CHESAPEAKE BAY TMDL PROJECT
(4 PONDS)
IFB No. 15304-FY17-15
Addendum #1
October 25, 2016

1. **The bid date has been extended to 3:30 p.m. Thursday November 10, 2016. Bids will be opened and read aloud at 25 West Market Street, Lower Level Conference Room 3.**

2. **All bidders are required to use the Unit Rate Table dated October 24, 2016 in order for their bid to be considered responsive (Attachment 'A'). The Unit Rate Table will also be available on the Town's Bid Board (www.leesburgva.goc/bidboard) in MS WORD format; however, any changes to the Unit Rate Table's description, unit or quantity shall render the bid non-responsive.**

3. **Correction to Instruction to Bidders: Under the "Required Contractor Qualifications" section on Page 25, the first paragraph should read:**
"This project requires specialized knowledge and expertise. The contractor must submit written information demonstrating experience by having completed a minimum of five (5) similar projects within the last five (5) years and commit to the availability of key, skilled personnel necessary to complete the entire scope of work required for the project. Submittals that do not comply with this criterion will **not** be considered."

4. The Town reserves the right to eliminate any of the four ponds and decrease contractor total bid lump sum amount by the eliminated pond lump sum amount, at no additional cost to the Town.

5. **Questions and Answers:**

Question 1: Can you provide me with the approximately "start date"?
Answer 1: Notice To Proceed (NTP) is anticipated by the beginning of 2017. After the construction contract is fully executed, the Town will provide an administrative NTP to facilitate ordering plant material and other related items.

Question 2: Is there a pre-bid for the project?
Answer 2: No.

Question 3: Page 33 of 136 has a specific maintenance plan for the Kohl's Pond. There is no maintenance plan in the documents for the other ponds. Is there a maintenance requirements for the other ponds, if so, please provide?
Answer 3: Delete the "Kohl's Pond: 1 year contract maintenance" requirements (page 33 of 136) from the Instructions to Bidders. In its place, add the following requirements which apply to all ponds.
"In addition to the warranty requirements contained in the contract, the Contractor will accompany the Town in performing an inspection of all four ponds in the spring and fall of the warranty period. These two inspections will check for 90%

vegetative cover. The Contractor will replant any areas where 90% cover has not been achieved."

Question 4: Please Confirm that all clearing & grubbing is to be done by others and is not in the base bid?
Answer 4: All clearing and grubbing is part of this Contract. Kohl's Pond Sheet 6 and Greenway Farm Pond Sheet 4 have been revised (see Attachment 'B') to delete the "Clearing by Others" note. Wood chips from the cleared trees may be spread on the field on the east side of the stream in the Greenway Farm Pond area to a depth of no more than four inches.

Question 5: Item #12 on the bid form for unit pricing has, "Dewatering system with pumps as needed" & has a quantity of 300 LF. How many days, weeks, or months are we dewatering 300 LF? Is this item a continuous dewatering (Stream Diversion) or pumping down of a pond?
Answer 5: All dewatering and pump around required for the construction is to be included in the Lump Sum item for each pond.

In the event that a change in the scope of work requires additional pump around, Item #12 will be utilized for payment. Further, the Unit has been revised to "Per Day" (see Attachment 'A' Revised Unit Rate Table). Bidders must use this Revised Unit Rate Table.

Question 6: Stipulated unit prices on page 7 of 136. Does your Rock Excavation unit price include the hauling of this material offsite and the dump fee?
Answer 6: Yes, the stipulated unit price for Rock Excavation must include hauling and disposing of the material.

Question 7: Is there a soils report and borings associated with this project, if so, please provide it.
Answer 7: The geotechnical reports from the original construction of the Foxridge Pond and Greenway Farm Pond are attached (see Attachment 'C'). Additional test pit information for the Greenway Farm pond will be provided in a separate addendum.

Question 8: How will unsuitable soils or undercut be handled, if required?
Answer 8: The cost of removing unsuitable soils and undercut is included in the Lump Sum unit price for each pond. The Contractor must perform due diligence in estimating the cost for unsuitable soils encountered.

Question 9: Stratford Pond: There is no detail for the micropool, are we to use the detail on sheet 17 of 22 "Typical Cross Section At Pool" for the micropool? If so, what is the thickness for compacted backfill material? This only shows installation 8" lifts.
Answer 9: The proposed micropool plan view and four cross sections are shown and labeled on Sheet 12. Sheet 17 refers to the step pool system for the incoming channel into the pond. For the step pool system, the thickness for the compacted backfill

material would vary and may not be required if there is a cut situation and a stable subgrade is met. In that case, the underdrain would be above the stable subgrade and no fill would be required. If fill is required, the compaction may be performed with the back of an excavator bucket and approved by the on-site engineer.

Question 10: Stratford Pond- Sheet 19 of 22 shows a detail for the Cascade Channel, please provide an elevation for the top of the riprap or a proposed thickness.
Answer 10: The invert of the channel (top of the cascade channel 318.40' which is the top of the riprap stone) is shown on Sheet 12 as "proposed storm channel 2 profile view". The thickness of the riprap for the cascade channel shall be approximately 2 x D50 = 2.2' (D50 for CL I = 1.1 ft.). Contractor shall place (NOT DUMP) V.D.O.T. Class I riprap to form the typical trapezoidal section with an undulating bed.

Question 11: Will the Town's Staff be performing the inspection services for this project or will it be performed by an outside consultant.
Answer 11: It is anticipated that Town staff will perform inspection services for the civil work and an outside consultant will inspect wetlands construction including planting. However the contractor is responsible for Q/C testing per Contract General Condition section 4.14.11. This Contractor provided Q/C testing shall be considered incidental to all other items of work.

Question 12: It appears that the drawings have not changed for the Greenway, Foxridge, and Kohl's Ponds. Addendums 1-3 in the first bid addressed several questions we asked pertaining to these projects. Will you issue an addendum that clarifies that the previously answered questions are a part of these contract documents?
Answer 12: Applicable questions from the addenda issued when this project was originally bid are included below (Questions & Answers 13 - 36).

Question 13: Foxridge Pond - Planting sheet 11 calls for Juncus ustitatus to be utilized in planting zone 1. Although a wetland species, it is native to Australia and thus unavailable. Could a native species be substituted?
Answer 13: Yes, Juncus Canadensis (Canada Rush) and Juncus Effusus (Soft Rush) are both acceptable alternatives.

Question 14: Greenway Pond - Planting sheet 11 calls for trees in plug form spaced at 18" OC. However, mortality rate will be high spaced this close together. Please advise.
Answer 14: Follow planting configuration as shown.

Question 15: Kohl's Pond - A planting plan has not been included. Please confirm no plantings will be required.
Answer 15: No planting is required for Kohl's Pond.

Question 16: For all three locations, the construction note on sheet 2 states "All areas… which are disturbed… shall be adequately stabilized… shall consist of permanent grass, seed mixture to be as recommended by the town." Will a seed mix such as ERNMX-113

be acceptable?
Answer 16: Yes.

Question 17: Cascade Outflow Channel detail shown on plan sheet 16 of the Greenway Pond Project shows splash rocks on top of the reinforced bedding mix. What percentage of splash rock coverage is required for quantifying the amount of splash rocks to be installed?
Answer 17: Splash rocks would cover between 50-60% of the width based on size dimensions for splash boulders given in the structure dimensions table on Sheet 16.

Question 18: The Diversion Channel Cross Section Detail has a note "Channel Bed Mix and splash rocks", are there additional splash rocks required other than the splash rocks that are included in the Channel Bed Mix, and if so how do we quantify.
Answer 18: No.

Question 19: What is the ratio of materials required for 20 tons of channel bed mix?
Answer 19: See channel bed material specs on Sheet 16 of the Greenway Farms Pond drawings.

Question 20: Typically stream bed sub-grade is not tested for compaction, are we required to test stream bed sub-grade on this project?
Answer 20: Yes.

Question 21: Is there a detail for the Foxridge Pond Micropool? Does this have to be lined with 18" depth river cobblestone mix?
Answer 21: There is no detail for Foxridge Pond Micropool. Yes, line the micropool with 18" depth river cobblestone mix.

Question 22: River Cobblestone typically comes in 2"-4", 4"-6",6"-16" and 16"+, what size are we pricing? If there is a specific mix on sizes, what is the ratio for 20 tons of river cobblestone?
Answer 22: Cobblestone gradation mix is shown in the Hydraulic Computations Results on Sheet 16 of the Foxridge Pond plans.

Question 23: Can you release the cad files to bidders before the bid date, for earthwork take-off purposes?
Answer 23: No.

Question 24: Greenway Pond Retrofit Plan shows "Curb Protection" sheet 8, does this same detail apply for Kohl's & Greenway Access? Kohl's & Greenway plans do not show this detail.
Answer 24: Foxridge and Kohl's do not require curb protection.

Question 25: Are we to include existing paved access road repair in the base bid? If so, can we use an allowance so everybody prices the same thing?
Answer 25: Contractors shall assume 10,000 SF of Access Road Repair.

Question 26: Are we to assume that existing topsoil quantities are sufficient for future re-spread requirements without the need to import topsoil?
Answer 26: This is a Lump Sum Contract; the Contractor will estimate the required top soil quantity and determine if additional topsoil is required.

Question 27: Is graffiti protection required on the inside of the existing SWM riser for the Greenway pond?
Answer 27: Yes. Specifications for the graffiti protection are provided on Sheet 19.

Question 28: Page 73 section(s) 4.9 and 4.9.1 of the specifications states: "Contractor shall secure and pay for all permits, fees, licenses and inspections necessary for the proper execution and completion of the work that are legally required at the time the proposals are received. " - What permits does the owner already have and what permits will be the responsibility of the contractor? Is the contractor expected to provide and pay for construction inspections?
Answer 28: The contractor is not responsible for any permits; the Town will apply for the County Grading permit and SWPPP authorization. The Contractor is responsible for testing and quality control per contract document while the Town will provide for construction inspection.

Question 29: Will the contractor be required to install access roads? Foxridge and Greenway call for a limited amount of wetland mats, is that all that is required for those projects?
Answer 29: Yes, see E&S Control Phase II for both projects.

Question 30: Is the extent of the stream riffle for Foxridge the zone 1 planting? Or how wide is the stream riffle for Foxridge?
Answer 30: The riffle technically includes the zone 1 planting area and is 12 ft. per sheet 18. However, the 2 ft. thick river cobblestone mix is only 8 ft. wide as per shown on the detail on Sheet 18.

Question 31: The Pool section detail on sheet 18 of 27 of the Foxridge plans shows rock toe but nowhere else on the plans indicates any rock toe? Is there rock toe on this project? And if so, where along the stream will the contractor be expected to install it?
Answer 31: Yes, there is a rock toe. It is required to be installed in the pool sections as shown in the detail on Sheet 18.

Question 32: Can you please provide a gradation table or a mix percentage table for the reinforced bed material for Foxridge Pond? Sheet 17 of 27 indicates that the entire channel should be filled with splash boulders to a depth of 2 feet and the void spaces filled with a mix a river cobblestones. Can you please elaborate on exactly how much of each material you would like installed? Such as 30% Splash Boulder and 70% 2"-8" River Cobble or whatever gradation the engineer intends.
Answer 32: On Sheet 16, under Hydraulics Computations Results, the gradation mix is shown for the main alignment (longest channel between plunge pool and

micropool) which runs through the pond bottom. The information on Sheet 17 is for the tributary channel which contains cross vanes feeding into the micropool. See channel bed material specs on Sheet 17 for the tributary bed material.

Question 33: Under the instructions to bidders there is an experience requirement for 5 similar projects over the past 5 years. Can a GC with less than that pre-requisite use a sub-contractor's experience to meet the requirements?
Answer 33: No. The prime contractor must have the experience required in the instructions to bidders.

Question 34: Are the three ponds to be performed simultaneously, or can the work be done consecutively?
Answer 34: The Contractor has 180 calendar days to substantially complete all four ponds. Per the General Conditions, section 4.11 "Project Schedule", the contractor is required to present its plan, sequence of construction, etc. for Town approval.

Question 35: Is there a grant for this project with a defined limit of funding for the project budget, or are additional funds available?
Answer 35: The Town has received a Stormwater Local Assistance Fund (SLAF) grant from the Department of Environmental Quality (DEQ) to finance 50% of the estimated cost of constructing each of the three ponds. The Town of Leesburg has set aside funds of the same amount of each grant for the four ponds. No additional funds are currently available for this construction.

Question 36: What is the proposed schedule for this project?
Answer 36: See Contract Time (page 30) and Project Schedules (page 74) of contract document.

END OF ADDENDUM #1

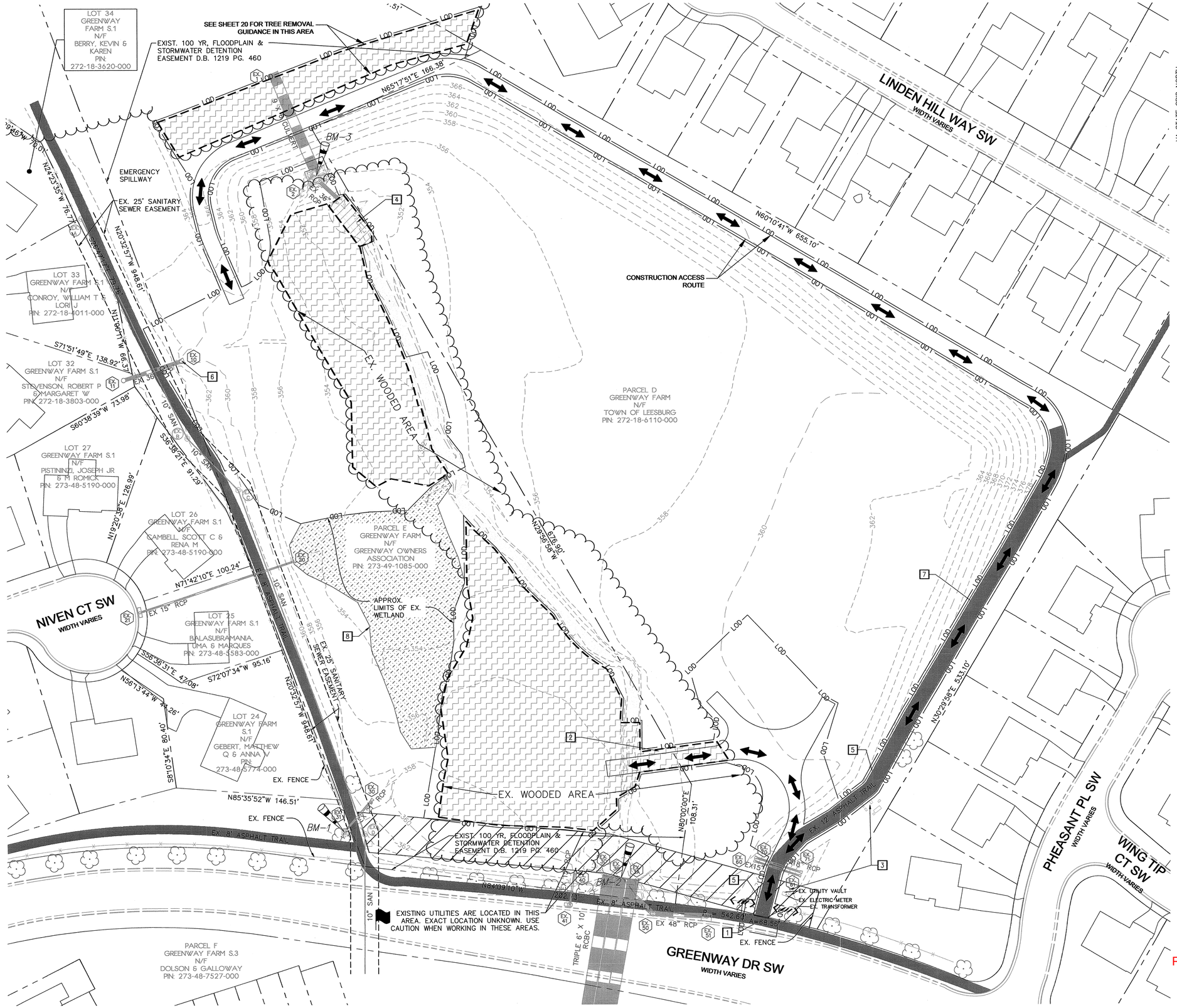
UNIT RATE TABLE
Revised by Addendum No. 1

The contractor shall use the form below to provide unit rates to be used in any change in scope (± addition or omission)

Ref.	DESCRIPTION	Unit	Qty.	Unit Price
1	± Allaying dust using water truck	DY	3	
2	± Curb protection, Complete in Place Incl. Maintenance & Removal (see plans for details)	EA	3	
3	± Silt Fence Complete in Place Incl. Maintenance & Removal	LF	300	
4	± Safety Fence Complete in Place Incl. Maintenance & Removal	LF	300	
5	± Tree Protection Complete in Place Incl. Maintenance & Removal	LF	300	
6	± Check Dam Complete in Place Incl. Maintenance & Removal	EA	3	
7	± Outlet Protection Complete in Place Incl. Maintenance & Removal	EA	3	
8	± Culvert Inlet Protection, Complete in Place Incl. Maintenance & Removal	EA	3	
9	± Removal and rearranging of rip-rap (see plans for details)	SY	300	
10	± Rip-rap bank protection, complete in place (see plans for details)	SY	300	
11	± 36" RCP Pipe, Complete in place including Excavation, Bedding & Backfill	LF	30	
12	**± Pump around - Dewatering system with pumps as needed (see plans for details)**	**DY**	**7**	
13	± Grading of access road	SY	300	
14	± Repair Asphalt Access road including VDOT 21-A stone base	SF	300	
15	± 5' Asphalt trail (2" SM-9.5 and 4" VDOT 21-A stone base)	LF	300	
16	± Regular excavation Including wetland areas	CY	300	

Unit Rates (continued)

Ref.	DESCRIPTION	Unit	Qty.	Unit Price
17	± Dredging of pond areas (1 foot)	SY	300	
18	± Rock Cross Vane Incl. Splash rocks and Reinforced Bed Mix complete in place with diversion channel (see plans for details)	EA	3	
19	± Soil Amendments: add sand, compost, topsoil or wetland mulch	CY	300	
20	± Remove and reset existing white vinyl split rail fence	LF	300	
21	± Wood chip matt, Complete in Place Incl. Maintenance & Removal	SY	300	
22	± Permanent Seeding & Mulching Incl. Lime and Fertilizer	SY	300	
23	± Purple martin box with raccoon predator guard, complete in place	EA	5	
24	± Bat House, complete in place	EA	15	



KEYNOTES

1. EX 4' TALL WHITE VINYL SPLIT RAIL FENCE TO BE REMOVED (FIRST POST ON EITHER SIDE OF CONSTRUCTION ACCESS) DURING CONSTRUCTION AND REPLACED AT THE END OF CONSTRUCTION.
2. CONTRACTOR TO MODIFY THE PROPOSED ACCESS TO/FROM THE PROJECT AREAS TO MINIMIZE TREE CLEARING.
3. CONTRACTOR TO PROTECT EXISTING TELECOMMUNICATION BOXES (ABOVEGROUND).
4. HEAVY CLEARING – CLEAN OUT AND REMOVE ALL DEBRIS FROM THIS AREA.
5. EXISTING REMOVABLE BOLLARDS SHALL BE REMOVED DURING CONSTRUCTION ACTIVITY ONLY. CONTRACTOR SHALL REPLACE ALL BOLLARDS AT CONCLUSION OF CONSTRUCTION ACTIVITIES DAILY.
6. REMOVE EXISTING END SECTION. PREPARE PIPE END FOR CONNECTION TO PROPOSED STRUCTURE.
7. TOWN OF LEESBURG TO INSPECT CONDITION OF ASPHALT ACCESS TRAIL AT CONCLUSION OF CONSTRUCTION. FOLLOWING INSPECTION, ENTIRE ACCESS ROAD MAY BE REPAVED FROM BACK OF CURB AT GREENWAY DRIVE TO THE END OF EXISTING ACCESS WITH TOWN OF LEESBURG APPROVAL.
8. EXISTING WETLANDS SHALL NOT BE DISTURBED AT ANY POINT DURING THIS PROJECT.

ADDITIONAL NOTES:

1. AN UNDERGROUND UTILITY SURVEY WAS NOT PERFORMED AS PART OF THIS PROJECT. THIS PLAN WAS DEVELOPED FROM EXISTING AS-BUILT SURVEY AND ADDITIONAL LIMITED SURVEY BY BOWMAN CONSULTING. IT IS THE DESIGNER'S OPINION THAT ADDITIONAL EXISTING UTILITIES MAY BE PRESENT AT THE SITE. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE LOCATION OF ALL EXISTING UTILITIES AND TO IDENTIFY ANY POTENTIAL CONFLICTS PRIOR TO ANY CONSTRUCTION, DEMOLITION, OR EXCAVATION ACTIVITIES.
2. CONTRACTOR SHALL NOTIFY THE TOWN OF LEESBURG OF ANY UTILITY CONFLICTS WITH PROPOSED PLANS.

LEGEND

- EXISTING PROPERTY LINE
- SANITARY SEWER EASEMENT LINE
- EXISTING INTERMEDIATE CONTOUR
- 245 EXISTING INDEX CONTOUR
- EXISTING TREE LINE
- EXISTING FENCE
- EXISTING FIRE HYDRANT
- EX 41 EXISTING STORM DRAIN STRUCTURE I.D. TAG
- EX A EXISTING SANITARY SEWER STRUCTURE I.D. TAG
- EXISTING SANITARY SEWER
- EXISTING STORM DRAIN
- EXISTING INFRASTRUCTURE TO BE REMOVED
- LOD PROPOSED LIMITS OF DISTURBANCE
- PROPOSED SITE ACCESS (2-WAY TRAFFIC)
- EXISTING WETLAND
- EXISTING STREAM
- PROPOSED SEDIMENT/DEBRIS REMOVAL AREA
- PROPOSED TREE REMOVAL AREA
- EXISTING ASPHALT TRAIL

CONTROL POINTS BASED ON NAD 83 AND NAVD 88 DATUMS

CONTROL POINT TABLE

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
BM-1	7083355.645	11742663.378	362.40	YARD DRAIN
BM-2	7083314.183	11742910.322	361.73	STORM OUTFALL
BM-3	7083940.781	11742640.154	362.58	RISER STRUCTURE

Revised 10/14/16 to remove "Clearing by Others"

0 40' 80'

GRAPHIC SCALE: 1" = 40'

amec foster wheeler
Environment & Infrastructure
14424 Albemarle Point Place
Suite 115
Chantilly, Virginia 20151
Tel. 703-488-3700
Fax. 703-488-3701
www.amecfw.com

APPR	DATE	DESCRIPTION	NO.

TOWN OF LEESBURG ESTABLISHED 1758 VIRGINIA

CHESAPEAKE BAY TMDL PROJECT PHASE 1 GREENWAY POND RETROFIT

100% CONSTRUCTION DOCUMENT

TOWN OF LEESBURG, VIRGINIA

LEESBURG ELECTION DISTRICT

COMMONWEALTH OF VIRGINIA
MATTHEW TROY BIGGS
Lic. No. 041116
10.7.16
PROFESSIONAL ENGINEER
SEAL

DESIGN BY: MB/TWJ	DRAWN BY: TWJ
REVIEWED BY: MB/JGR	
PROJECT MANAGER: TB	
AMEC FOSTER WHEELER PROJECT #: 565500010	
CONTRACT #: 300810-FY12-03	
DATE: 2015-07-23	SHEET SIZE: D
SCALE: AS SHOWN	

SHEET TITLE:
EX. CONDITIONS AND DEMOLITION PLAN

SHEET 04 OF 28

EDWARDS LANDING
PIN 188496798

PIN 188499781 | PIN 188499980 | PIN 188400281 | PIN 188400481 | PIN 188400781 | PIN 188401082 | PIN 188401382 | PIN 188401682 | PIN 188401882 | PIN 188402082 | PIN 188402482 | PIN 188402783 | PIN 188402983 | PIN 188403183 | PIN 188403383

VA STATE GRID NORTH NAD 1983

EX. 48' STORM WATER ESM'T DB. 1198 PG. 159
EX. STORM WATER DETENTION ESM'T DB. 1198 PG. 159
APPROXIMATE LOCATION OF PROPERTY LINE
EX. EMERGENCY SPILLWAY
EX. EMERGENCY SPILLWAY
EX. EMERGENCY SPILLWAY
EX. STORM WATER DETENTION ESM'T DB. 1198 PG. 159
EX. 100 YR. W.S.E. 325.08
WOOD LOT
APPROXIMATE LOCATION OF PROPERTY LINE
LEESBURG BY-PASS HIGHWAY
U.S. ROUTE NO. 15
VARIABLE WIDTH RIGHT-OF-WAY
BM-3
180 LF OF 42" RCP @ 2.59%
EX. 100 YR. W.S.E. 325.08
EX. DETENTION POND
EX. 100 YR. W.S.E. 325.08'
BOTTOM OF POND 311.00'
EX. 100 YR. W.S.E. 325.08
1200 EDWARDS FERRY RD NE
LEESBURG VA, 20176
PIN 188406506
EX. PAVED ACCESS ROAD
20' STORM DRAIN ESM'T
EX. 100 YR. W.S.E. 325.08
EX. STORM WATER DETENTION ESM'T DB. 1198 PG. 159
55 LF OF 21" RCP @ 2.99%
BM-2
179 LF OF 18" RCP @ 4.66%
29 LF OF 15" RCP @ 5.21%
30' SAN SEW ESM'T
110 LF OF 15" RCP @ 4.68%
46 LF OF 15" RCP @ 2.75%
82 LF OF 18" RCP @ 6.54%
87 LF OF 8" PVC @ 2.35%
10' W/L ESM'T
BM-1
25' SAN SEW ESM'T
84 LF OF 54" RCP @ 2.60%
15" SAN SEW ESM'T

KOHL'S STORE
1040 EDWARDS FERRY RD NE
LEESBURG VA, 20176
PIN 188400292

0 30' 60'
GRAPHIC SCALE: 1" = 30'

KEYNOTES

1. AREA TO BE CLEARED AND ROUGH GRADED AS REQUIRED FOR CONSTRUCTION ACTIVITIES. SEE SHEET 08.
2. ALL TREES LOCATED WITHIN THE STORMWATER MANAGEMENT PARCEL SHALL BE REMOVED TO THE PROPERTY LINE ON THE NORTH AND WEST SIDES. SEE TREE REMOVAL GUIDANCE SHEET 21.
3. REMOVE EXISTING GROUTED RIP-RAP AS SHOWN.

LEGEND

- EXISTING PROPERTY LINE
- UTILITY EASEMENT LINE
- 322 EXISTING INTERMEDIATE CONTOUR
- 320 EXISTING INDEX CONTOUR
- EXISTING TREE LINE
- EXISTING 100 YR WATER SURFACE ELEVATION
- EXISTING FIRE HYDRANT
- 13 EXISTING STORM DRAIN STRUCTURE I.D. TAG
- S U8 EXISTING SANITARY SEWER STRUCTURE I.D. TAG
- SS EXISTING SANITARY SEWER
- W EXISTING UNDERGROUND WATER LINE
- EXISTING STORM DRAIN
- EXISTING RIP-RAP
- EXISTING EMBANKMENT CROWN
- EXTENT OF DEMOLITION
- LOD PROPOSED LIMITS OF DISTURBANCE
- AREA TO BE CLEARED/GRADED

CONTROL POINTS BASED ON NAD 83 AND NAVD 88 DATUMS

CONTROL POINT TABLE

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
BM-1	7091078.310	11755811.890	333.02	CENTER STORM MANHOLE LID
BM-2	7091145.575	11756095.930	344.96	STORM INLET
BM-3	7091321.087	11955826.293	322.96	MANHOLE RIM BOLT

Revised 10-14-16 to remove "Clearing By Others"

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Suite 115
Chantilly, Virginia 20151
Tel. 703-488-3700
Fax. 703-488-3701
www.amecfw.com

APPR | DATE | DESCRIPTION | SYM

TOWN OF LEESBURG VIRGINIA ESTABLISHED 1758

CHESAPEAKE BAY TMDL PROJECT
PHASE 1
KOHL'S POND RETROFIT
100% CONSTRUCTION DOCUMENT
CATOCTIN ELECTION DISTRICT | TOWN OF LEESBURG, VIRGINIA

COMMONWEALTH OF VIRGINIA
MATTHEW TROY BIGGS
Lic. No. 041116
10-7-15
PROFESSIONAL ENGINEER
SEAL

DESIGN BY: MB/JGR	DRAWN BY: MEG
REVIEWED BY: MB/JGR	
PROJECT MANAGER: TB	
AMEC FOSTER WHEELER PROJECT #: 565500011	
CONTRACT #: 300810-FY12-03	
DATE: 2015-08-18	SHEET SIZE: D
SCALE: AS SHOWN	

SHEET TITLE:
EX. CONDITIONS AND DEMOLITION PLAN

SHEET 06 OF 21

Geotechnical & Material Testing, Inc.

- Geotechnical Engineering
- Construction Quality Control
- Construction Material Testing
- Pavement Design & Recycling

May 15, 1986

Pulte Home Corporation
Land Development
8200 Greensboro Drive
Suite 102
McLean, Virginia 22102

Attention: Mr. Charles Khoobyar
Vice President

Reference: Geotechnical Investigation
FOX RIDGE SUBDIVISION
Town of Leesburg
Loudoun County, Virginia
G.M.T. Project No. 86-E-1071

Gentlemen:

We have completed the geotechnical investigation at the above referenced site.

Twenty-six (26) test borings were drilled to depths ranging between 10 and 15 feet. The borings were so located as to generally cover all the four (4) phases of the proposed development.

The investigation disclosed the subsoil and ground water conditions to be suitable for the construction of single family dwelling units planned in a clustered four (4) unit layout.

Shallow foundations (continuous and spread footings) located in virgin soil formation (silty clays) have been recommended for the support of the structure. The total and differential settlements are expected to be within tolerable limits, if the foundation design is based upon the recommended allowable bearing pressures and other parameters.

Since the clays are moderately plastic and are susceptible to volume changes because of moisture variations, all exterior footings should be located at least 4 feet below the finished outside grades. The other footings can be located at nominal depths.

Ground water is not expected to pose any major problems during the construction stages or thereafter.

The soil conditions at the approximate invert elevations of the sewer lines, storm water drains and water lines are suitable for providing adequate support to individual pipe systems.

Excavation with the conventional earth moving equipment is feasible.

The silty clays are generally suitable for use as engineered fill. However, layers of clay with LL>45, (PI>20 and SL<15, may be encountered at random elevations. Such plastic clays should be spoiled or used for landscaping purposes.

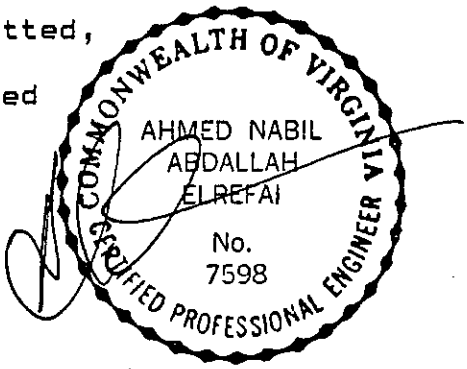
The silty clays below the topsoil are considered poor for subgrade support of pavements. Higher thickness of subbase requirements, commensurate with the low shear strength, have to be provided to insure satisfactory performance of streets and roadways. Geotextiles of suitable grades may be used to improve the soil support characteristics and thus have an economical pavement section.

An environmental study for the site is in progress and a report will be submitted seperately as soon as all the information is collected and evaluated.

Thank you for your continuing confidence in our services. Please do not hesitate to contact either of the undersigned, should you have any questions or if we can be of further service to you.

Respectfully submitted,

G.M.T., Incorporated



Ramesh Khanna
Principal Engineer

Ahmed Elrefai, Ph.D., P.E.
Chief Engineer

rk/lp

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REPORT

OF

GEOTECHNICAL INVESTIGATION

FOR

FOX RIDGE SUBDIVISION

TOWN OF LEESBURG

LOUDOUN COUNTY, VIRGINIA

I. INTRODUCTION

Pulte Home Corporation, McLean, Virginia based developers are planning to develop FOX RIDGE - a residential subdivision located off Route 7 bypass, in the Town of Leesburg, Loudoun County, Virginia. Two hundred and nine (209) single family dwelling units are planned to be built in a clustered four (4) unit layout in the forty-nine and a half (49.5) acre tract.

This report presents the findings of a preliminary geotechnical investigation and the recommendations based thereupon for the said project.

The investigation was carried out to:

A. Develop generalized information regarding the subsurface soil and groundwater conditions related to construction of the single family dwelling units.

B. Delineate problem areas, if any, with special reference to seasonal high water table conditions and to the presence of highly plastic clays susceptible to high shrink-swell on changes in natural moisture content.

C. Determine the suitability of on-site materials for use in controlled structural fill.

D. Evaluate the conditions disclosed and formulate recommendations for the foundations, earthwork and pavement design for the service roads and parking areas.

II. FUNDAMENTAL CONSIDERATIONS

The investigation has been performed on the basis of:

A. Discussions between Mr. Charles Khoobyar, Vice President, Land Development, Pulte Homes Corporation and Dr. Ahmed Elrefai, Chief Engineer, Geotechnical and Material Testing, Inc., regarding the scope of the investigation and subsequent authorization by Mr. Khoobyar to proceed with the investigation.

B. A preliminary site plan, scale 1" = 100' (contour interval 5 feet) prepared by Bengtson, DeBell, Elkin and Titus, consulting engineers and surveyors, showing the general topography of the site, the locations of various lots and the alignments of the streets and roads.

C. Twenty-six (26) test borings, so located as to cover the general area of the project. The test holes in the building areas were to be extended to a maximum depth of 15 feet below the existing ground surface; whereas the borings in the parking areas were terminated at 10 foot depths.

We understand that two (2) story single family dwelling units with/without basements are planned to be built in a clustered four (4) unit layout. Since the project is in the early stages of planning, details relative to the structural concept of individual units, their floor elevations and the final outside grades have yet to be established.

Although the magnitude of anticipated wall and column loads are not available at this time, such dwelling units are essentially light structures with wall loads ranging from 2 to 3 kips. The floor loads are of the order of 150 P.S.F.

We have prepared this report in accordance with generally accepted soil and foundation engineering practices and make no warranties, either expressed or implied as to the professional advice provided under the terms of the agreement and included in this report. The investigation has been conducted and the report prepared to assist the planners in the evaluation, design and preparation of drawings and specifications for the project.

The recommendations made in this report are based upon the foregoing information. We at G.M.T., Inc., should be informed of any changes in the location of the dwelling units or if the presumed parameters are substantially in variance with the actual values, so that the geotechnical data could be reviewed and recommendations modified as required.

III. INVESTIGATION

A. Test Boring Plan

Twenty-six (26) test borings were drilled with a truck-mounted mechanical rig. The depths to which the test borings were extended are indicated in the Appendix of this report.

The test boring locations were proposed by G.M.T., Inc. engineers and were established in the field by the survey crew from Dewberry & Davis. The ground surface elevations at the individual test locations were also provided by them.

Drilling and soil sampling were conducted in accordance with the procedures generally recognized and accepted as standardized methods of investigation of subsurface conditions related to earthwork and foundations engineering projects.

Standard penetration data were developed in conjunction with each sampling increment. Samples were placed into moisture tight jars and brought to our laboratory.

The location of the site is shown on the Vicinity Map on Plate No.1. The test locations are shown on the attached Test Boring Location Plan, Plate No. 2 in the Appendix. The boring logs are presented on Plates No. 3 through 27.

B. Laboratory Testing

The soil samples were visually classified in the laboratory by our geologist. The test for natural moisture content, plasticity index and grain-size analysis were conducted on some of the representative samples.

Moisture Density Relation Tests were conducted in accordance with VTM-1 specifications of the Virginia Department of Highways and Transportation on four (4) samples representing the borrow material and subgrade soils. The results of the Gradation and Atterberg Limits Tests are tabulated on Plates No. 28 through 30; whereas the Moisture Dry Density Curves are presented on Plates No. 30 through 34.

The site was inspected by G.M.T., Inc. personnel. The field and laboratory developed information was evaluated by the soils engineer for formulating recommendations for the earthwork, foundations and water proofing measures.

IV. FINDINGS

A. Site Conditions

Located to the east of Virginia State Route 7 Bypass, in the Town of Leesburg, the site has a gently sloping topography with a high elevation of 405± feet in the northwestern corner and a low elevation of 360 ± feet along the southeastern periphery of the property. The site is ~~well-drained~~ with an overall drainage in an easterly direction.

~~Bonded~~ water or structures of any kind were not observed.

The vegetation across the site consists of deciduous hardwoods with moderate undergrowth.

B. Geology

Based upon the visual examination of the soil samples recovered during the investigation and a reference to the Bedrock Map and Geotechnical Properties of Rocks of Culpepper Basin and Vicinity, Virginia and Maryland, ~~the site is underlain by the limestone conglomerate~~.

It is described as a gray, pebble and cobble conglomerate with a reddish brown to gray sandy, silty or limy matrix. The unit is extremely susceptible to solution, particularly on exposed faces and along joints and fractures. Residuum is reddish brown, non-calcareous silty and sandy clay and varies substantially in thickness depending upon the topography of the area.

C. Subsoil Conditions

The specific soil conditions encountered at the individual test borings are indicated on the Boring Logs. The stratification of soil profile represents the approximate boundaries between the different layers. In-situ; the transition may be gradual.

Approximately six (6) inches of organic contaminated soil (topsoil) is underlain by one (1) basic soil stratum, composed of yellowish brown and gray, slightly mottled silty clay (CL) with weathered limestone, siltstone fragments. The formation is generally stiff to very stiff (N values 6 to 28). ~~The upper 1 to 1.5 feet of this stratum is relatively softer with N values of 3 to 5.~~ Clays of high plasticity (CH) may be encountered at random elevations.

D. Ground Water Conditions

~~Ground water~~, commonly termed as "Water Table" in conjunction with permeable strata, ~~was not encountered within the depths explored~~. Perched water conditions created by the percolation of surface runoff through solution cavities or fractures and its entrapment over impervious clays, is not uncommon in such formations and may, therefore, be anticipated during mass-grading of the site or installation of underground utilities.

V. ASSESSMENT

Based upon the data developed during the field work and a review of the laboratory test results, ~~the site is considered suitable for the construction of the proposed clustered single family dwelling units~~.

Shallow foundations (continuous and spread footings), located in virgin soils or on controlled fill, are considered suitable for the support of the structure.

Since the clays are moderately plastic and are susceptible to volumn changes due to moisture variations it would be advisable to lower all the exterior footings at least 4 feet below the finished outside grades. The other footings can be located at nominal depths.

Ground water, commonly termed as "water table" is unlikely to pose construction stages. However, perched water may be encountered at random elevations during mass-grading of the site or during excavations for utilities.

The soil conditions at the approximate invert elevations of the sewer lines, storm water drains and water lines are suitable for providing adequate support to individual pipe systems.

Excavation with the conventional earth moving equipment is feasible. Seepage of ground water form within the excavation walls is anticipated. Occasional pumping from suitably located sumps may be required to obtain workable conditions within the excavations.

The silty clays of Stratum I are generally suitable for use as engineered fill. However, layers of highly plastic clay (LL>45, (PI>20 and SL<15), may be encountered at random elevations. Such clays should be spoiled or used for landscaping purposes.

Subsurface drainage may have to be provided in the streets and behind the curb and gutter in areas where perched water is encountered.

VI. RECOMMENDATIONS

A. Site Preparation

The following recommendations are made for the satisfactory performance of the earthwork that may be involved to attain the planned grades within the building areas and the parking lots.

1. Areas to support the dwelling units, streets and roadways should be stripped of trees and vegetation, topsoil and organic contaminated soil. The depth of this excavation, as indicated by the test pit logs, is expected to be approximately 6 inches.

   Additional undercut may have to be made in the areas where soft clayey silts - silty clays are present near the existing ground surface or to remove root mats of mature trees.

2. After stripping and excavation of all unsuitable materials, the area may be graded. Before placement of fill, the site should be inspected for proper stripping and preparation for receiving the fill by a soils engineer.

3. The areas within the building limits and those extending on all the sides to a minimum of 5 feet or depth of fill, whichever is more, should be inspected for proper stripping and preparation for receiving the fill by a soils engineer.

   The footings should be excavated after the building areas have been properly prepared.

4. After stripping and before any fill placement, the bottom of the stripped ares should be proofrolled and all loose and soft spots excavated. The excavated materials should be replaced with fill satisfying the controlled fill requirements specified later.

5. Material satisfactory for controlled fill should include clean soil or bankrun sand and gravel (GW, GC, GM, SC, SM) but exclude highly plastic clays (MH and CH soils).

   ML and CL materials may be used subject to the following limitations:

Moisture Dry Density (PCF)	>105
Liquid Limit (%)	<45
Plasticity Index	<20
Shrinkage Limit (%)	>15

   The fill materials should be free from topsoil, organic contaminated soil and rock fragments having a major dimension greater than 3 inches.

   The silty clays of Stratum I are generally suitable for use as engineered fill. However, layers of highly plastic clay (LL>45, (PI>20 and SL<15), may be encountered at random elevations. Such plastic clays should be spoiled or used for landscaping purposes.

6. Fill placement should be in horizontal layers 6 to 8 inches in loose thickness, compacted uniformly with heavy duty equipment.

7. Fill required to support footings, slabs on grade and backfill around and above the footings, should be compacted to a dry density of not less than ninety-five percent (95%) of maximum dry density as per ASTM D-698 specifications. The compaction requirements for streets, roadways and other paved areas should be governed by the VTM-1 method of Virginia Department of Highways and Transportation. The density of the fill should be checked in each lift by a certified soil technician.

For best assurance and proper site preparation, the site preparation should be performed under the guidance of and to the satisfaction of a soils engineer.

For best assurance and proper site preparation, the site preparation should be performed under the guidance of and to the satisfaction of a soils engineer.

B. Foundations

1. Allowable Bearing Pressures

As stated earlier, shallow foundations (continuous and spread footings), located in virgin soil formation or on controlled structural fill, are considered adequate for the support of the proposed structures.

The footings may be sized and designed on the basis of allowable bearing pressures indicated below, subject to verification of soil conditions at the bottom of footing trenches and excavations for suitable soil bearing by a geotechnical engineer.

	Allowable Bearing Pressure (PSF)	Minimum Width Footings (Inches)
COMPACTED FILL		
Isolated Footings	2,000	36
Continuous Footings	2,000	20
VIRGIN UNDISTURBED SOIL		
Isolated Footings	3,000	30
Continuous Footings	3,000	16

2. Approximate Depth of Footings

All exterior footings should be located at least 4 feet below the final outside grades to protect the subgrade soils against volume changes due to moisture variation. Other footings, may be located at nominal depths as per the County requirements or other relevant codes.

The continuous footings, partially located in fill and partially in undisturbed soil formation, should be designed as grade beams, 5 feet on either side of the transition. The column footings for lally columns, in similar circumstances should be extended into the underlying virgin soils.

3. Anticipated Settlements

The footings, if designed on the basis of recommended allowable bearing pressures, are expected to experience a total settlement of 1 inch with differential settlement between adjacent walls limited to half an inch.

Because of possible variations in subsurface conditions and related bearing capacity, all footing excavations and trenches should be inspected and approved by a soils engineer. Water and possibly some loose soil may collect in the footing excavations as a result of surface precipitation and near ground surface seepage. Should such a situation arise, the following is recommended:

a. Water, loose soil and soil softened by water should be removed from the bottom of the footing excavations before placing concrete.

b. Footing excavations should not be left open for long periods. It is suggested that the bottom of the footing excavations and trenches be protected by undercutting 3 inches and placing 3 inches of a lean-mix concrete slab immediately upon approval and before reinforcing steel is placed.

Backfill around and above the footing should satisfy the controlled fill requirements described in the previous section "A. Site Preparation".

C. Slab on Grade

The following recommendations are made for the placement of the slab on grade.

1. Floor slab excavation should be proofrolled and prepared as described under "A. Site Preparation". Silty clays (LL>45, PI>20 and SL<15), if encountered at and below the subgrade elevations of the slab on grade, should be excavated to a minimum depth of 2 feet and replaced with approved borrow material.

2. A free draining granular blanket of crushed stone or gravel should be placed under the floor slab for lateral drainage and as a capillary barrier. The thickness of this blanket should be at least 4 inches.

3. A 6 mil thick impermeable plastic membrane (vapour barrier) should be placed directly under the concrete floor slab and over the granular material.

4. The entire floor slab area should be reinforced with a welded wire fabric.

5. The column points and periphery walls should be isolated from the floor slab in order to minimize the possibility of the floor slab cracking due to relative displacement.

6. The floor slab should be designed on the basis of modulus of subgrade reaction "K" of not more than 150 psi/inch.

D. Utility Trenches

The ~~subsoil conditions~~ are suitable for providing adequate support to the water line, storm water and sewer pipes. Slight seepage of water, resulting from the downward percolation of surface runoff through the soil mass, may be encountered during wet seasons. This can be effectively handled by pumping out of accumulated water from suitable located sumps.

The backfill in utility trenches should conform to the requirements of Loudoun County in addition to the recommendations for "Site Preparation". Weathered rock may be used to backfill the trenches subject to the requirements of Section 401.11 (3 inch maximum) of the "Road and Bridge Specifications" of the Virginia Department of Highways and Transportation.

Plastic clays (LL>45, PI>20 and SL<15) should not be used to backfill the trenches.

E. Underdrainage for Sidewalks

The provision of underdrains below the sidewalk shall be governed by VDH&T "Sidewalk Underdrain Standards" dated February 9, 1981. Tests for plasticity index and grain-size distribution will be conducted on representative subgrade samples to establish the need for underdrainage along the sidewalks.

F. Pavements

The silty clays below the topsoil are considered poor for subgrade support of pavements. Higher thickness of subbase requirements, commensurate with the low shear strength of clays,have to be provided to insure satisfactory performance of streets and roadways. Geotextiles of suitable grades may be used to improve the soil support characteristics and thus have an economical pavement section.

Highly plastic silty clays (CH), if encountered at or below the planned subgrade elevations should be excavated a minimum of 2 feet below the planned subgrade elevations and replaced with engineered fill to insure satisfactory performance of the paved areas.

The soil subgrade in the paved areas is recommended to be rolled so as to have at least ninety-five per-cent (95%) of the maximum dry density as determined by VTM-1 method of VDH&T (AASHTO T-99) specifications within the upper 9.0 inches of natural soils and throughout the full depth of fill. The moisture content of the subgrade should be within plus or minus twenty percent (20%) of the optimum moisture content value.

The subgrade soils should be tested for laboratory C.B.R. values under soaked conditions in accordance with VDH&T requirements. The design of the pavements should then be made on these data.

G. Construction Quality Control

To insure that the soil conditions in-situ, of those developed during the construction are as envisaged during the design stage, construction control, continuous observation and testing are recommended as on the following page.

1. Controlled fill placement, if any,should be monitored by the soils technician under the overall guidance of a soils engineer.

2. All footing and floor slab excavations, preparation of subgrade, placement of aggregate base course, etc., should be carried out under the supervision of a soils engineer.

3. Damp proofing of the below grade construction and the installation of peripheral drainage should also be monitored by a geotechnical engineer.

VII. CLOSING REMARKS

The recommendations contained in this report are made on the basis of data developed at the individual test boring locations. The test locations were spaced and soil conditions in-between were interpolated in accordance with normal geotechnical practices. Any substantial variation encountered during the development work in the field should be evaluated during the construction stage and the design modifications recommended as the conditions warrant.

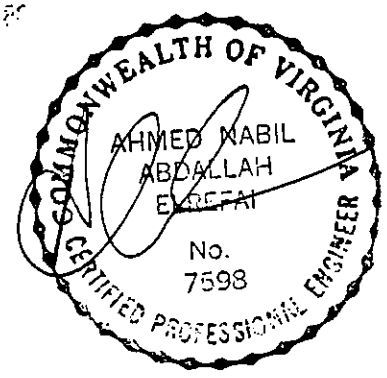
We sincerely appreciate your confidence in our services. Please do not hesitate to contact either of the undersigned, should you have any questions or if we can be of further assistance to you.

Respectfully submitted,

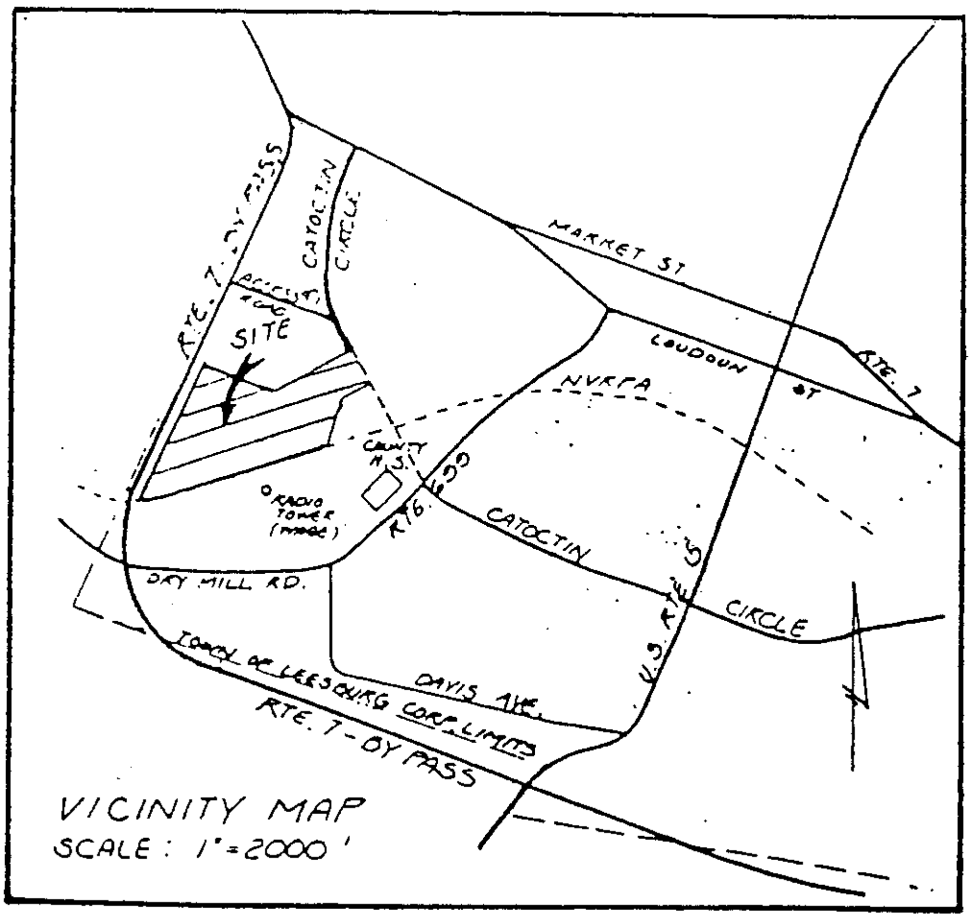
G.M.T., Incorporated

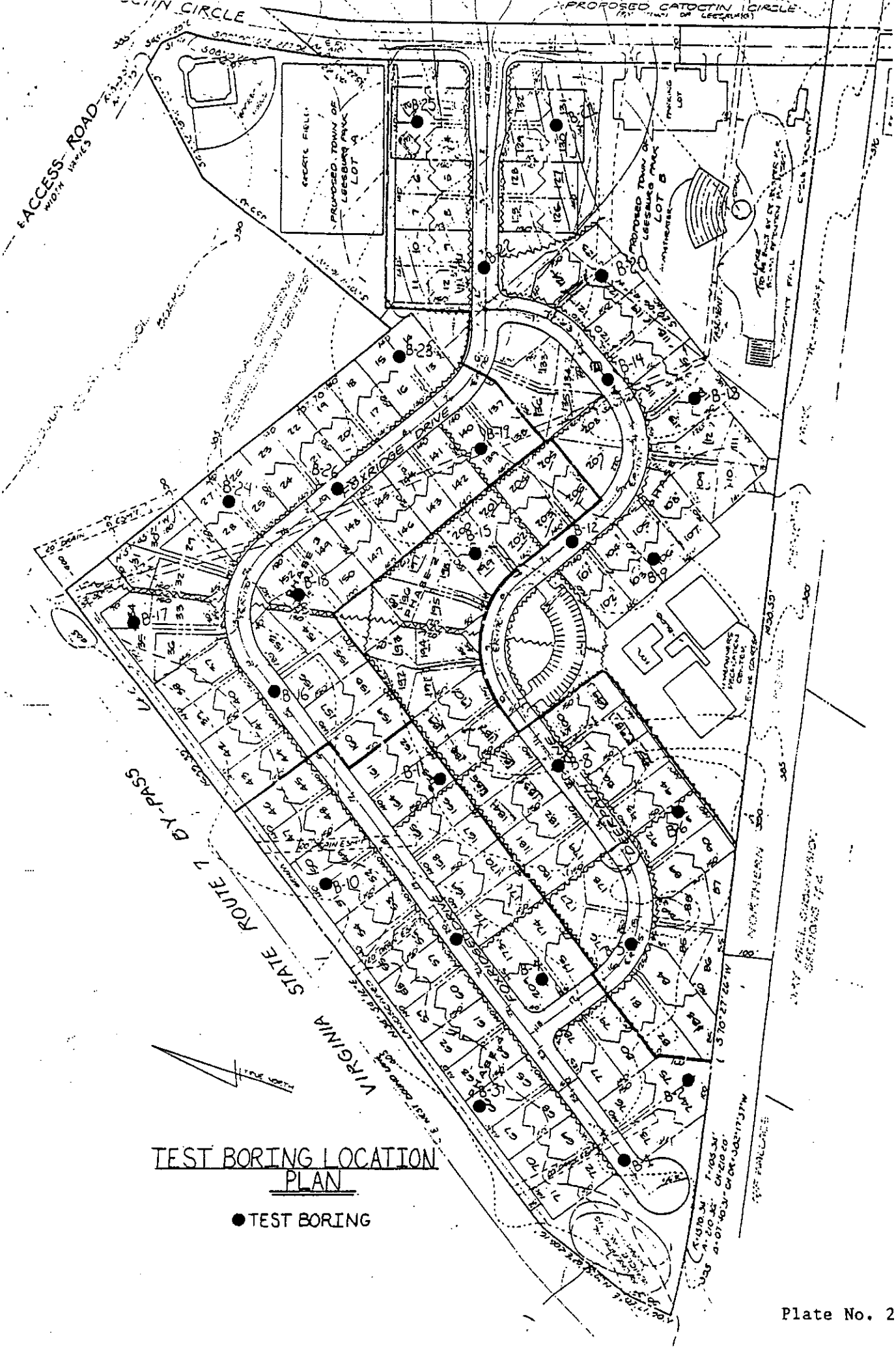
Ramesh Khanna
Principal Engineer

Ahmed Elrefai, Ph.D., P.E.
Chief Engineer



APPENDIX


RTE. 7 - BY PASS
CATOCTIN CIRCLE
MARKET ST
LOUDOUN ST
RTE. 7
SITE
NVRPA
COUNTY H.S.
RADIO TOWER
RTE. 659
CATOCTIN
CIRCLE
U.S. RTE. 15
DRY MILL RD.
DAVIS AVE.
TOWN OF LEESBURG CORP. LIMITS
RTE. 7 - BY PASS
VICINITY MAP
SCALE: 1"=2000'



TEST BORING LOCATION PLAN

● TEST BORING

Plate No. 2

GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 - 2050

BORING No. B-1
SHEET 1 OF 1

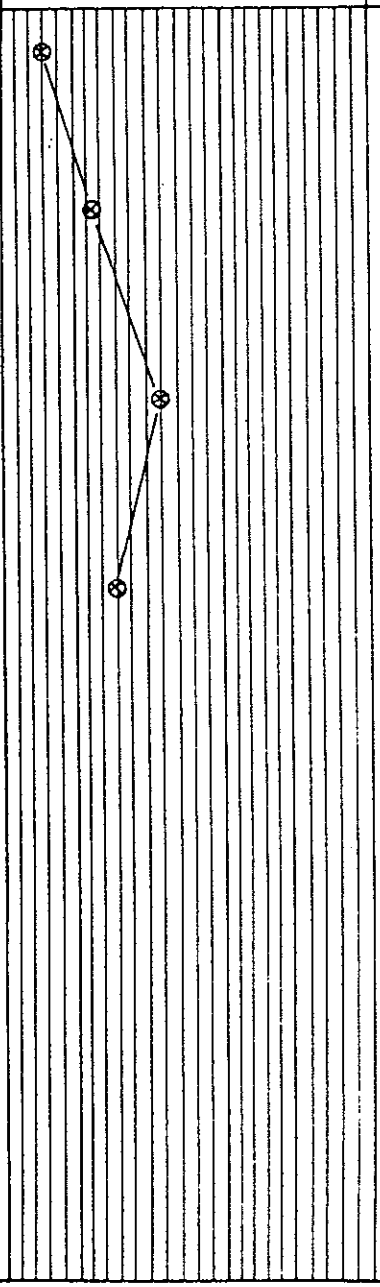
LOG OF TEST BORING

CLIENT: Pulte Home Corporation	BORING NUMBER AND LOCATION: As per plan
OWNER:	ARCHITECT - ENGINEER:

PROJECT: FOX RIDGE SUBDIVISION
GMTI #: 86-E-1071 DATE DRILLED: 04/24/86
ELEVATION: 394 ± feet

GROUND WATER ENCOUNTERED AT: None
GROUND WATER AT COMPLETION: Dry
AT 24 hrs.: None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in.	Penetration Blows Per 12-in.	Recovery IN.	REMARKS
	0	TOPSOIL	2			
S-1	1	yellowish brown silty clay, some mottling (CL, CH)	2	6		
	2		4			
	3		4			
S-2	4		5	13		
			8			
	5					
	6		4			
S-3	7		9	22		
			13			
	8					
	9		6			
S-4	10		6	16		
			10			
	11	Bottom of boring at 10.0'				
	12					
	13					
	14					
	15					
	16					
	17					
	18					
	19					
	20					



REMARKS
× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 3

GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 – 2050

BORING No. B-2
SHEET 1 OF 1

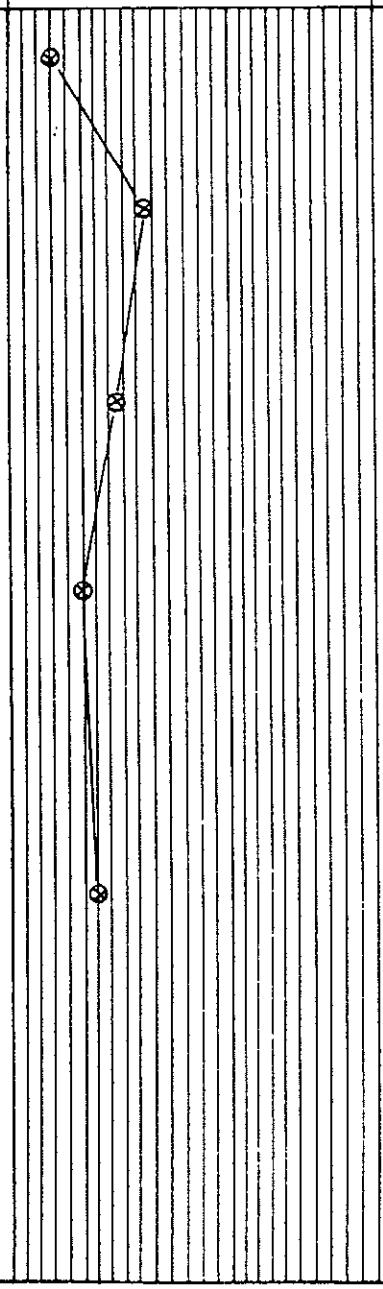
LOG OF TEST BORING

CLIENT: Pulte Home Corporation	BORING NUMBER AND LOCATION: As per plan
OWNER:	ARCHITECT – ENGINEER:

PROJECT: FOX RIDGE SUBDIVISION
GMTI #: 86-E-1071 DATE DRILLED: 04/24/86
ELEVATION: 392 ± feet

GROUND WATER ENCOUNTERED AT: None
GROUND WATER AT COMPLETION: Dry
AT 24 hrs.: None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in.	Penetration Blows Per 12-in.	Recovery IN.
	1	TOPSOIL	1		
S-1	1		1	6	
	2		5		
	3		6		
S-2	4		8	19	
	5		11		
	6		5		
S-3	7	reddish brown silty clay, few weathered rock fragments and yellowish brown mottles (CL)	6	15	
	8		9		
	9		3		
S-4	10		4	10	
	11		6		
	12				
	13				
	14		4		
S-5	15		6	12	
	16	Bottom of boring at 15.0'	6		
	17				
	18				
	19				
	20				



REMARKS
× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 4

GMTI

GEOTECHNICAL & MATERIAL TESTING, INC.

13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021

Telephone (703) 631 - 2050

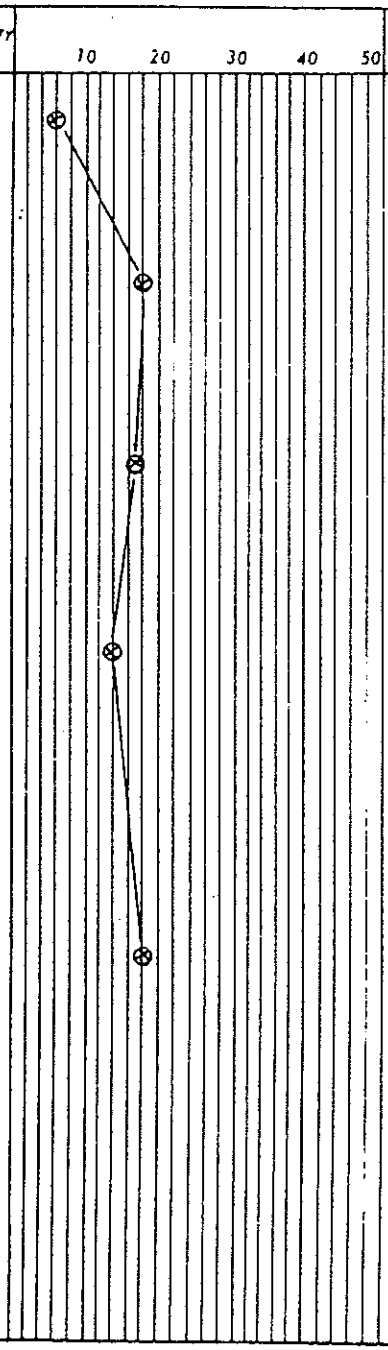
BORING No. B-3

SHEET 1 OF 1

LOG OF TEST BORING

CLIENT: Pulte Home Corporation	BORING NUMBER AND LOCATION: As per plan
OWNER:	ARCHITECT - ENGINEER:
PROJECT: FOX RIDGE SUBDIVISION	GROUND WATER ENCOUNTERED AT: None
GMTI #: 86-E-1071 DATE DRILLED: 04/24/86	GROUND WATER AT COMPLETION: Dry
ELEVATION: 403 ± feet	AT 24 hrs.: None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in	Penetration Blows Per 12-in	Recovery IN.
S-1	1	TOPSOIL	2		
		yellowish red clay, trace organics (CL , CH)	2	6	
	2		4		
	3		6		
S-2	4		8	18	
	5		10		
	6	mottled yellow/red/gray and brown silty clay (CL)	5		
S-3	7		7	17	
	8		10		
	9		3		
S-4	10		6	14	
	11		8		
	12				
	13				
	14	mottled yellow/red/gray and brown silty clay with weathered rock fragments (CL)	5		
S-5	15		7	19	
			12		
	16	Bottom of boring at 15.0'			
	17				
	18				
	19				
	20				



REMARKS

× Plastic Limit %

• Water Content %

△ Liquid Limit %

⊗ Standard Penetration N, Blows / Ft.

Plate No. 5

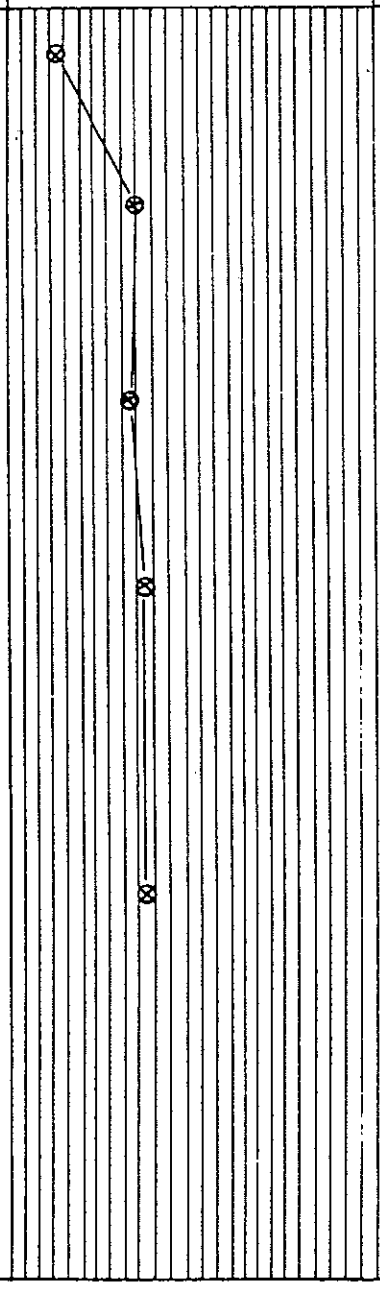
GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 - 2050

BORING No. B-4
SHEET 1 OF 1

LOG OF TEST BORING

CLIENT: Pulte Home Corporation
BORING NUMBER AND LOCATION: As per plan
OWNER:
ARCHITECT - ENGINEER:
PROJECT: FOX RIDGE SUBDIVISION
GMTI # 86-E-1071 DATE DRILLED 04/21/86
ELEVATION 396 ± feet
GROUND WATER ENCOUNTERED AT None
GROUND WATER AT COMPLETION Dry
AT 24 hrs. None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in.	Penetration Blows Per 12-in.	Recovery IN.
	1	TOPSOIL	2		
S-1	1		3	7	
	2		4		
	3		4		
S-2	3		7	18	
	4		11		
	5				
	6	reddish brown silty clay with yellowish brown mottles and trace weathered rock fragments (CL)	4		
S-3	6		7	17	
	7		10		
	8				
	9		4		
S-4	9		8	19	
	10		11		
	11				
	12				
	13				
	14		5		
S-5	14		8	19	
	15		11		
	15	Bottom of boring at 15.0'			
	16				
	17				
	18				
	19				
	20				



REMARKS
× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 6

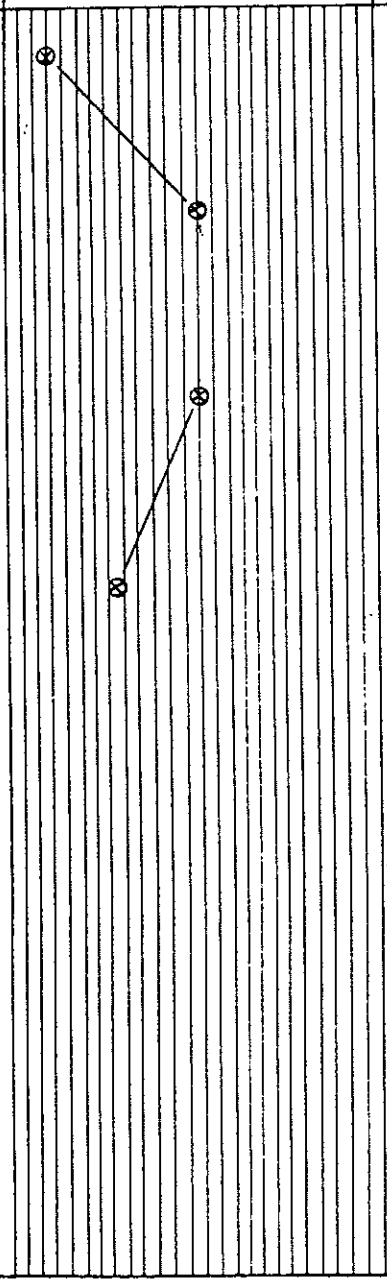
GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 - 2050

BORING No. B-5
SHEET 1 OF 1

LOG OF TEST BORING

CLIENT: Pulte Home Corporation
BORING NUMBER AND LOCATION: As per plan
OWNER:
ARCHITECT - ENGINEER:
PROJECT: FOX RIDGE SUBDIVISION
GMTI # 86-E-1071 DATE DRILLED 04/25/86
ELEVATION 396 ± feet
GROUND WATER ENCOUNTERED AT None
GROUND WATER AT COMPLETION Dry
AT 24 hrs. None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in.	Penetration Blows Per 12-in.	Recovery IN.
		TOPSOIL	2		
S-1	1	yellowish brown and gray silty clay, trace quartz gravel and few weathered rock fragments (CL)	2	6	
	2		4		
	3		6		
S-2			10	26	
	4		16		
	5				
			6		
S-3	6		12	26	
	7		14		
	8				
	9		4		
S-4			6	15	
	10		9		
		Bottom of boring at 10.0'			
	11				
	12				
	13				
	14				
	15				
	16				
	17				
	18				
	19				
	20				



REMARKS
× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N. Blows / Ft.

Plate No. 7

GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 - 2050

BORING No. B-6
SHEET 1 OF 1

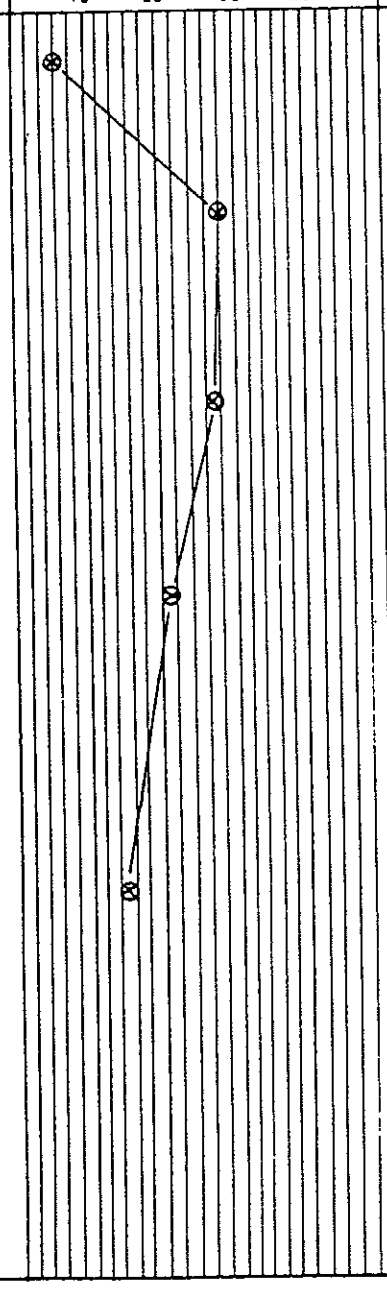
LOG OF TEST BORING

CLIENT Pulte Home Corporation	BORING NUMBER AND LOCATION As per plan
OWNER	ARCHITECT - ENGINEER

PROJECT FOX RIDGE SUBDIVISION
GMTI # 86-E-1071 DATE DRILLED 04/21/86
ELEVATION 396 ± feet

GROUND WATER ENCOUNTERED AT None
GROUND WATER AT COMPLETION Dry
AT 24 hrs. None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in.	Penetration Blows Per 12-in.	Recovery IN.
		TOPSOIL	3		
S-1	1		2	6	
	2		4		
	3		5		
S-2	4		11	28	
	5		17		
	6		7		
S-3	7	mottled reddish brown and gray silty clay with weathered rock fragments (CL, CH)	11	27	
	8		16		
	9		8		
S-4	10		10	21	
	11		11		
	12				
	13				
	14		4		
S-5	15		7	15	
			8		
		Bottom of boring at 15.0'			
	16				
	17				
	18				
	19				
	20				



REMARKS
× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 8

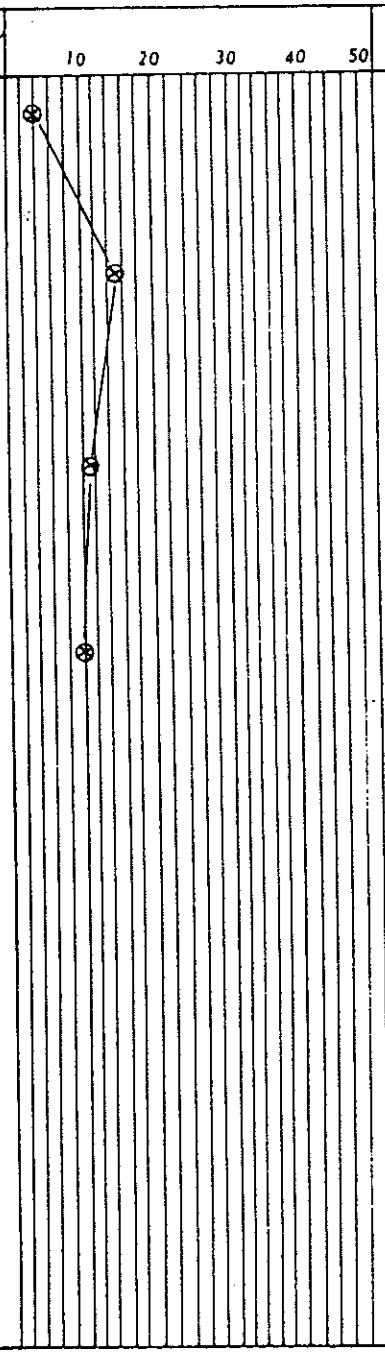
GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 – 2050

BORING No. B-7
SHEET 1 OF 1

LOG OF TEST BORING

CLIENT Pulte Home Corporation	BORING NUMBER AND LOCATION As per plan
OWNER	ARCHITECT – ENGINEER
PROJECT FOX RIDGE SUBDIVISION	GROUND WATER ENCOUNTERED AT None
GMTI # 86-E-1071 DATE DRILLED 04/24/86	GROUND WATER AT COMPLETION Dry
ELEVATION 397 ± feet	AT 24 hrs. None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in	Penetration Blows Per 12-in	Recovery IN.
		TOPSOIL	1		
S-1	1		2	4	
	2		2		
	3		5		
S-2			7	15	
	4	mottled reddish brown and yellowish gray silty clay (CL, CH)	8		
	5				
	6		3		
S-3			5	11	
	7		6		
	8				
	9		2		
S-4			4	10	
	10		6		
		Bottom of boring at 10.0'			
	11				
	12				
	13				
	14				
	15				
	16				
	17				
	18				
	19				
	20				



REMARKS

× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 9

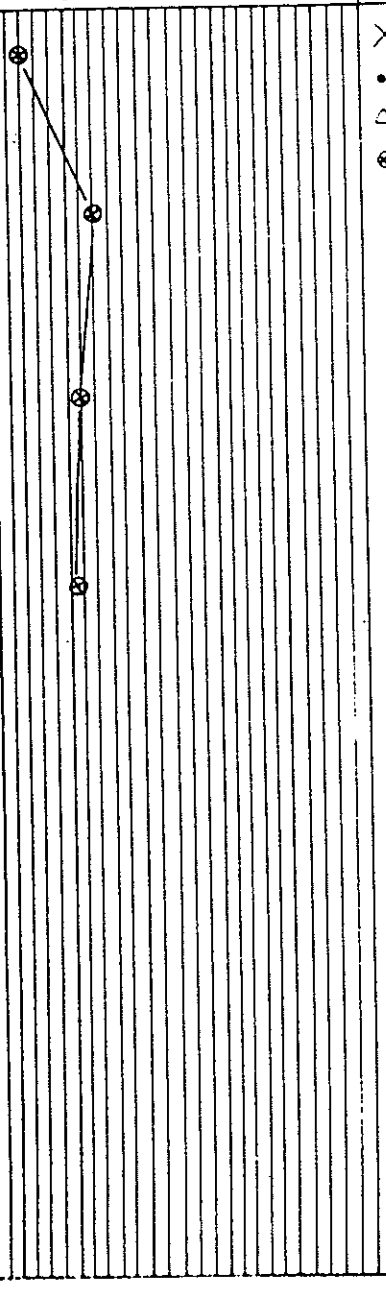
GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 – 2050

BORING No. B-8
SHEET 1 OF 1

LOG OF TEST BORING

CLIENT: Pulte Home Corporation
BORING NUMBER AND LOCATION: As per plan
OWNER:
ARCHITECT – ENGINEER:
PROJECT: FOX RIDGE SUBDIVISION
GMTI #: 86-E-1071 DATE DRILLED: 04/21/86
ELEVATION: 385 ± feet
GROUND WATER ENCOUNTERED AT: None
GROUND WATER AT COMPLETION: Dry
AT 24 hrs.: None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in	Penetration Blows Per 12-in	Recovery IN.
		TOPSOIL	1		
S-1	1		1	4	
	2		3		
	3	mottled yellowish brown and gray silty clay with few weathered rock fragments (CL)	4		
S-2	4		6	14	
	5		8		
	6		4		
S-3	7		5	12	
	8		7		
	9		3		
S-4	10		4	11	
	11	Bottom of boring at 10.0'	7		
	12				
	13				
	14				
	15				
	16				
	17				
	18				
	19				
	20				



REMARKS
× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 10

GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 - 2050

BORING No. B-9
SHEET 1 OF 1

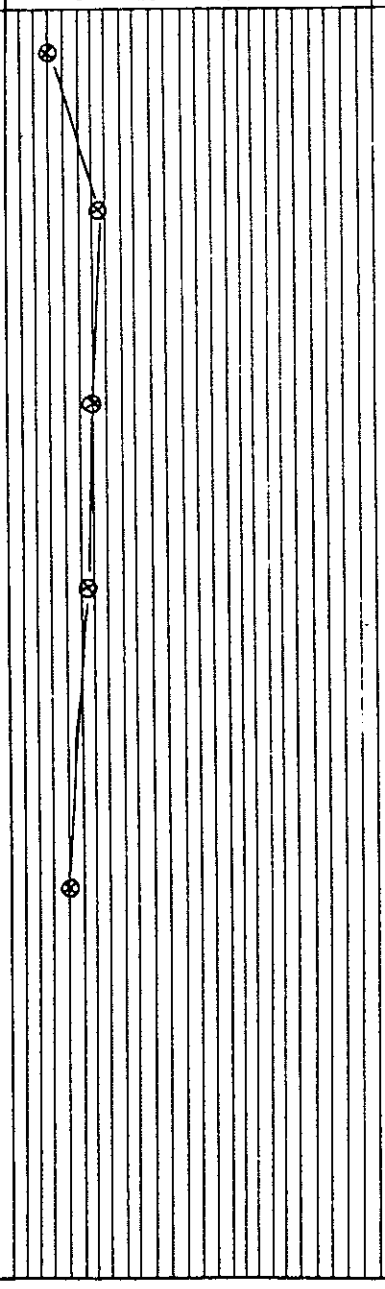
LOG OF TEST BORING

CLIENT: Pulte Home Corporation	BORING NUMBER AND LOCATION: As per plan
OWNER:	ARCHITECT - ENGINEER:

PROJECT: FOX RIDGE SUBDIVISION
GMTI #: 86-E-1071 DATE DRILLED: 04/21/86
ELEVATION: 379 ± feet

GROUND WATER ENCOUNTERED AT: None
GROUND WATER AT COMPLETION: Dry
AT 24 hrs.: None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in	Penetration Blows Per 12-in	Recovery IN.	REMARKS
	0	TOPSOIL	2			
S-1	1		3	6		
	2		3			
	3		4			
S-2	4		5	13		
	5	mottled yellowish red and brown silty clay with weathered rock fragments (CL)	8			
	6		4			
S-3	7		5	12		
	8		7			
	9					
S-4	10		2			
	11		4	11		
	12		7			
	13					
	14					
S-5	15		3			
	16	Bottom of boring at 15.0'	3	8		
	17		5			
	18					
	19					
	20					



× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 11

GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 - 2050

BORING No. B-10
SHEET 1 OF 1

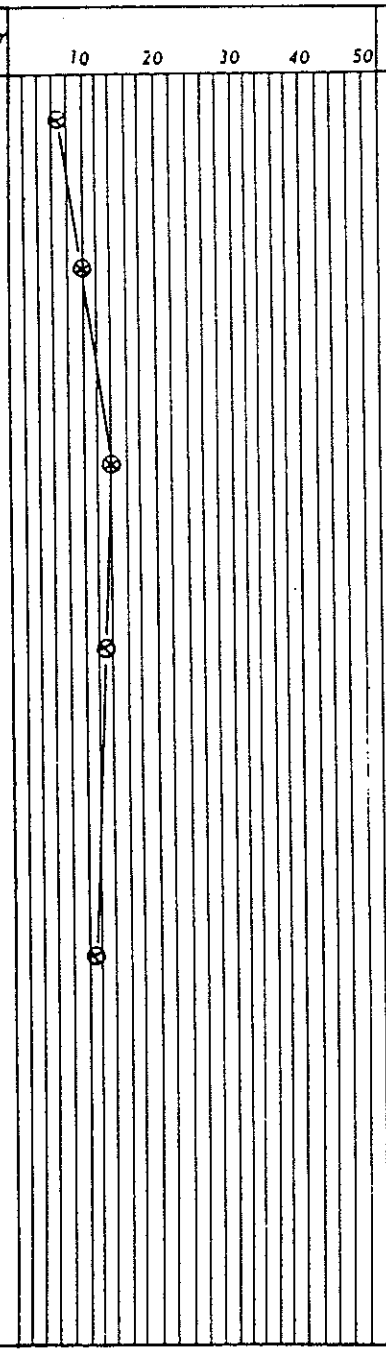
LOG OF TEST BORING

CLIENT: Pulte Home Corporation	BORING NUMBER AND LOCATION: As per plan
OWNER:	ARCHITECT - ENGINEER:

PROJECT: FOX RIDGE SUBDIVISION
GMTI #: 86-E-1071 DATE DRILLED: 04/24/86
ELEVATION: 403 ± feet

GROUND WATER ENCOUNTERED AT: None
GROUND WATER AT COMPLETION: Dry
AT 24 hrs.: None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in	Penetration Blows Per 12-in	Recovery IN.
		TOPSOIL	1		
S-1	1		3	7	
	2		4		
	3				
S-2	4		3		
	5		4	10	
		mottled yellowish brown and gray silty clay, trace sand with few weathered rock fragments (CL)	6		
	6				
S-3	7		4		
	8		6	14	
	9		8		
S-4	10				
	11		3		
	12		6	13	
	13		7		
	14				
S-5	15		4		
			5	11	
			6		
		Bottom of boring at 15.0'			
	16				
	17				
	18				
	19				
	20				



REMARKS
× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 12

GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 – 2050

BORING No. B-11
SHEET 1 OF 1

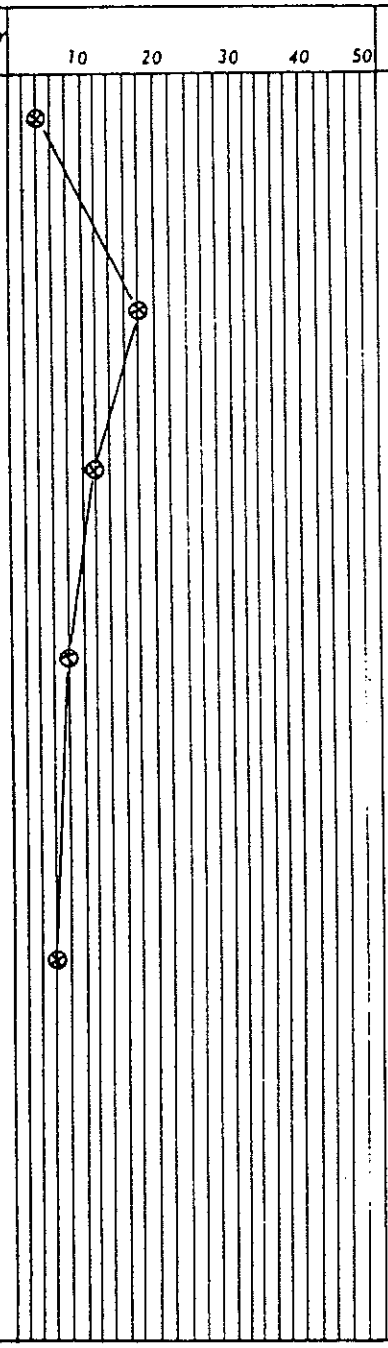
LOG OF TEST BORING

CLIENT Pulte Home Corporation	BORING NUMBER AND LOCATION As per plan
OWNER	ARCHITECT – ENGINEER

PROJECT FOX RIDGE SUBDIVISION
GMTI = 86-E-1071 DATE DRILLED 04/24/86
ELEVATION 389 ± feet

GROUND WATER ENCOUNTERED AT None
GROUND WATER AT COMPLETION Dry
AT 24 hrs. None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in	12-in	Recovery IN.
S-1	1	TOPSOIL	1 2 2	4	
	2				
S-2	3		8 8 10	18	
	4				
	5	mottled yellowish brown and gray silty clay with few weathered rock fragments (CL)			
S-3	6		4 6 6	12	
	7				
	8				
S-4	9		2 4 4	8	
	10				
	11				
	12				
	13				
S-5	14		3 3 3	6	
	15				
	16	Bottom of boring at 15.0'			
	17				
	18				
	19				
	20				



REMARKS
× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 13

GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 - 2050

BORING No. B-12
SHEET 1 OF 1

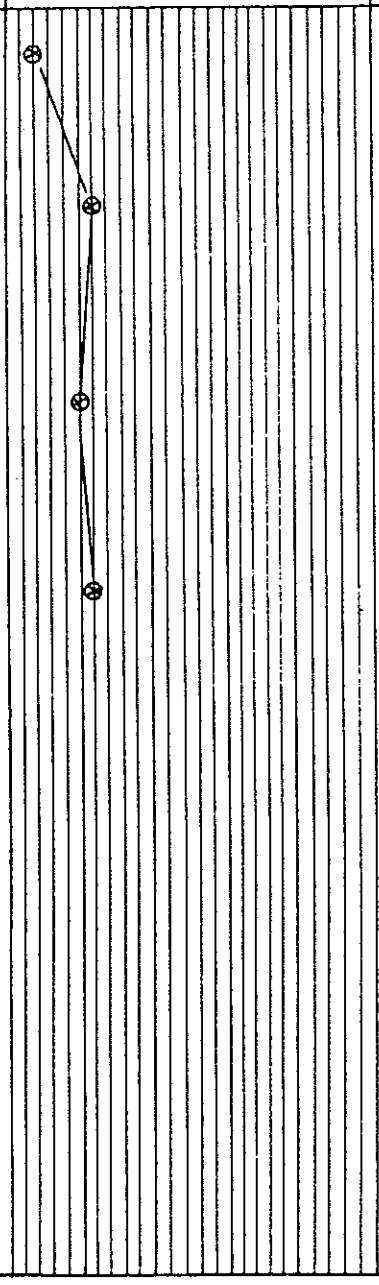
LOG OF TEST BORING

CLIENT: Pulte Home Corporation	BORING NUMBER AND LOCATION: As per plan
OWNER:	ARCHITECT - ENGINEER:

PROJECT: FOX RIDGE SUBDIVISION
GMTI #: 86-E-1071 DATE DRILLED: 04/21/86
ELEVATION: 377 ± feet

GROUND WATER ENCOUNTERED AT: None
GROUND WATER AT COMPLETION: Dry
AT 24 hrs.: None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in	Penetration Blows Per 12-in	Recovery IN.
			1		
S-1	1	TOPSOIL	1	4	
			3		
	2	mottled reddish brown and yellowish gray silty clay with weathered rock fragments (CL)			
	3		4		
S-2	4		5	12	
			7		
	5				
	6		3		
S-3	7		4	10	
			6		
	8				
	9		3		
S-4	10		5	12	
			7		
	11	Bottom of boring at 10.0'			
	12				
	13				
	14				
	15				
	16				
	17				
	18				
	19				
	20				



REMARKS
× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 14

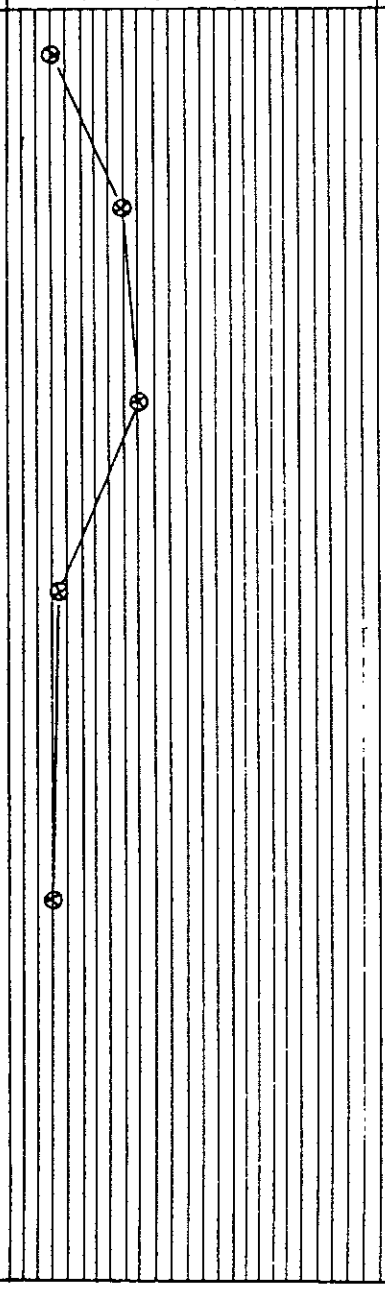
GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 – 2050

BORING No. B-13
SHEET 1 OF 1

LOG OF TEST BORING

CLIENT: Pulte Home Corporation
BORING NUMBER AND LOCATION: As per plan
OWNER:
ARCHITECT – ENGINEER:
PROJECT: FOX RIDGE SUBDIVISION
GMTI #: 86-E-1071
DATE DRILLED: 04/21/86
ELEVATION: 369 ± feet
GROUND WATER ENCOUNTERED AT: None
GROUND WATER AT COMPLETION: Dry
AT 24 hrs.: None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in.	Penetration Blows Per 12-in.	Recovery IN.
S-1	1	TOPSOIL	2, 3, 3	6	
	2				
S-2	3, 4	mottled yellowish brown and gray silty clay with some weathered rock fragments (CL)	4, 8, 8	16	
	5				
S-3	6, 7		5, 9, 9	18	
	8				
S-4	9, 10		5, 4, 3	7	
	11, 12, 13				
S-5	14, 15		2, 3, 3	6	
	16	Bottom of boring at 15.0'			
	17, 18, 19, 20				



REMARKS
× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 15

GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 – 2050

BORING No. B-14
SHEET 1 OF 1

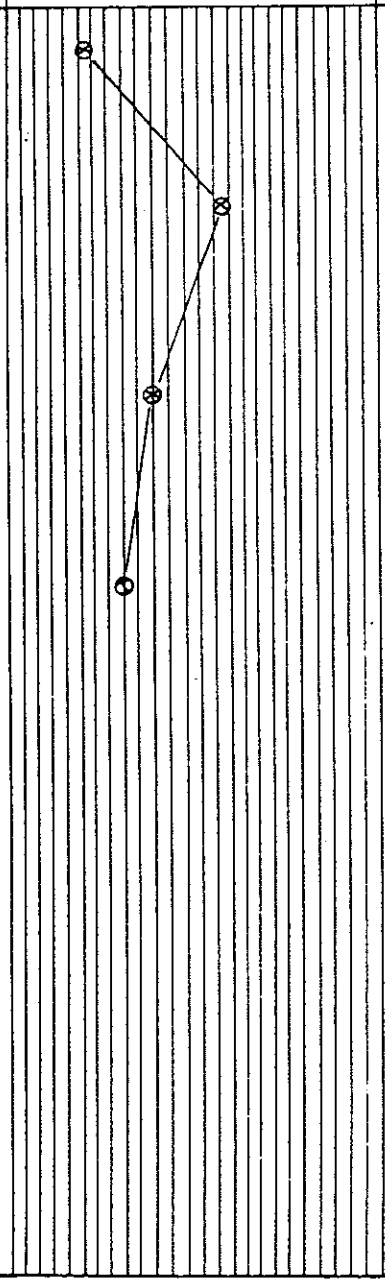
LOG OF TEST BORING

CLIENT: Pulte Home Corporation	BORING NUMBER AND LOCATION: As per plan
OWNER:	ARCHITECT – ENGINEER:

PROJECT: FOX RIDGE SUBDIVISION
GMTI #: 86-E-1071 DATE DRILLED: 04/21/86
ELEVATION: 369 ± feet

GROUND WATER ENCOUNTERED AT: None
GROUND WATER AT COMPLETION: Dry
AT 24 hrs.: None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in.	Penetration Blows Per 12-in.	Recovery IN.
	1	FILL	3		
S-1	1	TOPSOIL	5	11	
			6		
	2				
	3	mottled yellowish red and brown sandy clay with some weathered rock fragments. (CL)	6		
S-2	3		13	29	
	4		16		
	5				
	6		6		
S-3	6		9	20	
	7		11		
	8				
	9		6		
S-4	9		6	16	
	10		10		
	11	Bottom of boring at 10.0'			
	12				
	13				
	14				
	15				
	16				
	17				
	18				
	19				
	20				



REMARKS
× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 16

GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 – 2050

BORING No. B-15
SHEET 1 OF 1

LOG OF TEST BORING

CLIENT: Pulte Home Corporation	BORING NUMBER AND LOCATION: As per plan
OWNER:	ARCHITECT – ENGINEER:

PROJECT: FOX RIDGE SUBDIVISION
GMTI # 86-E-1071 DATE DRILLED: 04/21/86
ELEVATION: 380 ± feet

GROUND WATER ENCOUNTERED AT: None
GROUND WATER AT COMPLETION: Dry
AT 24 hrs. None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in	Penetration Blows Per 12-in	Recovery IN.
S-1	1	TOPSOIL	2, 2, 3	5	
	2				
S-2	3, 4	mottled yellowish brown silty clay with weathered rock fragments (CL)	3, 4, 6	10	
	5				
S-3	6, 7		2, 6, 7	13	
	8				
S-4	9, 10		3, 5, 6	11	
	11, 12, 13				
S-5	14, 15		3, 4, 5	9	
	16	Bottom of boring at 15.0'			
	17, 18, 19, 20				

10 20 30 40 50

REMARKS
× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 17

GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 – 2050

BORING No. B-16
SHEET 1 OF 1

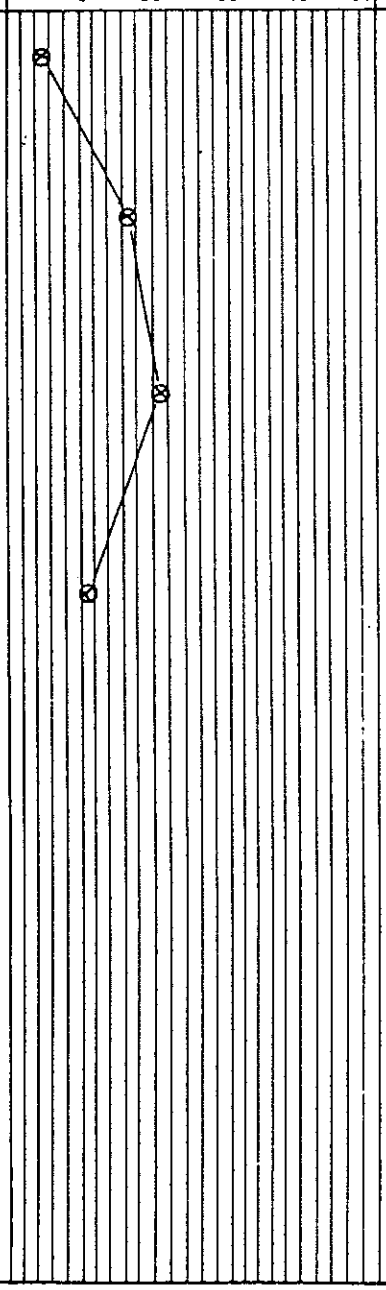
LOG OF TEST BORING

CLIENT: Pulte Home Corporation	BORING NUMBER AND LOCATION: As per plan
OWNER:	ARCHITECT – ENGINEER:

PROJECT: FOX RIDGE SUBDIVISION
GMTI #: 86-E-1071 DATE DRILLED: 04/25/86
ELEVATION: 397 ± feet

GROUND WATER ENCOUNTERED AT: None
GROUND WATER AT COMPLETION: Dry
AT 24 hrs.: None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in.	Penetration Blows Per 12-in.	Recovery IN.
	1	TOPSOIL	1		
S-1	1		2	5	
	2		3		
	3	mottled reddish brown, yellow and black silty clay with weathered rock fragments. (CL)	5		
S-2	4		7	17	
	5		10		
	6		5		
S-3	7		10	21	
	8		11		
	9		4		
S-4	10		4	11	
	11	Bottom of boring at 10.0'	7		
	12				
	13				
	14				
	15				
	16				
	17				
	18				
	19				
	20				



REMARKS
× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 18

GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 - 2050

BORING No. B-17
SHEET 1 OF 1

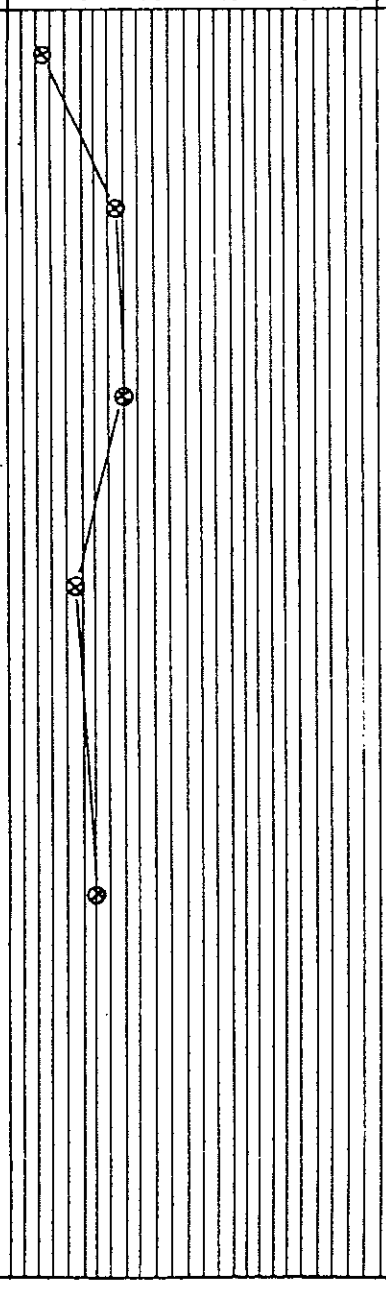
LOG OF TEST BORING

CLIENT Pulte Home Corporation	BORING NUMBER AND LOCATION As per plan
OWNER	ARCHITECT - ENGINEER

PROJECT FOX RIDGE SUBDIVISION
GMTI # 86-E-1071 DATE DRILLED 04/25/86
ELEVATION 398± feet

GROUND WATER ENCOUNTERED AT None
GROUND WATER AT COMPLETION Dry
AT 24 hrs. None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in	Penetration Blows Per 12-in	Recovery IN.
		TOPSOIL	1		
S-1	1		2	5	
			3		
	2				
	3		5		
S-2			6	15	
	4		9		
		mottled yellow and reddish brown silty clay with weathered rock fragments (CL)			
	5				
			4		
S-3	6		7	16	
	7		9		
	8				
	9		3		
S-4			4	9	
	10		5		
	11				
	12				
	13				
	14		4		
S-5			5	12	
	15		7		
		Bottom of boring at 15.0'			
	16				
	17				
	18				
	19				
	20				



REMARKS
× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 19

GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 – 2050

BORING No. B-18
SHEET 1 OF 1

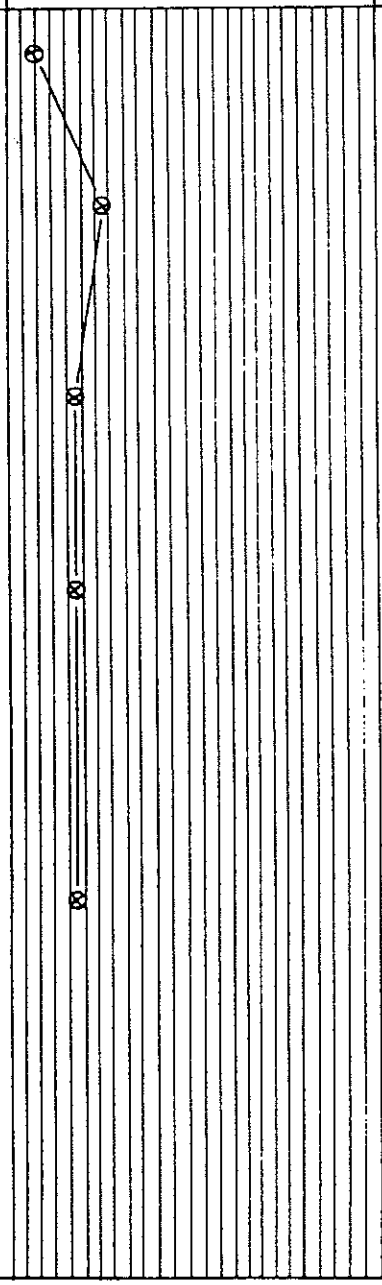
LOG OF TEST BORING

CLIENT Pulte Home Corporation	BORING NUMBER AND LOCATION As per plan
OWNER	ARCHITECT – ENGINEER

PROJECT FOX RIDGE SUBDIVISION
GMTI # 86-E-1071 DATE DRILLED 04/25/86
ELEVATION 387 ± feet

GROUND WATER ENCOUNTERED AT None
GROUND WATER AT COMPLETION Dry
AT 24 hrs. None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in	Penetration Blows Per 12-in	Recovery IN.
S-1	1	TOPSOIL	1 2	4	
	2		2		
S-2	3	mottled reddish brown and gray silty clay with weathered rock fragments (CL)	4 6	13	
	4		7		
	5				
S-3	6		4 4	9	
	7		5		
	8				
S-4	9		3 4	9	
	10		5		
	11				
	12				
	13				
S-5	14		3 4	9	
	15		5		
	16	Bottom of boring at 15.0'			
	17				
	18				
	19				
	20				



REMARKS
× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 20

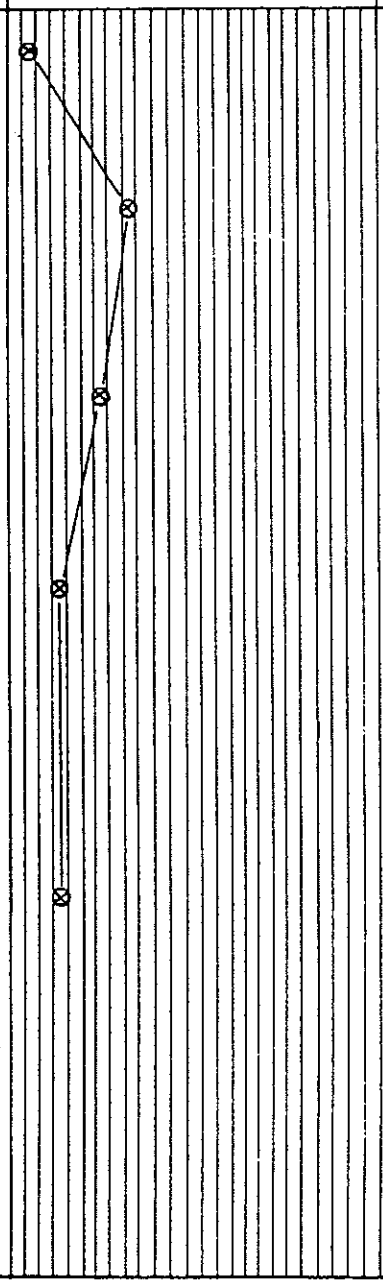
GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 - 2050

BORING No. B-19
SHEET 1 OF 1

LOG OF TEST BORING

CLIENT: Pulte Home Corporation
BORING NUMBER AND LOCATION: As per plan
OWNER:
ARCHITECT - ENGINEER:
PROJECT: FOX RIDGE SUBDIVISION
GMTI #: 86-E-1071
DATE DRILLED: 04/24/86
ELEVATION: 375 ± feet
GROUND WATER ENCOUNTERED AT: None
GROUND WATER AT COMPLETION: Dry
AT 24 hrs.: None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in	Penetration Blows Per 12-in	Recovery IN.	REMARKS
		TOPSOIL	2			
S-1	1		1	3		
	2		2			
	3		3			
S-2	4		8	17		
	5	mottled yellow and reddish brown silty clay with weathered rock fragments (CL)	9			
	6		4			
S-3	7		6	13		
	8		7			
	9		3			
S-4	10		3	7		
	11		4			
	12					
	13					
	14		2			
S-5	15		3	7		
	16	Bottom of boring at 15.0'	4			
	17					
	18					
	19					
	20					



REMARKS
× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 21

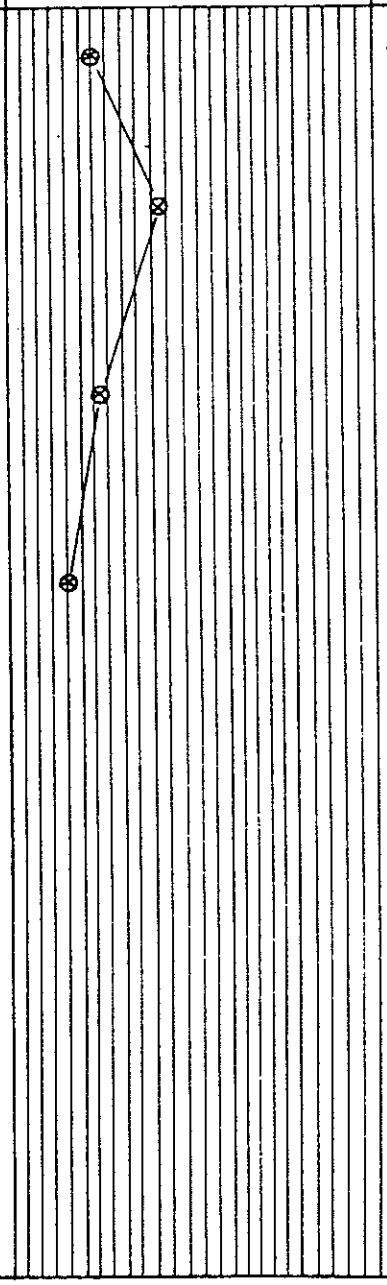
GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 – 2050

BORING No. B-20
SHEET 1 OF 1

LOG OF TEST BORING

CLIENT: Pulte Home Corporation
BORING NUMBER AND LOCATION: As per plan
OWNER:
ARCHITECT – ENGINEER:
PROJECT: FOX RIDGE SUBDIVISION
GMTI #: 86-E-1071 DATE DRILLED: 04/21/86
ELEVATION: 370 ± feet
GROUND WATER ENCOUNTERED AT: 8.5 feet
GROUND WATER AT COMPLETION: 8.5 feet
AT 24 hrs. ____ at ____ hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in.	Penetration Blows Per 12-in.	Recovery IN.
S-1	1	TOPSOIL	3, 4, 8	12	
	2				
S-2	3	mottled yellowish brown sandy to silty clay with weathered rock fragments (CL)	5, 9, 12	21	
	4				
	5				
S-3	6		5, 8, 5	13	
	7				
	8				
S-4	9		2, 4, 4	8	
	10				
	11				
	12				
	13	Auger Refusal at 12.1'			
	14				
	15				
	16				
	17				
	18				
	19				
	20				



REMARKS
× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 22

GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 – 2050

BORING No. B-22
SHEET 1 OF 1

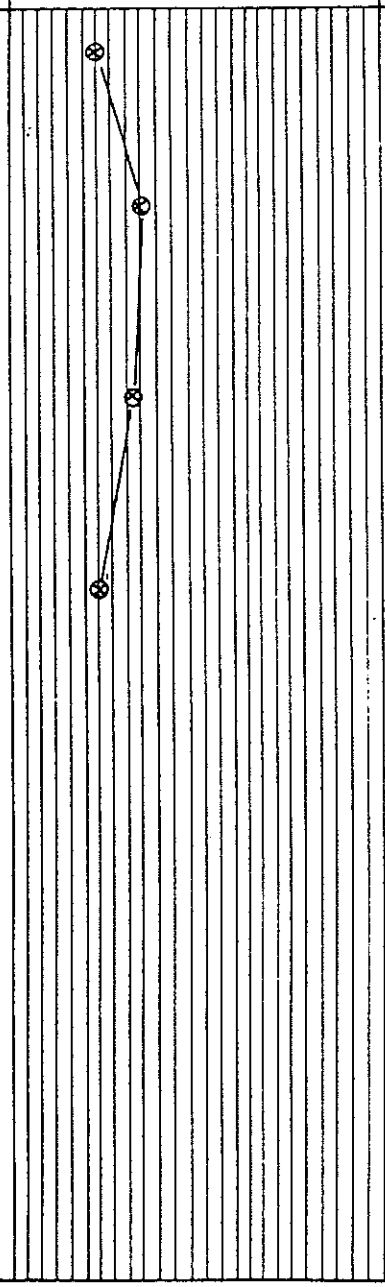
LOG OF TEST BORING

CLIENT: Pulte Home Corporation	BORING NUMBER AND LOCATION: As per plan
OWNER:	ARCHITECT – ENGINEER:

PROJECT: FOX RIDGE SUBDIVISION
GMTI #: 86-E-1071 DATE DRILLED: 04/21/86
ELEVATION: 373 ± feet

GROUND WATER ENCOUNTERED AT: None
GROUND WATER AT COMPLETION: Dry
AT 24 hrs.: None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in	Penetration Blows Per 12-in	Recovery IN.
	0	FILL	3		
S-1	1	TOPSOIL	6	12	
			6		
	2				
	3		8		
S-2			8	18	
	4	mottled yellowish brown sandy clay with weathered rock fragments (CL)	10		
	5				
	6				
S-3					
	7				
	8				
	9		4		
S-4			7	17	
	10		10		
		Bottom of boring at 10.0'			
	11				
	12				
	13				
	14				
	15				
	16				
	17				
	18				
	19				
	20				



REMARKS

× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 23

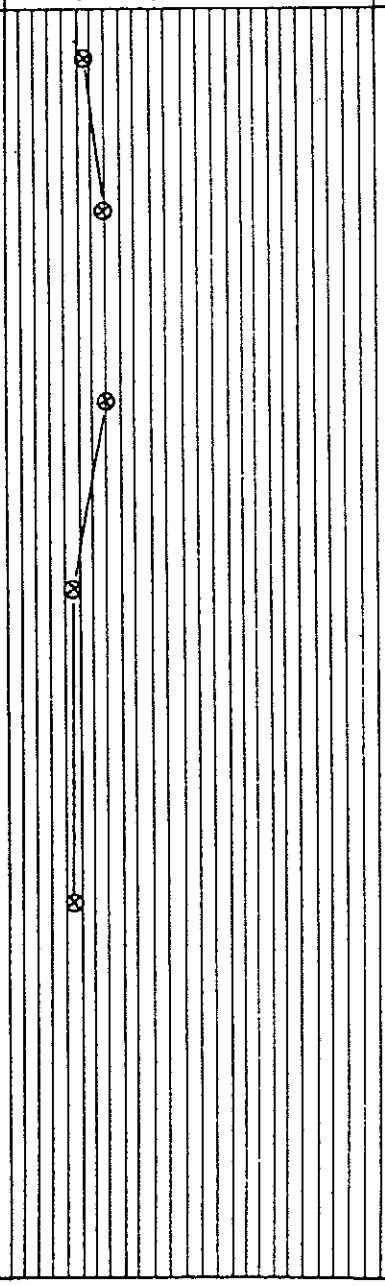
GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 – 2050

BORING No. B-23
SHEET 1 OF 1

LOG OF TEST BORING

CLIENT: Pulte Home Corporation
BORING NUMBER AND LOCATION: As per plan
OWNER:
ARCHITECT – ENGINEER:
PROJECT: FOX RIDGE SUBDIVISION
GMTI # 86-E-1071 DATE DRILLED 04/25/86
ELEVATION 377 ± feet
GROUND WATER ENCOUNTERED AT None
GROUND WATER AT COMPLETION Dry
AT 24 hrs. None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in	Penetration Blows Per 12-in	Recovery IN.
	0	TOPSOIL	1		
S-1	1	mottled yellow, reddish brown and gray silty clay with weathered rock fragments (CL)	7	11	
			4		
	2				
	3		5		
S-2			7	14	
	4		7		
	5				
	6		4		
S-3			7	14	
	7		7		
	8				
	9		3		
S-4			4	9	
	10		5		
	11				
	12				
	13				
	14		3		
S-5			4	9	
	15		5		
		Bottom of boring at 15.0'			
	16				
	17				
	18				
	19				
	20				



REMARKS
× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 24

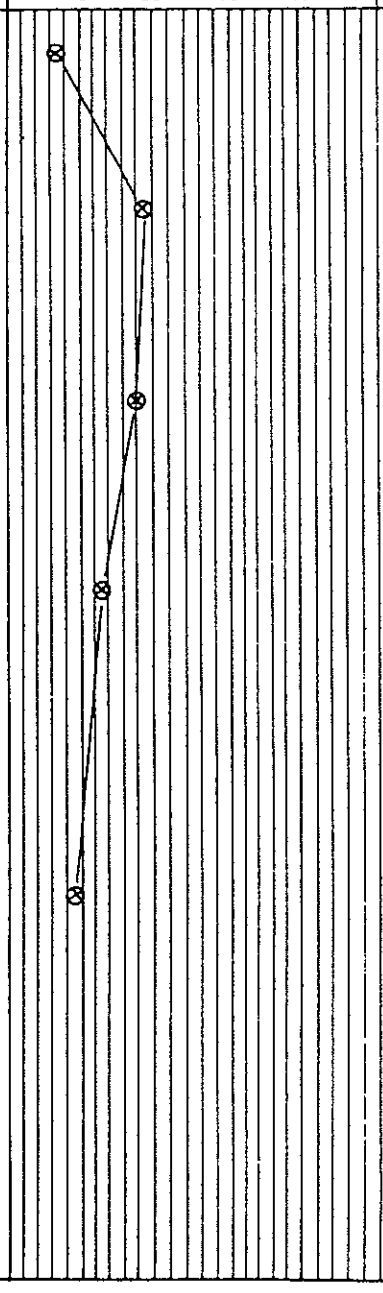
GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 - 2050

BORING No. B-24
SHEET 1 OF 1

LOG OF TEST BORING

CLIENT: Pulte Home Corporation	BORING NUMBER AND LOCATION: As per plan
OWNER:	ARCHITECT - ENGINEER:
PROJECT: FOX RIDGE SUBDIVISION	GROUND WATER ENCOUNTERED AT: None
GMTI #: 86-E-1071 DATE DRILLED: 04/25/86	GROUND WATER AT COMPLETION: Dry
ELEVATION: 385 ± feet	AT 24 hrs.: None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in.	Penetration Blows Per 12-in.	Recovery IN.
S-1	1	TOPSOIL	2, 3, 4	7	
	2				
S-2	3, 4	mottled reddish brown, yellow and gray silty clay with weathered rock fragments (CL)	4, 7, 12	19	
	5				
S-3	6, 7		5, 8, 10	18	
	8				
S-4	9, 10		4, 6, 7	13	
	11, 12, 13				
S-5	14, 15		3, 4, 5	9	
	16	Bottom of boring at 15.0'			
	17, 18, 19, 20				



REMARKS
× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 25

GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 - 2050

BORING No. B-25
SHEET 1 OF 1

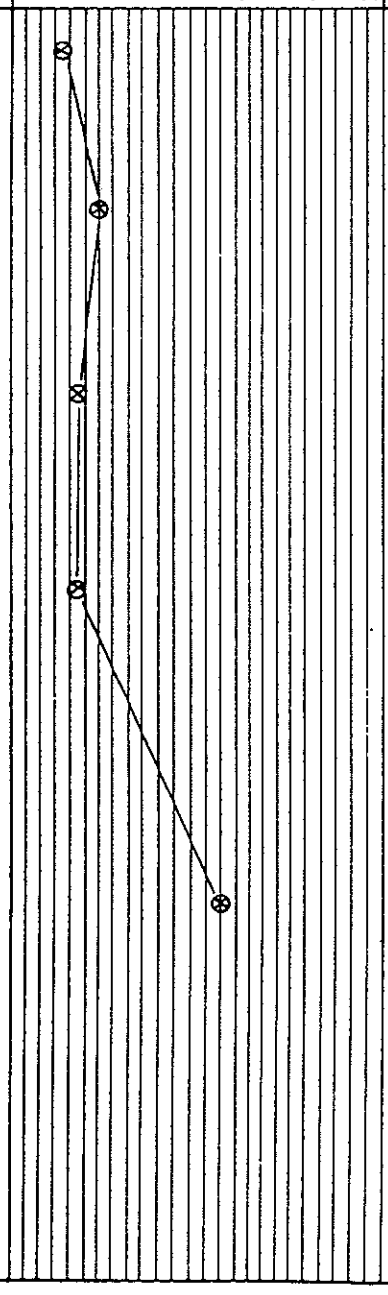
LOG OF TEST BORING

CLIENT: Pulte Home Corporation	BORING NUMBER AND LOCATION: As per plan
OWNER:	ARCHITECT - ENGINEER:

PROJECT: FOX RIDGE SUBDIVISION
GMTI # 86-E-1071 DATE DRILLED: 04/21/86
ELEVATION: 382 ± feet

GROUND WATER ENCOUNTERED AT: None
GROUND WATER AT COMPLETION: Dry
AT 24 hrs.: None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in.	Penetration Blows Per 12-in.	Recovery IN.
		TOPSOIL	3		
S-1	1		3	7	
			4		
	2				
	3		4		
S-2			6	12	
	4		6		
	5	mottled yellowish gray and reddish brown silty clay with weathered rock fragments (CL)			
	6		4		
S-3			4	9	
	7		5		
	8				
	9		4		
S-4			4	9	
	10		5		
	11				
	12				
	13				
	14		7		
S-5			14	28	
	15		14		
	16	Bottom of boring at 15.0'			
	17				
	18				
	19				
	20				



REMARKS
× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 26

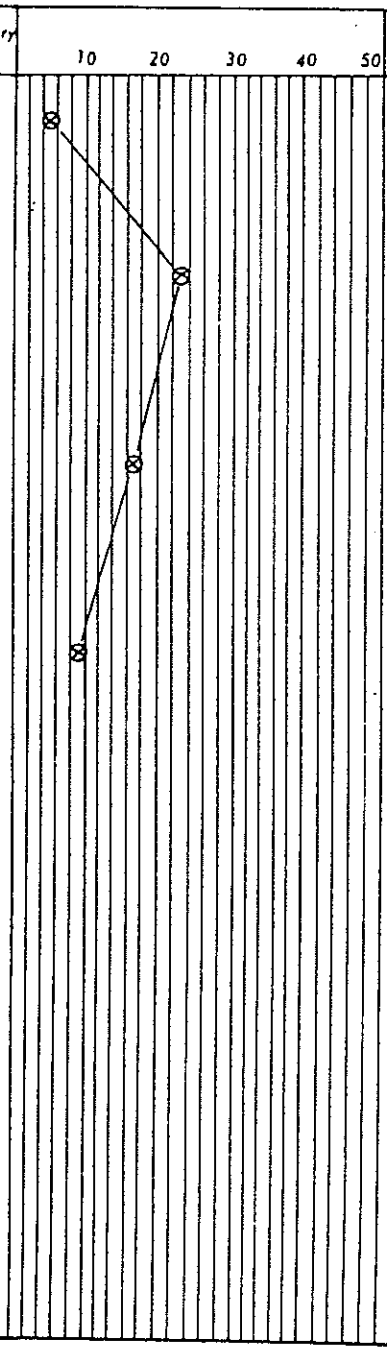
GEOTECHNICAL & MATERIAL TESTING, INC.
13944 B WILLARD ROAD CHANTILLY, VIRGINIA 22021
Telephone (703) 631 – 2050

BORING No. B-26
SHEET 1 OF 1

LOG OF TEST BORING

CLIENT: Pulte Home Corporation
BORING NUMBER AND LOCATION: As per plan
OWNER:
ARCHITECT – ENGINEER:
PROJECT: FOX RIDGE SUBDIVISION
GMTI #: 86-E-1071
DATE DRILLED: 04/25/86
ELEVATION: 382 ± feet
GROUND WATER ENCOUNTERED AT: None
GROUND WATER AT COMPLETION: Dry
AT 24 hrs.: None at hrs.

Type & Sample No.	Depth Ft.	SOIL DESCRIPTION	Penetration Blows Per 6-in.	Penetration Blows Per 12-in.	Recovery IN.
	1	TOPSOIL	1		
S-1	1		2	5	
	2		3		
	3	yellowish brown silty clay, trace quartz gravel and mottling (CL)	4		
S-2	3		10	23	
	4		13		
	5				
	6		5		
S-3	6		8	17	
	7		9		
	8				
	9		3		
S-4	9		4	8	
	10		4		
	11	Bottom of boring at 10.0'			
	12				
	13				
	14				
	15				
	16				
	17				
	18				
	19				
	20				



REMARKS
× Plastic Limit %
• Water Content %
△ Liquid Limit %
⊗ Standard Penetration N, Blows / Ft.

Plate No. 27

SUMMARY OF SOIL TEST DATA

OJECT NAME: FOX RIDGE SUBDIVISION DATE: May 1986

CLIENT NAME : Pulte Home Corporation G.M.T. PROJECT NO.: 86-E-1071

oring & Sample No.	Depth (feet)	Percent Passing (By Weight) 3/4"	3/8"	#4	#10	#40	#200	Plasticity LL	PI	WC	Unified Soil Class.
-1, S-2	2.5-4.0	---	---	100	100	98	96	62	31	39.2	CH
S-3	5.5-7.0	---	100	97	94	89	83	52	20	35.1	CH
S-4	8.5-10.0									39.3	
-2, S-1	0.0-1.5									26.6	
S-3	5.5-7.0									31.7	
S-5	13.5-15.0									28.7	
B-3, S-1	0.0-1.5	---	---	---	100	99	94	66	32	35.5	CH
S-2	2.5-4.0									32.2	
S-4	8.5-10.0									30.7	
B-4, S-1	0.0-1.5									26.2	
S-3	5.5-7.0									23.8	
S-5	13.5-15.0									22.7	
B-5, S-2	2.5-4.0									27.0	
S-4	8.5-10.0									33.2	
B-6, S-2	0.0-1.5									27.5	
S-3	5.5-7.0	100	91	90	89	84	77	53	23	26.7	CH
S-5	13.5-15.0									33.9	
B-7, S-2	2.5-4.0									23.0	
S-4	8.5-10.0									25.0	
B-8, S-2	2.5-4.0									26.8	
S-4	8.5-10.0									33.0	
B-9, S-1	0.0-1.5									27.6	
S-3	5.5-7.0									29.0	
S-5	13.5-15.0									30.1	
B-10, S-2	2.5-4.0									26.0	
S-4	8.5-10.0									23.3	

SUMMARY OF SOIL TEST DATA

OJECT NAME: FOX RIDGE SUBDIVISION DATE: May 1986

LIENT NAME : Pulte Home Corporation G.M.T. PROJECT NO.: 86-E-1071

oring & Sample No.	Depth (feet)	Percent Passing (By Weight) 3/4"	3/8"	#4	#10	#40	#200	Plasticity LL	PI	WC	Unified Soil Class.
-11, S-2	3.5-4.0									19.4	
S-4	8.5-10.0									27.5	
B-12, S-2	2.5-4.0									25.4	
S-4	8.5-10.0									21.1	
B-13, S-2	2.5-4.0	100	77	57	44	33	24	--	NP	22.7	GM
S-3	5.5-7.0	83	79	65	53	45	37	42	12	23.2	SM
S-4	8.5-10.0									30.7	
B-14, S-2	2.5-4.0									18.7	
S-4	8.5-10.0									17.1	
B-15, S-1	0.0-1.5									17.8	
S-2	2.5-4.0	---	100	94	91	85	73	36	14	29.5	
S-3	5.5-7.0	100	85	77	69	58	50	--	NP	22.0	ML
S-5	13.5-15.0									24.9	
-16, S-2	2.5-4.0									28.4	
S-4	8.5-10.0									32.9	
-17, S-1	0.0-1.5									21.7	
S-3	5.5-7.0									27.2	
S-5	13.5-15.0									36.3	
-18, S-2	2.5-4.0									23.7	
S-4	8.5-10.0									27.7	
-19, S-2	2.5-4.0									23.6	
S-4	8.5-10.0									24.4	
S-5	13.5-15.0									28.0	
-20, S-2	2.5-4.0									17.9	
S-4	8.5-10.0									28.8	

SUMMARY OF SOIL TEST DATA

PROJECT NAME: FOX RIDGE SUBDIVISION DATE: May 1986

CLIENT NAME : PULTE HOME CORPORATION G.M.T. PROJECT NO.: 86-E-1071

Boring & Sample No.	Depth (feet)	Percent Passing (By Weight) 3/4"	3/8"	#4	#10	#40	#200	Plasticity LL	PI	WC	Unified Soil Class.
B-22, S-2	2.5-4.0									23.0	
S-4	8.5-10.0									24.6	
B-23, S-1	0.0-1.5									22.7	
S-3	5.5-7.0	---	100	96	89	81	62	33	10	22.6	CL
S-5	13.5-15.0									23.0	
B-24, S-2	2.5-4.0									25.0	
S-4	8.5-10.0									30.9	
B-25, S-2	2.5-4.0									26.2	
S-4	8.5-10.0									25.1	
B-26, S-2	2.5-4.0									19.9	
S-4	8.5-10.0									23.4	
				BULK SAMPLE							
B-17	0.5-12.0	---	---	100	98	94	83	56	29	----	CH

Plate No. 30

GMTI
Geotechnical & Material Testing, Inc.
703—631-2050

C.M.T.I. PROJECT NO: 86-E-1071

DATE: May 1986

MOISTURE DENSITY CURVE NO: 1180-5

PROCTOR: Standard

TEST METHOD: VTM-1

CLIENT: Pulte Home Corporation

PROJECT: FOX RIDGE SUBDIVISION

SOURCE OF MATERIAL: on-site cut

SOIL DESCRIPTION: brown sandy silty clay - clayey silt

HAMMER WEIGHT (LBS): 5.5

HAMMER DROP (INCHES): 12

NO. BLOWS PER LAYER: 25

NO. OF LAYERS: 3

MOLD SIZE: 4 inch diameter

TEST PERFORMED ON MATERIAL PASSING #4 SIEVE

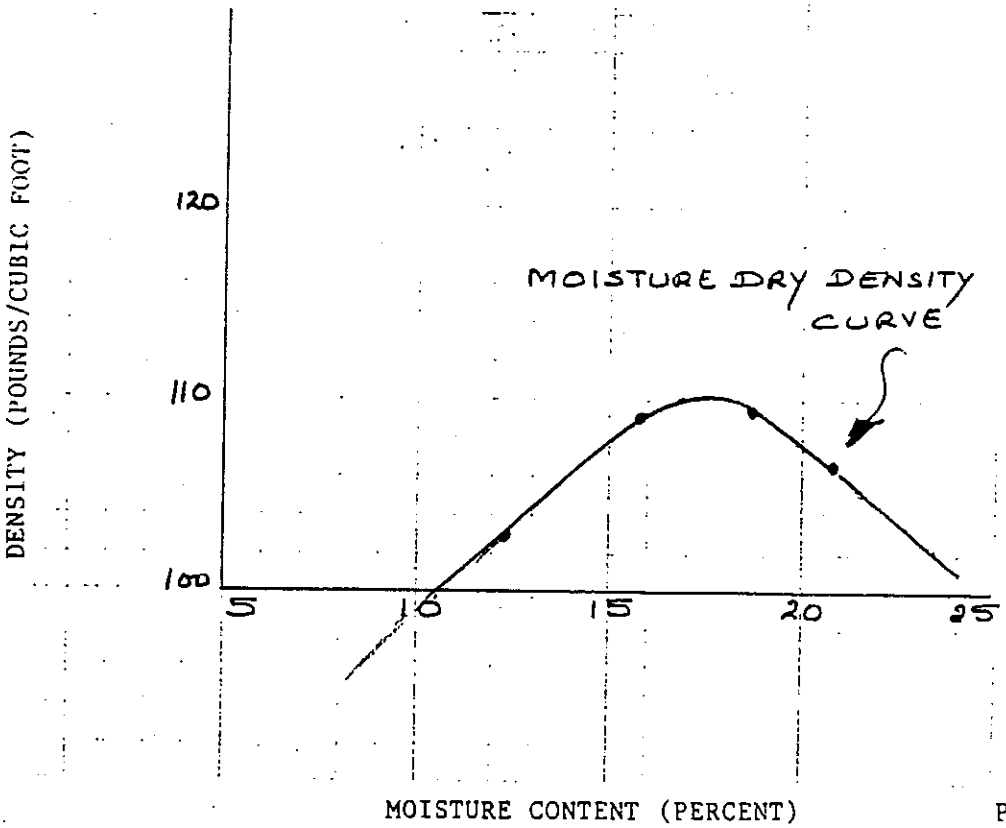
NATURAL WATER CONTENT:

LIQUID LIMIT:

PLASTIC LIMIT:

PLASTICITY INDEX:

UNIFIED SOIL CLASSIFICATION:



GRADATION TEST

SIEVE SIZE	PERCENT PASS. (BY WEIGHT)
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	
No. 40	
No. 200	

M.D.D. (PCF) 110.0

O.M.C. (%) 17.5

PERCENT RETAINED ON #4 SIEVE Nil

SPEC. GRAVITY ---

CORRECTED FOR +4 MATL.:

M.D.D. (PCF) 110.5

O.M.C. (%) 17.5

REMARKS:

Plate No. 31

GMTI
Geotechnical & Material Testing, Inc.
703—631-2050

C.M.T.I. PROJECT NO: 86-E-1071

DATE: May 1986

MOISTURE DENSITY CURVE NO: 1180-1

PROCTOR: Standard

TEST METHOD: VTM-1

CLIENT: Pulte Home Corporation

PROJECT: FOX RIDGE SUBDIVISION

SOURCE OF MATERIAL: TP-6, 1.0-8.0 feet

SOIL DESCRIPTION: reddish brown silty clay

HAMMER WEIGHT (LBS): 5.5

HAMMER DROP (INCHES): 12

NO.BLOWS PER LAYER: 25

NO.OF LAYERS: 3

MOLD SIZE: 4 inch diameter

NATURAL WATER CONTENT:

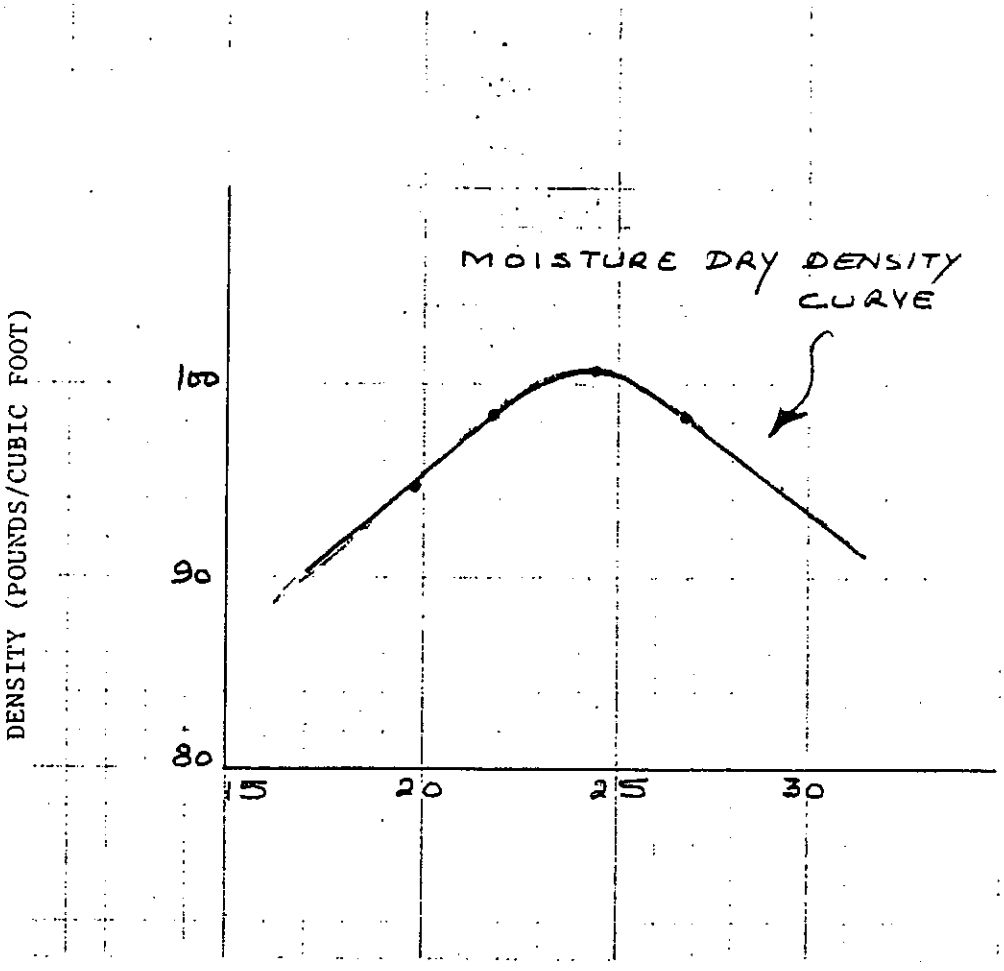
LIQUID LIMIT:

PLASTIC LIMIT:

PLASTICITY INDEX:

UNIFIED SOIL CLASSIFICATION:

TEST PERFORMED ON MATERIAL PASSING #4 SIEVE



GRADATION TEST

SIEVE SIZE	PERCENT PASS. (BY WEIGHT)
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	
No. 40	
No.200	

M.D.D.(PCF) 100.5

O.M.C.(%) 24.0

PERCENT RETAINED ON #4 SIEVE Nil

SPEC.GRAVITY ---

CORRECTED FOR +4 MATL.:

M.D.D.(PCF) 100.5

O.M.C.(%) 24.0

REMARKS:

Plate No. 32

GMTI
Geotechnical & Material Testing, Inc.
703—631-2050

G.M.T.I. PROJECT NO: 86-E-1071

DATE: May 1986

MOISTURE DENSITY CURVE NO: 1180-4

PROCTOR: Standard

TEST METHOD: VTM-1

CLIENT: Pulte Home Corporation

PROJECT: FOX RIDGE SUBDIVISION

SOURCE OF MATERIAL: B-25, 0.5-8.5 feet

SOIL DESCRIPTION: medium brown sandy silty clay

HAMMER WEIGHT (LBS): 5.5

HAMMER DROP (INCHES): 12

NO. BLOWS PER LAYER: 25

NO. OF LAYERS: 3

MOLD SIZE: 4 inch diameter

NATURAL WATER CONTENT:

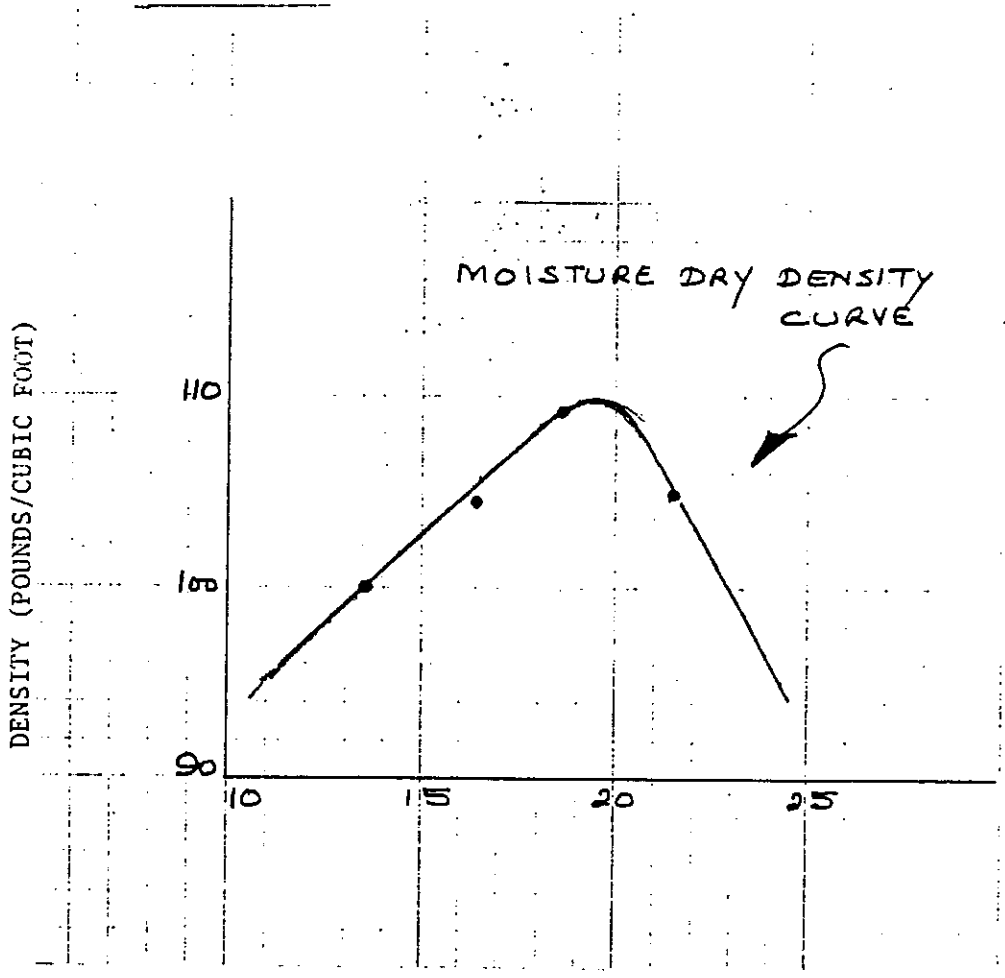
LIQUID LIMIT:

PLASTIC LIMIT:

PLASTICITY INDEX:

UNIFIED SOIL CLASSIFICATION:

TEST PERFORMED ON MATERIAL PASSING #4 SIEVE



GRADATION TEST

SIEVE SIZE	PERCENT PASS. (BY WEIGHT)
1 1/2"	
1"	
3/4"	
3/8"	
No. 4	
No. 10	
No. 40	
No. 200	

M.D.D. (PCF) 110.0

O.M.C. (%) 19.5

PERCENT RETAINED ON #4 SIEVE Nil

SPEC. GRAVITY ---

CORRECTED FOR +4 MATL.:

M.D.D. (PCF) 110.0

O.M.C. (%) 19.5

REMARKS:

Plate No. 33

GMTI
Geotechnical & Material Testing, Inc.
703—631-2050

G.M.T.I. PROJECT NO: 86-E-1071

DATE: May 1986

MOISTURE DENSITY CURVE NO: 1180-3

PROCTOR: Standard

TEST METHOD: VTM-1

CLIENT: Pulte Home Corporation

PROJECT: FOX RIDGE SUBDIVISION

SOURCE OF MATERIAL: B-17, 0.5-12.0 feet

SOIL DESCRIPTION: light brown silty clay

HAMMER WEIGHT (LBS): 5.5

HAMMER DROP (INCHES): 12

NO. BLOWS PER LAYER: 25

NO. OF LAYERS: 3

MOLD SIZE: 4 inchd iameter

NATURAL WATER CONTENT:

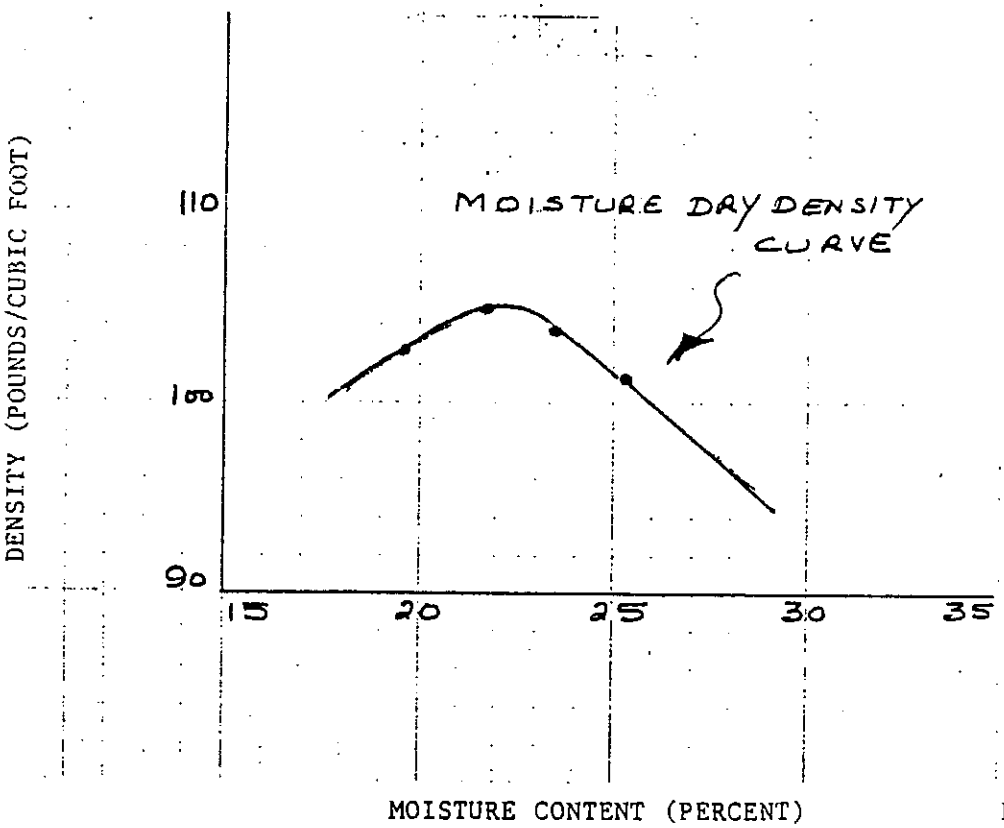
LIQUID LIMIT:

PLASTIC LIMIT:

PLASTICITY INDEX:

UNIFIED SOIL CLASSIFICATION:

TEST PERFORMED ON MATERIAL PASSING #4 SIEVE



GRADATION TEST

SIEVE SIZE	PERCENT PASS. (BY WEIGHT)
1 1/2"	
3/4"	
3/8"	
No. 4	
No. 10	
No. 40	
No. 200	

M.D.D. (PCF) 105.0

O.M.C. (%) 22.5

PERCENT RETAINED ON #4 SIEVE Nil

SPEC. GRAVITY ---

CORRECTED FOR +4 MATL.:

M.D.D. (PCF) 105.0

O.M.C. (%) 22.5

REMARKS:

Plate No. 34

1-229-4C-1

Attachment C - Greenway Geotech Report

Geotechnical & Material Testing, Inc.

- Geotechnical Engineering
- Construction Quality Control
- Construction Material Testing
- Pavement Design & Recycling

August 1, 1991

Trafalgar House
Residential Virginia
8300 Greensboro Drive
Suite 200
McLean, Virginia 22102

Attention: Mr. Mark Simms
Mr. Chris Rudy

Reference: Detailed Geotechnical Investigation - Type II
GREENWAY FARMS
STORM WATER MANAGEMENT POND
Town of Leesburg, Virginia
GMTI Project No. 91-E-1046

Gentlemen:

We have completed the Detailed Geotechnical Investigation - Type II at the above referenced site.

A total of seven (7) test borings were drilled during this investigation to depths ranging between 3.0 and 10.0 feet below the existing ground surface elevations.

The borings were located along the centerline of the dam embankment, emergency spillway and the pond basin area and were terminated when refusal of drill auger/split-spoon sampler was encountered. Rock was not cored at any location.

The investigation disclosed that the site is underlain by the residuum of four (4) different rock types. The upper 1.3 to 2.5 feet of the soils along the centerline of the dam are silty clays of medium to high plasticity. The underlying soils in the area, are saprolite of diabase, which progressively gets denser with increasing depth. Settlements of the bearing stratum under the embankment are, therefore, expected to be minimal.

The on-site soils, except highly plastic silty clays in the areas underlain by diabase, are suitable for use in the construction of the embaknment, subject to moisture adjustments.

703-631-2050
13944 B Willard Road • Chantilly, Virginia 22021
FAX 968-2930

Since deep cuts are to be made to attain the planned grades along the abutments and the spillway area, blasting of dense rock (diabase) may have to be resorted to, to attain the required grades during the installation of the conduit for the principal spillway.

The planned gradients of 3H:1V for both the upstream and downstream slopes are adequate for the structural integrity of the dam embankment, provided on-site soils are used to build the dam.

The recommendations relative to earthwork treatment, design of foundations for the riser structure and the wingwalls are detailed in the report.

Finally, we recommend that the overall design of the dam and its appurtenant structures should conform to the requirements of the Virginia Soil Conservation Service and Section 5.324 of the Town of Leesburg Design and Construction Standard Manual 1990.

The soil samples, obtained during this investigation, will be retained in our laboratory for thirty (30) days, unless otherwise advised.

This report has been prepared for use by Trafalgar House and their consultants only and should not be used or relied upon by others without our knowledge and consent.

Thank you for your confidence in our services. Please do not hesitate to contact us, should you have any questions or if we can be of further service to you.

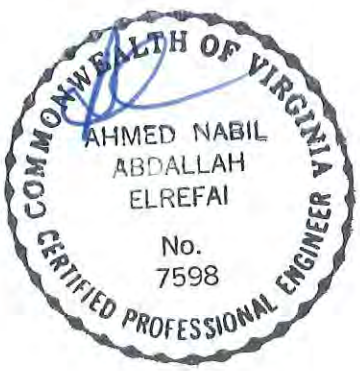
Respectfully submitted,

G.M.T., Incorporated

Ramesh Khanna
Principal Engineer

Ahmed Elrefai, Ph.D., P.E.
Chief Engineer

rk/lp



REPORT

OF

DETAILED GEOTECHNICAL INVESTIGATION

TYPE II

FOR

GREENWAY FARMS

STORM WATER MANAGEMENT POND

TOWN OF LEESBURG

VIRGINIA

Submitted To:

TRAFALGAR HOUSE

RESIDENTIAL VIRGINIA

8300 GREENSBORO DRIVE, SUITE 200

MCLEAN, VIRGINIA 22102

Geotechnical Engineers:

GEOTECHNICAL & MATERIAL TESTING, INC.

13944 B WILLARD ROAD

CHANTILLY, VIRGINIA 22021

GMTI PROJECT NO. 91-E-1046

AUGUST 1, 1991

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REPORT

OF

DETAILED GEOTECHNICAL INVESTIGATION

TYPE II

FOR

GREENWAY FARMS

STORM WATER MANAGEMENT POND

TOWN OF LEESBURG

VIRGINIA

I. INTRODUCTION (Scope of Project and Objective)

A dry pond is planned to be built as a part of the overall storm water management plans for GREENWAY FARMS - a residential subdivision, being developed in the municipal limits of the Town of Leesburg.

This report presents the findings of a detailed geotechnical investigation - Type II, planned and carried out to satisfy the general requirements detailed in Section 5-324 and Article 9 of the Town of Leesburg, Design and Construction Standards Manual.

The investigation was planned and performed to:

A. Develop data relative to the subsurface soil, rock and ground water conditions along the proposed dam embankment, the spillway area and the basin of the pond.

B. Determine the suitability of the 'on-site' material for use in the embankment.

C. Evaluate the conditions disclosed with special reference to the design of the upstream and downstream slopes, emergency spillway, the riser section, the dam embankment and the installation of the drainage conduit.

II. BACKGROUND

A. Site Conditions

Located west of US Route 15, the site for the storm water detention pond is characterized by a broad drainage swale, narrowing to a small stream near the proposed dam alignment. The total relief across the site is 41 ±feet (high elevation 384 ±feet in the east corner: low elevation 343 ±feet in the north corner.

The stream presently meanders through the middle of the proposed pond area, flowing in a northerly direction. The pond area is predominantly covered with tall field grasses. However, the area along the streambed and the proposed dam alignment is heavily wooded with deciduous hardwoods and scrub vegetation.

B. Area Geology

A reference to the available geologic literature and sample observation indicates that the site is located in the Culpeper Structural Basin. The site is underlain by four (4) distinct rock units.

The first two (2) rock units are of sedimentary origin. These formations include the Jurassic/Triassic-aged Catharpin Creek Member and Leesburg Limestone Conglomerate Member of the Bull Run Formation. The Catharpin Creek Member is characterized as a gray to red brown sandstone, interbedded with shale and siltstone. The Leesburg Member, on the other hand, is characterized as a gray, pebble and cobble conglomerate with a sandy, silty and/or limy matrix and calcite cement.

Both members of the Bull Run Formation have been intruded by a diabase dike of Jurassic-Triassic age. Diabase, the third rock type is an igneous rock which formed from molten magma. The magma intruded into the pre-existing sedimentary units. Diabase is characterized as a crystalline rock having a medium grained texture and an equigranular fabric of interlocking feldspar and pyroxene crystals.

As a result of the implacement of the igneous diabase, pre-existing sedimentary rocks, which where in contact with or very near to the molten magma, became 'baked'.

These 'baked' rocks, known as hornfels, are found directly adjacent to the narrow diabase dike. Portions of both the Catharpin Creek Member and the Leesburg Member were thermally metamorphosed in this manner. Generally speaking, the hornfels are dark gray in color, are very hard, are remineralized and show varying degrees of their original texture. The higher the degree of metamorphism, the less the original texture is present.

The approximate delineation of the areas, underlain by the four (4) geologic formations, are shown on Plate No. 2.

III. EXPLORATION AND SAMPLING METHODS

The investigation, drilling and sampling were carried out in accordance with the following ASTM Specifications.

General Method of Subsurface Investigation	: D420-69(1975)
Visual-Manual Description of Soils	: D2488-69(1975)
Penetration Test and Split Barrel Sampling of Soils	: D1586-67(1974)
Auger Borings	: D1452-65(1972)

Standard Penetration Test

The hammer for the Standard Penetration Test is lifted by means of a rope which is wrapped two times around a revolving cathead. Standard Penetration tests are typically performed at 2.5 foot intervals to a depth of 10 feet and at 5 foot intervals thereafter. The sample is taken by driving a Standard 2 inch outside diameter split-spoon sampler a minimum of three 6 inch intervals. The "N" value is taken as the sum of the blows for the second and third 6 inch interval. Boreholes are advanced by means of hollow stem augers or driven casing using the wash boring technique. Solid stem augers are not used.

Immediately after each Standard Penetration Test, soil samples are removed from the split-spoon and sealed in 8 ounce glass jars. Pertinent information regarding the test is recorded on the jar and the drillers log. The drilling foreman also notes on his log, such information as apparent location of ground water, changes in drilling pressure while advancing the holes, etc. The logs and samples are then returned to our office for review by a geologist/soils engineer. Tests are then conducted on representative samples as per ASTM/VTM Testing Procedures.

IV. REPORT OF FIELD INVESTIGATION

A. Test Boring Plan

The investigation has been carried out on the basis of:

A preliminary plan, scale 1"=50', contour interval 2 feet, prepared by Dewberry & Davis, the project Civil Engineers, showing the general topography of the site, the alignment of the proposed embankment and 100 year flood plain. The details relative to the riser structure, the upstream and downstream slopes, drainage pipe and the 9'x6' box culvert are shown on these drawings.

A total of seven (7) test borings, located along the dam embankment, the pond basin and the emergency spillway area, were drilled by a truck-mounted mechanical rig using hollow stem augers. The depths to which the borings were extended are indicated on the boring logs in the appendix of this report.

The test boring locations were proposed by G.M.T., Inc. engineers and were established in the field by the survey crew from Dewberry & Davis, the project Civil Engineers. The ground surface elevations at the individual test locations were also provided by them.

Drilling and soil sampling were conducted in accordance with the procedures generally recognized and accepted as standardized methods of investigation of subsurface conditions related to earthwork and foundation engineering projects.

Standard penetration data were developed in conjunction with each sampling increment. Samples were placed into moisture tight jars and brought to our laboratory.

The location of the site is shown on the Vicinity Map on Plate No. 1; whereas the boring locations are shown on the attached boring plan, Plate No. 2. The findings of the borings are presented on the attached Boring Logs, Plates No. 3 through 11.

B. Laboratory Testing

The soil samples were visually classified in the laboratory by our soils engineer. The tests for Natural Moisture Content, Plasticity Index and Grain-size Distribution were conducted on some of the representative jar samples.

The results of the Grain-size Analysis and Atterberg Limits Tests are indicated on the individual boring logs; whereas the Grain-size Distribution Curves are presented on Plates No. 12 and 13.

The site was inspected by G.M.T., Inc. personnel. The field and laboratory developed information was evaluated by the engineers for formulating the recommendations.

V. **FINDINGS**

A. Subsoil Conditions

The specific soil conditions encountered at the individual test borings are indicated on the Boring Logs. The stratification of soils profile represents the approximate boundaries between the different layers. In-situ the transition may be gradual.

Approximately 6 inches to a foot of organic contaminated soil (surficial topsoil) is underlain by two (2) basic soil strata, distinctly representative of the underlying parent rock (conglomerate of limestone; siltstone/sandstone, hornfels and diabase). These strata are briefly described hereunder.

LIMESTONE COMGLOMERATE

Stratum I

Encountered only at test location SWM-6 from below the topsoil layer down to the depths explored, this stratum is composed of brown silty clay of medium plasticity (CL) with saprolite of hornfel (conglomerate). The stratum is stiff to very hard (N values 17 to >50), gets denser with increasing depth. Refusal of drill auger/split-spoon sampler was encountered in this stratum at a depth of 5.8 feet.

SILTSTONE/SANDSTONE/HORNFELSL

Stratum IA

Encountered at test locations SWM-4, SWM-5 and SWM-7 and ranging in thickness from a minimum of 0.7 foot to a maximum of 8.8 feet, this stratum consists of brown, reddish brown to gray silty clays of medium to high plasticity with trace to little sand (CL, CH).

Based upon the standard penetration data (N values 7 to 19), the stratum can be designated as firm to stiff. Lower penetration resistance (N value of 2) appears to have been recorded perhaps, due to the disturbance of saturated silty clays during drilling operations.

Typical index properties are as follows:

Natural Moisture Content (%)	21.8
Material Passing 200 Sieve (0.075mm) %	93.7
Liquid Limit (%)	51
Plastic Limit (%)	26
Plasticity Index	25

Stratum IIA

Underlying Stratum IA and extending to the depths explored, this stratum is made up of saprolite of siltstone/sandstone. The soils are predominantly brown, gray and reddish brown sandy silty clays with fragments of weathered sandstone and hornfels. The stratum is very dense (N values 48 to >50). Refusal was encountered at depths of 8.6 and 5.1 feet at test locations SWM-4 and SWM-5 respectively.

DIABASE

Stratum IB

Encountered at all the three (3) test locations along the dam embankment (SWM-1, SWM-2 and SWM-3), this stratum consists of orange brown to brown silty clays of medium to high plasticity (CL, CH), with trace to some sand. The stratum is generally very stiff (N values 19 to 27).

Stratum IIB

Underlying Stratum IB and extending to the depths explored, this stratum is composed of yellowish brown and gray sandy clays to clayey sands with fragments of weathered diabase. This stratum is generally very dense (N values 37 to >50) shows relict rock structure and progressively gets denser with increasing depth. Refusal was encountered at depths of 2.6 and 7.7 feet below the existing ground surface.

Presence of large floating boulders is very common in these residual formations of diabase. Since deep cuts are to be made to attain the planned grades, such large boulders may be encountered during excavation for the pond.

Also ripping/blasting of dense diabase rock may have to be resorted to, to attain the planned grades, especially during the installation of the drainage condut (principal spillway).

Please refer to Plates No. 14 and 15 for sectional profiles along two (2) cross-sections.

B. Ground Water Conditions

Since five (5) of the seven (8) test holes were found dry (devoid of free water water) during and after the completion of drilling operations, presence of ground water, commonly termed as "Water Table" in conjunction with permeable strata is unlikely within the depths explored.

However, perched water or seasonally high water table conditions are a very common phenomenon in these residual soils. Such trapped water may, therefore, be encountered at random elevations, during excavations for the pond; especially if the work is undertaken during wet seasons or after prolonged periods of heavy precipitation. Water encountered at test locations SWM-6 and SWM-7 appears to be perched water of some nature. The water levels and the cave-in depths are shown on individual boring logs.

VI. GEOTECHNICAL EVALUATION

The following aspects of the design and construction were considered in evaluating the subsurface soil and water conditions on the site.

1. General engineering characteristics of the subsurface soils and potential settlement of the embankment.

2. Seepage from beneath and through the embankment.

3. Upstream and downstream slopes of the embankment.

4. Construction treatment of the dam embankment and installation of anti-seepage collars and drainage conduits.

A. Settlement

Since dense residual soils overlying weathered diabase rock, were encountered at the three (3) test locations (SWM-1, SWM-2 and SWM-3) along the dam alignment, excessive settlements of the bearing stratum, which may adversely affect the structural integrity of the embankment, are not anticipated. This, however, does not rule out marginal settlement due to primary consolidation of the embankment fill, over the life of the structure.

B. Seepage

Since the silty clays of Stratum I, IA and IIA and the dense weathered rock are almost impervious, appreciable seepage of water, impounded during the 12 hour drawdown time for the 2 year flood, is not anticipated from below the foundation of the dam.

The embankment, made up of soils of Stratum I and II, compacted as specified later, is expected to perform satisfactorily. Highly plastic silty clays (LL>45, PI>20 and SL<15) generated from the areas underlain by diabase may, however, be eliminated from the embankment fill, because of their known potential for shrinkage and swelling on changes in natural moisture and should instead be used as a liner in the areas of the pond basin where blasting or ripping of rock has to be resorted to, to attain the planned grades.

Gravel should not be used as bedding below the 9'x6' box culvert under any circumstances. The culvert section should either be installed on an impervious clay bed or on lean concrete, if weathered rock is exposed due to blasting and/or ripping during grading operations at the proposed invert elevations of the box culvert.

C. Slopes

The proposed gradients of 3H:1V for both the upstream and downstream slopes, are considered adequate for the stability of the embankment, built with the on-site soils. Any off-site borrow material, if required for use in the dam embankment, should be tested for its engineering properties, prior to use in the fill.

VII. RECOMMENDATIONS

A. Site Preparation

The design of the embankment, emergency spillway and other appurtenant structures should conform to the requirements of the Virginia Soil Conservation Service.

The following recommendations are made for the satisfactory performance of the earthwork.

1. Areas to support the dam embankment and the subsidiary embankment should be stripped of vegetation topsoil and organic contaminated soil. Additional undercut may be required to remove the root mat of mature trees.

2. After stripping and excavation of all unsuitable materials, the area may be graded. Before placement of fill, it is recommended that the site be inspected for proper stripping and preparation for receiving the fill by a soils engineer.

3. All excavation for the box culvert should be inspected and approved by the soils engineer because of the possible variations in the subsurface conditions.

4. Fill placement should be in horizontal layers 8 to 9 inches in loose thickness, compacted uniformly with heavy duty equipment.

5. Engineered fill in the body of the embankment should be compacted to a dry density of not less than ninety-five percent (95%) of maximum dry density as established by ASTM D-698 specifications. The density of the fill should be checked in each lift by a certified soil technician. The 'as compacted' water content should be controlled to within plus or minus twenty percent (±20%) of the optimum moisture content.

Since the dam embankment will also be utilized as a gravel access road for maintenance purposes, the upper 6 inches of the fill should be compacted to ninety-five percent (95%) of the standard proctor values, prior to placement of gravel, to insure satisfactory performance of the access road.

6. The on-site soils, except the highly plastic silty clays (LL>45, PI>20 and SL<15), are suitable for use in the embankment fill, subject to moisture adjustments.

For best assurance of the quality of earthwork, the site preparation should be performed under the guidance of and to the satisfaction of a soils engineer.

B. Bedding for Box Culvert

As discussed earlier, gravel should not be used as bedding below the 9'x6' box culvert. The box culvert should either be installed on an impervious compacted silty clay bedding or on a concrete 'mud mat' if weathered rock is exposed at or below the proposed invert elevations.

C. Riser Structure

The footings for the riser structure and wingwalls should be located in virgin soils of Stratum IIB (saprolite of diabase) and should be designed for an allowable bearing pressure of 4,000 PSF.

D. Construction Quality Control

Excavations for the box culvert, the riser structure and the wingwalls should be inspected by a geotechnical engineer, prior to the placement of concrete.

The placement of the embankment fill should be monitored by a certified soil technician under the overall guidance of a geotechnical engineer.

E. Inspection

All development and construction work should be performed under the inspection of the geotechnical engineer or the County Staff.

VII. CLOSING REMARKS

The recommendations contained in this report are made on the basis of the site information made available to us and the surface and subsurface data, developed at individual test locations. The test borings were spaced and the soil profiles at intermediate locations interpolated in accordance with normally accepted geotechnical practices, with the assumption that the limited number of test borings are representative of the subsoil and ground water conditions, both in the vertical and horizontal directions.

Significant variations, encountered during the development stages of the project should be brought to our notice immediately to enable us to re-evaluate our analysis and modify or revise the recommendations made in this report.

G.M.T., Inc. does not assume any responsibility for interpretation of the data presented in this report by others.

We sincerely appreciate your confidence in our services. Please do not hesitate to contact us, should you have any questions or if we can be of further assistance to you.

Respectfully submitted,

G.M.T., Incorporated

Ramesh Khanna
Principal Engineer

Ahmed Elrefai, Ph.D., P.E.
Chief Engineer

rk/lp

COMMONWEALTH OF VIRGINIA
AHMED NABIL ABDALLAH ELREFAI
No. 7598
CERTIFIED PROFESSIONAL ENGINEER

APPENDIX

VICINITY MAP

VICINITY MAP
1"=1000'

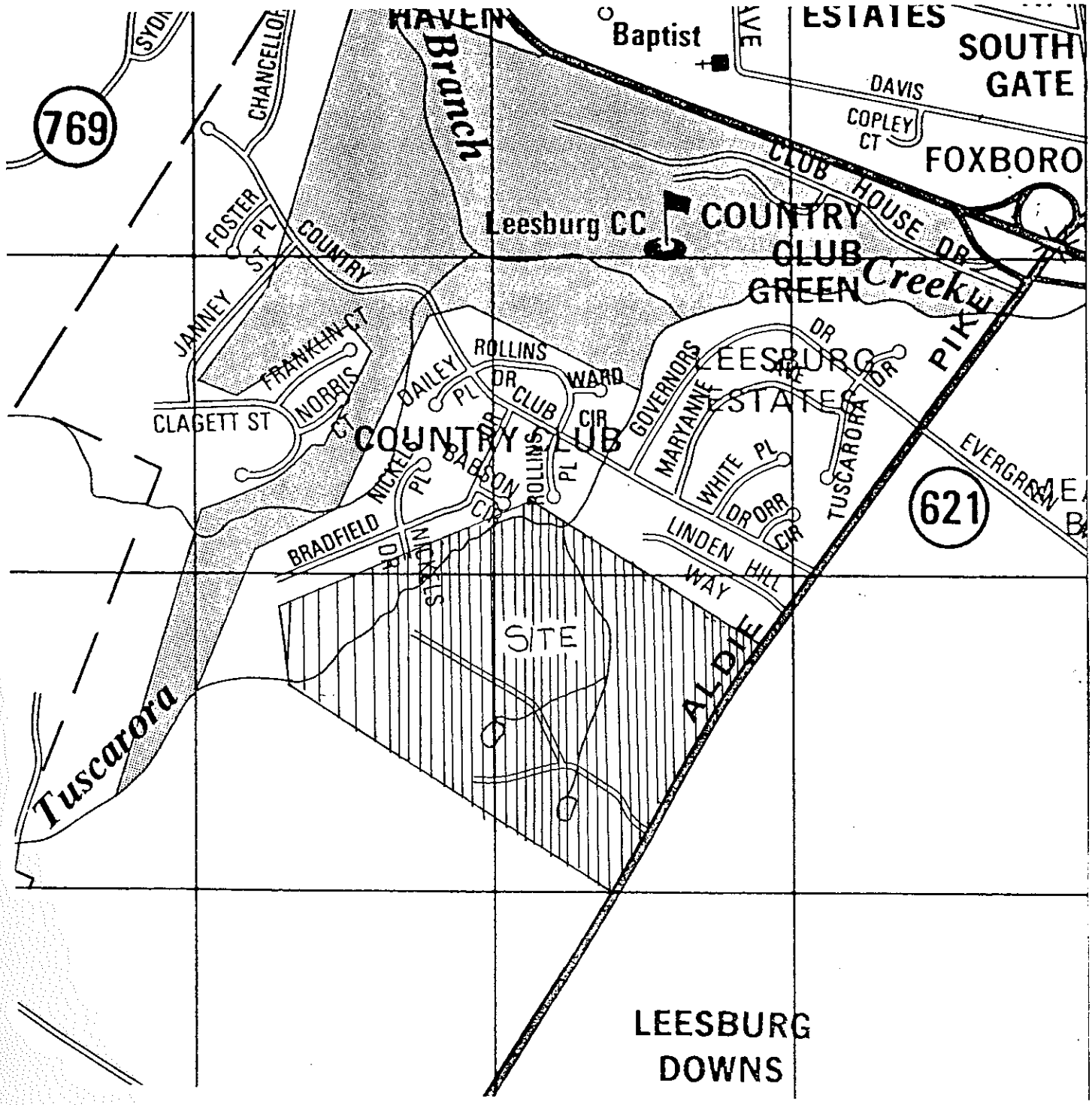


Plate No. 1

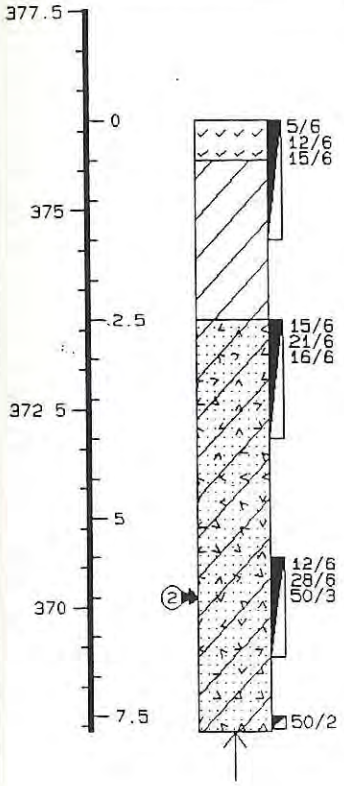
TEST LOCATION PLAN

TEST BORING LOGS

LOG OF TEST BORING

PROJECT: GREENWAY FARM - SWM POND
CLIENT: TRAFALGAR HOUSE
GROUNDWATER ENCOUNTERED AT: NONE FT.
GROUNDWATER AT COMPLETION: DRY FT.
GROUNDWATER ON 07/02/91 (24 HRS): DRY FT.
DRILLING METHOD: HOLLOW STEM AUGER

BORING NO.: SWM-1
GMTI PROJ NO.: 91-E-1046
ELEVATION: 375.13 FT.
DATE DRILLED: 07/01/91
CAVE-IN DEPTH: 6.0 FT.
SCALE: 1 INCH = 2.5 FT.



ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	NATURAL MOISTURE	LIQUID LIMIT	PLAS. INDEX	% -200 SIEVE	SPT N-VALUE
0	5/6 12/6 15/6		6" TOPSOIL	14.6				27
375		CL	ORANGE BROWN SILTY CLAY WITH SOME SAND					
2.5	15/6 21/6 16/6	CL, SC	Y.BROWN & GRAY BROWN SANDY CLAY TO CLAYEY SAND SAPROLITE OF DIABASE					37
372.5								
5	12/6 28/6 50/3							78/0.75'
370								
7.5	50/2							50/0.2'

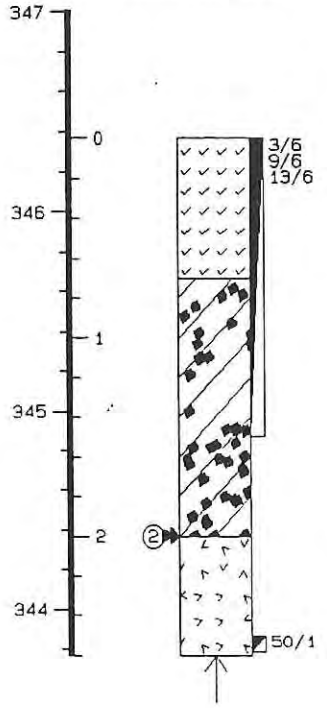
REFUSAL AT 7.7 FT.

PLATE NO. 3

LOG OF TEST BORING

PROJECT: GREENWAY FARM - SWM POND
CLIENT: TRAFALGAR HOUSE
GROUNDWATER ENCOUNTERED AT: NONE FT.
GROUNDWATER AT COMPLETION: DRY FT.
GROUNDWATER ON 07/15/91 (24 HRS): DRY FT.
DRILLING METHOD: HOLLOW STEM AUGER

BORING NO.: SWM-2
GMTI PROJ NO.: 91-E-1046
ELEVATION: 346.37 FT.
DATE DRILLED: 07/14/91
CAVE-IN DEPTH: 2.0 FT.
SCALE: 1 INCH = 1 FT.



ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	NATURAL MOISTURE	LIQUID LIMIT	PLAS. INDEX	% -200 SIEVE	SPT N-VALUE
			8" TOPSOIL	10.8				22
		CL, GC	BROWN SANDY SILTY CLAY WITH GRAVEL & COBBLES					
		SM	WEATHERED DIABASE					50/0.1'

REFUSAL AT 2.6 FT.

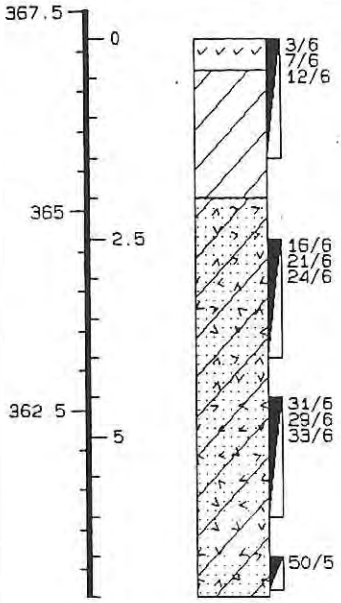
PLATE NO. 4

Geotechnical & Material Testing, Inc.

LOG OF TEST BORING

PROJECT: GREENWAY FARM - SWM POND
CLIENT: TRAFALGAR HOUSE
GROUNDWATER ENCOUNTERED AT: NONE FT.
GROUNDWATER AT COMPLETION: DRY FT.
GROUNDWATER ON 07/15/91 (24 HRS): DRY FT.
DRILLING METHOD: HOLLOW STEM AUGER

BORING NO.: SWM-3
GMTI PROJ NO.: 91-E-1046
ELEVATION: 367.17 FT.
DATE DRILLED: 07/14/91
CAVE-IN DEPTH: N/A FT.
SCALE: 1 INCH = 2.5 FT.



ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	NATURAL MOISTURE	LIQUID LIMIT	PLAS. INDEX	% -200 SIEVE	SPT N-VALUE
			5" TOPSOIL					19
		CL	ORANGE BROWN SILTY CLAY WITH SOME SAND					
		SC	Y.BROWN & GRAY BROWN CLAYEY SAND W/TR. DIABASE SAPROLITE OF DIABASE	9.0	23	8	38.4	45
								62
								50/0.4'

BOTTOM OF BORING AT 6.9 FT.

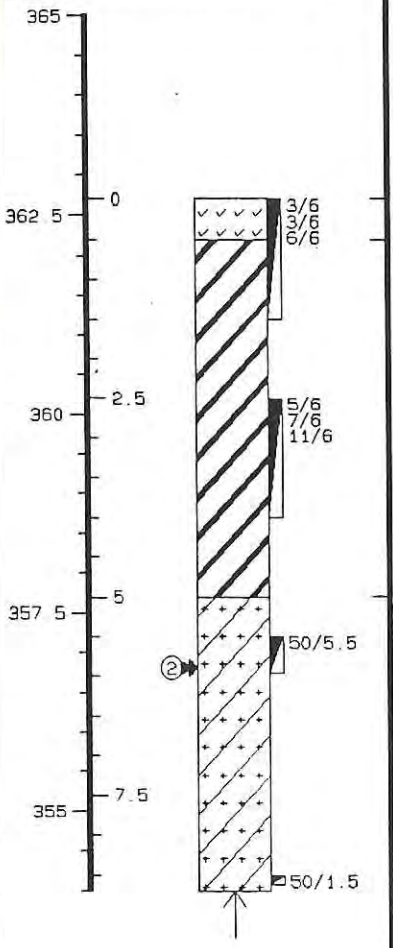
PLATE NO. 5

Geotechnical & Material Testing, Inc.

LOG OF TEST BORING

PROJECT: GREENWAY FARM - SWM POND
CLIENT: TRAFALGAR HOUSE
GROUNDWATER ENCOUNTERED AT: NONE FT.
GROUNDWATER AT COMPLETION: DRY FT.
GROUNDWATER ON 06/27/91 (24 HRS): DRY FT.
DRILLING METHOD: HOLLOW STEM AUGER

BORING NO.: SWM-4
GMTI PROJ NO.: 91-E-1046
ELEVATION: 362.70 FT.
DATE DRILLED: 06/26/91
CAVE-IN DEPTH: 5.9 FT.
SCALE: 1 INCH = 2.5 FT.



ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	NATURAL MOISTURE	LIQUID LIMIT	PLAS. INDEX	% -200 SIEVE	SPT N-VALUE
0			6" TOPSOIL					9
		CL. CH	GRAY BROWN SILTY CLAY (MED.-HIGH PLASTICITY) WITH TRACE SAND	31.4				18
5		CL. SC	L.BROWN & GRAY SANDY SILTY CLAY W/TR HORNFELS SAPROLITE OF HORNFELS					50/0.5'
								50/0.2'

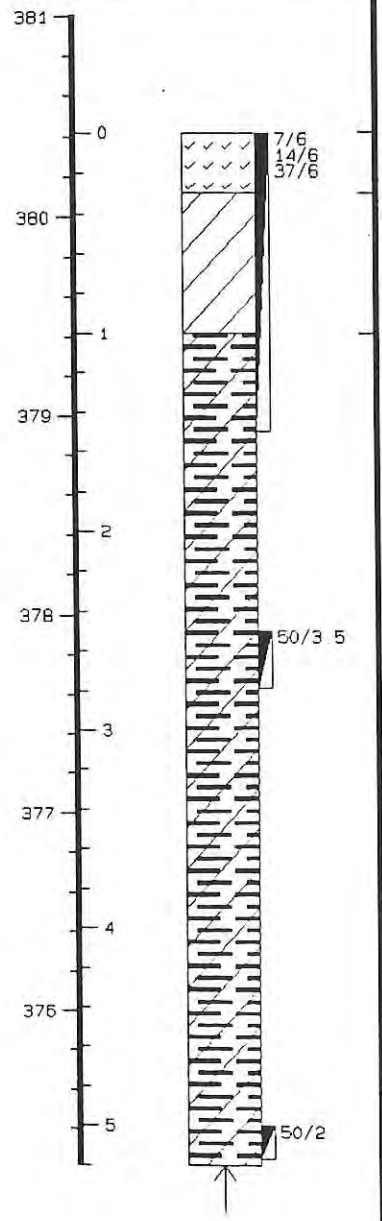
REFUSAL AT 8.6 FT.

PLATE NO. 6

LOG OF TEST BORING

PROJECT: GREENWAY FARM - SWM POND
CLIENT: TRAFALGAR HOUSE
GROUNDWATER ENCOUNTERED AT: NONE FT.
GROUNDWATER AT COMPLETION: DRY FT.
GROUNDWATER ON 07/03/91 (24 HRS): DRY FT.
DRILLING METHOD: HOLLOW STEM AUGER

BORING NO.: SWM-5
GMTI PROJ NO.: 91-E-1046
ELEVATION: 380.42 FT.
DATE DRILLED: 07/02/91
CAVE-IN DEPTH: N/A FT.
SCALE: 1 INCH = 1 FT.



ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	NATURAL MOISTURE	LIQUID LIMIT	PLAS. INDEX	% -200 SIEVE	SPT N-VALUE
			4" TOPSOIL	8.1				51
		CL	RED BROWN SILTY CLAY WITH LITTLE SAND					
		CL, SC	RED BROWN SILTY CLAY AND SILTSTONE FRAGMENTS SAPROLITE OF SILTSTONE					50/0.3'
								50/0.2'

REFUSAL AT 5.1 FT.

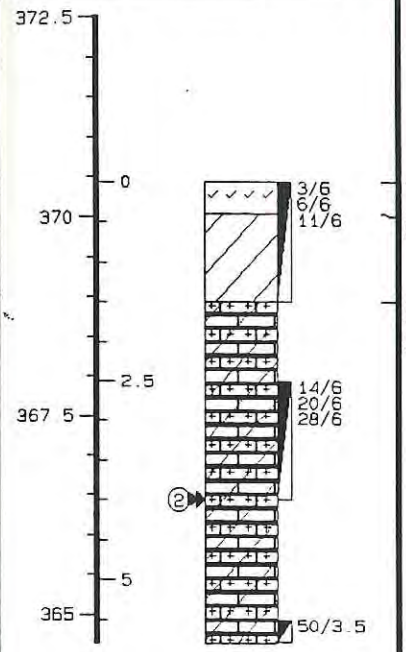
PLATE NO. 7

Geotechnical & Material Testing, Inc.

LOG OF TEST BORING

PROJECT: GREENWAY FARM - SWM POND
CLIENT: TRAFALGAR HOUSE
GROUNDWATER ENCOUNTERED AT: NONE FT.
GROUNDWATER AT COMPLETION: DRY FT.
GROUNDWATER ON 06/27/91 (24 HRS): DRY FT.
DRILLING METHOD: HOLLOW STEM AUGER

BORING NO.: SWM-6
GMTI PROJ NO.: 91-E-1046
ELEVATION: 370.44 FT.
DATE DRILLED: 06/26/91
CAVE-IN DEPTH: 4.0 FT.
SCALE: 1 INCH = 2.5 FT.



ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	NATURAL MOISTURE	LIQUID LIMIT	PLAS. INDEX	% -200 SIEVE	SPT N-VALUE
0	3/6		5" TOPSOIL	13.4				17
370	6/6 11/6	CL	BROWN SILTY CLAY WITH LITTLE SAND					
2.5		CL, SC	R.BROWN SILTY CLAY W/SAND SAPROLITE OF HORNFELS (LIMESTONE CONGLOMERATE)					48
367 5	14/6 20/6 28/6							
5								
365	50/3.5							50/0.3'

BOTTOM OF BORING AT 5.8 FT.

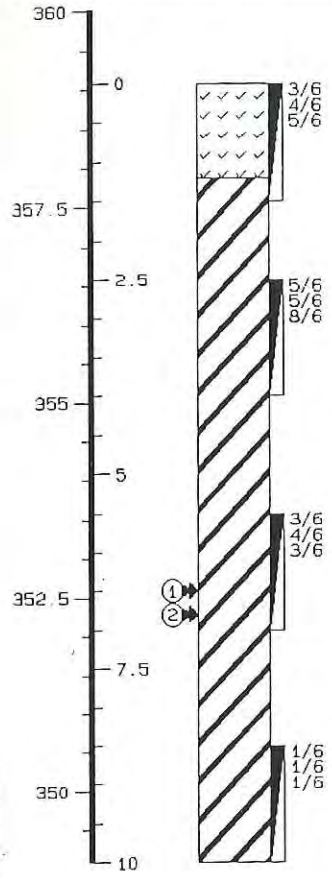
PLATE NO. 8

Geotechnical & Material Testing, Inc.

LOG OF TEST BORING

PROJECT: GREENWAY FARM - SWM POND
CLIENT: TRAFALGAR HOUSE
GROUNDWATER ENCOUNTERED AT: NONE FT.
GROUNDWATER AT COMPLETION: DRY FT.
GROUNDWATER ON 07/02/91 (24 HRS): 6.5 FT.
DRILLING METHOD: HOLLOW STEM AUGER

BORING NO.: SWM-7
GMTI PROJ NO.: 91-E-1046
ELEVATION: 359.09 FT.
DATE DRILLED: 07/01/91
CAVE-IN DEPTH: 6.8 FT.
SCALE: 1 INCH = 2.5 FT.



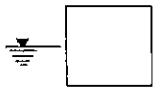
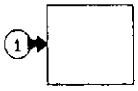
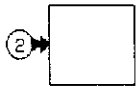
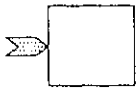
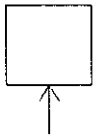
ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	NATURAL MOISTURE	LIQUID LIMIT	PLAS. INDEX	% -200 SIEVE	SPT N-VALUE
			14" TOPSOIL					9
		CL/CH	GRAY BROWN SILTY CLAY (MED.-HIGH PLASTICITY) WITH TRACE SAND	21.8	51	25	83.7	13
								7
								2

BOTTOM OF BORING AT 10.0 FT.

PLATE NO. 9

Geotechnical & Material Testing, Inc.

Legend:

Symbol:	Description:	Symbol:	Description:
	6" TOPSOIL		ORANGE BROWN SILTY CLAY WITH SOME SAND
	Y.BROWN & GRAY BROWN SANDY CLAY TO CLAYEY SAND SAPROLITE OF DIABASE		
	BROWN SANDY SILTY CLAY WITH GRAVEL & COBBLES		WEATHERED DIABASE
	GRAY BROWN SILTY CLAY (MED.-HIGH PLASTICITY) WITH TRACE SAND		L.BROWN & GRAY SANDY SILTY CLAY W/TR HORNFELS SAPROLITE OF HORNFELS
	RED BROWN SILTY CLAY AND SILTSTONE FRAGMENTS SAPROLITE OF SILTSTONE		
	R.BROWN SILTY CLAY W/SAND SAPROLITE OF HORNFELS (LIMESTONE CONGLOMERATE)		
	Standard penetration test. 140 lb. hammer dropped 30"		WATER ENCOUNTERED AT
	DEPTH TO GROUNDWATER AFTER 24 HOURS		DEPTH OF CAVE-IN
	DEPTH OF WATER AT COMPLETION		REFUSAL OF BORING

Notes:

1. Exploratory borings were drilled between June 26 & July 14, 1991 using hollow stem augers.
2. Free water was encountered during and at the completion of drilling.
3. Boring locations were proposed by GMTI & staked by the civil engineer.
4. The specific soil conditions encountered at the individual borings are indicated on the Boring Logs. The stratification of soil profile represents the approximate boundaries between the different layers. In-situ the transition may be gradual.
5. Refusal at the surface of rock, boulder, or obstruction is defined as a

Notes:

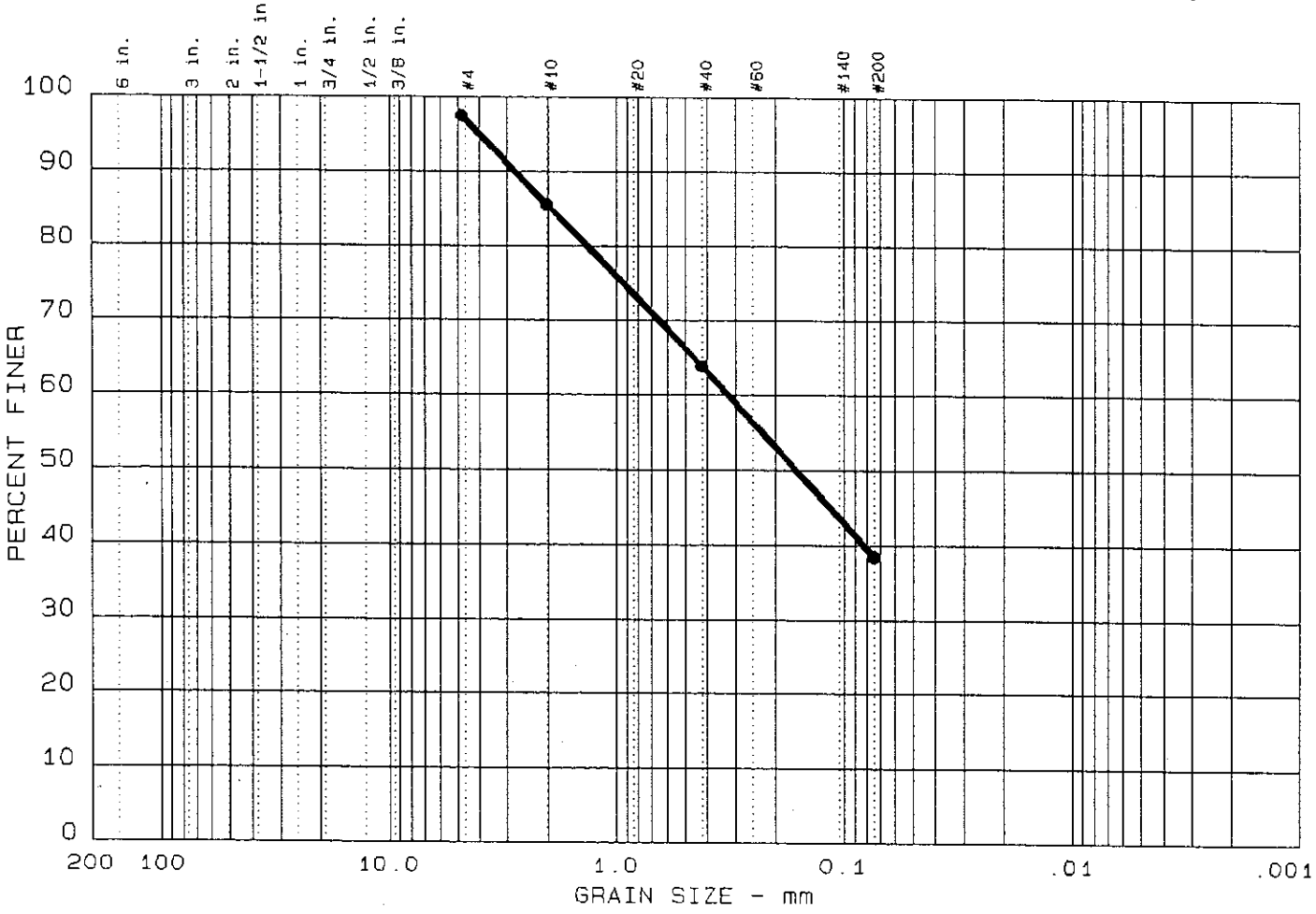
penetration resistance of 100 blows for 2 inches penetration or less.

6. Results of tests conducted on samples recovered are reported on the logs. Abbreviations used are:

DD = natural dry density (pcf)	LL = Liquid limit
NMC = natural moisture content (%)	PI = Plasticity index
UC = Unconfined compression (tsf)	pH = soil pH (%)
-200 = percent passing #200 sieve (%)	SS = Soluable sulfates
SR = Soil resistivity (ohm-cm)	N/A = not available
MDD = Maximum Dry Density (pcf)	OMC = Optimum Moisture content (%)

GRAIN-SIZE DISTRIBUTION CURVES

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	15	0.0	2.6	59.0	38.4	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	23	8	1.91	0.32	0.16					

MATERIAL DESCRIPTION	USCS	AASHTO
● GRAY BROWN CLAYEY SAND WITH TRACE GRAVEL	SC	

Project No.: 91-E-1046
Project: GREENWAY FARM - SWM POND
● Location: L.B.ND. 8698

Date: 7-25-91

Remarks:

SOURCE:

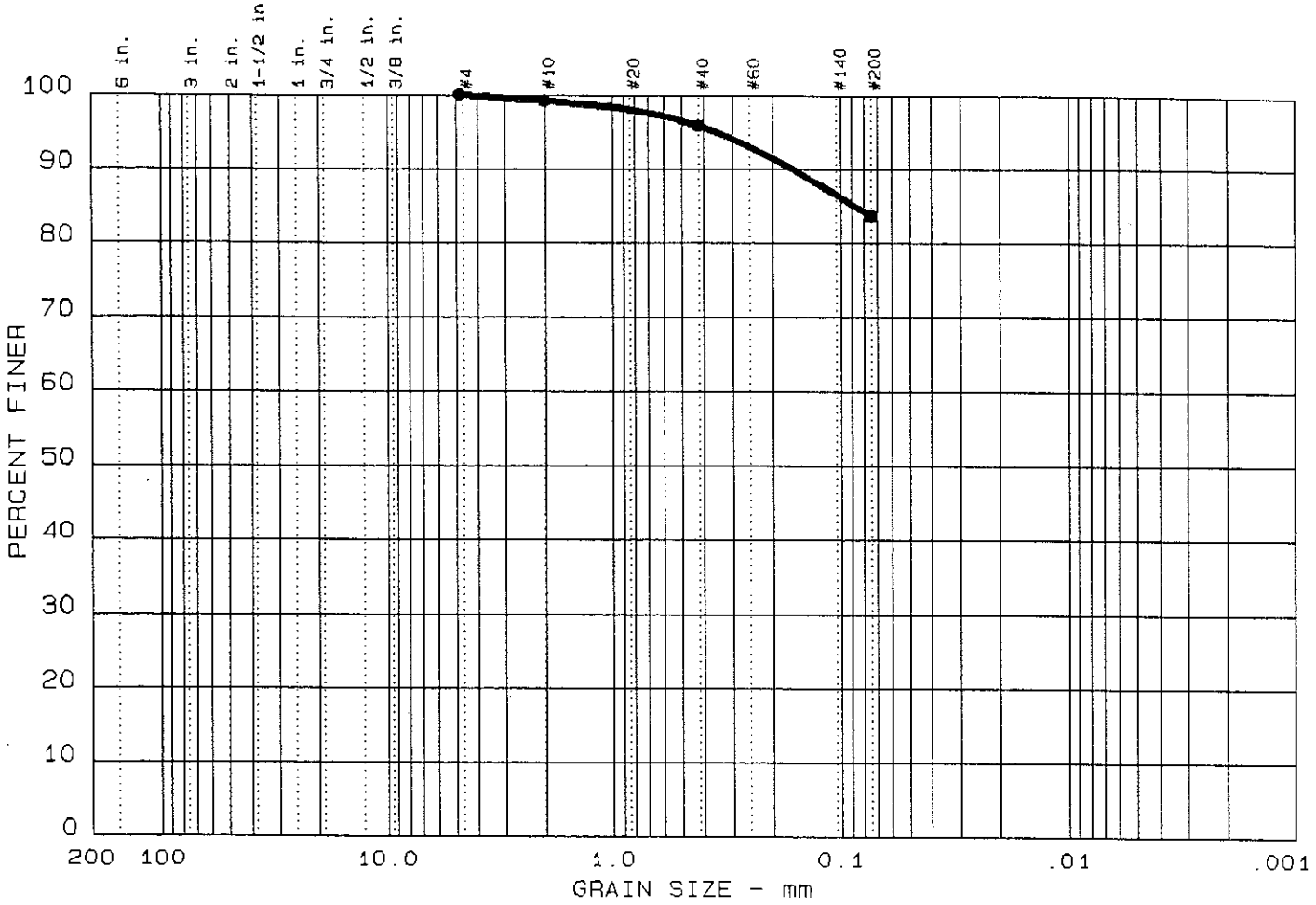
SWM-3, S-2

GRAIN SIZE DISTRIBUTION TEST REPORT

GMT, Inc.

Plate No. 12

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
●	7	0.0	0.0	16.3	83.7	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	51	25	0.09							

MATERIAL DESCRIPTION	USCS	AASHTO
● DK/GRAY-BR. HIGH PLASTICITY CLAY W/LITTLE SAND	CH	

Project No.: 91-E-1046
Project: GREENWAY FARM
● Location: L.B.ND. 91-E-1046

Date: 7-12-91

Remarks:

SOURCE:

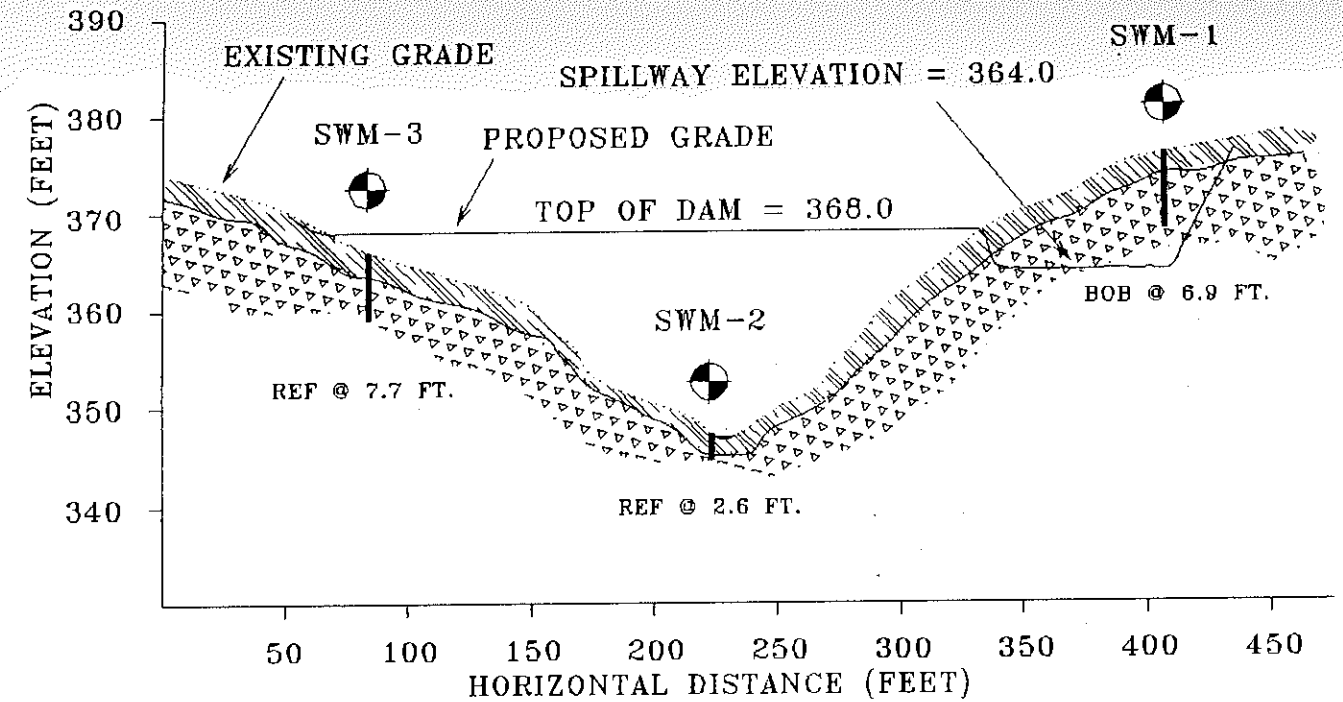
SWM-7, S-2

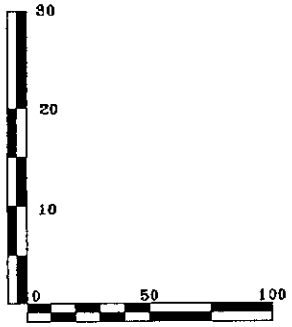
GRAIN SIZE DISTRIBUTION TEST REPORT

GMT, Inc.

Plate No. 13

CROSS-SECTIONAL PROFILES





STRATUM IB [DERIVED FROM DIABASE]

BROWN & Y.BROWN SANDY SILTY CLAY (MEDIUM - HIGH PLASTICITY) (CL, CH)

STRATUM IIB [DERIVED FROM DIABASE]

Y.BROWN & BROWN SANDY CLAY TO CLAYEY SAND TO SILTY SAND (CL, SC, SM)
SAPROLITE OF DIABASE

This profile has been extrapolated from the data developed at the individual test locations and is, therefore, not necessarily reflective of the actual subsoil & groundwater conditions at intermediate locations

VERTICAL EXAGGERATION = 4x

Plate No. 14

GMTI PROJECT NO: 91-E-1046

Geotechnical & Material Testing, Inc.
13944-B Willard Road, Chantilly, VA 22021
Phone: 703-631-2050 FAX: 703-968-2930

GREENWAY FARM

STORMWATER MANAGEMENT POND

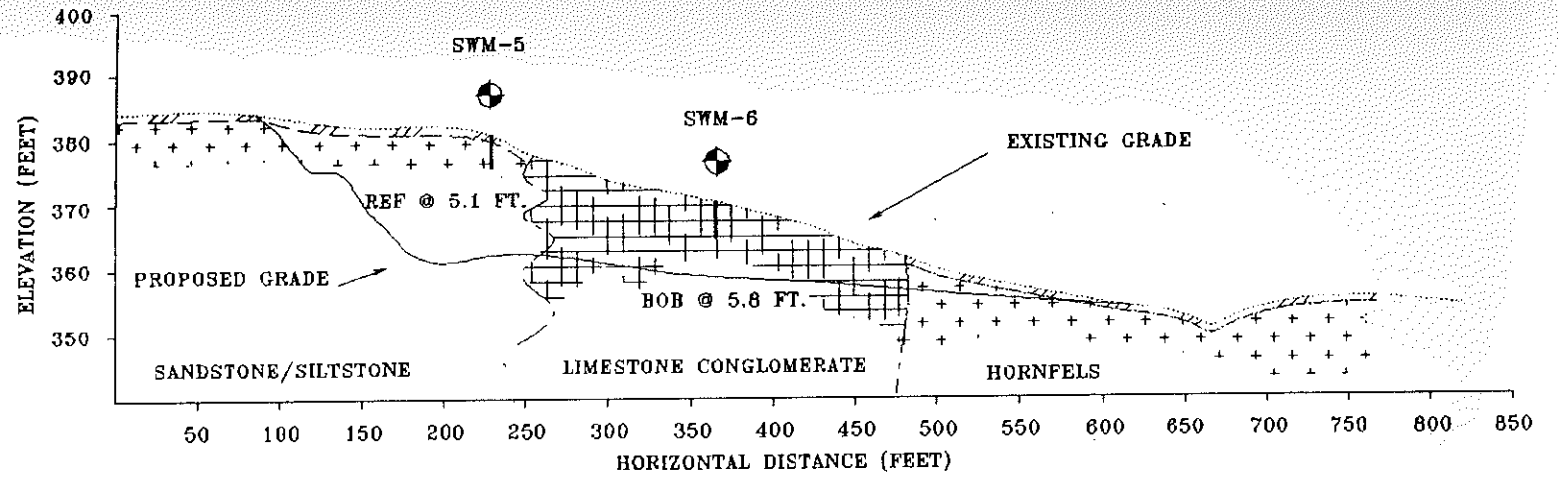
CROSS-SECTION E-E'

P.E.: AE | CREW CHIEF: MF

DATE OF INVESTIGATION: 7/91

SCALE: HORIZONTAL: VERTICAL:

DRAWN BY: JSX | DATE: 7/31/91



STRATUM I [LIMESTONE CONGLOMERATE]

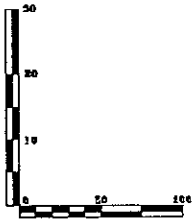
Y.BROWN & R.BROWN SANDY CLAY TO CLAYEY SAND WITH TRACE TO SOME GRAVEL SAPROLITE OF LIMESTONE CONGLOMERATE (CL, CH, SC)

STRATUM IA [DERIVED FROM HORNFELS (METAMORPHOSED LIMESTONE CONGLOMERATE)]

BROWN SILTY CLAY (MEDIUM - HIGH PLASTICITY) WITH TRACE SAND (CL, CH)

STRATUM IIA [DERIVED FROM HORNFELS (METAMORPHOSED LIMESTONE CONGLOMERATE)]

GRAY BROWN CLAYEY SAND TO SANDY CLAY - SAPROLITE OF HORNFELS (CL,SC)



This profile has been extrapolated from the data developed at the individual test locations and is, therefore, not necessarily reflective of the actual subsoil & groundwater conditions at intermediate locations

VERTICAL EXAGGERATION = 4x

GMTI PROJECT NO: 91-E-1046

Geotechnical & Material Testing, Inc.
13944-B Willard Road, Chantilly, VA 22021
Phone: 703-631-2050 FAX: 703-968-2930

GREENWAY FARM

STORMWATER MANAGEMENT POND

CROSS-SECTION F-F'

P.E.: AE	CREW CHIEF: MF
DATE OF INVESTIGATION: 7/91	
SCALE: HORIZONTAL: VERTICAL:	
DRAWN BY: JJK	DATE: 7/31/91

Plate No. 15

GREENWAY FARM: REGIONAL POND – PRELIMINARY DESIGN DATA SUMMARY

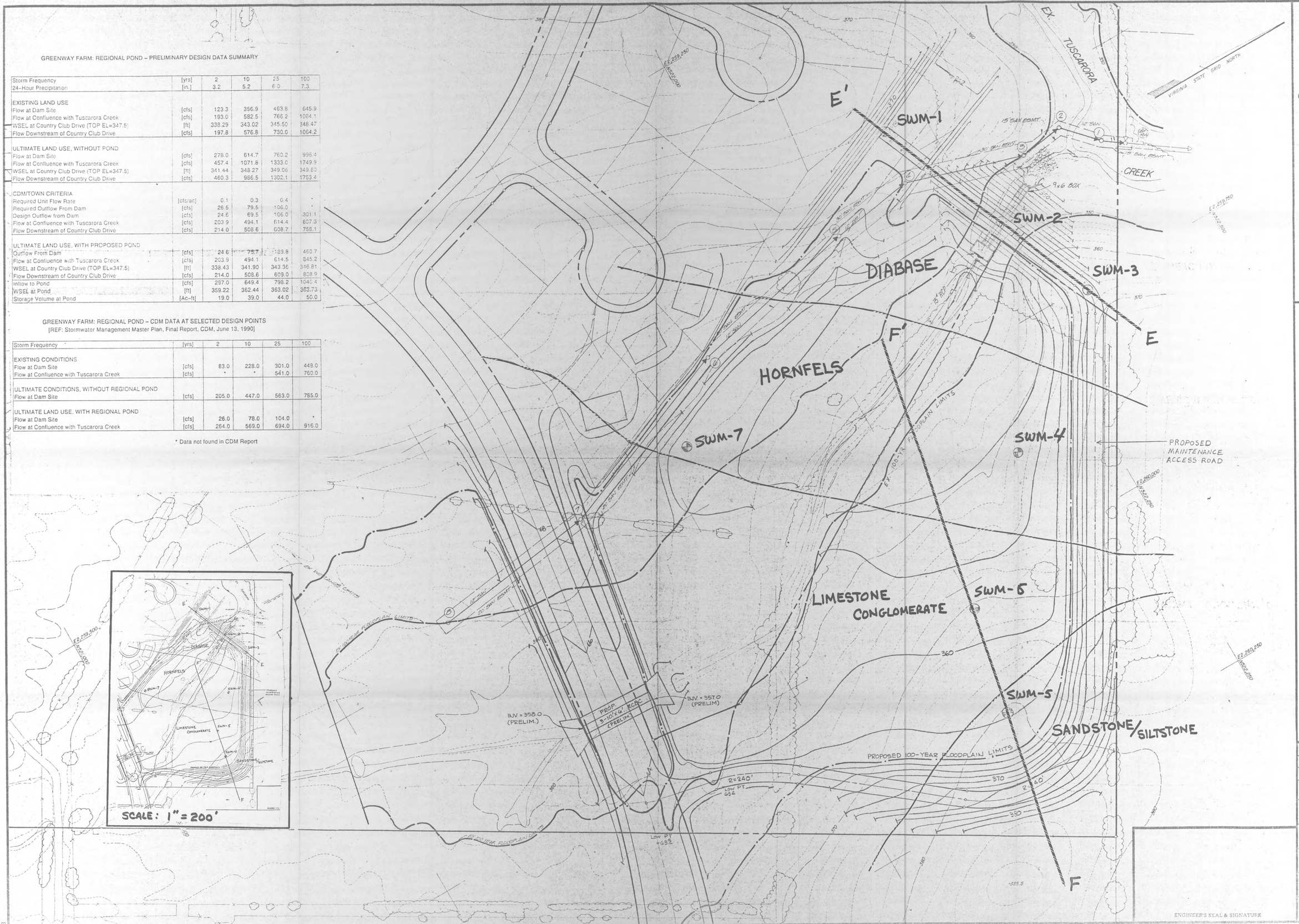
Storm Frequency	[yrs]	2	10	25	100
24-Hour Precipitation	[in.]	3.2	5.2	6.0	7.3
EXISTING LAND USE					
Flow at Dam Site	[cfs]	123.3	356.9	463.8	645.9
Flow at Confluence with Tuscarora Creek	[cfs]	193.0	582.5	766.2	1084.1
WSEL at Country Club Drive (TOP EL=347.5)	[ft]	338.29	343.02	345.50	348.47
Flow Downstream of Country Club Drive	[cfs]	197.8	576.8	730.0	1064.2
ULTIMATE LAND USE, WITHOUT POND					
Flow at Dam Site	[cfs]	278.0	614.7	760.2	996.4
Flow at Confluence with Tuscarora Creek	[cfs]	457.4	1071.8	1333.0	1749.9
WSEL at Country Club Drive (TOP EL=347.5)	[ft]	341.44	348.27	349.06	349.80
Flow Downstream of Country Club Drive	[cfs]	460.3	986.5	1302.1	1753.4
CDM/TOWN CRITERIA					
Required Unit Flow Rate	[cfs/ac]	0.1	0.3	0.4	*
Required Outflow From Dam	[cfs]	26.5	79.5	106.0	*
Design Outflow from Dam	[cfs]	24.6	69.5	106.0	301.1
Flow at Confluence with Tuscarora Creek	[cfs]	203.9	494.1	614.4	807.3
Flow Downstream of Country Club Drive	[cfs]	214.0	508.6	608.7	758.1
ULTIMATE LAND USE, WITH PROPOSED POND					
Outflow From Dam	[cfs]	24.6	75.7	189.8	460.7
Flow at Confluence with Tuscarora Creek	[cfs]	203.9	494.1	614.5	845.2
WSEL at Country Club Drive (TOP EL=347.5)	[ft]	338.43	341.90	343.36	346.81
Flow Downstream of Country Club Drive	[cfs]	214.0	508.6	609.0	809.9
Inflow to Pond	[cfs]	297.0	649.4	798.2	1040.4
WSEL at Pond	[ft]	359.22	362.44	363.02	363.73
Storage Volume at Pond	[Ac-ft]	19.0	39.0	44.0	50.0

GREENWAY FARM: REGIONAL POND – CDM DATA AT SELECTED DESIGN POINTS

[REF: Stormwater Management Master Plan, Final Report, CDM, June 13, 1990]

Storm Frequency	[yrs]	2	10	25	100
EXISTING CONDITIONS					
Flow at Dam Site	[cfs]	83.0	228.0	301.0	448.0
Flow at Confluence with Tuscarora Creek	[cfs]	*	*	541.0	760.0
ULTIMATE CONDITIONS, WITHOUT REGIONAL POND					
Flow at Dam Site	[cfs]	205.0	447.0	563.0	785.0
ULTIMATE LAND USE, WITH REGIONAL POND					
Flow at Dam Site	[cfs]	26.0	78.0	104.0	*
Flow at Confluence with Tuscarora Creek	[cfs]	264.0	569.0	694.0	916.0

* Data not found in CDM Report



Dewberry & Davis
Architects Engineers Planners Surveyors
8401 Arlington Blvd., Fairfax, VA 22031
☎ 703 849-0100

GREENWAY FARM REGIONAL POND PRELIMINARY DESIGN

Drawn By	JEC
Designed By	OY
Checked By	GLC
Date	SEPT. 1990
Scale	1"=50'
Plan Number	
Zoned	
Sheet	— of —
File Number	M-8083

ENGINEER'S SEAL & SIGNATURE