APPENDIX F

GEOTECHNICAL REVIEW FOR TOWN

AECOM

October 23, 2019

AECOM Geotechnical Practice
250 Apollo Dr., Chelmsford, MA 01824
T 978-905-2867 F 978-905-2101
www.aecom.com

Memorandum

Date:	10/23/19
To:	IHCC Files
From:	David M. Cregger, P.E., P.G.
Subject:	Review of Appendix H

AECOM responds by this letter to a request from Town of Huntington for Geotechnical Engineering Services for a Review of Slope Stability Evaluation Report Related to Indian Hills Country Club. The scope of work includes Review & Evaluation of Appendix H – Geotechnical Engineering Reports and Correspondence. We received 3 documents for review:

1. Appendix H-1 Geotechnical Engineering Services Report, Phase I of the Bluff Area Stability Evaluation, PS&S, dated July 25, 2008 *(does not include Appendix)*
2. Appendix H-2 Geotechnical Engineering Investigation and Slope Stability Analysis, PS&S, dated April 15, 2019 (with associated Appendices A&B)
3. Appendix H-3 Dynamic Earth Correspondence, dated July 8, 2019

F-1 Sec. 2.7

Methodology Used by PS&S

Document H-1, also known as Phase I, appears to have been done in a competent manner in general conformance to geotechnical practice where test borings and detailed observations have yet to be made (see detailed comments attached).

However, document H-2 appears to ignore the original plan for the investigation in a rush to complete the borings without senior level oversight which then impacted the ability to complete a credible slope evaluation (see detailed comments attached). We offer this opinion based on several deficiencies:

- Test borings were drilled with drilling mud which does not allow for the collection of groundwater table data,
- Separate groundwater observation wells were not installed by means of either hollow stem augers or with bio-degradable drilling mud,
- Continuous samples of the clay were not made to identify potential horizon of sliding,
- Undisturbed samples of the clay were not taken within the clay zone to determine the shear strength of the clay by means of laboratory testing,
- In-situ vane shear tests or pocket penetrometer tests on clay samples were not taken to determine shear strength, and
- Inadequate laboratory testing was completed.

These field investigation deficiencies then led to improper office evaluations including:

- Unjustified selection of shear strengths of the clay based on empirical textbook relations rather than development of site-specific properties formulated by lab and/or field testing,

F-2 Sec. 2.7

- Selection of a sliding surface at the base of the clay zone forcing the defined sliding without evidence of shear failure at that level,
- Assuming a groundwater table at sea level across the entire site resulting in heavier soil loads on the slip surface increasing resistance incorrectly, and
- Assuming an unacceptable Factor of Safety (FS) equal to 1.0 for slopes.

Our professional opinion is that these results do not follow conventional practice.

Recommendation of the 120-ft Buffer Zone

Our professional opinion, for the reasons cited above, is that the 120-ft buffer is inadequate at this time in a known landslide zone (see Figure 1 below). GeoStudio software of SEEP/W and SLOPE/W is appropriate for this work because it allows a seepage analysis and the application of the surcharge can be set back beyond the worst case slip circle. We would recommend that an FS=1.3 or greater be maintained to develop the setback.

F-3 Sec. 2.7

Due to the nature of the historical sliding in the area, it will be necessary to develop soil shear strengths based on residual soil parameters. It may be possible to use the existing soil samples, if they were saved in jars, to prepare remolded samples in the laboratory. Simple direct shear testing of remolded samples may provide appropriate parameters if it can be determined what the depth of sliding may be for appropriate normal loads during the test. Triaxial testing of remolded samples may also provide useful results, but may be more expensive.

F-4 Sec. 2.7

At least one extra boring upslope of the failure zone should be made with hollow stem augers to determine a reasonable groundwater level for the slope stability analyses. It would also be prudent to take a second boring or test pit through the land sliding mass just below the existing scarp to see if the depth of sliding can be determined to verify the slope stability model.

F-5 Sec. 2.7

AECOM is pleased to provide these recommendations and looks forward to answering any further questions you may have.

Figure 1. Google Earth Photograph Circa 2012 with Interpreted Landslide Scarps, Tension Cracks, Approximate Boring Locations, and Presumed Slope Stability Profile Location

PEER REVIEW COMMENT AND RESOLUTION FORM

PROJECT NO.: Town of Huntington, Indian Hills Country Club

DESCRIPTION: Geotechnical Engineering Service for Review of Slope Stability Evaluation Report

DESIGNER: Paulus, Sokolowski and Sartor Engineering, P.C.

SUBMITTAL: Appendix H1 - Geotechnical Engineering Reports and Correspondence, July 25, 2008

DATE: October 17, 2019

REVIEW SECTION: Geotechnical

REVIEWER NAME: DMCregger

NO.	SHEET OR ITEM	COMMENT	INITIAL ACTION	RESPONSE	QC REVIEW INITIAL	FINAL ACTION VERIFIED
COMPLETED BY REVIEWER			COMPLETED BY DESIGNER			BY REVIEWER
1	p.4	April 2001 photo shows caisson retaining wall at northeast end of site and a groin at the property line; stone riprap is not considered to be a wall, but does show up in 2004 air photos.				
2	p.5	Phase I tasks appear to be reasonable and non-invasive				
3	p.5	Phase II tasks are more invasive, but appear reasonable				
4	p.7	good historical reference and reporting				
5	p.7	17 feet of movement 2002-2008 should be shown on map				
6	p.8	there are existing borings; depth to clay is not stated				
7	p.8	good correlation to rainfall				
8	p.10	good correlation to groundwater				
9	p.10	more evaluation of drywell impact could have been made to elaborate on how the accelerated movements are documented				
10	p.12	recommendation of 2 borings and 2 inclinometers and 2 piezometers apperas to be reasonable				
11	p.13	figures were not attached				
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						

"SHEET OR ITEM" PREFIX FOR COMMENT NO'S - PLANS =P, SPEC. PROVS=S, EST.=E, CALC BOOK=C, DESIGN REPORT=D, OTHER=O
"ACTION" A=WILL INCORPORATE, B=WILL EVALUATE, C=DELETE COMMENT

PEER REVIEW COMMENT AND RESOLUTION FORM

PROJECT NO.: Town of Huntington, Indian Hills Country Club

DESCRIPTION: Geotechnical Engineering Service for Review of Slope Stability Evaluation Report

DESIGNER: Paulus, Sokolowski and Sartor Engineering, P.C.

SUBMITTAL: Appendix H-2 - Geotechnical Engineering Reports and Correspondence, April 15, 2019

DATE: October 17, 2019

REVIEW SECTION: Geotechnical

REVIEWER NAME: DMCregger

NO.	SHEET OR ITEM	COMMENT	INITIAL ACTION	RESPONSE	QC REVIEW INITIAL	FINAL ACTION VERIFIED
COMPLETED BY REVIEWER			COMPLETED BY DESIGNER			BY REVIEWER
1	p.1	is the date of this appendix correct?				
2	p.2	boring samples at 5-ft intervals was proposed to be continuous for delineation of the clay layer as stated in H-1				
3	p.3	what is thickness of the clay stratum				
4	p.4	groundwater readings were not obtained?				
5	p.4	FS should be > 1.3				
6	p.5	300 psf surcharge is a reasonable design				
7	p.6	is section 1-1 the SLOPE/W stability profile?				
8	p.9	what is the recovery of the sample?				
9	p.9	inspector should describe plasticity and stiffness of the clay				
10	p.10	what is difference between S10A and S10B? Is this a wet zone that could be the sliding zone?				
11	p.10	why is there poor recovery at S12? Is this the sliding zone?				
12	p.11	typo on S18 remark S8 indicates logs were not reviewed properly				
13	p.13	no water table given; no sample recovery data provided				
14	p.15	no water table given; no sample recovery data provided				
15	p.15	testing of lignite or other organic materials is important				
16	p.19	not reasonable to assume groundwater at sea level on the left side				
17	p.20	why is crest of slope not shown at highest point?				
18	p.21	only data on which to base the cohesion of the clay is the Atterberg limits; selection of 400, 500, 650, and 800 psf appears to be conservative; however, if the water table is higher than shown it may not be conservative				
19	p.22	groundwater line nearly intersects ground surface, but there is no report of water seeping out of the bluff				
20	p.22	cohesion parameters may not be correct for the higher water table				
21	p.23	why are there two water tables?				

"SHEET OR ITEM" PREFIX FOR COMMENT NO'S - PLANS =P, SPEC. PROVS=S, EST.=E, CALC BOOK=C, DESIGN REPORT=D, OTHER=O

"ACTION" A=WILL INCORPORATE, B=WILL EVALUATE, C=DELETE COMMENT