

**Stafford County**  
 Department of Public Works  
 Residential Soils Report Form

APPLICANT NAME: Masabianca Enterprises DATE: March 2, 2016  
 SITE ADDRESS: 306 Inlandside Cove TAX MAP, LOT AND PARCEL: \_\_\_\_\_  
 NAME OF SUBDIVISION: \_\_\_\_\_ BUILDING/ STRUCTURE TYPE: \_\_\_\_\_

**SOIL TEST RESULTS**

GEO TECHNICAL COMPANY NAME: Alexcom Assoc. PHONE #: 540-311-3157  
 EXPLORATION METHOD USED: ASTM D421-98 NUMBER OF TESTS PERFORMED: 1  
 LOCATION(S) OF TEST METHODS ON: Bore Location Plan  
 WHERE THE TESTS PERFORMED IN THE SAME LOCATION OF THE PROPOSED STRUCTURE?:  YES  NO  
 WHAT DEPTH WAS ACHIEVED WITH THE TEST METHOD (IF APPLICABLE): 48"  
 IS THE PROPOSED LOCATION A FILL AREA?:  YES  NO  
 WAS GROUNDWATER ENCOUNTERED?:  YES  NO  
 AT WHAT DEPTH WAS GROUNDWATER ENCOUNTERED? \_\_\_\_\_ 24 HR WATER TABLE IF KNOWN \_\_\_\_\_  
 UNIFIED SOIL CLASSIFICATION ENCOUNTERED/ AT DEPTH (WORST CASE):

_____ GW _____ DEPTH	_____ GM _____ DEPTH	_____ SC _____ DEPTH
_____ GP _____ DEPTH	_____ GC _____ DEPTH	<input checked="" type="checkbox"/> MH <u>48" DEPTH - log #2</u>
_____ SW _____ DEPTH	_____ SM _____ DEPTH	<input checked="" type="checkbox"/> ML-CL <u>48" DEPTH</u>
_____ SP _____ DEPTH	_____ SM-SC _____ DEPTH	<u>Bore log #4</u>
	_____ MI _____ DEPTH	

ALLOWABLE BEARING (PSF) 2,000 > B2 Sample  
1,500 > B4 Sample  
 EQUIVALENT FLUID PRESSURE (PSF) \* Note - B2  
45lb - B4

SPECIFY OTHER SOIL TYPE IF NOT LISTED ABOVE: \* Note: Sample B2 is MH soil and is not suitable for backfill. USE #57 stone or approved offsite material for backfill.  
 ACID SOILS: 5.1 (B-2) NONE 5.0 pH LEVEL Attach (sealed) remediation plan to this form if the PH is potentially detrimental. backfill  
 (B-4)  
 THE SITE IS FREE OF EVIDENCE OF SULFIDE SOIL IN ACCORDANCE WITH THE STAFFORD COUNTY SOILS POLICY  YES  NO

SHRINK SWELL TEST INDICATES (POTENTIAL):  NONE  LOW  
 SWELL INDEX PRESSURE: \_\_\_\_\_ MODERATE  HIGH

Linear Shrinkage: 19.7%

Sealing of this document certifies that all information submitted is accurate and that the engineer of record performed/ supervised all soil sampling, testing, evaluation and execution of this report.



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BASED ON THE SOIL TEST RESULTS (CHECK APPROPRIATE):

The foundation design indicated on the construction drawings meet/exceed the requirements set forth in the Uniform Statewide Building Code and the International Residential Code 2006 edition. (designer/contractor must complete checklist "A" and seal each applicable page of this document).

Because the soil conditions are beyond the parameters outlined in the USBC/IRC the proposed construction requires an engineered foundation design. (engineer must complete checklist "B" and seal each applicable page of this document).

**CHECKLIST A**

THIS SECTION MUST BE COMPLETED WHEN CONSTRUCTION PLANS MEET OR EXCEED THE PRESCRIPTIVE CODE REQUIREMENTS AS RELATED TO THE FINDINGS OF THE SOILS ANALYSIS. THE CONSTRUCTION PLANS MUST ACCOUNT FOR ALL CONSIDERATIONS IN THE CHECKLIST BELOW. (CHECK WHERE APPROPRIATE):

DESIGN LOAD BEARING FOR:

PERIMETER FOUNDATION FOOTINGS

SLAB

INTERMEDIATE AND PIER FOOTINGS

WALL THICKNESS

(FOR LATERAL EARTH PRESSURE AND UNBALANCED SOIL LOAD)

FOOTING DEPTH

FOOTING WIDTH

MONOLITHIC/TURN DOWN SLAB DESIGN

WALL CONSTRUCTION  
REINFORCEMENT

FOOTING WIDTH

FOOTING THICKNESS

PROJECTION

PIER SIZE

PIER HEIGHT

SLAB THICKNESS

FROST DEPTH

DESIGN FOR USBC  
602.10.6

IT IS IMPORTANT THAT WHEN USING THIS OPTION THAT ALL NOTES AND DETAILS ON THE CONSTRUCTION DRAWINGS CLEARLY CORRESPOND WITH SOILS ANALYSIS AS THEY RELATE TO USBC/IRC REQUIREMENTS. REQUIREMENTS WITHIN THE IRC/USBC ARE NOT LIMITED TO THE ABOVE LISTED CRITERIA.

I HAVE REVIEWED THE CONSTRUCTION DRAWINGS AND FIND THAT THEY SATISFY THE REQUIREMENTS WITHIN THE VIRGINIA UNIFORM STATEWIDE BUILDING CODE.

DESIGNER/ CONTRACTOR: \_\_\_\_\_

Stafford County  
Department of Public Works  
Residential Soils Report Form

CHECKLIST B

THIS SECTION MUST BE COMPLETED WHEN AN ENGINEERED FOUNDATION IS REQUIRED. IT IS IMPORTANT THAT THE ENGINEERED FOUNDATION SYSTEM ACCOUNTS FOR ALL OF THE LISTED CRITERIA BELOW.

THE ENGINEERED FOUNDATION SYSTEM IS:  INCORPORATED IN THE CONSTRUCTION DRAWINGS  
 DETAILED AS AN ATTACHMENT

THE PROPOSED FOUNDATION DESIGN ACCOUNTS FOR ALL OF THE FOLLOWING FACTORS AND CONSIDERATIONS:

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> EXPANSIVE SOIL                       | <input checked="" type="checkbox"/> SLAB DESIGN                       |
| <input checked="" type="checkbox"/> HIGH WATER TABLE                     | <input checked="" type="checkbox"/> SLAB REINFORCEMENT                |
| <input checked="" type="checkbox"/> EXISTING FILL                        | <input checked="" type="checkbox"/> FOOTING REINFORCEMENT             |
| <input checked="" type="checkbox"/> ENGINEERED FILL                      | <input checked="" type="checkbox"/> SURCHARGE FROM SLOPE OR IMBALANCE |
| <input checked="" type="checkbox"/> SWELL INDEX PRESSURE                 | UPLIFT DESIGN FOR   |
| <input checked="" type="checkbox"/> BEARING CAPACITY OF SOIL             | <input checked="" type="checkbox"/> FOOTING                           |
| LATERAL PRESSURE ON:   | <input checked="" type="checkbox"/> WALL                              |
| <input checked="" type="checkbox"/> FOOTING                              | <input checked="" type="checkbox"/> SLAB                              |
| <input checked="" type="checkbox"/> WALLS                                | <input checked="" type="checkbox"/> PIERS                             |
| <input checked="" type="checkbox"/> PIERS                                | <input checked="" type="checkbox"/> FOOTING REINFORCEMENT             |
| <input checked="" type="checkbox"/> FOOTING DEPTH                        | <input checked="" type="checkbox"/> PIER HEIGHT                       |
| <input checked="" type="checkbox"/> FOOTING THICKNESS                    | <input checked="" type="checkbox"/> PIER SIZE                         |
| <input checked="" type="checkbox"/> FOOTING WIDTH                        | <input checked="" type="checkbox"/> SLAB THICKNESS <i>Suspended</i>   |
| <input checked="" type="checkbox"/> WALL THICKNESS                       | <input checked="" type="checkbox"/> MONOLITHIC SLAB DESIGN            |
| <input checked="" type="checkbox"/> WALL REINFORCEMENT (AND ORIENTATION) | <input type="checkbox"/> COMPLETE BACKFILL SHEET IF APPLICABLE        |



Sealing of this document certifies that all information submitted is accurate and that the engineer of record performed/ supervised all soil sampling, testing, evaluation and execution of this report.

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Certain soil types and conditions are not outlined in the International Residential Code (non-prescriptive). If native (on site) soils are deemed unsuitable for backfill against foundation walls or for footing support the contractor, in coordination with the soils engineer, may choose to utilize borrowed or engineered fill material. When this is the case, a registered design professional shall oversee and certify all borrowed or engineered fill. This form must be completed, sealed and on site for inspection prior to final inspection. Please check all applicable items.

The proposed construction is to be placed on a fill pad. (Please attach approved engineered pad certification with this form).

The proposed construction is on a site composed of expansive soils.

The proposed construction is on a site composed of soils with bearing capability less than that which is specified in the construction drawings.

Other condition that can not satisfy the requirements within the IRC International Residential Code (please explain):

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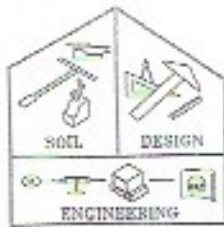
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Sealing this document certifies that all soil on site is suitable for the proposed construction as specified on the construction drawings. This includes all undisturbed soil to support footings, backfill against foundation walls, borrowed fill and fill sites.

ENGINEERS SEAL
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## AlexCom & Associates, Inc.

11 Debruen Lane  
Fredericksburg, Virginia 22405  
Tel: (540) 371-3157 Fax: (540) 371-7920  
Email: alexcom@vacoxmail.com

March 1, 2016

Casablanca Enterprises  
1033 Isabella Drive  
Stafford, VA. 22554

Reference: 306 Ironside Cove  
Shrink Swell Soil Investigation  
Stafford County, Virginia  
AlexCom Project # 150830

To Whom It May Concern:

### Purpose:

As per your request, AlexCom & Associates performed a shrink/swell soil investigation of the above referenced lot in Stafford County, Virginia. The investigation was conducted in a manner that would allow for determination of problematic soil conditions such as bearing capacity, high water table indicators, and potential shrink/swell soils.

### Procedure:

The investigation, which was performed in accordance with the Stafford County Soil Testing Policy, included the evaluation of auger borings at opposite corners of the proposed structure. The locations were determined from client provided stakes or approximated from available information utilizing topographical interpretation along with taping and pacing techniques.

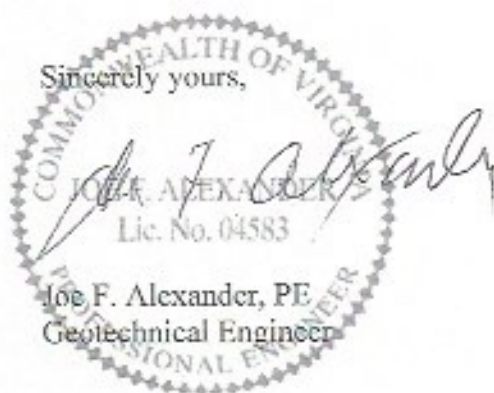
Based upon a client provided site plan or typical construction practice, the borings were extended to a depth of at least two feet (2') beyond anticipated footing elevation unless auger refusal occurred. Encountered soil horizons were visually categorized and logged utilizing the Unified Soils Classification System (USCS) with additional notes regarding any soft, moist, or unsuitable soils. The presence and depth of encountered subsurface water was estimated during excavation. Unless denoted by a laboratory number, the soil horizon descriptions and classifications contained in the boring logs are based upon visual observation by a Soil Technician. The soil bearing capacity was determined as the boring was advanced based upon auger resistance and use of a "T" bar probe when required.

A sample of the soil deemed to have the greatest potential for expansive behavior at or below footing depth was taken for laboratory analysis of its grain size distribution, Atterberg Limits, and linear shrinkage. The shrinkage test was performed in accordance with ASTM D427 and the USCS Classification was based on Atterberg Limits conducted in accordance with ASTM D4318 and ASTM D2487.

Limitations / Conditions:

The results of this investigation may be substantially influenced by the accuracy of provided information. In situations where a site plan is not provided and/or the house corners have not been staked, it should be understood that it is the client's responsibility to contact AlexCom if the field conditions differ from those presented in this investigation. Groundwater elevations are highly variable and it is possible that the elevation or presence of moisture seepage encountered during excavation may vary from those indicated in this report. The results and recommendations provided in this report do not reflect variations in subsurface conditions or in unexplored portions of the site. If changes to the location, elevation, or foundation type of the home occur after the initial data for this investigation has been obtained, then the results should not be considered valid until AlexCom & Associates has been provided an opportunity to review the changes and, if necessary, modify the recommendations.

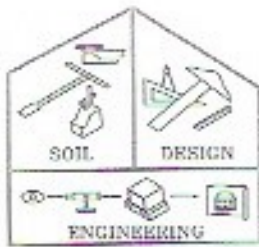
Sincerely yours,



ENC: Stafford County Shrink/Swell Soil Form, Boring Logs, Laboratory Results, Foundation Design

CC: File

File Path: P:\Geotech\2016\2016 Shrink Swell\306 Ironside Cove - Casablanca Enterprises - Stafford Co. Letter.doc



## AlexCom & Associates, Inc.

11 Debruen Lane  
Fredericksburg, Virginia 22405  
Tel: (540) 371-3157 Fax: (540) 371-7920  
www.alexcomva.com

Professional Memberships: ICC, WACEL, NOWRA, VOWRA, AMRL

March 2, 2016

Casablanca Enterprises  
1033 Isabella Drive  
Stafford, Va. 22554

### Reference: 306 Ironside Cove; Stafford Co. VA pH Test Results

The pH of the soil was tested with the PH55 Waterproof Meter as referenced in Milwaukee PH55 Waterproof Meter Manual.

The pH level for Bore Log Sample #2 was determined to be 5.1. For grass growth purposes, the area should be treated with 150lbs of lime per 1000 sq/ft of area to promote grass growth and correct levels of pH to 6.5.

The pH level for Bore Log Sample #4 was determined to be 5.0. For grass growth purposes, the area should be treated with 140lbs of lime per 1000 sq/ft of area to promote grass growth and correct pH level of acid soils to 6.5



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## Results:

Summarized findings of the borings and laboratory tests are presented in the underlying table with detailed results attached to this report:

### **Summarized Investigation Results B-2 Bore Log**

Recommended Soil Bearing Capacity	2,000 psf
Fill Encountered	No
Groundwater Indicators Encountered	No
Auger Refusal Encountered	No
Sample Classification	MH
pH	5.1
Liquid Limit	52.5
Plasticity Index	17.8
Natural Moisture Content	27.9%
Linear Shrinkage	19.7%
Design Lateral Soil Load	*Note
Special Foundation Design Required	Yes

### **Summarized Investigation Results B-4 Bore Log**

Recommended Soil Bearing Capacity	1,500 psf
Fill Encountered	No
Groundwater Indicators Encountered	No
Auger Refusal Encountered	No
Sample Classification	ML
pH	5.0
Liquid Limit	38.2
Plasticity Index	10.3
Natural Moisture Content	14.0%
Linear Shrinkage	8.3%
Design Lateral Soil Load	45lb
Special Foundation Design Required	No

## Recommendations:

Based upon the findings of the investigation, it appears that the soil horizons encountered within the zone of influence for the foundation exhibit a moderate to high potential for shrink/swell behavior. A special foundation design will be required to resist the lateral soil pressures and minimize potential subgrade expansion/contraction due to seasonal variations in moisture content. **\*Note: Sample B-2 is MH soil and is NOT suitable for backfill. Use #57 stone or approved off site material for backfill purposes.**



# ALEXCOM & ASSOCIATES, INC

## SHRINK / SWELL REPORT

Project Name: 306 Ironside Cove Project Number: 150830  
 Client Name: Bill Roth Date: November 24, 2015  
 Section: \_\_\_\_\_ Phase: \_\_\_\_\_ Lot: \_\_\_\_\_ County: Stafford

Lab No.	Sample	Depth	USCS	Description
3499 - 15	2	48"	MH	Elastic Silt
3499 15	4	48"	ML	Silt

PROPERTY	3499 - 15	3499 15			
Shrinkage Limit :	-6.5%	22.9%			
Shrinkage Ratio:	1.6	1.5			
Volumetric Shrinkage:	93%	30%			
Linear Shrinkage:	19.7%	8.3%			
Specific Gravity:	1.46	2.30			

**SHRINKAGE LIMIT:** The shrinkage limit of a soil is the maximum water content at which a reduction in water will not cause a decrease in volume of soil mass.

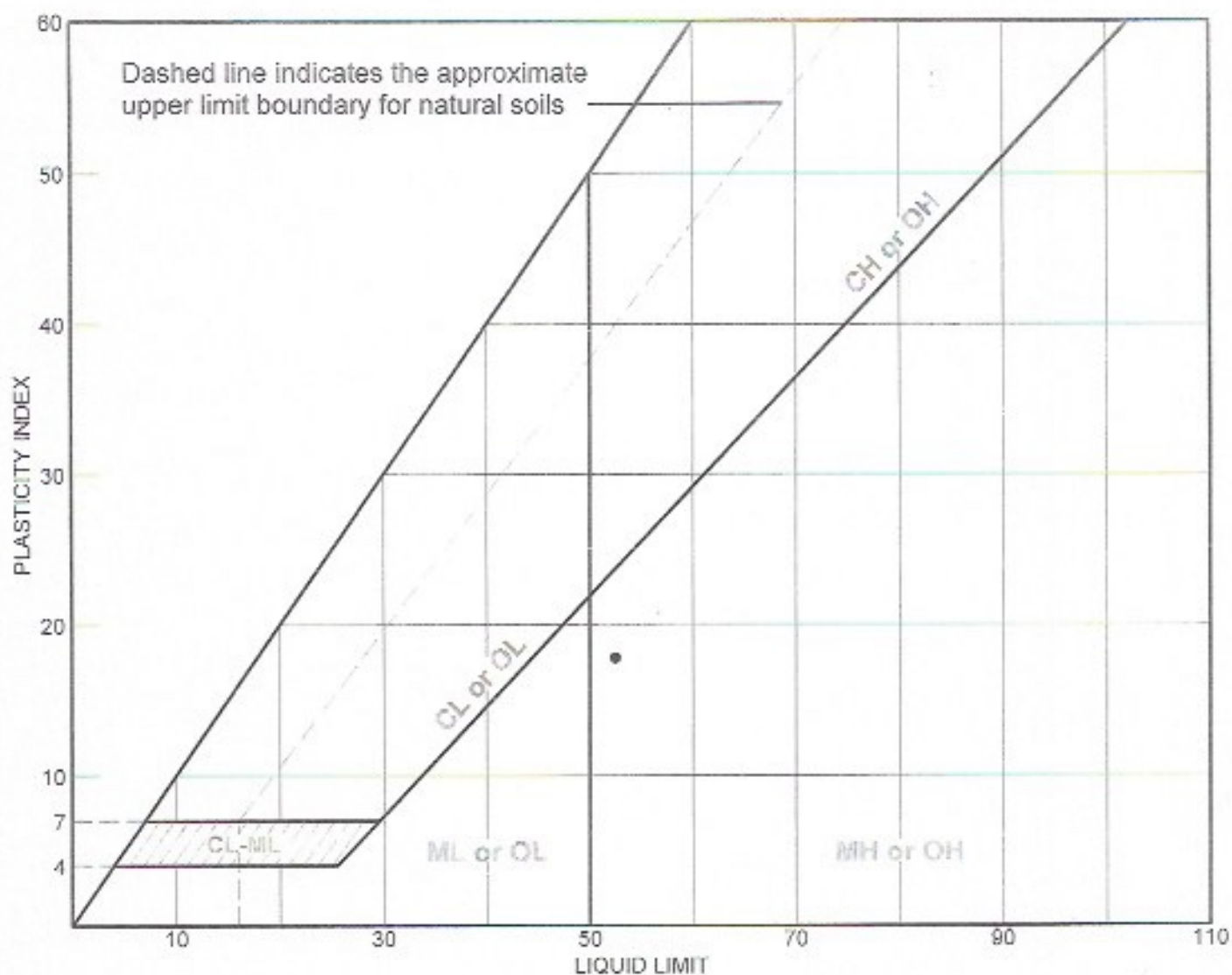
**SHRINKAGE RATIO:** The shrinkage ratio of a soil is the ratio of a given volume change expressed as a percent of the dry volume relative to the corresponding change in water content above the shrinkage limit, expressed as a percentage of the mass of oven dried soil

**VOLUMETRIC SHRINKAGE:** The volumetric shrinkage of the soil is the decrease in volume, expressed as a percentage of the soil mass when dried, of a soil mass when the water content is reduced from a given value to the shrinkage limit.

**LINEAR SHRINKAGE:** The linear shrinkage of a soil is the decrease in one dimension of a soil mass, expressed as a percentage of the original dimension when the water content is reduced from a given value to the shrinkage limit.

**SPECIFIC GRAVITY:** The specific gravity of a soil is the weight in air of a given volume of soil particles at a stated temperature to the weight in air of an equal volume of water at the stated temperature.

# LIQUID AND PLASTIC LIMITS TEST REPORT



## SOIL DATA

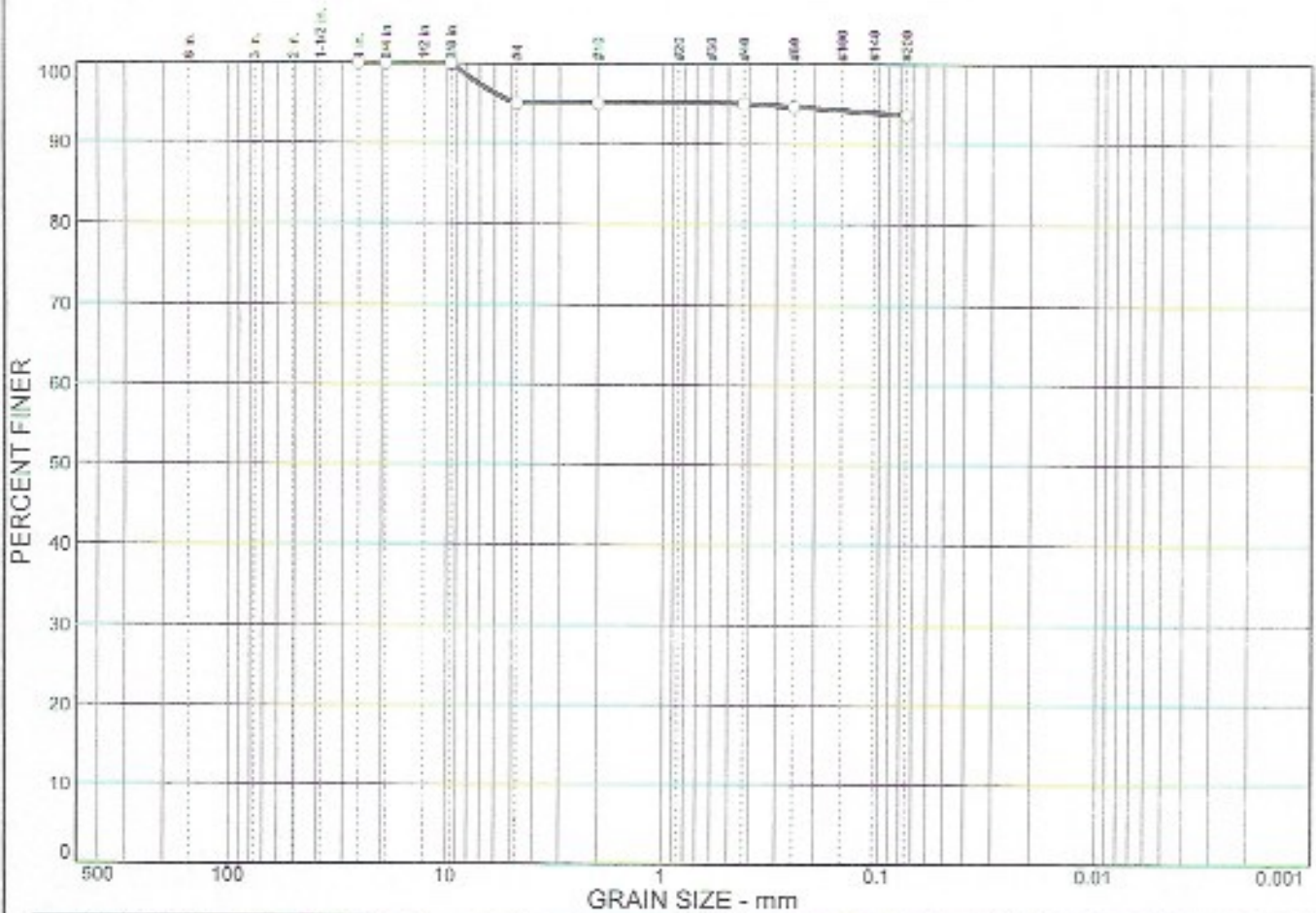
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
•	3499-15	2	48"	27.9	34.7	52.5	17.8	MH

LIQUID AND PLASTIC LIMITS TEST REPORT  
 AlexCom & Associates, Inc.  
 Consulting Engineers  
 Phone: 540-371-3157 \* Fax: 540-371-7920

Client: Bill Roth  
 Project: 306 Ironside Cove  
 Project No.: 150830

Plate

# Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	5.0	1.4	93.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 in.	100.0		
.75 in.	100.0		
.375 in.	100.0		
#4	95.0		
#10	95.0		
#40	95.0		
#60	94.6		
#200	93.6		

**Soil Description**

Elastic silt

**Atterberg Limits**

PL= 34.7      LL= 52.5      PI= 17.8

**Coefficients**

D<sub>85</sub>=      D<sub>60</sub>=      D<sub>50</sub>=  
D<sub>30</sub>=      D<sub>15</sub>=      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= MH      AASHTO= A-7-5(21)

**Remarks**

\* (no specification provided)


Sample No.: 2      Source of Sample: 3499-15      Date: 11/24/15  
 Location: Back Right Corner      Elev./Depth: 48"

AlexCom & Associates, Inc. Consulting Engineers Phone: 540-371-3157 * Fax: 540-371-7920	Client: Bill Roth Project: 306 Ironside Cove Project No: 150830	Date: 11/24/15 Elev./Depth: 48" Plate
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## BORING LOG

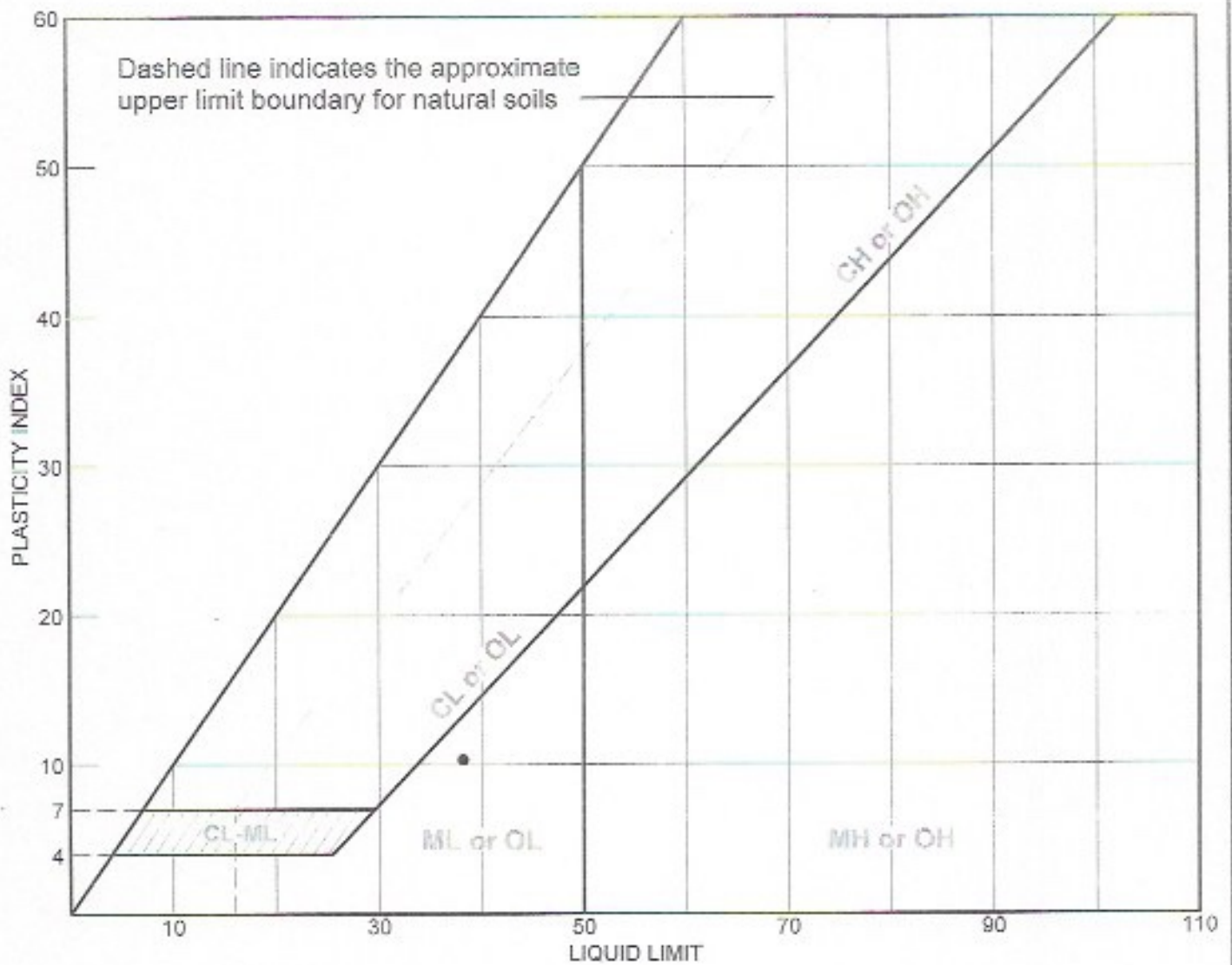
### BORE HOLE No.: B-2

PROJECT 306 Ironside Cove	PROJECT NO. 150830
CLIENT Roth, Bill	DATE 11/24/15
LOCATION Left Front Corner	ELEV. 100'as
EXCAVATION METHOD Hand auger	LOGGER DH
DEPTH TO - Water: n/a      When checked: 11/24/15      Caving: n/a	

ELEVATION/ DEPTH	SOIL SYMBOLS AND SAMPLERS			USCS	LIQUID LIMIT	PLASTIC INDEX	LINEAR SHRINKAGE	DESCRIPTION	SPECIFIC GRAVITY	NATURAL MOISTURE %
	GRAPHIC	BULK	DRIVEN							
100 — 0				TPS				Top soil		
98 — 2				MH				Tan Reddish Grey Sandy Silt, DCP @ 4.5', 12-12-15, 2000 psf.		
96 — 4										
94 — 6										
92 — 8										
90 — 10										

ALL SOIL CLASSIFICATIONS WERE FIELD ASSIGNED UNLESS DENOTED BY A LABORATORY NUMBER.

# LIQUID AND PLASTIC LIMITS TEST REPORT



## SOIL DATA

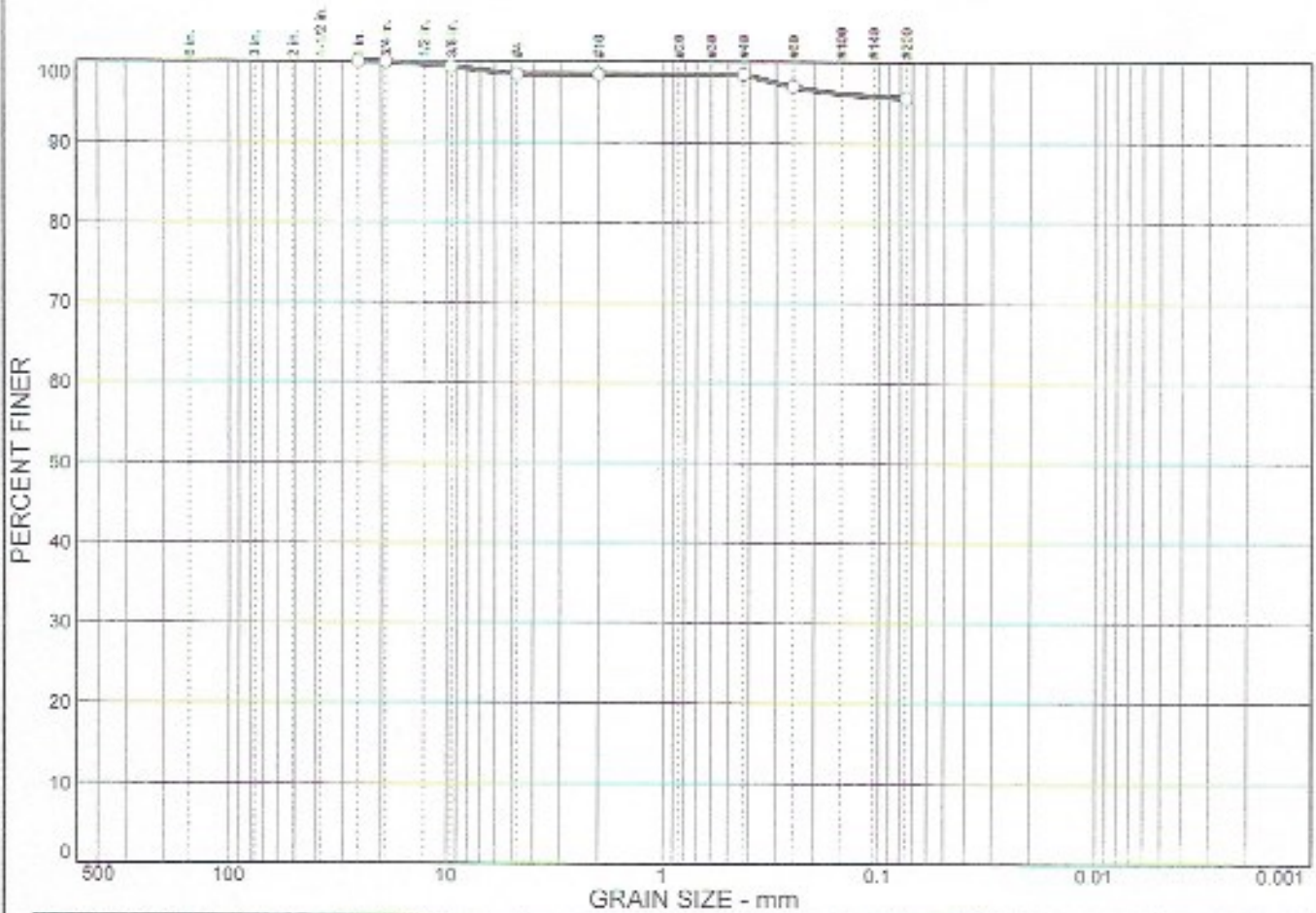
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
•	3499-15	4	48"	14.0	27.9	38.2	10.3	ML

LIQUID AND PLASTIC LIMITS TEST REPORT  
 AlexCom & Associates, Inc.  
 Consulting Engineers  
 Phone: 540-371-3157 \* Fax: 540-371-7920

Client: Bill Roth  
 Project: 306 Ironside Cove  
 Project No.: 150830

Plate

# Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY
0.0	1.5	2.9	95.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 in.	100.0		
.75 in.	100.0		
.375 in.	99.4		
#4	98.5		
#10	98.5		
#40	98.5		
#60	97.0		
#200	95.6		

**Soil Description**

Silt

**Atterberg Limits**

PL= 27.9      LL= 38.2      PI= 10.3

**Coefficients**

D<sub>85</sub>=      D<sub>60</sub>=      D<sub>50</sub>=  
D<sub>30</sub>=      D<sub>15</sub>=      D<sub>10</sub>=  
C<sub>u</sub>=      C<sub>c</sub>=

**Classification**

USCS= ML      AASHTO=

**Remarks**

(no specification provided)


Sample No.: 4      Source of Sample: 3499-15      Date: 11/24/15  
Location: Front Left Corner      Elev./Depth: 48"

<b>AlexCom &amp; Associates, Inc.</b> Consulting Engineers Phone: 540-371-3157 * Fax: 540-371-7920	Client: Bill Roth Project: 306 Ironside Cove Project No: 150830	Plate
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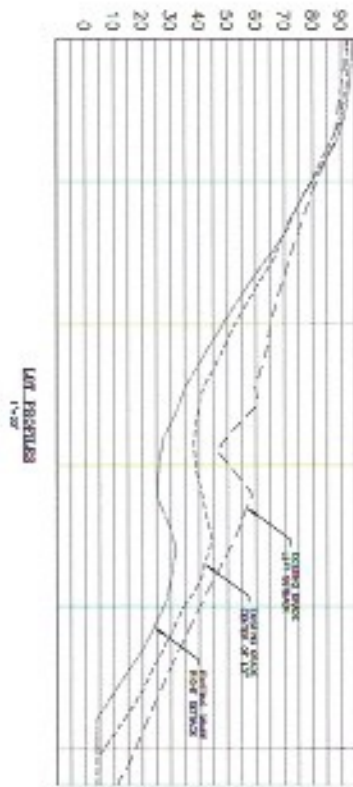
## BORING LOG

### BORE HOLE No.: B-4

PROJECT 306 Ironside Cove	PROJECT NO. 150830
CLIENT Roth, Bill	DATE 11/24/15
LOCATION Back Left Corner	ELEV. 100' as
EXCAVATION METHOD Hand auger	LOGGER DH
DEPTH TO - Water: n/a      When checked: 11/24/15      Caving: n/a	

ELEVATION/ DEPTH	SOIL SYMBOLS AND SAMPLERS			USCS	LIQUID LIMIT	PLASTIC INDEX	LINEAR SHRINKAGE	DESCRIPTION	SPECIFIC GRAVITY	NATURAL MOISTURE %
	GRAPHIC	BULK	DRIVEN							
100 — 0				TPS				Topsoil		
98 — 2				ML				Tan Sandy Silt, DCP @ 4', 8-9-10, 1500 psf.		
96 — 4										
94 — 6										
92 — 8										
90 — 10										

ALL SOIL CLASSIFICATIONS WERE FIELD ASSIGNED UNLESS DENOTED BY A LABORATORY NUMBER.



05/01/10  
1:10,000

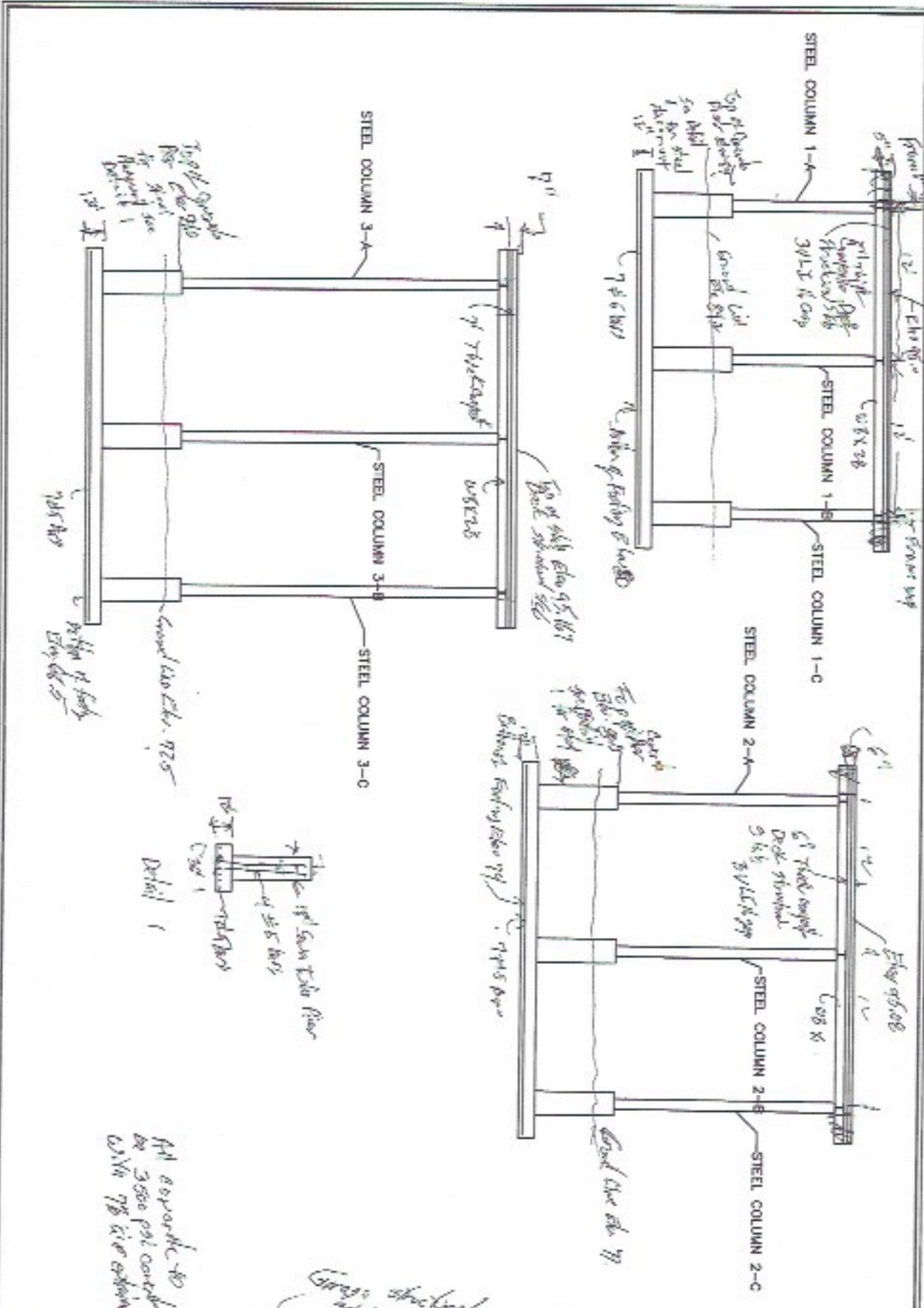
DATE	BY
05/01/10	J.P.A.
05/01/10	J.P.A.
05/01/10	J.P.A.
05/01/10	J.P.A.
05/01/10	J.P.A.

**PLAN AND PROFILE**  
**306 IRONSIDE COVE**  
 FOR DILL HOME  
 Aquia Magisterial District, Stafford County, VA

**ALEXCOM & ASSOCIATES, INC.**  
 GEOTECHNICAL / CIVIL AND  
 STRUCTURAL ENGINEERS  
 11 BURMAN LANE  
 FREDERICKSBURG, VIRGINIA 22402  
 PHONE (540) 371-3157, FAX (540) 371-7920

NO.	DATE





All openings to be 3500 psi concrete with 7/8" dia expansion

George Structural 3rd Floor 6/10/00

**SITE PLAN**  
PROJECT NAME

**ALEXCOM & ASSOCIATES, INC.**  
 GEOTECHNICAL / CIVIL AND  
 STRUCTURAL ENGINEERS  
 11 DEQUAN LANE  
 FREDERICKSBURG, VIRGINIA 22405  
 PHONE (541) 371-2100, FAX (541) 371-2102

0310030

NO.	DESCRIPTION	DATE

ALEXCOM & ASSOCIATES, INC.  
 GEOMETRICAL / CIVIL AND  
 SURVEYING ENGINEERS  
 11 DEERFIELD LANE  
 WASHINGTON, MASS 02459  
 PHONE (617) 271-2121, FAX (617) 271-7800



**HOUSE BOX**  
 306 IRONSIDE COVE  
 PO BOX 2078  
 STAFFORD COUNTY, VA

DATE	BY	DESCRIPTION

1"=10'  
 1509310

