



COUNTY PURCHASING AGENT
Fort Bend County, Texas

Jaime Kovar
County Purchasing Agent

(281) 341-8640
Fax (281) 341-8645

June 24, 2022

TO: All Prospective Bidders

RE: Addendum No. 1 – Fort Bend County Bid 22-083 Flat Bank/Steep Bank Channel Bank Stabilization for Fort Bend County Drainage District FEMA Project 11898

Addendum 1:

Attached is Addendum 1. Vendors are to use Addendum 1 document (provided by Engineer) while preparing their solicitation response.

Immediately upon your receipt of this addendum, please fill out the following information and email this page to Olivia Rios at olivia.rios@fortbendcountytexas.gov

Company Name

Signature of person receiving addendum Date

If you have any questions, please contact this office.

Sincerely,

Jaime Kovar
County Purchasing Agent



M&E Consultants

Soil & Water Engineering Solutions

Subject:

Date: 6-22-2022

Contract – Site Showing for Fort Bend County Drainage District
Flat Bank/ Steep Bank Channel Bank Stabilization, Bid 22-083
Fort Bend County, Texas

To: Jamie Kovar
County Purchasing Agent
Fort Bend County

Addenda to Bid 22-083

The following information is added to the solicitation:

CORRECTIONS TO THE SOLICITATION:

Project drawings are replaced with the attached drawings.

The specifications have been updated and include the following changes.

CS 420 Section 6, change “Site Preparation shall include the removal of existing pipes, concrete rubble or other structures required **for the installation of the sheet pile walls**”, to ... required to **repair the channel slopes**.

CS 420 Section 6, change Site Preparation, change “Site Preparation shall include the installation of culverts provided by the **county...**” to **contractor. The Contractor shall furnish and install all pipe, joints and end sections as shown on the drawings. All pipe and fittings furnished shall be 24” diameter, Poly-coated, 12 gage, riveted pipe.**

CS 420 Section 6, (Bid Items 12, 13 and 14), a., b. and c., change the Classification from Class A to Class **C**.

TECHNICAL QUESTIONS & ANSWERS

Q: Does the Contractor have to furnish a lab for testing Class A compaction testing?

A: Yes, the contractor is responsible for hiring a lab to perform testing as needed to create proctor curves in accordance with ASTM requirements, and to perform on site density testing to ensure all Class A compaction is met.

Q: Where is the riprap stockpiled?

A: Stockpile areas are located within the work limits adjacent to the channel, the contractor will have to determine locations for each site, in order to maintain access for other equipment. Staging and delivery times will have to be coordinated for optimum use to space and access.

Q: What type of Construction schedule is required?

A: Unless furnished prior to contract award, the Contractor shall, prior to commencement of work, submit to the Contracting Officer for approval: (1) a construction schedule showing the order in which he/she proposes to carry on the work indicating the periods during which he/she will perform work on each item listed in the bid schedule; and (2) the hours and days in which he/she proposes to carry on the work.

If, in the opinion of the Contracting Officer, the Contractor falls behind the approved construction schedule, the Contractor shall take such steps as may be necessary to improve his/her process and the Contracting Officer may require him/her to either increase the number of shifts, days or hours of work, or the amount of construction plant, or all of them, and to submit for approval such revised construction schedule as may be deemed necessary to show the manner in which the agreed rate of progress will be regained, all without additional cost to the Contracting Local Organization. If the Contractor fails to submit a revised construction schedule within the time specified by the Contracting Officer, the Contracting Officer may withhold approval of progress payments and/or take such other actions as provided in this contract until such time as the Contractor submits the required construction schedule. Failure of the Contractor to comply with the requirements of the Contracting Officer under this article shall be grounds for determination by the Contracting Officer that the Contractor is not prosecuting the work with such diligence as will insure completion within the time specified. Upon such determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part thereof, in accordance with the General Conditions.

The maximum workweek that will be approved is:

- Monday through Saturday, 10 hours per day
- Work is permitted during "daylight" hours only.

All work under this contract except minor items of work of an emergency, protective, or maintenance nature will be suspended for the periods listed below. These days are not included in the original contract performance time:

- July 4, 2022
- November 24-26, 2022
- December 24 -26, 2022
- January 2, 2023

Q: How are rainout days handled?

A: Weather delays shall be handled as following.

The Contracting Officer may order suspension of the work in whole or in part, commencing with the day after receipt of the Notice to Proceed by the Contractor, due to weather or the effects of weather at the site, for such time as he/she considers it unfavorable for satisfactory prosecution of the work.

When the Contracting Officer orders suspension under (a) of this article, the contract completion date shall be extended a full calendar day for each calendar day during suspension of the work if:

- (1) All work is suspended except minor items as may be designated in this contract (work of an emergency, protective or maintenance nature may be performed at any time); and

(2) The hours lost in any one workday of the authorized workweek through suspension equal one-half or more of the hours of an authorized workday.

(c) If the Contracting Officer orders suspension of work as provided in (b) of this article and the hours lost in the workday immediately preceding a non-workday equal one-half or more of the hours in an authorized workday, the contract completion date shall be extended a full calendar day for each non-workday during suspension of the work.

(d) When the Contracting Officer orders any suspension of the work under this article, the Contractor shall not be entitled to any cost or damages resulting from such suspension.

(e) When the contract completion date is extended under this article, the contract shall be modified in writing accordingly.

Q: How are variation in quantities handled?

A: Excavation, earthfill, rock riprap and geotextile quantity variations shall be handled as following:

(a) Where the quantity of work shown for an item in the bid schedule, including any modification thereof, is estimated, no adjustment of the contract price nor of the performance time shall be made for overruns or underruns which are within 25 percent of the estimated quantity of any such item.

(b) For overruns of more than 25 percent, the Contracting Officer shall re-estimate the quantity for the item, establish an equitable contract price for the overrun of more than 25 percent, adjust contract performance time equitably, and modify the contract in writing accordingly; this article to thereafter be applicable to the total re-estimated item quantity.

(c) For underruns of more than 25 percent, the Contracting Officer shall determine the quantity for the item, establish an equitable contract price therefor, adjust contract performance time equitably, and modify the contract in writing accordingly.

Q: Is there a clause to protect the existing infrastructure such as the sidewalks?

A: the following clause shall be added.

PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS

(a) The Contractor shall preserve and protect all structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, which are not to be removed and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so and shall avoid damaging vegetation that will remain in place. If any limbs or branches of trees are broken during contract performance, or by the careless operation of equipment, or by workmen, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.

(b) The Contractor shall protect from damage all existing improvements and utilities (1) at or near the work site, and (2) on adjacent property of a third party, the locations of which are made known to or should be known by the Contractor. The Contractor shall repair any damage to those facilities, including those that are the property of a third party, resulting from failure to comply with the requirements of this contract or failure to exercise reasonable care in performing the work. If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.

Q: Is the successful contractor required to attend a pre-work conference?

A: Yes, the successful offeror will be notified and will be required to attend. The Contracting Officer's notification will include specific details regarding the date, time, and location of the conference, any need for attendance by subcontractors, and information regarding the items to be discussed

Q: Are there any safety clauses for this job?

– ACCIDENT PREVENTION AND SAFETY

- (a) The Contractor shall provide and maintain work environments and procedures which will:
 - (1) Safeguard the public and Contracting Local Organization personnel, property, materials, supplies, and equipment exposed to Contractor operations and activities.
 - (2) Avoid interruptions of Contracting Local Organization operations and delays in project completion dates; and
 - (3) Control costs in the performance of this contract.
- (b) Whenever the Contracting Officer becomes aware of any noncompliance with these requirements or any condition which poses a serious or imminent danger to the health or safety of the public or Contracting Local Organization personnel, the Contracting Officer shall notify the Contractor orally, with written confirmation, and request immediate initiation of corrective action. This notice, when delivered to the Contractor or the Contractor's representative at the work site, shall be deemed sufficient notice of the noncompliance and that corrective action is required. After receiving the notice, the Contractor shall immediately take corrective action. If the Contractor fails or refuses to promptly take corrective action, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. The Contractor shall not be entitled to any equitable adjustment of the contract price or extension of the performance schedule on any stop work order issued under this article.
- (c) The Contractor shall insert this article, including this paragraph (c), with appropriate changes in the designation of the parties, in subcontracts.
- (d) Before commencing the work, the Contractor shall--
 - (1) Submit a written proposed plan for implementing this article. The plan shall include an analysis of the significant hazards to life, limb, and property inherent in contract work performance and a plan for controlling these hazards; and
 - (2) Meet with representatives of the Contracting Officer to discuss and develop a mutual understanding relative to administration of the overall safety program.
- (e) In the event there is a conflict between the requirements contained in the specifications, Contractor's safety program, and U.S. Department of Labor construction safety and health standards, the more stringent requirement will prevail.

The Contractor shall comply with applicable OSHA 1926 safety regulations. The Contracting Officer will notify the Contractor of any noncompliance with these requirements. If the Contractor refuses to comply with these requirements, all or part of the work may be suspended until corrective action is taken.

The Inspector and Project Engineer will have delegated authority to suspend work for any noncompliance with safety requirements that poses a serious or imminent danger to the health or safety of the public and/or personnel of the Contractor, Contracting Local Organization, or Federal Grantor Agency, or the Quality Assurance Personnel.

The Contract and OSHA 1926 and 1910 emphasizes several specific safety items which must be understood by the Contractor prior to bidding this job. Among these items are the requirements for:

Written plan for accident prevention and safety (CO must approve prior to beginning work).

First Aid Training certificates, one person per crew

First aid facilities – on site

Safety Meetings, weekly “tool box” and

Restroom Facilities on site monthly joint safety meetings

Dust control

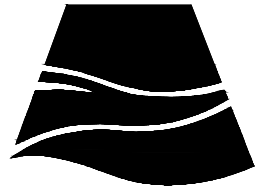
Rollover protective structures

Backup alarms

Hard hats shall be worn on the job site at all times and equipment shall be outfitted with working backup alarms, seat belts, and approved roll-over protective structures.

All equipment shall be inspected by the QA Construction Inspector prior to use on the project.

Equipment will be inspected at the job site.



M&E CONSULTANTS

Soil & Water Engineering Solutions
F-4324

FORT BEND COUNTY DRAINAGE DISTRICT

FLAT BANK/STEEP BANK – CHANNEL REPAIR
FORT BEND COUNTY, TEXAS

SPONSORED BY
FORT BEND COUNTY
FORT BEND COUNTY DRAINAGE DISTRICT

COOPERATING WITH
FEMA PROJECT 11898

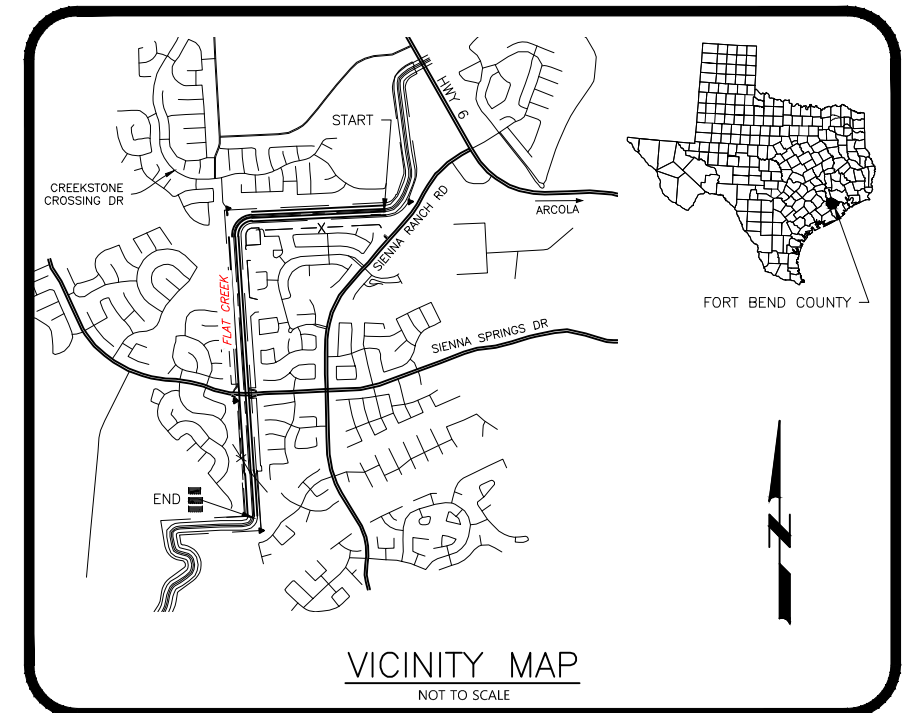
2022
ENGINEERING JOB CLASS VI
CONSTRUCTION DRAWINGS APPROVED



B. Trent Street
B. TRENT STREET
TEXAS REG. P.E. NO. 61421

6/23/2022
DATE

INDEX OF DRAWINGS	
SHEET NO.	TITLE
–	COVER
1	LEGEND AND CONSTRUCTION NOTES
2	GENERAL PLAN
3	SITE 14 PLAN AND SECTION
4	SITES 15 AND 16 PLANS AND SECTIONS
5	SITES 17 AND 18 PLANS AND SECTIONS
6	SITE 19 PLAN AND SECTION
7	SITE 14–16 DRAIN PIPE PROFILES
8–10	GEOLOGIC INVESTIGATION BORE HOLES
11	STORMWATER POLLUTION PREVENTION PLAN
12	STORMWATER POLLUTION PREVENTION PLAN DETAILS





CALL BEFORE YOU DIG!

Texas 811
Know what's below. Call before you dig.

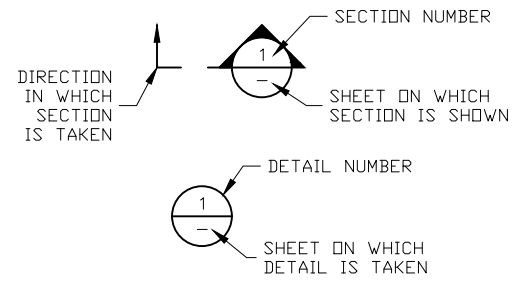
PARTICIPANTS REQUEST 48 HOURS NOTICE BEFORE YOU DIG, DRILL, OR BLAST - STOP AND CALL

811

THE LONE STAR NOTIFICATION COMPANY AT 1-800-669-8344

SYMBOLS LEGEND

- EXISTING PROPERTY LINE
- 358--- EXISTING CONTOUR
- STREAM
- X- EXISTING FENCE
- DHE- EXISTING OVERHEAD ELECTRIC LINES
- UE-UE- EXISTING UNDERGROUND ELECTRIC LINES
- WW- WW- EXISTING WASTEWATER LINES
- - - - - CITY LIMITS
- - - - - TEMPORARY EASEMENT
- - - - - PERMANENT EASEMENT
- LOC- LIMITS OF CONSTRUCTION
- SF-SF-SF- SILT FENCE
- - - - - 100-YR FLOOD INUNDATION LEVEL
- X- PROPOSED FENCE
- O-O- PROPOSED HANDRAIL
- B-X EXISTING BOREHOLES
- EXISTING POWER POLE
- ▲BMX EXISTING BENCHMARK
- Ⓟ EXISTING PIEZMETER
- ← DIRECTION OF STORMWATER RUNOFF
- ▽ WATER LEVELS
- [Pattern] FLEX ROAD
- [Pattern] CONCRETE
- [Pattern] STABILIZED CONSTRUCTION ENTRANCE
- [Pattern] HIGH-SERVICE ROCK BERM
- [Pattern] EXISTING WETLAND
- YYY CUT SLOPE
- YYY FILL SLOPE
- LEFT RIGHT ORIENTATION WHEN LOOKING DOWNSTREAM



ABBREVIATIONS

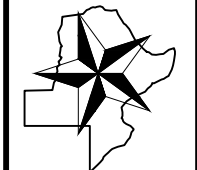
- ' , FT FEET
- APPROX. APPROXIMATELY
- B, BL BASELINE
- BMP BEST MANAGEMENT PRACTICE
- BM BENCH MARK
- C/C CENTER TO CENTER
- CFS CUBIC FEET PER SECOND
- Ⓢ CENTERLINE
- C.J. CONSTRUCTION JOINT
- CT. J. CONTRACTION JOINT
- DEG. DEGREES
- ∅ DIAMETER
- D/S DOWNSTREAM
- EA EACH
- E/F EACH FACE
- E/W EACH WAY
- E EAST, EASTING
- ELEV., EL. ELEVATION
- EXIST. EXISTING
- IN. INCHES
- LOC LIMITS OF CONSTRUCTION
- MAX. MAXIMUM
- MIN. MINIMUM
- MSL MEAN SEA LEVEL
- NOI NOTICE OF INTENT
- N NORTH, NORTHING
- N.T.S. NOT TO SCALE
- D.C. ON CENTER
- PSI POUNDS PER SQUARE INCH
- R RADIUS
- REINF. REINFORCED, REINFORCING
- SCH. SCHEDULE
- SHT. SHEET
- SF SILT FENCE
- STA. STATION
- S.S. STAINLESS STEEL
- SWPPP STORM WATER POLLUTION PREVENTION PLAN
- S.D. STUB DIVERSION
- TYP. TYPICAL
- U/S UPSTREAM
- WPAP WATER POLLUTION ABATEMENT PLAN
- YR YEAR

GENERAL NOTES

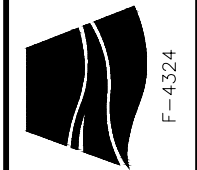
1. THE GENERAL NOTES AND TYPICAL DETAILS ARE GENERAL AND APPLY TO THE ENTIRE PROJECT EXCEPT WHERE THERE ARE SPECIFIC INDICATIONS TO THE CONTRARY.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING ALL EXISTING CONDITIONS, INCLUDING LOCATION AND DIMENSIONS OF ALL EXISTING UTILITIES. CONTRACTOR SHALL NOTIFY OWNER'S RESIDENT REPRESENTATIVE IF THERE IS A CONFLICT BETWEEN THE CONTRACT DOCUMENTS AND EXISTING CONDITIONS BEFORE PROCEEDING WITH WORK.
3. CONTOURS WERE OBTAINED FROM SURVEYS PERFORMED IN 2010 AND 2014. CONTRACTOR SHALL MAKE SITE SURVEYS AS NECESSARY FOR CONSTRUCTION AND IN ACCORDANCE WITH TECHNICAL SPECIFICATION 7, CONSTRUCTION SURVEYS.
4. THE LIMITS OF CONSTRUCTION ARE SET 2 FEET INSIDE PERMANENT AND TEMPORARY EASEMENTS UNLESS OTHERWISE SHOWN. CONTRACTOR SHALL STAY WITHIN THE LIMITS OF CONSTRUCTION AND NOT VENTURE OFF THE ACCESS ROADS EXCEPT FOR DIRECT ACCESS TO THE WORK AREAS. CONTRACTOR SHALL CLEARLY MARK THE LIMITS OF CONSTRUCTION WITH SILT FENCE.
5. COMPLY AND CONDUCT WORK IN ACCORDANCE WITH OWNER'S SECURITY REGULATIONS AND REQUIREMENTS. PROVIDE SITE SECURITY AS NECESSARY TO PROTECT AGAINST VANDALISM AND LOSS BY THEFT.
6. CONTRACTOR SHALL MANAGE AND PROTECT THE WORK FROM FLOOD FLOWS, STREAM FLOWS, SURFACE WATER RUNOFF, GROUNDWATER OR ANY OTHER WATER ENCOUNTERED DURING THE PROGRESS OF THE WORK IN ACCORDANCE WITH TECHNICAL SPECIFICATION II, REMOVAL OF WATER.
7. NOTIFY OWNER OF ANY SIGNS TO BE TEMPORARILY REMOVED. ALL EXISTING SIGNS TEMPORARILY REMOVED, IF ANY, SHALL BE STORED ON SITE BY THE CONTRACTOR AND SHALL BE REINSTALLED BY THE CONTRACTOR AT THE END OF CONSTRUCTION IN THEIR ORIGINAL CONDITION.
8. THE AREA AROUND OVERHEAD ELECTRICAL TOWERS SHALL BE PROTECTED. PROTECTION SHALL BE PROVIDED TO ANY TOWER, POLE OR GUY STRUCTURE WHEN TRAFFIC OR CONSTRUCTION ACTIVITY IS WITHIN 50 FEET OF THE STRUCTURE.
9. WORK UNDER THIS CONTRACT IS AUTHORIZED UNDER THE TERMS AND CONDITIONS OF THE U.S. ARMY CORPS OF ENGINEERS NATIONWIDE PERMIT 3, MAINTENANCE. SEE THE SWPPP FOR DETAILS.
10. CONTRACTOR SHALL FOLLOW REQUIREMENTS OF SWPPP.
11. CONSTRUCT THE STAGING AREAS AND VEHICLE MAINTENANCE AREAS IN A MANNER TO MINIMIZE THE RUNOFF OF POLLUTANTS.
12. NO ON-SITE CONCRETE BATCH PLANT WILL BE PERMITTED.
13. NO CONSTRUCTION FILL OR MATERIALS SHALL BE PLACED OR STORED IN AREAS NOT SPECIFICALLY DESIGNATED FOR THAT PURPOSE.
14. PROVIDE PROTECTED STORAGE FOR PAINTS, CHEMICALS, SOLVENTS, AND OTHER POTENTIALLY HAZARDOUS MATERIALS.
15. HANDLING, STORAGE, AND DISPOSAL OF ALL WASTE MATERIAL SHALL CONFORM TO THE SWPPP.
16. PREVENT POLLUTION OF SURFACE WATER AND GROUNDWATER WITH PETROLEUM PRODUCTS OR OTHER HAZARDOUS OR REGULATED SUBSTANCES. TAKE SPECIAL MEASURES TO PREVENT CHEMICALS, FUELS, OILS, GREASES, HERBICIDES, AND INSECTICIDES FROM ENTERING DRAINAGE WAYS. DO NOT ALLOW WATER USED IN ON-SITE MATERIAL PROCESSING AND CLEANUP, AND OTHER WASTEWATERS TO ENTER A DRAINAGE WAY, STREAM, OR RIVER.
17. PROMPTLY REPAIR EQUIPMENT LEAKING OIL/HYDRAULIC FLUID/ETC. IMMEDIATELY REMOVE AND REPLACE, AS NECESSARY, ALL SOILS ON WHICH SUCH LEAKAGE OCCURRED. PREVENT THE SPREAD OF LEAKED FLUIDS OR FLUID CONTAMINATED MATERIALS FROM THE ORIGINAL LEAK AREA. BE RESPONSIBLE FOR THE PROPER HANDLING AND DISPOSAL OF ALL SUCH CONTAMINATED MATERIALS.
18. PROVIDE SECONDARY CONTAINMENT AROUND ANY FUEL AND CHEMICAL STORAGE AREAS TO ENSURE THAT SPILLS FROM ANY SUCH AREAS DO NOT DISCHARGE FROM THE SECONDARY CONTAINMENT AREA. THE SECONDARY CONTAINMENT CAPACITY SHALL BE ADEQUATE TO CONTAIN THE CAPACITY OF THE LARGEST TANK/CONTAINER PLUS SUFFICIENT FREEBOARD TO CONTAIN PRECIPITATION.
19. PRECAUTIONS SHALL BE TAKEN DURING EQUIPMENT FUELING AND CHEMICAL TRANSFER OPERATIONS IN ORDER TO PREVENT SPILLS FROM OCCURRING AND TO MINIMIZE THE IMPACT OF ANY SPILL THAT DOES OCCUR. ALL FUEL AND CHEMICAL TRANSFERS SHALL BE CONTINUOUSLY MONITORED. MAINTAIN APPROPRIATE EQUIPMENT ON-SITE FOR RESPONDING TO ANY OIL OR HAZARDOUS SUBSTANCE SPILL. ADDITIONALLY, THERE SHALL BE AN ON-SITE PROHIBITION AGAINST THE TOPPING OFF OF TANKS AND EQUIPMENT.
20. REMOVE ALL FORM WORK FOLLOWING CONSTRUCTION.
21. EXISTING ROADS, ACCESS DRIVES, UTILITIES AND PROPERTY WITHIN THE LIMITS OF CONSTRUCTION DAMAGED BY CONTRACTOR AND ALL DISTURBED AREAS SHALL BE REPAIRED BY CONTRACTOR TO SAME OR BETTER CONDITION PRIOR TO END OF CONSTRUCTION.
22. DATUM INFORMATION:
 HORIZONTAL DATUM IS TEXAS STATE PLANE, NAD83, SOUTH CENTRAL ZONE, 4204, US SURVEY
 FEETVERTICAL DATUM IS NAVD 88. ALL ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL (MSL).

DESIGNED BY: BTS
 DRAWN BY: JPK
 CHECKED BY: BTS
 FILE NAME: FB-Flat_Steep-JK-2.dwg
 DATE PLOTTED: 6/23/22

LEGEND
 FLAT BANK/STEEP BANK REPAIR PROJECT
 IN
 FORT BEND COUNTY, TEXAS



M&E CONSULTANTS
 Soil & Water Engineering Solutions
 P.O. BOX 9
 HEIDENHEIMER, TX 76533
 (254) 983-9103, 9104 (FAX)

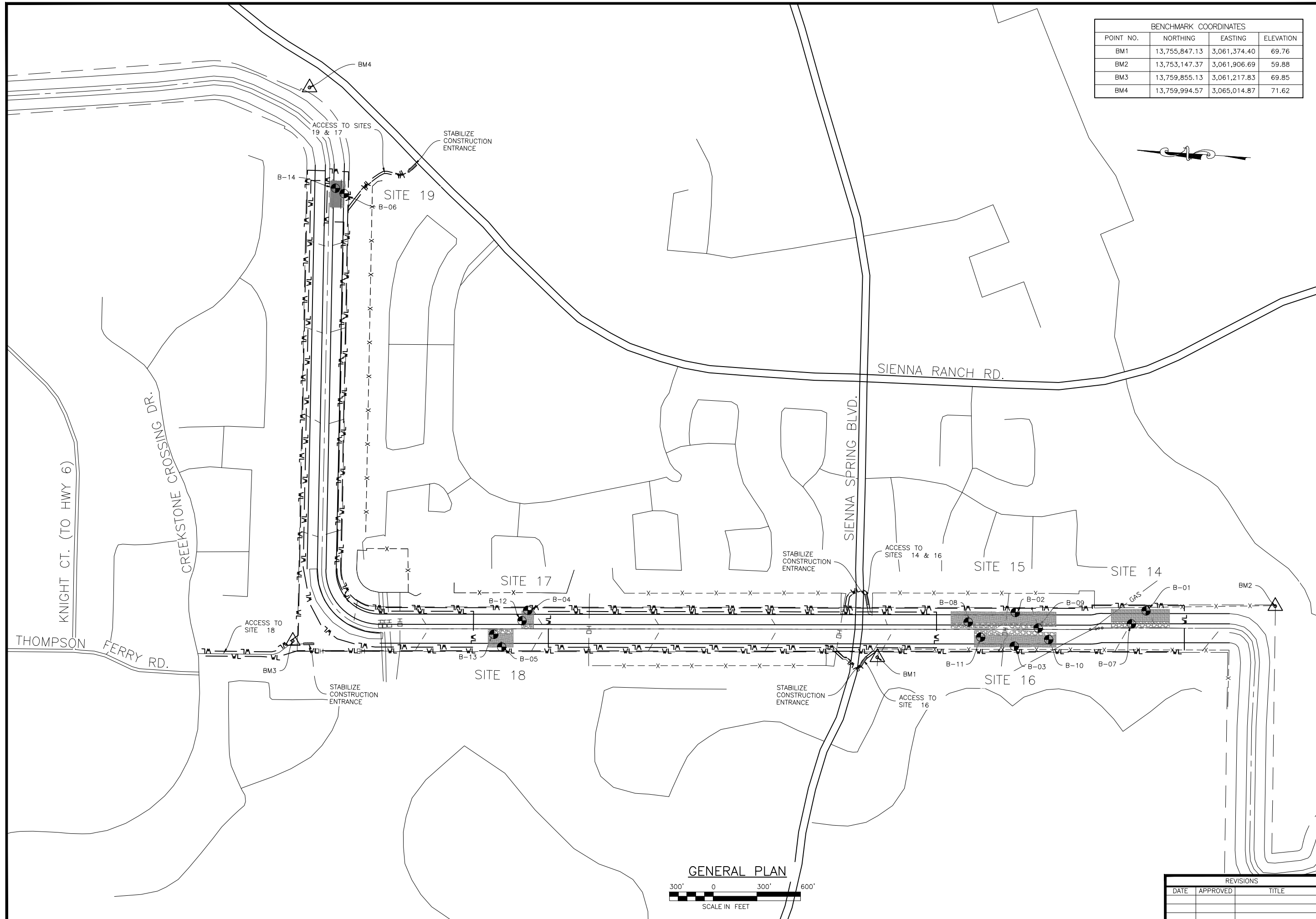


REVISIONS		
DATE	APPROVED	TITLE
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6/23/2022

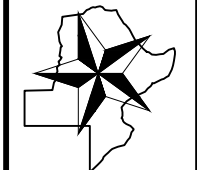


BENCHMARK COORDINATES			
POINT NO.	NORTHING	EASTING	ELEVATION
BM1	13,755,847.13	3,061,374.40	69.76
BM2	13,753,147.37	3,061,906.69	59.88
BM3	13,759,855.13	3,061,217.83	69.85
BM4	13,759,994.57	3,065,014.87	71.62

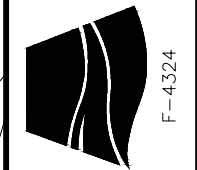


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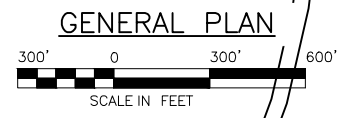
GENERAL PLAN
 FLAT BANK/STEEP BANK REPAIR PROJECT
 IN
 FORT BEND COUNTY, TEXAS



M&E CONSULTANTS
 Soil & Water Engineering Solutions
 P.O. BOX 9
 HEIDENHEIMER, TX 76533
 (254) 983-9103, 9104 (FAX)



SHEET
2



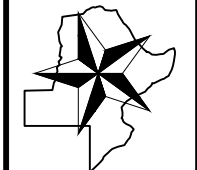
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DATE	APPROVED	TITLE

6/23/2022

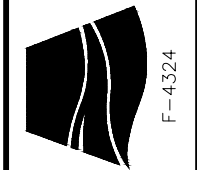


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DRAWN BY: JPK
CHECKED BY: BITS
FILE NAME: FB-Flat_Steep-JK-2.dwg
DATE PLOTTED: 6/23/22

SITE 14 PLAN & SECTION
FLAT BANK/STEEP BANK REPAIR PROJECT
IN
FORT BEND COUNTY, TEXAS

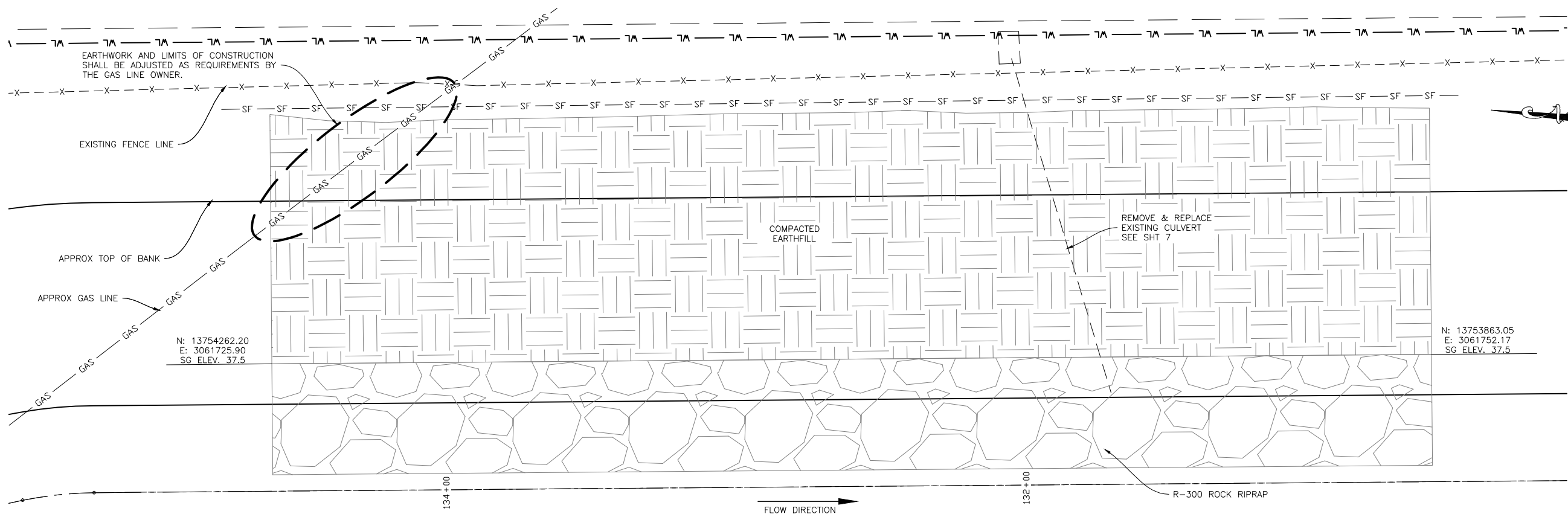


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HEIDENHEIMER, TX 76533
(254) 983-9103, 9104 (FAX)



SHEET

3

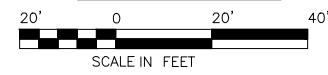


N: 13754262.20
E: 3061725.90
SG ELEV. 37.5

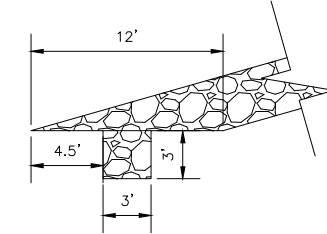
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SG ELEV. 37.5

FLOW DIRECTION

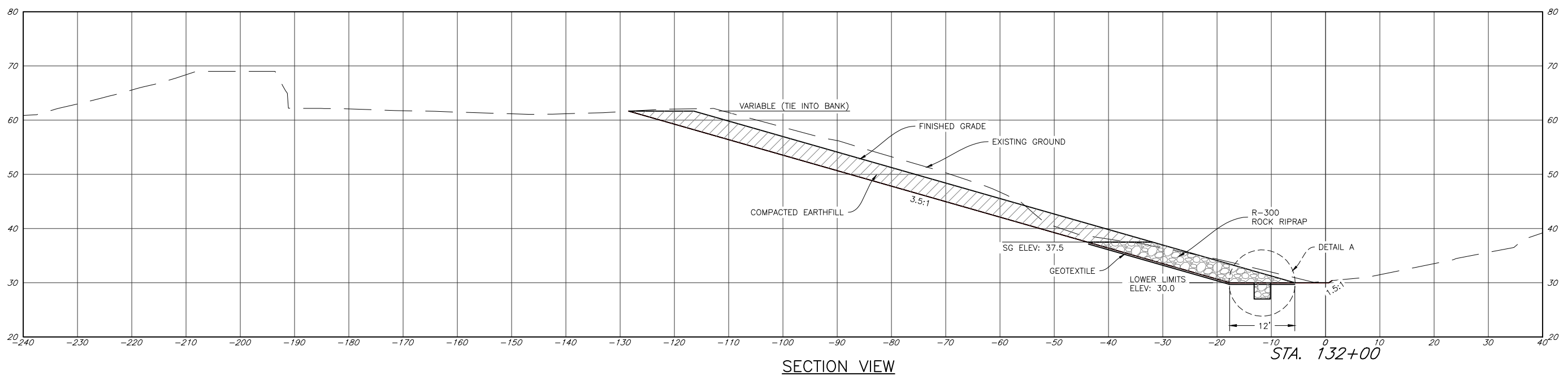
SITE 14 PLAN



A 25 FEET TRANSITION AREA FOR THE EXCAVATION AND FINISHED GRADE SHALL BE ADDED AT EACH END OF THE REPAIR AREA SHOWN TO TRANSITION TO THE EXISTING CHANNEL CONFIGURATION.



DETAIL "A"
N.T.S.



SECTION VIEW

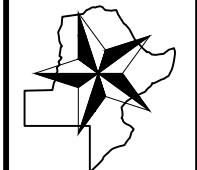
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6/23/2022

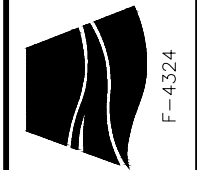


DESIGNED BY: BTS
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SITES 15 AND 16 PLANS AND SECTIONS
FLAT BANK/STEEP BANK REPAIR PROJECT
IN
FORT BEND COUNTY, TEXAS

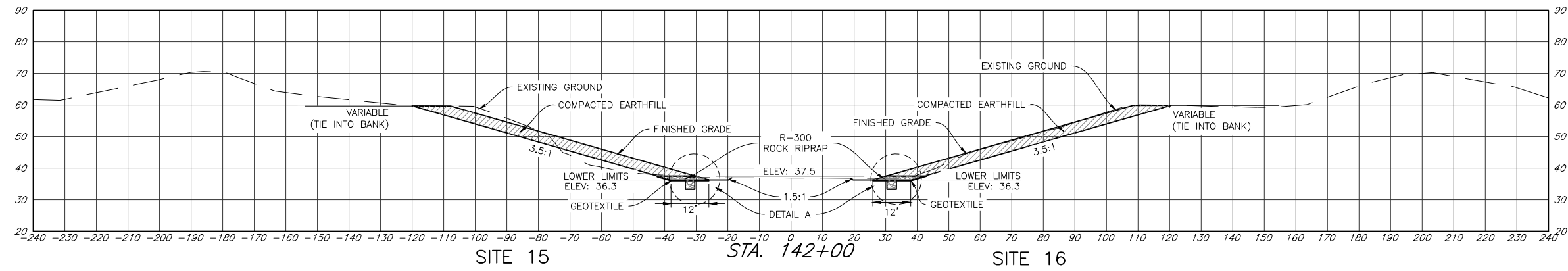
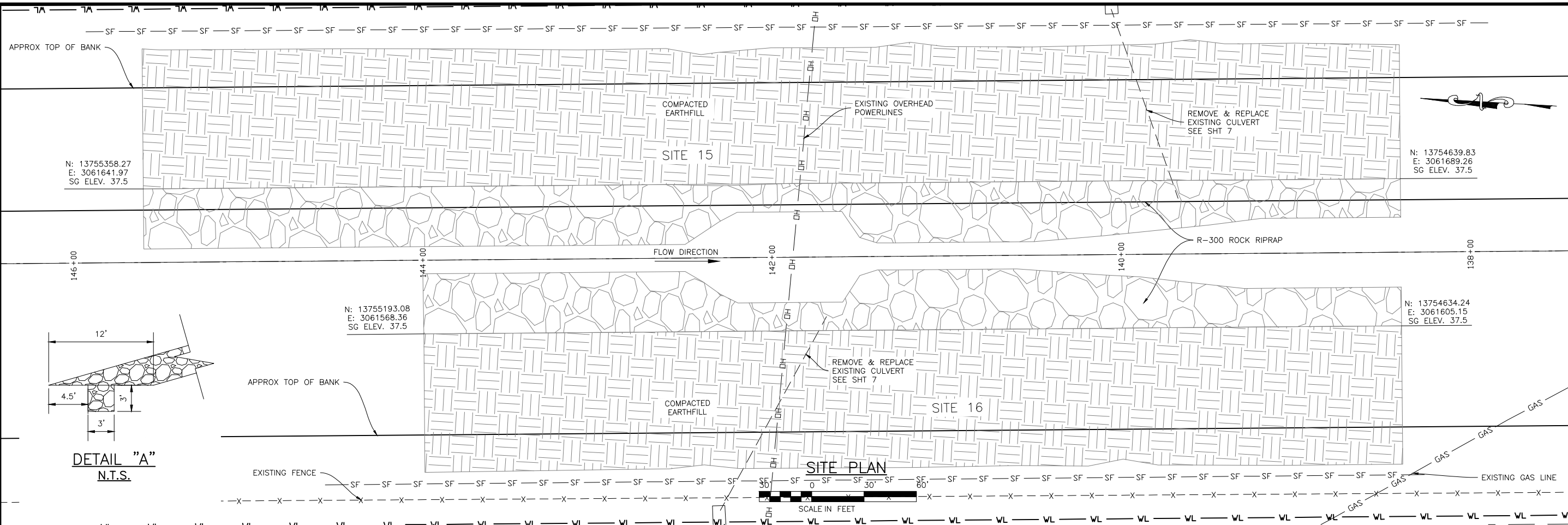


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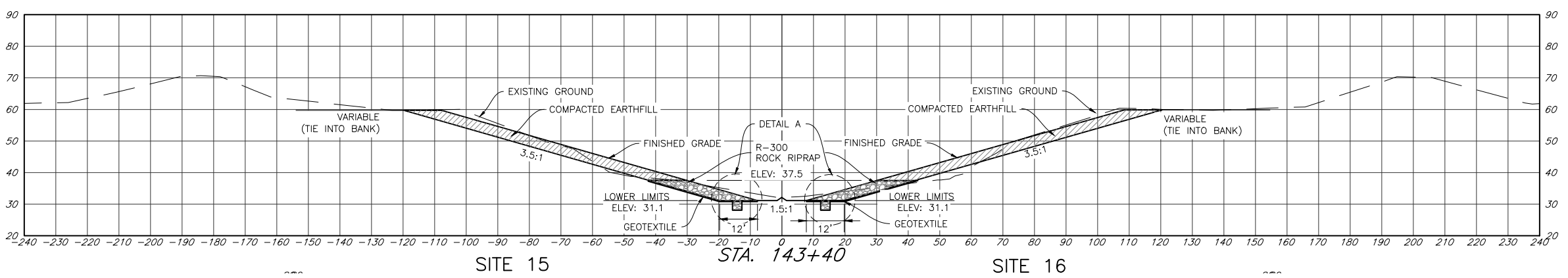


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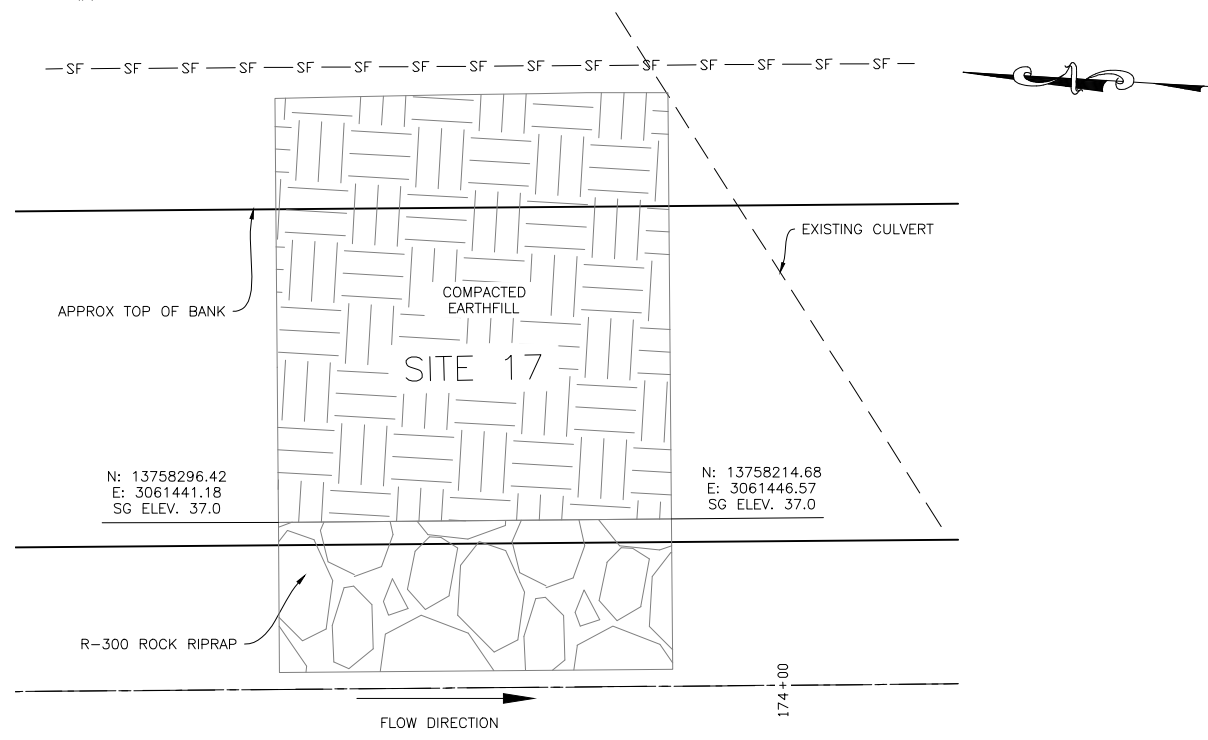
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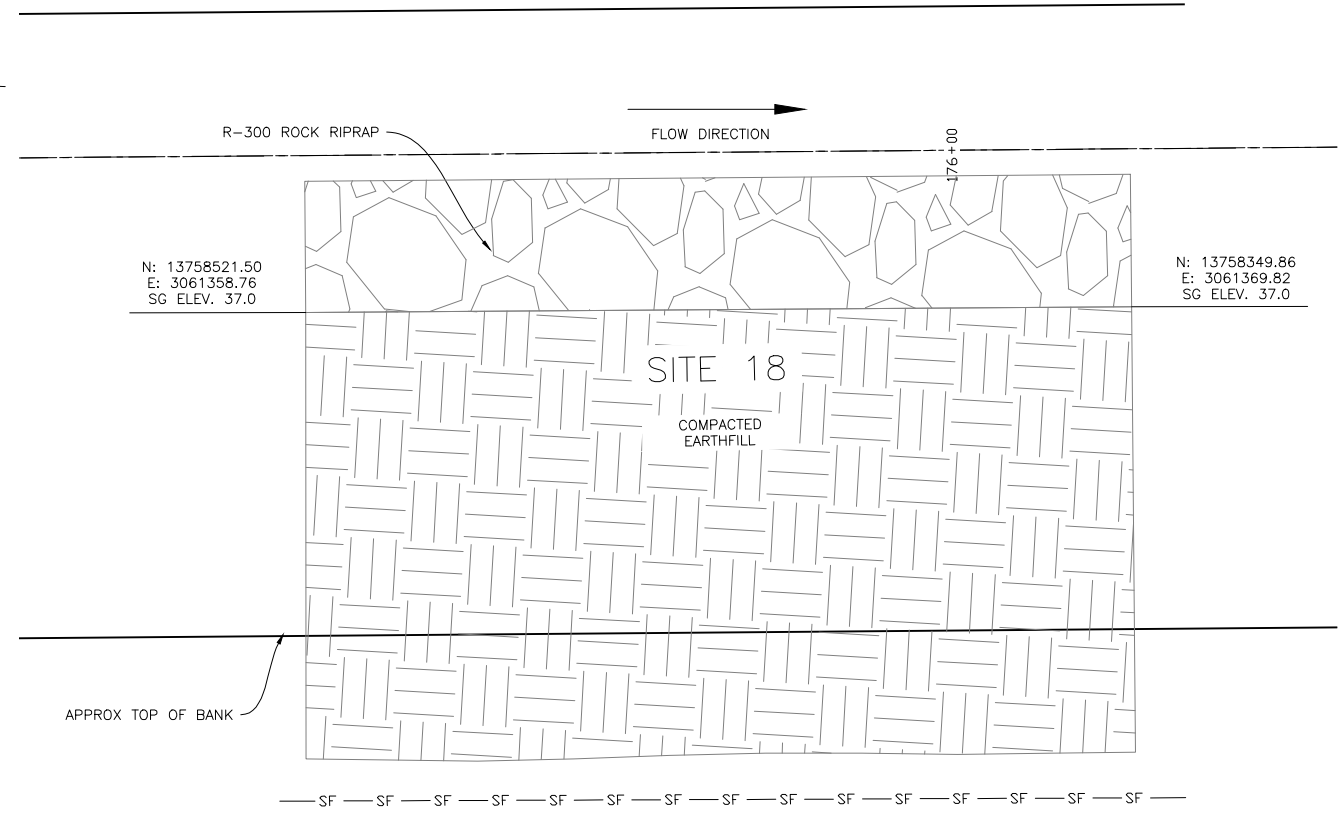
A 25 FEET TRANSITION AREA FOR THE EXCAVATION AND FINISHED GRADE SHALL BE ADDED AT EACH END OF THE REPAIR AREA SHOWN TO TRANSITION TO THE EXISTING CHANNEL CONFIGURATION.



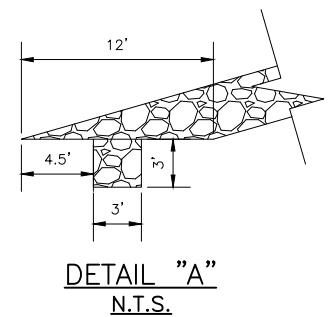
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DATE	APPROVED	TITLE



PLAN VIEW SITE 17
 SCALE IN FEET
 20' 0 20' 40'

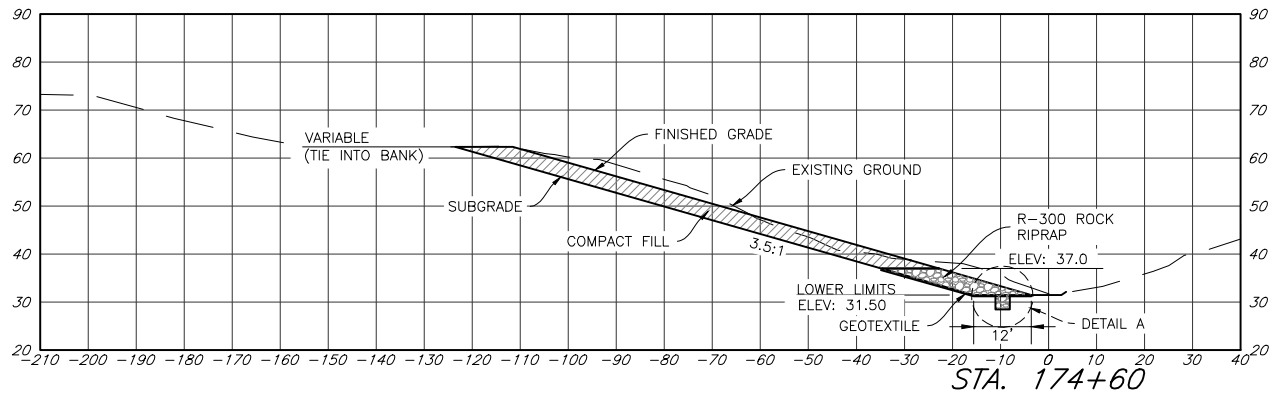


PLAN VIEW SITE 18
 SCALE IN FEET
 20' 0 20' 40'

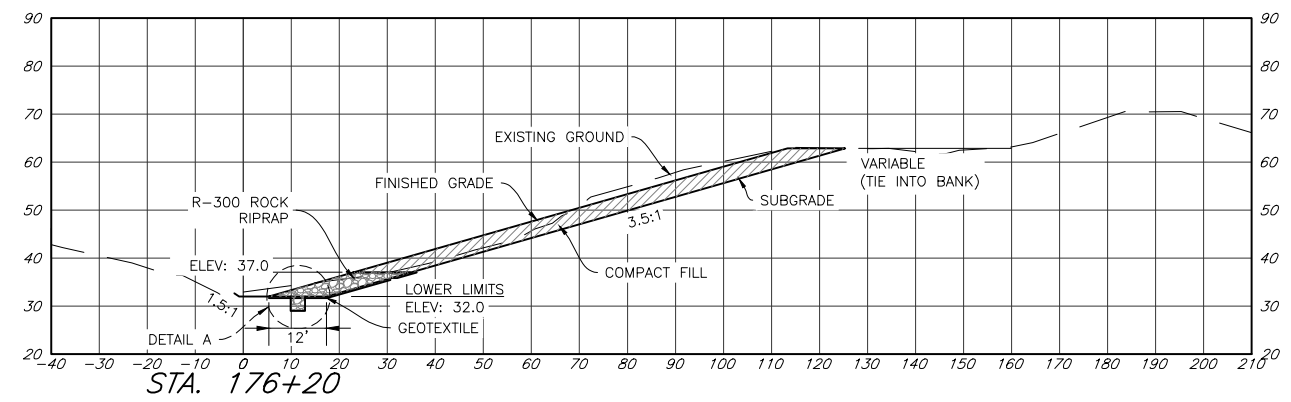


DETAIL "A"
 N.T.S.

A 25 FEET TRANSITION AREA FOR THE EXCAVATION AND FINISHED GRADE SHALL BE ADDED AT EACH END OF THE REPAIR AREA SHOWN TO TRANSITION TO THE EXISTING CHANNEL CONFIGURATION.



SECTION VIEW SITE 17
 STA. 174+60

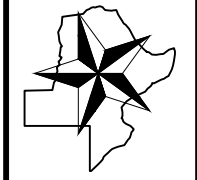


SECTION VIEW SITE 18
 STA. 176+20

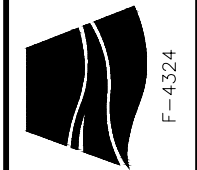
REVISIONS		
DATE	APPROVED	TITLE

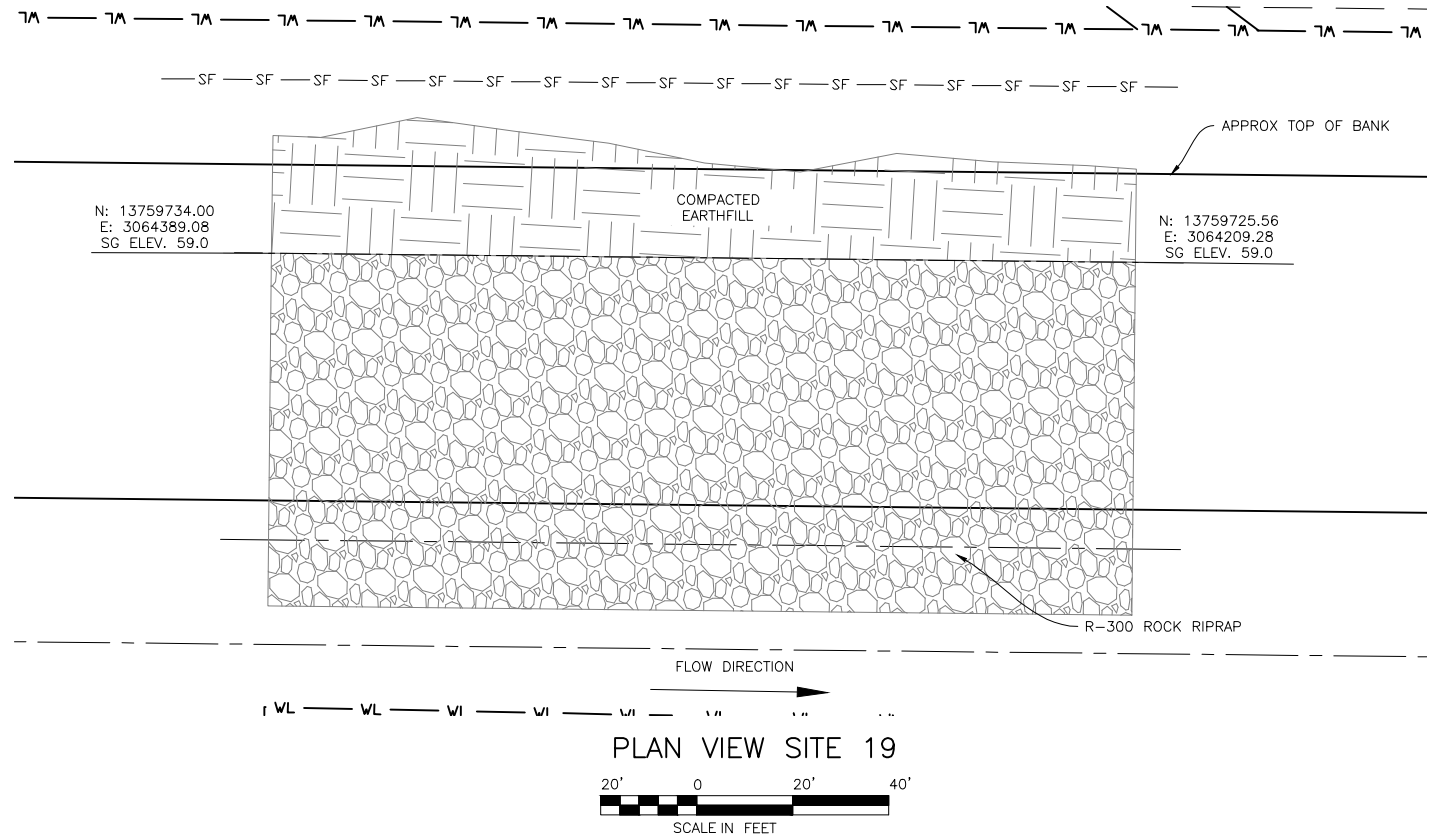
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 DATE PLOTTED: 6/23/22

SITES 17 AND 18 PLANS AND SECTIONS
 FLAT BANK/STEEP BANK REPAIR PROJECT
 IN
 FORT BEND COUNTY, TEXAS

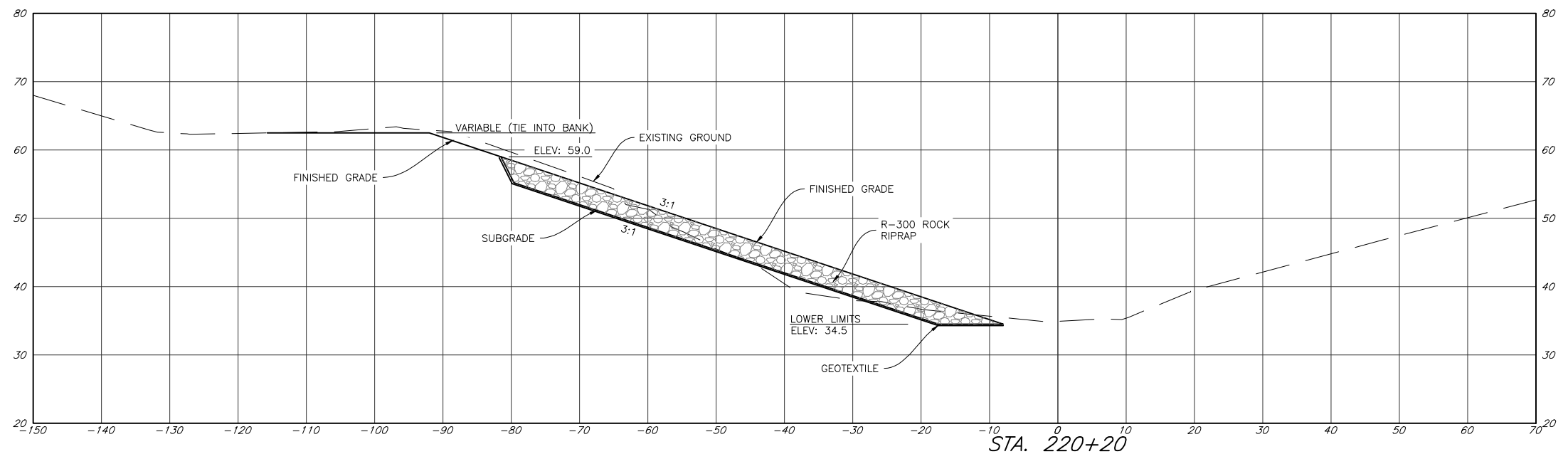


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THE REPAIR AREA SHALL BE BLENDED ON THE ENDS OF THE WORK TO THE EXISTING CHANNEL CONFIGURATION.



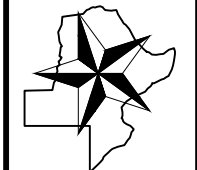
SECTION VIEW SITE 19

REVISIONS		
DATE	APPROVED	TITLE

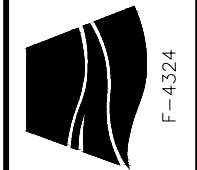


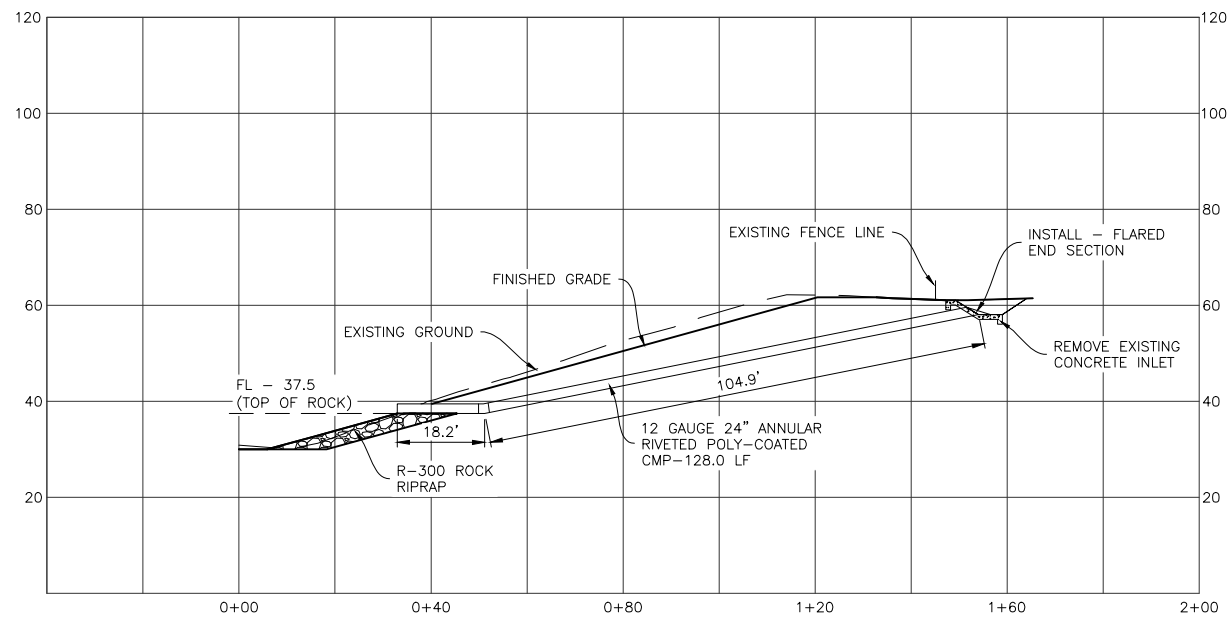
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SITE 19 PLAN AND SECTION
 FLAT BANK/STEEP BANK REPAIR PROJECT
 IN
 FORT BEND COUNTY, TEXAS

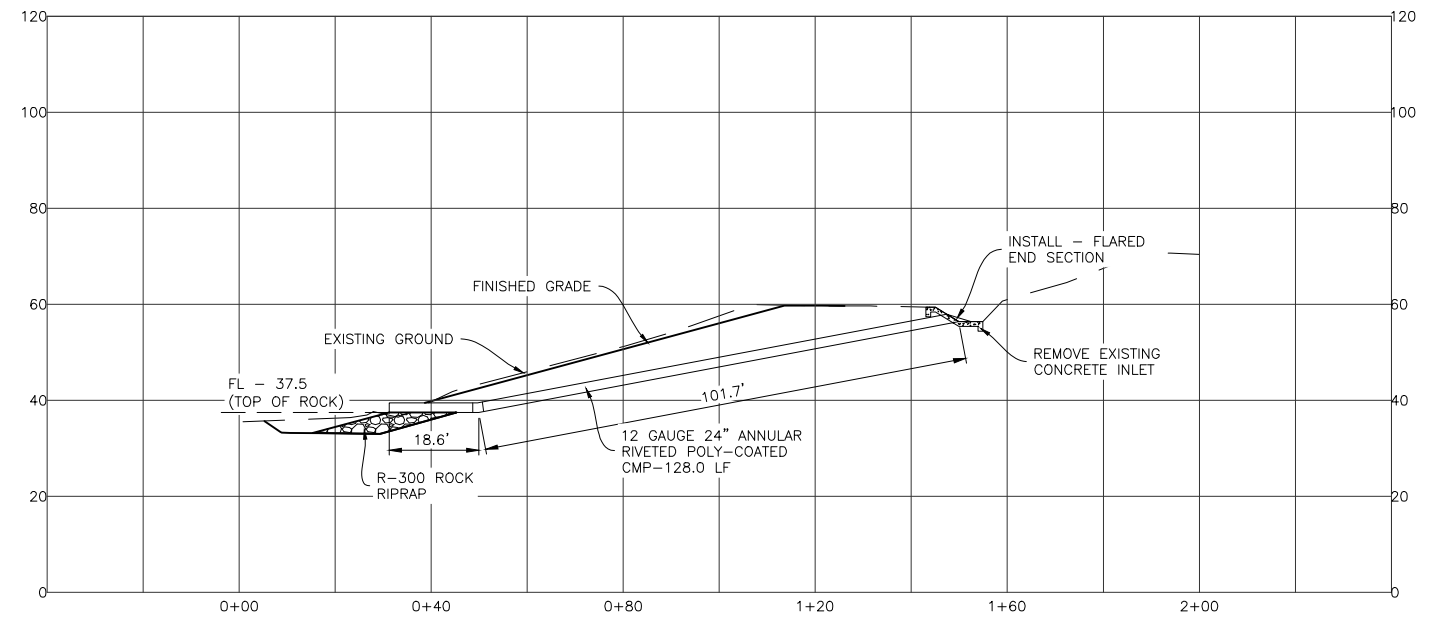


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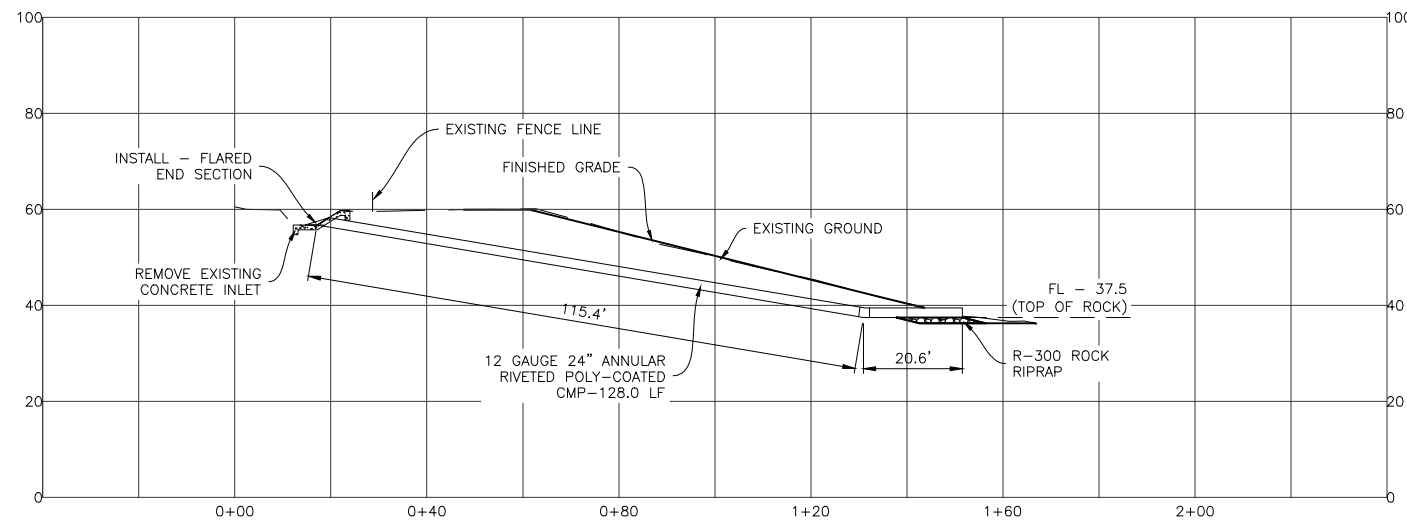




SITE 14-CMP SECT



SITE 15-CMP SECT



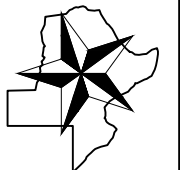
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6/23/2022

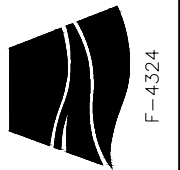


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SITE 14-16 DRAIN PIPE PROFILES
 FLAT BANK/STEEP BANK REPAIR PROJECT
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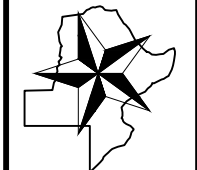
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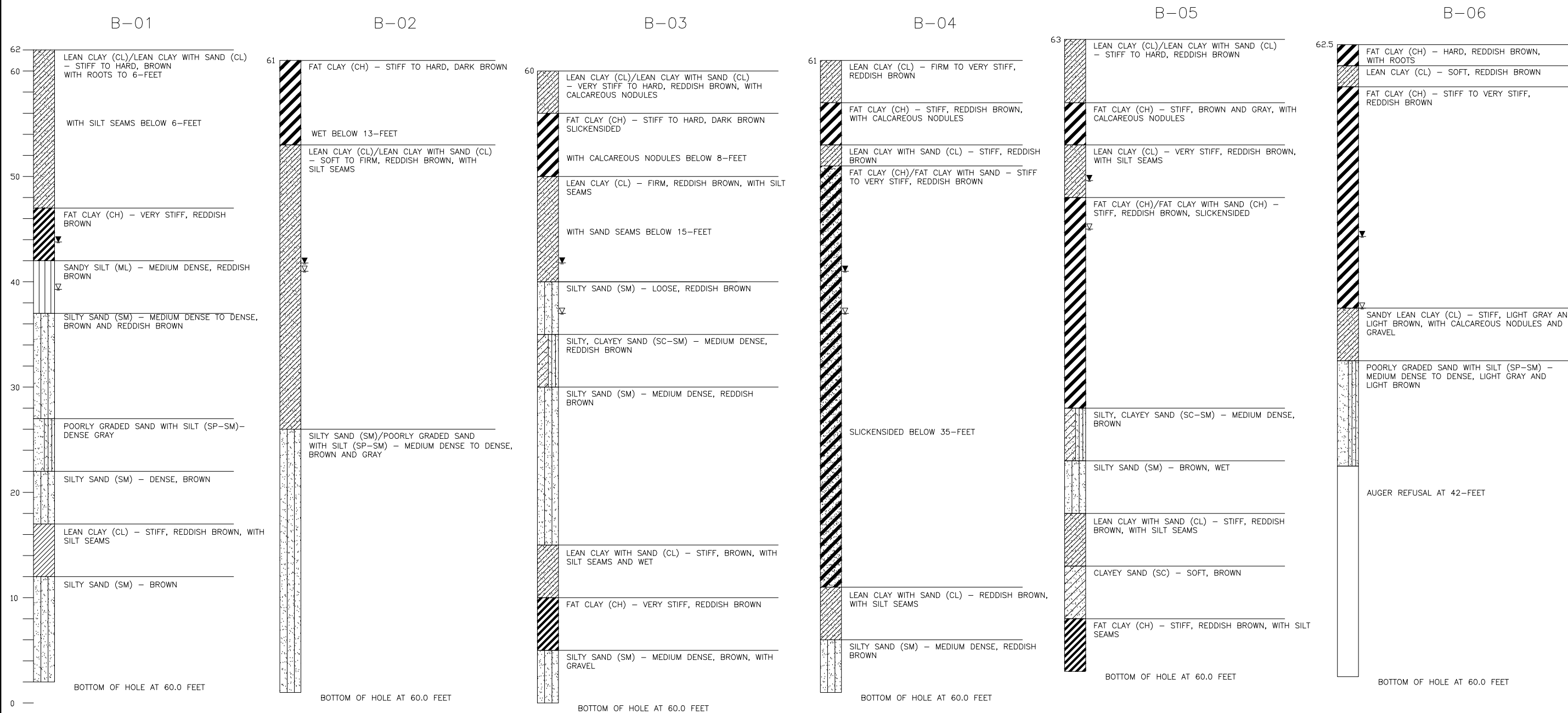
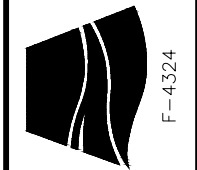


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1
GEOLOGIC INVESTIGATION PROFILES
FLAT BANK/STEEP BANK REPAIR PROJECT
IN
FORT BEND COUNTY, TEXAS



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ABBREVIATIONS

Ang.	ANGULAR	Lay.	LAYER OR LAYERS	T.	THIN
B.	BEDDED OR BEDDING	Len.	LENS OR LENSES	T.B.	THIN - BEDDED
Bld.	BOULDERS (> 12")	Ls.	LIMESTONE	Tuff.	TUFFACEOUS
Calc.	CALCAREOUS	Lse.	LOOSE	U.A.D.	UNABLE TO AUGER DEEPER
Cal.	CALICHE	Mg.	MARL OR MARLY	U.D.B.D.	UNABLE TO DRY BARREL DEEPER
Col.	CAVITIES	Mos.	MASSIVE	U.E.D.	UNABLE TO EXCAVATE DEEPER
Cmt.	CEMENTED	Mt.	MATRIX	U.S.	UPSTREAM
Ch.	CHALK OR CHALKY	Med.	MEDIUM	Var.	VARIABLE
C	CLAY, CLAYEY	Mic.	MICACEOUS	V/.	VERY
Cse.	COARSE	Mod.	MODERATELY	Vug.	VUGULAR
Cbl.	COBBLES (3" - 12")	Nod.	NODULE OR NODULAR	Wtr.	WATER LEVEL AS ENCOUNTERED
Cpt.	COMPACT	N.R.	NO RECOVERY	W.	WELL GRADED
Con.	CONCRETIONS	O	ORGANIC	W/	WITH
Cng.	CONGLOMERATE	Part.	PARTINGS	W/.	WEATHERED
Cs.	CLAYSTONE	Per.	PERMEABLE	Wea.	INITIALLY ENCOUNTERED
C.T.	CAVED TO	Po.	POORLY GRADED	W	STATIC WATER LEVEL
Xin.	CRYSTALLINE	P.	POORLY GRADED	W	STATIC WATER LEVEL
Ds.	DENSE	Rdd.	ROUNDED	W	STATIC WATER LEVEL
Dip.	DIPPING	S	SAND, SANDY	W	STATIC WATER LEVEL
D.S.	DOWNSTREAM	Ss.	SANDSTONE	W	STATIC WATER LEVEL
Fe.	IRON	Sat.	SATURATED	W	STATIC WATER LEVEL
Fig.	FLAGSTONE OR FLAGGY	Sh	SHALE, OR SHALY	W	STATIC WATER LEVEL
Fr.	FINE	Sj.	SLIGHTLY	W	STATIC WATER LEVEL
Frm.	FIRM	Slo.	SLOWLY	W	STATIC WATER LEVEL
Frac.	FRACTURED	M	SILT, SILTY	W	STATIC WATER LEVEL
Frg.	FRAGMENTS	Sft.	SOFT	W	STATIC WATER LEVEL
Fri.	FRIABLE	S/.	SOME	W	STATIC WATER LEVEL
Grn.	GRAIN	Str.	STIFF	W	STATIC WATER LEVEL
G	GRAVEL, GRAVELLY	Str.	STREAKS	W	STATIC WATER LEVEL
Gyp.	GYPSEOUS				
Hd.	ROCK HARDNESS				
H.	HIGHLY				
Int.	INTERBEDDED				
Lam.	LAMINATED				

UNIFIED SOIL CLASSIFICATION SYSTEM SYMBOLS

CW	WELL GRADED GRAVELS; GRAVEL - SAND MIXTURES
GP	POORLY GRADED GRAVELS
GM	SILTY GRAVELS; GRAVEL - SAND - SILT MIXTURES
GC	CLAYEY GRAVELS; GRAVEL - SAND - CLAY MIXTURES
SW	WELL GRADED SANDS; SAND - GRAVEL MIXTURES
SP	POORLY GRADED SANDS
SM	SILTY SAND
SC	CLAYEY SANDS; SAND - CLAY MIXTURES
ML	SILTS WITH LIQUID LIMIT OF 50 OR LESS
MH	SILTS WITH LIQUID LIMIT ABOVE 50
CL	CLAYS WITH LIQUID LIMIT OF 50 OR LESS
CH	CLAYS WITH LIQUID LIMIT ABOVE 50
OL	ORGANIC SILTS AND CLAYS WITH LIQUID LIMIT OF 50 OR LESS
OH	ORGANIC SILTS AND CLAYS WITH LIQUID LIMIT ABOVE 50

SYMBOLS LEGEND
UNCONSOLIDATED MATERIAL

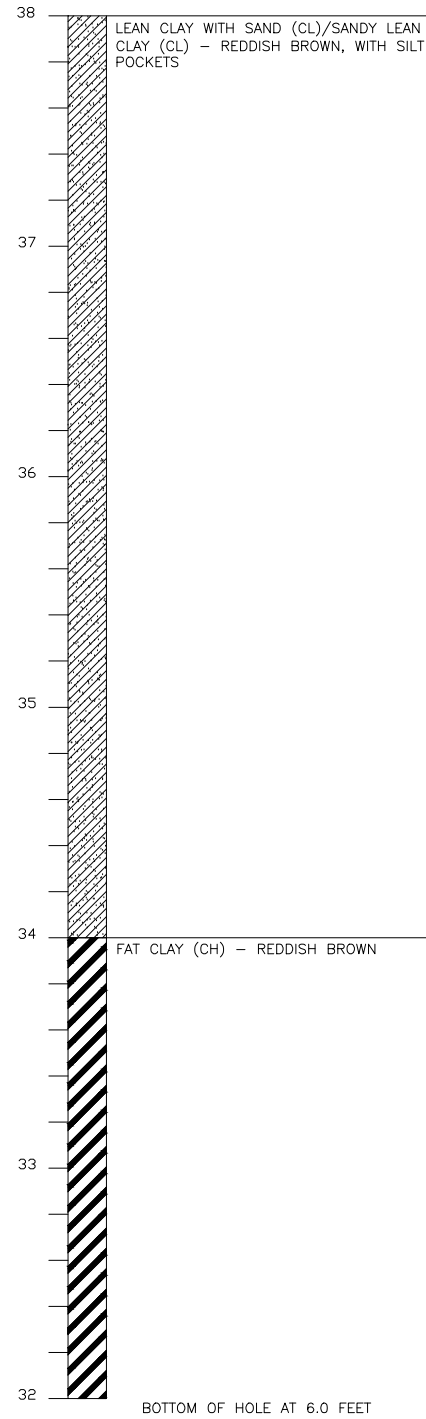
	GRAVEL		SAND		SILT		CLAY
	GRAVEL, SANDY		SAND, GRAVELLY		SILT, GRAVELLY		CLAY, GRAVELLY
	GRAVEL, SILTY		SAND, SILTY		SILT, SANDY		CLAY, SANDY
	GRAVEL, CLAYEY		SAND, CLAYEY		SILT, CLAYEY		CLAY, SILTY
	COBBLES, BOULDERS						

CONSOLIDATED MATERIAL (SEDIMENTARY ROCKS)

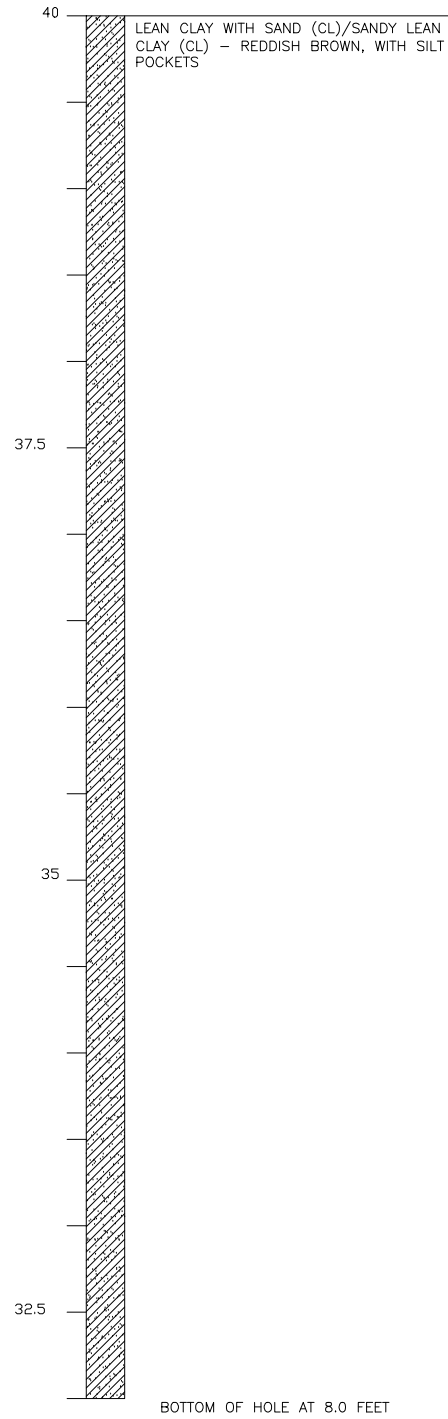
	CONGLOMERATE CNG.		SHALE SH.		LIMESTONE LS.
	BRECCIA BRC.		SILTSTONE MS		DOLOMITE DOL.
	SANDSTONE SS.		CLAYSTONE CS.		CHALK CH.
			GYPSUM GYP.		CHERT CHT.

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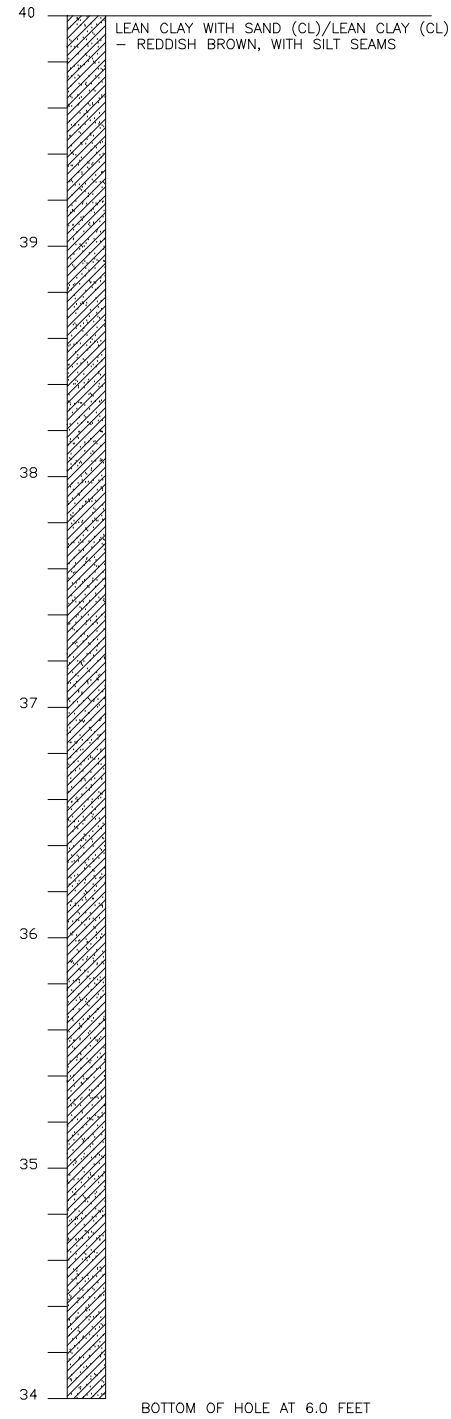
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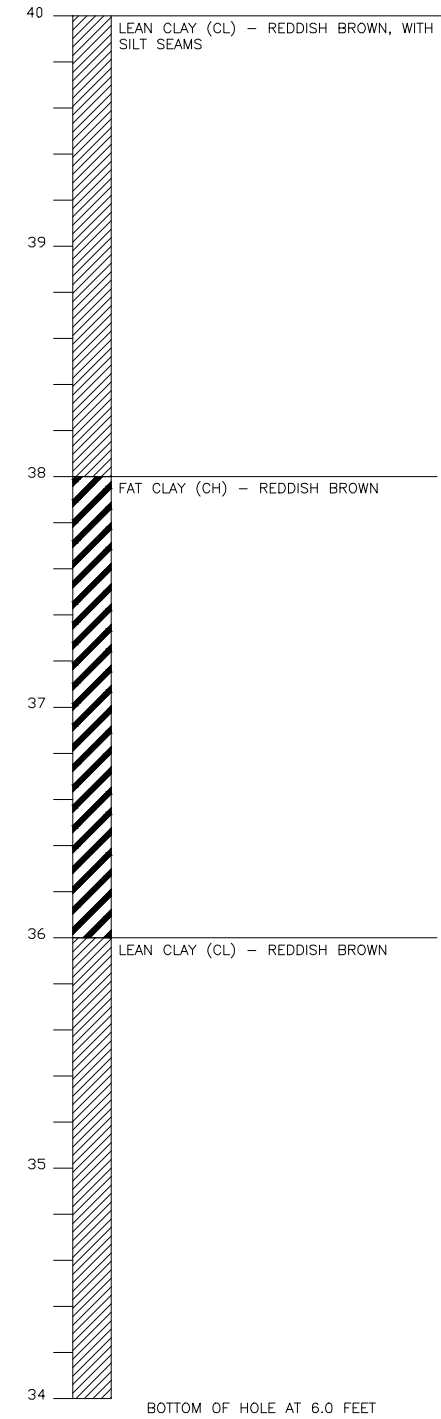
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B-09



B-10

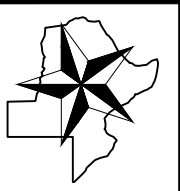


6/23/2022

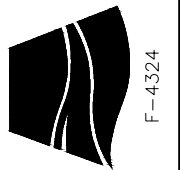


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GEOLOGIC INVESTIGATION PROFILES 2
 FLAT BANK/STEEP BANK REPAIR PROJECT
 IN
 FORT BEND COUNTY, TEXAS



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9

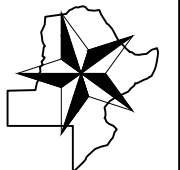
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GEOLOGIC INVESTIGATION PROFILES 3
 FLAT BANK/STEEP BANK REPAIR PROJECT
 IN
 FORT BEND COUNTY, TEXAS



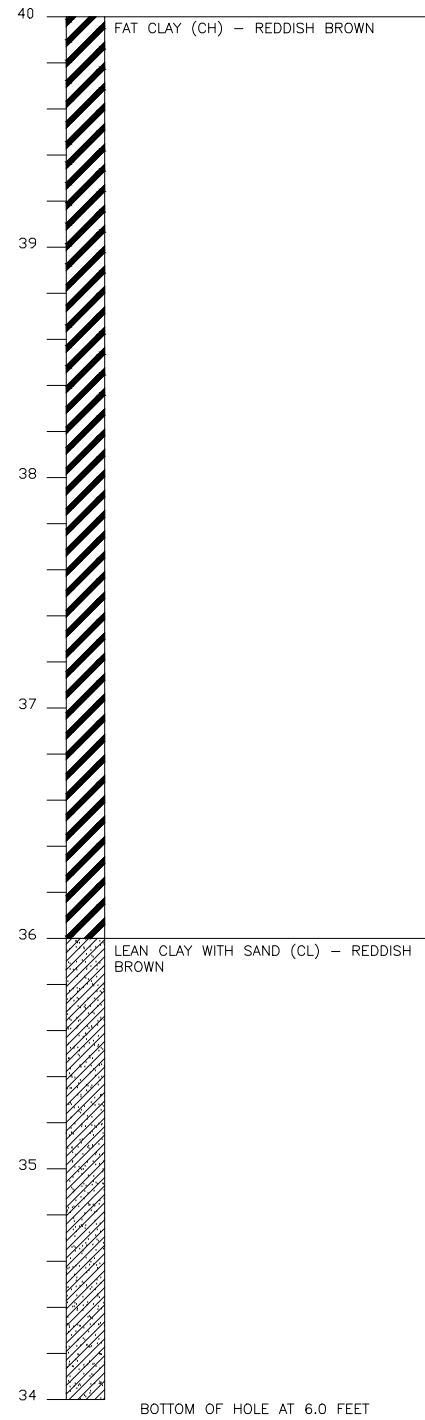
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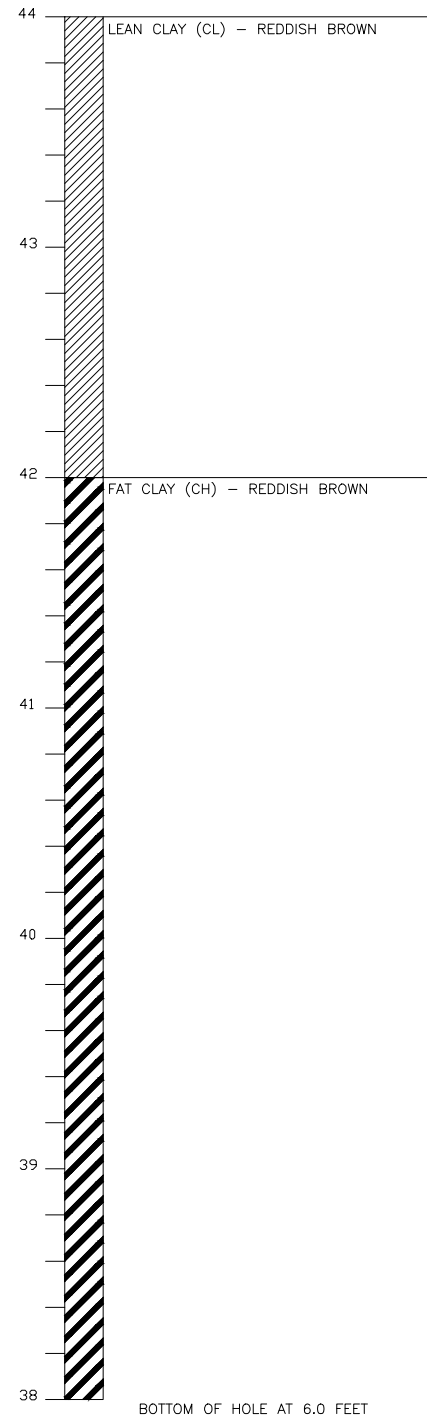
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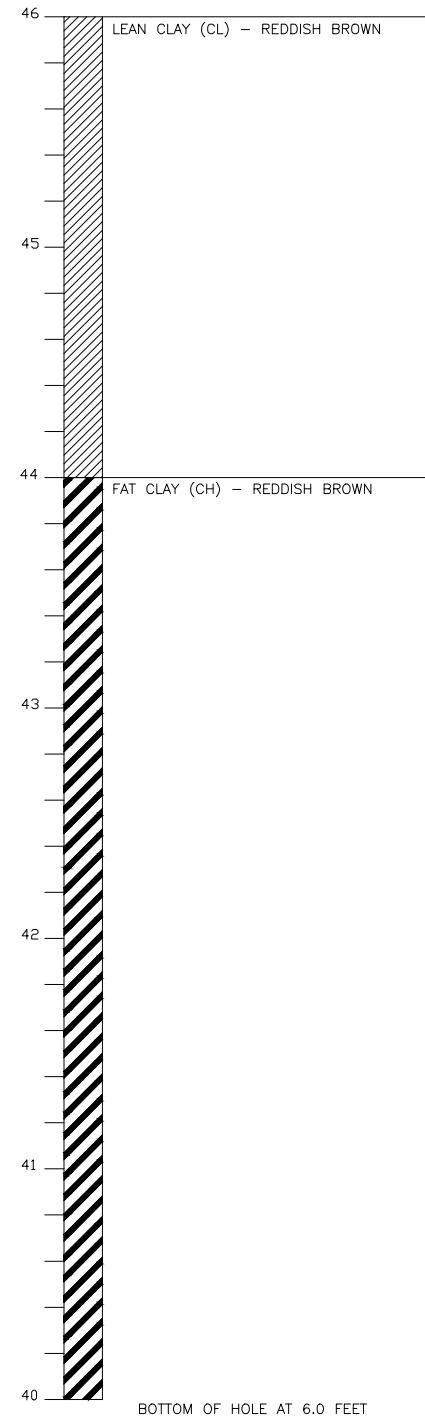
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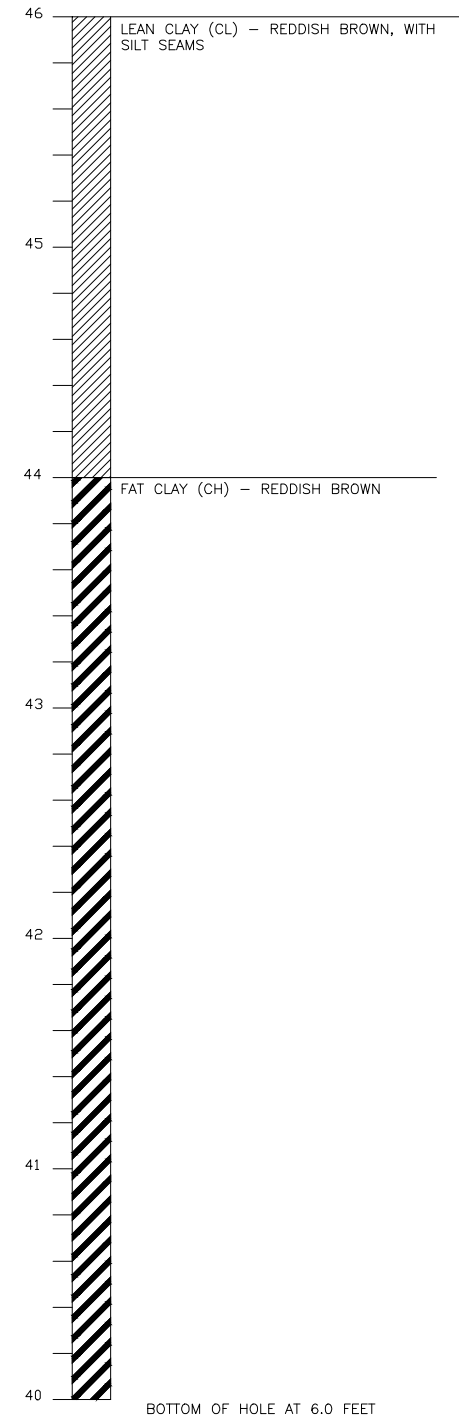
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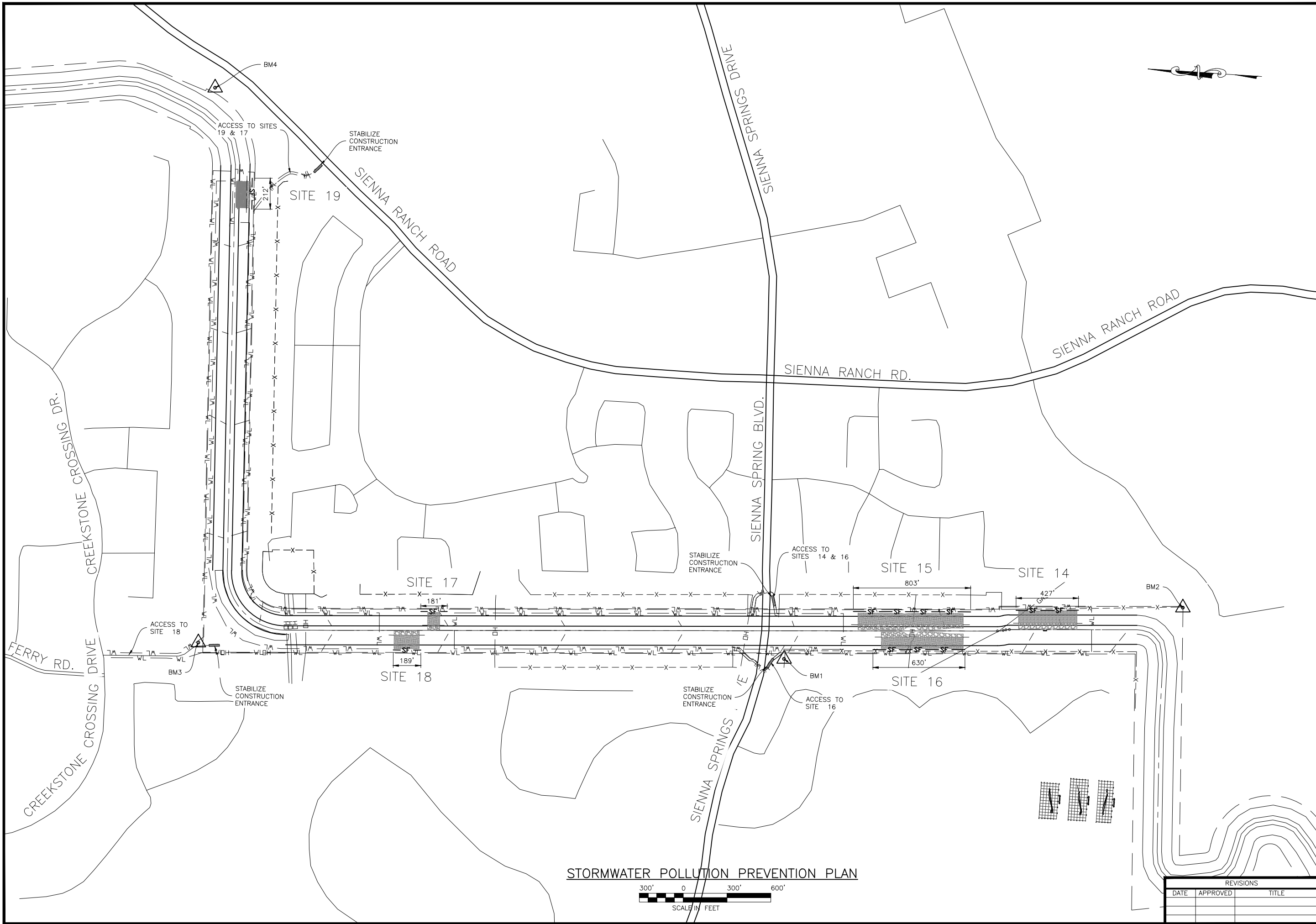
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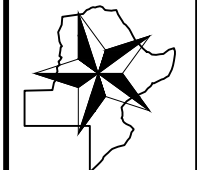
STORMWATER POLLUTION PREVENTION PLAN



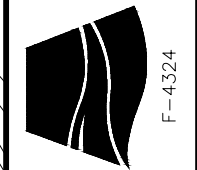
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SWPPP
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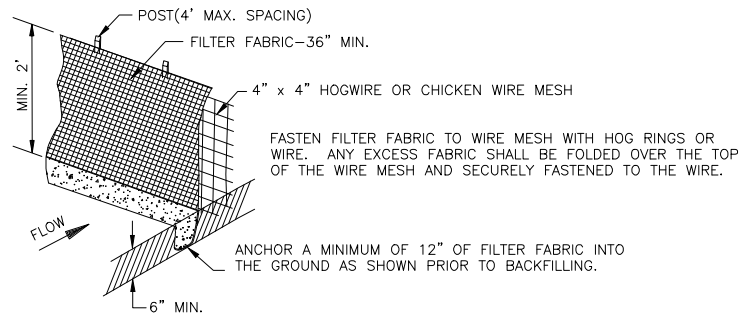
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11



STAKES FOR INSTALLING SEDIMENT FILTER FABRIC SILT FENCE SHALL BE 5' STEEL "T" POSTS. ALL STEEL POSTS AND FILTER FABRIC SILT FENCES SHALL BE REMOVED AT THE END OF THE CONTRACT.

NOTES:

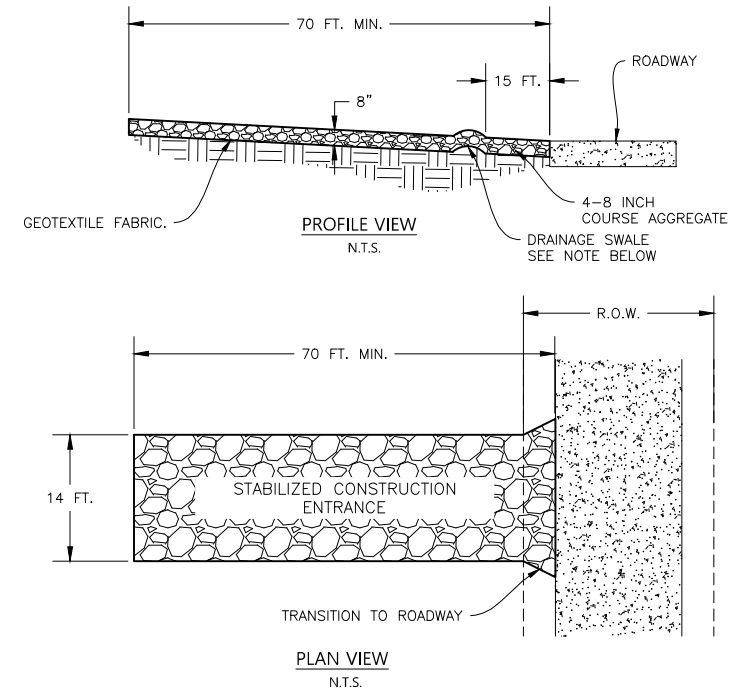
1. SEDIMENT FILTERS SHALL BE FABRIC (GEOTEXTILE) SILT FENCES AND INSTALLED ACCORDING TO ASTM D6462. THE MATERIALS SHALL BE IN ACCORDANCE WITH ASTM D6461 AND MATERIAL SPECIFICATION 592.
2. STAKES FOR INSTALLING SEDIMENT FILTER FABRIC SILT FENCE SHALL BE 5 FT. STEEL "T" POSTS. ALL STEEL POSTS AND FILTER FABRIC SILT FENCES SHALL BE REMOVED AT THE END OF THE CONTRACT.
3. FASTEN FILTER FABRIC TO WIRE MESH WITH HOG RINGS OR WIRE. ANY EXCESS FABRIC SHALL BE FOLDED OVER THE TOP OF THE WIRE MESH AND SECURELY FASTENED TO THE WIRE.
4. SILT FILTERS SHALL BE PROVIDED AT THE FOLLOWING LOCATIONS:
 - (A) ALONG THE DOWNSTREAM BOUNDARY OF ANY AREA WHICH IS STRIPPED OF EXISTING VEGETATION AND/OR SURFACE MATERIAL DURING ANY PHASE OF CONSTRUCTION ACTIVITY.
 - (B) ALONG THE DOWNSTREAM BOUNDARY OF ANY SOIL MATERIAL WHICH IS STOCKPILED DURING ANY PHASE OF CONSTRUCTION ACTIVITY FOR MORE THAN 14 DAYS.
 - (C) OTHER AREAS WHICH ARE DETERMINED BY THE CONTRACTING OFFICER TO BE POTENTIAL SILT SOURCES.
5. SILT FILTERS SHALL NOT BE USED WHERE CONCENTRATED FLOWS WHICH EXCEED ONE CFS ARE EXPECTED, OR WHERE DRAINAGE AREA EXCEEDS TWO ACRES.
6. THE HEIGHT OF SILT FENCES SHALL NOT EXCEED 48 INCHES (HIGHER FENCES MAY IMPOUND VOLUMES OF WATER SUFFICIENT TO CAUSE FAILURE OF THE STRUCTURE).
7. SPLICES IN THE FILTER FABRIC ARE NOT RECOMMENDED. WHEN JOINTS ARE UNAVOIDABLE, FABRIC SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT POST, WITH A MINIMUM 6-INCH LAP.

MAINTENANCE

1. SILT FILTERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
2. SILT DEPOSITS SHOULD BE REMOVED AFTER EACH STORM EVENT. THEY MUST BE REMOVED WHEN THE LEVEL OF DEPOSITS REACH APPROXIMATELY ONE-HALF THE HEIGHT OF THE SEDIMENT FILTER.
3. SHOULD THE FABRIC ON A SILT FENCE DECOMPOSE OR BECOME INEFFECTIVE PRIOR TO THE END OF THE EXPECTED USABLE LIFE, THE FABRIC SHALL BE REPLACED PROMPTLY UNLESS INSPECTION REPORTS INDICATE THAT THE REPLACEMENT IS UNNECESSARY.

FILTER FABRIC SILT FENCE DETAILS

NOTE:
APPROXIMATELY 2,442 FEET OF SEDIMENT FENCE IS CURRENTLY SHOWN.



NOTES:

1. THE STABILIZED CONSTRUCTION ENTRANCE SHALL CONSIST OF A MINIMUM OF 8 INCH THICKNESS OF CRUSHED ROCK PREDOMINANTLY 4 INCH TO 8 INCH IN SIZE PLACED OVER GEOTEXTILE. THE AGGREGATES SHALL BE CLEAN, HARD, DURABLE, AND FREE FROM ADHERENT COATINGS SUCH AS SALT, ALKALI, DIRT, CLAY, LOAM, SHALE, SOFT OR FLAKY MATERIALS, AND ORGANIC OR INJURIOUS MATTER.
2. IF THE SLOPE TOWARDS THE ROAD EXCEEDS 2%, CONSTRUCT A DRAINAGE SWALE 8 INCHES HIGH WITH 3:1 (H:V) SIDE SLOPES ACROSS THE FOUNDATION APPROXIMATELY 15 FEET FROM THE ENTRANCE TO DIVERT RUNOFF AWAY FROM THE PUBLIC ROAD.
3. THE GEOTEXTILE FABRIC SHOULD BE DESIGNED SPECIFICALLY FOR THE USE AS A SOIL FILTRATION MEDIA WITH AN APPROXIMATE WEIGHT OF 6 OX/YD², A MULLEN BURST RATING OF 140 LB/IN², AND AN EQUIVALENT OPENING SIZE GREATER THAN A NUMBER 50 SIEVE.
4. THE MINIMUM WITH OF THE ENTRANCE SHALL BE 14 FEET.
5. INSTALL A DRAINAGE PIPE UNDER PAD AS NEEDED TO MAINTAIN PROPER PUBLIC ROAD DRAINAGE.
6. WHEN NECESSARY, WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC ROADWAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH 4 INCH MINIMUM CRUSHED STONE OR COMMERCIAL RACK THAT DRAINS TO A SEDIMENT TRAP OR BASIN.

MAINTENANCE AND REMOVAL:

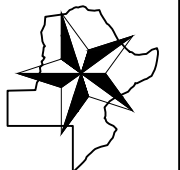
1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC ROADWAYS. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND, AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC ROADWAY MUST BE REMOVED IMMEDIATELY.
2. ALL SEDIMENT SHALL BE PREVENTED FROM ENTERING ANY STORM DRAIN, DITCH OR WATER COURSE BY USING APPROVED METHODS.
3. ONCE CONSTRUCTION IS COMPLETE, THE ENTRANCE AND ACCUMULATED SILT SHALL BE REMOVED AND DISPOSED OF IN AN APPROVED MANNER.

STABILIZED CONSTRUCTION ENTRANCE

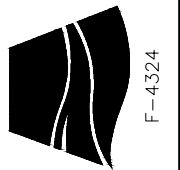


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M&E CONSULTANTS
Soil & Water Engineering Solutions
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REVISIONS		
DATE	APPROVED	TITLE



M&E Consultants
Soil & Water Engineering Solutions

FORT BEND COUNTY DRAINAGE DISTRICT

FLAT BANK/STEEP BANK

SITES NO. 14, 15, 16, 17, 18 AND 19

CHANNEL BANK STABILIZATION

FORT BEND COUNTY, TEXAS

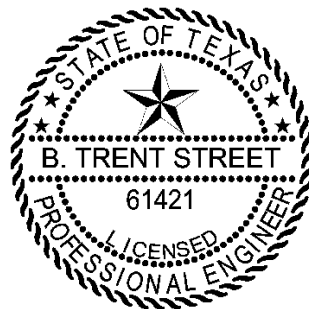
SPECIFICATIONS

SPONSORED BY:

FORT BEND COUNTY

COOPERATING WITH:

FEDERAL EMERGENCY MANAGEMENT ADMINISTRATION
OF THE
DEPARTMENT OF HOMELAND SECURITY



B. Trent Street
4/29/2022

M&E Consultants LLC
Texas Registered
Engineering Firm
F-004324

1. Specifications:

Construction Specification No.	Title	Date
1	Clearing	5/01
5	Pollution Control	1/14
7	Construction Surveys	1/09
8	Mobilization and Demobilization	5/01
9	Traffic Control	5/01
11	Removal of Water	5/01
21	Excavation	5/01
23	Earthfill	1/09
26	Topsoiling	5/01
61	Rock Riprap	9/18
94	Contractor Quality Control	1/09
95	Geotextile	1/14
406	Hydro Mulch Seeding	4/22
420	Site Preparation	4/22

Material Specification No.	Title	Date
523	Rock for Riprap	9/18
592	Geotextile	9/18

2. Definitions:
 - Contracting Local Organization (CLO) – Fort Bend County
 - Owners – Fort Bend County Drainage District
 - Contracting Officer – Fort Bend County
 - Engineer – M&E Consultants Construction Engineer (Any reference in the construction specifications to contracting officer’s technical representative (COTR) shall mean
 - Inspector – M&E Consultants Construction Inspector (on-site)
 - Quality Assurance (QA) - M&E Consultants Construction Inspector (on-site)
 - Quality Control (QC) - Contractor's Construction Inspector (on-site)
3. Drawings:

Flat Bank/Steep Bank Creek, Sites 14, 15, 16, 17, 18 and 19 Drawing No. TX-EN-0791, Cover plus Sheets 1 thru 11.
4. Location:

The project is in Missouri City, Fort Bend County, Texas.
5. Time to be allowed for completion of contract is 182 calendar days. (holidays and weather days not included)

Construction Specification 1—Clearing

1. Scope

The work shall consist of the clearing and disposal of trees, snags, logs, brush, shrubs, stumps, and rubbish from the designated areas.

2. Classification

Unless otherwise specified in section 8, clearing will be classified according to the following definitions:

Class A—Requires that trees and other woody vegetation be removed so that the remaining stumps extend no higher than 4 inches above the ground surface.

Class B—Requires that trees and other woody vegetation be removed so that the remaining stumps extend no higher than 12 inches above the ground surface.

Class C—Requires that trees and other woody vegetation be removed as near the ground surface as conventional tools or field conditions will permit or as specified in section 8.

3. Protection of existing vegetation

Trees and other woody vegetation designated to remain undisturbed shall be protected from damage throughout the entire construction period. Any damage resulting from the contractor's operations or neglect shall be repaired by the contractor.

Earthfill, stockpiling of materials, vehicular parking, and excessive foot or vehicular traffic shall not be allowed within the dripline of vegetation designated to remain in place. Vegetation damaged by any of these or similar actions shall be replaced with viable vegetation of the same species or as specified in section 8 and approved by the contracting officer.

Any cuts, skins, scrapes, or bruises to the bark of the vegetation shall be carefully trimmed and local nursery accepted procedures used to seal damaged bark.

Any limbs or branches 0.5-inch or larger in diameter that are broken, severed, or otherwise seriously damaged during construction shall be cut off at the base of the damaged limb or branch flush with the adjacent limb or tree trunk.

All roots 1 inch or larger in diameter that are cut, broken, or otherwise severed during construction operations shall have the end smoothly cut perpendicular to the root. Roots exposed during excavation or other operations shall be covered with moist earth and/or backfilled as soon as possible to prevent them from drying.

4. Marking

The limits of the areas to be cleared will be marked by stakes, flags, tree markings, or other suitable methods. Trees to be left standing and uninjured will be designated by special markings placed on the trunks at a height of about 6 feet above the ground surface.

5. Clearing

All trees not marked for preservation and all snags, logs, brush, shrubs, stumps, rubbish, and similar materials shall be cleared from within the limits of the marked areas.

6. Disposal

All materials cleared from the designated areas shall be disposed of at locations shown on the drawings or in a manner specified in section 8. The contractor is responsible for complying with all local rules and regulations and the payment of any and all fees that may result from the disposal at locations away from the construction location.

7. Measurement and payment

Method 1—For items of work for which specific unit prices are established in the contract, the cleared area is measured to the nearest 0.1 acre. Payment for clearing is made for the total area within the designated limits at the contract unit price for the specified class of clearing. Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

Method 2—For items of work for which specific unit prices are established in the contract, the length of the cleared area is measured to the nearest full station (100 feet) along the line designated on the drawings or in the specifications. Payment for clearing is made for the total length within the designated limits at the contract unit price for the specified class of clearing. Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

Method 3—For items of work for which specific unit prices are established in the contract, the cleared areas is measured within the specified limits to the nearest 0.1 acre. The cleared areas are determined by measuring the width cleared, within the specified limits, at representative sections and multiplying the average width between sections by the linear distance between sections. Payment for clearing is made at the contract unit price for the item and shall constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

Method 4—For items of work for which specific lump sum prices are established in the contract, payment for clearing is made at the contract lump sum prices. Such payment shall constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

All Methods—These provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract, but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in section 8.

8. Items of work and construction details

8. **Items of work and construction details**

In Section 6, Disposal, all woody materials removed from the cleared areas shall be disposed offsite at a location of the contractor's own choosing as approved by the Engineer or chipped, stockpiled, and land applied as directed by the Engineer. Rubbish, fences, non-woody material shall be disposed of offsite at a location of the contractor's own choosing as approved by the Engineer. All disposal methods shall be in accordance with state and local regulations.

The Contractor is to take precaution, when temporarily stockpiling cleared and grubbed materials, to guard against such cleared and grubbed materials being floated or transported off the worksite by rainstorm runoff.

Items of work to be performed in conformance with this specification and the construction details therefore are:

- a. **Subsidiary Item, Clearing, Class C**
 - (1) This item shall consist of all clearing within the work limits required for construction of the works of improvement as shown on the drawings.
 - (2) The actual limits of required clearing will be as designated or staked at the time of the showing the site to prospective bidders.
 - (3) Upon completion of the clearing operation, all areas which have been cleared shall be dressed to be reasonably smooth by blading, dragging or floating. The entire area shall be reasonably free of abrupt mounds, dips and windrows to provide a clear area for construction staking.
 - (4) Separate payment will not be made for this item of work. Compensation for this item will be included in the payment for Excavation, Common.

Construction Specification 5—Pollution Control

1. Scope

The work consists of installing measures or performing work to control erosion and minimize the production of sediment and other pollutants to water and air from construction activities.

The following BioPreferred® product categories are applicable to this specification:

- mulch and compost materials
- erosion control materials
- fertilizers
- dust suppressants
- agricultural spray adjuvants

2. Material

Silt fence shall conform to the requirement of Materials Specification 592, Geotextile. All other material furnished shall meet the requirements of the material specifications listed in section 8 of this specification.

3. Erosion and sediment control measures and works

The measures and works shall include, but are not limited to, the following:

Staging of earthwork activities—The excavation and moving of soil materials shall be scheduled to minimize the size of areas disturbed and unprotected from erosion for the shortest reasonable time.

Seeding—Seeding to protect disturbed areas shall occur as soon as reasonably possible following completion of that earthwork activity.

Mulching—Mulching to provide temporary protection of the soil surface from erosion.

Diversions—Diversions to divert water from work areas and to collect water from work areas for treatment and safe disposition. They are temporary and shall be removed and the area restored to its near original condition when the diversions are no longer required or when permanent measures are installed.

Stream crossings—Culverts or bridges where equipment must cross streams. They are temporary and shall be removed and the area restored to its near original condition when the crossings are no longer required or when permanent measures are installed.

Sediment basins—Sediment basins collect, settle, and eliminate sediment from eroding areas from impacting properties and streams below the construction site(s). These basins are temporary and shall be removed and the area restored to its original condition when they are no longer required or when permanent measures are installed.

Sediment filters—Straw bale filters or geotextile silt fences trap sediment from areas of limited runoff. Sediment filters shall be properly anchored to prevent erosion under or around them. Silt fences shall be installed and maintained in accordance with ASTM D6462. These filters are temporary and shall be removed and the area restored to its original condition when they are no longer required or when permanent measures are installed.

Waterways—Waterways for the safe disposal of runoff from fields, diversions, and other structures or measures. These works are temporary and shall be removed and the area restored to its original condition when they are no longer required or when permanent measures are installed.

Other—Additional protection measures as specified in section 8 of this specification or required by Federal, State, or local government.

4. Chemical pollution

The contractor shall provide watertight tanks or barrels or construct a sump sealed with plastic sheets to collect and temporarily contain chemical pollutants, such as drained lubricating or transmission fluids, grease, soaps, concrete mixer washwater, or asphalt, produced as a by-product of the construction activities. Pollutants shall be disposed of in accordance with appropriate state and Federal regulations. At the completion of the construction work, tanks, barrels, and sumps shall be removed and the area restored to its original condition as specified in section 8 of this specification. Sump removal shall be conducted without causing pollution.

Sanitary facilities, such as chemical toilets, or septic tanks shall not be located next to live streams, wells, or springs. They shall be located at a distance sufficient to prevent contamination of any water source. At the completion of construction activities, facilities shall be disposed of without causing pollution as specified in section 8 of this specification.

5. Air pollution

The burning of brush or slash and the disposal of other materials shall adhere to state and local regulations.

Fire prevention measures shall be taken to prevent the start or spreading of wildfires that may result from project activities. Firebreaks or guards shall be constructed and maintained at locations shown on the drawings.

All public access or haul roads used by the contractor during construction of the project shall be sprinkled or otherwise treated to fully suppress dust. All dust control methods shall ensure safe construction operations at all times. If chemical dust suppressants are applied, the material shall be a commercially available product specifically designed for dust suppression and the application shall follow manufacturer's requirements and recommendations. A copy of the product data sheet and manufacturer's recommended application procedures shall be provided to the engineer 5 working days before the first application.

6. Maintenance, removal, and restoration

All pollution control measures and temporary works shall be adequately maintained in a functional condition for the duration of the construction period. All temporary measures shall be removed and the site restored to near original condition.

7. Measurement and payment

Method 1—For items of work for which specific unit prices are established in the contract, each item is measured to the nearest unit applicable. Payment for each item is made at the contract unit price for that item. For water or chemical suppressant items used for dust control for which items of work are established in section 8 of this specification, measurement for payment will not include water or chemical suppressants that are used inappropriately or excessive to need. Such payment will constitute full compensation for the completion of the work.

Method 2—For items of work for which lump sum prices are established in the contract, payment is made as the work proceeds and supported by invoices presented by the contractor that reflect actual costs. If the total of all progress payments is less than the lump sum contract price for this item, the balance remaining for this item will be included in the final contract payment. Payment of the lump sum contract price will constitute full compensation for completion of the work.

Method 3—For items of work for which lump sum prices are established in the contract, payment will be prorated and provided in equal amounts on each monthly progress payment estimate. The number of months used for prorating shall be the number estimated to complete the work as outlined in the

contractor's approved construction schedule. The final month's prorated amount will be provided with the final contract payment. Payment as described will constitute full compensation for completion of the work.

All Methods—The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract, but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary. Such items, and the items to which they are made subsidiary, are identified in section 8 of this specification.

8. Items of work and construction details

8. Items of work and construction details

This construction site is greater than five (5) acres in area and is subject to the Texas Pollutant Discharge Elimination System (TPDES) requirements administered by the Texas Commission on Environmental Quality (TCEQ). Rules for the TPDES process relative to construction sites are contained in the TPDES General Permit NO. TXR150000. A copy of General Permit No. TXR150000 may be found on the TCEQ website.

In conformance with TPDES General Permit TXR150000, a Storm Water Pollution Prevention Plan (SWP3) is required for the construction site. A SWP3 prepared by M&E Consultants is provided. The Contractor shall review the SWP3 and shall amend the plan with a detailed work sequence outline which defines and delineates the proposed construction operation. The amended SWP3 shall be signed by the Contractor and submitted to the Contracting Officer prior to issuance of the Notice to Proceed. A copy of the approved SWP3, as amended, will be maintained at the construction site by the Contractor. A copy of the permit shall be attached to the SWP3.

A copy of the Notice of Intent (NOI) shall be posted at the site until the TPDES permit number is issued for the site. An 8 ½" x 11" notice shall be posted at the site giving the following information about the permit: permit number, contact name, contact phone and project description. If a permit number has not been issued, a copy of the NOI shall be posted with the notice.

If the Contractor identifies sediment control items, which are considered essential to the anticipated construction operation, but which are not reflected by the contract bid schedule, a written request for a contract modification will be provided to the Contracting Officer. The request will identify the items, operation, and provide an assessment of changes to the contract cost and performance time.

TPDES also requires an NOI and Notice of Termination (NOT) to be filed with TCEQ. The Contractor will be responsible for submitting the Contractor's copy of the NOI to the Engineer at least five business days before work begins. When the contract is completed, the Contractor shall provide the NRCS Project Engineer a copy of the NOT that he/she will file with the TCEQ.

In conformance with TPDES requirements, the Inspector and the Contractor (or the Contractor's Quality Control person) shall perform periodic inspections of the sediment control practices. At a minimum, inspections shall be conducted every 14 days, on the first workday of the week, and within 24 hours of any rainfall event of more than 0.5 inches at the construction site. After each inspection, a written report will be prepared which summarizes the status of inspected items. The reports will (a) evaluate effectiveness, (b) identify maintenance needs and/or (c) recommend remedial corrective action and will be prepared and signed by the Owner and the Contractor. The report shall be filed on site in the same location as the SWP3. The Contractor shall be responsible for identified corrective maintenance needs.

In Section 3, Erosion and sediment control measures and works, Sediment filters shall be limited to geotextile sediment filters. The sediment filter material shall meet the requirements of ASTM D6461 and Material Specification 592. The silt fence shall be installed according to the requirements in ASTM D6462.

a. Bid Item 1, Pollution Control

- (1) This item shall consist of performing all work and furnishing all materials necessary to accomplish the work defined in Section 1 of this specification, including all works required to implement the Storm Water Pollution Prevention

Plan, construct the stabilized construction entrance, and maintenance of sediment filters, but not the installation of the fabric sediment filters.

- (2) The stabilized construction entrance shall be installed as shown on the drawings. This item shall be removed at the completion of construction.
- (3) In Section 7, Measurement and payment, Method 3 shall apply.

b. Bid Item 2, Sediment Filters

- (1) This item shall consist of furnishing and installing sediment filter fences to the lengths and locations designated on the drawings and otherwise needed to control sediment from leaving the construction site. Maintenance of installed sediment filter fences shall be paid for under the bid item for Pollution Control.
- (2) In Section 7, Measurement and payment, Method 1 shall apply.

Construction Specification 7—Construction Surveys

1. Scope

The work consists of performing all surveys, measurements, and computations required by this specification.

2. Equipment and material

Equipment for construction surveys shall be of a quality and condition to provide the required accuracy. The equipment shall be maintained in good working order and in proper adjustment at all times. Records of repairs, calibration tests, accuracy checks, and adjustments shall be maintained and be available for inspection by the engineer. Equipment shall be checked, tested, and adjusted as necessary in conformance with manufacturer's recommendations.

Material is field notebooks, stakes, templates, platforms, equipment, spikes, steel pins, tools, and all other items necessary to perform the work specified.

3. Quality of work

All work shall follow recognized professional practice and the standards of the industry unless otherwise specified in section 9 of this specification. The work shall be performed to the accuracy and detail appropriate for the type of job. Notes, sketches, and other data shall be complete, recorded neatly, legible, reproducible and organized to facilitate ease in review and allow reproduction of copies for job documentation. Survey equipment that requires little or no manual recording of field data shall have survey information documented as outlined in section 9 of this specification.

All computations shall be mathematically correct and shall include information to identify the bid item, date, and who performed, checked, and approved the computations. Computations shall be legible, complete, and clearly document the source of all information used including assumptions and measurements collected.

If a computer program is used to perform the computations, the contractor shall provide the engineer with the software identification, vendor's name, version number, and other pertinent data before beginning survey activities. Computer generated computations shall show all input data including values assigned and assumptions made.

The elevations of permanent and temporary bench marks shall be determined and recorded to the nearest 0.01 foot. Differential leveling and transit traverses shall be of such precision that the error of vertical closure in feet shall not exceed plus or minus 0.1 times the square root of the traverse distance in miles. Linear measurements shall be accurate to within 1 foot in 5,000 feet, unless otherwise specified in section 9 of this specification. The angular error of closure for transit traverses shall not exceed 1 minute times the square root of the number of angles turned.

The minimum requirements for placing slope stakes shall be at 100-foot stations for tangents, as little as 25 feet for sharp curves, breaks in the original ground surface and at any other intermediate stations necessary to ensure accurate location for construction layout and measurement. Slope stakes and cross sections shall be perpendicular to the centerline. Significant breaks in grade shall be determined for cross sections. Distances shall be measured horizontally and recorded to the nearest 0.1 foot. Side shots for interim construction stakes may be taken with a hand level.

Unless otherwise specified in section 9 of this specification, measurements for stationing and establishing the location of structures shall be made to the nearest 0.1 foot.

Elevations for concrete work, pipes, and mechanical equipment shall be determined and recorded to the nearest 0.01 foot. Elevations for earth work shall be determined and recorded to the nearest 0.1 foot.

4. Primary control

The baselines and bench marks for primary control, necessary to establish lines and grades needed for construction, are shown on the drawings and have been located on the job site.

These baselines and bench marks shall be used as the origin of all surveys, layouts, and measurements to establish construction lines and grades. The contractor shall take all necessary precautions to prevent the loss or damage of primary control points. Any stakes or control points lost or damaged by construction activity will be reestablished by the contractor or at contractor expense.

5. Construction surveys

Before work starts that requires contractor performed surveys, the contractor shall submit in writing for the engineer's review: the name, qualifications, and experience of the individuals to be assigned to the survey tasks.

Method 1—Contractor performed surveys shall include:

- checking and any supplemental or interim staking
- performing quantity surveys, measurements, and computations for progress payment
- other surveys as described in section 9 of this specification

Method 2—Contractor performed surveys shall consist of all work necessary for:

- establishing line and grade for all work
- setting slope stakes for all work
- checking and any supplemental or interim staking
- establishing final grade stakes
- performing quantity surveys, measurements, and computations for progress payment
- other surveys as described in section 9 of this specification

Method 3—Contractor performed surveys shall consist of all work necessary for:

- establishing line and grade for all work
- setting slope stakes for all work
- checking and any supplemental or interim staking
- establishing final grade stakes
- performing quantity surveys, measurements, and computations for progress payments
- performing original (initial) and final surveys for determinations of final quantities
- other surveys as described in section 9 of this specification.

6. Staking

The construction staking required for the item shall be completed before work on any item starts. Construction staking shall be completed as follows or as otherwise specified in section 9 of this specification:

Clearing and grubbing—The boundary of the area(s) to be cleared and grubbed shall be staked or flagged at a maximum interval of 200 feet, closer if needed, to clearly mark the limits of work. When contractor staking is the basis for determining the area for final payment, all boundary stakes will be reviewed by the engineer before start of this work item.

Excavation and fill—Slope stakes shall be placed at the intersection of the specified slopes and ground

line. Slope stakes and the reference stakes for slopes shall be marked with the stationing, required cut or fill, slope ratio, and horizontal distance from the centerline or other control line. The minimum requirements for placing slope stakes is outlined in section 3, Quality of work.

Structures—Centerline and offset reference line stakes for location, alignment, and elevation shall be placed for all structures.

7. Records

All survey data shall be recorded in fully identified standard hard-bound engineering survey field notebooks with consecutively numbered pages. All field notes and printed data shall include the purpose or description of the work, the date the work was performed, weather data, sketches, and the personnel who performed and checked the work. Electronically generated survey data and computations shall be bound, page numbered, and cross referenced in a bound field notebook containing the index for all survey activities. All work shall follow recognized professional practice.

The construction survey records shall be available at all times during the progress of the work for examination and use by the engineer and when requested, copies shall be made available. The original field notebooks and other records shall be provided to and become the property of the owner before final payment and acceptance of all work.

Complete documentation of computations and supporting data for progress payments shall be submitted to the engineer with each invoice for payment as specified in section 9 of the specification. When the contractor is required to conduct initial and final surveys as outlined in section 5, Construction Surveys, notes shall be provided as soon as possible after completion to the engineer for the purpose of determining final payment quantities.

8. Payment

Method 1—For items of work for which lump sum prices are established in the contract, payment is made as the work proceeds, after presentation of correct and accurate invoices by the contractor showing related costs and evidence of the charges of suppliers, subcontractors, and others for supplies furnished and work performed. Invoices for the total amount of the contract price will not be accepted until all surveys are complete and required documentation has been determined complete. If the total of such payments is less than the lump sum contract price for this item, the unpaid balance will be included in the final contract payment. Payment of the lump sum contract price will constitute full compensation for completion of all work under the bid item.

Method 2—For items of work for which lump sum prices are established in the contract, payment is made as the work proceeds with progress payment amounts determined as a percentage of the total work planned as projected from the contractor's approved construction schedule. Payment of the lump sum contract price will constitute full compensation for completion of all work under this bid item.

All Methods—Payment will not be provided under this item for the purchase price of materials or equipment having a residual value.

Compensation for any item of work described in the contract, but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and the item to which they are made subsidiary are identified in section 9 of this specification.

9. Items of work and construction details

9. Items of work and construction details

In Section 5, Construction surveys, Method 2 shall apply.

In Section 8, Payment, Method 2 shall apply.

Items of work to be performed in conformance with this specification and the construction details therefore are:

a. Bid Item 3, Construction Surveys

- (1) This item shall consist of performing all work required by Section 1 of this specification.
- (2) All surveys shall proceed from benchmarks; reference points and/or stakes set or established by the Engineer. The benchmarks are shown on the drawings.
- (3) Initial and final surveys for determinations of final quantities will be performed by the Engineer.
- (4) In Section 5, Construction Surveys, the surveys conducted by the Contractor shall include but not be limited to:
 - (a) Those required to check all excavation and earthfill slopes as work progresses to insure such slopes are maintained at those specified.
 - (b) Earthfill slopes shall be checked at least each five feet of vertical interval and corrected to planned slope.
 - (c) Those required to set "bluetops" for subgrades and finished grades of all excavations, earthfills and appurtenances to the works.

Construction Specification 8—Mobilization and Demobilization

1. Scope

The work consists of the mobilization and demobilization of the contractor's forces and equipment necessary for performing the work required under the contract. It does not include mobilization and demobilization for specific items of work for which payment is provided elsewhere in the contract. Mobilization will not be considered as work in fulfilling the contract requirements for commencement of work.

2. Equipment and material

Mobilization shall include all activities and associated costs for transportation of contractor's personnel, equipment, and operating supplies to the site; establishment of offices, buildings, and other necessary general facilities for the contractor's operations at the site; premiums paid for performance and payment bonds including coinsurance and reinsurance agreements as applicable; and other items specified in section 4 of this specification.

Demobilization shall include all activities and costs for transportation of personnel, equipment, and supplies not required or included in the contract from the site; including the disassembly, removal, and site cleanup of offices, buildings, and other facilities assembled on the site specifically for this contract.

This work includes mobilization and demobilization required by the contract at the time of award. If additional mobilization and demobilization activities and costs are required during the performance of the contract as a result of changed, deleted, or added items of work for which the contractor is entitled to an adjustment in contract price, compensation for such costs will be included in the price adjustment for the item or items of work changed or added.

3. Payment

Payment will be made as the work proceeds, after presentation of paid invoices or documentation of direct costs by the contractor showing specific mobilization and demobilization costs and supporting evidence of the charges of suppliers, subcontractors, and others. When the total of such payments is less than the lump sum contract price, the balance remaining will be included in the final contract payment. Payment of the lump sum contract price for mobilization and demobilization will constitute full compensation for completion of the work.

Payment will not be made under this item for the purchase costs of materials having a residual value, the purchase costs of materials to be incorporated in the project, or the purchase costs of operating supplies.

4. Items of work and construction details

4. Items of work and construction details

Items of work to be performed in conformance with this specification and the construction details therefore are:

a. Bid Item 4, Mobilization and Demobilization

- (1) This item shall consist of performing all items of work for mobilization and demobilization as required by Sections 1 and 2 of this specification.
- (2) The mobilization operation shall include but not be limited to the items in Section 2 of this specification and the following items of work:
 - (a) Access to the work area will require multiple access points and shall be designated at the showing of the site to prospective bidders. Access roads shall be constructed and maintained by the Contractor. The access roads shall be a minimum of 14 feet wide and be graded and smoothed to provide a surface which can be easily traversed by automobiles. The roads shall be maintained in a smooth rut-free condition throughout the contract period.
 - (b) As a part of this bid item the Contractor shall furnish a facility at the construction campsite suitable for use as a Field Office for the Contracting Local Organization (CLO). The facility shall contain not less than 128 square feet (8-ft-wide by 16-ft-long) having a minimum 7-ft-high ceiling. The facility shall be constructed in a workmanlike manner and shall be weather-tight. It shall have not less than two windows and one door. A microwave oven 0.80 cubic foot in size and having a minimum power rating of 650 watts output shall be provided. A substantial workbench or table, 3-ft-wide by 8-ft-long with the work surface 42" above floor level shall be provided. Cabinet storage shelves shall be included with the workbench. One office swivel chair and 4 straight chairs shall be provided. The floor shall have a heavy-duty vinyl or similar covering. Walls, ceilings and floors shall be constructed in such a manner as to provide a minimum of 1.5 inches of space between inside and outside surfaces. The 1.5-inch space shall be filled with a high-density insulation material. The facility shall be wired for electricity with a minimum of two ceiling fixtures and a minimum of two wall outlets on each long wall. A thermostatically controlled means that can maintain the temperature inside the facility at 75 degrees in the summer with refrigerated air and 80 degrees in the winter, for heating and air conditioning the facility shall be provided. The facility shall be built in such a manner that it is substantial and can be easily moved. A prefabricated building or trailer will be an acceptable facility if approved by the Contracting Officer. The Contractor shall furnish and install all utilities to the facility. The facility shall be maintained in good condition throughout the contract period by the Contractor, except for damages caused by negligence of the CLO. The facility shall be separate and apart from any building or facilities of the Contractor and shall be for sole use of the CLO and meet all City of Katy permitting requirements.

- (c) The facility shall be securely anchored or tied down to provide maximum possible stability against overturning by high winds. Flashing or skirting shall be installed around the facility from floor level to ground level.
 - (d) Access to the door to the facility from the ground shall be provided by substantial steps leading to a landing having a minimum size of 5 feet wide by 6 feet long. Substantial handrails shall be provided for the steps and the landing.
 - (e) The Contractor shall furnish and install electrical service to CLO field trailer. The electrical service shall be 110-120-volt, 60 amp, alternating current. The Contractor shall be responsible for supply of power to the field office throughout the contract period. If a portable generator is used to supply electrical power, the Contractor shall be responsible for the complete operation and maintenance of the generator. The generator shall remain in an operating condition 24 hour per day and shall be located a minimum of 100 feet from the field office and shielded to minimize the noise in the CLO occupied building/facility and adjacent residences.
 - (f) The facility shall be enclosed by a six (6) foot high chain link fence placed to provide a minimum of six (6) feet clearance between the fence and the outside walls of the facility. One (1) gate four (4) feet in width shall be installed in the fence.
 - (g) All utilities shall be in place at the worksite prior to the start of work requiring continuous inspection and no later than 15 days after receipt of the Notice to Proceed.
- (3) The demobilization operation shall include but not be limited to the following items of work:
- (a) All debris, trash, tires, equipment, equipment parts, chains, cables, and other such items resulting from the construction operation shall be removed from the worksite and disposed of in an approved sanitary land fill of the Contractor's own choosing.
 - (b) All disturbed areas shall be bladed or smoothed to blend the area with the surrounding land surface. The bladed or smoothed surface shall be free of abrupt mounds, windrows, depressions or other irregularities that would prevent the safe operation of ordinary farm equipment thereon. The finished surface shall prevent diversion of surface runoff and shall prevent standing or ponding water.
 - (c) All buildings, trailers, chain link fence, storage sheds, sanitary facilities, cattle guard and other such items shall be removed from the worksite when construction work is completed.
 - (d) All utilities shall be removed from the site as required by the owner of the utility after construction work is completed.
 - (e) All traffic control devices, warning signs, barricades and any other material used for traffic control shall be removed.
 - (f) The access road shall be replaced to the pre-construction condition.

- (4) The item of work subsidiary to this bid item is Traffic Control as specified in Construction Specification 9.

Construction Specification 9—Traffic Control

1. Scope

The work shall consist of establishing traffic control and maintaining safe, convenient use of public roads and rights-of-way.

2. Traffic and access

The contractor's operations shall cause no unnecessary inconvenience to the public. The public rights-of-way shall be maintained at all times unless interruption is authorized by proper local authority.

Contractor's authorized closing or detour plans shall be provided to the engineer for approval.

Safe and adequate access shall be provided and maintained to all public protection devices and to all critical utility control locations. Facility access shall be continuous and unobstructed unless otherwise approved.

3. Storage of equipment and material in public streets

Construction materials and equipment shall not be stored or parked on public streets, roads, or highways. During any material or equipment loading or unloading activities that may temporarily interfere with traffic, an acceptable detour shall be provided for the duration of the activity. Any associated expense for this activity is the responsibility of the contractor.

Excavated material, including suitable material that is intended for adjacent trench backfill or other earth backfill as specified in section 5 of this specification, shall not be stored on public streets, roads, or highways that remain in service for the public. Any waiver of this requirement must be obtained from the proper local authority and approved by the engineer. All excess and unsuitable material shall be removed from the site as soon as possible. Any spillage shall be removed from roadways before they are used by the public.

4. Street closures, detours, and barricades

The contractor shall comply with the requirements of all applicable responsible units of government for closure of any street, road, or highway. The contractor shall provide the required barriers, guards, lights, signs, temporary bridges, and flaggers together with informing the public of any detours and construction hazards by the most suitable means available, such as local newspapers or radio stations. The contractor is also responsible for compliance with additional public safety requirements that may arise during construction. The contractor shall furnish, install, and, upon completion of the work, promptly remove all signs, warning devices, and other materials used in the performance of this work.

Unless otherwise specified, the contractor shall notify, in writing, the fire chief, police chief, county sheriff, state patrol, schools that operate school buses, or any other government official as may be appropriate no less than 7 days before closing, partly closing, or reopening any street, road, or highway.

Unless otherwise specified, the contractor shall furnish to the engineer a written plan showing the proposed method of signing, barricading for traffic control, and safety for street detours and closures.

All temporary detours will be maintained to ensure use of public rights-of-way is provided in a safe manner. This may include dust control, grading, and graveling as required in section 7 of this specification.

5. General and specific references

All signs, signals, barricades, use of flaggers, and other traffic control and public safety devices shall conform to the general requirements set forth in the Manual of Uniform Traffic Control Devices (MUTCD) and the latest edition of *Standard Highway Signs and Standard Alphabets for Highway Signs* and/or *OSHA Construction Industry Standards (29 CFR Part 1926), Subpart G, Signs, Signals, and*

Barricades unless otherwise specified in section 7 of this specification.

6. Measurement and payment

For items of work for which specific lump sum prices are established in the contract, payment for the work is made at the contract lump sum price. Progress payments will be made based upon the percentage of estimated total time that traffic control will be required unless otherwise specified in section 7 of this specification. Payment will constitute full compensation for all flaggers, labor, materials, equipment, and all other items necessary and incidental to completion of the work.

Compensation for any item of work described in the contract, but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and items to which they are made subsidiary are identified in section 7 of this specification.

7. Items of work and construction details

7. Items of work and construction details

Items of work to be performed in conformance with this specification and the construction details therefore are:

a. Subsidiary Item, Traffic Control

- (1) This item shall consist of performing all items of work for traffic control as required by Sections 1 and 2 of this specification.
- (2) In Section 4, the Contractor shall furnish a written plan showing the proposed method of signing, barricading for traffic control, use of flaggers, etc. to be approved by Fort Bend County Drainage District and Missouri City.
- (3) Separate payment will not be made for this item of work. Compensation for this item will be included in the payment for the bid item Mobilization and Demobilization.

Construction Specification 11—Removal of Water

1. Scope

The work consists of the removal of surface water and ground water as necessary to perform the construction required by the contract in accordance with the specifications. It shall include: (1) constructing, installing, building, and maintaining all necessary temporary water containment facilities, channels, and diversions; (2) furnishing, installing, and operating all necessary pumps, piping, and other facilities and equipment; and (3) removing all such temporary works and equipment after their intended function is no longer required.

2. Diverting surface water

The contractor shall install, maintain, and operate all cofferdams, channels, flumes, sumps, and all other temporary diversion and protective works needed to divert streamflow and other surface water through or around the construction site. Control of surface water shall be continuous during the period that damage to construction work could occur. Unless otherwise specified and/or approved, the diversion outlet shall be into the same drainageway that the water would have reached before being diverted.

The contractor shall furnish the contracting officer, in writing, a proposed plan for diverting surface water before beginning any construction activities for which a diversion is required, unless waived in section 8 of this specification. Acceptance of this plan or the waiving of the plan requirement will not relieve the contractor of the responsibilities related to this activity during the process of completing the work as specified.

3. Dewatering the construction site

Foundations, cutoff trenches, and all other parts of the construction site shall be dewatered and kept free of standing water and muddy conditions as necessary for the proper execution of the work. The contractor shall furnish, install, operate, and maintain all drains, sumps, pumps, casings, well points, and all other equipment required to properly dewater the site as specified. Dewatering systems that cause a loss of soil fines from the foundation areas will not be permitted.

The contractor shall furnish the contracting officer, in writing, a proposed plan for dewatering before commencing with any construction activity for which dewatering may be required, unless waived in section 8 of this specification. Acceptance of this plan or the waiving of the plan requirement will not relieve the contractor of the responsibilities for completing the specified work.

4. Dewatering borrow areas

The contractor shall maintain all borrow areas free of surface water or otherwise provide for timely and effective removal of surface and subsurface water that accumulates within the borrow area, unless waived in section 8 of this specification. Borrow material shall be processed as necessary to achieve proper and uniform moisture content at the time of placement.

If pumping to dewater borrow areas is included as a bid item of work in the bid schedule, each pump discharge pipe shall be equipped with a water meter. The meter shall be such that the measured quantity of water is accurate within 3 percent of the true quantity. The contractor shall provide necessary support to perform accuracy tests of the water meter when requested by the contracting officer.

5. Erosion and pollution control

Removal of water from the construction site, including the borrow areas, shall be accomplished so that erosion and the transporting of sediment and other pollutants are minimized. Dewatering activities shall be accomplished in a manner that the water table water quality is not altered. Pollution control activities shall not conflict with the requirements of Construction Specification 5, Pollution Control, if it is a part of this contract.

6. Removal of temporary works

When temporary works are no longer needed, the contractor shall remove and return the area to a condition similar to that which existed before construction. Areas where temporary works were located shall be graded for sightly appearance with no obstruction to natural surface waterflows or the proper functioning and access to the works of improvement installed. The contractor shall exercise extreme care during the removal stages to minimize the loss of soil sediment and debris that was trapped during construction.

Pipes, casings, and any other material used to dewater the site shall be removed from temporary wells. The wells shall be filled to ground level with clean gravel or other suitable material approved by the contracting officer. The contractor shall exercise extreme care to prevent pollution of the ground water by these actions.

7. Measurement and payment

Method 1—Items of work listed in the bid schedule for removal of water, diverting surface water, and dewatering construction sites and borrow areas are paid for at the contract lump sum prices. Such payment will constitute full compensation for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work.

Method 2—Items of work listed in the bid schedule for removal of water, diverting surface water, dewatering construction sites, and dewatering borrow areas are paid for at the contract lump sum prices. Such payment will constitute full compensation for furnishing, installing, operating, and maintaining the necessary trenches, drains, sumps, pumps, and piping and for all labor, equipment, tools, and all other items necessary and incidental to the completion of the work. The exception is that additional payment for pumping to dewater borrow areas and the removal of water will be made as described in the following paragraph.

If pumping to dewater borrow areas is a contract bid item, payment is made at the contract unit price, which shall be the price per 1,000 gallons shown in the bid schedule. Such payment will constitute full compensation for pumping only. Compensation for equipment and preparation and for other costs associated with pumping is included in the lump sum payment for removal of water or the lump sum payment for dewatering the borrow areas. Payment is made only for pumping that is necessary to dewater borrow areas that cannot be effectively drained by gravity or that must have the water table lowered to be usable as a suitable borrow source. Pumping for other purposes will not be included for payment under this item.

All Methods—The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract, but not listed in the bid schedule is included in the payment for the contract line item to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in section 8 of this specification.

8. Items of work and construction details

8. Items of work and construction details

Items of work to be performed in conformance with this specification and the construction details therefore are:

a. Bid Item 5, Removal of Water

- (1) This item shall consist of all operations necessary to accomplish the work defined in Section 1 of this specification.
- (2) Written plans for diverting surface waters and for dewatering the site are required. The Contractor's plans for diverting surface waters and dewatering the site shall be submitted to the Engineer prior to the start of construction operations.
- (3) In Section 7, Measurement and payment, Method 1 shall apply. Payment shall be prorated and paid in equal amounts on each monthly estimate. The number of months used for prorating shall be the number estimated to complete the work. The final month's prorate amount is made with the final payment.

Construction Specification 21—Excavation

1. Scope

The work shall consist of the excavation required by the drawings and specifications and disposal of the excavated materials.

2. Classification

Excavation is classified as common excavation, rock excavation, or unclassified excavation in accordance with the following definitions.

Common excavation is defined as the excavation of all materials that can be excavated, transported, and unloaded using heavy ripping equipment and wheel tractor-scrapers with pusher tractors or that can be excavated and dumped into place or loaded onto hauling equipment by excavators having a rated capacity of one cubic yard or larger and equipped with attachments (shovel, bucket, backhoe, dragline, or clam shell) appropriate to the material type, character, and nature of the materials.

Rock excavation is defined as the excavation of all hard, compacted, or cemented materials that require blasting or the use of ripping and excavating equipment larger than defined for common excavation. The excavation and removal of isolated boulders or rock fragments larger than 1 cubic yard encountered in materials otherwise conforming to the definition of common excavation shall be classified as rock excavation. The presence of isolated boulders or rock fragments larger than 1 cubic yard is not in itself sufficient cause to change the classification of the surrounding material.

For the purpose of these classifications, the following definitions shall apply:

Heavy ripping equipment is a rear-mounted, heavy duty, single-tooth, ripping attachment mounted on a track type tractor having a power rating of at least 250 flywheel horsepower unless otherwise specified in section 10.

Wheel tractor-scraper is a self-loading (not elevating) and unloading scraper having a struck bowl capacity of at least 12 cubic yards.

Pusher tractor is a track type tractor having a power rating of at least 250 flywheel horsepower equipped with appropriate attachments.

Unclassified excavation is defined as the excavation of all materials encountered, including rock materials, regardless of their nature or the manner in which they are removed.

3. Blasting

The transportation, handling, storage, and use of dynamite and other explosives shall be directed and supervised by a person(s) of proven experience and ability who is authorized and qualified to conduct blasting operations.

Blasting shall be done in a manner as to prevent damage to the work or unnecessary fracturing of the underlying rock materials and shall conform to any special requirements in section 10 of this specification. When specified in section 10, the contractor shall furnish the engineer, in writing, a blasting plan before blasting operations begin.

4. Use of excavated material

Method 1—To the extent they are needed, all suitable material from the specified excavations shall be used in the construction of required permanent earthfill or rockfill. The suitability of material for specific purposes is determined by the engineer. The contractor shall not waste or otherwise dispose of suitable excavated material.

Method 2—Suitable material from the specified excavations may be used in the construction of required

earthfill or rockfill. The suitability of material for specific purposes is determined by the engineer.

5. Disposal of waste materials

Method 1—All surplus or unsuitable excavated materials are designated as waste and shall be disposed of at the locations shown on the drawings.

Method 2—All surplus or unsuitable excavated materials are designated as waste and shall be disposed of by the contractor at sites of his own choosing away from the site of the work. The disposal shall be in an environmentally acceptable manner that does not violate local rules and regulations.

6. Excavation limits

Excavations shall comply with OSHA Construction Industry Standards (29CFR Part 1926) Subpart P, Excavations, Trenching, and Shoring. All excavations shall be completed and maintained in a safe and stable condition throughout the total construction phase. Structure and trench excavations shall be completed to the specified elevations and to the length and width required to safely install, adjust, and remove any forms, bracing, or supports necessary for the installation of the work. Excavations outside the lines and limits shown on the drawings or specified herein required to meet safety requirements shall be the responsibility of the contractor in constructing and maintaining a safe and stable excavation.

7. Borrow excavation

When the quantities of suitable material obtained from specified excavations are insufficient to construct the specified earthfills and earth backfills, additional material shall be obtained from the designated borrow areas. The extent and depth of borrow pits within the limits of the designated borrow areas shall be as specified in section 10 or as approved by the engineer.

Borrow pits shall be excavated and finally dressed to blend with the existing topography and sloped to prevent ponding and to provide drainage.

8. Overexcavation

Excavation in rock beyond the specified lines and grades shall be corrected by filling the resulting voids with portland cement concrete made of materials and mix proportions approved by the engineer. Concrete that will be exposed to the atmosphere when construction is completed shall meet the requirements of concrete selected for use under Construction Specification 31, Concrete for Major Structures, or 32, Structure Concrete, as appropriate.

Concrete that will be permanently covered shall contain not less than five bags of cement per cubic yard. The concrete shall be placed and cured as specified by the engineer.

Excavation in earth beyond the specified lines and grades shall be corrected by filling the resulting voids with approved, compacted earthfill. The exception to this is that if the earth is to become the subgrade for riprap, rockfill, sand or gravel bedding, or drainfill, the voids may be filled with material conforming to the specifications for the riprap, rockfill, bedding, or drainfill. Before correcting an overexcavation condition, the contractor shall review the planned corrective action with the engineer and obtain approval of the corrective measures.

9. Measurement and payment

For items of work for which specific unit prices are established in the contract, the volume of each type and class of excavation within the specified pay limits is measured and computed to the nearest cubic yard by the method of average cross-sectional end areas or by methods outlined in section 10 of this specification. Regardless of quantities excavated, the measurement for payment is made to the specified pay limits except that excavation outside the specified lines and grades directed by the engineer to remove unsuitable material is included. Excavation required because unsuitable conditions result from the contractor's improper construction operations, as determined by the engineer, is not included for measurement and payment.

Method 1—The pay limits shall be as designated on the drawings.

Method 2—The pay limits shall be defined as follows:

- a. The upper limit shall be the original ground surface as it existed before the start of construction operations except that where excavation is performed within areas designated for previous excavation or earthfill, the upper limit shall be the modified ground surface resulting from the specified previous excavation or earthfill.
- b. The lower and lateral limits shall be the neat lines and grades shown on the drawings.

Method 3—The pay limits shall be defined as follows:

- a. The upper limit shall be the original ground surface as it existed before the start of construction operations except that where excavation is performed within areas designated for previous excavation or earthfill, the upper limit shall be the modified ground surface resulting from the specified previous excavation or earthfill.
- b. The lower and lateral limits shall be the true surface of the completed excavation as directed by the engineer.

Method 4—The pay limits shall be defined as follows:

- a. The upper limit shall be the original ground surface as it existed before the start of construction operations except that where excavation is performed within areas designated for previous excavation or earthfill, the upper limit shall be the modified ground surface resulting from the specified previous excavation or earthfill.
- b. The lower limit shall be at the bottom surface of the proposed structure.
- c. The lateral limits shall be 18 inches outside of the outside surface of the proposed structure or shall be vertical planes 18 inches outside of and parallel to the footings, whichever gives the larger pay quantity, except as provided in d below.
- d. For trapezoidal channel linings or similar structures that are to be supported upon the sides of the excavation without intervening forms, the lateral limits shall be at the underside of the proposed lining or structure.
- e. For the purposes of the definitions in b, c, and d, above, any specified bedding or drainfill directly beneath or beside the structure will be considered to be a part of the structure.

All methods—The following provisions apply to all methods of measurement and payment.

Payment for each type and class of excavation is made at the contract unit price for that type and class of excavation. Such payment will constitute full compensation for all labor, materials, equipment, and all other items necessary and incidental to the performance of the work except that extra payment for backfilling overexcavation will be made in accordance with the following provisions.

Payment for backfilling overexcavation, as specified in section 8 of this specification, is made only if the excavation outside specified lines and grades is directed by the engineer to remove unsuitable material and if the unsuitable condition is not a result of the contractor's improper construction operations as determined by the engineer.

Compensation for any item of work described in the contract, but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in section 10 of this specification.

10. Items of work and construction details

10. **Item of work and construction details**

In Section 4, Use of excavated material, Method 1 shall apply. There is no guarantee that materials obtained from the specified excavations may be used directly in specified fill areas. Separate stockpiling of selected materials, based on their engineering properties, to insure their availability for use in specific zones of fill areas may be required. Stockpiling shall be conducted on areas shown on the construction drawings or as approved by the Engineer. Additional compensation will not be made for stockpiling of excavated materials. Cost for stockpiling of excavated materials shall be included in the compensation for the bid item(s) for excavation.

In Section 5, Disposal of waste materials, Method 1 shall apply. The disposal of the excavated materials shall include transporting, depositing, and spreading the materials to and on the designated waste areas. The waste areas shall be at the locations designated on the drawings. The finished surface of the waste area(s) shall be uniform and conform to the topography. Additional compensation for disposal of excavated materials and dressing of the surface of waste areas will not be made. Costs will be included in the compensation for the bid item for excavation.

The upper limit for the excavations shall be the measured surface of the ground before construction.

The lower limits of excavations shown on the drawings shall be considered the true surface of completed excavation unless unsuitable materials still exist. The actual depths and extent of these excavations will be determined by the Engineer after examination of materials encountered. After the limits of excavation shown on the drawings are complete, the Engineer will examine the completed surface and mark areas that need additional excavation to remove unsuitable materials.

Prior to performing the designated excavations, the embankment shall be stripped of vegetal, organic and any other unsuitable materials. The depth of this stripping shall be sufficient to remove soil containing significant vegetative or organic matter. The depth of stripping is estimated to be 6 inches, on average.

Suitable materials resulting from the required excavations shall be used to construct the specified fills except materials suitable for topsoil shall be stockpiled at the location designated by the Engineer. Unsuitable materials shall be placed in the waste area shown on the drawings.

In Section 8, reference to Construction Specification 32 shall not apply.

In Section 9, Measurement and payment, Method 3 shall apply. The neat lines and grades shown on the drawings shall be considered the true surface of the completed excavation unless otherwise approved by the Engineer.

Items of work to be performed in conformance with this specification and the construction details therefore are:

- a. Bid Item 6, Excavation, Common
 - (1) This item shall consist of all excavation required for the reconstruction of the channel and channel slopes as shown on the drawings.
 - (2) Items of work subsidiary to this bid item are:
 - (a) Clearing, Class C, as specified in Construction Specification 1 as it applies to this bid item.
 - (b) Excavation, Common, Foundation Stripping as specified in Section 10.c. of this specification as it applies to this bid item.

- b. Subsidiary Item, Excavation, Common, Foundation Stripping
- (1) This item shall apply to the areas receiving earthfill that do not require other excavations before earthfill placement. This excavation shall consist of removing weeds, grass, roots and soils containing significant vegetative or organic material from the ground surface (including any waste areas) prior to placing earthfill in required areas. The depth of stripping shall be sufficient to remove the vegetative material and soil containing significant organic matter and is estimated to be 3 to 12 inches. The total required volume of stripping shall not exceed that obtained by assuming a depth of 6 inches.
 - (2) Separate payment will not be made for this item. Compensation for this item will be included in the payment for the bid item for Excavation, Common.

Construction Specification 23—Earthfill

1. Scope

The work consists of the construction of earth embankments, other earthfills, and earth backfills required by the drawings and specifications.

Earthfill is composed of natural earth materials that can be placed and compacted by construction equipment operated in a conventional manner.

Earth backfill is composed of natural earth material placed and compacted in confined spaces or adjacent to structures (including pipes) by hand tamping, manually directed power tampers or vibrating plates, or their equivalent.

2. Material

All fill material shall be obtained from required excavations and designated borrow areas. The selection, blending, routing, and disposition of material in the various fills shall be subject to approval by the engineer.

Fill materials shall contain no frozen soil, sod, brush, roots, or other perishable material. Rock particles larger than the maximum size specified for each type of fill shall be removed prior to compaction of the fill.

The types of material used in the various fills shall be as listed and described in the specifications and drawings.

3. Foundation preparation

Foundations for earthfill shall be stripped to remove vegetation and other unsuitable material or shall be excavated as specified.

Except as otherwise specified, earth foundation surfaces shall be graded to remove surface irregularities and shall be scarified parallel to the axis of the fill or otherwise acceptably scored and loosened to a minimum depth of 2 inches. The moisture content of the loosened material shall be controlled as specified for the earthfill, and the surface material of the foundation shall be compacted and bonded with the first layer of earthfill as specified for subsequent layers of earthfill.

Earth abutment surfaces shall be free of loose, uncompacted earth in excess of 2 inches in depth normal to the slope and shall be at such a moisture content that the earthfill can be compacted against them to produce a good bond between the fill and the abutments.

Rock foundation and abutment surfaces shall be cleared of all loose material by hand or other effective means and shall be free of standing water when fill is placed upon them. Occasional rock outcrops in earth foundations for earthfill, except in dams and other structures designed to restrain the movement of water, shall not require special treatment if they do not interfere with compaction of the foundation and initial layers of the fill or the bond between the foundation and the fill.

Foundation and abutment surfaces shall be no steeper than one horizontal to one vertical unless otherwise specified. Test pits or other cavities shall be filled with compacted earthfill conforming to the specifications for the earthfill to be placed upon the foundation.

4. Placement

Earthfill shall not be placed until the required excavation and foundation preparation have been completed and the foundation has been inspected and approved by the engineer. Earthfill shall not be placed upon a frozen surface nor shall snow, ice, or frozen material be incorporated in the earthfill matrix.

Earthfill shall be placed in approximately horizontal layers. The thickness of each layer before compaction shall not exceed the maximum thickness specified in section 10 or shown on the drawings.

Materials placed by dumping in piles or windrows shall be spread uniformly to not more than the specified thickness before being compacted.

Hand compacted earth backfill shall be placed in layers whose thickness before compaction does not exceed the maximum thickness specified for layers of earth backfill compacted by manually directed power tampers.

Earth backfill shall be placed in a manner that prevents damage to the structures and allows the structures to assume the loads from the earth backfill gradually and uniformly. The height of the earth backfill adjacent to a structure shall be increased at approximately the same rate on all sides of the structure.

Earthfill and earth backfill in dams, levees, and other structures designed to restrain the movement of water shall be placed to meet the following additional requirements:

- (a) The distribution of materials throughout each zone shall be essentially uniform, and the earthfill shall be free from lenses, pockets, streaks, or layers of material differing substantially in texture, moisture content, or gradation from the surrounding material. Zone earthfills shall be constructed concurrently unless otherwise specified.
- (b) The surface of each layer shall be scarified parallel to the axis of the fill to a depth of not less than 2 inches before the next layer is placed.
- (c) The top surface of embankments shall be maintained approximately level during construction with two exceptions: A crown or cross-slope of about 2 percent shall be maintained to ensure effective drainage, or as otherwise specified for drainfill or sectional zones.
- (d) Dam embankments shall be constructed in continuous layers from abutment to abutment except where openings to facilitate construction or to allow the passage of streamflow during construction are specifically authorized in the contract.
- (e) Embankments built at different levels as described under (c) or (d) above shall be constructed so that the slope of the bonding surfaces between embankment in place and embankment to be placed is not steeper than 3 feet horizontal to 1 foot vertical. The bonding surface of the embankment in place shall be stripped of all material not meeting the requirements of this specification and shall be scarified, moistened, and recompacted when the new earthfill is placed against it. This ensures a good bond with the new earthfill and obtains the specified moisture content and density at the contact of the in place and new earthfills.

5. Control of moisture content

During placement and compaction of earthfill and earth backfill, the moisture content of the material being placed shall be maintained within the specified range.

The application of water to the earthfill material shall be accomplished at the borrow areas insofar as practicable. Water may be applied by sprinkling the material after placement on the earthfill, if necessary. Uniform moisture distribution shall be obtained by disking.

Material that is too wet when deposited on the earthfill shall either be removed or be dried to the specified moisture content prior to compaction.

If the top surface of the preceding layer of compacted earthfill or a foundation or abutment surface in the zone of contact with the earthfill becomes too dry to permit suitable bond, it shall either be removed or scarified and moistened by sprinkling to an acceptable moisture content before placement of the next layer of earthfill.

6. Compaction

Earthfill—Earthfill shall be compacted according to the following requirements for the class of compaction specified:

Class A compaction—Each layer of earthfill shall be compacted as necessary to provide the density of the earthfill matrix not less than the minimum density specified in Section 10 or identified on the drawings. The earthfill matrix is defined as the portion of the earthfill material finer than the maximum particle size allowed in the reference compaction test method specified (ASTM D698 or ASTM D1557).

Class B compaction—Each layer of earthfill shall be compacted to a mass density not less than the minimum density specified.

Class C compaction—Each layer of earthfill shall be compacted by the specified number of passes of the type and weight of roller or other equipment specified or by an approved equivalent method. Each pass shall consist of at least one passage of the roller wheel or drum over the entire surface of the layer.

Earth backfill—Earth backfill adjacent to structures shall be compacted to a density equivalent to that of the surrounding in-place earth material or adjacent required earthfill or earth backfill. Compaction shall be accomplished by hand tamping or manually directed power tampers, plate vibrators, walk-behind, miniature, or self-propelled rollers. Unless otherwise specified heavy equipment including backhoe mounted power tampers or vibrating compactors and manually directed vibrating rollers shall not be operated within 3 feet of any structure. Towed or self-propelled vibrating rollers shall not be operated within 5 feet of any structure. Compaction by means of drop weights operating from a crane or hoist is not permitted.

The passage of heavy equipment will not be allowed:

- Over cast-in-place conduits within 14-days after placement of the concrete
- Over cradled or bedded precast conduits within 7 days after placement of the concrete cradle or bedding
- Over any type of conduit until the backfill has been placed above the top surface of the structure to a height equal to one-half the clear span width of the structure or pipe or 3 feet, whichever is greater, except as may be specified in section 10.

Compacting of earth backfill adjacent to structures shall not be started until the concrete has attained the strength specified in section 10 for this purpose. The strength is determined by compression testing of test cylinders cast by the contractor's quality control personnel for this purpose and cured at the work site in the manner specified in ASTM C 31 for determining when a structure may be put into service.

When the required strength of the concrete is not specified as described above, compaction of earth backfill adjacent to structures shall not be started until the following time intervals have elapsed after placement of the concrete.

Structure	Time interval (days)
Vertical or near-vertical walls with earth loading on one side only	14
Walls backfilled on both sides simultaneously	7
Conduits and spillway risers, cast-in-place (with inside forms in place)	7
Conduits and spillway risers, cast-in-place (inside forms removed)	14
Conduits, pre-cast, cradled	2

Conduits, pre-cast, bedded	1
Cantilever outlet bents (backfilled both sides simultaneously)	3

7. Reworking or removal and replacement of defective earthfill

Earthfill placed at densities lower than the specified minimum density or at moisture contents outside the specified acceptable range of moisture content or otherwise not conforming to the requirements of the specifications shall be reworked to meet the requirements or removed and replaced by acceptable earthfill. The replacement earthfill and the foundation, abutment, and earthfill surfaces upon which it is placed shall conform to all requirements of this specification for foundation preparation, approval, placement, moisture control, and compaction.

8. Testing

During the course of the work, the contractor shall perform quality control tests, as applicable, to identify earthfill and earth backfill materials; determine the reference maximum density and optimum moisture content; and document that the moisture content of material at the time of compaction and the density of earthfill and earth backfill in place conform to the requirements of this specification.

Determining Reference Maximum Density and Optimum Moisture Content—For Class A compaction, the reference maximum density and optimum moisture content shall be determined in accordance with the compaction test and method specified on the drawings or in section 10.

Documenting Specification Conformance—In-place densities of earthfill and earth backfill requiring Class A compaction shall be measured in accordance with ASTM D1556, D2167, D2937, or D6938. Moisture contents of earthfill and earth backfill at the time of compaction shall be measured in accordance with ASTM D2216, D4643, or D6938. Values of moisture content determined by ASTM D2216 are considered the true value of the soil moisture. Values of moisture content determined by ASTM D4643 or D6938 shall be verified by comparison to values obtained by ASTM D2216. Values of in-place density and moisture content determined by these tests shall be compared to the minimum density and moisture content range specified on the drawings or in section 10.

Correction for Oversize Particles—If the materials to be used for earthfill or earth backfill contain more than 5 percent by dry weight of oversize rock particles (particles larger than those allowed in the specified compaction test and method), corrections for oversize particles shall be made using the appropriate procedures explained in ASTM D4718.

9. Measurement and payment

For items of work for which specific unit prices are established in the contract, the volume of each type and compaction class of earthfill and earth backfill within the specified zone boundaries and pay limits is measured and computed to the nearest cubic yard by the method of average cross-sectional end areas. Unless otherwise specified in section 10, no deduction in volume is made for embedded items, such as, but not limited to, conduits, inlet structures, outlet structures, embankment drains, sand diaphragm and outlet, and their appurtenances.

The pay limits shall be as defined below, with the further provision that earthfill required to fill voids resulting from overexcavation of the foundation, outside the specified lines and grades, will be included in the measurement for payment only under the following conditions:

- Where such overexcavation is directed by the engineer to remove unsuitable material, and
- Where the unsuitable condition is not a result of the contractor's improper construction operations as determined by the engineer.

Earthfill beyond the specified lines and grades to backfill excavation required for compliance with OSHA requirements will be considered subsidiary to the earthfill bid item(s).

Method 1—The pay limits shall be as designated on the drawings.

Method 2—The pay limits shall be the measured surface of the foundation when approved for placement of the earthfill and the specified neat lines of the earthfill surface.

Method 3—The pay limits shall be the measured surface of the foundation when approved for placement of the earthfill and the measured surface of the completed earthfill.

Method 4—The pay limits shall be the specified pay limits for excavation and the specified neat lines of the earthfill surface.

Method 5—The pay limits shall be the specified pay limits for excavation and the measured surface of the completed earthfill.

Method 6—Payment for each type and compaction class of earthfill and earth backfill is made at the contract unit price for that type and compaction class of earthfill. Such payment will constitute full compensation for all labor, material, equipment, and all other items necessary and incidental to the performance of the work.

Method 7—Payment for each type and compaction class of earthfill and earth backfill is made at the contract unit price for that type and compaction class of earthfill. Such payment will constitute full compensation for all labor, material, equipment, and all other items necessary and incidental to the performance of the work except furnishing, transporting, and applying water to the foundation and earthfill material. Water applied to the foundation and earthfill material is measured and payment made as specified in Construction Specification 10.

All methods—The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract, but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in section 10 of this specification.

10. Items of work and construction details

10. **Items of work and construction details**

In Section 2, Materials, the maximum particle size shall be 4 inches.

In Section 3, Foundation preparation the foundation on which earthfill is to be placed that has not had previous excavation performed shall be properly prepared as outlined in Section 3 of this specification.

In Section 4, Placement, the Engineer will not permit frozen materials to be incorporated in the specified fills. Removal of all frozen materials from the fill on which materials are to be deposited will be required. Additional compensation for removal of frozen materials from the fill will not be made. Cost of removing frozen materials from the fill will be included in the compensation for the bid item(s) for the designated earthfills.

The earthfill beneath the earthfill shall be completed to the line and grades shown on the drawings before placement of the earthfill.

All surfaces shall be closely examined immediately prior to the placement of all earthfills and backfills. All materials that exhibit drying cracks, slaking, or other evidence of being unstable or unsuitable, shall be removed or reworked by scarification, wetting, and compaction to the affected depths prior to the placement of fill. Additional compensation will not be made for removing or reworking the foundation or fill materials to meet the requirements herein specified.

After being deposited on the fill, each lift of fill material shall be spread, bladed and smoothed to the extent necessary to ensure that the surface is free of abrupt mounds, depressions or windrows to provide a smooth uniform surface for operation of plowing and compaction equipment.

Each lift of fill material shall then be disked, bladed, and plowed to an acceptable degree and depth to thoroughly loosen, blend, and bond the material with the preceding lift before compaction is started.

The minimum disk blade size shall be 34" in diameter. An increase in the weight of the plow, an increase in disc size, a decrease in thickness of lifts being placed, or any combination of these may be required to accomplish the blending and bonding herein specified.

In Section 6, Compaction, Class A compaction shall apply. In-place dry density of materials being placed shall not be less than 95 percent of the maximum dry density obtained during tests performed in accordance with the procedures contained in ASTM D698 (Laboratory Compaction Characteristics of Soil Using Standard Effort) using Method A or B, as appropriate. Placement moisture shall be from optimum to optimum plus 3 percent as determined from the above test. The moisture content of the materials being placed shall be adjusted as necessary to meet these requirements.

Maximum layer thickness shall be 8 inches before compaction and the maximum particle size shall be 4 inches.

In Section 9, Measurement and payment, Methods 2 and 6 shall apply. In Method 2 the measured surface shall be the surface before the placement of topsoil.

Items of work to be performed in conformance with this specification and the construction details therefore are:

a. Bid Item 7, Earthfill

- (1) This item shall consist of all earthfill designated for reconstruction of the channel and channel slopes as shown on the drawings.

- (2) The item of work subsidiary to this bid item is Topsoil as specified in Construction Specification 26.

Construction Specification 26—Topsoiling

1. Scope

The work consists of furnishing and spreading topsoil to specified depths at locations shown on the drawings.

2. Quality of topsoil

Topsoil shall consist of friable surface soil reasonably free of grass, roots, weeds, sticks, rocks, or other unsuitable material. Additional quality requirements, if any, are in section 7 of this specification.

3. Furnishing

Method 1—Topsoil shall be salvaged from designated earth surfaces that will be disturbed by construction activities. After designated sites have been cleared and grubbed, the topsoil shall be removed from the designated areas and stockpiled at locations shown on the drawings or acceptable to the engineer. Unsuitable material encountered during removal of topsoil shall be disposed of at locations shown on the drawings or approved by the engineer, or it will be otherwise hauled and disposed of at locations removed from the construction site. The contractor is responsible for complying with all local rules and regulations and the payment of any and all fees that may result from the disposal at locations outside the construction work limits.

Method 2—Topsoil shall be furnished from an offsite source designated by the contractor. The engineer shall be granted access to the source for inspection and acceptance before delivery to the site. Test results and samples shall be provided when specified in section 7 of this specification.

4. Stockpiling

Stockpiles of topsoil shall not conflict with the requirements of Construction Specification 5, Pollution Control, when made a part of this contract.

5. Spreading

Method 1—Spreading shall not be conducted when the ground or topsoil is frozen, excessively wet, or otherwise in a condition detrimental to uniform spreading operations. Surfaces designated to receive a topsoil application shall be lightly scarified just before the spreading operation.

Following the spreading operation, the topsoil surface shall be left reasonably smooth and without ruts or surface irregularities that could contribute to concentrated water flow downslope.

Method 2—Spreading shall not be performed when the ground or topsoil is frozen, excessively wet, or otherwise in a condition detrimental to uniform spreading operations. Surfaces designated to receive a topsoil application shall be lightly scarified just before the spreading operation. Where compacted earthfills are designated to be topsoiled, the topsoil shall be placed concurrently with the earthfill and shall be bonded to the compacted fill with the compacting equipment.

Following the spreading operation, the topsoil surface shall be left reasonably smooth and without ruts or surface irregularities that could contribute to concentrated water flow downslope.

6. Measurement and payment

Method 1—The total surface covered by topsoil is measured and the area(s) computed to the nearest square yard. Payment for furnishing and placing topsoil is made at the contract unit price.

Method 2—The total surface covered by topsoil, except the surface area of embankments, levees, dikes, and other earthfills not included for payment, is measured and the area(s) computed to the nearest square yard.

Payment for topsoil spread on the surface of embankments, levees, dikes, and other earthfills is included

in the measurement and payment for that item of earthfill where topsoil application occurred.

Method 3—For items of work for which specific unit prices are established in the contract, the volume of topsoil furnished and spread is computed to the nearest cubic yard by the method of average cross-sectional end areas from surveys of the excavated topsoil stockpile or, if not stockpiled, cross-sectional surveys of the borrow area(s). Payment for furnishing and spreading topsoil is made at the contract unit price.

All methods—The following provisions apply to all methods of measurement and payment. Compensation for any item of work described in the contract, but not listed in the bid schedule is included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in section 7 of this specification.

All payment methods—Payment will constitute full compensation for all labor, equipment, material, and all other items necessary and incidental to the completion of the work. This includes excavating, stockpiling, hauling, spreading, and the wasting of unsuitable excavated material.

7. Items of work and construction details

7. Items of work and construction details

In Section 3, Furnishing, Method 1 shall apply.

In Section 5, Spreading, Method 1 shall apply. After spreading the topsoil on the required areas, a minimal amount of compacted effort shall be applied by passing over the entire surface with at least one pass of a dozer track. Care shall be taken to avoid over compaction that will hinder the establishment of grass.

Topsoil should be at or near optimum moisture as determined by the feel method during spreading. The topsoil shall be spread uniformly to the specified thickness. Finished grades shall be maintained at that specified, and the final surfaces of topsoiled areas shall be dressed by blading, dragging, or floating operations.

Items of work to be performed in conformance with this specification and the construction details therefore are:

- a. Subsidiary Item, Topsoil
 - (1) This item shall consist of salvaging of approved topsoil from required excavations and from the foundation stripping operations and placing and spreading it on all fill areas as shown on the drawings.
 - (2) The depth of topsoil placement shall be 6 inches, except in areas where the fill depth is less than 6” the topsoil depth shall equal the fill depth.
 - (3) Separate payment will not be made for this item of work. Compensation for this item will be included in the payment for the bid item Earthfill.

Construction Specification 61—Rock Riprap

1. Scope

The work consists of the construction of rock riprap revetments and blankets, including filter or bedding where specified.

2. Material

Rock riprap must conform to the requirements of Material Specification 523, Rock for Riprap, or if so specified, must be obtained from designated sources. It must be free from dirt, clay, sand, rock fines, and other material not meeting the required gradation limits.

At least 30 days before rock is delivered from other than designated sources, the contractor must designate in writing the source from which rock material will be obtained and provide information satisfactory to the contracting officer that the material meets contract requirements. The contractor must provide the responsible engineer free access to the source for the purpose of obtaining samples for testing. The size and grading of the rock must be as specified in section 8.

Rock from approved sources must be excavated, selected, and processed to meet the specified quality and grading requirements at the time the rock is installed.

Based on a specific gravity of 2.65 (typical of limestone and dolomite) and assuming the individual rock is shaped midway between a sphere and a cube, typical size/weight relationships are:

Sieve size of rock	Approx. weight of rock	Weight of test pile
16 inches	300 pounds	6,000 pounds
11 inches	100 pounds	2,000 pounds
6 inches	15 pounds	300 pounds

When specified in section 8 or when it is necessary to verify the gradation of the rock riprap, a particle size analysis must be performed in accordance with ASTM D5519, Test Method A or B. The analysis must be performed at the work site on a test pile of representative rock. The mass of the test pile must be at least 20 times the mass of the largest rock in the pile. The results of the test are compared to the gradation required for the project. Test pile results that do not meet the construction specifications must be cause for the rock to be rejected. The test pile that meets contract requirements must be left on the job site as a sample for visual comparison. The test pile must be used as part of the last rock riprap to be placed.

Filter or bedding aggregates when required must conform to Material Specification 521, Aggregates for Drainfill and Filters, unless otherwise specified. Geotextiles must conform to Material Specification 592, Geotextile.

3. Subgrade preparation

The subgrade surface on which the rock riprap, filter, bedding, or geotextile is to be placed must be cut or filled and graded to the lines and grades shown on the drawings. When fill to subgrade lines is required, it must consist of approved material and must conform to the requirements of the specified class of earthfill.

Rock riprap, filter, bedding, or geotextile must not be placed until the foundation preparation is completed and the subgrade surface has been inspected and approved.

4. Equipment-placed rock riprap

The rock riprap must be placed by equipment on the surface and to the depth specified. It must be installed to the full course thickness in one operation and in such a manner as to avoid serious displacement of the underlying material. The rock for riprap must be delivered and placed in a manner that ensures the riprap in place is reasonably homogeneous with the larger rocks uniformly distributed and firmly in contact one to another with the smaller rocks and spalls filling the voids between the larger rocks. Some hand placing may be required to provide a neat and uniform surface.

Rock riprap must be placed in a manner to prevent damage to structures. Hand placing is required as necessary to prevent damage to any new and existing structures.

5. Hand placed rock riprap

The rock riprap must be placed by hand on the surface and to the depth specified. It must be securely bedded with the larger rocks firmly in contact one to another without bridging. Spaces between the larger rocks must be filled with smaller rocks and spalls. Smaller rocks must not be grouped as a substitute for larger rock. Flat slab rock must be laid on its vertical edge except where it is laid like paving stone and the thickness of the rock equals the specified depth of the riprap course.

6. Filter or bedding

When the contract specifies filter, bedding, or geotextile beneath the rock riprap, the designated material must be placed on the prepared subgrade surface as specified. Compaction of filter or bedding aggregate is not required, but the surface of such material must be finished reasonably smooth and free of mounds, dips, or windrows.

7. Measurement and payment

Method 1—For items of work for which specific unit prices are established in the contract, the quantity of each type of rock riprap placed within the specified limits is computed to the nearest ton by actual weight. The volume of each type of filter or bedding aggregate is measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas. For each load of rock riprap placed as specified, the contractor must furnish to the responsible engineer a statement-of-delivery ticket showing the weight to the nearest 0.1 ton.

Payment is made at the contract unit price for each type of rock riprap, filter, or bedding. Such payment is considered full compensation for completion of the work.

Method 2—For items of work for which specific unit prices are established in the contract, the quantity of each type of rock riprap placed within the specified limits is computed to the nearest 0.1 ton by actual weight. The quantity of each type of filter or bedding aggregate delivered and placed within the specified limits is computed to the nearest 0.1 ton. For each load of rock riprap placed as specified, the contractor must furnish to the engineer a statement-of-delivery ticket showing the weight to the nearest 0.1 ton. For each load of filter or bedding aggregate, the contractor must furnish to the responsible engineer a statement-of-delivery ticket showing the weight to the nearest 0.1 ton.

Payment is made at the contract unit price for each type of rock riprap, filter, or bedding. Such payment is considered full compensation for completion of the work.

Method 3—For items of work for which specific unit prices are established by the contract, the volume of each type of rock riprap and filter or bedding aggregate is measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas.

Payment is made at the contract unit price for each type of rock riprap, filter, or bedding. Such payment is considered full compensation for completion of the work.

Method 4—For items of work for which specific unit prices are established by the contract, the volume of each type of rock riprap, including filter and bedding aggregate, is measured within the specified limits

and computed to the nearest cubic yard by the method of average cross-sectional end areas.

Payment is made at the contract unit price for each type of rock riprap, including filter and bedding. Such payment is considered full compensation for completion of the work.

Method 5—For items of work for which specific unit prices are established by the contract, the quantity of each type of rock riprap placed within the specified limits is computed to the nearest ton by actual weight. For each load of rock for riprap placed as specified, the contractor must furnish to the responsible engineer a statement-of-delivery ticket showing the weight to the nearest 0.1 ton.

Payment is made at the contract unit price for each type of rock riprap, and includes compensation for any aggregate or geotextile installed as specified for filter or bedding. Such payment is considered full compensation for completion of the work.

Method 6—For items of work for which specific unit prices are established by the contract, the volume of each type of rock riprap is measured within the specified limits and computed to the nearest cubic yard by the method of average cross-sectional end areas.

Payment is made at the contract unit price for each type of rock riprap and includes compensation for any aggregate or geotextile installed as specified for filter or bedding. Such payment is considered full compensation for completion of the work.

All methods—The following provision applies to all methods of measurement and payment. Compensation for any item of work described in the contract, but not listed in the bid schedule, is included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in section 8.

No separate payment is made for testing the gradation of the test pile. Compensation for testing is included in the appropriate bid item for riprap.

8. Items of work and construction details

8. Items of work and construction details

In Section 7, Measurement and payment, Method 1 shall apply.

Rock for use as riprap shall comply with the requirement of Material Specification 523, Rock Type 1.

Rock gradation requirements are shown on the drawings. Prior to delivery of rock to the construction site, the Contractor shall provide a certified gradation analysis from the rock quarry and other evidence satisfactory to the Engineer showing the rock to be supplied complies with the specified gradation(s). Any difference of opinion between the Engineer, Contracting Officer and the Contractor concerning gradation of the riprap being delivered to the site shall be resolved by dumping and checking the gradation of one random truck load of rock

In the event such additional checking procedure becomes necessary, the mechanical equipment, scales, preparation of a sorting site, and labor needed to prove the gradation by weighing shall be provided by the Contractor at no additional cost.

Rock will be subject to additional testing beyond ASTM's listed in Material Specification 523 when in judgement of the Engineer, delivered rock has defects that may not have been detected by the specified laboratory tests. These defects may result in accelerated weathering. Any rock delivered that experiences degradation when selected samples are placed in water for a time of 7 days will be in non-compliance of the specification.

If, at any time, the rock is delivered to the construction site, separation or segregation of the smaller rock fraction from the larger rock fraction has occurred, the rock shall be reworked as necessary to insure a reasonably uniform distribution of the various rock sizes prior to placement of the rock. Due care shall be exercised during this rework operation (if required) to prevent inclusion of earth or other undesirable materials in the riprap.

The contractor shall have various layers in the source rock quarry tested in accordance with ASTM D5240 if the rock quality is in question as determined by the Engineer.

Riprap delivery shall be made only during scheduled working hours, and delivery tickets shall be furnished to the Engineer.

Riprap shall be equipment placed. Equipment shall not be allowed on the rock during or after placement.

Items of work to be performed in conformance with this specification and the construction details therefore are:

- a. Bid Item 8, Rock Riprap
 - (1) This item shall include furnishing and placing the rock riprap as shown on the drawings.

Construction Specification 94—Contractor Quality Control

1. Scope

The work consists of developing, implementing, and maintaining a quality control system to ensure that the specified quality is achieved for all materials and work performed.

2. Equipment and materials

Equipment and material used for quality control shall be of the quality and condition required to meet the test specifications cited in the contract. Testing equipment shall be properly adjusted and calibrated at the start of operations and the calibration maintained at the frequency specified. Records of equipment calibration tests shall be available to the engineer at all times. Equipment shall be operated and maintained by qualified operators as prescribed in the manufacturer's operating instructions, the references specified, and as specified in section 10 of this specification. All equipment and materials used in performing quality control testing shall be as prescribed by the test standards referenced in the contract or in section 10.

All equipment and materials shall be handled and operated in a safe and proper manner and shall comply with all applicable regulations pertaining to their use, operation, handling, storage, and transportation.

3. Quality control system

Method 1—The contractor shall develop, implement, and maintain a system of quality control to provide the specified material testing and verification of material quality before use. The system activities shall include procedures to verify adequacy of completed work, initiate corrective action to be taken, and document the final results. The identification of the quality control personnel and their duties and authorities shall be submitted to the contracting officer in writing within 15 calendar days after notice of award.

Method 2—The contractor shall develop, implement, and maintain a system adequate to achieve the specified quality of all work performed, material incorporated, and equipment furnished before use. The system established shall be documented in a written plan developed by the contractor and approved by the contracting officer. The system activities shall include the material testing and inspection needed to verify the adequacy of completed work and procedures to be followed when corrective action is required. Daily records to substantiate the conduct of the system shall be maintained by the contractor. The quality control plan shall cover all aspects of quality control and shall address, as a minimum, all specified testing and inspection requirements. The plan provided shall be consistent with the planned performance in the contractor's approved construction schedule. The plan shall identify the contractor's onsite quality control manager and provide an organizational listing of all quality control personnel and their specific duties. The written plan shall be submitted to the contracting officer within 15 calendar days after notice of award. The contractor shall not proceed with any construction activity that requires inspection until the written plan is approved by the contracting officer.

All methods—The quality control system shall include, but not be limited to, a rigorous examination of construction material, processes, and operation, including testing of material and examination of manufacturer's certifications as required, to verify that work meets contract requirements and is performed in a competent manner.

4. Quality control personnel

Method 1—Quality control activities shall be accomplished by competent personnel. A competent person is: One who is experienced and capable of identifying, evaluating, and documenting that materials and processes being used will result in work that complies with the contract; and, who has authority to take prompt action to remove, replace, or correct such work or products not in compliance. Off-site testing

laboratories shall be certified or inspected by a nationally recognized entity. The Contractor shall submit to the Contracting Officer, for approval, laboratory certification or inspection information. The Contractor shall submit to the Contracting Officer, for approval, the names, qualifications, authorities, certifications, and availability of the competent personnel who will perform the quality control activities.

Method 2—Quality control activities shall be accomplished by competent personnel who are separate and apart from line supervision and who report directly to management. A competent person is one who is experienced and capable of identifying, evaluating, and documenting that material and processes being used will result in work that complies with the contract, and who has authorization to take prompt action to remove, replace, or correct such work or products not in compliance. Offsite testing laboratories shall be certified or inspected by a nationally recognized entity. The Contractor shall submit to the Contracting Officer, for approval, laboratory certification or inspection information. The contractor shall submit to the contracting officer, for approval, the names, qualifications, authorities, certifications, and availability of the competent personnel who will perform the quality control activities.

5. Post-award conference

The contractor shall meet with the contracting officer before any work begins and discuss the contractor's quality control system. The contracting officer and the contractor shall develop a mutual understanding regarding the quality control system, including procedures for correcting quality control issues.

6. Records

The contractor's quality control records shall document both acceptable and deficient features of the work and corrective actions taken. All records shall be on forms approved by the contracting officer, be legible, and be dated and signed by the competent person creating the record.

Unless otherwise specified in section 10 of this specification, records shall include:

- a. Documentation of shop drawings including date submitted to and date approved by the contracting officer, results of examinations, any need for changes or modifications, manufacturer's recommendations and certifications, if any, and signature of the authorized examiner.
- b. Documentation of material delivered including quantity, storage location, and results of quality control examinations and tests.
- c. Type, number, date, time, and name of individual performing quality control activities.
- d. The material or item inspected and tested, the location and extent of such material or item, and a description of conditions observed and test results obtained during the quality control activity.
- e. The determination that the material or item met the contract provisions and documentation that the engineer was notified.
- f. For deficient work, the nature of the defects, specifications not met, corrective action taken, and results of quality control activities on the corrected material or item.

7. Reporting results

The results of contractor quality control inspections and tests shall be communicated to the engineer immediately upon completion of the inspection or test. Unless otherwise specified in section 10, the original plus one copy of all records, inspections, tests performed, and material testing reports shall be submitted to the engineer within one working day of completion. The original plus one copy of documentation of material delivered shall be submitted to the engineer before the material is used.

8. Access

The contracting officer and the engineer shall be given free access to all testing equipment, facilities, sites, and related records for the duration of the contract.

9. Payment

Method 1—For items of work for which lump sum prices are established in the contract, payment is made as the work proceeds, after presentation by the contractor of invoices showing related costs and evidence of charges by suppliers, subcontractors, and others for furnishing supplies and work performed. If the total of such payments is less than the lump sum contract price for this item, the remaining balance is included in the final contract payment. Payment of the lump sum contract price constitutes full compensation for completion of the work.

Payment is not made under this item for the purchase cost of material and equipment having a residual value.

Method 2—For items of work for which lump sum prices are established in the contract, payment is prorated and paid in equal amounts on each monthly estimate. The number of months used for prorating shall be the number estimated to complete the work. The final month's prorate amount is made with the final payment. Payment as described above constitutes full compensation for completion of the work.

Payment is not made under this item for the purchase cost of material and equipment having a residual value.

All methods—Compensation for any item of work described in the contract, but not listed in the bid schedule, is included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in section 10.

10. Items of work and construction details

10. Items of work and construction details

In Section 3, Quality control system, Method 2 shall apply, except that the written plan shall be submitted to the Contracting Officer within 10 calendar days after notice of award.

In Section 4, Quality control personnel, Method 2 shall apply.

In Section 9, Payment, Method 2 shall apply.

Items of work to be performed in conformance with this specification and the construction details therefore are:

- a. Bid Item 9, Contractor Quality Control
 - (1) This item shall consist of furnishing all equipment, tools, materials, and labor and performing all work to accomplish the work defined in Section 1 of this specification.
 - (2) The burden of proof that work performed meets contract requirements rests upon the Contractor. Quality assurance inspections and tests by the CLO are for the sole benefit of the CLO. The use of such words as "as approved by the Engineer or Contracting Officer" and words of like import in the specifications or drawings which refer to approval by the Contracting Officer are a part of the CLO's Quality Assurance program and do not relieve the Contractor in any part for the Contractor's Quality Control Responsibilities as specified.
 - (3) Quality Control is defined as a rigorous examination and inspection of construction materials, processes and operations to verify that the work being performed meets contract requirements and shall be performed by a qualified Inspector employed by or under contract to the Contractor.
 - (4) The Contractor's quality control system shall be approved and operational before commencement of work. The Contractor's Quality Control Personnel shall submit to the on-site NRCS Inspector Daily Quality Control Reports, for each day the Contractor is on site performing work.
 - (5) Quality control tests shall be conducted in accordance with the standard test methods identified in the specifications. The Contractor shall provide all equipment required to perform all quality control tests. Testing equipment shall meet the requirements as specified by ASTM test methods and be properly calibrated and serviced.
 - (6) All mention of inspection or Inspector in (7) and (8) below is referring to work performed by the Contractor's Quality Control Personnel unless otherwise noted.
 - (7) The degree of quality control specified shall be defined as:
 - (a) Periodic review or inspection is defined as the intermittent presence of the Inspector to observe construction operations and/or perform tests and take measurements as needed to determine and document that the work being performed complies with the specifications.
 - (b) Full time inspection is defined as the full-time presence of the Inspector to observe one or more construction operations and/or perform tests and take measurements at critical points in various operations to determine and document that the work being performed complies with the

specifications and to be available for consultation in case of emergency or changes in work conditions.

- (c) Continuous inspection is defined as the continuous presence of the Inspector to observe one construction operation and/or perform tests and take measurements at critical points in the operation to determine and document that the work being performed complies with the specifications and to be immediately available for consultation in case of emergency or changes in work conditions.

(8) The Contractor's inspection system shall include the following items of work that will require the Contractor's quality control. Any item of work not listed below shall be performed or constructed as shown on the drawings and as specified in the construction and material specifications.

- (a) The Contractor's inspection on all items not listed in (b) through (f) below shall consist of periodic review of those items to assure that all contract specifications are being met and that the items are being properly installed or carried out.
- (b) Seeding, Sprigging, and Mulching - Quality control shall consist of determining that the vegetative materials supplied comply with the specifications; that the areas to be vegetated are properly prepared, smoothed and graded; and that sprigging is performed as specified. Full time inspection shall be required.
- (c) Excavation - Quality control shall consist of full-time inspection to determine that all excavation is being accomplished as specified and that the specified excavation has removed all required or unsuitable materials and that grades are properly documented. The Inspector shall determine that all materials selected for use in backfill of the specified works are free of undesirable materials and that all materials are placed in the designated waste, stockpile or fill areas.
- (d) Earthfill – The Inspector shall select materials from the required excavations, stockpiles, and/or borrow area(s) to ensure the completed fills are constructed in accordance with the drawings and specifications. The Inspector shall ensure that the foundation conditions are satisfactory prior to placement of fill materials, free of undesirable materials, at the specified moisture content, and properly compacted.

Degree of inspection

Continuous inspection is required at the following times:

- Fills being placed adjacent to conduits and concrete structures
- Moisture and density are not being achieved,
- Fill materials are being compacted with hand-operated compactors.

Full-time inspection shall be required at all other times.

Class A Compaction – The Inspector shall select and obtain representative samples of the materials and have moisture-density curves made (according to ASTM D698 test procedures) of each Unified Soil Classification material to be placed in the specified fills using Class A

compaction. Moisture-density curves shall be completed as necessary to provide data needed when fill operations begin and may be needed as fill progresses to insure correct selection and specified compaction of fill materials. A “One-Point Family of Curves Method” (hereafter referred to as the one-point method) shall be employed to determine the optimum moisture and maximum density values for all fill materials. The procedure for performing the one-point method is as follows:

- construct a family of curves using compaction test data compiled on soil samples tested in accordance with the procedure set forth in ASTM D698,
- make a one-point compaction test specimen from soil material representing the fill material that is being placed (moisture content shall be on the dry side of optimum),
- plot the one-point moisture-density values, obtained from the test, on the family of curves,
- using the curves above and below the plotted point as a guide, draw a new compaction curve through the plotted point,
- use this curve as the control for the moisture and density of the material being placed. Unless otherwise directed by the Engineer, at least one one-point test shall be conducted for every three in-place moisture density tests that are taken.

Unless otherwise directed by the Engineer, at least one one-point test shall be conducted for every three in-place moisture density tests made. More frequent tests shall be required if compaction requirements are not being met and when fills are being placed in critical locations, such as, conduit and concrete backfills. In these instances, continuous inspection shall be required.

- (e) Rock Riprap - Quality control shall consist of full-time inspection during the placement of the rock riprap. The Inspector shall also determine that the rock riprap complies with the specified quality and gradation limits; that proper certifications are provided; that the rock is placed in a manner to prevent damage to the geotextile; that the rock is placed as shown on the drawings and as specified and that segregation of particle sizes has not occurred during delivery or placement. At least one onsite gradation test will be made by the Contractor.
- (f) Site Preparation Conduit Installation - Quality control shall consist of continuous inspection during the placement of new conduit. In addition, the Inspector shall assure that the conduit is placed to the lines and grade designated, that conduit’s joint is properly prepared, and couplers placed correctly.
- (9) The skills, knowledge, abilities and experience needed by the Contractor's quality control personnel to perform the quality control shall be as follows:
 - (a) Ability to maintain communications with the landowners, the Contracting Officer and the Contractor.
 - (b) Knowledge of cut and grade staking and earthwork installations.

- (c) Knowledge of soils, including foundation conditions, density and classifications.
 - (d) Knowledge of sampling of soils and determination of density of in-place soils.
 - (e) When applicable, knowledge of acceptable moisture-density test methods and the ability to satisfactorily perform the tests.
 - (f) Ability to interpret survey notes and to prepare quantity computations.
 - (g) Ability to maintain adequate files and records of construction inspection work.
 - (h) Ability to interpret construction drawings and specifications.
 - (i) Knowledge of the United Soil Classification System and the ability to interpret soil classification requirements from the construction drawings.
- (10) Quality control personnel shall also be responsible for maintaining a record of progress with photographs. Construction activities shall be documented with 3 megapixels or greater digital photography in a JPEG file format. Photographs of daily construction work, problems encountered, and unique construction practices shall be taken to insure full coverage of all work performed. The photographs shall be numbered, date and time imprinted and indexed with documentation explaining construction activities shown and must be submitted with the request for final payment.

Construction Specification 95—Geotextile

1. Scope

This work consists of furnishing all material, equipment, and labor necessary for the installation of geotextiles.

2. Quality

Geotextiles shall conform to the requirements of Material Specification 592 and this specification.

3. Storage

Before use, the geotextile shall be stored in a clean, dry location out of direct sunlight, not subject to extremes of either hot or cold temperatures, and with the manufacturer's protective cover undisturbed. Receiving, storage, and handling at the job site shall be in accordance with the requirements listed in ASTM D 4873.

4. Surface preparation

The surface on which the geotextile is to be placed shall be graded to the neat lines and grades as shown on the drawings. It shall be reasonably smooth and free of loose rock and clods, holes, depressions, projections, muddy conditions, and standing or flowing water (unless otherwise specified in section 7 of this specification).

5. Placement

Before the geotextile is placed, the soil surface will be reviewed for quality assurance of the design and construction. The geotextile shall be placed on the approved prepared surface at the locations and in accordance with the details shown on the drawings and specified in section 7 of this specification. It shall be unrolled along the placement area and loosely laid, without stretching, in such a manner that it conforms to the surface irregularities when material or gabions are placed on or against it. The geotextile may be folded and overlapped to permit proper placement in designated area(s).

Method 1—The geotextile shall be joined by machine sewing using thread material meeting the chemical requirements for the geotextile fibers or yarn. Thread shall be polypropylene, polyester, or Kevlar™ aramid thread, unless a specific thread type is specified. The thread shall be consist of two parallel stitched rows at a spacing of about 1 inch and shall not cross (except for any required re-stitching). The stitching shall be a lock-type stitch. Each row of stitching shall be located a minimum of 2 inches from the geotextile edge. Unless otherwise specified, the seam tensile strength as measured according to ASTM D4884 shall be a minimum of 90 percent of the geotextile tensile strength in the weakest principal direction as measured according to ASTM D4632.

The geotextile shall be temporarily secured during placement of overlying material to prevent slippage, folding, wrinkling, or other displacement of the geotextile. Unless otherwise specified, methods of securing shall not cause punctures, tears, or other openings to be formed in the geotextile.

Method 2—The geotextile shall be joined by overlapping a minimum of 18 inches (unless otherwise specified) and secured against the underlying foundation material. Securing pins, approved and provided by the geotextile manufacturer, shall be placed along the edge of the panel or roll material to adequately hold it in place during installation. Pins shall be steel or fiberglass formed as a **U**, **L**, or **T** shape or contain "ears" to prevent total penetration through the geotextile. Steel washers shall be provided on all but the U-shaped pins. The upstream or upslope geotextile shall overlap the abutting downslope geotextile. At vertical laps, securing pins shall be inserted through the bottom layers along a line through approximately the mid-point of the overlap. At horizontal laps and across slope labs, securing shall be inserted through the bottom layer only. Securing pins shall be placed along a line about 2 inches in from the edge of the placed geotextile at intervals not to exceed 12 feet unless otherwise specified. Additional pins shall be installed as necessary and where appropriate to prevent any undue slippage or movement of the

geotextile. The use of securing pins will be held to the minimum necessary. Pins are to remain in place unless otherwise specified.

Should the geotextile be torn or punctured, or the overlaps or sewn joint disturbed, as evidenced by visible geotextile damage, subgrade pumping, intrusion, or grade distortion, the backfill around the damaged or displaced area shall be removed and restored to the original approved condition. The repair shall consist of a patch of the same type of geotextile being used and overlaying the existing geotextile. When the geotextile seams are required to be sewn, the overlay patch shall extend a minimum of 1 foot beyond the edge of any damaged area and joined by sewing as required for the original geotextile except that the sewing shall be a minimum of 6 inches from the edge of the damaged geotextile. Geotextile panels joined by overlap shall have the patch extend a minimum of 2 feet from the edge of any damaged area.

Geotextile shall be placed in accordance with the following applicable specification according to the use indicated in section 7:

Slope protection—The geotextile shall not be placed until it can be anchored and protected with the specified covering within 48 hours or protected from exposure to ultraviolet light. In no case shall material be dropped on uncovered geotextile from a height of more than 3 feet.

Subsurface drains—The geotextile shall not be placed until drainfill or other material can be used to provide cover within the same working day. Drainfill material shall be placed in a manner that prevents damage to the geotextile. In no case shall material be dropped on uncovered geotextile from a height of more than 5 feet.

Road stabilization—The geotextile shall be unrolled in a direction parallel to the roadway centerline in a loose manner permitting conformation to the surface irregularities when the roadway fill material is placed on its surface. In no case shall material be dropped on uncovered geotextile from a height of more than 5 feet. Unless otherwise specified, the minimum overlap of geotextile panels joined without sewing shall be 24 inches. The geotextile may be temporarily secured with pins recommended or provided by the manufacturer, but they shall be removed before the permanent covering material is placed.

6. Measurement and payment

Method 1—For items of work for which specific unit prices are established in the contract, the quantity of geotextile for each type placed within the specified limits is determined to the nearest specified unit by measurements of the covered surfaces only, disregarding that required for anchorage, seams, and overlaps. Payment is made at the contract unit price. Such payment constitutes full compensation for the completion of the work.

Method 2—For items of work for which specific unit prices are established in the contract, the quantity of geotextile for each type placed with the specified limits is determined to the nearest specified unit by computing the area of the actual roll size or partial roll size installed. The computed area will include the amount required for overlap, seams, and anchorage as specified. Payment is made at the contract unit price. Such payment constitutes full compensation for the completion of the work.

Method 3—For items of work for which specific lump sum prices are established in the contract, the quantity of geotextile is not measured for payment. Payment for geotextiles is made at the contract lump sum price and constitutes full compensation for the completion of the work.

All methods—The following provisions apply to all methods of measurement and payment.

Compensation for any item of work described in the contract, but not listed in the bid schedule, is included in the payment for the item of work to which it is made subsidiary. Such items and the items to which they are made subsidiary are identified in section 7 of this specification.

7. Items of work and construction details

7. Items of work and construction details

In Section 5, Placement, Method 2 shall apply.

In Section 6, Measurement and payment, Method 1 shall apply.

Geotextiles shall be non-woven Class I and meet Material Specification 592.

Items of work to be performed in conformance with this specification and the construction details therefore are:

- a. Bid Item 10, Geotextile
 - (1) This item shall consist of furnishing and placing the geotextile beneath the rock riprap as shown on the drawings.
 - (2) Placing the geotextile for the rock riprap includes all excavation, fill and backfill required for keying geotextile into the slope, as shown on the drawings.
 - (3) The geotextile shall be placed immediately prior to the placement of rock riprap. Geotextile placement must be approved by the Engineer before rock placement.

Construction Specification 406—Hydro Mulch Seeding

1. Scope

This work consists of preparing the area for treatment, furnishing all labor, materials, equipment, supplies, supervision and tools and performing all work necessary to seed, fertilize, water, maintain, and cleanup of side slopes and finished grades, in accordance with this specifications, for the purpose of temporary erosion control or final stabilization.

The hydro-mulch seeding operations, together with all necessary related work, shall conform to the requirements specified in this section. The area(s) to be hydro-mulch seeded shall be as shown on the construction drawings.

2. Materials

Seed shall comply with the U. S. Department of Agriculture Rules and Regulations – Federal Seed Act. Seed bags shall have tags affixed for inspection in the field. Bags without tags will be rejected. Seed shall be tested and certified by a commercial or state laboratory not more than nine (9) months prior to the date of planting. Tags on seed bags shall show the name of the seed, locality and year of harvest, percentage purity, germination and dormant seed, Johnson grass content and noxious weed content. Seed shall be provided in clean, unopened and undamaged bags. Seed(s) shall be provided with no objectionable material, such as sticks, stems and unthreshed seed heads, which will hinder proper distribution. Seed that is wet, moldy, starting to germinate or otherwise damaged, will not be accepted by Fort Bend County.

Standard seed plan, planting Dates, plant species and seeding rate are as follows:

Species	Application Rate Pounds/Ac	Planting Date
Hulled Common Bermuda Grass 98/88	40	Jan 1 to Mar 31
Unhulled Common Bermuda Grass 98/88	40	
Hulled Common Bermuda Grass 98/88	40	Apr 1 to Sep 30
Hulled Common Bermuda Grass 98/88	40	Oct 1 to Dec 31
Unhulled Common Bermuda Grass 98/88	40	
Annual Rye Grass (Gulf)	30	

Seeding shall be applied in accordance with the following:

- Planting dates are approximate, the Engineer will determine which seed to use prior to start of seeding.
- Seeding rate for “Pure Live Seed” is used to determine the actual application rate of bulk material to obtain.
- $PLS = (\% \text{germination} \times \% \text{purity}) 98 \times 88 = 86.2\% PLS$.
- $\text{Rate}/PLS = \text{LBS of seed needed for application} / 1.807 = 1.24 \text{ lbs. of seed needed}/1000 \text{ SF}$.
- Certified Bermuda must have a Blue Tag and tested by an accredited seed testing lab.

Commercial fertilizer shall be applied to the entire seeded area at the prescribed rates. All fertilizer used shall be delivered in bags or containers clearly labeled showing analysis. A pelleted or granulated fertilizer shall be used with an analysis of 10-10-5 (nitrogen – phosphoric acid – potash), unless otherwise approved by the Engineer. The figures in the analysis represent the nitrogen, phosphoric acid and potash nutrients respectively as determined by the methods of the Association of Official Agricultural Chemists.

The sources of nitrogen in the fertilizer shall be roughly balanced between ammoniacal (quick release) and nitrate nitrogen (slow release). Fertilizer shall be readily water-soluble.

Fertilizer of a different analysis may be substituted as approved by the Engineer. It shall be pelleted or granulated fertilizer with a lower concentration. The total amounts of nutrients furnished and applied per acre shall equal or exceed that specified for each nutrient.

Mulch shall be virgin wood cellulose fiber made from whole wood chips. Rate of application shall be 2000 pounds per acre. Soil stabilizers shall be applied at a rate of 40 pounds per acre. On side slopes Terra Type III (or approved equal) shall be used. On all other areas Terra Tack I (or approved equal) shall be used. Alternatively, Ultra Bond 2002 (or approved equal) shall be applied at a rate of one gallon per square yard in three applications. First application shall be at a rate of 1/2 gallon per square yard followed by another application in about two weeks at a rate of 1/4 gallon per square yard. The third application shall follow in about two months at a rate of 1/4 gallon per square yard. The concentrate shall be diluted in 1:5 ratio with water or as recommended by the manufacturer.

Wood cellulose fiber mulch, for use in the grass seed and fertilizer, shall be processed in such a manner that it will not contain any germination or growth inhibiting factors. It shall be dyed an appropriate color to allow visual metering of its application. The wood cellulose fibers shall have the property of becoming evenly dispersed and suspended when agitated in water. When sprayed uniformly on the surface of the soil, the fibers shall form a blotter-like ground cover which readily absorbs water and allows infiltration to the underlying soil. Weight specifications from suppliers, shall refer only to the air-dry weight of the fiber. The mulch material shall be supplied in packages having a gross weight not greater than 100 pounds and must be marked by the manufacturer to show the dry weight content. Suppliers shall be prepared to certify that laboratory and field testing of their product has been accomplished and that it meets all the preceding requirements.

Water shall be free from oil, acid, alkali, salt and other substances harmful to the growth of grass. The water source shall be subject to approval, prior to use.

3. Hydro mulch seeding operation

Immediately after the finished grade has been approved, begin hydro-mulching operations to reduce erosion and excessive weed growth.

Hydraulic equipment used for the application of fertilizer, seed and slurry of prepared wood fiber mulch shall have a built-in agitation system with an operating capacity sufficient to agitate, suspend and homogeneously mix a slurry containing up to 40 pounds of fiber plus a combined total of 70 pounds of fertilizer solids for each 100 gallons of water. The slurry distribution lines shall be large enough to prevent stoppage. The discharge line shall be equipped with a set of hydraulic spray nozzles which provide even distribution of the slurry on the area to be seeded. The slurry tank shall have a minimum capacity of 800 gallons and shall be mounted on a traveling unit, which may either be self-propelled or drawn with a separate unit which will place the slurry tank and spray nozzles within sufficient proximity to the areas to be seeded, so as to provide uniform distribution without waste. The Engineer may authorize equipment with a smaller tank capacity, provided the equipment has the necessary agitation system and sufficient pump capacity to spray the slurry in a uniform coat.

Slurry preparation shall take place on the worksite. The slurry preparation should begin by adding water to the tank when the engine is at half throttle. When the water level has reached the height of the agitator shaft, good re-circulation shall be established, and seed shall be added. Fertilizer shall then be added, followed by wood pulp mulch. The wood pulp mulch shall only be added to the mixture after the seed and when the tank is at least one-third filled with water. The engine throttle shall be opened to full speed when the tank is half filled with water. All the wood pulp mulch shall be added by the time the tank is two-thirds to three-fourths full. Spraying shall commence immediately when the tank is full. The

operator shall spray the area with a uniform visible coat, by using the green color of the wood pulp as a guide.

4. Application

The Contractor shall obtain approval of hydro-mulch area preparation from the Engineer prior to application. If rain is imminent, then the application of hydro mulch seeding operation and fertilizer shall be postponed until weather conditions exist such that the potential for the runoff of the slurry and fertilizer from the site is minimized.

Operators of hydro-mulching equipment shall be thoroughly experienced in this type of application. Apply the specified slurry mix to form a uniform mat at the specified rate. The Contractor shall avoid getting the hydro mulch on paved areas. Keep paved and planting areas clean during maintenance operations. Contractor shall confine hydro-mulching within the areas designated on the plans and keep it from contact with other plant material. Immediately after application, thoroughly wash off any plants, planting areas or paved areas not intended to receive slurry mix.

If the Engineer notes any unmulched areas after hydro-mulching, the Contractor shall be required to seed the unmulched areas with the grasses that were to have been planted at no additional cost to Harris County.

5. Contractor's Maintenance & Guarantee Period

It shall be the responsibility of the Contractor to maintain all hydro mulch seeded areas until satisfactory growth has occurred as determined by the Engineer and for 60 days after the successful completion of all punch list items. Maintenance shall consist of watering, weeding, repairing of all erosion, and reseeding, as necessary to establish a uniform stand of the specified grasses. A minimum of 95 percent of the area seeded shall be covered with the specified grass with no bare or dead spots greater than 10 square feet. The Contractor shall make as many repeat seedings as necessary to achieve the required level of coverage. Such reseeding is to be performed within 14 calendar days of notification by the Engineer.

The Contractor shall be responsible for 1 mowing per month in the months of April through October. The Contractor shall also be responsible for 1 mowing every 6 weeks in the months of November through March. In addition, the Contractor shall water all grassed areas as often as necessary to establish satisfactory growth and to maintain its growth throughout the duration of the project; including the 60-day period after the punch list is completed as described above.

6. Submittal Required

The Contractor shall submit copy of seed tag(s) and letter from the supplier attesting that the seed meets the requirements as stated herein. Certification shall include common name; botanical name, percent by weight of each plant species; year of harvest; percent purity, germination and dormant seed; percent noxious weed content; and date of certification. The Contractor shall certify on the application of the project.

7. Measurement and payment

The unit of measurement for all work performed and materials furnished, as described herein, shall be by the acre or per station as indicated in the bid documents. Measurement shall be done upon completion of the work performed within the limits shown on the drawings and as described herein. The area measured for payment will be computed to the nearest 1/10 acre or station.

Payment for hydro-mulch seeding will be made at the contract unit price per acre or per station and includes final grading, mulch, seed, fertilizer, watering, maintenance and clean-up. Additional payment shall not be made for those areas that are reseeded as provided in Section 4 above.

8. Items of work and construction details

8. Items of work and construction details

When working on slopes which are steeper than 3:1 horizontal to vertical, all rubber tire equipment on the slope will be held with truck or tractor and winch line with the truck or tractor operating along the crown of the channel or other suitable flat surface. As an alternative, track (crawler) equipment with a low center of gravity may work up and down the slopes to perform the work without a winch line requirement when operated in accordance with applicable OSHA requirements.

Items of work to be performed in conformance with this specification and the construction details therefore are:

- b. Bid Item 11, Vegetation, Hydro Mulch Seeding
 - (1) This item shall consist of preparing the seedbed and furnishing and applying the hydro mulch mixture the designated areas as shown on the drawings.
 - (2) The rate of application of the fertilizer shall be forty-eight (48) pounds of nitrogen (N), forty-eight (48) pounds of phosphorous (P) and twenty-four (24) pounds of potassium (K) per acre.

Construction Specification 420 – Site Preparation

1. Scope

The work shall consist of the excavation and/or earthfill placement required by the drawings and specifications.

2. Classification

Site preparation will be classified in accordance with the following definitions.

Class A Site Preparation. Site preparation requiring a combined volume not more than 200 cubic yards of required excavations and/or earthfill placement.

Class B Site Preparation. Site preparation requiring a combined volume of 201 to ,400 cubic yards of required excavations and/or earthfill placement.

Class C Site Preparation. Site preparation requiring a combined volume of 401 to 600 cubic yards of required excavations and/or earthfill placement.

Class D Site Preparation. Site preparation requiring a combined volume of 601 to 800 cubic yards of required excavations and/or earthfill placement.

Class E Site Preparation. Site preparation requiring a combined volume of 801 to 1,000 cubic yards of required excavations and/or earthfill placement.

Class F Site Preparation. Site preparation requiring a combined volume of 1,001 to 1,200 cubic yards of required excavations and/or earthfill placement.

Class G Site Preparation. Site preparation requiring a combined volume of 1,201 to 1,500 cubic yards of required excavations and/or earthfill placement.

Class H Site Preparation. Site preparation requiring a combined volume of 1,501 to 2,000 cubic yards of required excavations and/or earthfill placement.

Class I Site Preparation. Site preparation requiring a combined volume of 2,001 to 2,500 cubic yards of required excavations and/or earthfill placement.

Class J Site Preparation. Site preparation requiring a combined volume of 2,501 to 3,000 cubic yards of required excavations and/or earthfill placement.

3. Excavation

Excavations required to prepare the site shall be done in accordance with the requirements of Construction Specification 21. All excavations shall be unclassified excavations. The depths of excavations as shown on the construction drawings are approximate. The actual depth and extent of excavations will be determined after examination of materials encountered.

Suitable materials resulting from required excavations shall be used for the required earthfills and backfills. Any materials not utilized in the required fills shall be disposed of in the waste area. These materials shall be approved on site prior to placement.

In Construction Specification 21 the following shall apply:

Section 4, Use of excavated materials – Method 1 – There is no guarantee that materials obtained from the specified excavations may be used directly in specified fill areas. Stockpiling of selected materials to insure their availability for use in specific zones of the fill areas may be required. Additional compensation will not be made for stockpiling of excavated materials. Cost for stockpiling of excavated materials shall be included in the compensation for the bid items for Site Preparation.

Section 5, Disposal of waste materials – Method 1 – The disposal of the excavated materials shall include transporting, depositing, and spreading the materials to and on the designated fill or waste areas. The area on which each load of material shall be deposited shall be approved on-site beforehand. The surfaces of waste areas shall be dressed to be reasonably smooth and to be free of mounds, dips, windrows, or depressions which would prevent the safe operation of ordinary farm equipment thereon and the finished surface of waste areas will not be made. Cost for disposal of excavated materials and dressing of the surfaces of waste areas will be included in the compensation for the bid items for Site Preparation.

4. Earthfill

Earthfills required to prepare the site shall be placed in accordance with the requirements of Construction Specification 23. All compaction shall be Class C in accordance with Section 6 of Construction Specification 23. Compaction shall be accomplished by five (5) passes of a pad roller, vibratory roller, hand operated pneumatic tamper or an approved equivalent method. The hand operated tamper shall only be used adjacent to pipes or walls. A roller weighing at least 100 pounds per square inch of bearing area shall be used. The in-place moisture content of the earthfill material shall be range from 12% to 18% by weight as tested using a speedy moisture tester, or other appropriate methods. The moisture content of the backfill materials when placed shall be adjusted as necessary to meet the requirements. Fill lifts shall not be more than 6” thick prior to compaction and the maximum allowable particle size shall be 6”. Earth backfill lifts adjacent to pipes or walls shall not be more than 4” thick prior to compaction, and the maximum particle size shall be 3”.

One pass of the roller shall be defined as the required number of successive trips, which will ensure complete coverage of the entire surface area of each lift being processed. Each pass of the compacting equipment shall be offset so that the total compactive effort shall be distributed evenly over the entire area.

5. Measurement and payment

The number of each class of site preparation will be counted. Payment for each class of site preparation shall be made at the contract lump sum price for that class of site preparation. Such payment will constitute full compensation for all labor, equipment, materials and all other items necessary and incidental to the completion of the work.

Compensation for any item of work described in the contract but not listed in the bid schedule will be included in the payment for the item of work to which it is made subsidiary. Such items and items to which they are made subsidiary are identified in Section 6 of this specification.

6. Items of Work and Construction Details

Waste areas and borrow areas will be designated at the time of site showing.

The class of site preparation is based on quantities derived from preliminary survey data. Variations in these quantities may be possible when the work is performed. However, modification to the contract will not be made for work performed more than these estimated quantities except under the following conditions:

1. The variation must exceed 10% more than the maximum quantity established for the class of site preparation and have a minimum contract value for the additional work more than \$1,000.00. (The contract value is to be determined by dividing the lump sum amount in the bid schedule by the applicable maximum yardage for the class of site preparation shown for the contract item in the table of quantities.) If the variation exceeds 10% and \$1,000.00, the class of site preparation will be adjusted and paid for at the rate for the adjusted class.
2. It is the Contractor's responsibility to submit proof that the estimated site preparation class in question exceeds the percentage and cost parameters in item (a) above. Proof will consist of applicable survey data or other measurements made by a qualified surveyor in accordance with recognized professional practice and the contract specifications.
3. The survey data or other measurements as applicable shall be presented to the NRCS prior to any work on the contract item for which the quantity is questioned. Three working days shall be provided to the NRCS to verify data prior to the beginning of work for this contract item.
4. A final survey or other measurements as applicable shall be made and presented to the NRCS after the work is completed which will allow measurement for the quantity in question. If this survey data indicates justification for a contract modification within the parameters of item (a) above, it will be made in accordance with the change clause contained in the contract.

Site Preparation shall include the removal of existing pipes, concrete rubble or other structures required **to repair the channel slopes** as specified in the drawings.

Site Preparation shall include the installation of culverts provided by the **contractor** as shown on the drawings. The contractor shall furnish and install all pipe joints and end sections as shown on the drawings. **All pipe and fittings furnished shall be 24" diameter, poly-coated, 12 gage, riveted corrugated pipe.** Installation shall include foundation preparation, placement, backfill, and all other work necessary to install the culverts.

Road surfacing material (gravel, asphalt, and oil sand) shall be stockpiled separate from other excavated materials. Stockpiled road surfacing material shall be placed after all other earthfill has been placed, including any additional fill materials provided by the county. The stockpiled road surface materials shall be placed as a final surface.

The items of work subsidiary to Site Preparation are Clearing, Class Cas specified in Construction Specification 1 and Topsoil as specified in Construction Specification 26.

Items of work to be performed in conformance with this specification and the construction details therefore are:

- a. Bid Item 12, Earthwork – Pipe Replacement, Site 14, Class C
 - (1) The item shall include the earthwork required to remove existing drainage pipes and installation of new drainage pipes as shown on the drawings.

- (2) The removed drainage pipe shall be disposed of offsite at an approved location of the contractors own choosing.
- b. Bid Item 13, Earthwork– Pipe Replacement, Site 15, Class C
 - (1) The item shall include the earthwork required to remove existing drainage pipes and installation of new drainage pipes as shown on the drawings.
 - (a) The removed drainage pipe shall be disposed of offsite at an approved location of the contractors own choosing.
- c. Bid Item 14, Earthwork– Pipe Replacement, Site 16, Class C
 - (1) The item shall include the earthwork required to remove existing drainage pipes and installation of new drainage pipes as shown on the drawings.
 - (2) The removed drainage pipe shall be disposed of offsite at an approved location of the contractors own choosing.

Material Specification 523—Rock for Riprap

1. Scope

This specification covers the quality of rock to be used in the construction of rock riprap.

2. Quality

Individual rock fragments shall be dense, sound, and free from cracks, seams, and other defects conducive to accelerated weathering. Except as otherwise specified, the rock fragments shall be angular to subrounded. The least dimension of an individual rock fragment must be not less than one-third the greatest dimension of the fragment. ASTM D4992 provides guidance on selecting rock.

Except as otherwise provided, the rock must be tested and must have the following properties:

Rock type 1

- **Bulk specific gravity (saturated surface-dry basis)**—Not less than 2.5 when tested in accordance with ASTM D6473 on samples prepared as described for soundness testing.
- **Absorption**—Not more than 2 percent when tested in accordance with ASTM D6473 on samples prepared as described for soundness testing.
- **Soundness**—The weight loss in five cycles must not be more than 10 percent when sodium sulfate is used or more than 15 percent when magnesium sulfate is used.

Rock type 2

- **Bulk specific gravity (saturated surface-dry basis)**—Not less than 2.5 when tested in accordance with ASTM D6473 on samples prepared as described for soundness testing.
- **Absorption**—Not more than 2 percent when tested in accordance with ASTM D6473 on samples prepared as described for soundness testing.
- **Soundness**—The weight loss in five cycles must be not more than 20 percent when sodium sulfate is used or more than 25 percent when magnesium sulfate is used.

Rock type 3

- **Bulk specific gravity (saturated surface-dry basis)**—Not less than 2.3 when tested in accordance with ASTM D6473 on samples prepared as described for soundness testing.
- **Absorption**—Not more than 4 percent when tested in accordance with ASTM D6473 on samples prepared as described for soundness testing.
- **Soundness**—The weight loss in five cycles must be not more than 20 percent when sodium sulfate is used or more than 25 percent when magnesium sulfate is used.

3. Methods of soundness testing

Rock cube soundness—The sodium or magnesium sulfate soundness test for all rock types (1, 2, or 3) must be performed on a test sample of $5,000 \pm 300$ grams of rock fragments, reasonably uniform in size and cubical in shape, and weighing, after sampling, about 100 grams each. They must be obtained from rock samples that are representative of the total rock mass, as noted in ASTM D4992, and that have been sawed into slabs as described in ASTM D5121. The samples shall further be reduced in size by sawing the slabs into cubical blocks. The thickness of the slabs and the size of the sawed fragments must be determined by the size of the available test apparatus and as necessary to provide, after sawing, the approximate 100-gram samples. The cubes shall undergo five cycles of soundness testing in accordance with ASTM C88.

Internal defects may cause some of the cubes to break during the sawing process or during the initial soaking period. Do not test any of the cubes that break during this preparatory process. Such breakage, including an approximation of the percentage of cubes that break, must be noted in the test report.

After the sample has been dried following completion of the final test cycle and washed to remove the sodium sulfate or magnesium sulfate, the loss of weight shall be determined by subtracting from the original weight of the sample the final weight of all fragments that have not broken into three or more fragments.

The test report shall show the percentage loss of the weight and the results of the qualitative examination.

Rock slab soundness—When specified, the rock shall also be tested in accordance with ASTM D5240. Deterioration of more than 25 percent of the number of blocks is cause for rejection of rock from this source. Rock must also meet the requirements for average percent weight loss stated below.

- For projects located north of the Number 20 Freeze-Thaw Severity Index Isoline (fig. 523–1), unless otherwise specified, the average percent weight loss for Rock Type 1 must not exceed 20 percent when sodium sulfate is used or 25 percent when magnesium sulfate is used. For Rock Types 2 and 3, the average percent weight loss must not exceed 25 percent for sodium sulfate soundness or 30 percent for magnesium sulfate soundness.
- For projects located south of the Number 20 Freeze-Thaw Severity Index Isoline, unless otherwise specified, the average percent weight loss for Rock Type 1 must not exceed 30 percent when sodium sulfate is used or 38 percent when magnesium sulfate is used. For Rock Types 2 and 3, the average percent weight loss must not exceed 38 percent for sodium sulfate soundness or 45 percent for magnesium sulfate soundness.

Figure 523-1 Number 20 freeze-thaw severity index isoline (map approximates the map in ASTM D5312)



4. Field durability inspection

Rock that fails to meet the material requirements stated above (if specified), may be accepted only if similar rock from the same source has been demonstrated to be sound after 5 years or more of service under conditions of weather, wetting and drying, and erosive forces similar to those anticipated for the rock to be installed under this specification.

A rock source may be rejected if the rock from that source deteriorates in less than 5 years under similar use and exposure conditions expected for the rock to be installed under this specification, even though it meets the testing requirements stated above.

Deterioration is defined as the loss of more than one-quarter of the original rock volume, or severe cracking that would cause a block to split. Measurements of deterioration are taken from linear or surface area particle counts to determine the percentage of deteriorated blocks. Deterioration of more than 25 percent of the pieces is cause for rejection of rock from the source.

5. Grading

The rock must conform to the specified grading limits after it has been placed within the matrix of the rock riprap. Grading tests must be performed, as necessary, according to ASTM D5519, Method A, B, or C, as applicable.

Material Specification 592—Geotextile

1. Scope

This specification covers the quality of geotextile, including geotextile for temporary silt fence.

2. General Requirements

Fiber (thread and yarn) used in the manufacture of geotextile must consist of synthetic polymer composed of a minimum of 85 percent by weight polypropylene, polyester, polyamide, polyethylene, polyolefin, or polyvinylchloride. The fiber must be formed into a stable network of filaments retaining dimensional stability relative to each other. The geotextile must be free of defects such as holes, tears, and abrasions. The geotextile must be free of any chemical treatment or coating that significantly reduces its porosity. Fibers must contain stabilizers, inhibitors, or both to enhance resistance to ultraviolet light. Geotextile, other than that used for temporary silt fence, must conform to the requirements in tables 592-1 or 592-2, as applicable. Geotextile used for temporary silt fence must conform to ASTM D6461.

Thread used for factory or field sewing must be of a color contrasting to the color of the fabric and made of high-strength polypropylene, polyester, or polyamide material. It must be as resistant to ultraviolet light as the geotextile being sewn.

3. Classification

There are two geotextile classifications, woven and nonwoven. Geotextile for temporary silt fence may be either woven or nonwoven. Slit film woven geotextile may not be used except for temporary silt fence.

Woven geotextiles are made from fabric that is formed by the uniform and regular interweaving of the threads or yarns in two directions. Woven fabrics must be manufactured from monofilament yarn formed into a uniform pattern with distinct and measurable openings, retaining their position relative to each other. The fabric must have a selvedge edge or otherwise be finished to prevent unraveling.

Nonwoven geotextiles are made from fabric that is formed by a random placement of threads in a mat and bonded by needle punching, heat bonding, or resin bonding. Nonwoven geotextile must have distinct but variable small openings, retaining their position relative to each other when bonded. The use of heat- or resin-bonded nonwovens is restricted as specified in note 2 of table 592-2.

4. Sampling and Testing

The geotextile must conform to tables 592-1, 592-2, or ASTM D6461 as applicable for the product type shown on the label. Documentation described in either a. or b. below is required to verify the product meets the specified requirements:

Product properties as listed in the latest edition of the "Specifiers Guide," Geosynthetics (Industrial Fabrics Association International, 1801 County Road B, West Roseville, MN 55113-4061 or at <http://www.geosindex.com>), and that represent average roll values, are acceptable.

Test data from the geotextile production run for each of the specified tests listed in tables 592-1, 592-2, or ASTM D6461, as applicable.

5. Shipping and Storage

Each roll of geotextile must be labeled or tagged to clearly identify the brand, class, and the individual production run in accordance with ASTM D4873. The geotextile must be shipped and transported in rolls wrapped with a cover for protection from moisture, dust, dirt, debris, and ultraviolet light. The cover must be maintained undisturbed to the maximum extent possible before placement.

Material Specification 592 Geotextile (continued)

Table 592–1 Requirements for woven geotextiles ^{1/}

Property	Test method	Class I	Class II	Class III	Class IV
Grab tensile strength (lb)	ASTM D4632	247 minimum	180 minimum	180 minimum	315
Elongation at failure (%)	ASTM D4632	<50	<50	<50	<50
Trapezoidal tear strength (lb)	ASTM D4533	90 minimum	67 minimum	67 minimum	112 minimum
Puncture strength (lb)	ASTM D6241	495 minimum	371 minimum	371 minimum	618 minimum
Ultraviolet stability (% retained strength)	ASTM D4355	50 minimum	50 minimum	50 minimum	70 minimum
Permittivity sec ⁻¹	ASTM D4491			as specified	
Apparent opening Size (AOS) ^{2/}	ASTM D4751			as specified	
Percent open area (POA) (%)	USACE ^{3/} CWO-02215-86			as specified	

^{1/} All values are minimum average roll values (MARV) in the weakest principal direction, unless otherwise noted.

^{2/} Maximum average roll value.

^{3/} Note: CWO is a USACE reference.

Material Specification 592 Geotextile (continued)

Table 592-2 Requirements for nonwoven geotextiles ^{1/}

Property	Test method	Class I ^{2/}	Class II ^{2/}	Class III ^{2/}	Class IV ^{2/}
Grab tensile strength (lb)	ASTM D4632 grab test	202 minimum	157 minimum	112 minimum	202 minimum
Elongation at failure (%)	ASTM D4632	50 minimum	50 minimum	50 minimum	50 minimum
Trapezoidal tear strength (lb)	ASTM D4533	79 minimum	56 minimum	40 minimum	79 minimum
Puncture strength (lb)	ASTM D6241	433 minimum	309 minimum	223 minimum	433 minimum
Ultraviolet light (retained strength) (%)	ASTM D4355	50 minimum	50 minimum	50 minimum	50 minimum
Permittivity sec ⁻¹	ASTM D4491		0.70 minimum or as specified		
Apparent opening size (AOS) (mm) ^{3/}	ASTM D4751		0.22 maximum or as specified		

^{1/} All values are minimum average roll values (MARV) in the weakest principal direction, unless otherwise noted.
^{2/} Needle punched geotextiles may be used for all classes. Heat-bonded or resin-bonded geotextiles may be used for class IV only.
^{3/} Maximum average roll value.

