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Prepared for:
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c/o JHM Group of Companies
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#### 1.0 INTRODUCTION

# 1.1 Summary

This report presents the results of subsurface explorations and our geotechnical design and construction recommendations for the proposed Marina Village Housing Complex Redevelopment located in Bridgeport, Connecticut.

The existing fill is not suitable for support of foundations and should be removed. Foundations should be designed as spread footings bearing on the naturally deposited sands or on compacted structural fill or crushed stone placed after removal of existing fill.

The slab-on-grade may be supported on a 12 inch thick layer of compacted structural fill. The existing fill may be left in place below floor slabs provided that intense proof-compaction of the subgrade, as discussed below, is completed prior to placement of the structural fill.

# 1.2 Scope of Work

Freeman Companies, LLC performed the following tasks:

- Engaged a drilling contractor to drill test borings and obtain soil samples.
- Observed the test borings.
- Arranged for laboratory testing of selected soil samples.
- Evaluated the subsurface conditions and prepared this report containing geotechnical design recommendations and construction considerations.

#### 1.3 Authorization

Work was completed in accordance with our agreement dated April 14, 2015.

# 1.4 Elevation Datum

Survey information for the project site is not available at this time.

#### 2.0 SITE AND PROJECT DESCRIPTION

#### 2.1 Site Description

The project site is bounded to north by Railroad Avenue, to the east by Park Avenue, to the south by Johnson Street and the west by Columbia Street., in Bridgeport, Connecticut as shown on Figure 1, Site Location Map. The existing Marina Village Housing Complex currently occupies the site. As of the date of this report, the structures in the project parcel, are generally uninhabited, with the exception of a few apartments. Demolition of the existing structures is scheduled to be completed by October 2015.

The site is generally level, with both paved and grassy areas. The site is shown on Figure 2, Subsurface Exploration Location Plan.



# 2.2 Project Description

The proposed redevelopment will include construction of eight new housing structures. We understand that some of the proposed structures will have a maximum of four stories with floor slabs located at the existing ground surface with no basements. Based on the master plan, this first phase will include 123 units and 164 parking spaces, as well as a grassy recreation area.

# 3.0 SUBSURFACE EXPLORATIONS

Ten test borings (B-1/MW-3 through B-10) were drilled by New England Boring Contractors, Inc. of Glastonbury, Connecticut on May 12 through 14, 2015. Borings were completed with hollow-stem augers to depths ranging from 8 feet to 20.7 feet below the existing ground surface and were terminated at the predetermined depths. Borings B-1/MW-3, B-4/MW-1, and B-9/MW-2 were finished as environmental monitoring wells. The remaining borings were backfilled with cuttings upon completion.

Boring locations were determined by taping from existing structures. A Freeman Companies environmental scientist monitored the drilling, classified the soil samples, and prepared the test boring logs included in Appendix A. Boring locations are shown on Figure 2, Subsurface Exploration Location Plan.

Four grain size distribution analyses and one constant head (fixed wall) permeability test were performed on soil samples recovered from the borings by Geotesting Express of Acton, Massachusetts. Results of laboratory testing are provided in Appendix B.

# 4.0 SUBSURFACE CONDITIONS

The borings encountered topsoil, asphalt, fill, and sand, as described below. Subsurface conditions are known only at the boring locations and may differ significantly between borings. See the attached Table 1 for boring specific subsurface data.

**Topsoil/ Asphalt** – Topsoil was described as light brown to brown silty SAND (SM). Up to 1.1 feet of topsoil was encountered in the borings conducted in grassy areas. Asphalt thickness ranged from 1 inch to 3 inches.

**Fill** – Fill was described as very loose to dense, dark brown to light brown, silty SAND with gravel (SM), varying to poorly graded sand with gravel (SP), asphalt, crushed brick, concrete, and other manmade material debris. Standard Penetration Test N-Values ranged from 2 to 47 blows per foot (bpf). The fill extended to depths below ground surface ranging from 0 feet (B-9) to greater than 9 feet (B-8). Environmental testing indicated that the fill is environmentally impacted. Please reference the report titled "Environmental Evaluations and Materials Management Report" prepared by Freeman Cos., dated May 2015 for discussion on environmental impacts.

Sand – Sand was encountered in each of the borings, and was described as loose to very dense, tan to brown, poorly graded sand with silt and gravel (SP) varying to silty sand with gravel (SM). Standard Penetration Test N-Values ranged from 6 to 69 blows per foot (bpf).



**Silt** – A silt layer was encountered in Borings B-1/MW-3, B-2 and B-3 at a depth of approximately 16.5 feet. The silt is described as light brown, sandy silt (ML). The thickness of this deposit was not determined.

**Groundwater** – Soil samples were wet at depths ranging from 6 to 11 feet below the existing ground surface. Groundwater was measured in the monitoring wells at a depth of 6.4 feet to 7.6 feet after four to five days. Laboratory testing also indicated that the groundwater is environmentally impacted.

Groundwater level measurements represent conditions at the time of the explorations and may not represent static conditions. Groundwater levels will fluctuate with season, precipitation, nearby construction activities, and other conditions.

#### 5.0 GEOTECHNICAL ENGINEERING RECOMMENDATIONS

# 5.1 Foundation Design

The existing fill is variable in consistency and density. Therefore, we recommend that the existing fill be removed below footings within the bearing zone which is defined by a 1 horizontal to 1 vertical (1H:1V) line sloped outward and downward from points located one foot outside the bottom exterior edge of the footing on all sides.

Foundations should be designed as spread footings bearing on the naturally deposited sand or on compacted structural fill or crushed stone wrapped in a geotextile separation fabric placed over the sand after removal of the unsuitable existing fill.

Footings should be designed for a maximum allowable bearing pressure of 4,000 pounds per square foot (psf). The allowable bearing pressure applies to footings having a minimum lateral dimension of at least 3 feet. For smaller footings, the recommended allowable bearing pressure should be reduced by the ratio of actual minimum footing size to 3 feet. At the recommended bearing pressure, total and differential settlements are anticipated to be less than 1 inch and ¾ inch, respectively. Most settlement will occur during construction as dead load is applied.

Exterior footings should bear a minimum of 3.5 feet below the lowest adjacent ground surface for frost protection. Footings at heated interior locations may be designed to bear 2 feet below the proposed top of floor slab, however, building shut downs and power failures should be considered.

# 5.2 Floor Slab Design

The final floor elevation is not known at this time, but it is anticipated that it will be at or near the existing grade as no basement space is planned. The floor slab may be designed as a slab-on-grade bearing on a minimum 12 inch thick layer of compacted structural fill.

Existing fill may remain in place beneath the floor slabs provided that intense proof compaction of the subgrade is completed prior to placement of the compacted structural fill. The subgrade should be compacted with a minimum of 10 passes of a 10 ton vibratory drum roller. Any subgrades that are soft or yielding during proof compaction should be removed and replaced with compacted structural fill.

# 5.3 Foundation Drainage



The floor slab will be at or near existing grade. Water levels in the monitoring wells indicate that groundwater is a minimum of 6 feet below grade. Existing grade should be below floor grade and slope away from the building. Therefore, underslab or foundation drainage will not be necessary.

# 5.4 Seismic Design

Soils at the site are classified as *Stiff Soil Profile* for earthquake design purposes, and are not susceptible to liquefaction. The corresponding site class is D. Design seismic coefficients are 0.270g for short period ( $S_s$ ) and 0.064g for one second period ( $S_1$ ), per the 2009 Amendment to the Connecticut State Building Code.

# 5.5 Infiltration

We understand that project stormwater disposal will include infiltration. The existing fill on-site is not suitable for infiltration and will require removal and replacement with compacted Structural Fill or Crushed Stone over a geotextile fabric. Infiltration should assume flow into Structural Fill and the sand. A laboratory fixed wall permeability was completed on a composite sample of the sands. The results indicate a permeability of 2.0 x 10-2 centimeters per second (cm/sec).

The proposed infiltration area will be located in the grassy recreation area in the middle of the site, south of the parking area. The thickness of existing fill was 8 feet to 9 feet in this area. Groundwater levels noted in the monitoring wells were approximately 6 feet to 7 feet below existing grade.

#### 5.6 Backfill Materials

**Structural Fill** - Structural Fill should be used for fill within the building footprint. Structural Fill should consist of hard, durable sand and gravel, free of clay, organic matter, surface coatings, recycled materials, asphalt, and other deleterious materials, and meet the requirements of ConnDOT M.02.01, Granular Fill. The gradation should be M.02.06 grading A. Structural Fill shall be compacted in maximum 9-inch-thick, loose lifts to at least 95 percent of the maximum dry density determined in accordance with ASTM D1557.

Crushed Stone – Crushed Stone should consist of hard, durable, crushed or broken stone, free from recycled materials, asphalt, loam or clay. Crushed Stone should meet the gradation requirements of ConnDOT M.01.01, No. 6. Crushed stone should be placed in maximum 12-inch-thick loose lifts and compacted with at least 4 to 6 passes of a double-drum, walk-behind, vibratory compactor.

**Common Fill** – Common fill for general site filling outside the limits of structures should consist of mineral soil free from organic matter, recycled materials, asphalt, loam or clay, have a maximum particle size of 6 inches, and be capable of being placed and compacted. Common fill should be compacted in maximum 9-inch-thick, loose lifts to at least 92 percent of the maximum dry density determined in accordance with ASTM D1557.

**Geotextile Fabric** – Geotextile fabric should be a non-woven product similar to Mirafi 140N, or an approved equal product.



# 6.0 CONSTRUCTION CONSIDERATIONS

# 6.1 Subgrade Preparation

Foundation subgrade materials will consist of compacted structural fill placed after removal of unsuitable fill. Bearing surfaces should be free of standing water, frost, and loose soil before placement of reinforcing steel and concrete. It is recommended that Freeman Companies observe subgrade preparation activities.

# 6.2 Excavation and Dewatering

Excavation of up to 9 feet of unsuitable existing fill will be required beneath the building footings. Conventional heavy construction equipment should be suitable for excavation in existing soil materials. Excavation should conform to OSHA excavation regulations contained in 29 CFR Part 1926, latest edition. Subgrades should be excavated in such a way to minimize disturbance, such as using a smooth faced bucket.

Groundwater is expected to be encountered during over-excavation activities for foundation construction or during other deep excavations at the site. If dewatering quantities are excessive Crushed Stone could be used in lieu of Structural Fill. We anticipate that excavation dewatering may be accomplished by pumping from properly filtered sumps discharged according to federal, state, and local regulations. The site should be graded to direct runoff away from excavations.

Specifications should require the contractor to maintain groundwater one foot below the bottom of excavation at all times.

# 6.3 Temporary Lateral Support

Open cut excavations appear feasible for the majority of excavations, provided there is adequate space to slope the excavation. Temporary lateral support of excavations may be necessary where excavations extend below groundwater, for utility excavations, or where excavations are close to existing structures, roads, or utilities. Trench boxes, steel sheeting or soldier piles and lagging may be feasible. Excavations and excavation support should be designed and constructed in conformance all OSHA, State, and Federal Regulations.

# 6.4 Freezing Conditions

If construction is performed during freezing weather, special precautions will be required to prevent the subgrade from freezing. Freezing of soil beneath foundations and slabs during construction may result in settlement when the soil thaws.

Subgrades should be free of frost prior to placement of concrete for footings. Frost-susceptible soils that have frozen should be removed and replaced with compacted Structural Fill or geotextile fabric and Crushed Stone. The footing and the soil adjacent to the footing should be protected from freezing until they are backfilled.

Soils placed as fill should be free of frost, as should be the ground on which it is placed. Floor slabs should be heated or insulated during freezing weather to prevent freezing of the subgrade.

#### 6.5 Backfilling and Compaction



Fill placed within the building limits should consist of Structural Fill or Crushed Stone wrapped in a geotextile fabric.

#### 6.6 Use of On-Site Excavated Soils

The existing fill is not suitable for reuse as compacted Structural Fill but could be used as Common Fill provided that environmental requirements can be met. Please reference environmental report for direction on storage and disposal of the existing fill materials.

#### 6.7 Site Disturbance

The existing fill will be sensitive to disturbance from construction equipment, due to the fines and debris content. Soils could easily become disturbed, and the ground surface could become excessively muddy and unstable due to traffic by heavy construction equipment, particularly during or immediately following periods of inclement weather. Project specifications should require that the Contractor maintain stable site conditions at all times.

#### 7.0 FUTURE SERVICES AND LIMITATIONS

# 7.1 Future Engineering Services

Freeman Companies should be engaged during final design to:

- Review final design drawings and prepare an earthwork specification.
- Provide consultation to the design team on geotechnical issues on an as-needed basis.

Freeman Companies should be engaged during construction to:

- Review contractor submittals related to geotechnical issues.
- Provide construction monitoring to verify that soil conditions exposed in excavations are in general conformance with our design assumptions, to observe that the subgrades for the footings and floor slabs are prepared in the intended manner, and that fill materials are properly placed and compacted.

#### 7.2 Limitations

This report was prepared for the exclusive use of Bridgeport Community Renewal Associates, LP, and the project design team. The recommendations provided herein are based on the project information provided at the time of this report and may require modification if there are any changes in the nature, design, or location of the facility.

The recommendations in this report are based in part on the data obtained from the subsurface explorations. The nature and extent of variations between explorations may not become evident until construction. If variations from the anticipated conditions are encountered, it may be necessary to revise the recommendations in this report.

Our professional services for this project have been performed in accordance with generally accepted engineering practices; no warranty, express or implied, is made.

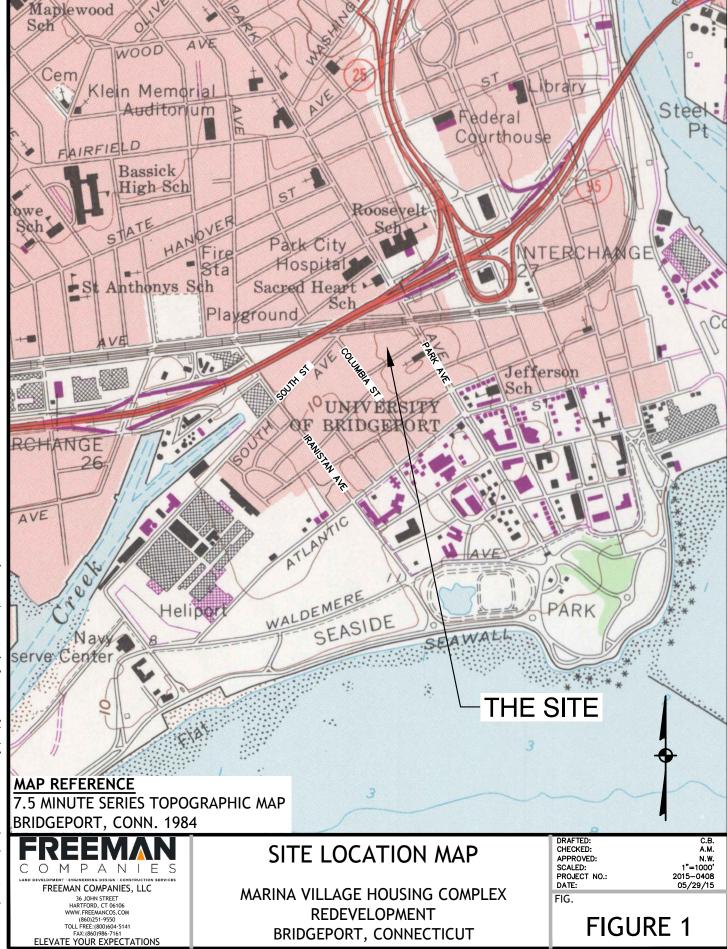
# 2015-0408 Marina Village Housing Complex Redevelopment Bridgeport, Connecticut

Table 1
Subsurface Data

		Pavement/				Groundwater
Boring No.	Depth (ft.)	Topsoil	Fill	Sand	Silt	Depth
B-1/MW	17	0.08	7	9	>1	6.4
B-2	17	0.8	3	13.3	>.7	8
B-3	17	0.2	5	11.4	>0.6	8
B-4/MW	17	0.08	4	>13		7.56
B-5	8	1.1	7.6	>8		6.5
B-6	10	0.2	8.5	>1.5		7
B-7	8	0.3	4.4	>3.6		6
B-8	12	0.5	10	>2		6.5
B-9/MW	17			>17		6.41
B-10	20.7		8.5	>12.2		11

# Notes:

- 1. Groundwater levels are approximate, except in those borings designated as monitoring wells, and may not represent static groundwater levels.
- 2. "--" Not Encountered



anies, LLC . Y:\2015\2015-0408 - Marina Village\DWC\Figure 1 and 2.dwg May 28, 2015-2:08pm Plotted By. cbarzola



# APPENDIX A

# **TEST BORING LOGS**

Exploration NORTHING HORIZONT VERTICAL LOCATION	S: AL DAT DATUN	TUM: 1:				E31	IIVIAIEDG	KUU	OFFSET: INE: ND SURFACE ELEV. (FT):	-	B-1/MW-3 PAGE 1 of 1
Drilling Into	format T / END: OR: No DD: 4.2 PD: 4.2 PEL DEPT OTES: DNS: ID	5/14/2 ew Englar 25 in / N/A Safety Har THS (ft):	015	- 5/14/20 Boring er 2 8.00 5/	015	DRILLER:  CASING ID/ HAMMER W  4 6.40 5/1	Mike St. Jc OD:N/A / /EIGHT (lbs) 8/2015	/ N/A ): _1	TOTAL DEPTH (FT):17.0  LOGGED BY (Person):J.  EXPLORATION TYPE/METH CORE INFO:  HAMMER DROP (inch):3  estrubed Tube Sample WOH = Weight of Hamm	Herpich  OD: Hollow  omer S <sub>v</sub> =	Pocket Torvane Shear Strength
	Pe	D = Outside en. = Penet ec. = Reco	tratio	n Length	S = Sp	Minute per Fo blit Spoon Direct Push S	S		Core RQD = ROCK Quality De nic Core PID = Photoionization D Veight of Rods $Q_v$ = Pocket Penetromel	etector NA, I	Field Vane Shear Strength NM = Not Applicable, Not Measured
Elev. Depti	I or	Sample No.		SAMPL Depth (ft)	Pen./ Rec. (in)	Blows Count or RQD	Test Data	GRAPHIC LOG	Sample Description & Classification		H <sub>2</sub> 0 Depth CONSTRUCTION DETAILS
-		S-1	X	0.25 to 2.25	24/18				ASPHALT (1 in.)  (0.1'- 0.3') POORLY GRADED GRAVE ~100% gravel, coarse; dry, black, FILL (0.3'- 3') SILTY SAND (SM); ~75% sar coarse, ~15% fines, ~10% gravel, fine medium; brown, FILL, with crushed bri	nd, fine to	backfill cuttings 6" bentonite seal. 1/4
- - - !	5	S-2	X	4 to 6	24/6	3-2-7- 22			(3'- 7') SILTY SAND WITH GRAVEL (sand, fine to medium, ~35% gravel, cc ~15% fines; brown, FILL, with crushed glass, black material (odor).	SM); ~50% parse,	<b>y</b> bag
- - - 10	0	S-3	X	8 to 10	24/20	9-12- 12-14			(7'- 16') POORLY GRADED SAND (SI sand, medium to coarse, ~10% gravel fines; brown.	P); ~85% , fine, ~5%	▼#2 sand for sand pack. 3 bags. 2" diamter PVC Screen, 0.010 slot size
- - - 18 - -	5	S-4		15 to 17	24/18	5-8-14- 20			(16'- 17') SANDY SILT (ML); ~60% fin sand, fine to medium; brown.  Bottom of Exploration at 17 feet	es, ~40%	17' bottom depth of boring, backfill cuttings, PVC plug
- - 20 - -	0										
Stratification line boundary betwee gradual. Water I at times and und Fluctuations of g other factors that measurements of	een soil typ level readii der condition groundwate an those pr	es, transition ngs have bons stated. er may occuresent at the	ons n een ur du	made F	PROJEC	T NAME: ATE: Bri		illage T	nan Companies, LLC Housing Complex Redeve	36 Ha N   E S (86	eeman Companies, LLo John Street rtford, CT 06102 60) 251-9550 w.freemancos.com

Expl NOR	oration	Loc	ation	ı	EASTI	NG:		STATI	ON:	OFFSET:			ORATION
VER	TICAL D	ATUN	1:				ES	TIMATED GE	ERL ROUI	INE: ND SURFACE ELEV. (FT):			B-2 GE 1 of 1
LOC	ATION:											PAG	JE 1 OT 1
DATE CONT EQUI AUGE HAMI WATI	TRACTOF PMENT: ER ID/OD MER TYP	/ END: R: _N : _N// E: _S L DEP1	5/12/20 ew Englar A / N/A Safety Han	nd Bo	oring	[	CASING ID	_Mike St. Joh D/OD: _N/A /   WEIGHT (lbs):	N/A	EXPLORATION TYPE/METHOD	D: Hollow	· Stem A	uger
_	REVIATION	S: ID	= Inside D D = Outside en. = Penet ec. = Recov	Dian	meter Length	mpf = S = Sp	Blows per Fo Minute per Fo Blit Spoon Direct Push	Foot C =	= Rock = Soi	strubed Tube Sample Core Nic Core Weight of Rods  WOH = Weight of Hammer RQD = Rock Quality Desig PID = Photoionization Dete Q <sub>v</sub> = Pocket Penetrometer	nation $F_v =$ ctor NA,	Field Var	orvane Shear Strength le Shear Strength Applicable, Not Measured
		Casing Pen.		S	SAMPL	E INFO	RMATIO	N	90.				
Elev. (ft)	Depth (ft)	(bpf) or Core Rate (mpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blows Count or RQD	Test Data	GRAPHIC LOG	Sample Description & Classification		H <sub>2</sub> 0 Depth	Remarks
			S-1	M	0 to	24/19	2-6-13- 6		77.77	TOPSOIL			
5/29/15	- - - 5 - - - -		S-2 S-3	X X	4 to 6 8 to 10	24/23	2-1-1-3			(1'- 1.5') POORLY GRADED SAND WIT GRAVEL (SP); ~70% sand, fine to coars gravel, fine to coarse, ~5% fines; tan, FIL asphalt pieces.  (1.5'- 3') POORLY GRADED SAND WIT GRAVEL (SP); ~50% sand, fine to coars gravel, fine to coarse, ~5% fines; brown, crushed concrete and asphalt.  (3'- 4.9') SILTY SAND (SM); ~70% sand, coarse, ~30% fines; brown.  (4.9'- 16.3') POORLY GRADED SAND (\$~95% sand, medium to coarse, ~5% fine	e, ~25% .L,  H e, ~45% FILL,  fine to  SP):	Ţ	
	- - - 15 - -		S-4	X	15 to 17	24/24	15-14- 16-18			(16.3'- 17') SILT (ML); ~80% fines, ~20% wet, light brown. Bottom of Exploration at 17 feet	sand;	-	
FREEMAN COMPANIES PROJECT 2015-0408 - MARINA VILLAGE GPJ GINT STD US LAB GDT and the property of the property	- 20 												
Stratific bounds	ary betweer	n soil typ	nt approxim es, transitio	ns ma						nan Companies, LLC			Companies, LLC
gradua at time Fluctua other fa measu	s and unde ations of gro	r condition oundwate those po	er may occuresent at the	ır due	to C	CITY/ST	ATE: Br	: Marina Vil idgeport, CT ER: 2015-0		Housing Complex Redeve	1 E S H	artford 60) 25	Street , CT 06102 1-9550 emancos.com

E	Explo	oration	Loca	ation		EASTI	NG:		STATI	ON:	OFFSET:		EXPL	ORATION
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Ľ	OCA	TION:		'					I IIWA I ED GI	100	VD SORFACE ELEV. (F1).		PAG	GE 1 of 1
C E	OATE CONTI EQUIP	RACTOF MENT: R ID/OD	/ END: R: _N	5/12/20 ew Englar A / N/A safety Han	nd E	Boring		CASING ID	_Mike St. Jol D/OD: _N/A / WEIGHT (lbs):	N/A	EXPLORATION TYPE/METHO CORE INFO:	erpich  D: Hollow	Stem A	uger
٧	VATE	R LEVE	L DEPT				12/2015							
_		RAL NO	S: ID OI Pe	= Inside D D = Outside en. = Penet ec. = Recov	e Dia ratio	ameter on Length	mpf = S = Sp	Blows per Fo Minute per Fo blit Spoon Direct Push	Foot C :	= Rocl	strubed Tube Sample k Core c C	nation F <sub>v</sub> = ector NA,	Field Van	orvane Shear Strength e Shear Strength Applicable, Not Measured
			Casing Pen.			SAMPL	E INFO	RMATIO	N	LOG				
	Elev. (ft)	Depth (ft)	(bpf) or Core Rate (mpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blows Count or RQD	Test Data	GRAPHIC LOG	Sample Description & Classification		H <sub>2</sub> 0 Depth	Remarks
		- - - - 5		S-1		0.2 to 2.2 4 to 6		8-8-5-9 2-4-3-4			ASPHALT (2 in.)  (0.2'- 2.2') POORLY GRADED SAND W GRAVEL (SP); ~60% sand, medium to c ~30% gravel, fine, ~10% fines; dry, tan, conrete, asphalt and brick pieces (fill).  (2.2'- 5') SILTY SAND (SM); ~60% sand coarse, ~25% gravel, fine, ~15% fines; c FILL, conrete, asphalt and brick pieces (5'- 12.5') POORLY GRADED SAND (SI sand, coarse, ~5% fines; dry, tan, FILL.	coarse, FILL, , fine to dry, tan, fill).		
15		- - - - 10		S-3	X	8 to 10	24/24	6-5-7-8					Ţ	
3PJ GINT STD US LAB.GDT 5/29/15		_ _ _ 15		S-4	$\sqrt{}$	15 to 17	24/24	22-24- 27-28			(12.5'- 16.4') POORLY GRADED SAND ~85% sand, medium to coarse, ~10% gr fine, ~5% fines; wet, brown.	àvel,		
MARINA VILLAGE. G		_									wet, light brown.  Bottom of Exploration at 17 feet	S Gama,		
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FREEMAN COMP.	oundar radual. t times luctuati ther fac	y betweer Water lev and unde ions of gro	n soil typ vel readii r conditio oundwate those pr	nt approximes, transitions have been stated. er may occuresent at the	ns r een ur di	made	PROJEC CITY/ST	T NAME: ATE: Br		lage -	nan Companies, LLC Housing Complex Redeve	36 N   E S CONSTRUCTION SERVICES (86	John Irtford, 30) 25	Companies, LLC Street CT 06102 1-9550 emancos.com

NORT HORIZ	oration THING: ZONTA	L DA1	ΓUM:		EASTII	NG:	STA	STAT	ION: TERL	OFFSET:		PLORATION  4/MW-1
VERT	ICAL D	ATUN	۸:				ES	TIMATED G	ROU	ND SURFACE ELEV. (FT):		AGE 1 of 1
Drillin DATE CONTI EQUIP AUGE HAMM WATE GENE	NG INFO START / RACTOR PMENT: R ID/OD IER TYP	DEND:   END:   R: N   4.2   E: S   L DEP1   TES:	5/13/20 ew Englan 25 in / N/A Safety Ham	0)15 d B	- 5/13/20 Boring er 2 8.00 5/	015 ( H 13/2015	DRILLER: CASING IE	_Mike St. Jo D/OD: _N/A / WEIGHT (lbs) /18/2015	N/A : <u>1</u>	EXPLORATION TYPE/METHOD:  CORE INFO:  HAMMER DROP (inch): 30	Hollow Stem	Auger  Torvane Shear Strength
	ı	O Pe	D = Outside en. = Penetr ec. = Recov	Dia atio	meter n Length	mpf = S = Sp	Minute per F blit Spoon Direct Push	Foot C S	= Rocl C = So /OR = \		tion $F_v = Field Va$ or NA, NM = N	
		Casing Pen. (bpf)		; 	SAMPL	E INFO	RMATIO	N	100	Sample	H <sub>2</sub> 0	WELL CONSTRUCTION
Elev. (ft)	Depth (ft)	or Core Rate (mpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blows Count or RQD	Test Data	GRAPHIC	Description & Classification	Depth	DETAILO
	_		S-1	$\bigvee$	0.1 to 2.1	24/2	20-9- 10-4			ASPHALT (1 in.)  (0.1'- 0.4') POORLY GRADED GRAVEL (0.4'- 0.4') Redium to coarse, ~40% sal fine; FILL.	GP); nd,	backfill cuttings 6"
			S-2	$\bigvee$	2 to 4		4-2-3-3			(0.4'- 2.1') POORLY GRADED GRAVEL W SAND (GP); ~60% gravel, medium to coar ~40% sand, fine; dry, black, FILL. (2.1'- 2.5') SILTY SAND (SM); ~60% sand	rse,	bentonit seal. 1/4 bag
	_ 5 _		S-3	$\bigvee$	to 6	24/15	4-6-8- 12			~40% fines; dry, tan, FILL.  (2.5'- 4') POORLY GRADED SAND WITH AND GRAVEL (SM); ~70% sand, fine, ~20 fines, ~10% gravel, coarse, angular; dry, b FILL, asphalt pieces.	o% rown,	
	- - - - 10		S-4	X	8 to 10	24/24	4-9-14- 43			(4'- 9') POORLY GRADED SAND WITH GRAVEL (SP); ~90% sand, fine to coarse, gravel, fine; wet, tan.  (9'- 12.5') SILTY SAND (SM); ~50% sand, medium, ~40% fines, ~10% gravel, fine to coarse; wet, light brown.	~10% \\ \rightarrow{\Psi}{\Psi}	# sand for sand pack 2" diamter PVC Screen, 0.010 slot size
	- - - - 15		S-5		15 to 17	24/14	18-13- 16-18			(12.5'- 17') SILTY SAND WITH GRAVEL (~65% sand, medium to coarse, ~20% fine: ~15% gravel, fine to coarse; wet, gray.	SC); s,	17' bottom depth of boring, backfill
	_								114.	Bottom of Exploration at 17 feet		cuttings PVC plug
	_ 20 _											
boundar	ry betweer	n soil typ	nt approxima	าร ท						man Companies, LLC	Freema	ın Companies, Li
gradual. at times Fluctuat other fac	. Water level and under ions of gro	vel readi r conditi oundwat those p	ngs have be ons stated. er may occu resent at the	en i r du	made Fine to	CITY/ST	ATE: Br	: Marina V ridgeport, C ER: 2015-	Т	Housing Complex Redeve	Hartford SERVICES (860) 2	n Street d, CT 06102 51-9550 eemancos.com

Explo	ration	Loca	ation		EASTII	NC:		eT.	ATION		OFFSET:		EXPI	LORATION
HORIZ	TING: ZONTAI	_ DAT	UM:		EASIII	NG:	ST	ATION CE	ATION: ENTERL	.INE:	OFFSET:	-		B-5
VERT	ICAL D	ATUN	1:				ES	TIMATED	GROU	ND SURFA	CE ELEV. (FT):	_		GE 1 of 1
LOCA	TION:											_	PA	GE 1 01 1
	ng Info													
			_		5 - 5/12/20					-	TOTAL DEPTH (FT): 8.0			
	RACTOR MENT:	: <u>N</u> €	ew Englar	nd E	Boring	[	ORILLER:	Mike St.	. John		LOGGED BY (Person): _ EXPLORATION TYPE/MET		, Stam Δ	ulger
		N/A	\ / N/A				CASING I	D/OD: N	/A / N/A		CORE INFO:	TIOD. TIONOW	Otem	lugei
HAMM	ER TYP	E: _S	afety Har	nme	er	<u> </u>				40	HAMMER DROP (inch):	30		
			HS (ft):		<b>2</b> 6.50 5/	12/2015								
	RAL NO		= Inside D	iam	eter	bpf = E	Blows per F	oot	U = Undi	strubed Tube S	Sample WOH = Weight of Ha	nmer S., =	Pocket 1	Forvane Shear Strength
		Pe	D = Outside en. = Penet ec. = Reco	tratio	on Length	mpf = I S = Sp	Minute per l blit Spoon Direct Push	Foot	C = Rock	c Core	RQD = Rock Quality [ PID = Photoionization	Designation $F_v = 0$ Detector NA,	Field Va	
		Casing			SAMPL	E INFO	RMATIO	N	90					
Elev. (ft)	Depth (ft)	Pen. (bpf) or Core Rate (mpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blows Count or RQD	Test Data			Sample Description & Classification		H <sub>2</sub> 0 Depth	Remarks
			S-1	M	0	24/21	2-6-13-		<u>1 1/v</u>	TOPSOIL	_ (13 in.)			
	-			IXI	to 2		17		// . ;\ XX	(1.1'- 2')	SILTY SAND (SM); ~50% s	and. ~50%	1	
	-		S-2	H	2	24/22	25-15-			fines, ~09	% gravel; dry, dark brown, F nd asphalt.			
	_		-	Ш	to 4		32-23			(2'- 2.75')	WELL GRADED SAND (S			
				$\mathbb{N}$	4					1	e to coarse; dry, light brown B') SILTY SAND (SM); ~809			
	_		S-3	M	4 to	24/19	17-8-5- 6			~20% fine	eś; dry, dark brown, ÉILL, w			
	<del></del> 5			IXI	6						oof felt, and concrete. ) SANDY SILT (ML); ~70%	fines, ~30%		
	_		S-4	H	6	24/24	4-3-3-				e to coarse; moist, dark brown SILTY SAND (SM); ~80% s		$\blacksquare$	
	-			Ш	to 8		18			coarse, ~	20% fines; moist, tan, FILL		-	
	_			V					XX		SANDY SILT (ML); ~70% fi to coarse; wet, dark browr			
										(6.4'- 6.7'	) SILTY SAND (SM); ~80%	sand,		
											o coarse, ~20% fines; wet, ) SILTY SAND WITH GRA			
	— 10										nd, medium to coarse, ~309 evel, fine; wet, tan, FILL.	6 fines,		
	_									(7.6'- 8')	SILTY SAND (SM); ~85% s	and, fine to		
	_										~15% fines; wet, tan.  f Exploration at 8 feet			
										Bottom o	Exploration at 0 loct			
	_													
	<del></del> 15													
	-													
	_													
	_													
	— 20													
	_													
	_													
	-													
Stratifica	tion lines	epreser	nt approxim	l nate	I.	000==	) DV (2			2:	onice II C	F-	'00ma	n Companies II C
boundar	y between	soil type	es, transitions have b	ons r	may be 📙						anies, LLC Complex Redevel	Fr 36 A N 36	eemal John	n Companies, LLC Street

gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

FREEMAN COMPANIES PROJECT 2015-0408 - MARINA VILLAGE.GPJ GINT STD US LAB.GDT 5/29/15

CITY/STATE: Bridgeport, CT
PROJECT NUMBER: 2015-0408

Hartford, CT 06102 C O M P A N I E S (860) 251-9550 www.freemancos.com

Exp	loratio	n Loc	ation	E40	TINO:		OT ATI	ONI-	OFFSET.		EXPLORATION
HOR	IZONT	AL DA	TUM:	EAS	- ING:	STA	STATE	ON: ERL	OFFSET: LINE: ND SURFACE ELEV. (FT):		B-6
VER	TICAL	DATU	M:			ES	TIMATED GR	OU	ND SURFACE ELEV. (FT):		PAGE 1 of 1
Drill	ing Inf	orma	tion								
			: <u>5/13/20</u> New Englan			DRILLER:	Mike St. Joh	ın	TOTAL DEPTH (FT):10.0 LOGGED BY (Person): J. He	erpich	
EQUI	PMENT:	:							EXPLORATION TYPE/METHOD		Stem Auger
			/A / N/A Safetv Ham				/OD: <u>N/A / I</u> WEIGHT (lbs):				
WAT	ER LEVI	EL DEP			5/13/2015						
	ERAL NO		D = Inside Di	iameter	bpf =	Blows per Fo	oot U =	= Undi	istrubed Tube Sample WOH = Weight of Hammer		Pocket Torvane Shear Strength
		F	OD = Outside Pen. = Peneti Rec. = Recov	ration Leng	th $\dot{S} = S$	Minute per F plit Spoon Direct Push	SC	= So DR = \	k Core RQD = Rock Quality Design nic Core PID = Photoionization Dete Weight of Rods Q <sub>v</sub> = Pocket Penetrometer	ctor NA,	Field Vane Shear Strength NM = Not Applicable, Not Measured
		Casin Pen.	ĭ <b>⊢</b> —	SAM	PLE INFO	RMATIO	N	F00	Sample		
Elev. (ft)	Depth (ft)	n (bpf) or Core Rate (mpf	Sample No.	ed Dep		Blows Count or RQD	Test Data	GRAPHIC LOG	Description & Classification		H <sub>2</sub> 0 Depth Remarks
			S-1	0 to	24/19	13-17- 11-14		$\otimes$	ASPHALT (2 in.) (0.2'- 4.7') SILTY SAND WITH GRAVEL	/SM)·	
				2					~65% sand, fine to coarse, ~20% fines, ~ gravel, fine to coarse; dark brown, FILL,	15%	
			S-2	2 to	24/19	13-22- 105-30		$\bowtie$	concrete, brick, and black material.		
				4				$\bigotimes$			
			S-3	4 to	24/21	15-2-2- 2					
	- 5	5		6				$\bigotimes$	(4.7'- 4.8') SILT WITH SAND (ML); ~50% fine, ~50% fines; tan, FILL.	sand,	
	-		S-4	6	24/19	2-1-1-1			(4.8'- 6') SILT WITH SAND (ML); ~70% s fine to coarse, ~30% fines; gray, FILL, wi		
	-			to 8				$\bigotimes$	concrete, brick, black material, unknown material,	white	Ţ
	-		S-5	8	24/24	8-10-		$\bigotimes$	(6'- 7.6') SILTY SAND (SM); ~70% sand, coarse, ~30% fines; tan, FILL.	fine to	
	-			to   10		15-19			(7.6'- 8.5') SILTY SAND (SM); ~85% san coarse, ~15% fines; gray, FILL, with cond		
	- 10	) <del>                                    </del>		/ \ 					brick, black material, unknown white mat	erial,.	
5/29/15	-								sand, fine to coarse, ~2% fines; tan.	), ~90%	
	-								Bottom of Exploration at 10 feet		
B.GDJ	-										
USLA	-										
STD	- 15	5									
GINT	-										
ii GPJ	_										
LLAGE											
> Y											
MAR	_ 20	,									
0408											
2015-											
JECT											
PRO											
FREEMAN COMPANIES PROJECT 2015-0408 - MARINA VILLAGE.GPJ GINT STD USLAB.GDT seem of the party of											
Stratific bound	ary between	en soil ty	ent approximates, transition	ns may be					man Companies, LLC		eeman Companies, LLC
gradua at time	al. Water less and und	evel read ler condi	lings have be tions stated.	een made	1		: Marina Vil		Housing Complex Redeve	Ha	John Street artford, CT 06102
other f		n those	iter may occu present at the de.		1		ER: 2015-0		LAND DEVILOPMENT TRAINERING BESSAN I	ONSTRUCTION SERVICES (8)	60) 251-9550 vw.freemancos.com

Hartford, CI UDIU2 COMPANIES (860) 251-9550 www.freemancos.com

Explo	oration	Loca	ation										EXPL	ORATION
NORT	THING:		1184.		EASTIN	NG:	CT	STATI	ON:	INIT.	OFFSET:			D 7
VEDT	ZONTA	L DAI	UM:				SI	ATION CEN		INE:	CE ELEV. (FT):			B-7
LOCA	TION:	AIOW	١٠					TIMATED G	\OUI	ND SUKFA	CE ELEV. (F1)		PA	GE 1 of 1
	ng Info			N15	5 - 5/12/20	115					TOTAL DEPTH (FT): 8.0			
					Boring		ORILLER:	Mike St. Jo	hn	-	LOGGED BY (Person): J. He	rpich		
EQUIP	MENT:										EXPLORATION TYPE/METHOD	: Hollow	Stem A	uger
								<b>D/OD:</b> N/A /			CORE INFO:			
		_			er • coo e/		HAMMER	WEIGHT (lbs)	: <u>1</u>	10	HAMMER DROP (inch): 30			
	RAL NO		по (п.):	_3	Z 6.00 5/	12/2015								
	VIATION		= Inside D	iam	eter	bpf = E	Blows per F	oot U	= Undi	strubed Tube				orvane Shear Strength
		Pe	D = Outside en. = Pener ec. = Reco	ratio	on Length	S = Sp	Minute per l dit Spoon Direct Push	S	C = So	Core nic Core Veight of Rods	RQD = Rock Quality Design PID = Photoionization Detect Q <sub>v</sub> = Pocket Penetrometer S	ctor NA,		ne Shear Strength t Applicable, Not Measured
		Casing			SAMPL	E INFO	RMATIO	N	LOG					
Elev. (ft)	Depth (ft)	Pen. (bpf) or Core Rate (mpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blows Count or RQD	Test Data	GRAPHIC L		Sample Description & Classification		H₂0 Depth	Remarks
			S-1	1/	0	24/17	9-21-		XXX	APHALT	(3 in.)			
	-			IXI	to 2		21-39		$\bowtie$		) SILTY SAND WITH GRAVEL nd, fine to medium, ~20% grave			
	_			$\square$					$\bowtie$	coarse, ~	15% fines; brown, FILL, with as	phalt,		
			S-2	M	2 to	24/24	11-8-4- 5		$\bowtie$	plastic, a	nd black materials.			
	_			M	4				$\bowtie$					
	_		S-3	H	4	24/24	2-2-2-2		$\boxtimes$					
	<b>—</b> 5			Ш	to 6						SILTY SAND WITH GRAVEL (S nd, fine to medium, ~20% grave			
				$\mathbb{N}$						~20% fin	es; moist, tan.		▼	
			S-4	M	6 to	24/20	4-16- 21-14			(6'- 6.5') ~70% sa	SILTY SAND WITH GRAVEL (S nd, fine, ~20% fines, ~10% grav	SM);	_	
	_			IXI	8		21-14				to coarse; wet.	CI,		
	-			Н						(6.5'- 8')	POORLY GRADED SAND (SP); dium to coarse, ~5% fines; wet,	;~95% tan /		
											f Exploration at 8 feet	tari.		
	<u> </u>													
	-													
	_													
	_													
	— 15													
	_													
	F													
	_													
	_ 20													
	-													
	_													
			nt approxim			OGGET	) BY (Co	nsultant):	reer	nan Como	anies II C	Fr	eemai	n Companies, LLC
gradual.	Water lev	el readir	es, transitions ngs have b	ns r een							Complex Redever	36	John	Street

gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

FREEMAN COMPANIES PROJECT 2015-0408 - MARINA VILLAGE.GPJ GINT STD US LAB.GDT 5/29/15

CITY/STATE: Bridgeport, CT
PROJECT NUMBER: 2015-0408

Hartford, CT 06102 COMPANIES (860) 251-9550 www.freemancos.com

Explo	ration	Loca	tion										EXP	LORATION
NORT	HING:				EASTI	NG:		STA	TION:		OFFSET:			
HORIZ	ZONTAI	L DAT	UM:				ST	ATION CEN	NTERL	INE:	OF F1 F1/ (FT)			B-8
								IIMATED	3ROUI	ND SURFA	CE ELEV. (FT):		PA	GE 1 of 1
	ng Info			o 4 =	= 14010	0.15								
			5/13/2 ew Englar				ADII I ED:	Mike St. J	lohn	-	TOTAL DEPTH (FT): 12.0  LOGGED BY (Person): J. He	rnich		
	MENT:	. <u>INC</u>	ew Erigiai	iu b	oring	— <b>'</b>	JRILLER.	WIRE St. 3	JOHN		EXPLORATION TYPE/METHOD		Stem A	waer
		N/A	1 / N/A				CASING IE	<b>)/OD</b> : N/A	/ N/A		CORE INFO:			
		_	afety Har				HAMMER	WEIGHT (lbs	s): _14	10	HAMMER DROP (inch): 30			
			HS (ft):	Ţ	6.50 5/	/13/2015								
	RAL NO		- Institute D		4	h-f-1	DI F-		I I — I I — «I	atorila ad Triba (	No		D1-47	F
ADDRE	EVIATIONS	OI Pe	= Inside D 0 = Outside n. = Penet c. = Reco	e Dia tratio	ameter on Length	mpf = S = Sp	Blows per Fo Minute per Folit Spoon Direct Push	oot	C = Rock SC = Soi		RQD = Rock Quality Design PID = Photoionization Deter	nation $F_v = $	Field Va	Forvane Shear Strength ne Shear Strength of Applicable, Not Measured
		Casing		;	SAMPL	E INFO	RMATIO	N	90					
Elev. (ft)	Depth (ft)	Pen. (bpf) or Core Rate (mpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blows Count or RQD	Test Data	GRAPHIC LOG		Sample Description & Classification		H <sub>2</sub> 0 Depth	Remarks
			S-1	M	0	24	9-12-8-		74 14.	TOPSOIL				I
	-			IXI	to 2		16				POORLY GRADED SAND WITH (SP); ~60% sand, fine to coarse			
	_			Ц	•	0.4				gravel, fir	ne to coarse, ~10% fines; dry, Fl	LL, with		
			S-2	M	2 to	24	5-5-4-4				ocrete, and black material.  OORLY GRADED SAND WITH			
	_			M	4					GRAVEL	(SP); ~70% sand, medium to co	oarse,		
	-		S-3	Н	4	24	7-7-9-8			~30% gra	evel, fine to coarse; dry, tan, FIL	L, DIACK		
	<del>-</del> 5			Ш	to 6						OORLY GRADED SAND WITH (SP); ~75% sand, fine to coarse	- 200/		
				$\mathbb{N}$	U					gravel, fir	ne to coarse, ~5% fines; moist, o	lark		
			S-4	M	6 to	24	5-5-4-3			brown, FI white mat	LL, with brick, black material, ur	nknown	Ţ	
	-			IXI	8					(7'- 10') S	SILTY SAND WITH GRAVEL (S	M);		
	_		S-5	$\mathbb{H}$	8	24	100/2"		$\otimes$		nd, fine to coarse, ~20% gravel, 20% fines; wet, dark brown, FIL			
			3-3	M	to	24	100/2		$\otimes$		ck material, unknown white mate			
				M	10									
	— 10		S-6	И	10	24	11-15-		ĬĬ		SILTY SAND WITH GRAVEL (S			
	-			IXI	to 12		16-21				nd, fine to coarse, ~30% gravel, 15% fines; wet, brown.	fine to		
	_			Ν						D-#	Francisco et 40 feet			
										DOLLOITI O	f Exploration at 12 feet			
	-													
	<del></del> 15													
	_													
	_													
	-													
	_													
	— 20													
	-													
	_													
	-													
Stratifica	tion lines	epreser	nt approxim	nate	<del></del>	000=	) D)/ /C					F		n Companies II C
boundar	y between	soil type	es, transition	ns m							anies, LLC Complex Redeve	56 N	John John	n Companies, LLC Street

gradual. Water level readings have been made at times and under conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the time measurements were made.

FREEMAN COMPANIES PROJECT 2015-0408 - MARINA VILLAGE.GPJ GINT STD US LAB.GDT 5/29/15

CITY/STATE: Bridgeport, CT
PROJECT NUMBER: 2015-0408

Hartford, CT 06102 COMPANIES (860) 251-9550 www.freemancos.com

NOR	ZONTA	L DAT	UM:				ST	ATION CENT	ΓERL	OFFSET:		PLORATION 9/MW-2
VERI	ICAL D	ATUN	1:				ES	TIMATED GI	ROU	ND SURFACE ELEV. (FT):		AGE 1 of 1
Drilli DATE CONT EQUIF AUGE HAMN WATE	NG INFO START / RACTOR PMENT: R ID/OD IER TYP	END:   END:   R: No 	5/14/2 ew Engla 55 in / N//	2015 and E	5 - 5/14/20 Boring er	015 	DRILLER: CASING IE	_Mike St. Joi D/OD: _N/A / WEIGHT (lbs):	N/A	EXPLORATION TYPE/METHOD: CORE INFO:	Hollow Stem	Auger
ABBRI	EVIATION	OI Pe	= Inside [ D = Outsiden. = Pene ec. = Reco	de Dia etratio	ameter on Length	mpf = S = Sp	Blows per Fo Minute per Fo blit Spoon Direct Push	Foot C S0	= Roc C = So OR =	istrubed Tube Sample k Core nic Core Weight of Rods  WOH = Weight of Hammer RQD = Rock Quality Designa PID = Photoionization Detect Q <sub>v</sub> = Pocket Penetrometer St	ion $F_v = \text{Field V}$ or NA, NM = N	Torvane Shear Strength ane Shear Strength lot Applicable, Not Measure
		Casing Pen.			SAMPL	E INFO	RMATIO	N	FOG	Sample		WELL CONSTRUCTION
Elev. (ft)	Depth (ft)	(bpf) or Core Rate (mpf)	Sample No.	Type	Depth (ft)	Pen./ Rec. (in)	Blows Count or RQD	Test Data	GRAPHIC	Description & Classification	H <sub>2</sub> 0 Depth	DETAILO
			S-1		0 to 2	24/20	14-16- 24-24			(0'- 9.5') SILTY SAND WITH GRAVEL (SN ~55% sand, fine to coarse, ~30% fines, ~1 gravel, fine to medium; moist, brown.	l); 5%	backfill cuttings 6" bentonit seal. 1/4 bag.
	_ _ _ _ 10		S-2 S-3		4 to 6 8 to 10		14-19- 17-21 21-30- 39-33			(9.5'- 10') SILTY SAND WITH GRAVEL (S ~55% sand, fine to coarse, ~30% fines, ~1 gravel, fine to medium; moist, black, odor. (10'- 17') SILTY SAND WITH GRAVEL (SI ~55% sand, fine to coarse, ~30% fines, ~1	5% //);	#2 sand for sand pack. 2" diamter PVC Screen.
	_ _ 15 _		S-4	X	15 to 17	24/22	32-41- 72-100			gravel, fine to medium; moist, brown.  Bottom of Exploration at 17 feet		0.010 slot size
												backfill cuttings, PVC plug
bounda gradual at times Fluctual other fa	ation lines ry betweer . Water lev and unde tions of gro ctors than ements we	n soil typ vel readii r conditio oundwate those pr	es, transiti ngs have tons stated er may occ esent at th	ons r been cur du	made	PROJEC	T NAME ATE: Bi		llage	man Companies, LLC Housing Complex Redeve	36 John Hartfor (860) 2	an Companies, Ll n Street d, CT 06102 51-9550 eemancos.com

NORT	oration 'HING: ZONTAI		_		EASTI	NG:	ST.	STA	ATION: ENTERL	OFFSET: INE: ID SURFACE ELEV. (FT):			E	ORATION  3-10
LOCA	TION:	A1011							OROGI	DON'T AGE LEEV. (11).			PA	GE 1 of 1
DATE : CONTI EQUIP AUGEI HAMM WATEI GENEI	RACTOR MENT: R ID/OD: ER TYPI	N/A  S: Ne  N/A  S: S  DEPT  TES:  DID  OIL	5/13/2 ew Engla A / N/A afety Ha THS (ft): = Inside I D = Outsid	mm	neter ameter	5/13/2015 bpf = E	CASING IE	oot	/A / N/A  bs): _14  U = Undis C = Rock	0 HAMMER DROF  strubed Tube Sample WOH = V Core RQD = R	erson): J. He TYPE/METHOD P (inch): 30 Weight of Hammer Rock Quality Design	Hollow $S_{v} = $ Paration $S_{v} = $	Pocket T Field Var	orvane Shear Strength
Rec. = Recovery Length DP = Direct Push Sample WOR = Weight of Rods Q <sub>v</sub> = Pocket Penetrometer Strength													NM = No	t Applicable, Not Measured
		Casing Pen.			SAMPL	E INFO	RMATIO	N	_00	_				
Elev. (ft)	Depth (ft)	(bpf)	Sample No.	e Type	Depth (ft)	Pen./ Rec. (in)	Blows Count or RQD	Test Data	GRAPHIC LOG	Sam Descript Classific	tion & cation		H₂0 Depth	Remarks
	5 - 10 - 15 - 20 - 20 ty between	epreser				24/24	11-6-6- 5 20-17- 20-16 16-32- 30-40 57-77- 59-129	nsultant):		(0'- 3.5') SILTY SAND WIT ~40% sand, fine to coarse gravel, fine to medium; dry  (3.5'- 8.5') SILTY SAND W ~40% sand, fine to mediur gravel, fine to coarse; dry,  (8.5'- 20.7') SILTY SAND N ~60% sand, fine to coarse medium, ~20% fines; wet,	with GRAVEL, ~20% gravel, brown.	(SM); ~20%	₽emar	n Companies, LLC
boundar gradual.	y between Water lev	soil type el readir	es, transiti ngs have t	ions been	may be		•			nan Companies, LLC Housing Complex Redeve	FREEM	36	John	Street
at times Fluctuati other fac	and under ons of gro ctors than te ments we	condition undwate hose pr	ons stated er may occ esent at th	l. cur d	ue to	CITY/ST	ATE: B	ridgeport, ER: 201	СТ	. Isaamig Complex Nedeve	C O M P A N	N I E S (86	rtford 30) 25	, CT 06102 1-9550 emancos.com

FREEMAN COMPANIES PROJECT 2015-0408 - MARINA VILLAGE.GPJ GINT STD US LAB.GDT 5/29/15



# APPENDIX B LABORATORY TEST RESULTS



Client: Freeman Companies, LLC

Project: Marina Village Housing Redevelopment

Location: Bridgeport, CT

Boring ID: B-2 Sample Type: bag Tested By: jbr Sample ID: S3 Test Date: 05/27/15 Checked By: emm

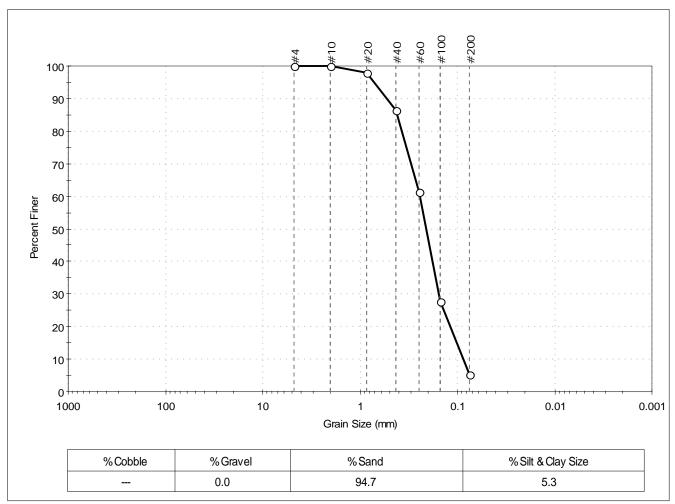
Depth: 8-10 ft Test Id: 333328

Test Comment: ---

Sample Description: Moist, brownish yellow sand with silt

Sample Comment: ---

# Particle Size Analysis - ASTM D422



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	98		
#40	0.42	87		
#60	0.25	61		
#100	0.15	28		
#200	0.075	5.3		

<u>Coefficients</u>						
D <sub>85</sub> = 0.4112 mm	$D_{30} = 0.1550 \text{ mm}$					
D <sub>60</sub> = 0.2446 mm	$D_{15} = 0.1011 \text{ mm}$					
D <sub>50</sub> = 0.2101 mm	$D_{10} = 0.0867 \text{ mm}$					
$C_u = 2.821$	$C_c = 1.133$					

Project No:

GTX-303192

 $\begin{array}{cc} & & \textbf{Classification} \\ \underline{\text{ASTM}} & & \text{N/A} \end{array}$ 

AASHTO Fine Sand (A-3 (1))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ROUNDED

Sand/Gravel Hardness: HARD

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Client: Freeman Companies, LLC

Project: Marina Village Housing Redevelopment

Location: Bridgeport, CT

Boring ID: B-4 Sample Type: bag Tested By: jbr Sample ID: S5 Test Date: 05/27/15 Checked By: emm

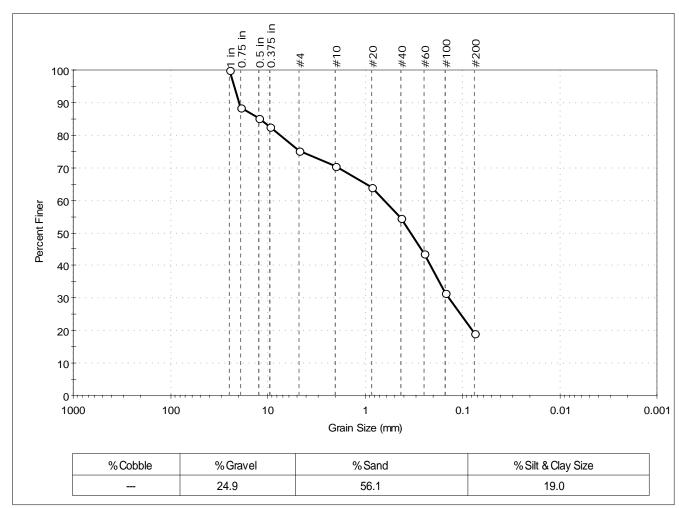
Depth: 15-17 ft Test Id:

Test Comment: ---

Sample Description: Moist, light gray silty sand with gravel

Sample Comment: ---

# Particle Size Analysis - ASTM D422



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	89		
0.5 in	12.50	85		
0.375 in	9.50	82		
#4	4.75	75		
#10	2.00	71		
#20	0.85	64		
#40	0.42	54		
#60	0.25	44		
#100	0.15	31		
#200	0.075	19		

<u>Coefficients</u>						
$D_{85} = 12.1370 \text{ mm}$	$D_{30} = 0.1382 \text{ mm}$					
$D_{60} = 0.6376 \text{ mm}$	$D_{15} = N/A$					
$D_{50} = 0.3418 \text{ mm}$	$D_{10} = N/A$					
$C_{II} = N/A$	$C_c = N/A$					

Project No:

333329

GTX-303192

 $\frac{\text{Classification}}{\text{ASTM}} \qquad \text{N/A}$ 

AASHTO Silty Gravel and Sand (A-2-4 (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ROUNDED

Sand/Gravel Hardness: HARD

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Client: Freeman Companies, LLC

Project: Location:

Marina Village Housing Redevelopment Bridgeport, CT

Boring ID: B-7 Sample Type: bag Tested By: jbr Test Date: 05/27/15 Sample ID: S4 Checked By: emm

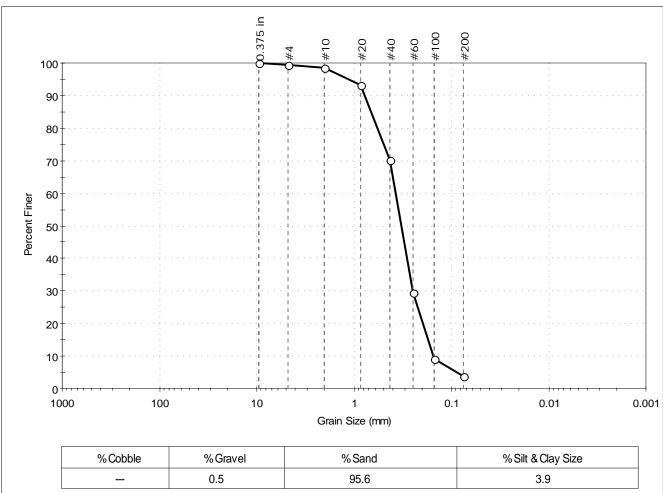
Depth: 6-8 ft Test Id: 333330

Test Comment:

Sample Description: Moist, brownish yellow sand

Sample Comment:

# Particle Size Analysis - ASTM D422



		•				
Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies		Coeff
					D <sub>85</sub> = 0.663	36 mm
0.375 in	9.50	100			$D_{60} = 0.372$	20 mm
#4	4.75	99			D <sub>00</sub> = 0.372	20 111111
#10	2.00	98			$D_{50} = 0.326$	64 mm
#20	0.85	93			$C_{u} = 2.422$	2
#40	0.42	70				

0.375 in	9.50	100	
#4	4.75	99	
#10	2.00	98	
#20	0.85	93	
#40	0.42	70	
#60	0.25	30	
#100	0.15	9	
#200	0.075	3.9	

<u>Coefficients</u>						
$D_{85} = 0.6636 \text{ mm}$	$D_{30} = 0.2513 \text{ mm}$					
$D_{60} = 0.3720 \text{ mm}$	$D_{15} = 0.1739 \text{ mm}$					
$D_{50} = 0.3264 \text{ mm}$	$D_{10} = 0.1536 \text{ mm}$					
$C_u = 2.422$	$C_c = 1.105$					

Project No:

GTX-303192

<u>Classification</u> Poorly graded sand (SP) <u>ASTM</u>

Fine Sand (A-3 (1)) <u>AASHTO</u>

<u>Sample/Test Description</u> Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness: ---



Client: Freeman Companies, LLC

Project: Marina Village Housing Redevelopment

Location: Bridgeport, CT

Project No: GTX-303192 Boring ID: B-10 Sample Type: bag Tested By: jbr 05/27/15 Sample ID: S5 Test Date: Checked By: emm

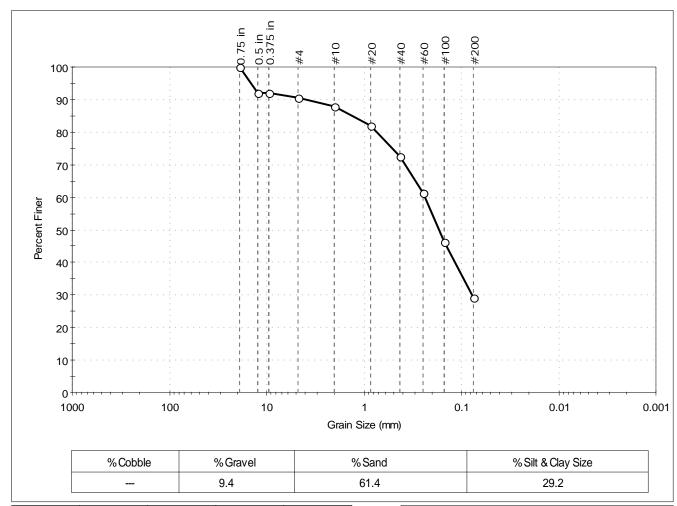
20-22 ft Depth: Test Id: 333331

Test Comment:

Sample Description: Moist, brown silty sand

Sample Comment:

# Particle Size Analysis - ASTM D422



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	92		
0.375 in	9.50	92		
#4	4.75	91		
#10	2.00	88		
#20	0.85	82		
#40	0.42	73		
#60	0.25	61		
#100	0.15	46		
#200	0.075	29		

<u>Coefficients</u>						
$D_{85} = 1.3240 \text{ mm}$	$D_{30} = 0.0775 \text{ mm}$					
$D_{60} = 0.2386 \text{ mm}$	$D_{15} = N/A$					
$D_{50} = 0.1696 \text{ mm}$	$D_{10} = N/A$					
$C_u = N/A$	$C_C = N/A$					

Classification <u>ASTM</u> N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ROUNDED

Sand/Gravel Hardness: HARD



Client: Freeman Companies, LLC

Project Name: Marina Village Housing Redevelopment

Project Location: Bridgeport, CT

GTX #: 303192

Start Date: 05/28/15 Tested By: jcw
End Date: 05/29/15 Checked By: emm

Boring #: B-4/Combined

Sample #: S4
Depth: 6-10 ft

Visual Description: Moist, yellowish brown sand with gravel

# Permeability of Granular Soils (Constant Head) by ASTM D2434

Sample Type: Remolded

Sample Information: Maximum Dry Density: --- pcf

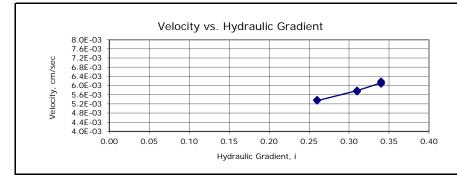
Optimum Moisture Content: --- %
Compaction Test Method: --Classification (ASTM D2487): --Assumed Specific Gravity: 2.65

Sample Preparation / Test Setup:

Test specimen compacted with moderate effort at air-dried moisture content. Material > 3/8-inch removed from sample prior to testing (0% of sample).

Parameter	Initial	Final
Height, in	4.03	4.03
Diameter, in	3.98	3.98
Area, in <sup>2</sup>	12.4	12.4
Volume, in <sup>3</sup>	50.1	50.1
Mass, g	1239	1575
Bulk Density, pcf	94.2	120
Moisture Content, %	0.9	28.3
Dry Density, pcf	93.3	93.3
Degree of Saturation, %		97.0
Void Ratio, e		0.77

	Reading	Volume of		Flow Rate,		Permeability,	Temp.,	Correction	Permeability @
Date	#	Flow, cc	Flow, sec	cc/sec	Gradient	cm/sec	°C	Factor	20 °C, cm/sec
5/28	1	4.3	10	0.43	0.26	2.1E-02	19.1	1.023	2.1E-02
5/28	2	4.3	10	0.43	0.26	2.1E-02	19.1	1.023	2.1E-02
5/28	3	4.3	10	0.43	0.26	2.1E-02	19.1	1.023	2.1E-02
5/28	4	4.6	10	0.46	0.31	1.9E-02	19.1	1.023	1.9E-02
5/28	5	4.6	10	0.46	0.31	1.9E-02	19.1	1.023	1.9E-02
5/28	6	4.6	10	0.46	0.31	1.9E-02	19.1	1.023	1.9E-02
5/28	7	4.9	10	0.49	0.34	1.8E-02	19.1	1.023	1.8E-02
5/28	8	4.9	10	0.49	0.34	1.8E-02	19.1	1.023	1.8E-02
5/28	9	5.0	10	0.50	0.34	1.8E-02	19.1	1.023	1.9E-02



PERMEABILITY @ 20  $^{\circ}$ C = 2.0 x 10<sup>-2</sup> cm/sec

Note: This standard has been withdrawn by ASTM with no replacement.