ADDENDUM NO. 1

BID NO. 19-05

RIPKEN STADIUM STRUCTURAL REPAIR
CITY OF ABERDEEN, MARYLAND

To all holders of the specifications, the following corrections are hereby made. All other items shall remain unchanged. This addendum shall become part of the Contract Documents for the above referenced project.

The structural condition report performed by Hillis-Carnes Engineer Associates is provided in this addendum. The geotechnical report is provided within the structural condition report.

For purposes of this addendum, the estimated design fees and construction costs and been omitted from the structural condition report.

Acknowledgement of Addendum

Name: ____

Company: ____

Date: ____

Signature: ____

HILLIS-CARNES
ENGINEERING ASSOCIATES

10975 Guilford Road, Suite A
Annapolis Junction, MD 20701
Phone (410) 880-4788
Fax (410) 880-4098
www.hcea.com

STRUCTURAL CONDITION REPORT

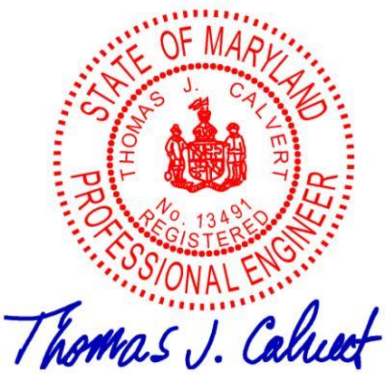
RIPKEN STADIUM
LEFT FIELD RAMP RETAINING WALL

ABERDEEN, MD

HCEA JOB NO.18317A

August, 2018

Prepared for:
Mr. Kyle Torster
Director Department Public Works
City of Aberdeen
60 North Parke Street
Aberdeen, MD 21001



Thomas J. Calvert, P.E.

William M. Carnes, P.E.

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

The purpose of this investigation was to perform a structural condition assessment of the existing lower retaining wall along the ramp located in the left field area, document our findings, and make general recommendations for repairs. Crews from Hillis-Carnes Engineering Associates made site visits in June and July, 2018. We visually inspected the cast-in-place concrete retaining walls and ramp slab and performed test borings along the outside of the wall as well as through the ramp slab.

No concrete material testing was performed. The soil samples obtained from the borings were analyzed in the laboratory. The Geotechnical Report is included as Appendix A of this report. Photographs of representative conditions are included herein. Recommendations for repairs to the lower retaining wall are included.

2.0 EXECUTIVE SUMMARY

The lower retaining wall along the ramp needs to be reinforced with a new wall built directly in front of the existing with additional tiebacks installed.

The existing joint sealant between the ramp slab and the retaining walls on both sides requires replacement to keep surface water from penetrating the subgrade below the slab. This joint is critical and should be maintained. The joint sealant between the plaza slab and the upper retaining wall needs to be replaced where it has failed and maintained in the future.

Patch joints between ramp sections where differential settlement has occurred to illuminate a tripping hazard.

3.0 GENERAL DESCRIPTION

The focus of the investigation is on the lower site retaining wall that runs along the ramp located at the left field side of the stadium. The ramp runs approximately 229 feet from the plaza level down to the top of a set of stairs. The concrete ramp is a slab on grade between the upper concrete retaining wall which supports the plaza slab and a lower concrete retaining wall. The ramp has intermediate “landings” or flat sections every 30’ with a 30 inch drop between landings. The elevation difference between the plaza level and the base of the ramp at the stairs is approximately 12’-9”. The ramp is approximately 5 feet wide.

As detailed on the original construction drawings, the plaza slab bears on a four inch ledge at the top of the upper retaining wall. The ramp slab bears on a 4 inch ledge at the lower retaining wall and is not supported along the intersection with the upper retaining wall.

4.0 OBSERVATIONS

A team from Hillis-Carnes Engineering Associates (HCEA) visited the site during the period from 6/1/18 and 7/24/18 and made the following observations:

The lower concrete retaining wall along the ramp is in poor condition with noticeable lateral deflection and numerous cracks and spalls. There is evidence of previous crack repairs using epoxy injection and concrete pilasters added to the outside face of the wall. Nine tieback anchors were installed in 2005 through the lower retaining wall, below the upper retaining wall footing and into the soil behind the upper wall. These tiebacks were installed in an attempt to keep the lower wall from rotating outward due to the lateral soil pressures from the retained soil and surcharge loading from the upper retaining wall footing. It is our opinion that the lower retaining wall was not adequately designed to support the surcharge loading applied to it from the upper retaining wall, and the tiebacks were added as a remedial solution to this problem three years after the stadium opened.

There are gaps between the ramp slab and the upper retaining wall and between the ramp slab and the lower retaining wall as result of the lateral movement in the lower retaining wall. The flexible sealant between the edge of the slab and the face of the walls has failed as a result of this movement, allowing surface water runoff to saturate the subgrade under the ramp. This additional water increases the lateral pressures on the wall causing further movement. There are also areas where differential settlement in the slab subgrade has resulted in uneven surfaces across joints.

A new railing was installed on the top of the lower wall within the last few years. It appears that a concrete curb was added to the top of the existing wall and the railing attached to the top of the curb. It is not known how the additional curb is connected to the original wall.

5.0 RECOMMENDED REMEDIAL WORK

Based upon our observations, the following remedial work is recommended:

Provide a new concrete wall in front of the existing lower wall along the ramp. This wall will be placed directly against the existing wall. In order to construct this wall, tiebacks will be installed at approximately 9 feet on center through the existing low wall and extend through the new wall. This will stabilize the existing wall while excavating for the new wall foundation and provide additional lateral support for the new wall. We recommend that this new wall extend from the existing stairs at the bottom of the ramp to approximately 35 feet from the beginning of the ramp at the high end. Refer to Options 1 and 2 sections attached.

Remove the existing joint sealant between the ramp slab and the walls and replace with new expansion joint material and joint sealant to prevent surface water runoff from penetrating the subgrade below the slab. Replace, as needed, and maintain the joint sealant between the plaza level slab and the upper retaining wall.

Replace sections of the ramp slab or use a repair mortar to level out uneven joints between slab sections.

6.0 PHOTOGRAPHS

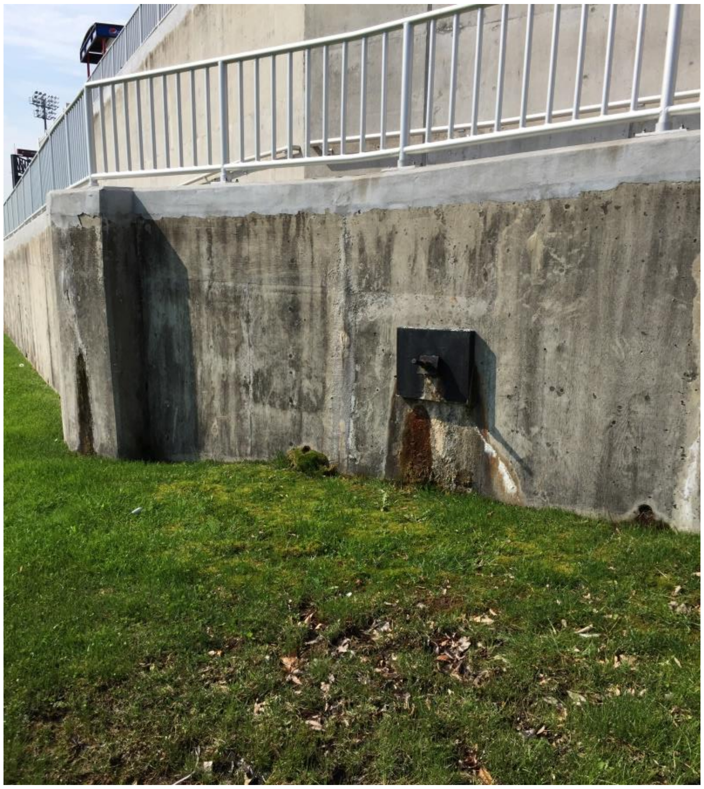
See the following pages for photographs with descriptions.

7.0 EXISTING CONDITIONS and WALL REPAIR SKECHES

See attached plans, existing conditions sections and wall repair options 1 and 2.

8.0 GEOTECHNICAL REPORT

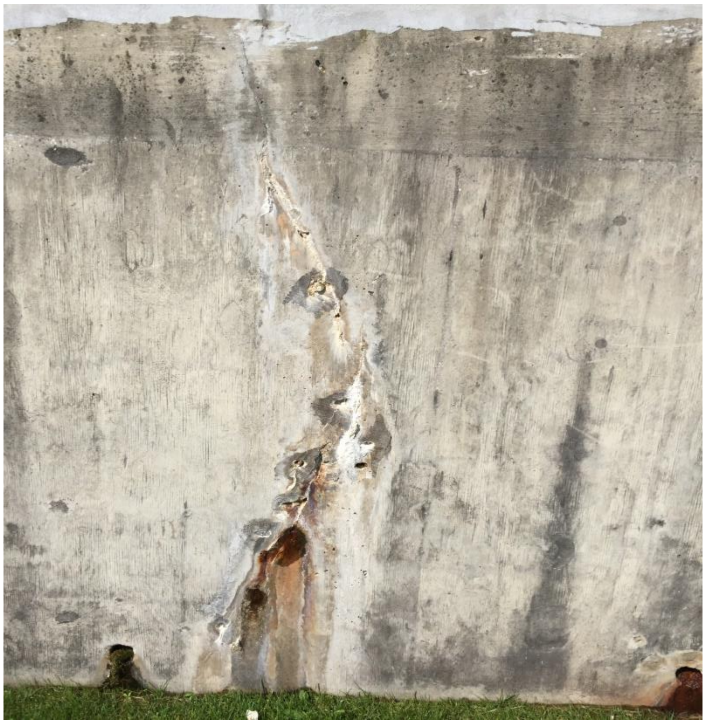
See attached Geotechnical Report.



Pilaster and tieback anchor plate

Wall cracks and water seepage

Existing tiebacks and light pole

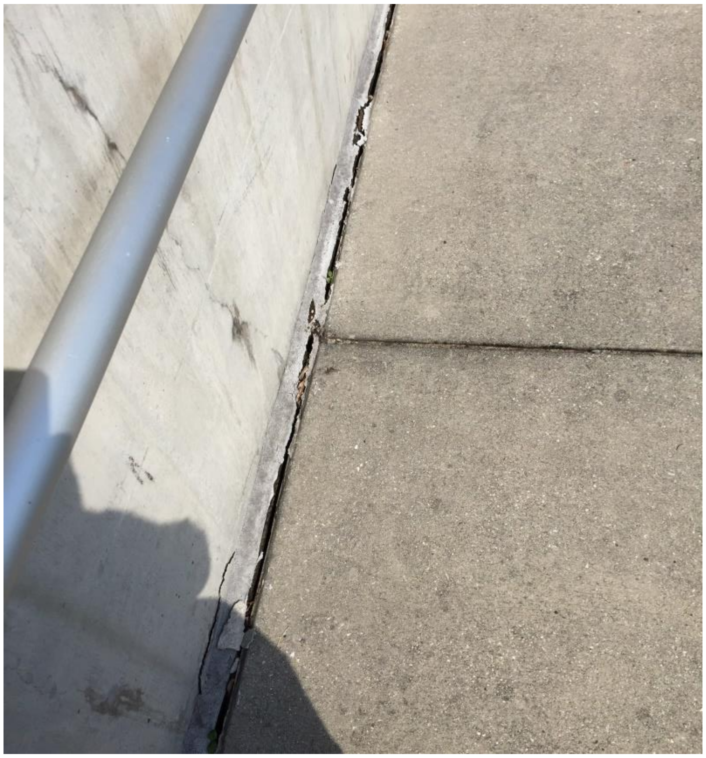


Previous crack repair by epoxy injection

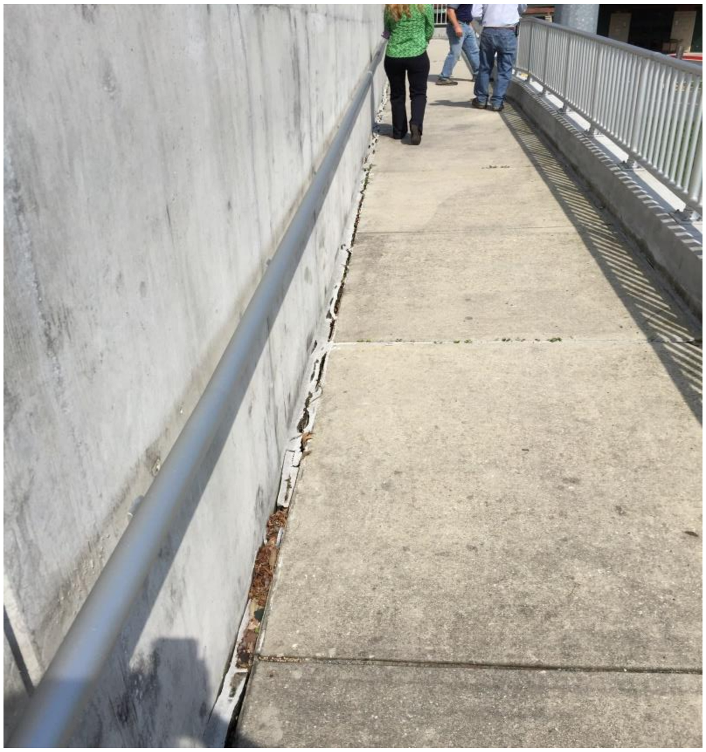
End of ramp at stair

Cracks and spalls at pilaster

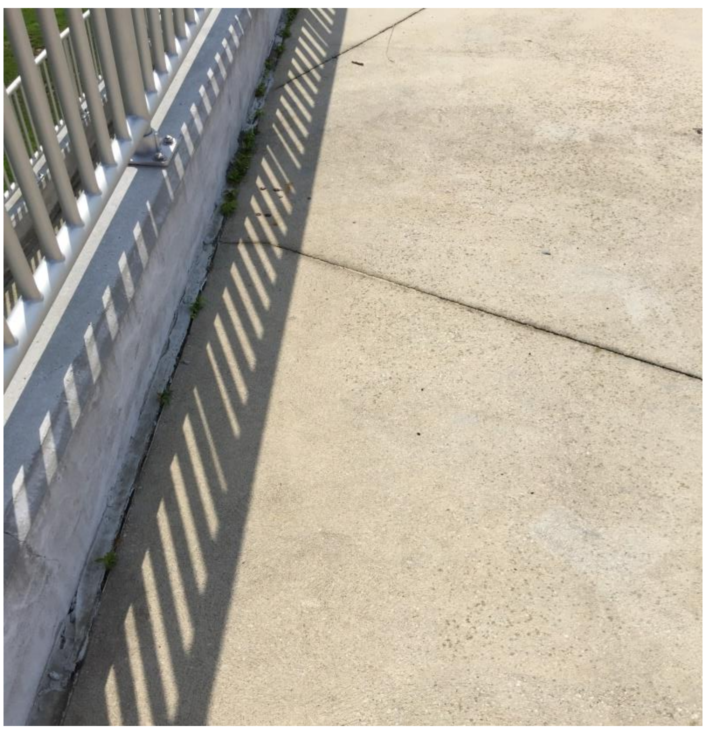
Failed tieback (note anchor plate and portion of tieback on ground)



Failed joint sealant and gap between ramp and upper wall



Gap between ramp slab and upper wall



Failed joint sealant and gap between ramp and lower wall

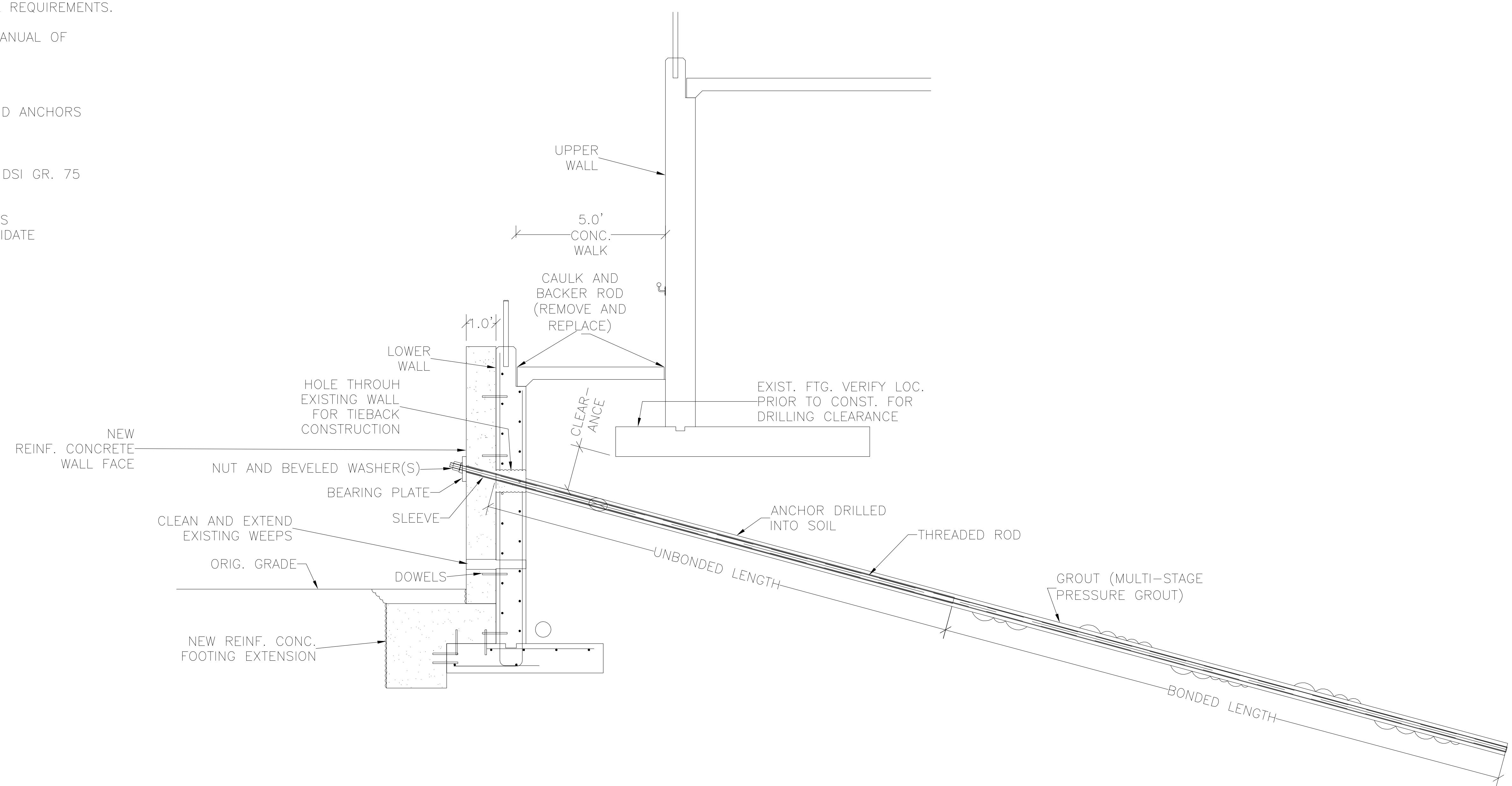
NOTES: (PENDING FINAL DESIGN)

CONSTRUCTION TO MEET IBC AND LOCAL REQUIREMENTS.

1. CONCRETE CONSTRUCTION PER ACI MANUAL OF CONCRETE PRACTICE, CURRENT EDITION
CONCRETE 4500 PSI, WC <= 0.40,
AIR ENTRAINED. REINF. ASTM A619.

2. TIEBACKS PER FHWA G.E.C. 4 GROUND ANCHORS AND ANCHORED SYSTEMS
SPACING APPROX. 9' C/C
LOAD APPROX. 100 KIPS
THREADBAR GALV'D OR EPOXY-COATED, DSI GR. 75
GROUT 4000 PSI

INSTALL AND TEST ONE OF THE TIEBACKS PRIOR TO GENERAL PRODUCTION TO VALIDATE CAPACITY AND CONSTRUCTION METHODS.



WALL REPAIR OPTION 1

4.0'

HILLIS-CARNES ENGINEERING ASSOCIATES
10975 Guilford Road, Suite A Annapolis Junction, Maryland
Ph: (410) 880-4788 WWW.HCEA.COM Fax: (410) 880-4098

RIPKEN STADIUM – WALL REPAIR
HARFORD COUNTY, MD.

PROJECT NO.	18317A	DESIGN BY:	N/A
DATE:	8/8/18	DRAWN BY:	PR
SCALE:	NTS	CHECKED BY:	......
SHEET:	1 OF 1		

NOTES: (PENDING FINAL DESIGN)

CONSTRUCTION TO MEET IBC AND LOCAL REQUIREMENTS.

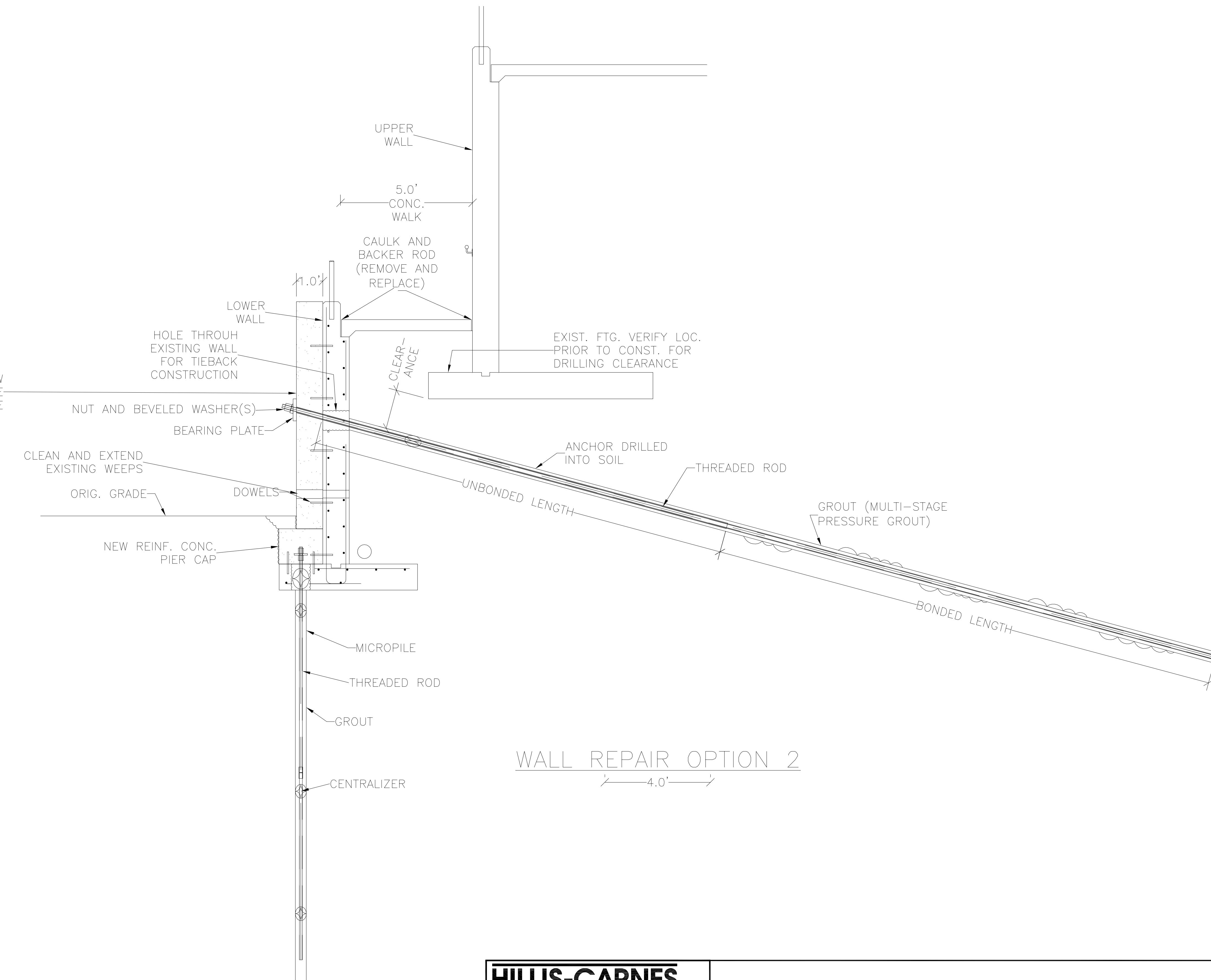
1. CONCRETE CONSTRUCTION PER ACI
MANUAL OF CONCRETE PRACTICE
CURRENT EDITION
CONCRETE 4500 PSI, WC <= 0.40,
AIR ENTRAINED. REINF. ASTM A619.

2. TIEBACKS PER FHWA G.E.C. 4 GROUND ANCHORS
AND ANCHORED SYSTEMS
SPACING APPROX. 9' C/C
LOAD APPROX. 100 KIPS
THREADBAR GALV'D OR EPOXY-COATED, DSI GR. 75
GROUT 4000 PSI

INSTALL AND TEST ONE OF THE TIEBACKS
PRIOR TO GENERAL PRODUCTION TO VALIDATE
CAPACITY AND CONSTRUCTION METHODS.

MICROPILES PER FHWA SA-97-070 MICROPILE DESIGN
AND CONSTRUCTION GUIDELINES
SPACING APPROX. 13.5' C/C
LOAD APPROX. 25 KIPS
THREADBAR GALV'D OR EPOXY-COATED, DSI GR. 75
GROUT 4000 PSI

INSTALL AND TEST ONE OF THE MICROPILES
PRIOR TO GENERAL PRODUCTION TO VALIDATE
CAPACITY AND CONSTRUCTION METHODS.
A TENSION TEST IS ACCEPTABLE.



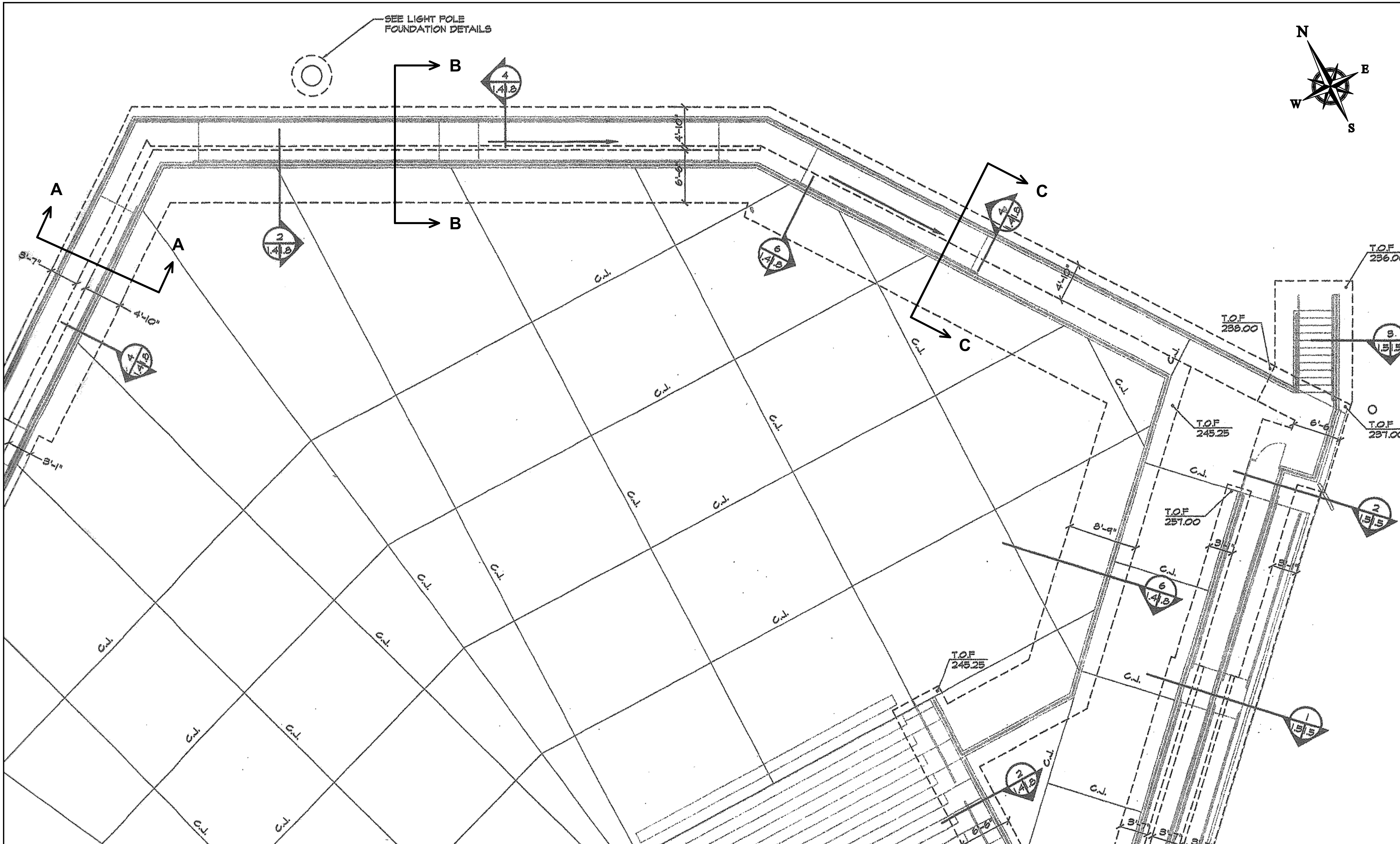
WALL REPAIR OPTION 2

4.0'

HILLIS-CARNES ENGINEERING ASSOCIATES
10975 Guilford Road, Suite A Annapolis Junction, Maryland
Ph: (410) 880-4788 WWW.HCEA.COM Fax: (410) 880-4098

RIPKEN STADIUM – WALL REPAIR
HARFORD COUNTY, MD.

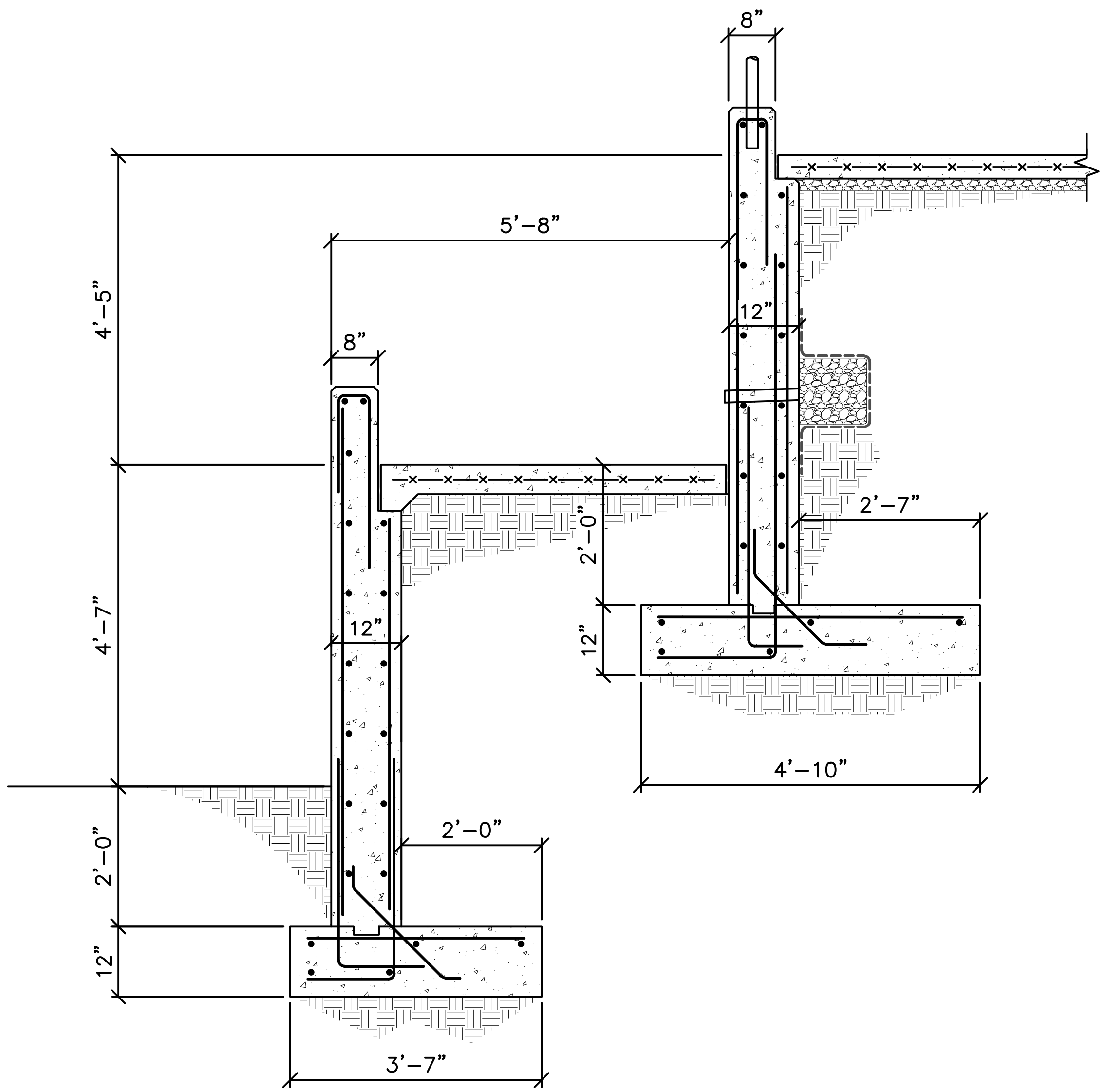
PROJECT NO.	18317A	DESIGN BY:	N/A
DATE:	08/08/18	DRAWN BY:	PR
SCALE:	NTS	CHECKED BY:	......
SHEET:	1 OF 1		



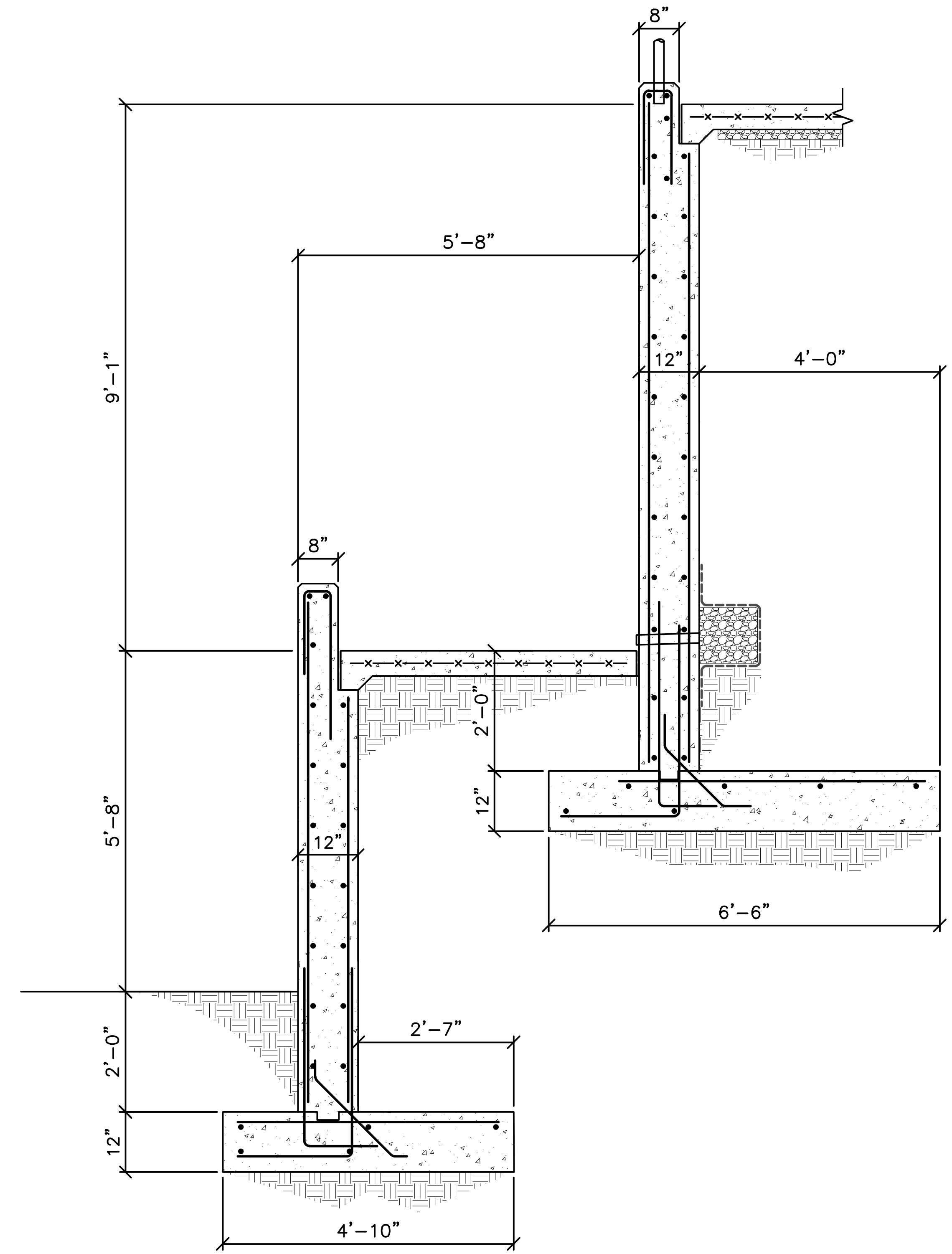
HILLIS-CARNES ENGINEERING ASSOCIATES	PLAN
10975 Guilford Road, Suite A Annapolis Junction, Maryland	RIPKEN STADIUM
(410) 880-4788 WWW.HCEA.COM Fax: (410) 880-4098	ABERDEEN, MARYLAND

PROJECT NO.	18317A	DESIGN BY:	
DATE:	8/9/18	DRAWN BY:	AM
SCALE:	3/32"=1'-0"	CHECKED BY:	TJC
SHEET:	S-1		

\\terra\vol1\AJ Project Files\2018\18317A Ripken Stadium\CAD DESIGN DWGS\PRODUCTION\18317A FOUND WALL.dwg Aug 09, 2018 - 8:44am



SECTION A

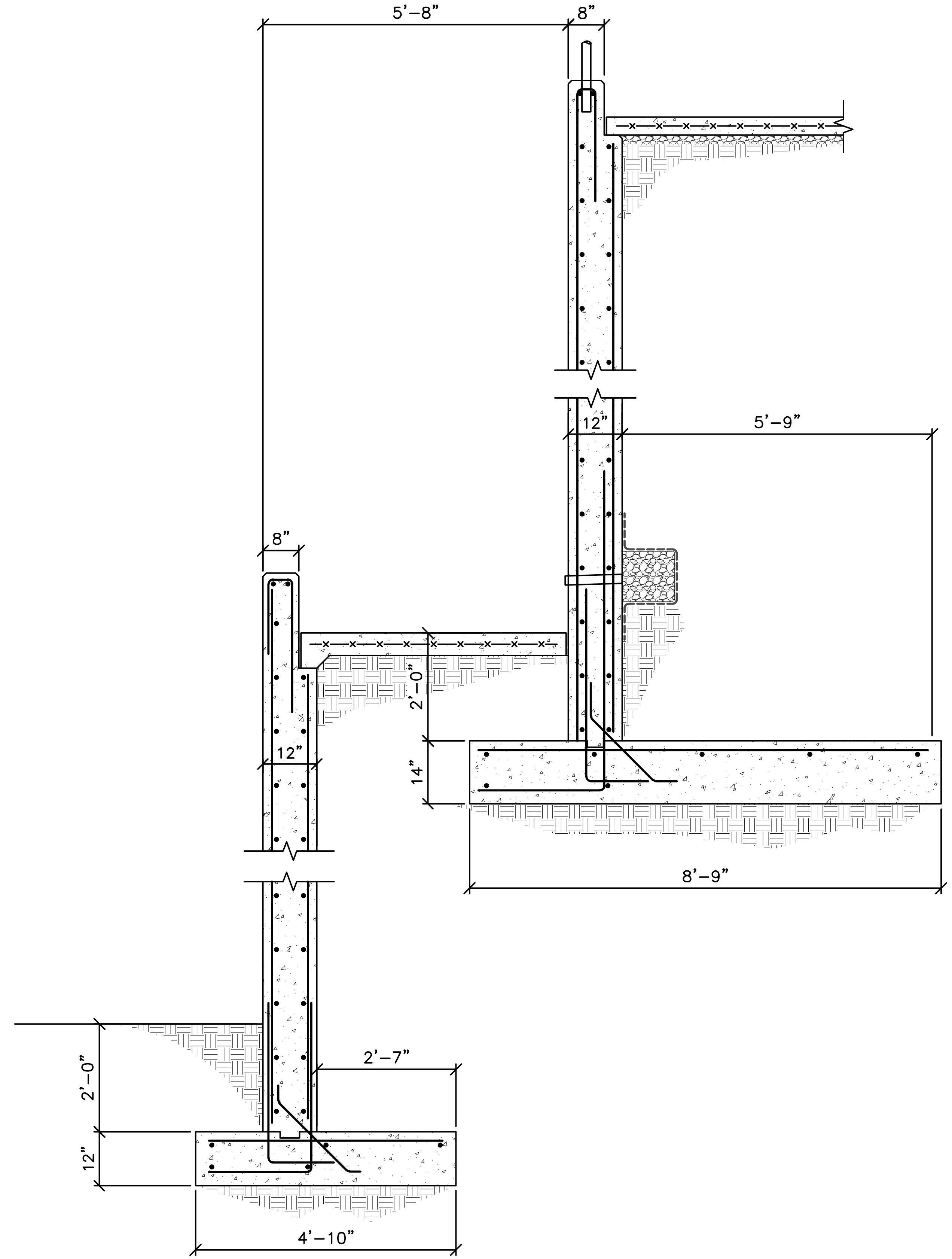


SECTION B

HILLIS-CARNES
ENGINEERING ASSOCIATES
10975 Guilford Road, Suite A Annapolis Junction, Maryland
(410) 880-4788 WWW.HCEA.COM Fax: (410) 880-4098

CONCRETE WALL SECTIONS
RIPKEN STADIUM
ABERDEEN, MARYLAND

PROJECT NO.	18317A	DESIGN BY:	
DATE:	8/9/18	DRAWN BY:	AM
SCALE:	3/8"=1'-0"	CHECKED BY:	TJC
SHEET:	S-2		



WALL SECTION C

HILLIS-CARNES ENGINEERING ASSOCIATES
10975 Guilford Road, Suite A Annapolis Junction, Maryland
(410) 880-4788 WWW.HCEA.COM Fax: (410) 880-4098

CONCRETE WALL SECTIONS
RIPKEN STADIUM
ABERDEEN, MARYLAND

PROJECT NO.	18317A	DESIGN BY:	
DATE:	8/9/18	DRAWN BY:	AM
SCALE:	3/8"=1'-0"	CHECKED BY:	TJC
SHEET:	S-3		

\\terra\vol1\AJ Project Files\2018\18317A Ripken Stadium\CAD DESIGN DWGS\PRODUCTION\18317A FOUND WALL.dwg Aug 09, 2018 - 8:45am

HILLIS-CARNES
ENGINEERING ASSOCIATES

1371 Brass Mill Road, Suite E
Belcamp, MD 21017
Phone (443) 760-3900
Fax (443) 327-4694
www.hcea.com

August 8, 2018

Mr. Kyle Torster
Director Department of Public Works
City of Aberdeen
60 North Parke Street
Aberdeen, MD 21001

Re: Geotechnical Engineering Letter
Ripken Stadium – Concrete Retaining Wall Evaluation
873 Long Drive, Aberdeen, MD 21001
HCEA Job Number E18052

Dear Mr. Torster:

Hillis-Carnes Engineering Associates, Inc. (HCEA) is pleased to provide this letter reporting the results of this limited subsequent subsurface exploration for the above-referenced project. HCEA performed the subsurface exploration to evaluate the retaining walls and ramp located along the exterior of the stadium in the left field area due to continuous movement of the lower wall.

Project Information

Based on a site reconnaissance and provided information, a reinforced concrete cantilevered retaining wall is failing that retains a walkway (ramp) and is the lower part of a two wall retaining system located along the exterior of the stadium in the left field area. The upper wall does not show any signs of distress and is not a part of this study. The lower wall was previously repaired with tiebacks; however, the tieback system does not appear to be effective and the wall has reportedly moved further since the installation of the tieback system and the concrete is cracked and distressed. The ramp adjacent to the lower wall has significantly moved away from the upper wall. The height of the upper retaining wall from the ramp ranged from approximately 4-foot, 5 inches to 10-foot, 11 inches and the height of the lower retaining wall from the existing ground surface ranged from approximately 4-foot, 7 inches to 7-foot, 6 inches in the areas of the borings and concrete cores.

Field Exploration and Laboratory Testing

Three (3) geotechnical Standard Penetration Test (SPT) borings were drilled along the bottom of the lower wall in order to determine the general subsurface conditions. The borings performed were identified as B-1 through B-3 and were drilled to depths of 20 feet and 25 feet below the existing ground surface. The number of borings and the locations were selected by HCEA and were staked by HCEA by measuring from existing site features. In addition, HCEA performed three (3) concrete cores along the ramp. The number of borings and concrete cores and the locations were selected by

HCEA and were staked by HCEA by measuring from existing site features. Therefore, the boring and concrete core locations should be considered approximate. The approximate boring and concrete coring locations are shown on the Soil Boring and Concrete Coring Location Plan attached to this letter.

The borings were advanced with hollow-stem augers and the subsurface soils were generally sampled at 2.5 ft. and 5.0 ft. intervals. Samples were taken by driving a 1-3/8 inch I.D. (2-inch O.D.) split-spoon sampler in general accordance with ASTM D-1586 specifications. The sampler was first seated 6 inches to penetrate any loose cuttings and then was driven an additional 12 inches with blows of a 140-pound hammer, falling 30 inches. The number of hammer blows required to drive the sampler the final 12 inches is designated as the "Penetration Resistance" or "N" value. The penetration resistance (N-value) can be used as an indication of the soil strength and compression characteristics.

Hand augers were performed within the concrete cores along the ramp. Dynamic Cone Penetrometer (DCP) testing was performed at 1-foot intervals to determine the stability of the subsurface conditions. The DCP uses a 15 pound mass that free falls 20 inches to strike an anvil to penetrate a 1.5-inch diameter, 45 degree cone into the soil. The number of blows required to achieve 1.75 inches of penetration are recorded.

Portions of each SPT soil sample and representative samples from the hand augering operations were placed in glass jars and transported to HCEA's laboratory. All of the jarred samples were visually examined in the laboratory by the Geotechnical Engineer and visually-manually classified in general accordance with the Unified Soil Classification System (USCS) and ASTM D-2488. The Unified Soil Classification Symbols appear on the Records of Soil Exploration (boring logs) and the system nomenclature is generally described in the Appendix.

Laboratory testing was performed on representative samples from the borings and hand augers, which generally consisted of Atterberg limits, sieve analysis, and moisture content, in general accordance with ASTM D-2487 to obtain the USCS classification of the soil tested. In addition, a direct shear test was performed on a sample obtained from Concrete Core C-1. The results of the laboratory testing are presented in the Appendix and the USCS classifications presented on the boring and concrete coring logs were revised where necessary based on the laboratory test results.

Subsurface Results

Details of the subsurface conditions encountered at the site are shown on the boring and concrete coring logs. Strata divisions shown on the boring logs have been estimated based on visual examinations of the recovered boring samples and the collection intervals. In the field, strata changes could occur gradually and/or at different levels than indicated on the boring logs. A brief description of the subsurface conditions and pertinent engineering characteristics of the soils are given below.

Groundwater conditions indicated on the boring logs are those observed during the preliminary subsurface exploration. Fluctuations in groundwater levels should be expected and are typically influenced by changes in seasons, grading, runoff, infiltration rates, and may be influenced by other factors.

Generalized subsurface conditions and pertinent engineering characteristics of the soils, based on the results of this exploration are discussed below.

Subsurface Conditions: The borings performed below and in front of the retaining wall encountered topsoil and the thickness was approximately 5 inches. The actual topsoil thickness should be expected to vary in front of the retaining wall. Below the topsoil, the borings encountered materials identified as fill, probable fill, and possible fill to depths of approximately 2.5 feet to 13.5 feet. The fill, probable fill, and possible fill materials were identified using the USCS as lean clay (CL) with subordinate amounts of sand, gravel and organics and silt (ML) with subordinate amounts of gravel and sand. Fill materials exhibit a soil stratification indicating placement by mechanical methods. The SPT N-values recorded in the borings generally indicated soft to stiff consistencies in the fine-grained and cohesive soils.

Below the fill, probable fill, and possible fill materials, the natural soils encountered in the borings generally consisted of lean clay (CL) with subordinate amounts of sand and gravel and elastic silt (MH) with subordinate amounts of clay, sand, and gravel, and silty sand (SM) and clayey sand (SC) with subordinate amounts of gravel, and clayey gravel (GC) and gravel (GM). The SPT N-values recorded in the borings generally indicated soft to very stiff consistency in the fine-grained and cohesive soils and very loose to medium dense relative densities for the granular soils.

Since the size of the samples obtained in the borings is relatively small in comparison to the areal extent of the project site and since the fill materials could be of similar composition to the natural soils encountered at the site, it is often difficult to determine the presence and composition of fill materials from the SPT samples.

Groundwater was monitored during and at completion of the borings, with the highest groundwater levels recorded in each boring. Groundwater was encountered at Boring B-2 at 23.5 feet below the existing ground surface. However, standing water and saturated soils conditions were observed at the surface in the vicinity of Borings B-2 and B-3.

The concrete cores taken on the ramp encountered CR-6 and stone dust (#10 screenings) to depths of approximately 3 feet to 4 feet below the concrete along the ramp. Due to water seepage causing the hand auger hole to cave in, C-2 and C-3 were terminated at approximately 4 feet and 1.5 feet, respectively. Below the CR-6, C-1 encountered silty, clayey sand (SC-SM), clayey sand (SC), and lean clay (CL). It should be noted that during the coring process for C-2 and C-3, both concrete cores sunk approximately 2 inches; therefore, it appears that there is an approximate 2-inch void beneath the ramp in the vicinity of C-2 and C-3.

Conclusions and Recommendations

Based on the information provided by the subsurface exploration, HCEA recommends that a new retaining wall be constructed in front of the failing retaining wall. In addition tie-backs will be installed through the existing retaining wall through the new retaining wall for additional lateral support.

Retaining Wall Foundation Recommendations: Our findings indicate that the new retaining can be supported on spread footings bearing on approved natural soils and/or new engineered fill placed over approved natural soils or a combination thereof. Foundations should not be supported on or over any existing fill materials, if encountered, unless the fill materials are specifically observed, tested and approved by the Geotechnical Engineer or his designated representative in the field during construction.

Based on the anticipated structural loads, the settlement tolerances, and the general soil conditions which were encountered, it is recommended that a net allowable design soil bearing pressure of 2,000 psf be used for the new retaining wall footings in approved natural soils, in new structural fill placed over approved natural soils or a combination thereof.

All footing excavations should be examined by a Geotechnical Engineer or his authorized representative prior to the placement of concrete. The purpose of the examination would be to verify that the exposed materials will be capable of supporting the design bearing pressure. If soft pockets and/or unsuitable existing fill materials are encountered in the footing excavations, the unsuitable materials should be removed to a suitable footing bearing level and replaced with lean (1500 psi) concrete, flowable fill or engineered fill. Soft soils were encountered at Boring B-3 from below the topsoil to approximately 3 feet below the existing ground surface. Soft soils may be encountered along areas of the new retaining wall alignment, it should be anticipated that localized foundation areas may need to be over-excavated to achieve a suitable bearing level. MH soils were encountered at all of the boring locations at depths deeper than the anticipated retaining wall bearing levels. However, MH soils are extremely moisture sensitive and HCEA recommends that if MH soils are encountered at the foundation bearing level, the foundation excavations should be extended a depth of 4 feet below exterior grades. The over-excavated volume can be backfilled using lean-mix concrete or structural fill. In addition, foundations where MH soils are encountered should be poured the same day they are excavated or a mud mat should be poured over the foundation bearing level to protect the stability of the bearing soils.

The retaining wall footings should be located at depths of at least 30 inches below final exterior grades so as to provide adequate protection from frost heave.

Retaining Wall Lateral Earth Pressure: The magnitude of lateral earth pressure against subsurface walls is dependent on the type of backfill soil, drainage provisions, and whether the walls are permitted to yield during and/or after placement of the backfill. The cast-in-place retaining wall will be designed such that movement of the top of the wall is prohibited; therefore, an equivalent fluid pressure distribution considering an equivalent fluid weight of 60 lbs/ft was used for design purposes. To determine the equivalent fluid weight, a friction angle of 30 degrees and a unit weight of 115 pcf were used for the soil properties. In addition, the surcharge loadings that were considered in the retaining wall design included the upper wall and the retained soils. Because of the obvious drainage problems we assumed hydrostatic pressure along the full height of the lower wall. A Lateral Earth Pressure Diagram is attached to this letter.

HCEA appreciates having had the opportunity to provide our services for this project. Should you have any questions concerning the contents of this letter, or require additional consultation, design, or monitoring and testing services, please contact our Office.

Sincerely,
HILLIS-CARNES ENGINEERING ASSOCIATES, INC.

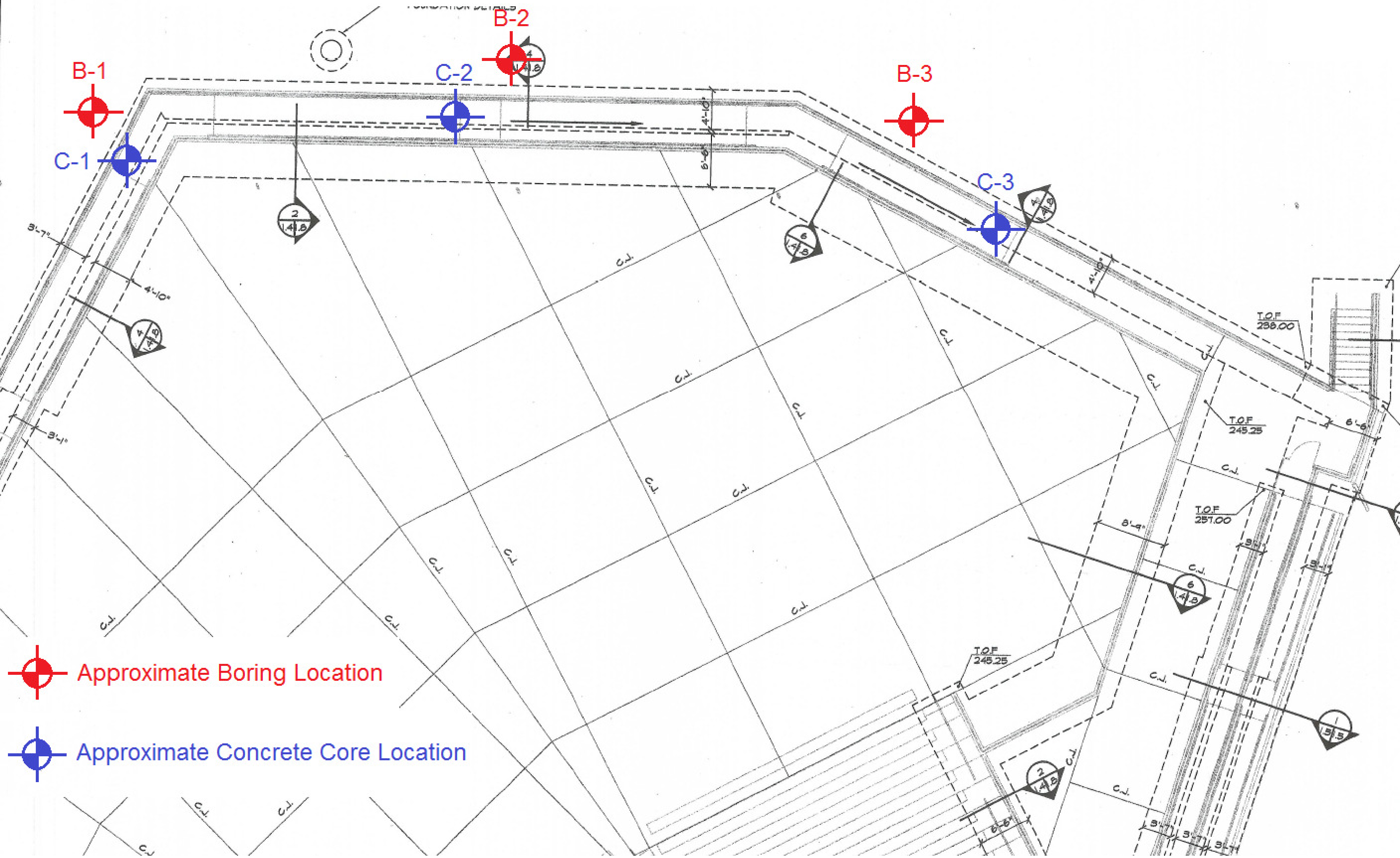
William M. Carnes, P.E.
President
bcarnes@hcea.com

Charles A. Shaw, P.E.
Branch Manager
cshaw@hcea.com

Attachments: Boring and Concrete Coring Location Plan
Boring Logs (B-1 through B-3)
Concrete Coring Logs (C-1 through C-3)
Soil Description Sheet
Lateral Earth Pressure Diagram
Laboratory Test Results

Soil Boring and Concrete Coring Location Plan

Source: Foundation Plan, Sheet No. S1.5 prepared by Design Exchange Architects, Inc. and dated February 5, 2001



HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Ripken Stadium** Boring No.: B-1

Location: Ripken Stadium, Aberdeen, MD Job #: E18052

SAMPLER

Datum:	Hammer Wt.: 140 lbs.	Hole Diameter: 6 in.	Foreman: B. Van Doren
Surf. Elev.: ft	Hammer Drop: 30 in.	Rock Core Diameter: NA	Inspector:
Date Started: 7/2/2018	Pipe Size (O.D.): 2.0 in.	Boring Method: HSA	Date Completed: 7/2/2018

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	N
0	D	Orange-brown with beige, moist, medium stiff, CLAY, some sand, some gravel, trace organics (CL; FILL)	5" topsoil	1	10	16.9	1-2-3	5
	I	Tan-gray to tan and beige, moist, very loose to loose, silty SAND, some gravel, some clay (SM)		2	15	10.0	2-4-5	9
5	D		Groundwater not encountered while drilling	3	11	11.1	3-2-2	4
	I	Brown-orange to orange-brown, moist, stiff, CLAY, some gravel, trace sand (CL)		4	18	17.6	3-4-6	10
10	I			5	18	10.2	3-4-6	10
	D	Orange-brown, moist, loose, clayey GRAVEL, some sand (GC)		6	12	18.0	4-4-4	8
15		White, orange-brown and dark gray to dark orange-brown, moist, stiff, SILT, some clay, trace sand (MH)						
	D			7	18		4-4-5	9
20		Boring terminated at 20 ft	Boring backfilled at completion					
25								
30								

SPT N (blows/ft): 10, 30, 50

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER	CAVE IN DEPTH
AT COMPLETION	DRY ft.	15.0 ft.
AFTER 24 HRS.	ft.	ft.
AFTER ___ HRS.	ft.	ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES
ENGINEERING ASSOCIATES, INC.
RECORD OF SOIL EXPLORATION

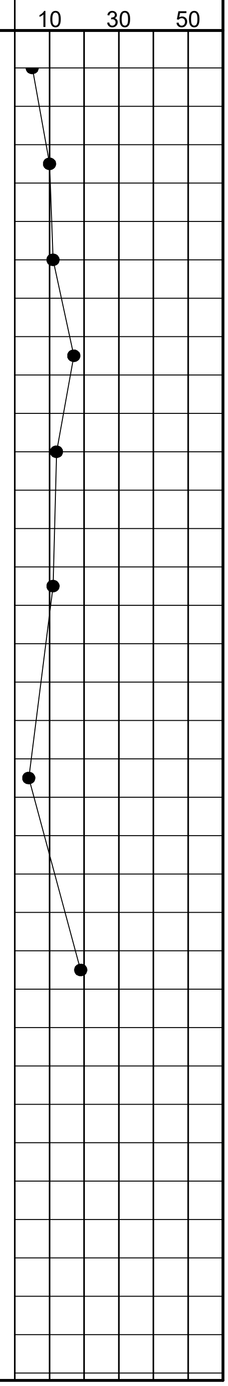
Project Name	**Ripken Stadium**	Boring No.	B-2
Location	Ripken Stadium, Aberdeen, MD	Job #	E18052

SAMPLER

Datum		Hammer Wt.	140 lbs.	Hole Diameter	6 in.	Foreman	B. Van Doren
Surf. Elev.	ft	Hammer Drop	30 in.	Rock Core Diameter	NA	Inspector	
Date Started	7/2/2018	Pipe Size (O.D.)	2.0 in.	Boring Method	HSA	Date Completed	7/2/2018

Elevation/ Depth (ft)	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	N
0	I	Gray-beige with orange-brown, moist, medium stiff, CLAY, some gravel, some sand, trace organics (CL; probable FILL)	5" topsoil	1	11	14.2	1-2-3	5
	D	Tan-gray and beige, moist, loose, clayey SAND, some gravel, trace organics (SC)		2	10	12.6	3-5-5	10
5	I	Orange-brown and beige red/ orange-brown, moist, stiff to very stiff, CLAY, some gravel, some silt, trace sand to some sand (CL)	Groundwater encountered at 23.5 ft while drilling	3	15	12.5	3-5-6	11
	I			4	16	15.4	6-7-10	17
10	D			5	14	25.2	3-5-7	12
15	I	Red/orange-brown with light gray to dark orange-brown and dark gray, moist, medium stiff to soft, SILT, some clay, some sand (MH)		6	15	43.8	4-5-6	11
20	D			7	16	70.9	3-2-2	4
25	D	Dark orange-brown and dark gray, wet, medium dense, GRAVEL, some sand, some silt (GM)		8	18		7-10-9	19
		Boring terminated at 25 ft	Boring backfilled at completion					
30								

SPT N (blows/ft)



SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER	CAVE IN DEPTH
AT COMPLETION	19.0 ft.	20.5 ft.
AFTER 24 HRS.	ft.	ft.
AFTER ___ HRS.	ft.	ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Ripken Stadium** — Boring No.: B-3

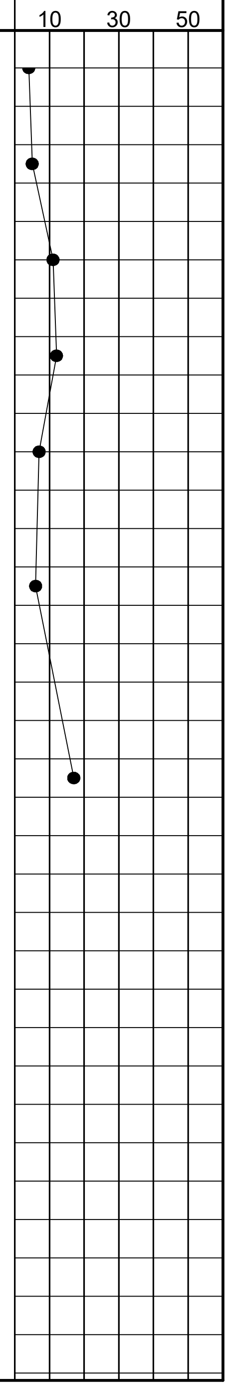
Location: Ripken Stadium, Aberdeen, MD — Job #: E18052

SAMPLER

Datum:	Hammer Wt.: 140 lbs.	Hole Diameter: 6 in.	Foreman: B. Van Doren
Surf. Elev.: ft	Hammer Drop: 30 in.	Rock Core Diameter: NA	Inspector:
Date Started: 7/2/2018	Pipe Size (O.D.): 2.0 in.	Boring Method: HSA	Date Completed: 7/2/2018

Elevation/ Depth (ft)	Soil Symbols/ Sample Conditions	Description	Boring and Sampling Notes	Sample No.	Rec. (in)	NM (%)	SPT Blows	N
0	I	Gray-beige, moist, medium stiff, CLAY, some gravel, some sand, trace organics (CL; probable FILL)	5" topsoil	1	10	29.0	1-2-2	4
	I	Beige-brown to beige/orange-brown to red/orange-brown, moist, medium stiff to stiff SILT, some gravel, some sand (ML; possible FILL)		2	12	15.9	1-2-3	5
5	I		Groundwater not encountered while drilling	3	18	20.2	3-5-6	11
	I			4	18	13.1	3-5-7	12
10	I			5	16	29.9	2-3-4	7
	D	Dark orange-brown with purple-brown, very moist, medium stiff, SILT, some clay, some sand, some iron-cemented gravel (MH)		6	15	40.6	2-3-3	6
15								
	D	Dark gray and red/orange-brown with light gray, moist, medium dense, GRAVEL and ironstone, some sand, some silt (GM)		7	18		9-9-8	17
20		Boring terminated at 20 ft	Boring backfilled at completion					
25								
30								

SPT N (blows/ft)



SAMPLER TYPE
- DRIVEN SPLIT SPOON UNLESS OTHERWISE
- PT - PRESSED SHELBY TUBE
- CA - CONTINUOUS FLIGHT AUGER
- RC - ROCK CORE

SAMPLE CONDITIONS
- D - DISINTEGRATED
- I - INTACT
- U - UNDISTURBED
- L - LOST

	GROUND WATER	CAVE IN DEPTH
AT COMPLETION	DRY ft.	15.0 ft.
AFTER 24 HRS.	ft.	ft.
AFTER ___ HRS.	ft.	ft.

BORING METHOD
- HSA - HOLLOW STEM AUGERS
- CFA - CONTINUOUS FLIGHT AUGERS
- DC - DRIVING CASING
- MD - MUD DRILLING

STANDARD PENETRATION TEST-DRIVING 2" O.D. SAMPLER 1' WITH 140# HAMMER FALLING 30": COUNT MADE AT 6" INTERVALS.

HILLIS - CARNES ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name: **Ripken Stadium** | Boring No.: C-1

Location: Aberdeen, MD | Job #: E18052

SAMPLER

Datum: ____ | Hammer Wt.: N/A lbs. | Hole Diameter: ____ | Foreman: T. Pendlebury

Surf. Elev.: ____ ft | Hammer Drop: N/A in. | Rock Core Diameter: N/A | Inspector: C. Shaw

Date Started: 07/09/18 | Pipe Size: N/A in. | Boring Method: Hand Augered | Date Completed: 07/09/18

Elevation/ Depth	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	DCP Blows 1.25" intervals
0			Concrete core - 6.5"		
		CR-6		1	3-5-7-7
2				2	5-9-10-7
		Tan, moist, medium dense, silty clayey SAND, with gravel. (SC-SM)		3	5-5-5-4
4				4	5-4-3-7
				5	3-2-3-7
6		Dark gray, wet, medium dense, clayey SAND. (SC)		6	6-6-5-4
		Brown, moist, very stiff, lean CLAY, some gravel, with sand. (CL)		7	3-9-7-8
		Boring terminated at 7'5"			
8					
10					
12					
14					

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER	CAVE IN DEPTH
AT COMPLETION	____ ft.	____ ft.
AFTER 24 HRS.	____ ft.	____ ft.
AFTER ____ HRS.	____ ft.	____ ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

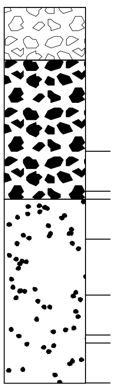
HILLIS - CARNES
ENGINEERING ASSOCIATES, INC.

RECORD OF SOIL EXPLORATION

Project Name	**Ripken Stadium**	Boring No.	C-2
Location	Aberdeen, MD	Job #	E18052

SAMPLER

Datum		Hammer Wt.	N/A lbs.	Hole Diameter		Foreman	T. Pendlebury
Surf. Elev.	ft	Hammer Drop	N/A in.	Rock Core Diameter	N/A	Inspector	C. Shaw
Date Started	07/09/18	Pipe Size	N/A in.	Boring Method	Hand Augered	Date Completed	07/09/18



Elevation/ Depth	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	DCP Blows 1.25" intervals
0			Concrete Core - 5.25" (Core sunk 2 inches after coring operations)		
		Wet CR-6		1	3-2-3-4
2		Wet stone dust		2	7-7-7-6
			Hole kept on caving in due to water seepage	3	8-5-5-4
				4	4-8-8-8
4		Boring terminated at 3'11"			
6					
8					
10					
12					
14					

SAMPLER TYPE
DRIVEN SPLIT SPOON UNLESS OTHERWISE
PT - PRESSED SHELBY TUBE
CA - CONTINUOUS FLIGHT AUGER
RC - ROCK CORE

SAMPLE CONDITIONS
D - DISINTEGRATED
I - INTACT
U - UNDISTURBED
L - LOST

	GROUND WATER	CAVE IN DEPTH
AT COMPLETION	ft.	ft.
AFTER 24 HRS.	ft.	ft.
AFTER ___ HRS.	ft.	ft.

BORING METHOD
HSA - HOLLOW STEM AUGERS
CFA - CONTINUOUS FLIGHT AUGERS
DC - DRIVING CASING
MD - MUD DRILLING

HILLIS - CARNES
ENGINEERING ASSOCIATES, INC.
RECORD OF SOIL EXPLORATION

Project Name: **Ripken Stadium** — Boring No.: C-3

Location: Aberdeen, MD — Job #: E18052

SAMPLER

Datum		Hammer Wt.	N/A lbs.	Hole Diameter		Foreman	T. Pendlebury
Surf. Elev.	ft	Hammer Drop	N/A in.	Rock Core Diameter	N/A	Inspector	C. Shaw
Date Started	07/09/18	Pipe Size	N/A in.	Boring Method	Hand Augered	Date Completed	07/09/18

Elevation/ Depth	SOIL SYMBOLS/ SAMPLE CONDITIONS	Description	Boring and Sampling Notes	Sample No.	DCP Blows 1.25" intervals
0			Concrete Core - 5.75" (Core sunk 2 inches after coring operations)		
		Wet CR-6	Hole kept on caving in due to water seepage	1	4-5-5-4
		Boring terminated at 1'5"			
2					
4					
6					
8					
10					
12					
14					

SAMPLER TYPE

DRIVEN SPLIT SPOON UNLESS OTHERWISE

PT - PRESSED SHELBY TUBE

CA - CONTINUOUS FLIGHT AUGER

RC - ROCK CORE

SAMPLE CONDITIONS

D - DISINTEGRATED

I - INTACT

U - UNDISTURBED

L - LOST

	GROUND WATER	CAVE IN DEPTH
AT COMPLETION	ft.	ft.
AFTER 24 HRS.	ft.	ft.
AFTER ___ HRS.	ft.	ft.

BORING METHOD

HSA - HOLLOW STEM AUGERS

CFA - CONTINUOUS FLIGHT AUGERS

DC - DRIVING CASING

MD - MUD DRILLING

HILLIS-CARNES ENGINEERING ASSOCIATES, Inc.

10975 Guilford Road, Suite A • Annapolis Junction, Maryland 20701
Phone: (410)880-4788 • Fax: (410)880-4098

Description of Soils – per ASTM D2487

Major Component	Component Type	Component Description	Symbol	Group Name
Coarse-Grained Soils, More than 50% is retained on the No. 200 sieve	**Gravels** – More than 50% of the coarse fraction is retained on the No. 4 sieve. Coarse = 1" to 3" Medium = ½" to 1" Fine = ¼" to ½"	Clean Gravels <5% Passing No. 200 sieve	**GW**	Well Graded Gravel
			GP	Poorly Graded Gravel
		Gravels with fines, >12% Passing the No. 200 sieve	**GM**	Silty Gravel
			GC	Clayey Gravel
	Sands – More than 50% of the coarse fraction passes the No. 4 sieve. Coarse = No.10 to No.4 Medium = No. 10 to No. 40 Fine = No. 40 to No. 200	Clean Sands <5% Passing No. 200 sieve	**SW**	Well Graded Sand
			SP	Poorly Graded Sand
		Sands with fines, >12% Passing the No. 200 sieve	**SM**	Silty Sand
			SC	Clayey Sand
Fine Grained Soils, More than 50% passes the No. 200 sieve	Silts and Clays Liquid Limit is less than 50 Low to medium plasticity	Inorganic	**ML**	Silt
			CL	Lean Clay
		Organic	**OL**	Organic silt
				Organic Clay
	Silts and Clays Liquid Limit of 50 or greater Medium to high plasticity	Inorganic	**MH**	Elastic Silt
			CH	Fat Clay
		Organic	**OH**	Organic Silt
				Organic Clay
Highly Organic Soils	Primarily Organic matter, dark color, organic odor		**PT**	Peat

Proportions of Soil Components

Component Form	Description	Approximate percent by weight
Noun	Sand, Gravel, Silt, Clay, etc.	50% or more
Adjective	Sandy, silty, clayey, etc.	35% to 49%
Some	Some sand, some silt, etc.	12% to 34%
Trace	Trace sand, trace mica, etc.	1% to 11%
With	With sand, with mica, etc.	Presence only

Particle Size Identification

Particle Size	Particle dimension
Boulder	12" diameter or more
Cobble	3" to 12" diameter
Gravel	¼" to 3" diameter
Sand	0.005" to ¼" diameter
Silt/Clay (fines)	Cannot see particle

Cohesive Soils

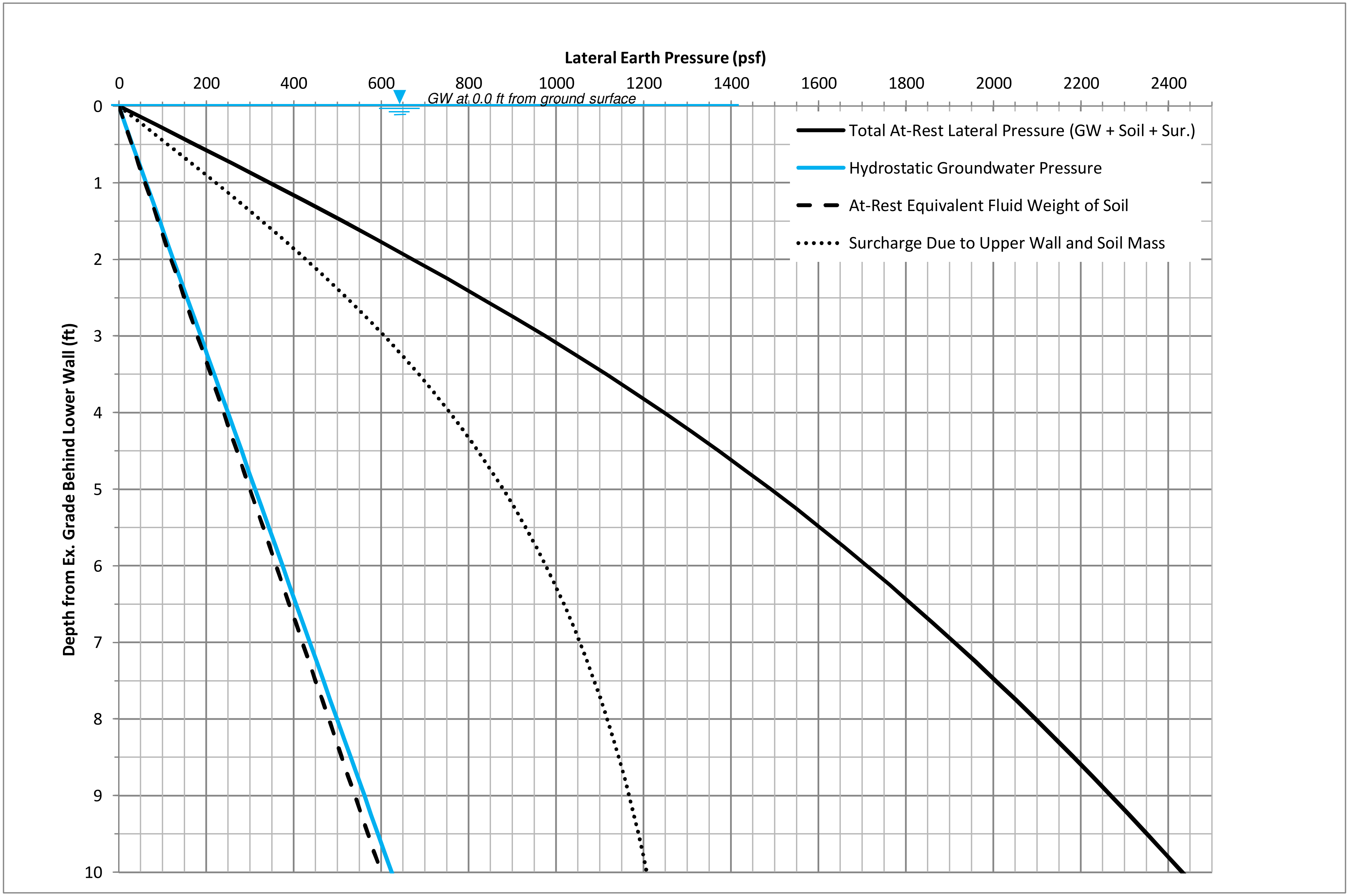
Field Description	No. of SPT Blows/ft	Consistency
Easily Molded in Hands	Less than 2	Very Soft
Easily penetrated several inches by thumb	2 – 4	Soft
Penetrated by thumb with moderate effort	4 – 8	Medium Stiff
Penetrated by thumb with great effort	8 – 15	Stiff
Indented by thumb only with moderate effort	15 – 30	Very Stiff
Indented by thumb only with great effort	Greater than 30	Hard

Granular Soils

No. of SPT Blows/ft	Relative Density
Less than 5	Very Loose
5 – 10	Loose
10 – 30	Medium Dense
30 – 50	Dense
Greater than 50	Very Dense

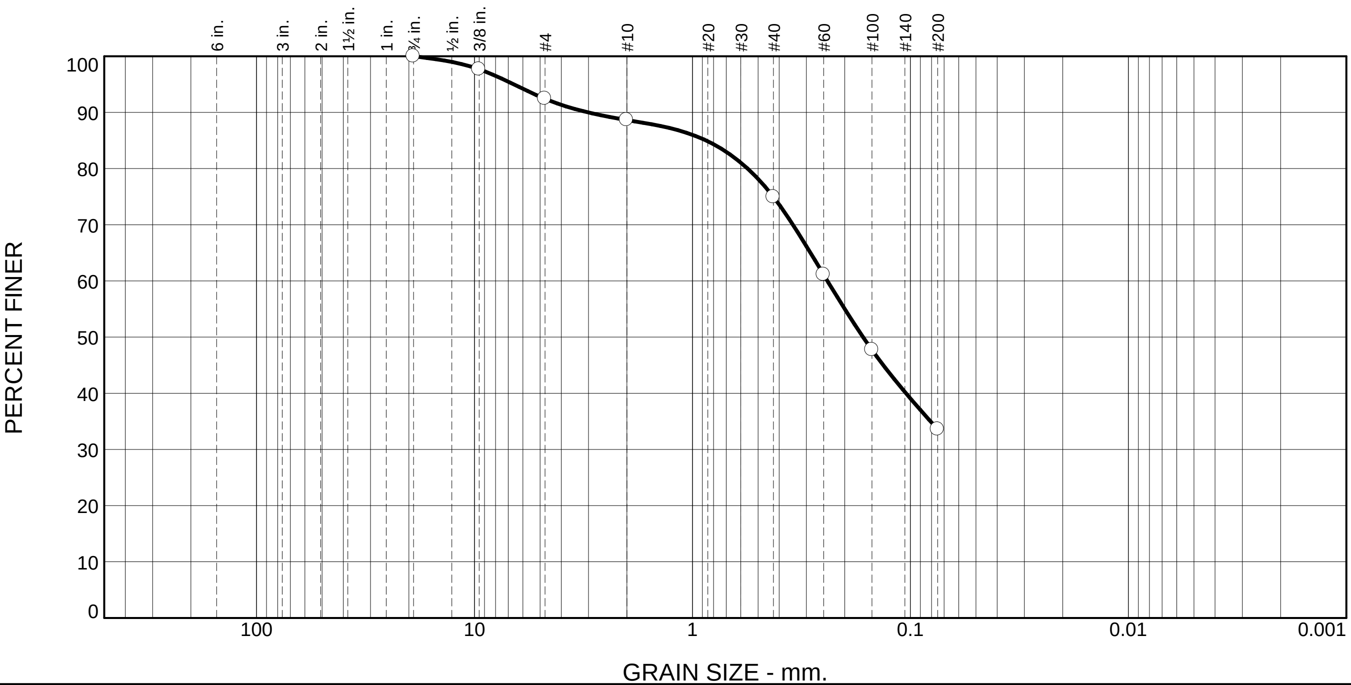
Other Definitions:

- **Fill:** Encountered soils that were placed by man. Fill soils may be controlled (engineered structural fill) or uncontrolled fills that may contain rubble and/or debris.
- **Saprolite**: Soil material derived from the in-place chemical and physical weathering of the parent rock material. May contain relic structure. Also called residual soils. Occurs in Piedmont soils, found west of the fall line.
- **Disintegrated Roc**k: Residual soil material with rock-like properties, very dense, N = 60 to 51/0".
- **Karst:** Descriptive term which denotes the potential for solutioning of the limestone rock and the development of sinkholes.
- **Alluvium:** Recently deposited soils placed by water action, typically stream or river floodplain soils.
- **Groundwater Level**: Depth within borehole where water is encountered either during drilling, or after a set period of time to allow groundwater conditions to reach equilibrium.
- **Caved Depth:** Depth at which borehole collapsed after removal of augers/casing. Indicative of loose soils and/or groundwater conditions.



Lateral Earth Pressure (psf)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
GW at 0.0 ft from ground surface
Depth from Ex. Grade Behind Lower Wall (ft)
0
1
2
3
4
5
6
7
8
9
10
Total At-Rest Lateral Pressure (GW + Soil + Sur.)
Hydrostatic Groundwater Pressure
At-Rest Equivalent Fluid Weight of Soil
Surcharge Due to Upper Wall and Soil Mass

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	7.6	3.8	13.6	41.4	33.6	

Test Results (ASTM D 422 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4	100.0		
3/8	97.7		
#4	92.4		
#10	88.6		
#40	75.0		
#60	61.1		
#100	47.7		
#200	33.6		

* (no specification provided)

Material Description

Tan-Grey to Tan and Beige Silty Sand

Atterberg Limits (ASTM D 4318)

PL= 17 **LL=** 19 **PI=** 2

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-2-4(0)

Coefficients

D_{90}= 3.0101 D_{85}= 0.8661 D_{60}= 0.2402
D_{50}= 0.1648 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: **Date Tested:** 07/18/18
Tested By: Will Tripp
Checked By: John Singleton
Title: LM

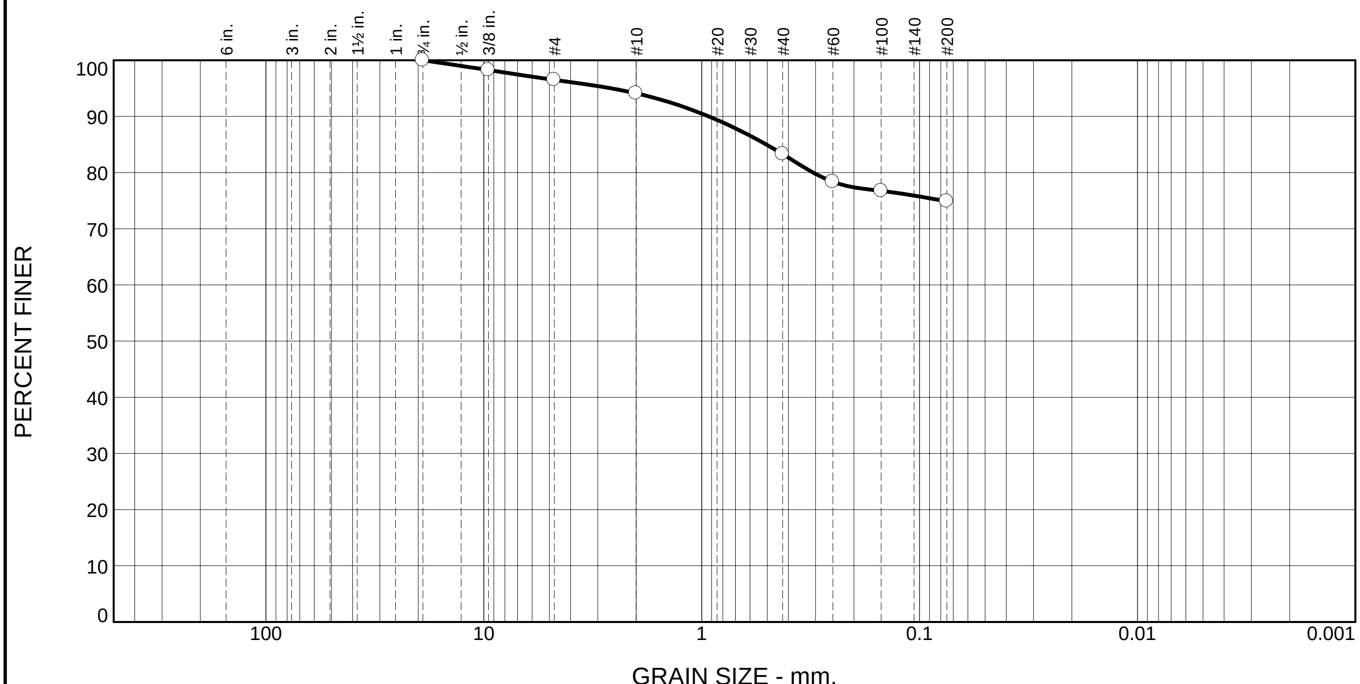
Location: B-1
Sample Number: 2 **Depth:** 2.5-4.0
Date Sampled: 07/02/18

HILLIS-CARNES ENGINEERING ASSOCIATES

Belcamp, MD

Client: City of Aberdeen
Project: Ripken Stadium Geo
Project No: E18052 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.5	2.4	10.8	8.4	74.9	

Test Results (ASTM D 422 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
3/4	100.0		
3/8	98.3		
#4	96.5		
#10	94.1		
#40	83.3		
#60	78.4		
#100	76.7		
#200	74.9		

* (no specification provided)

Material Description

Beige Brown to Beige/Orange Brown to red/orange brown Silt with Sand

Atterberg Limits (ASTM D 4318)

PL= 27 **LL=** 40 **PI=** 13

Classification

USCS (D 2487)= ML **AASHTO (M 145)=** A-6(10)

Coefficients

D_{90}= 0.9284 D_{85}= 0.5053 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 07/10/18 **Date Tested:** 07/20/2018

Tested By: Will Tripp

Checked By: John Singleton

Title: LM

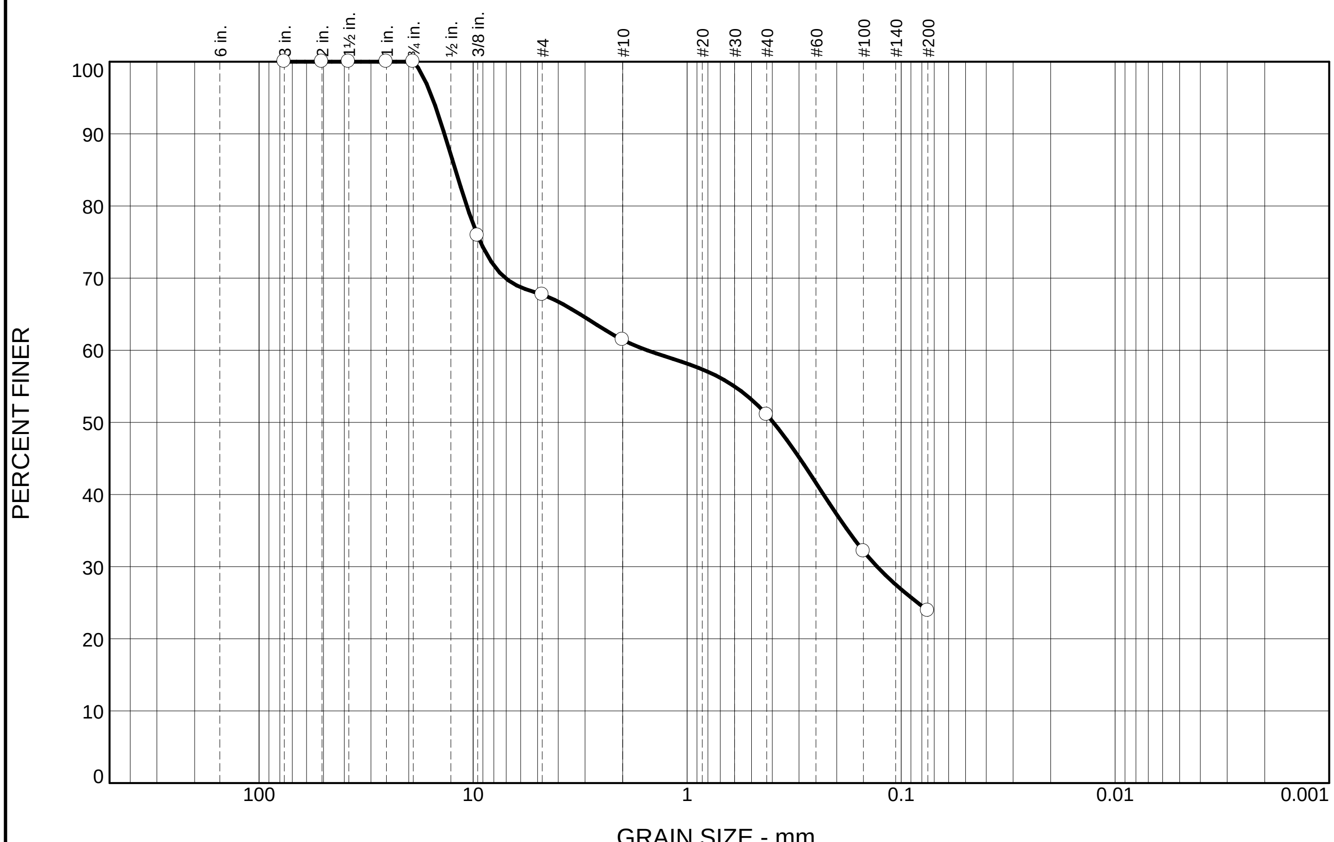
Location: B-3
Sample Number: 2 **Depth:** 2.5-4.0 **Date Sampled:** 07/02/18

HILLIS-CARNES ENGINEERING ASSOCIATES

Belcamp, MD

Client: City of Aberdeen
Project: Ripken Stadium Geo
Project No: E18052 **Figure**

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0.0	32.3	43.8	23.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0		
2"	100.0		
1 - 1/2"	100.0		
1"	100.0		
3/4"	100.0		
3/8"	75.9		
#4	67.7		
#10	61.4		
#40	51.1		
#100	32.2		
#200	23.9		

* (no specification provided)

Material Description

Gray brown silty, clayey sand with gravel

Atterberg Limits

PL= 18 LL= 24 PI= 6

Coefficients

D_{90}= 13.6135 D_{85}= 12.0913 D_{60}= 1.5376
D_{50}= 0.3956 D_{30}= 0.1294 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SC-SM AASHTO= A-2-4(0)

Remarks

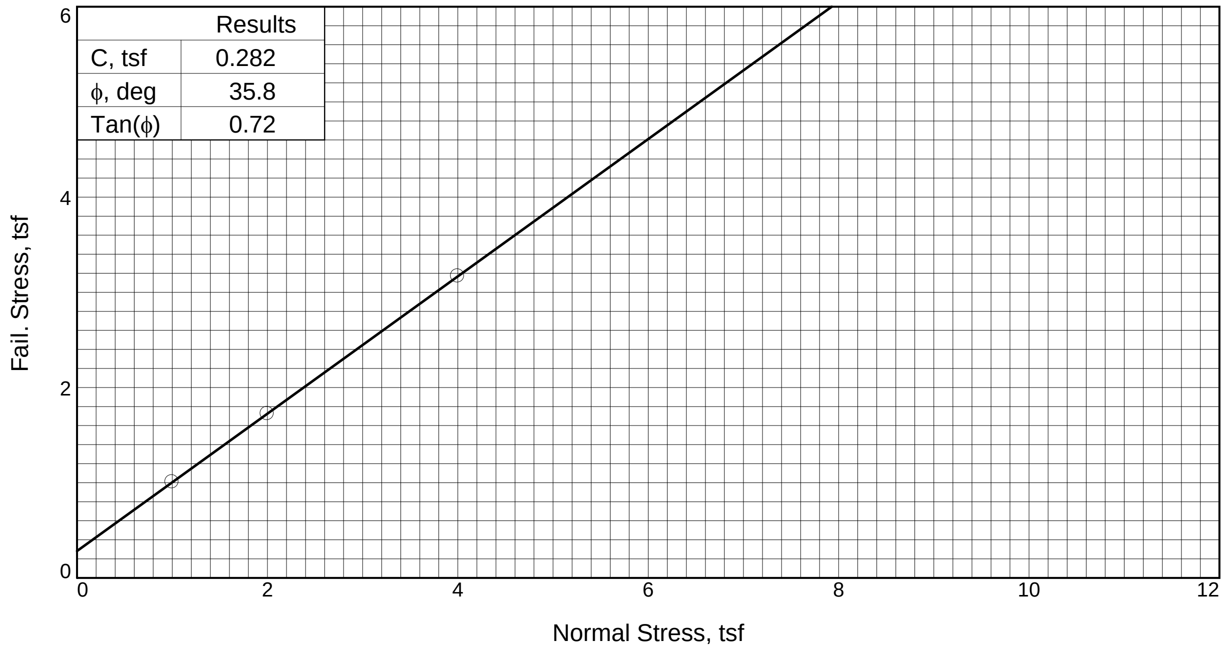
Moisture content: 11.9%

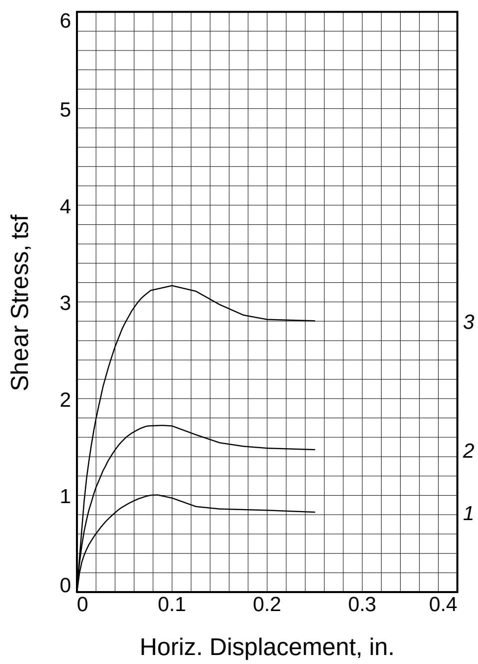
Location: C-1. 4'-6'
Sample Number: 1

Date: 07/20/18

HILLIS-CARNES ENGINEERING ASSOCIATES, INC.
Annapolis Junction, MD

Client: City of Aberdeen
Project: Ripken Stadium
Project No: E18052 **Figure**





Sample No.		1	2	3
Initial	Water Content, %	12.0	12.0	11.8
	Dry Density, pcf	125.7	126.4	126.1
	Saturation, %	95.0	96.9	95.0
	Void Ratio	0.3406	0.3339	0.3363
	Diameter, in.	2.50	2.50	2.50
	Height, in.	0.94	0.95	0.98
At Test	Water Content, %	12.4	12.0	11.6
	Dry Density, pcf	127.2	128.7	130.0
	Saturation, %	103.4	104.9	105.1
	Void Ratio	0.3248	0.3098	0.2967
	Diameter, in.	2.50	2.50	2.50
	Height, in.	0.93	0.93	0.95
Normal Stress, tsf		1.000	2.000	4.000
Fail. Stress, tsf		1.005	1.723	3.168
Displacement, in.		0.09	0.09	0.10
Ult. Stress, tsf				
Displacement, in.				
Strain rate, %/min.		0.04	0.04	0.04

Sample Type: recompacted
Description: Gray brown silty, clayey sand with gravel
LL= 24 **PL=** 18 **PI=** 6
Assumed Specific Gravity= 2.7
Remarks: Report Date: 07/25/2018

Figure ________

Client: City of Aberdeen

Project: Ripken Stadium

Location: C-1. 4'-6'

Sample Number: 1

Proj. No.: E18052 **Date Sampled:**

DIRECT SHEAR TEST REPORT
HILLIS-CARNES ENGINEERING ASSOCIATES, INC.
Annapolis Junction, MD