COLLIN COUNTY, TEXAS

ADDENDUM No. One (1) IFB NO. 2013-271

INVITATION FOR BIDS
FOR

CONSTRUCTION, BRIDGE: COUNTY ROAD 419 OVER BRINLEE CREEK

DATE: November 7, 2013

NOTICE TO ALL PROSPECTIVE BIDDERS:

YOU ARE HEREBY DIRECTED TO MAKE CHANGES TO THE INVITATION FOR BIDS IN ACCORDANCE WITH THE ATTACHED INFORMATION.

ADD: Mandatory Pre-Bid Sign-In form

ADD: Questions and Answers from Pre-Bid Meeting

ADD: Questions and Answers from Bidsync

ADD: Geotech Report

DELETE: Plan Sheet Cover Page
REPLACE WITH: Plan Sheet Cover Page (dated 11/6/13)

DELETE: Plan Sheet 9, Roadway Plan & Profile
REPLACE WITH: Plan Sheet 9, Roadway Plan & Profile (dated 11/6/13)

ADD: Plan Sheet 9A, Water Crossing Fence Detail

DELETE: Plan Sheet 12
REPLACE WITH: Plan Sheet 12 (TxDOT April 1997)

DELETE: Plan Sheet 2
REPLACE WITH: Plan Sheet 2 (dated 11/6/2013)

DELETE: Bid Schedule
REPLACE WITH: Addendum 1 Bid Schedule

PLEASE NOTE ALL OTHER TERMS, CONDITIONS, SPECIFICATIONS DRAWINGS, ETC. REMAIN UNCHANGED.

SINCERELY,
MICHALYN RAINS, CPPO, CPPB
PURCHASING AGENT

MANDATORY PRE-BID MEETING SIGN-IN SHEET

Project:	IFB 2013-271, Construction, Bridge: CR 419 over Brinlee Creek	**Meeting Date:**	November 5, 2013
Facilitator:	Matt Dobecka, CPPB Collin County Purchasing	**Place/Room:**	Commissioners' Courtroom

Name	Company	Phone	E-Mail
Will Mee	McMahon Contracting	972-263-6907	will@mcmahoncontracting.com
MARK GAINES	Rebcon Inc	972-444-8230	estimating@rebcon.com
Jake O'Brien	Ed Bell Construction Comp.	469-261-1813	estimating@ebcc.com
Chris Kumnick	Iowa Bridge + Culvert	940 440 0099	estimating@ibctx.com
Sam Taj	Medtronixsolutions USA LLC	469-767-9645	usallcms@gmail.com
Juan Yanez	Hwy19Con LLC	903 243 4187	Juan@highway19construction.com
LARRY KENNON	ASHLAR CONTRACTING Co	972 540 5000	LARRY_ASHLAR@YAHOO.COM

MANDATORY PRE-BID MEETING SIGN-IN SHEET

Project:	IFB 2013-271, Construction, Bridge: CR 419 over Brinlee Creek	**Meeting Date:**	November 5, 2013
Facilitator:	Matt Dobecka, CPPB Collin County Purchasing	**Place/Room:**	Commissioners' Courtroom

Name	Company	Phone	E-Mail
Chip Fisher	2L Construction LLC	940-433-2670	chip@2lconstruction.com
Rob STARR	MASSANA Construction	469-647-0007	Starrr@massanaconstruction.com

Question: Is there a drill shaft required for the bridge abutment (labeled wingwall in plans)?

Response: No, per table A on TxDOT Abutments standard (sheet 17) the Tx40 girder at a 2:1 header slope is a cantilevered wingwall. No drill shafts are required.

Question: Is the removal of the existing pavement subsidiary to prep ROW or will a bid item be added?

Response: A bid item will be added for the removal of existing pavement.

Question: Clarify Bedding Material (6”), specifically is there an underlayment.

Response: Item is spec’d to TxDOT Specification Item 432. For protection stone riprap, provide Type 2 filter fabric in accordance with DMS-6200.

Question and Answers for Bid #2013-271 - Construction, Bridge: County Road 419 over Brinlee Creek

OVERALL BID QUESTIONS

Question 1
What is the engineers estimate for this scope of work? **(Submitted: Oct 25, 2013 12:25:18 PM CDT)**
Answer

- $242,000 **(Answered: Oct 29, 2013 2:14:42 PM CDT)**

Question 2
Sheets 9, 15, 48, 49 & 50 shows a need for excavation and embankment. The quantity for these items are not determined in the plans and there are no bid items for them. Will embankment and excavation be added to the bid items? **(Submitted: Oct 28, 2013 10:24:22 AM CDT)**
Answer

- Excavation and Embankment quantities area accounted for and are noted in the estimated quantities on sheet 2. **(Answered: Oct 29, 2013 2:14:42 PM CDT)**

Question 3
Sheet 2 and 16 do not have a bid item for approach slabs but sheets 15 and 20 indicates that approach slabs are included. Will a bid item be added for them? **(Submitted: Oct 28, 2013 11:44:16 AM CDT)**
Answer

- Bid Item will be added for approach slab. **(Answered: Oct 29, 2013 2:14:42 PM CDT)**

Question 4
There is no bid item for prime coat over the flex base. Is it required? **(Submitted: Oct 29, 2013 8:34:34 AM CDT)**
Answer

- Prime Coat was not specified for this job. **(Answered: Oct 29, 2013 2:14:42 PM CDT)**

Question 5
Is epoxy coated reinforcing steel required for any part of the bridge? **(Submitted: Oct 29, 2013 8:35:43 AM CDT)**
Answer

- No epoxy coated rebar used in the bridge. **(Answered: Oct 29, 2013 2:14:41 PM CDT)**

Question 6
Is there a boring log that shows underground conditions for this job? **(Submitted: Nov 1, 2013 8:02:43 AM CDT)**
Answer

- Boring log will be issued in Addendum One. **(Answered: Nov 4, 2013 2:01:12 PM CST)**

Question 7
I don't see how 25 cy of embankment can be enough material to rebuild the slopes of the roadway as shown on sheets 9, 48, 49 & 50. Is this quantity correct? **(Submitted: Nov 1, 2013 8:07:28 AM CDT)**
Answer

- There will be 850 CY of excavation from the roadway channel for the grading of the bridge. We determined this material to be sufficient to rebuild the side slopes of the proposed roadway. **(Answered: Nov 4, 2013 2:01:12 PM CST)**

Question 8
Page 8 of the construction agreement 2.1 reference a different job. **(Submitted: Nov 6, 2013 2:11:51 PM CST)**
Answer

- Thanks, I'll get it changed. **(Answered: Nov 6, 2013 2:29:50 PM CST)**

Print Close

GEOTECHNICAL ENGINEERING STUDY
BRIDGE REPLACEMENT
C.R. 419
ANNA, COLLIN COUNTY, TEXAS

Presented To:

Dannenbaum Engineering Corporation

July 2012

PROJECT NO. 830-12-22

CMJ ENGINEERING, INC.

7636 Pebble Drive
Fort Worth, Texas 76118
www.cmjengr.com

July 14, 2012
Report No. 830-12-22

Dannenbaum Engineering Corporation
4141 Blue Lake Circle, Suite 240
Dallas, Texas 75244

Attn: Mr. Danny Everett, P.E.

GEOTECHNICAL ENGINEERING STUDY
BRIDGE REPLACEMENT
C.R. 419
ANNA, COLLIN COUNTY, TEXAS

Dear Mr. Everett:

Submitted here are the results of the geotechnical engineering services for the referenced project. This study was performed in general accordance with CMJ Estimate 12-3710 dated January 9, 2012. The geotechnical services were authorized by Mr. Danny Everett, P.E. June 6, 2012.

Engineering analyses and recommendations are contained in the text section of the report. Results of our field and laboratory services are included in the appendix of the report. We would appreciate the opportunity to be considered for providing the materials engineering and geotechnical observation services during the construction phase of this project.

We appreciate the opportunity to be of service Dannenbaum Engineering Corporation. Please contact us if you have any questions or if we may be of further service at this time.

Respectfully submitted,
CMJ ENGINEERING, INC.
TEXAS FIRM REGISTRATION NO. F-9177

STATE OF TEXAS
JAMES P. SAPPINGTON, IV
97402
LICENSED
PROFESSIONAL ENGINEER
7-14-12

James P. Sappington IV, P.E.
Project Engineer
Texas No. 97402

copies submitted: (2) Mr. Danny Everett, P.E.; Dannenbaum Engineering Corporation (by mail)
(1) Mr. Danny Everett, P.E.; Dannenbaum Engineering Corporation (by e-mail)

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Plate

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1.0 INTRODUCTION

1.1 General

This report presents the results of a geotechnical engineering study for the proposed bridge replacement along County Road 419, approximately 0.3 mile south of FM 455 and 0.1 mile north of La Paloma Drive in Anna, Collin County, Texas. Structural loads are anticipated to be moderate to heavy. Plate A.1, Plan of Borings, depicts the approximate location of exploration borings.

1.2 Purpose and Scope

The purpose of this geotechnical engineering study has been to determine the general subsurface conditions, evaluate the engineering characteristics of the subsurface materials encountered, provide recommendations for bridge foundations, and provide earthwork recommendations.

To accomplish its intended purposes, the study has been conducted in the following phases: (1) drilling sample borings to determine the general subsurface conditions and to obtain samples for testing; (2) performing laboratory tests on appropriate samples to determine pertinent engineering properties of the subsurface materials; and (3) performing engineering analyses, using the field and laboratory data to develop geotechnical recommendations for the proposed construction.

The design is currently in progress and the locations and/or elevations of the structure could change. The recommendations contained in this report are based on data supplied by Dannenbaum Engineering Corporation. Once the final design is near completion (80-percent to 90-percent stage), it is recommended that CMJ Engineering, Inc. be retained to review those portions of the construction documents pertaining to the geotechnical recommendations, as a means to determine that our recommendations have been interpreted as intended.

1.3 Report Format

The text of the report is contained in Sections 1 through 7. All plates and large tables are contained in Appendix A. The alpha-numeric plate and table numbers identify the appendix in which they appear. Small tables of less than one page in length may appear in the body of the text and are numbered according to the section in which they occur.

Units used in the report are based on the English system and may include tons per square foot (tsf), kips (1 kip = 1,000 pounds), kips per square foot (ksf), pounds per square foot (psf), pounds per cubic foot (pcf), and pounds per square inch (psi).

2.0 FIELD EXPLORATION AND LABORATORY TESTING

2.1 Field Exploration

Subsurface materials at the project site were explored by two vertical soil borings. Borings B-1 and B-2 were drilled to a depth of 50 feet below existing grade. The borings were drilled using continuous flight augers at the approximate locations shown on the Plan of Borings, Plate A.1. The boring logs are included on Plates A.4 and A.5 and keys to classifications and symbols used on the logs are provided on Plates A.2 and A.3.

Undisturbed samples of cohesive soils were obtained with nominal 3-inch diameter thin-walled (Shelby) tube samplers at the locations shown on the logs of borings. The Shelby tube sampler consists of a thin-walled steel tube with a sharp cutting edge connected to a head equipped with a ball valve threaded for rod connection. The tube is pushed into the soil by the hydraulic pulldown of the drilling rig. The soil specimens were extruded from the tube in the field, logged, tested for consistency with a hand penetrometer, sealed, and packaged to limit loss of moisture.

The consistency of cohesive soil samples was evaluated in the field using a calibrated hand penetrometer. In this test a 0.25-inch diameter piston is pushed into the relatively undisturbed sample at a constant rate to a depth of 0.25 inch. The results of these tests, in tsf, are tabulated at respective sample depths on the logs. When the capacity of the penetrometer is exceeded, the value is tabulated as 4.5+.

To evaluate the relative density and consistency of the harder formations, a modified version of the Texas Cone Penetration test was performed at selected locations. Texas Department of Transportation (TXDOT) Test Method Tex-132-E specifies driving a 3-inch diameter cone with a 170-pound hammer freely falling 24 inches. This results in 340 foot-pounds of energy for each blow. This method was modified by utilizing a 140-pound hammer freely falling 30 inches. This results in 350 foot-pounds of energy for each hammer blow. In relatively soft materials, the penetrometer cone is driven 1 foot and the number of blows required for each 6-inch penetration is tabulated at respective test depths, as blows per 6 inches on the log. In hard materials (rock or rock-like), the penetrometer cone is driven with the resulting penetrations, in inches, recorded for the first and second 50 blows, a total of 100 blows. The penetration for the total 100 blows is recorded at the respective testing depths on the boring logs.

Ground-water observations during and after completion of the borings are shown on the upper right of the boring log. Upon completion of the borings, the bore holes were backfilled with soil cuttings and plugged at the surface by hand tamping.

2.2 Laboratory Testing

Laboratory soil tests were performed on selected representative samples recovered from the borings. In addition to the classification tests (liquid limits and plastic limits), unconfined compressive strength, moisture content, and unit weight tests were performed. Results of the laboratory classification tests, strength, moisture content, and unit weight tests conducted for this project are included on the boring logs.

The above laboratory tests were performed in general accordance with applicable ASTM procedures, or generally accepted practice.

3.0 SUBSURFACE CONDITIONS

3.1 Site Geology

According to the Sherman Sheet of the Geologic Atlas of Texas, the project site is located within the Austin Chalk Geological Formation. This formation typically consists of clays overlying chalky limestone rock. The thickness of the clay above the limestone can vary significantly. Below the clays, the limestones are generally encountered in a weathered condition, and transition into an unweathered condition with depth. Occasionally, old stream beds, which have been filled during more recent geological time, are encountered in the Austin Chalk formation. The unweathered primary limestone material is gray in color.

3.2 Soil Conditions

Specific types and depths of subsurface strata encountered at the boring locations are shown on the boring logs in Appendix A. The generalized subsurface stratigraphy encountered in the borings are discussed below. Note that depths on the borings refer to the depth from the existing grade or ground surface present at the time of the investigation, and the boundaries between the various soil types are approximate.

Fill materials are present to a depth of 2 feet in Boring B-1, consisting of brown silty clays and clays with limestone fragments. Natural soils consist of dark brown, brown, and gray clays and silty clays of moderate to high plasticity. These clays often contain calcareous nodules. Limestone fragments are present within the natural clays below 2- to 4-foot depths. The various clays encountered in the borings had tested Liquid Limits (LL) ranging from 48 to 65 with Plasticity Indices (PI) ranging from 32 to 43 and are classified as CL and CH by the USCS. The various clayey soils were generally very stiff to hard (soil basis) in consistency with pocket penetrometer readings of 3.0 to over 4.5 tsf.

Tan and gray limestone is present at 5 feet below ground in Boring B-2. This stratum is 2½ feet thick. Gray limestone is next present in Borings B-1 and B-2 at depths of 6 to 7½ feet and continues to the 50-foot boring completion depths. The gray limestone is hard to very hard (rock basis), with Texas Cone Penetrometer (THD) test values ranging from ¼ to 1¼ inches of penetration for 100 hammer blows. Shaly limestone seams are noted within the gray limestone below 27 feet in the borings.

3.3 Ground-Water Observations

The borings were drilled using continuous flight augers in order to observe ground-water seepage during drilling. Ground-water seepage was encountered during drilling in Boring B-2 at 30 feet below existing grade. Ground-water was observed at completion of drilling operations at 25 feet in this boring. Boring B-1 was dry during drilling and dry at completion. Table 3.3-1 summarizes the observed water level data.

TABLE 3.3-1
Ground-Water Observations

Boring No.	Seepage During Drilling (ft.)	Water at Completion (ft.)
B-1	Dry	Dry
B-2	30	25

Fluctuations of the ground-water level can occur due to seasonal variations in the amount of rainfall; site topography and runoff; hydraulic conductivity of soil strata; and other factors not evident at the time the borings were performed.

4.0 BRIDGE FOUNDATION RECOMMENDATIONS

4.1 General Foundation Considerations

Two independent design criteria must be satisfied in the selection of the type of foundation to support the proposed bridge structure. First, the ultimate bearing capacity, reduced by a sufficient factor of safety, must not be exceeded by the bearing pressure transferred to the foundation soils. Second, due to consolidation or expansion of the underlying soils during the operating life of the structure, total and differential vertical movements must be within tolerable limits. The recommended foundation alternative for the proposed structure is discussed below. Foundation construction considerations are presented in Section 4.3.3.

4.2 Potential Vertical Movements

Lightly loaded structures placed on-grade will be subject to movement as a result of moisture induced volume changes in the active to highly active clays. The clays expand (heave) with increases in moisture and contract (shrink) with decreases in moisture. The movement typically occurs as post construction heave. The potential magnitude of the moisture induced movements is rather indeterminate. It is influenced by the soil properties, overburden pressures, thickness of clays and, to a great extent, by soil moisture levels at the time of construction. The greatest potential for post-construction movement occurs when the soils are in a dry condition at the time of construction. Based on the conditions encountered in the borings, the potential moisture induced movements are estimated to be on the order of up to 2 to 2½ inches where the slabs are situated near present existing grades.

4.3 Straight Shaft Pier Design Parameters

4.3.1 Design Criteria

Recommendations and parameters for the design of cast-in-place straight-shaft drilled piers are outlined below. Specific recommendations for the construction and installation of the drilled piers are included in the following section, and shall be followed during construction.

Bearing Stratum	Gray LIMESTONE
Depth of Bearing Stratum:	Approximately 6 to 7½ feet below existing grades
Required Penetration/Depth:	All piers should penetrate into the bearing stratum a minimum of 2 feet.
Allowable End Bearing Capacity:	40,000 psf

Allowable Skin Friction:	6,000 psf for compressive loads and 4,000 psf for tensile loads. *Skin friction should be used on that part of the shaft embedded in bearing strata below any temporary casing.*

The maximum ratio of overall shaft length to shaft diameter is 20:1. The minimum recommended pier diameter is 24 inches. The above values contain a safety factor of three (3).

Drilled shafts should extend through any weathered zones or tan limestone and bear only in competent gray limestone. Ground-water seepage above the gray limestone can require temporary casing for proper shaft installation.

For lateral shaft resistance, an allowable passive resistance of 5,000 psf may be considered in the gray limestone.

In order to develop full load carrying capacity in skin friction, adjacent shafts should have a minimum center-to-center spacing of 3 times the diameter of the larger shaft. Closer spacing may require some reductions in skin friction and/or changes in installation sequences. Closely spaced shafts should be examined on a case-by-case basis. As a general guide, the design skin friction will vary linearly from the full value at a spacing of 3 diameters to 50 percent of the design value at 2 diameters.

Settlements for properly installed and constructed straight shafts in the gray limestone will be primarily elastic and are estimated to be 1 inch or less. Differential settlement between adjacent piers is estimated at ½ inch or less.

4.3.2 Soil Induced Uplift Loads

The drilled shafts could experience tensile loads as a result of post construction heave in the site soils. The magnitude of these loads varies with the shaft diameter, soil parameters, and particularly the in-situ moisture levels at the time of construction. For design purposes, an uplift load of 1,800 psf over a shaft length of 6 feet is estimated. This load must be resisted by the dead load on the shaft, continuous vertical reinforcing steel in the shaft, and a shaft adhesion developed within the bearing strata. In order to aid in the structural design of the reinforcement, minimum reinforcing should be equal to 0.5 percent of the shaft area.

4.3.3 Drilled Shaft Construction Considerations

Drilled pier construction should be monitored on a full-time basis by a representative of the geotechnical engineer to observe, among other things, the following items:

- Identification of bearing material
- Adequate penetration of the shaft excavation into the bearing layer
- The base and sides of the shaft excavation are clean of loose cuttings
- If seepage is encountered, whether it is of sufficient amount to require the use of temporary steel casing. If casing is needed it is important that the field representative observe that a high head of plastic concrete is maintained within the casing at all times during their extraction to prevent the inflow of water

It should be anticipated that ground-water seepage could be encountered during installation of straight shafts penetrating the gray limestone and that seepage rates and/or caving could be sufficient to require the use of temporary casing for installation of the straight shafts. The casing should be seated in the bearing stratum with all water and most loose material removed prior to beginning the design penetration. Care must then be taken that a sufficient head of plastic concrete is maintained within the casing during extraction.

Precautions should be taken during the placement of reinforcing steel and concrete to prevent loose, excavated soil from falling into the excavation. Concrete should be placed as soon as practical after completion of the drilling, cleaning, and observation. Excavation for a drilled pier should be filled with concrete before the end of the workday, or sooner if required to prevent deterioration of the bearing material. Prolonged exposure or inundation of the bearing surface with water will result in changes in strength and compressibility characteristics. If delays occur, the drilled pier excavation should be deepened as necessary and cleaned, in order to provide a fresh bearing surface.

The concrete should have a slump of 6 inches plus or minus 1 inch. The concrete should be placed in a manner to prevent the concrete from striking the reinforcing cage or the sides of the excavation. Concrete should be tremied to the bottom of the excavation to control the maximum free fall of the plastic concrete to less than 10 feet, or focus concrete in the middle of the reinforcing cage to prevent segregation.

A drilling rig of sufficient size and weight will be necessary for drilling and/or coring through the hard layers to reach the desired bearing stratum and achieve the required penetration. It should be anticipated that hard to very hard zones can be present in the gray limestone. The hard to very hard layers can complicate pier drilling operations.

In addition to the above guidelines, the specifications from the Association of Drilled Shaft Contractors Inc. "Standards and Specifications for the Foundation Drilling Industry" as Revised 1999 or other recognized specifications for proper installation of drilled shaft foundation systems should be followed.

4.4 Lateral Earth Pressures

4.4.1 *General*

The abutments must be designed for lateral pressures including, but not necessarily limited to, earth, water, surcharge, swelling, and vibration. In addition, the lateral pressures will be influenced by whether the backfill is drained or undrained, and above or below the ground-water table.

4.4.2 *Equivalent Fluid Pressures*

Lateral earth pressures on the abutments will depend on a variety of factors, including the type of soils behind the wall, the condition of the soils, and the drainage conditions behind the wall. Recommended lateral earth pressures expressed as equivalent fluid pressures, per foot of wall height, are presented in Table 4.4.2-1 for a wall with a level backfill behind the top of the wall. The equivalent fluid pressure for an undrained condition should be used if a drainage system is not present to remove water trapped in the backfill and behind the wall. Pressures are provided for at-rest and active earth pressure conditions. Rigid walls are not anticipated to develop enough movement to mobilize active earth pressures. In order to allow for an active condition the top of the wall(s) must deflect on the order of 0.4 percent.

For the select fill or free draining granular backfill, these values assume that a "full" wedge of the material is present behind the wall. The wedge is defined where the wall backfill limits extend outward at least 2 feet from the base of the wall and then upward on a 1H:2V slope. For narrower backfill widths of granular or select fill soils, the equivalent fluid pressures for the on-site soils should be used.

TABLE 4.4.2-1 – Equivalent Fluid Pressures				
Backfill Material	At-Rest Equivalent Fluid Pressure (pcf)		Active Equivalent Fluid Pressure (pcf)	
	Drained	Undrained	Drained	Undrained
Excavated on-site clay or clay fill material	100	110	90	100
Select fill or on-site soils meeting material specifications	75	100	55	90
Free draining granular backfill material	55	90	35	80

4.4.3 *Additional Lateral Pressures*

The location and magnitude of permanent surcharge loads (if present) should be determined, and the additional pressure generated by these loads such as the weight of construction equipment and vehicular loads that are used at the time the structures are being built must also be considered in the design. The effect of this or any other surcharge loading may be accounted for by adding an additional uniform load to the full depth of the side walls equivalent to one-half of the expected vertical surcharge intensity for select backfill materials, or equal to the full vertical surcharge intensity for clay backfill. The equivalent fluid pressures, given here, do not include a safety factor. Analysis of surcharge loads (if any) should be performed on a case-by-case basis. This is not included in the scope of this study. These services can be provided as additional services upon request.

4.5 Wall Backfill Material Requirements

On-Site Soil Backfill: For wall backfill areas with site-excavated materials or similar imported materials, all oversized fragments larger than four inches in maximum dimension should be removed from the backfill materials prior to placement. The backfill should be free of all organic and deleterious materials, and should be placed in maximum 8-inch compacted lifts at a minimum of 95 percent of Standard Proctor density (ASTM D 698) within a moisture range of plus to minus 3 percentage points of optimum moisture. Compaction within five feet of the walls should be accomplished using hand compaction equipment, and should be between 90 and 95 percent of the Standard Proctor density.

Select Fill: All wall select backfill should consist of clayey sand and/or sandy clay material with a Plasticity Index of 16 or less, with a Liquid Limit not exceeding 35. The select fill should be placed in maximum 8-inch lifts and compacted to between 95 and 100 percent of Standard Proctor density (ASTM D 698) within a moisture range of plus to minus 3 percentage points of the optimum moisture. Compaction within five feet of the walls should be accomplished using hand compaction equipment and should be compacted between 90 and 95 percent of the Standard Proctor density.

Granular Backfill: All free draining granular wall backfill material should be a crushed stone, sand/gravel mixture, or sand/crushed stone mixture. The material should have less than 3 percent passing the No. 200 sieve and less than 30 percent passing the No. 40 sieve. The minus No. 40 sieve material should be non-plastic. Granular wall backfill should not be water jetted during installation.

4.6 Abutment Drainage Requirements

In order to achieve the "drained" condition for lateral earth pressure using either on-site soil or select fill backfill for low-permeability walls (concrete, masonry, etc.), a vertical drainage blanket or geocomposite drainage member must be installed adjacent to the wall on the backfill side. The drainage must be connected to an outlet drain at the base of the wall. Drainage could be provided using a collector pipe or weep holes near the base of the abutment. Drains should be properly filtered to minimize the potential for erosion through these drains, and/or the plugging of drain lines. Design or specific recommendations for drainage members is beyond the scope for this study. These services can be provided as an additional service upon request.

5.0 EARTHWORK

5.1 Site Preparation

The subgrade should be firm and able to support the construction equipment without displacement. Soft or yielding subgrade should be corrected and made stable before construction proceeds. The subgrade should be proof rolled to detect soft spots, which if exist, should be reworked to provide a firm and otherwise suitable subgrade. Proof rolling should be performed using a heavy pneumatic tired roller, loaded dump truck, or similar piece of equipment. The proof rolling operations should be observed by the project geotechnical engineer or his/her representative. Prior to fill placement, the subgrade should be scarified to a minimum depth of 6 inches, its moisture content adjusted, and recompacted to the moisture and density recommended for fill.

5.2 Placement and Compaction

Fill material should be placed in loose lifts not exceeding 8 inches in uncompacted thickness. The uncompacted lift thickness should be reduced to 4 inches for structure backfill zones requiring hand-operated power compactors or small self-propelled compactors. The fill material should be uniform with respect to material type and moisture content. Clods and chunks of material should be broken down and the fill material mixed by disking, blading, or plowing, as necessary, so that a material of uniform moisture and density is obtained for each lift. Water required for sprinkling to bring the fill material to the proper moisture content should be applied evenly through each layer.

The on-site soils are suitable for use in site grading. Imported fill material should be clean soil with a Liquid Limit less than 50 and no rock greater than 4 inches in maximum dimension. The fill materials should be free of vegetation and debris.

The fill material should be compacted to a minimum of 95 percent of the maximum dry density determined by the Standard Proctor test, ASTM D 698. In conjunction with the compacting operation, the fill material should be brought to the proper moisture content. The moisture content for general earth fill should range from 2 percentage points below optimum to 5 percentage points above optimum (-2 to +5). These ranges of moisture contents are given as maximum recommended ranges. For some soils and under some conditions, the contractor may have to maintain a more narrow range of moisture content (within the recommended range) in order to consistently achieve the recommended density.

If fill is to be placed on existing slopes that are steeper than five horizontal to one vertical, then the fill materials should be benched into the existing slopes in such a manner as to provide a good contact between the two materials and allow relatively horizontal lift placement.

Field density tests should be taken as each lift of fill material is placed. As a guide, one field density test per lift for each 5,000 square feet of compacted area is recommended. For small areas or critical areas the frequency of testing may need to be increased to one test per 2,500 square feet. A minimum of 2 tests per lift should be required. The earthwork operations should be observed and tested on a continuing basis by an experienced geotechnician working in conjunction with the project geotechnical engineer.

Each lift should be compacted, tested, and approved before another lift is added. The purpose of the field density tests is to provide some indication that uniform and adequate compaction is being obtained. The actual quality of the fill, as compacted, should be the responsibility of the contractor and satisfactory results from the tests should not be considered as a guarantee of the quality of the contractor's filling operations.

Any pavement structure (concrete, base course material or stabilized subgrade) should extend a minimum of 12 inches beyond the edge of the excavation trench. This additional width of pavement structure greatly reduces the potential for reflective cracking upwards into the pavement. In addition, proper backfilling of the soils will result in no undue settlement of backfill material and resulting differential movement between the natural soils and backfill trench. If a high class bedding material or backfill material is desired, a lean concrete will limit water intrusion into the trench and will not require compaction after placement.

5.3 Excavation

The side slopes of excavations through the overburden soils should be made in such a manner to provide for their stability during construction. Existing structures, pipelines or other facilities, which are constructed prior to or during the currently proposed construction and which require excavation, should be protected from loss of end bearing or lateral support.

Temporary construction slopes and/or permanent embankment slopes should be protected from surface runoff water. Site grading should be designed to allow drainage at planned areas where erosion protection is provided, instead of allowing surface water to flow down unprotected slopes.

Trench safety recommendations are beyond the scope of this report. The contractor must comply with all applicable safety regulations concerning trench safety and excavations including, but not limited to, OSHA regulations.

5.4 Trench Backfill

Trench backfill for pipelines or other utilities should be properly placed and compacted. Overly dense or dry backfill can swell and create a mound along the completed trench line. Loose or wet backfill can settle and form a depression along the completed trench line. Distress to overlying structures, pavements, etc. is likely if heaving or settlement occurs. On-site earth fill material is recommended for trench backfill. Care should be taken not to use loose granular material, to prevent the backfilled trench from becoming a french drain and piping surface or subsurface water beneath structures, pipelines, or pavements. If a higher class bedding material is required for the pipelines, a lean concrete bedding will limit water intrusion into the trench and will not require compaction after placement. The density and moisture content should be as recommended for fill in this report. A minimum of one field density test should be taken per lift for each 150 linear feet of trench, with a minimum of 2 tests per lift.

5.5 Soil Corrosion Potential

Specific testing for soil corrosion potential was not included in the scope of this study. However, based upon past experience on other projects in the vicinity, the soils at this site may be corrosive. Standard construction practices for protecting metal pipe and similar facilities in contact with these soils should be used.

5.6 Erosion and Sediment Control

All disturbed areas should be protected from erosion and sedimentation during construction, and all permanent slopes and other areas subject to erosion or sedimentation should be provided with permanent erosion and sediment control facilities. All applicable ordinances and codes regarding erosion and sediment control should be followed.

6.0 CONSTRUCTION OBSERVATIONS

In any geotechnical investigation, the design recommendations are based on a limited amount of information about the subsurface conditions. In the analysis, the geotechnical engineer must assume the subsurface conditions are similar to the conditions encountered in the borings. However, quite often during construction anomalies in the subsurface conditions are revealed. Therefore, it is recommended that CMJ Engineering, Inc. be retained to observe earthwork and foundation installation and perform materials evaluation during the construction phase of the project. This enables the geotechnical engineer to stay abreast of the project and to be readily available to evaluate unanticipated conditions, to conduct additional tests if required and, when necessary, to recommend alternative solutions to unanticipated conditions. Until these construction phase services are performed by the project geotechnical engineer, the recommendations contained in this report on such items as final foundation bearing elevations, proper soil moisture condition, and other such subsurface related recommendations should be considered as preliminary.

It is proposed that construction phase observation and materials testing commence by the project geotechnical engineer at the outset of the project. Experience has shown that the most suitable method for procuring these services is for the owner or the owner's design engineers to contract directly with the project geotechnical engineer. This results in a clear, direct line of communication between the owner and the owner's design engineers and the geotechnical engineer.

7.0 REPORT CLOSURE

The borings for this study were selected by CMJ Engineering, Inc. The locations and elevations of the borings should be considered accurate only to the degree implied by the methods used in their determination. The boring logs shown in this report contain information related to the types of soil encountered at specific locations and times and show lines delineating the interface between these materials. The logs also contain our field representative's interpretation of conditions that are believed to exist in those depth intervals between the actual samples taken. Therefore, these boring logs contain both factual and interpretive information. Laboratory soil classification tests were also performed on samples from selected depths in the borings. The results of these tests, along with visual-manual procedures were used to generally classify each stratum. Therefore, it should be understood that the classification data on the logs of borings represent visual estimates of classifications for those portions of each stratum on which the full range of laboratory soil classification tests were not performed. It is not implied that these logs are representative of subsurface conditions at other locations and times.

With regard to ground-water conditions, this report presents data on ground-water levels as they were observed during the course of the field work. In particular, water level readings have been made in the borings at the times and under conditions stated in the text of the report and on the boring logs. It should be noted that fluctuations in the level of the ground-water table can occur with passage of time due to variations in rainfall, temperature and other factors. Also, this report does not include quantitative information on rates of flow of ground water into excavations, on pumping capacities necessary to dewater the excavations, or on methods of dewatering excavations. Unanticipated soil conditions at a construction site are commonly encountered and cannot be fully predicted by mere soil samples, test borings or test pits. Such unexpected conditions frequently require that additional expenditures be made by the owner to attain a properly designed and constructed project. Therefore, provision for some contingency fund is recommended to accommodate such potential extra cost.

The analyses, conclusions and recommendations contained in this report are based on site conditions as they existed at the time of our field investigation and further on the assumption that the exploratory borings are representative of the subsurface conditions throughout the site; that is, the subsurface conditions everywhere are not significantly different from those disclosed by the borings at the time they were completed. If, during construction, different subsurface conditions from those encountered in our borings are observed, or appear to be present in excavations, we must be advised promptly so that we can review these conditions and reconsider our recommendations where necessary. If there is a substantial lapse of time between submission of this report and the start of the work at the site, if conditions have changed due either to natural causes or to construction operations at or adjacent to the site, or if structure locations, structural loads or finish grades are changed, we urge that we be promptly informed and retained to review our report to determine the applicability of the conclusions and recommendations, considering the changed conditions and/or time lapse.

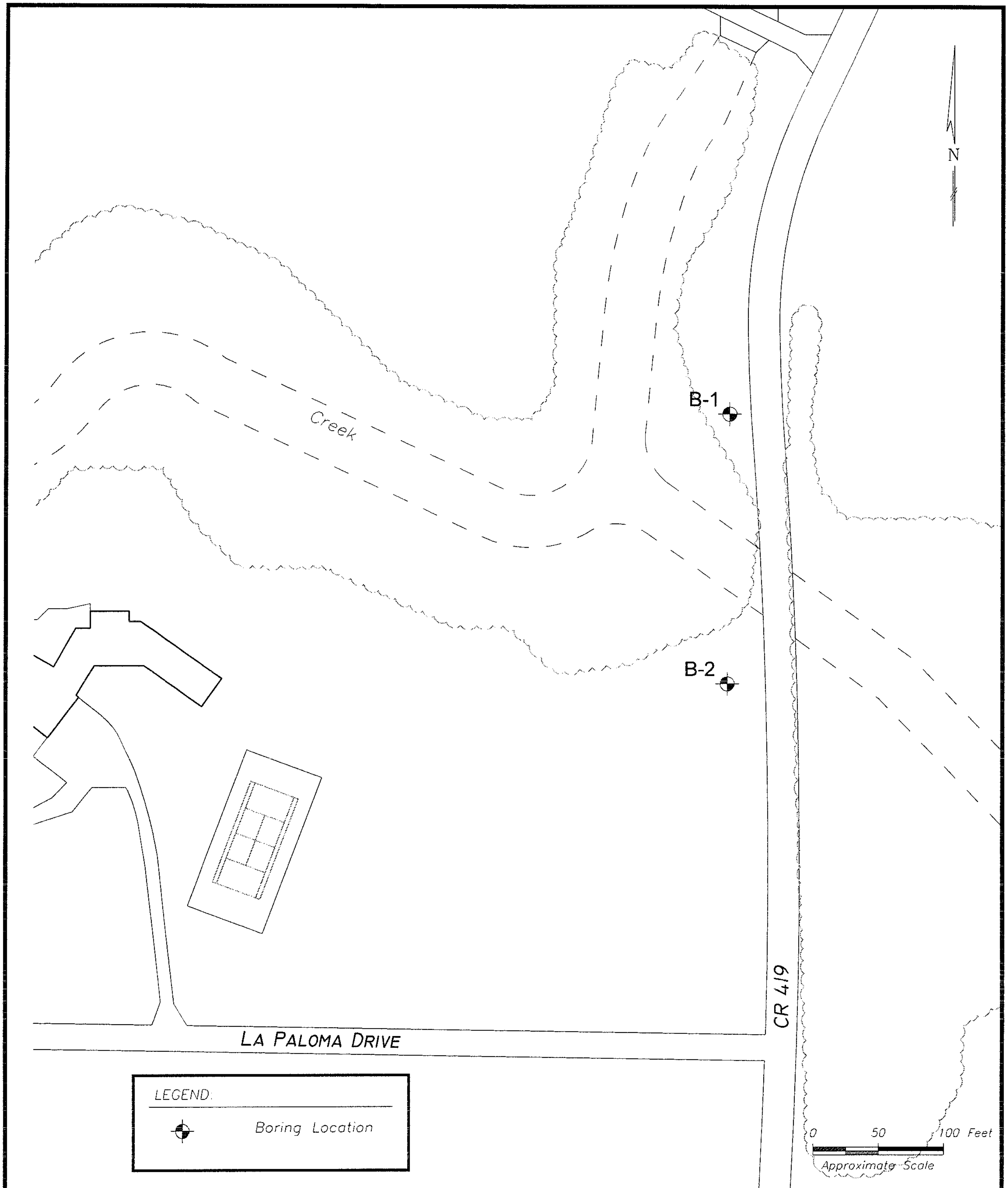
Further, it is urged that CMJ Engineering, Inc. be retained to review those portions of the plans and specifications for this particular project that pertain to earthwork and foundations as a means to determine whether the plans and specifications are consistent with the recommendations contained in this report. In addition, we are available to observe construction, particularly the compaction of structural fill, or backfill and the construction of foundations as recommended in the report, and such other field observations as might be necessary.

The scope of our services did not include any environmental assessment or investigation for the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, ground water or air, on or below or around the site.

This report has been prepared for use in developing an overall design concept. Paragraphs, statements, test results, boring logs, diagrams, etc. should not be taken out of context, nor utilized without a knowledge and awareness of their intent within the overall concept of this report. The reproduction of this report, or any part thereof, supplied to persons other than the owner, should indicate that this study was made for design purposes only and that verification of the subsurface conditions for purposes of determining difficulty of excavation, trafficability, etc. are responsibilities of the contractor.

This report has been prepared for the exclusive use of Dannenbaum Engineering Corporation for specific application to design of this project. The only warranty made by us in connection with the services provided is that we have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of our profession practicing in the same or similar locality. No other warranty, expressed or implied, is made or intended.

* * * *



CMJ ENGINEERING, INC.

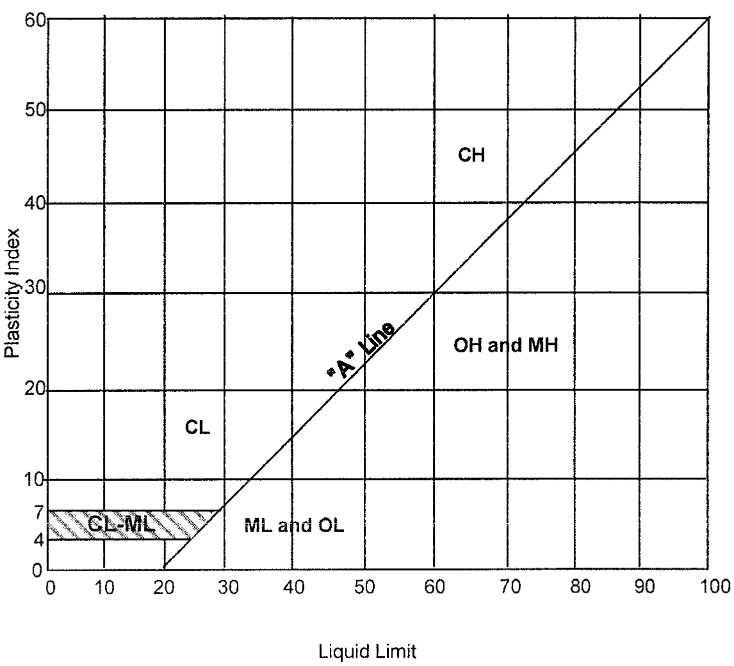
CMJ PROJECT NO. 830-12-22

PLAN OF BORINGS

BRIDGE REPLACEMENT
CR 419
ANNA, TEXAS

PLATE
A.1

Major Divisions			Grp. Sym.	Typical Names	Laboratory Classification Criteria	
Coarse-grained soils (more than half of the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows: Less than 5 percent..............GW, GP, SW, SP More than 12 percent..............GM, GC, SM, SC 5 to 12 percent..............*Borderline* cases requiring dual symbols	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4: $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines		Not meeting all gradation requirements for GW
		Gravels with fines (Appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures		Liquid and Plastic limits below "A" line or P.I. greater than 4 — Liquid and plastic limits plotting in hatched zone between 4 and 7 are borderline cases requiring use of dual symbols
			GC	Clayey gravels, gravel-sand-clay mixtures		Liquid and Plastic limits above "A" line with P.I. greater than 7
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines		$C_u = \frac{D_{60}}{D_{10}}$ greater than 6: $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP	Poorly graded sands; gravelly sands, little or no fines		Not meeting all gradation requirements for SW
		Sands with fines (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures		Liquid and Plastic limits below "A" line or P.I. less than 4 — Liquid and plastic limits plotting between 4 and 7 are borderline cases requiring use of dual symbols
			SC	Clayey sands, sand-clay mixtures		Liquid and Plastic limits above "A" line with P.I. greater than 7
Fine-grained soils (More than half of material is smaller than No. 200 sieve)	Silts and clays (Liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity	Plasticity Chart (see below)	
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, and lean clays		
			OL	Organic silts and organic silty clays of low plasticity		
	Silts and clays (Liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts		
			CH	Inorganic clays of high plasticity, fat clays		
			OH	Organic clays of medium to high plasticity, organic silts		
	Highly Organic soils		Pt	Peat and other highly organic soils		

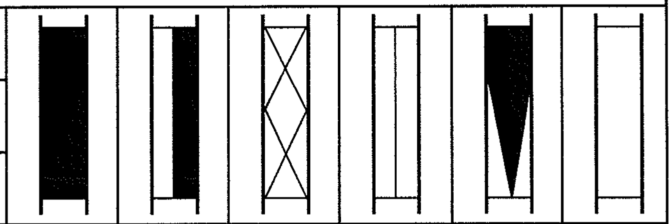


Plasticity Chart

UNIFIED SOIL CLASSIFICATION SYSTEM **PLATE A.2**

SOIL OR ROCK TYPES

GRAVEL	LEAN CLAY	LIMESTONE
SAND	SANDY	SHALE
SILT	SILTY	SANDSTONE
CLAYEY	HIGHLY PLASTIC CLAY	CONGLOMERATE



Shelby Tube	Auger	Split Spoon	Rock Core	Cone Pen	No Recovery

TERMS DESCRIBING CONSISTENCY, CONDITION, AND STRUCTURE OF SOIL

Fine Grained Soils (More than 50% Passing No. 200 Sieve)

Descriptive Item	Penetrometer Reading, (tsf)
Soft	0.0 to 1.0
Firm	1.0 to 1.5
Stiff	1.5 to 3.0
Very Stiff	3.0 to 4.5
Hard	4.5+

Coarse Grained Soils (More than 50% Retained on No. 200 Sieve)

Penetration Resistance (blows/foot)	Descriptive Item	Relative Density
0 to 4	Very Loose	0 to 20%
4 to 10	Loose	20 to 40%
10 to 30	Medium Dense	40 to 70%
30 to 50	Dense	70 to 90%
Over 50	Very Dense	90 to 100%

Soil Structure

Calcareous	Contains appreciable deposits of calcium carbonate; generally nodular
Slickensided	Having inclined planes of weakness that are slick and glossy in appearance
Laminated	Composed of thin layers of varying color or texture
Fissured	Containing cracks, sometimes filled with fine sand or silt
Interbedded	Composed of alternate layers of different soil types, usually in approximately equal proportions

TERMS DESCRIBING PHYSICAL PROPERTIES OF ROCK

Hardness and Degree of Cementation

Very Soft or Plastic	Can be remolded in hand; corresponds in consistency up to very stiff in soils
Soft	Can be scratched with fingernail
Moderately Hard	Can be scratched easily with knife; cannot be scratched with fingernail
Hard	Difficult to scratch with knife
Very Hard	Cannot be scratched with knife
Poorly Cemented or Friable	Easily crumbled
Cemented	Bound together by chemically precipitated material; Quartz, calcite, dolomite, siderite, and iron oxide are common cementing materials. and iron oxide are common cementing materials.

Degree of Weathering

Unweathered	Rock in its natural state before being exposed to atmospheric agents
Slightly Weathered	Noted predominantly by color change with no disintegrated zones
Weathered	Complete color change with zones of slightly decomposed rock
Extremely Weathered	Complete color change with consistency, texture, and general appearance approaching soil

CMJ ENGINEERING INC.

Project No.	Boring No.	Project
830-12-22	B-1	**Bridge Replacement** **CR 419, South of FM 455 - Anna, Texas**

Location	Water Observations
See Plate A.1	**Dry during drilling; dry at completion**

Completion Depth	Completion Date	Surface Elevation	Type
50.0'	**7-4-12**		**CME-55, w/ CFA**

Stratum Description

Depth, Ft.	Stratum Description	REC %	RQD %	Blows/Ft. or Pen Reading, T.S.F.	Passing No 200 Sieve, %	Liquid Limit, %	Plastic Limit, %	Plasticity Index	Moisture Content, %	Unit Dry Wt. Lbs./Cu. Ft.	Unconfined Compression Pounds/Sq. Ft.
0–2	**SILTY CLAY / CLAY**, brown, w/ limestone fragments, hard (fill)			4.5+					10		
				4.5+					16		
2–6	**SILTY CLAY**, brown and gray, w/ limestone fragments and seams, hard			4.5+		48	16	32	13		
				4.5+					25	108	11740
5				100/1.5"							
6–50	**LIMESTONE**, gray, hard to very hard										
10				100/0.75"							
15				100/0.75"							
20				100/0.5"							
25				100/0.5"							
27	-w/ shaly limestone seams below 27'										
30				100/0.5"							
35				100/0.5"							
40				100/1.25"							
45				100/1.25"							
50				100/0.75"							

CMJ ENGINEERING INC.

Project No.	Boring No.	Project
830-12-22	B-2	**Bridge Replacement** **CR 419, South of FM 455 - Anna, Texas**
Location: **See Plate A.1**		Water Observations: **Seepage at 30' during drilling; water at 25' at completion**
Completion Depth **50.0'**	Completion Date **7-4-12**	
Surface Elevation		Type **CME-55, w/ CFA**

Depth, Ft.	Stratum Description	REC %	RQD %	Blows/Ft. or Pen Reading, T.S.F.	Passing No 200 Sieve, %	Liquid Limit, %	Plastic Limit, %	Plasticity Index	Moisture Content, %	Unit Dry Wt. Lbs./Cu. Ft.	Unconfined Compression Pounds/Sq. Ft.
0	**CLAY**, dark brown, w/ calcareous nodules, very stiff to hard			4.5+					19		
				4.5+		65	22	43	22		
				3.0					22	102	8160
				4.25					23		
	-w/ limestone fragments, 4' to 5'			3.0					22		
5	**LIMESTONE**, tan and gray										
7.5	**LIMESTONE**, gray, hard to very hard										
10				100/0.75'							
15				100/0.75'							
20				100/0.5"							
25				100/0.5"							
27	-w/ shaly limestone seams below 27'										
30				100/0.75'							
35				100/0.5"							
40				100/0.5"							
45				100/1"							
50				100/0.75'							

COLLIN COUNTY, TEXAS

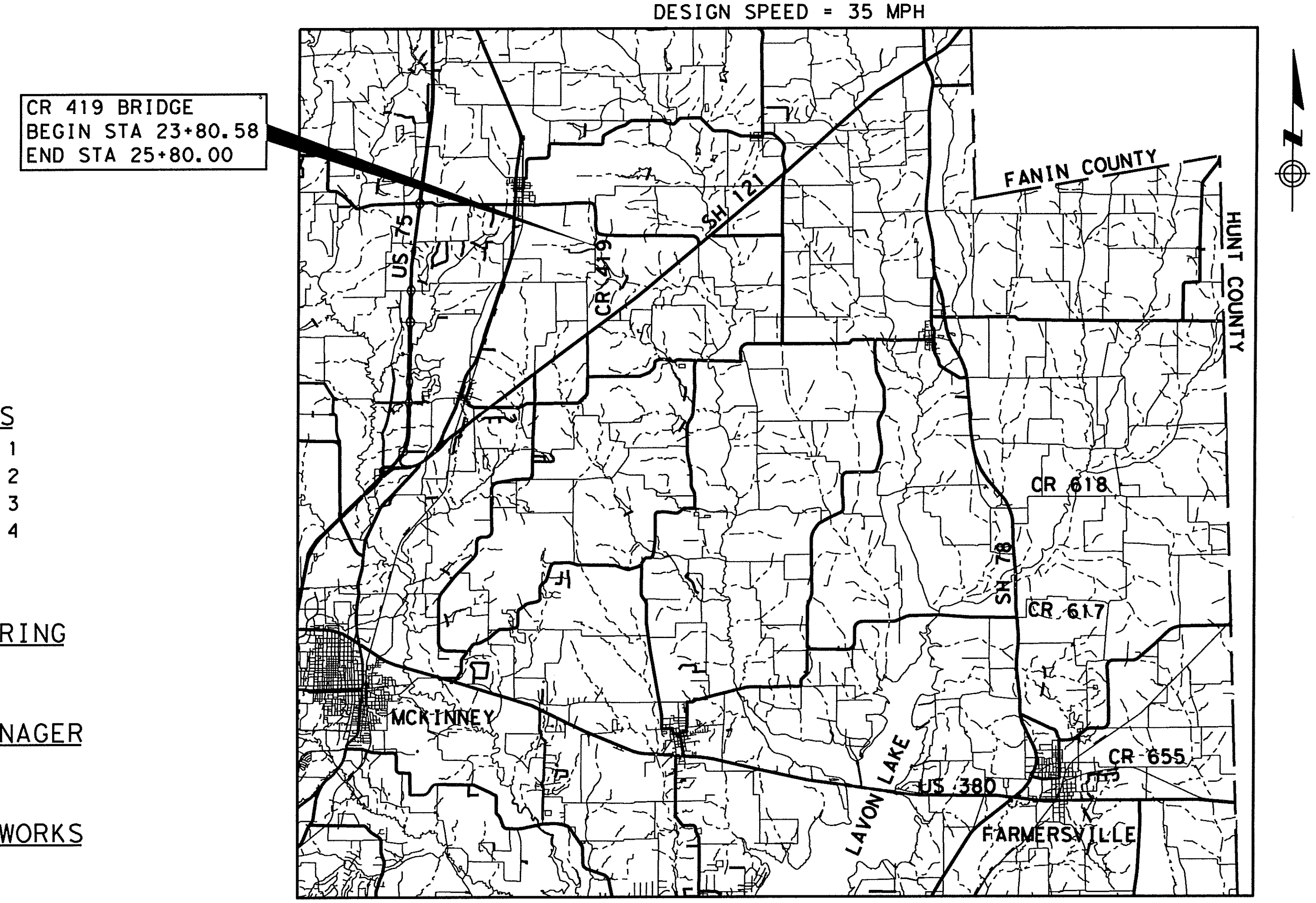
COUNTY ROAD 419 OVER BRINLEE CREEK
BRIDGE REPLACEMENT

BP# 07-00-14

LENGTH OF PROJECT: FT = 199.42 MI = 0.038

CONSTRUCT TWO LANE RURAL ROADWAY CONSISTING OF GRADING, BRIDGE, ASPHALT PAVEMENT & DELINEATION.

DESIGN SPEED = 35 MPH



VICINITY MAP
N.T.S.

COLLIN COUNTY

COUNTY JUDGE
KEITH SELF

COUNTY COMMISSIONERS

MATT SHAHEEN	PRECINCT 1
CHERYL WILLIAMS	PRECINCT 2
CHRIS HILL	PRECINCT 3
DUNCAN WEBB	PRECINCT 4

DIRECTOR OF ENGINEERING
RUBEN DELGADO, P.E.

SPECIAL PROJECTS MANAGER
JEFF DURHAM, R.P.L.S.

DIRECTOR OF PUBLIC WORKS
JON KLEINHEKSEL

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
1	TITLE AND INDEX OF SHEETS
2	QUANTITIES & TYPICAL SECTIONS
3	DETOUR LAYOUT
4 - 8	BC(1,2,4,5,10)-07
9	ROADWAY PLAN & PROFILE
⚠ 9A	WATER CROSSING FENCE DETAIL
10	MBGF-11
11	MBGF (T101)-11
12	⚠ SGT(7)-11
13	D&OM(3)-04
14	D&OM(VIA)-04
15	BRIDGE LAYOUT
16	BRIDGE QUANTITIES
17 - 19	AIG-28-30
20	BAS-A
21	CSAB
22 - 23	FD
24	IGSD-28
25 - 26	IGD
27 - 29	IGEB
30	IGMS
31	IGTS
32	MEBR(C)
33 - 36	PCP
37	PCP-FAB
38 - 39	PMDF
40	TRAFFIC RAIL TYPE T101
41 - 42	SEJ-A
43 - 44	SIG-28-30
45	SW3P
46	EC(1)-09
47	EC(2)-93
48 - 50	CROSS SECTIONS

⚠ ADDENDUM 1 11/06/2013

DANNENBAUM
ENGINEERING COMPANY - DALLAS, LLC
T.B.P.E. FIRM REGISTRATION #8996
4141 BLUE LAKE CIRCLE, STE 240 DALLAS, TX 75244 (972) 239-2002

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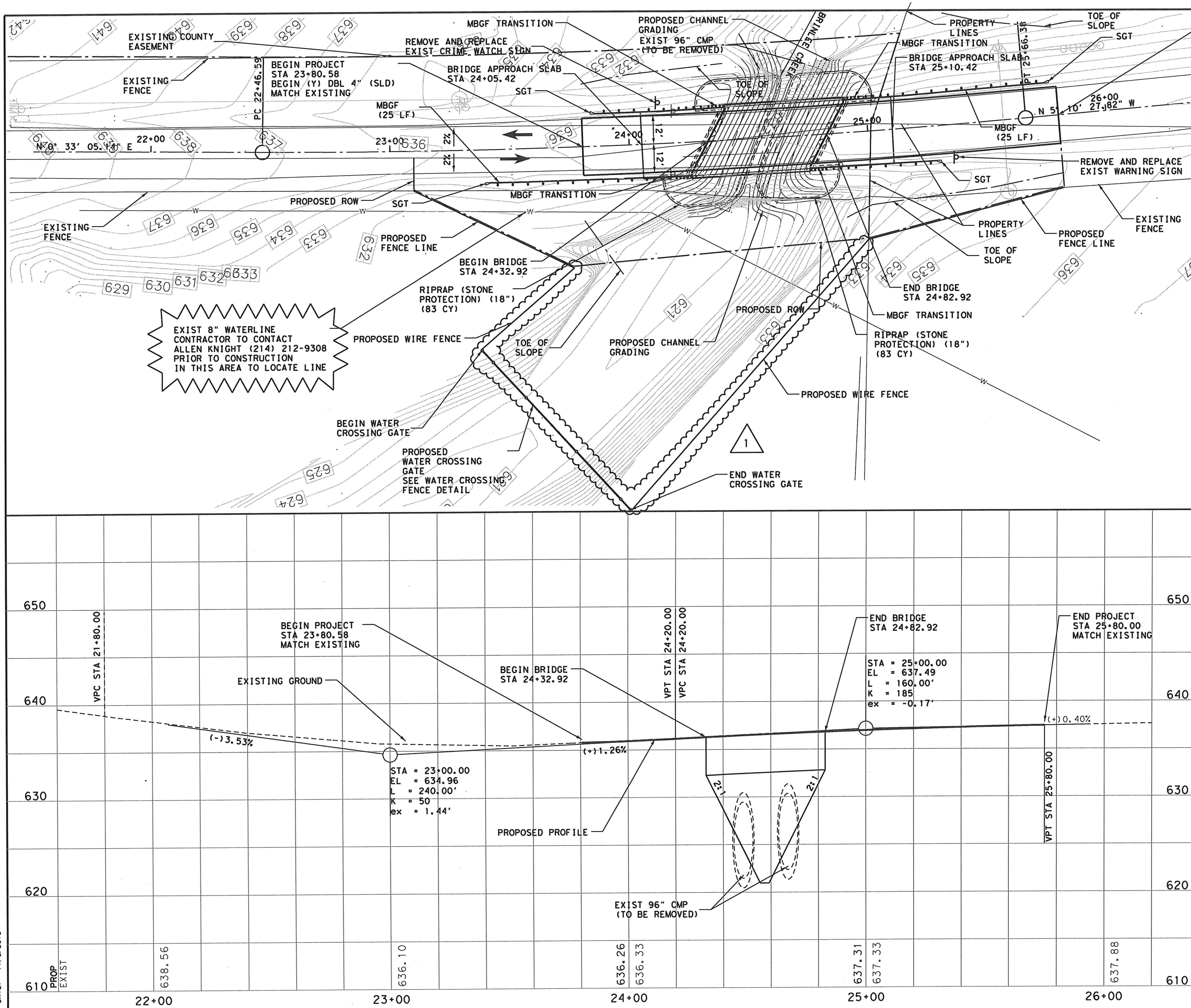
DATE: 11/6/2013



NO.	DATE	REVISION	APP.
1	11/06/13	ADDENDUM 1	DWE

DANNENBAUM ENGINEERING, CO.
DALLAS LLC
REGISTRATION NO. 8996

SIGNATURE OF REGISTRANT 11/06/13

STATE OF TEXAS
DANIEL W. EVERETT
93551
LICENSED
PROFESSIONAL ENGINEER

DANNENBAUM
ENGINEERING COMPANY - DALLAS, LLC
T.B.P.E. FIRM REGISTRATION #8996
4141 BLUE LAKE CIRCLE, STE 240 DALLAS, TX 75244 (972) 239-2002

COLLIN COUNTY, TEXAS

COUNTY ROAD 419 OVER BRINLEE CREEK

ROADWAY
PLAN & PROFILE

SHEET 1 OF 1

DESIGN	TF	COUNTY	DEC, INC. PROJECT NO.	SHEET NO.
GRAPHICS	KJA	COLLIN	4433-54	9
CHECK	MGV	STATE	DATE: 11/6/2013	
CHECK	RF	TEXAS	SCALE: AS SHOWN	

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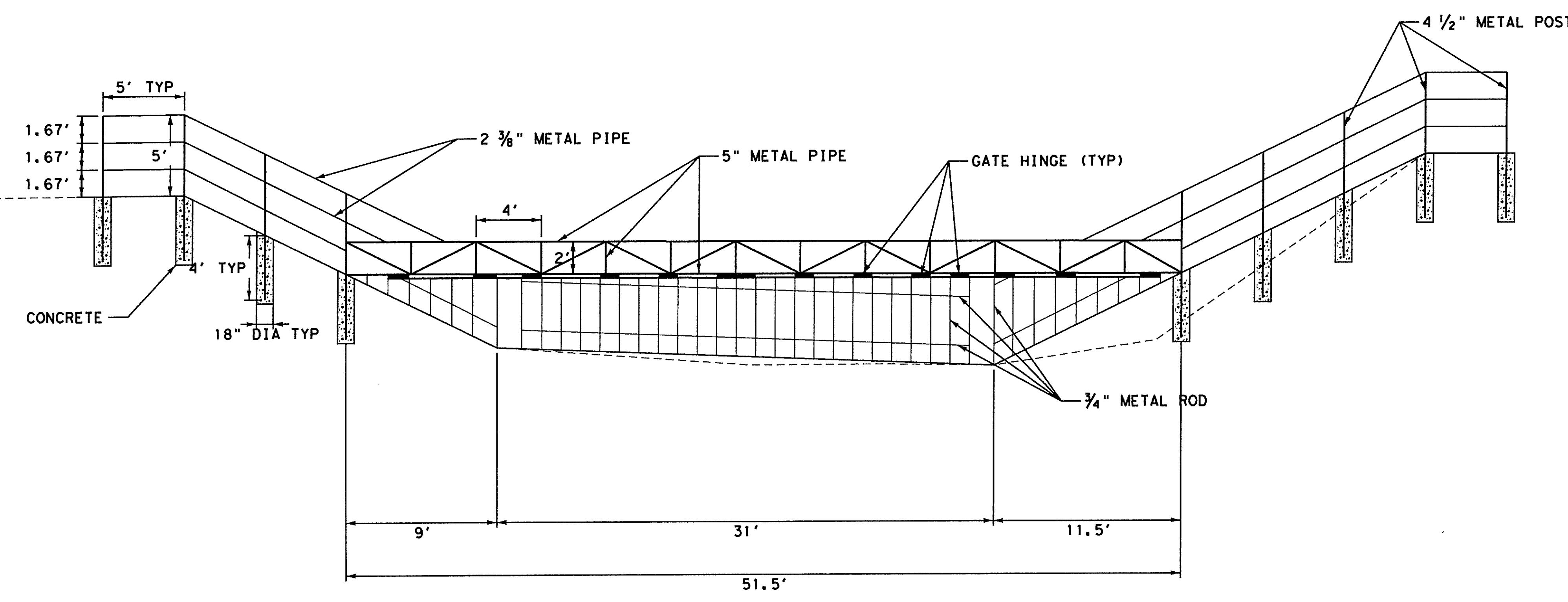

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ENGINEERING COMPANY - DALLAS, LLC
T.B.P.E. FIRM REGISTRATION #8996
4141 BLUE LAKE CIRCLE, STE 240 DALLAS, TX 75244 (972) 239-2002

COLLIN COUNTY, TEXAS

COUNTY ROAD 419 OVER BRINLEE CREEK

WATER CROSSING
FENCE DETAIL

DESIGN	TF	COUNTY	DEC, INC. PROJECT NO.	SHEET NO.
GRAPHICS	KJA	COLLIN	4433-54	
CHECK	MGV	STATE	DATE: 11/6/2013	9A
CHECK	RF	TEXAS	SCALE: AS SHOWN	

...\DGN\Details\FENCE DETAIL

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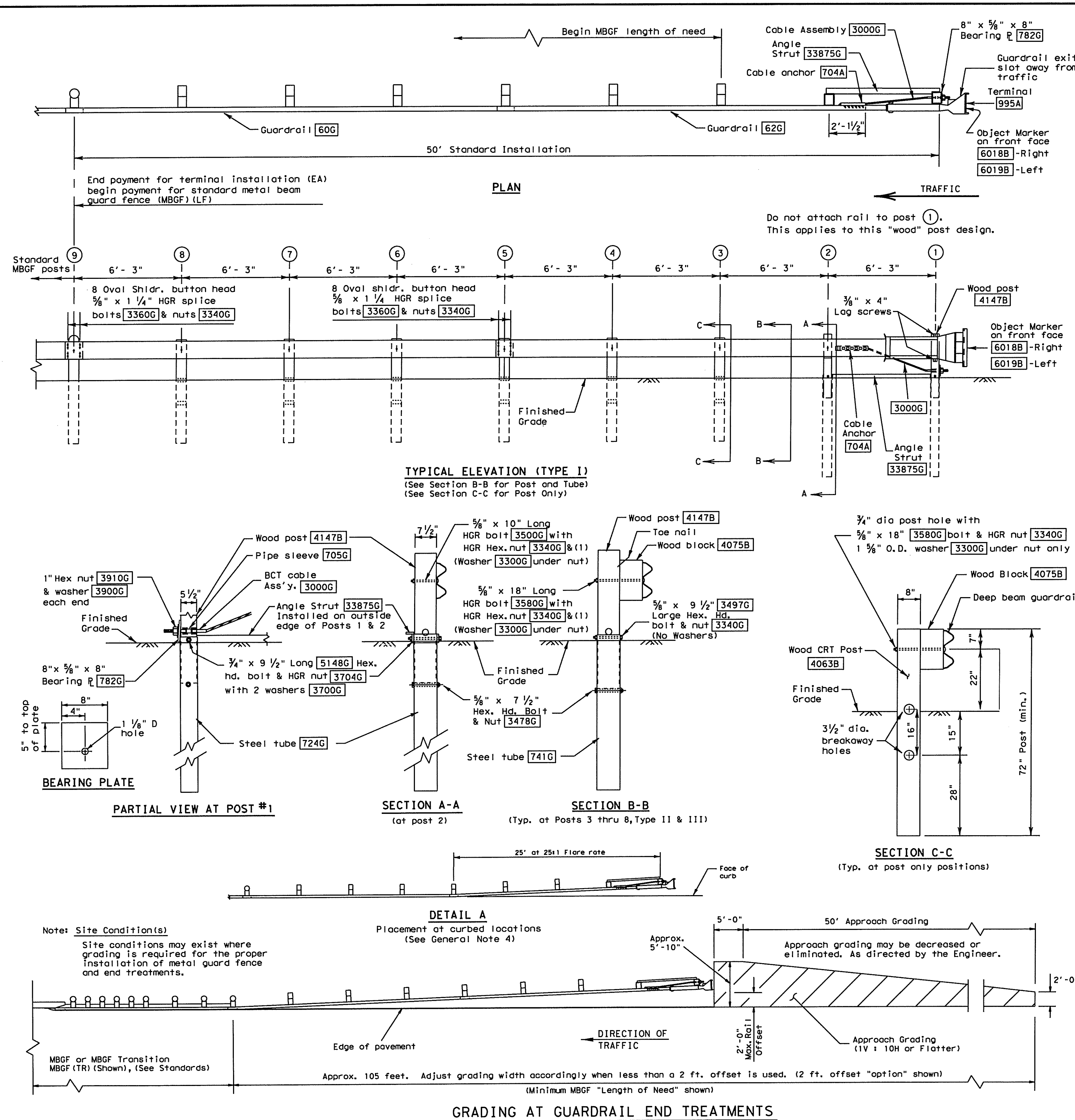
DATE:
FILE:

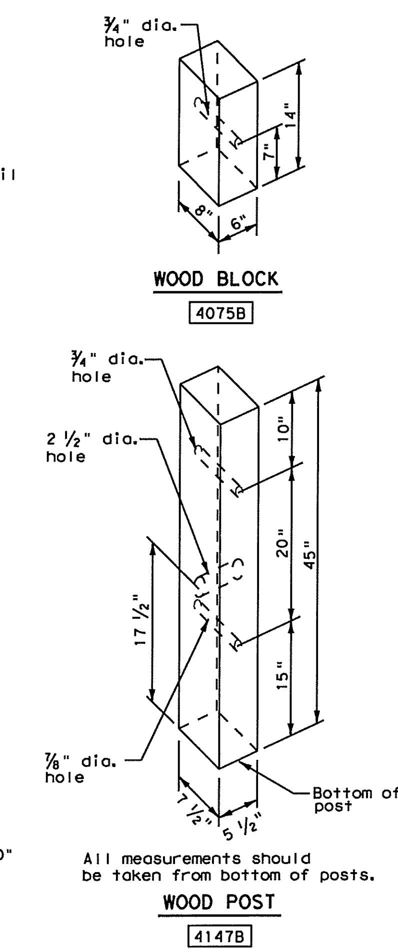


GENERAL NOTES

1. The Type of SGT unit will be specified elsewhere in the plans. Numbers in circles indicate post position. The Type of SGT unit chosen is a maintenance consideration and does not affect the systems performance.

Post & Tube Options	Post Only
Type I Posts ① thru ②	Posts ③ thru ⑧
Type II Posts ① thru ④	Posts ⑤ thru ⑧
Type III Posts ① thru ⑧	None

2. SGT's placed within the "minimum" 150 ft. radius, shall be installed straight. Standard rail elements may be installed within the radius, without special fabrication.
3. All bolts, nuts, cable assemblies, cable anchors, steel tubes & bearing plates shall be galvanized.
4. At non-curbed locations, a flare rate of 25:1 may be used over the first 50 ft. of the system to prevent the terminal head from encroaching on the shoulder. The flare may be decreased or eliminated for specific installations, if directed by the Engineer. At curbed locations, a flare rate of 25:1 shall be used beginning at post number 5 and ending at post number 1.
5. The steel tubes shall not protrude more than 4 inches above ground. Site grading may be necessary to meet this requirement.
6. The steel tubes may be driven with an approved driving head. They shall not be driven with the wood post in the tube. If the steel tubes are placed in drilled holes, the backfill material must be satisfactorily compacted to prevent tube settlement.
7. If solid rock is encountered. See the manufacturer's installation manual for the proper installation guidance.
8. The breakaway cable assembly must be taut. A locking device, (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening the nuts.
9. The wood blocks shall be "toe nailed" to the rectangular wood posts to prevent them from turning when the wood shrinks.
10. For curb installations, the soil tubes and posts shall be installed at the proper ground elevation behind the curb. The posts will then require field drilling new holes to accommodate the rail to post connection bolt to maintain the proper height of the rail above the gutter pan. The excess post length above the rail will be removed if directed by the Engineer.
11. An object marker shall be installed on the front of the impact head as detailed on D&OM(VIA).
12. A special site evaluation should be considered, prior to using this end treatment where there is less than 25 feet between the extrusion side of the end treatment and any adjacent driving lane.



POST & TUBE OPTIONS
Type I Posts ① thru ②
Type II Posts ① thru ④
Type III Posts ① thru ⑧

BILL OF MATERIAL

Code #	Type I Qty. (POST & TUBE OPTIONS)	Type II Qty.	Type III Qty.	DESCRIPTION
62G	1	1	1	#1 Deep Beam Guardrail (12 Ga) at 25'
60G	1	1	1	#2 Deep Beam Guardrail (12 Ga) at 25'
724G	2	2	2	Steel Tube - 6"x 8"x 72"x 1/8" min
741G	0	2	6	Steel Tube - 6" x 8" x 54" x 1/8" min
4147B	2	4	8	Wood Posts - 5 1/2" x 7 1/2" x 45"
4063B	6	4	0	Wood CRT Posts - 6"x 8"x 72"
4075B	6	6	6	Wood Block - 6"x 8"x 14"
705G	1	1	1	Pipe Sleeve - 2" std. pipe x 5 1/2"
782G	1	1	1	Bearing Plate - 8"x 8"x 5/8"
704A	1	1	1	Cable Anchor
3000G	1	1	1	Cable Assembly (3/4" x 78")
33875G	1	1	1	Angle Strut
995A	1	1	1	ET-2000 Plus Guardrail Terminal
HARDWARE				
5148G	2	2	2	3/4" x 9 1/2" Hex Hd (Top of tubes 1&2) A325
3300G	7	7	7	5/8" Washers
3478G	2	4	8	5/8" x 7 1/2" Hex Bolt
3500G	1	1	1	5/8" x 10" Post Bolt (Post 2 of LET)
3580G	6	6	6	5/8" x 18" HGR Post Bolt (posts ③ thru ⑧)
3360G	16	16	16	5/8" x 1 1/4" HGR Splice Bolt
3340G	25	27	31	5/8" HGR Nut (16-spl, 7-posts)
4228G	2	2	2	3/8" x 4" Lag Screw
3910G	2	2	2	1" Hex Nut (Anchor Cable)
3900G	2	2	2	1" Washer (Anchor Cable)
6018B	1	1	1	Right - Object Marker
6019B	1	1	1	Left - Object Marker
3700G	4	4	4	3/4" Washer
3704G	2	2	2	3/4" Heavy Hex Nut
3497G	0	2	6	5/8" x 9 1/2" Hex Hd (Top of Tubes 3-8) A307

Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL (ET-2000 PLUS) (WOOD POST)

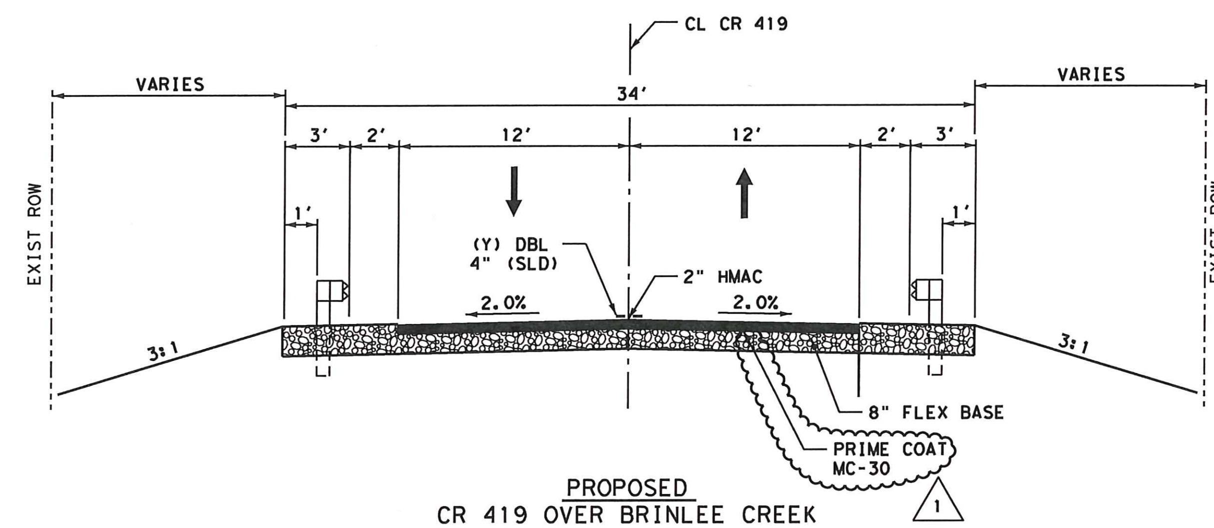
SGT(7)-11

FILE: sgt712.dgn	DN: TxDOT	CK: AM	DW: BD	CK: VP
©TxDOT April 1997	CONT	SECT	JOB	HIGHWAY
REVISIONS				
12-2011	DIST	COUNTY		SHEET NO. 12

ESTIMATED QUANTITIES

ITEM	ITEM DESCRIPTION	UNIT	CO RD 419
	ROADWAY		
1	MOBILIZATION	LS	1
2	PREPARING ROW	STA	3.00
2A	REMOVE EXISTING PAVEMENT (6")	CY	88
3	D-GR HMA (METH) TY-C PG 64-22 (2")	TON	59
3A	CONC CL S (APPR SLAB)	LF	61.8
4	FL BS (TY A GR 4)(8")	CY	168
4A	PRIME COAT MC-30	GAL	103
5	EXCAVATION (ROADWAY AND CHANNEL)	CY	850
6	EMBANKMENT	CY	113
7	BROADCAST SEEDING (TYPE 1)	ACRE	0.2
8	RIPRAP (STONE PROTECTION) (18")	CY	166
9	BEDDING MATERIAL (6")	CY	70
10	BARRICADES, SIGNS, AND TRAFFIC HANDLING	MO	4
11	WIRE FENCE (5-WIRE BARBED)	LF	363
11A	WATER CROSSING FENCE	EA	1
12	MTL W-BEAM GD FEN (TIM POST)	LF	50
13	MTL BM GD FEN TRANS (T101)	EA	4
14	GUARDRAIL END TREATMENT (INSTALL)	EA	4
15	REF PAV MRK TY II (Y) 4" (SLD)	LF	400
16	TEMP SEDIMENT CONTROL FENCE (INSTALL & REMOVE)	LF	400
17	ROCK FILTER DAM (TY 2)	LF	48
	BRIDGE		
18	CEMENT STABILIZED BACKFILL	CY	109
19	DRILL SHAFT (36 IN)	LF	180
20	CL C CONC (ABUT)	CY	46.4
21	REINF CONC SLAB (CL S)	SF	1,500
22	PRESTR CONC BEAM (Tx40)	LF	198
23	CONC SURF TREAT (CLASS I)	SY	167
24	RAIL (TY T101)	LF	148
25	SEALED EXPANSION JOINT (4 IN)(SEJ-A)	LF	70
26	REMOVE 96" CMP	LF	122

△1



PROPOSED
CR 419 OVER BRINLEE CREEK
TYPICAL PAVING SECTION

NO.	DATE	REVISION	APP.
1	11/06/13	ADDENDUM 1	DWE

DANNENBAUM ENGINEERING, CO.
DALLAS LLC
REGISTRATION NO. 8996

[signature] 11/06/13
SIGNATURE OF REGISTRANT

STATE OF TEXAS
DANIEL W. EVERETT
93551
LICENSED
PROFESSIONAL ENGINEER

DANNENBAUM
ENGINEERING COMPANY - DALLAS, LLC
T.B.P.E. FIRM REGISTRATION #8996
4141 BLUE LAKE CIRCLE, STE 240 DALLAS, TX 75244 (972) 239-2002

COLLIN COUNTY, TEXAS

COUNTY ROAD 419 OVER BRINLEE CREEK

QUANTITIES &
TYPICAL SECTION

SHEET 1 OF 1

DESIGN	COUNTY	DEC, INC. PROJECT NO.	SHEET NO.
GRAPHICS	COLLIN	4433-54	
CHECK	STATE	DATE: 11/6/2013	2
CHECK	TEXAS	SCALE: AS SHOWN	

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FILE: c:\projectwise\dannenbaum\workdir\danielle.rix\dms04545\4433-54 TYP AND QUAN.dgn
DATE: 11/6/2013

COLLIN COUNTY
CONSTRUCTION, BRIDGE:
CR 419 OVER BRINLEE CREEK
Addendum 1
BID SCHEDULE

ITEM NO.	SPECIAL REFERENCE SPEC ITEM	QUANTITY	UNIT	DESCRIPTION WITH BID PRICE WRITTEN IN WORDS	UNIT PRICE	EXTENDED AMOUNT
1		1	LS	MOBILIZATION, DEMOBILIZATION, BONDS, INSURANCE, for the sum of: _______________________________DOLLARS and________________________________CENTS PER LUMP SUM	$	$
2		3.00	STA	PREPARING ROW, including all appurtenant work, complete in place, for the sum of: _______________________________DOLLARS and________________________________CENTS PER STATION	$	$
2A		88.00	CY	REMOVE EXISTING PAVEMENT (6"), including all appurtenant work, complete in place, for the sum of: _______________________________DOLLARS and________________________________CENTS PER CUBIC YARD	$	$
3	TxDOT ITEM 340	59	TONS	DGR HMA(METH) TY-C PG64-22(2"), complete in place, for the sum of: _______________________________DOLLARS and________________________________CENTS PER TON	$	$
3A	TxDOT ITEM 420	61.8	LF	CONC CL S (APPR SLAB), for the sum of: _______________________________DOLLARS and________________________________CENTS PER CUBIC YARD		
4		168	CY	FL BS (TY A GR 4)(8"), complete in place for the sum of: _______________________________DOLLARS and________________________________CENTS PER CUBIC YARD	$	$
4A		103	GAL	PRIME COAT MC-30, complete in place for the sum of: _______________________________DOLLARS and________________________________CENTS PER GALLON	$	$
5		850	CY	EXCAVATION (ROADWAY AND CHANNEL), complete in place, for the sum of: _______________________________DOLLARS and________________________________CENTS PER CUBIC YARD	$	$
6		113	CY	EMBANKMENT , complete in place, for the sum of: _______________________________DOLLARS and________________________________CENTS PER CUBIC YARD	$	$
7		0.2	ACRES	BROADCAST SEED (TYPE 1), complete in place, for the sum of: _______________________________DOLLARS and________________________________CENTS PER ACRE	$	$

COLLIN COUNTY
CONSTRUCTION, BRIDGE:
CR 419 OVER BRINLEE CREEK

BID SCHEDULE

ITEM NO.	SPECIAL REFERENCE SPEC ITEM	QUANTITY	UNIT	DESCRIPTION WITH BID PRICE WRITTEN IN WORDS	UNIT PRICE	EXTENDED AMOUNT
8		166	CY	RIPRAP (STONE PROTECTION)(18 IN), complete in place, for the sum of: _______________________________DOLLARS and________________________________CENTS PER CUBIC YARD	**$**	**$**
9	TxDOT ITEM 432	70	CY	BEDDING MATERIAL (6"), complete in place, for the sum of: _______________________________DOLLARS and________________________________CENTS PER CUBIC YARD	**$**	**$**

COLLIN COUNTY
CONSTRUCTION, BRIDGE:
CR 419 OVER BRINLEE CREEK

BID SCHEDULE

ITEM NO.	SPECIAL REFERENCE SPEC ITEM	QUANTITY	UNIT	DESCRIPTION WITH BID PRICE WRITTEN IN WORDS	UNIT PRICE	EXTENDED AMOUNT
10		4	MO	BARRICADES, SIGNS AND TRAFFIC HANDLING, complete in place, for the sum of: ______________________________DOLLARS and_______________________________CENTS PER MONTH	**$**	**$**
11		266	LF	WIRE FENCE (5-WIRE BARBED WIRE), complete in place, for the sum of: ______________________________DOLLARS and_______________________________CENTS PER LINEAR FOOT	**$**	**$**
11A		1	EA	WATER CROSSING FENCE, complete in place, for the sum of: ______________________________DOLLARS and_______________________________CENTS PER EACH	**$**	**$**
12	TxDOT ITEM 540	50	LF	MTL W-BEAM GD FEN (TIM POST), complete in place, for the sum of: ______________________________DOLLARS and_______________________________CENTS PER LINEAR FOOT	**$**	**$**
13	TxDOT ITEM 540	4	EA	MTL BM GD FEN TRANS (T101), complete in place, for the sum of: ______________________________DOLLARS and_______________________________CENTS PER EACH	**$**	**$**
14	TxDOT ITEM 544	4	EA	GUARDRAIL END TREATMENT (INSTALL), complete in place, for the sum of: ______________________________DOLLARS and_______________________________CENTS PER EACH	**$**	**$**
15	TxDOT ITEM 666	400	LF	REF PAV MRK TY II (Y) 4" (SLD) ______________________________DOLLARS and_______________________________CENTS PER LINEAR FOOT	**$**	**$**
16		400	LF	TEMP SEDMT CONT FEN (INSTAL & REMOVE), complete in place, for the sum of: ______________________________DOLLARS and_______________________________CENTS PER LINEAR FOOT	**$**	**$**
17	TxDOT ITEM 506	48	LF	ROCK FILTER DAM (TY 2)(INSTALL & REMOVE), complete in place, for the sum of: ______________________________DOLLARS and_______________________________CENTS PER LINEAR FOOT	**$**	**$**
BRIDGE						
18	TxDOT ITEM 400	109	CY	CEM STABIL BACKFILL, for the sum of: ______________________________DOLLARS and_______________________________CENTS PER CUBIC YARD	**$**	**$**

COLLIN COUNTY
CONSTRUCTION, BRIDGE:
CR 419 OVER BRINLEE CREEK

BID SCHEDULE

ITEM NO.	SPECIAL REFERENCE SPEC ITEM	QUANTITY	UNIT	DESCRIPTION WITH BID PRICE WRITTEN IN WORDS	UNIT PRICE	EXTENDED AMOUNT
19	TxDOT ITEM 416	180	LF	DRILL SHAFT (36 IN), for the sum of: ________________________________DOLLARS and________________________________CENTS PER LINEAR FOOT	$	$
20	TxDOT ITEM 420	46.4	CY	CL C CONC (ABUT), for the sum of: ________________________________DOLLARS and________________________________CENTS PER CUBIC YARD	$	$
21	TxDOT ITEM 422	1,500	SF	REINF CONC SLAB (CL S), for the sum of: ________________________________DOLLARS and________________________________CENTS PER SQUARE FOOT	$	$
22	TxDOT ITEM 425	198	LF	PRESTR CONC BEAM (TX40), for the sum of: ________________________________DOLLARS and________________________________CENTS PER LINEAR FOOT	$	$
23	TxDOT ITEM 428	167	SY	CONC SURF TREAT (CLASS I), for the sum of: ________________________________DOLLARS and________________________________CENTS PER SQUARE YARD	$	$
24	TxDOT ITEM 450	148	LF	RAIL (TY T101), for the sum of: ________________________________DOLLARS and________________________________CENTS PER LINEAR FOOT	$	$
25	TxDOT ITEM 454	70	LF	SEALED EXPANSION JOINT (4 IN)(SEJ-A), complete in place for the sum of: ________________________________DOLLARS and________________________________CENTS PER LINEAR FOOT	$	$
26		122	LF	REMOVAL OF OLD STRUCTURE, for the sum of: ________________________________DOLLARS and________________________________CENTS PER LINEAR FOOT	$	$
					CR 419 OVER BRINLEE CREEK TOTAL BID	**$**