September 24, 2010
Kleinfelder Project No: 110778

Leo A. Daly Company
Attn: Mr. Dan Dellovechio, P.E.
8600 Indian Hills Drive
Omaha, Nebraska 68114-4039

Subject: Supplementary Geotechnical Consultation
Proposed Chiller Plant – USCG Academy
Pickering Road and Bibb Street
New London, Connecticut

Dear Mr. Dellovechio:

We are pleased to submit additional geotechnical data and recommendations that were not included in our previous geotechnical study report dated June 24, 2010. This additional information includes data from our preliminary infiltration study at the site and recommendations related to pavement design. We understand that specific design concepts for the infiltration features and pavements are not available at this time.

Preliminary Infiltration Study

Our preliminary infiltration study included evaluation of the subsurface conditions with test pit excavations at two locations selected by the Leo A. Daly Company and double-ring infiltrometer testing at two locations in each test pit. The test pit locations are shown on Plate 1. Logs of the test pit excavations are shown on Plates 2 and 3. Data from the four infiltrometer tests are presented in Plates 4 and 5. Laboratory gradation analyses are also attached for samples obtained from the test pits.

The infiltration testing was performed in general accordance with the requirements outlined in the Connecticut Stormwater Quality Manual (2004). The general procedure for the double ring infiltrometer testing consisted of driving a 12-inch-diameter steel ring into the ground with a minimum penetration of two inches followed by an 8-inch-diameter steel ring centered inside the 12-inch-diameter ring. The inner ring was driven to about the same penetration depth as the outer ring. Both rings were then filled with at least 4 inches of water and presoaked in 30-minute intervals for a total of one hour. The water level drop in the final 30-minute presoaking period was recorded and used to determine the testing measurement time interval. During the testing, the drop in water level of the center ring is recorded at regular time intervals. Water level drop readings are obtained from a fixed reference point and continue at the appropriate time interval until a minimum of eight readings are obtained or a

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stabilized rate of drop is observed, whichever occurs first. A stabilized rate of drop is defined as a difference of ¼ inch or less of drop between the highest and lowest readings of four consecutive readings.

The following discussions summarize our findings:

Test Pit 1 (Closer to Tennis Courts)

The soil encountered at this test pit location was silty sand with gravel with some cobbles and boulders. Bedrock was encountered at a depth of 5 to 7 feet. Groundwater was not encountered at the time of our test pit excavation. Due to the presence of bedrock at a depth of about 5 to 7 feet, our infiltration tests were conducted at a depth of 2 feet below grade. Infiltration rates interpreted from the two tests completed at this location varied from 2 to 6 inches per hour. The test durations ranged from 1.3 to 2.5 hours.

Test Pit 2 (Closer to Railroad Tracks)

The soil encountered at this test pit location was silty sand with gravel with occasional cobbles. Bedrock was encountered at a depth of 3 to 4 feet. Groundwater was not encountered at the time of our test pit excavation. Due to the presence of shallow bedrock, our infiltration tests were conducted at a depth of 1 to 1.5 feet below grade. Infiltration rates interpreted from the two tests completed at this location varied from 3 to 6 inches per hour. The duration for both tests was 1.3 hours.

It is stated within the Connecticut Stormwater Quality Manual (2004) that infiltration facilities should not be placed over fill materials and the bottom of the infiltration facility should be located at least 3 feet above the seasonally high water table or bedrock. It is also stated that infiltration basins are not recommended in areas with natural slopes greater than 15 percent and should be located at least 50 feet from slopes greater than 15 percent. A minimum field-measured soil infiltration rate of 0.3 inches per hour is recommended as a practical lower limit for the feasibility of infiltration practices. Field-measured soil infiltration rates should not exceed 5 inches per hour as the upper limit for infiltration practices.

As is typical with the double-ring infiltration test, the actual long-term infiltration rates into the soil may be lower due to groundwater mounding and or other factors. We did not evaluate infiltration into the underlying bedrock, but we expect that the bedrock infiltration is negligible based on our experience.

Due to the sloping topography at the site and the presence of bedrock, consideration should also be given to the potential for infiltration water to travel laterally across the bedrock surface and exit the ground surface where bedrock outcrops or the soil cover is thin.

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Once the proposed stormwater facility type, location, and grading is determined, the information should be provided to Kleinfelder for our review and additional analyses and/or field testing performed as appropriate.

Pavement and Site Utility Line Recommendations

Pavement thickness design recommendations were not requested as part of this study. However, recommendations were requested regarding pavement type designations and backfill bedding designations. This information is presented below.

Asphalt (ACC) Pavements

ACC paving requirements are referenced to Article M.04 from the Connecticut DOT Standard Specifications for Roads, Bridges and Incidental Construction (latest edition). ACC pavements should include Class 1 bituminous concrete for the asphalt base course and Class 2 bituminous concrete for the asphalt surface course.

Portland Cement Concrete (PCC) Pavements

PCC paving requirements are referenced to Article M.03 from the Connecticut DOT Standard Specifications for Roads, Bridges and Incidental Construction (latest edition). PCC pavements typically have a 28-day minimum compressive strength of approximately 3600 pounds per square inch (psi) with a minimum water to cement ratio of 0.49.

Pipe Bedding

Pipe bedding requirements are referenced to Article M.08.01from the Connecticut DOT Standard Specifications for Roads, Bridges and Incidental Construction (latest edition). Pipe bedding should be sand or sandy soil, all of which passes a 3/8-inch sieve, and not more than 10 percent passing a No. 200 sieve. For instances where ground water is encountered, No. 6 stone conforming to Article M.01.01 of the previously mentioned document should be used instead of sand or sandy soil.

Limitations

The infiltration testing described in this letter report is preliminary in nature and should not be used for final design. The areas evaluated at the site during our preliminary infiltration study may not be suitable for the implementation of a stormwater infiltration system due to factors including but not limited to existing slopes and bedrock depths. Alternate stormwater management systems may be feasible and may include detention systems and/or integration into an existing or proposed discharge network. Consideration may also be given to the exploration of other areas of the larger project site to further assess the feasibility of stormwater infiltration systems. Short-term infiltration rates such as those generated from

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double-ring infiltrometer tests and laboratory correlation are likely unsuitable for final design as other factors influence the site suitability and infiltration rate. In addition, the limitations presented in our report dated June 24, 2010 should also be applied to this letter.

Closure

We appreciate the opportunity to provide geotechnical services to you on this project. Please contact us at (402) 331-2260 if you have any questions regarding this report or if we can provide assistance with other aspects of the project.

Sincerely,

KLEINFELDER

Brian T. Havens, P.E. (NE)
Project Geotechnical Engineer

William C. Rinker, P.E. (CT)
Geotechnical Group Manager

cc: Mr. Al Hottovy, P.E. – Leo A. Daly

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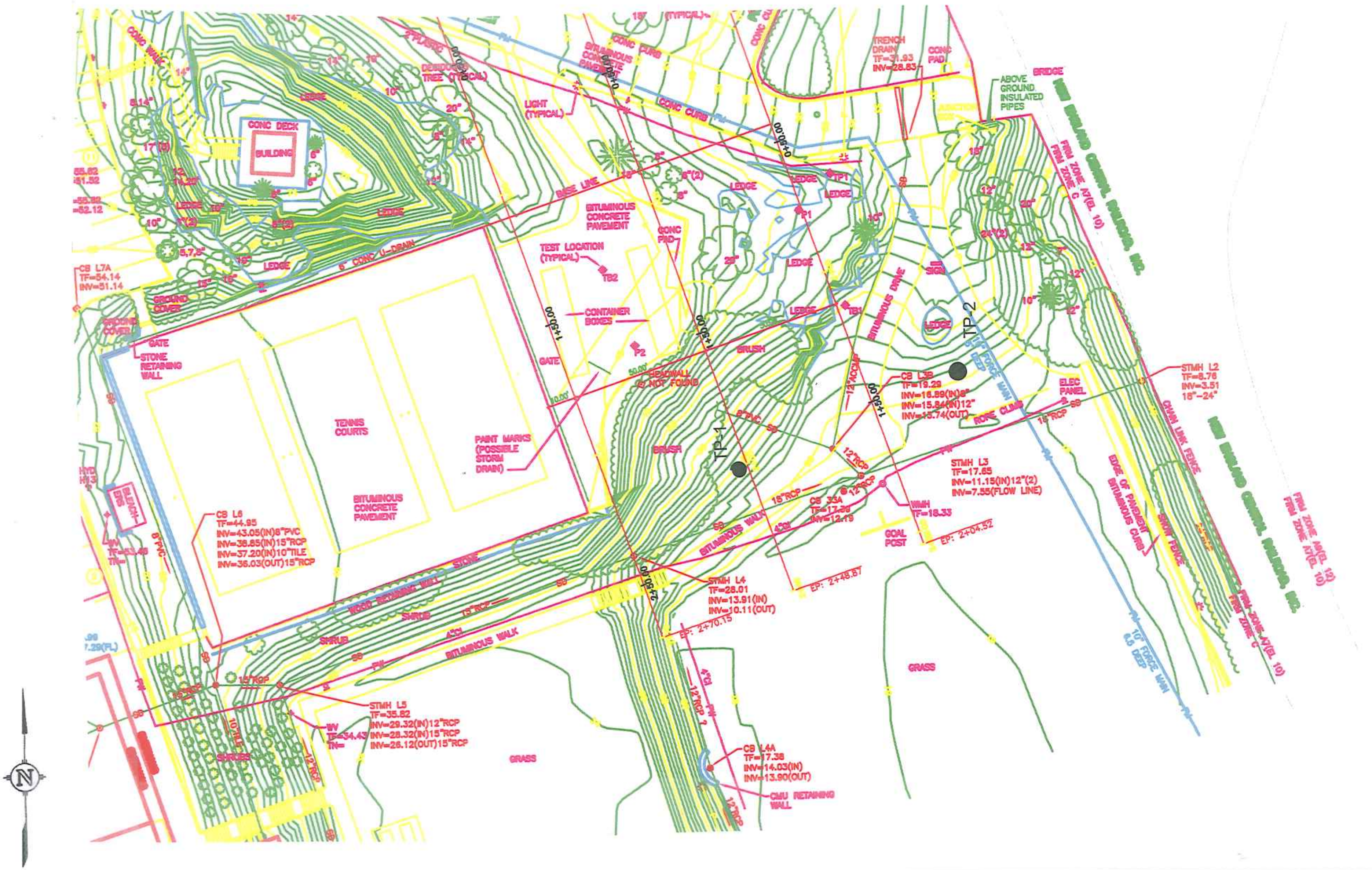

PLATE 1 TEST PIT LOCATION PLAN

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Source: Leo A Daly Company

Note: Not to Common Scale

PLATE 1 TEST PIT LOCATION PLAN
Proposed Chiller Plant
US Coast Guard Academy
New London, Connecticut
Project 110778 September 2010

Test Pit Number: TP-01	**Location:** New London, CT	**Contractor:** Red Technologies
Test Pit Total Depth: 7.0 ft	**Coordinates (X/Y, Lat/Long):** N/A° / N/A°	**Excavation Equipment:** Excavator
Depth to Rock: 5.0 ft	**Datum/Coordinate System:** N/A	**General Notes:**
Date Begin/End: 06-16-10 / 06-16-10	**Top of Test Pit Elevation:** 25.0 ft	
Surface Conditions: Grass	**Coordinate Data Source:** N/A	
WL Measurement Point: NA	**Depth to Groundwater Initial/Time:** Not Encountered	
Logged By: E. Backlund	**Depth to Groundwater Final/Time:** Not Encountered	

The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.

Depth (ft)	Elevation (ft)	Sample Type Symbol	Sample Number	Graphic Log	USCS Symbol	Field Soil Description & Classification: Description	Pocket Pen. (tsf)	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
					SM	SM: 8" Topsoil and Root Mat								
					SM	SM: Silty SAND with Gravel (SM) with moderate cobbles and boulders, light brown to brown, dry								Infiltration test performed at 2 ft bgs.
5	20				GNEISS	GNEISS: GNEISS, light gray to gray, fresh to slightly weathered, weak to mod. strong (R2-R3)								Rock encountered at depths ranging from 5-7 feet bgs.
						Test Pit refusal at a depth of 7.0 ft below existing site grade.								
10	15													
15	10													
20	5													

KLEINFELDER Bright People. Right Solutions.	**Project Number:** 110778	**TEST PIT LOG TP-01**
	Date: 06-30-10	
	Entry By: E. Backlund	**USCG Academy**
	Checked By: J. Morrison	

Test Pit Number: TP-02	**Location:** New London, CT	**Contractor:** Red Technologies
Test Pit Total Depth: 4.0 ft	**Coordinates (X/Y, Lat/Long):** N/A° / N/A°	**Excavation Equipment:** Excavator
Depth to Rock: 3.0 ft	**Datum/Coordinate System:** N/A	**General Notes:**
Date Begin/End: 06-16-10 / 06-16-10	**Top of Test Pit Elevation:** 21.0 ft	
Surface Conditions: Grass	**Coordinate Data Source:** N/A	
WL Measurement Point: NA	**Depth to Groundwater Initial/Time:** Not Encountered	
Logged By: E. Backlund	**Depth to Groundwater Final/Time:** Not Encountered	

Depth (ft)	Elevation (ft)	Sample Type Symbol	Sample Number	Graphic Log	USCS Symbol	Field Soil Description & Classification: Description	Pocket Pen. (tsf)	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.								
					SM	SM: 8 in Topsoil and Root Mat								
					SM	SM: Silty SAND with Gravel (SM) with occaisional cobbles, dark brown, dry								Infiltration tests performed at 1 and 1.5 ft bgs.
					GNEISS	GNEISS: GNEISS, gray, fresh to slightly weathered, weak to mod. strong (R2-R3)								Rock encountered at depths ranging from 3 to 4 feet bgs.
						Test Pit refusal at a depth of 4.0 ft below existing site grade.								
5	16													
10	11													
15	6													
20	1													

TEST PIT LOG-NO WATER KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_VER_2-EXTON.GLB 110778 TEST PIT LOGS.GPJ 9/13/10

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Project Number: 110778	**TEST PIT LOG TP-02**
Date: 06-30-10	
Entry By: E. Backlund	**USCG Academy**
Checked By: J. Morrison	

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DRI-1a

DOUBLE-RING INFILTROMETER TEST RECORD

PROJECT NAME: USCG - Proposed Chiller Plant
PROJECT NUMBER: 110778
PROJECT LOCATION: New London, CT
TESTED BY: ESB
DATE STARTED: June 16, 2010
DATE FINISHED: June 16, 2010

TESTING CONSTANTS

TEST LOCATION: TP-1 (downslope)
TEST ELEVATION: 2 ft bgs
WATER DEPTH WITHIN RINGS: (>4") 8 3/8 in.
PENETRATION OF RINGS: 2.0 in.
WATER LEVEL DROP AFTER PRESOAK: 2 3/8 in.
MEASUREMENT INTERVAL: 30 min.

RATE OF FALL DATA

INTERVAL NUMBER	TIME		WATER LEVEL MEASUREMENTS (in) (with respect to top of ring)		INFILTRATION RATE (inches per hour)
	START	END	START	END	
PRESOAK START - 30	10:50	11:20	1 5/8	3	2 3/4
PRESOAK 30 - 60	11:20	11:50	1 1/8	2 1/8	2
1	11:50	12:20	3/4	1 3/4	2
2	12:20	12:50	1 3/4	2 3/4	2
3	12:50	1:20	1 1/2	2 3/8	1 3/4
4	1:20	1:50	2 3/8	3 3/8	2
5	1:50	2:20	3 3/8	4 3/8	2
6					
7					
8					

NOTES

1. Test performed in general accordance with the Connecticut Stormwater Quality Manual (2004 edition)
2. Stabilized rate of drop is defined as a difference of 1/4-inch or less drop between the highest and lowest readings of four consecutive readings.

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DRI-1b

DOUBLE-RING INFILTROMETER TEST RECORD

PROJECT NAME: USCG - Proposed Chiller Plant
PROJECT NUMBER: 110778
PROJECT LOCATION: New London, CT
TESTED BY: ESB
DATE STARTED: June 16, 2010
DATE FINISHED: June 16, 2010

TESTING CONSTANTS

TEST LOCATION: TP-1 (upslope)
TEST ELEVATION: 2 ft bgs
WATER DEPTH WITHIN RINGS: (>4"): 10 1/8 in.
PENETRATION OF RINGS: 2 1/2 in.
WATER LEVEL DROP AFTER PRESOAK: 6 5/8 in.
MEASUREMENT INTERVAL: 10 min.

RATE OF FALL DATA

INTERVAL NUMBER	TIME		WATER LEVEL MEASUREMENTS (in) (with respect to top of ring)		INFILTRATION RATE (inches per hour)
	START	END	START	END	
PRESOAK START - 30	10:50	11:20	1 3/8	5 1/8	7 1/2
PRESOAK 30 - 60	11:20	11:50	1 1/2	4 3/8	5 3/4
1	11:50	12:00	7/8	2 1/2	9 3/4
2	12:00	12:10	2 1/2	3 1/2	6
3	12:10	12:20	1 5/8	2 5/8	6
4	12:20	12:30	2 5/8	3 1/2	5 1/4
5	12:30	12:40	1 1/2	2 1/2	6
6	12:40	12:50	2 1/2	3 5/8	6 3/4
7	12:50	1:00	1 7/8	3	6 3/4
8	1:00	1:10	3	4	6

NOTES

1. Test performed in general accordance with the Connecticut Stormwater Quality Manual (2004 edition)
2. Stabilized rate of drop is defined as a difference of 1/4-inch or less drop between the highest and lowest readings of four consecutive readings.

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DRI-2a

DOUBLE-RING INFILTROMETER TEST RECORD

PROJECT NAME: USCG - Proposed Chiller Plant
PROJECT NUMBER: 110778
PROJECT LOCATION: New London, CT
TESTED BY: ESB
DATE STARTED: June 16, 2010
DATE FINISHED: June 16, 2010

TESTING CONSTANTS

TEST LOCATION: TP-2 (downslope)
TEST ELEVATION: 1 ft bgs
WATER DEPTH WITHIN RINGS: (>4") 10 in.
PENETRATION OF RINGS: 3 in.
WATER LEVEL DROP AFTER PRESOAK: 8 1/4 in.
MEASUREMENT INTERVAL: 10 min.

RATE OF FALL DATA

INTERVAL NUMBER	TIME		WATER LEVEL MEASUREMENTS (in) (with respect to top of ring)		INFILTRATION RATE (inches per hour)
	START	END	START	END	
PRESOAK START - 30	11:30	12:00	1	5 1/4	8 1/2
PRESOAK 30 - 60	12:10	12:40	1	5	8
1	12:43	12:53	1 5/8	2 1/2	5 1/4
2	12:53	1:03	2 1/2	3 7/8	8 1/4
3	1:03	1:13	7/8	2	6 3/4
4	1:13	1:23	2	3 1/8	6 3/4
5	1:23	1:33	3 1/8	4 3/8	7 1/2
6	1:33	1:43	7/8	2	6 3/4
7	1:43	1:53	2	3	6
8	1:53	2:03	3	4 1/4	7 1/2

NOTES

1. Test performed in general accordance with the Connecticut Stormwater Quality Manual (2004 edition)
2. Stabilized rate of drop is defined as a difference of 1/4-inch or less drop between the highest and lowest readings of four consecutive readings.

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DRI-2b

DOUBLE-RING INFILTROMETER TEST RECORD

PROJECT NAME: USCG - Proposed Chiller Plant
PROJECT NUMBER: 110778
PROJECT LOCATION: New London, CT
TESTED BY: ESB
DATE STARTED: June 16, 2010
DATE FINISHED: June 16, 2010

TESTING CONSTANTS

TEST LOCATION: TP-2 (upslope)
TEST ELEVATION: 1.5 ft bgs
WATER DEPTH WITHIN RINGS: (>4") 8 1/2 in.
PENETRATION OF RINGS: 2 3/4 in.
WATER LEVEL DROP AFTER PRESOAK: 4 1/2 in.
MEASUREMENT INTERVAL: 10 min.

RATE OF FALL DATA

INTERVAL NUMBER	TIME		WATER LEVEL MEASUREMENTS (in) (with respect to top of ring)		INFILTRATION RATE (inches per hour)
	START	END	START	END	
PRESOAK START - 30	11:30	12:00	2 3/4	4 7/8	4 1/4
PRESOAK 30 - 60	12:10	12:40	1/2	2 7/8	4 3/4
1	12:43	12:53	1	1 3/4	4 1/2
2	12:53	1:03	1 3/4	2 3/8	3 3/4
3	1:03	1:13	2 3/8	2 7/8	3
4	1:13	1:23	2 7/8	3 1/2	3 3/4
5	1:23	1:33	3 1/2	4 1/8	3 3/4
6	1:33	1:43	1 3/8	2	3 3/4
7	1:43	1:53	2	2 1/2	3
8	1:53	2:03	2 1/2	3 1/8	3 3/4

NOTES

1. Test performed in general accordance with the Connecticut Stormwater Quality Manual (2004 edition)
2. Stabilized rate of drop is defined as a difference of 1/4-inch or less drop between the highest and lowest readings of four consecutive readings.

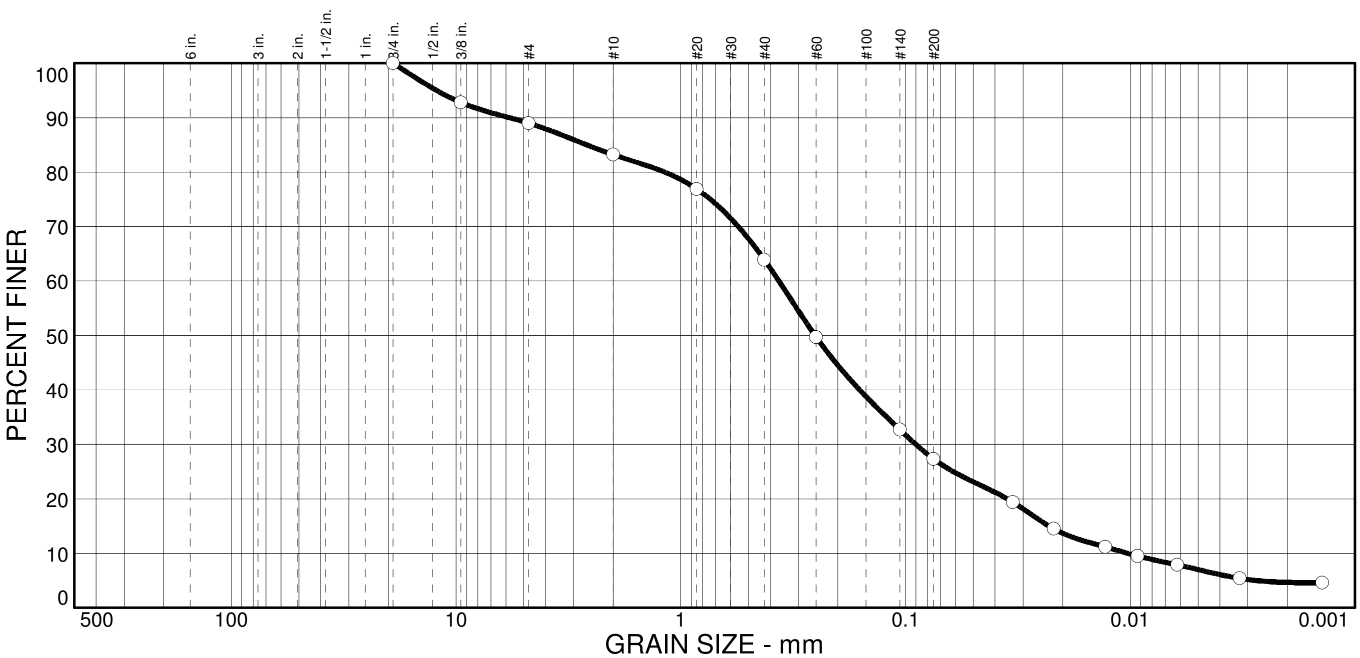
Grain Size Analysis Report (ASTM D 422)

Project: Proposed Chiller Plant-US Coast Guard Academy **Project No.:** 110778

Client: Leo A. Daly

Source of Sample: DRI-1a (Downslope in TP) **Date:** 7/2/2010

Elev./Depth: 2.0 ft



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	11.0	61.7	20.3	7.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75 in.	100.0		
.375 in.	92.8		
#4	89.0		
#10	83.2		
#20	76.9		
#40	63.9		
#60	49.7		
#140	32.7		
#200	27.3		

* (no specification provided)

Soil Description

Silty SAND

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{85}= 2.62 D_{60}= 0.366 D_{50}= 0.253
D_{30}= 0.0901 D_{15}= 0.0230 D_{10}= 0.0103
C_u= 35.68 C_c= 2.16

Classification

USCS= SM AASHTO= -

Remarks

As-received Moisture%= 8

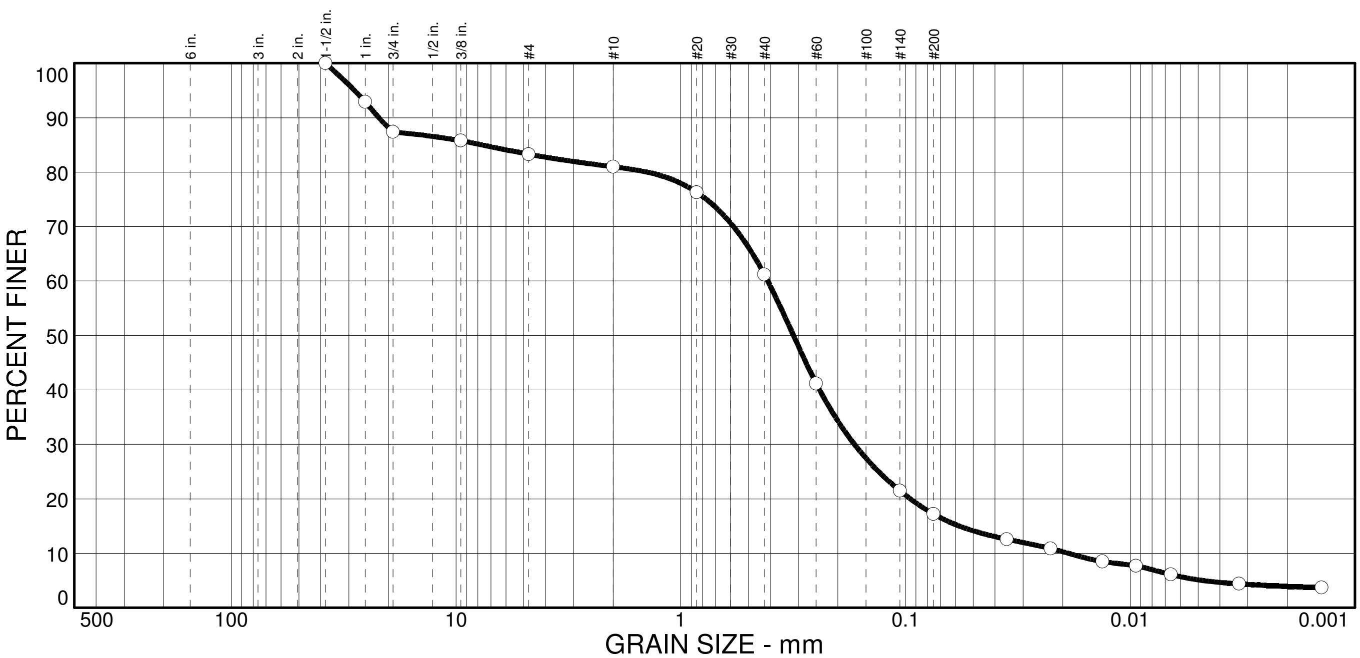
Grain Size Analysis Report (ASTM D 422)

Project: Proposed Chiller Plant-US Coast Guard Academy **Project No.:** 110778

Client: Leo A. Daly

Source of Sample: DRI-1b(Upslope in TP) **Date:** 7/2/2010

Elev./Depth: 2.0 ft



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	16.7	66.1	12.1	5.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	92.9		
.75 in.	87.4		
.375 in.	85.8		
#4	83.3		
#10	81.0		
#20	76.3		
#40	61.2		
#60	41.2		
#140	21.5		
#200	17.2		

* (no specification provided)

Soil Description

Silty SAND with gravel

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{85}= 7.62 D_{60}= 0.410 D_{50}= 0.316
D_{30}= 0.169 D_{15}= 0.0576 D_{10}= 0.0188
C_u= 21.79 C_c= 3.69

Classification

USCS= SM AASHTO= -

Remarks

As-received Moisture%= 16

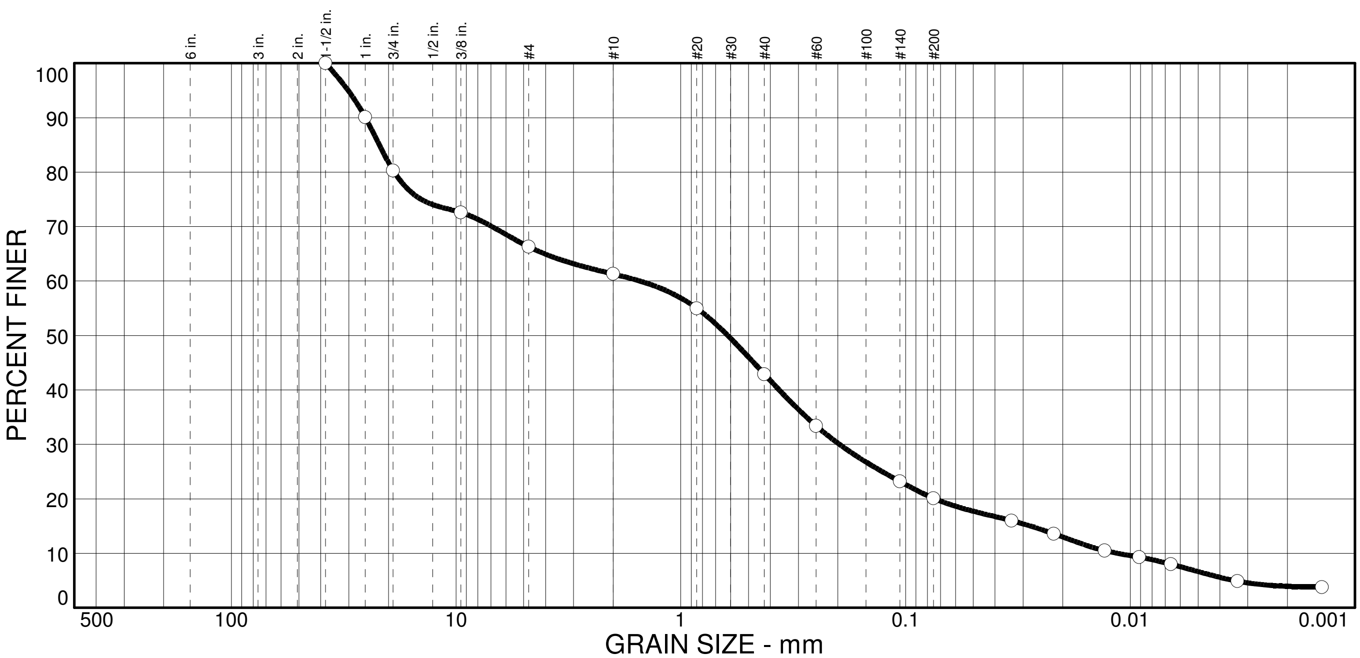
Grain Size Analysis Report (ASTM D 422)

Project: Proposed Chiller Plant-US Coast Guard Academy **Project No.:** 110778

Client: Leo A. Daly

Source of Sample: DRI-2a (Downslope in TP) **Date:** 7/2/2010

Elev./Depth: 1.0 ft



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	33.7	46.2	13.4	6.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5 in.	100.0		
1 in.	90.1		
.75 in.	80.3		
.375 in.	72.6		
#4	66.3		
#10	61.3		
#20	55.0		
#40	42.9		
#60	33.4		
#140	23.2		
#200	20.1		

* (no specification provided)

Soil Description

Silty SAND with gravel

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{85}= 22.0 D_{60}= 1.52 D_{50}= 0.618
D_{30}= 0.197 D_{15}= 0.0278 D_{10}= 0.0114
C_u= 133.37 C_c= 2.24

Classification

USCS= SM AASHTO= -

Remarks

As-received Moisture%= 18

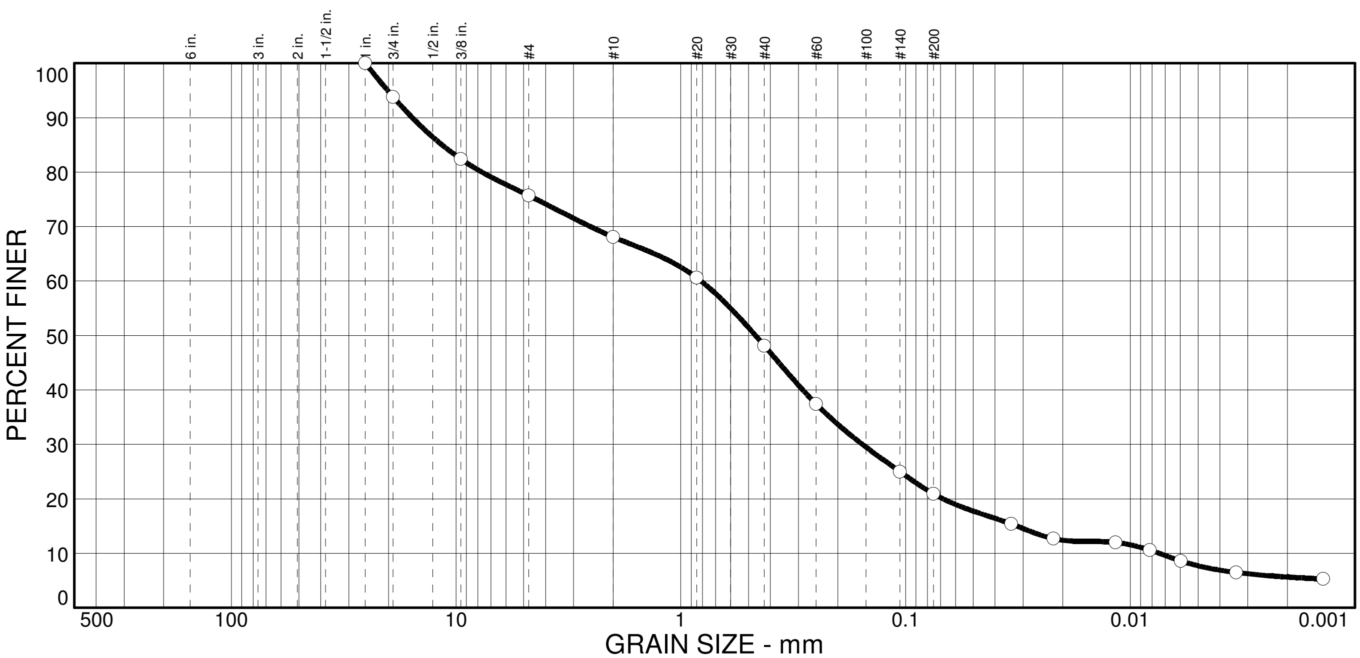
Grain Size Analysis Report (ASTM D 422)

Project: Proposed Chiller Plant-US Coast Guard Academy **Project No.:** 110778

Client: Leo A. Daly

Source of Sample: DRI-2b (Upslope in TP) **Date:** 7/2/201

Elev./Depth: 1.5 ft



% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
0.0	24.3	54.8	13.2	7.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 in.	100.0		
.75 in.	93.8		
.375 in.	82.4		
#4	75.7		
#10	68.1		
#20	60.6		
#40	48.1		
#60	37.4		
#140	25.0		
#200	20.9		

* (no specification provided)

Soil Description

Silty SAND with gravel

Atterberg Limits

PL= - LL= - PI= -

Coefficients

D_{85}= 11.6 D_{60}= 0.814 D_{50}= 0.466
D_{30}= 0.156 D_{15}= 0.0320 D_{10}= 0.0074
C_u= 109.47 C_c= 4.01

Classification

USCS= SM AASHTO= -

Remarks

As-received Moisture%= 17

Important Information about Your
Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

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