Ft) (12)

(12) Quantities shown are for one structure end if Lt or Rt. Quantities shown are for two structure ends if Both.



PIPE RUNNER LAYOUT

SPECIAL NOTE:

This tabular sheet is to be filled out by the culvert specifier and provides information for the construction details and quantities of Pipe Runners.

An Excel 97 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet shall be signed, sealed, and dated by a licensed Professional Engineer.

Note that the tabular quantities are given for estimating purposes only. It is likely that these quantities will change due to field conditions. Therefore, all dimensions shall be verified by the Contractor in the field prior to fabrication of the Safety End Treatment components.

LEVELS DISPLAYED

ACC:

1

SHEET 3 OF 3

Texas Department of Transportation
Bridge Division

SAFETY END TREATMENT WITH STRAIGHT WINGS

FOR 0° SKEW BOX CULVERTS TYPE I ~ CROSS DRAINAGE

SETB-SW-0

FILE: setbs0se.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: GAF
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REVISIONS				
11-10: Add note for synthetic fibers.	COUNTY	CONTROL	SECT	JOB	HIGHWAY