

December 2, 2016

File: 2016-2392

QuantumPlace Developments Ltd.
Suite 203, 1026 16 Avenue NW
Calgary, Alberta
T2M 0K6

Attention: Phil Wareham, C.E.T.

**Re: Slope Stability Assessment
Proposed Storm Water Retention Ponds Expansion (Pond Nos. 5 and 6)
Hamptons Golf Course
Calgary, Alberta**

This report presents the results of a slope stability assessment completed by E2K Engineering Ltd. (E2K) for the proposed expansion of the storm water retention ponds (Nos. 5 and 6) within the Hamptons Golf Course located in Calgary, Alberta. It is understood that the intent of this expansion is to increase the short term stormwater storage capacity of these two ponds in the event of heavy precipitation.

E2K has previously completed a geotechnical investigation at this site and issued a report dated September 28, 2016. The purpose of this assessment is to evaluate the global stability of the slopes within and around the proposed expansions of these ponds.

The stability assessment has been completed utilizing the soil parameters derived based on the above referenced geotechnical investigation completed by E2K. Contour maps of the proposed expansions were not provided to E2K at the time of completing this assessment. However, contour maps of the existing grades and the extents of the proposed expansions with corresponding Normal Water Level (NWL) and High Water Level (HWL) for each pond were provided to E2K as AutoCAD files. The extents of the proposed expansions were provided by Stormwater Solutions Inc. (SSI) and the existing contour maps were provided by WATT Consulting Group (WATT). The current assessment assumes that the existing grades within the proposed expansion limits will be regraded as per the information provided by SSI and the grades surrounding the expansion limits will remain unaltered. Cross sections for the current slope stability assessment were derived based on this information and as shown in the Appendix of this report.

A total of three (3) cross sections, Sections A and B for Pond 5 and Section C for Pond 6, were analyzed as the worst case cross sections. The stability assessment has been completed utilizing the geotechnical software GeoStudio 2012 (Slope/w), a commercially available software provided by Geo-Slope International Ltd. Based on the observations in the standpipe piezometers, as noted in the above referenced geotechnical report, the long term groundwater table at this site is anticipated to be significantly deep below the existing grades. This assessment was completed with the assumed worst case groundwater situations at each of the cross sections.

The following information was provided by SSI and utilized in the stability assessment:

	Proposed Elevations (m)		
	NWL	HWL	Bottom of Pond
Pond 5	1183.0	1187.0	1179.4
Pond 6	1180.0	1183.5	1175.5

The grades within these ponds and below the NWL were understood to be at 3H:1V (Horizontal:Vertical) slope.

An observation to the information provided by SSI and WATT indicates that the proposed HWL of Pond 6 is higher than the existing grades on the north and east sides of the pond. It is assumed that the grades in these areas will be reworked and raised to a minimum elevation matching with the HWL. The subsurface soil conditions encountered in our geotechnical investigation generally consisted of clay underlying topsoil, with the exception of BH-04. This borehole was drilled near the top of the berm on the east side of Pond 6 and consisted of sandy silt fill with trace to some gravel in the upper 2.5 m below grade. It is recommended that this fill material should be replaced with clay fill (compacted to minimum 98% of Standard Proctor Maximum Dry Density) as the silt soils with sand and gravel contents could be highly porous and can activate a failure with any minor damage to the pond liner at the HWL condition.

The soil parameters considered in our stability analysis were chosen conservatively based on the information available from the geotechnical report, and as shown below:

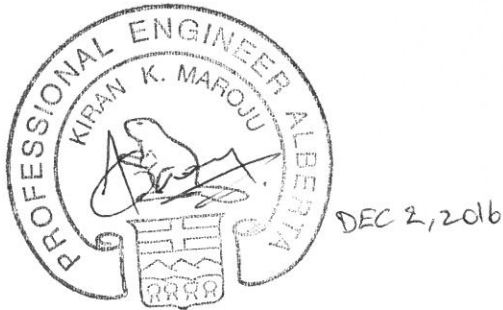
Soil Type: Clay
Friction Angle: 28 degrees
Cohesion: 2 kPa
Unit Weight: 19 kN/m³

Based on the results of our analysis, all the three cross sections were observed to have a minimum factor of safety of 1.5, as required by the City of Calgary. As stated earlier, this assessment has been completed based on the limited information available and the assumptions stated above. If the grades considered in the analysis or any of the stated assumptions are identified to be incorrect, E2K should be notified and given an opportunity to revise the stability assessment.

We trust the information contained herein meets your present requirements. Should you require inspection services, or further information regarding this project, please do not hesitate to contact our office.

Yours truly,

E2K Engineering Ltd.
APEGA Permit to Practice: P9582



Kiran K. Maroju, P.Eng.
Intermediate Geotechnical Engineer

Attachments: Site Plan
 Global Stability Analyses



Figure 1
Site Plan

Legend:

 Approximate location of the borehole

 Approximate location of the cross section for slope stability assessment

Slope Stability Assessment
Hamptons Golf Course - Ponds 5 & 6 Expansion
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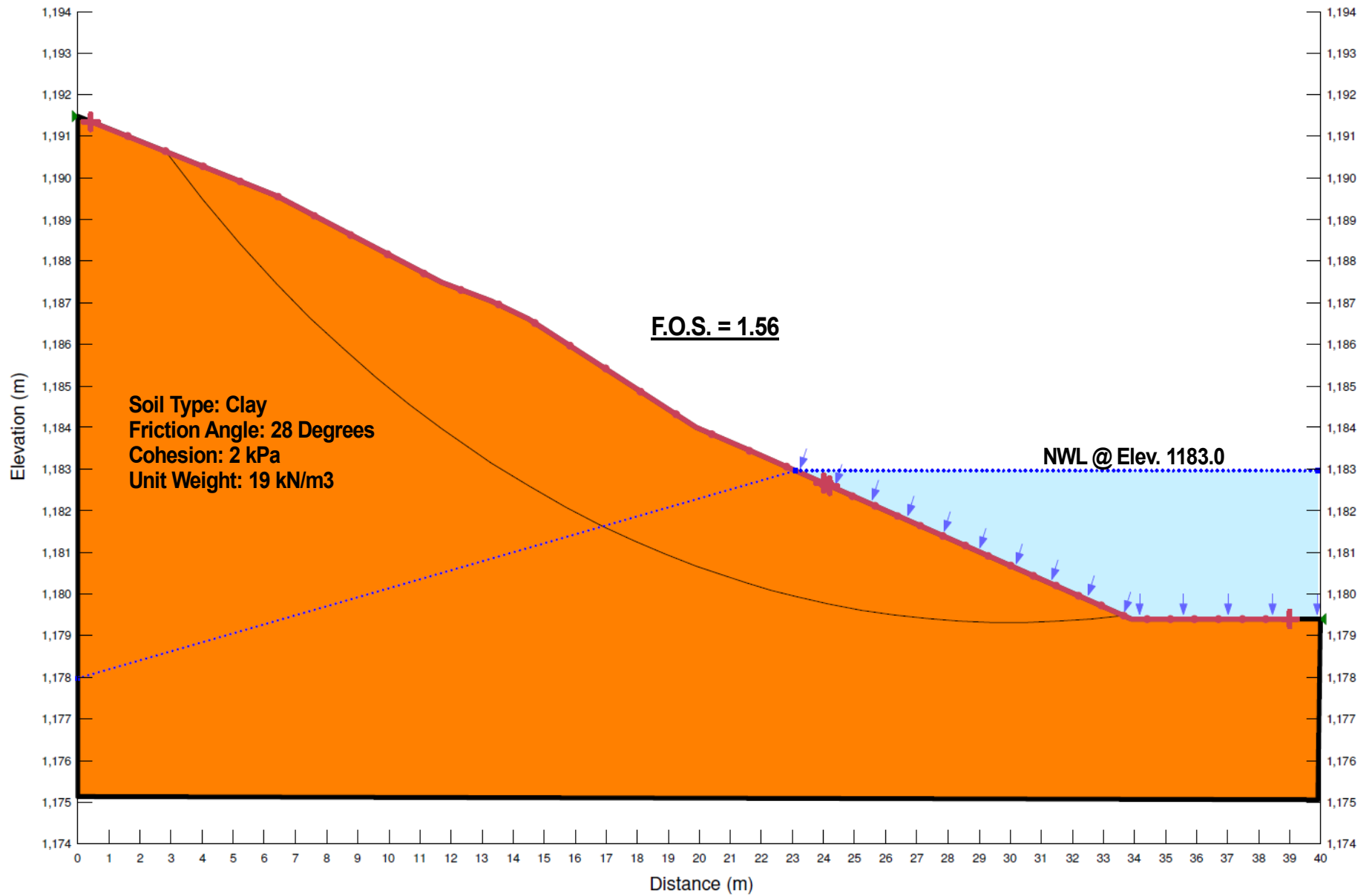


Figure 2
Pond 5 - Section A - NWL 1183.0

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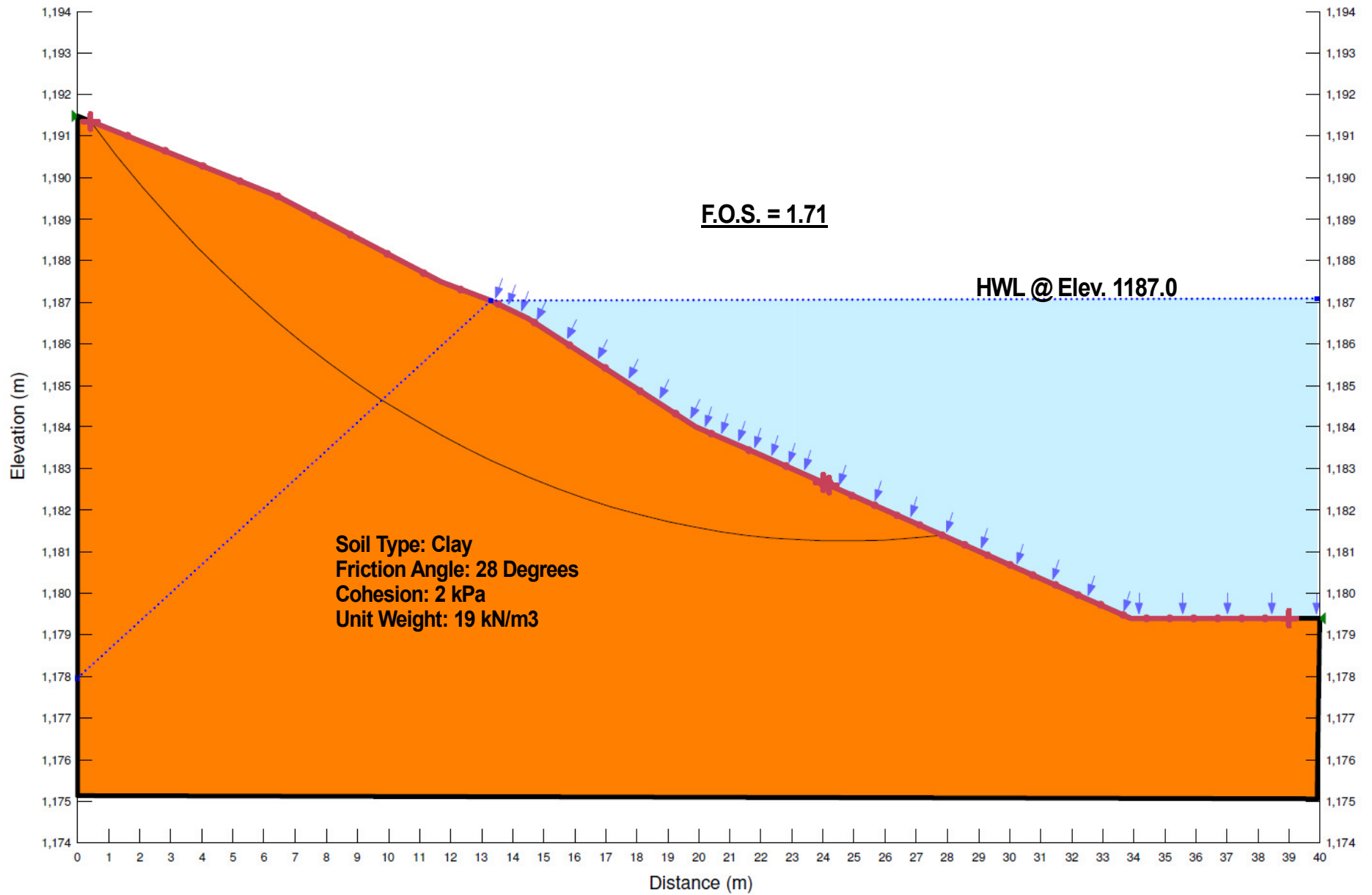


Figure 3
Pond 5 - Section A - HWL 1187.0

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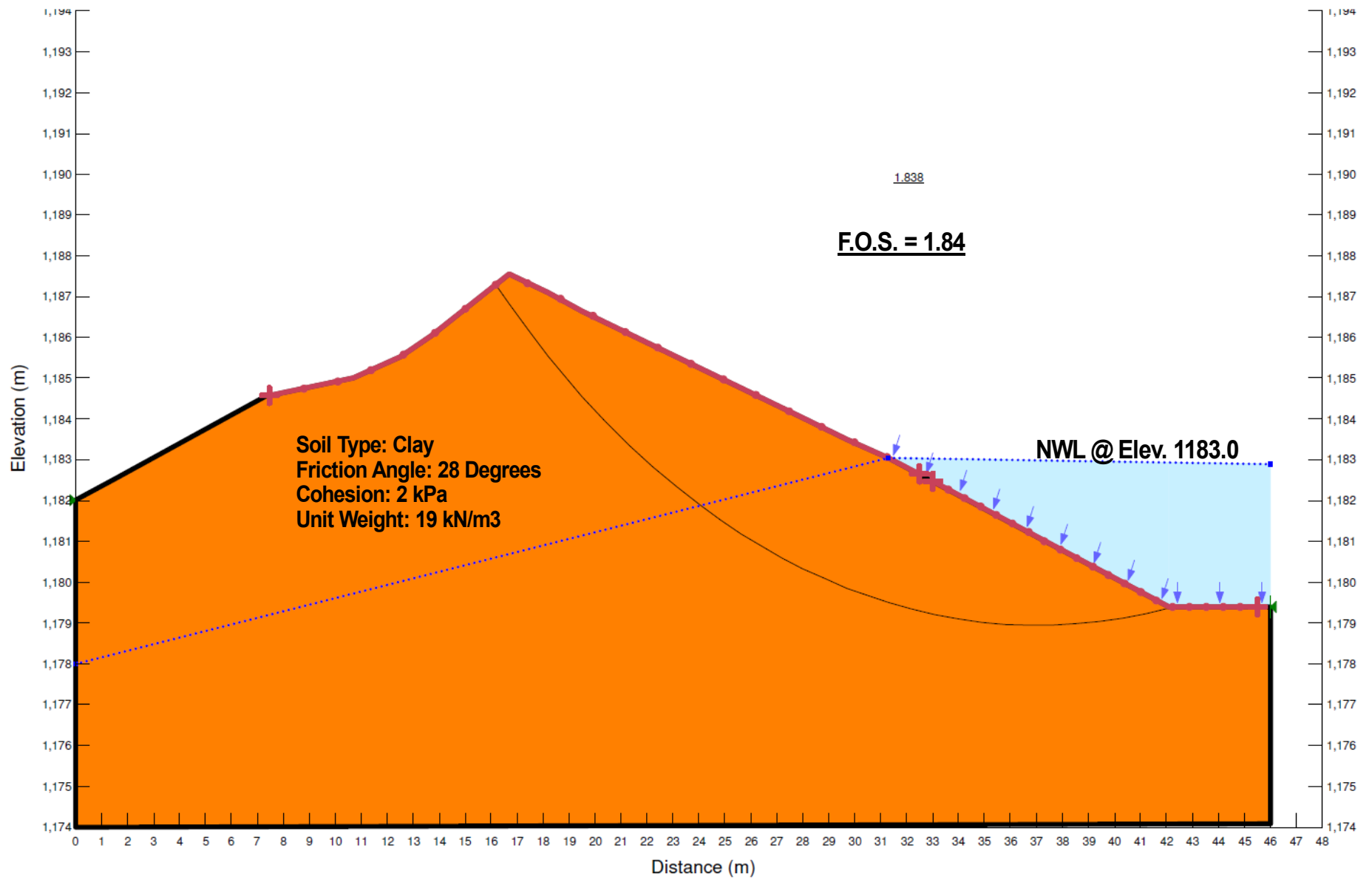
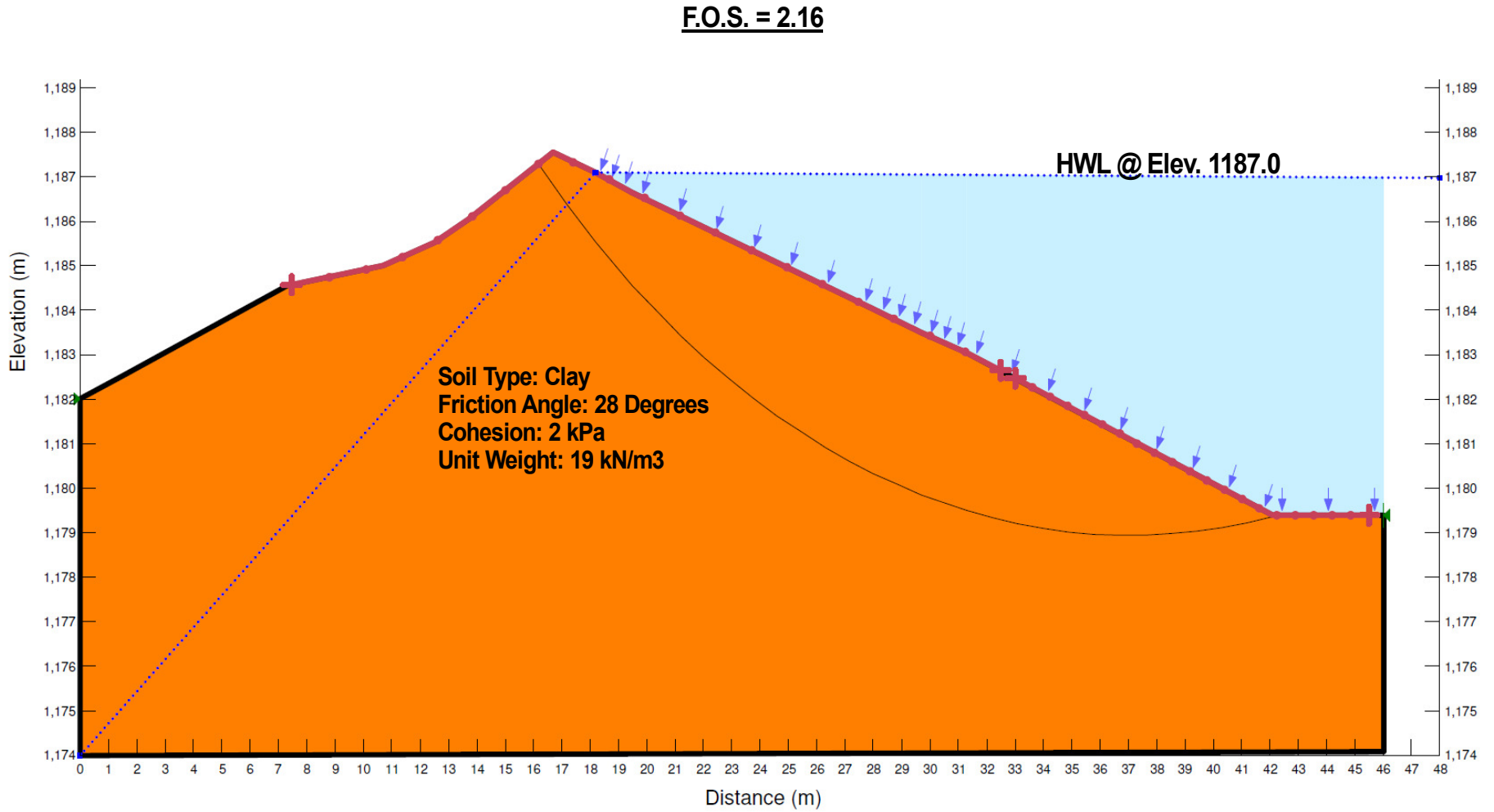


Figure 4
Pond 5 - Section B - NWL 1183.0



**Figure 5
Pond 5 - Section B - HWL 1187.0**

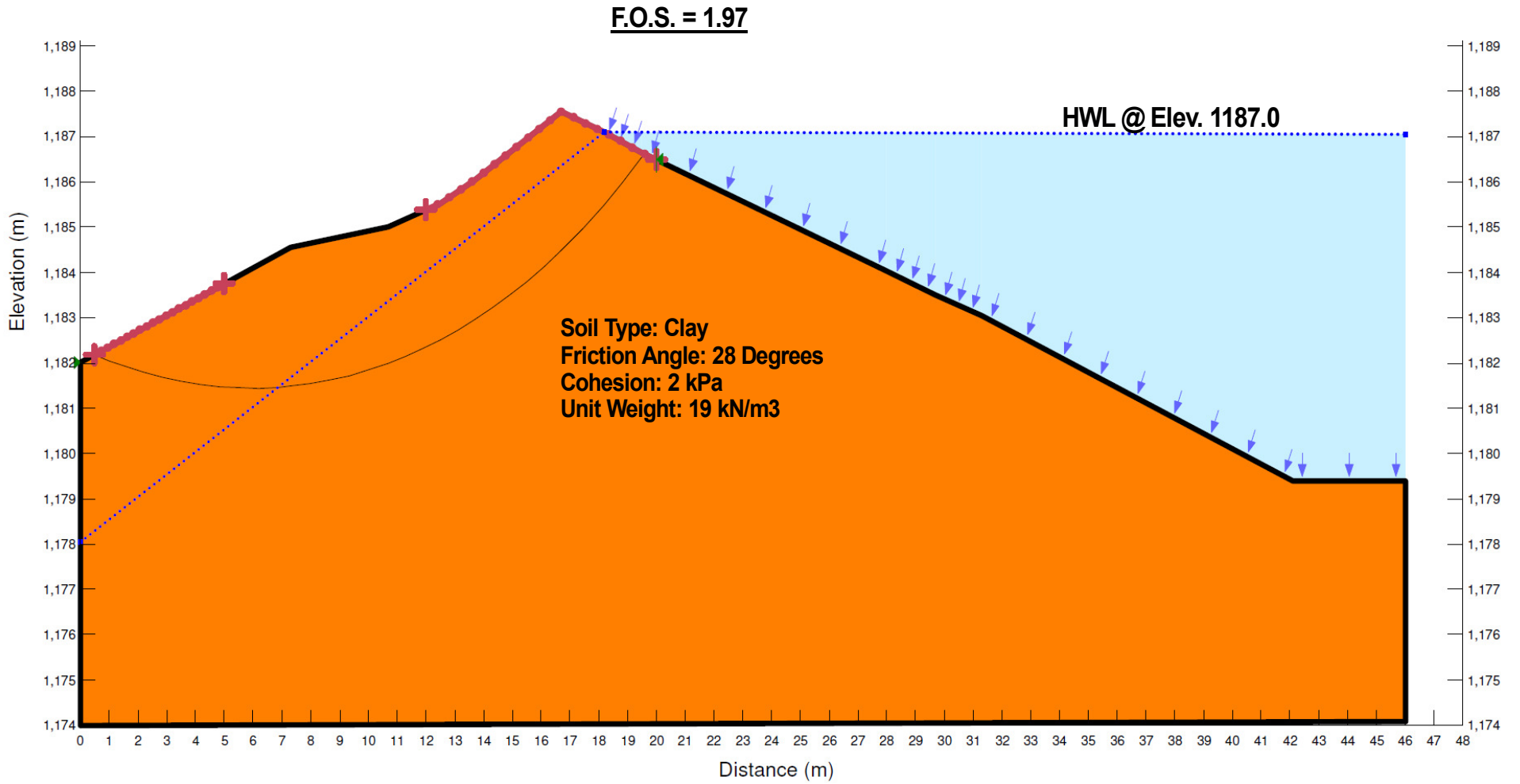


Figure 6
Pond 5 - Section B - HWL 1187.0

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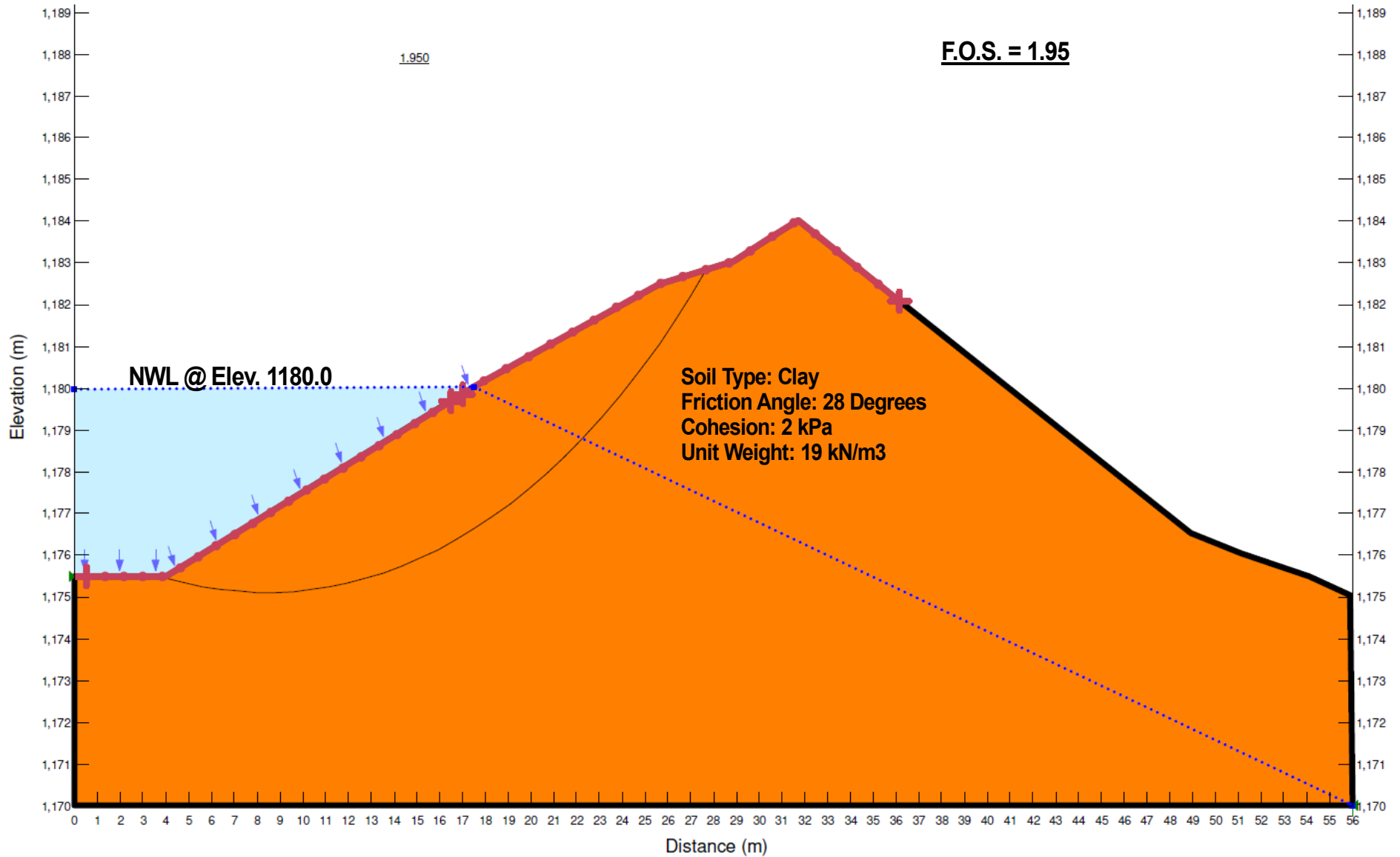


Figure 7
Pond 6 - Section C - NWL 1180.0

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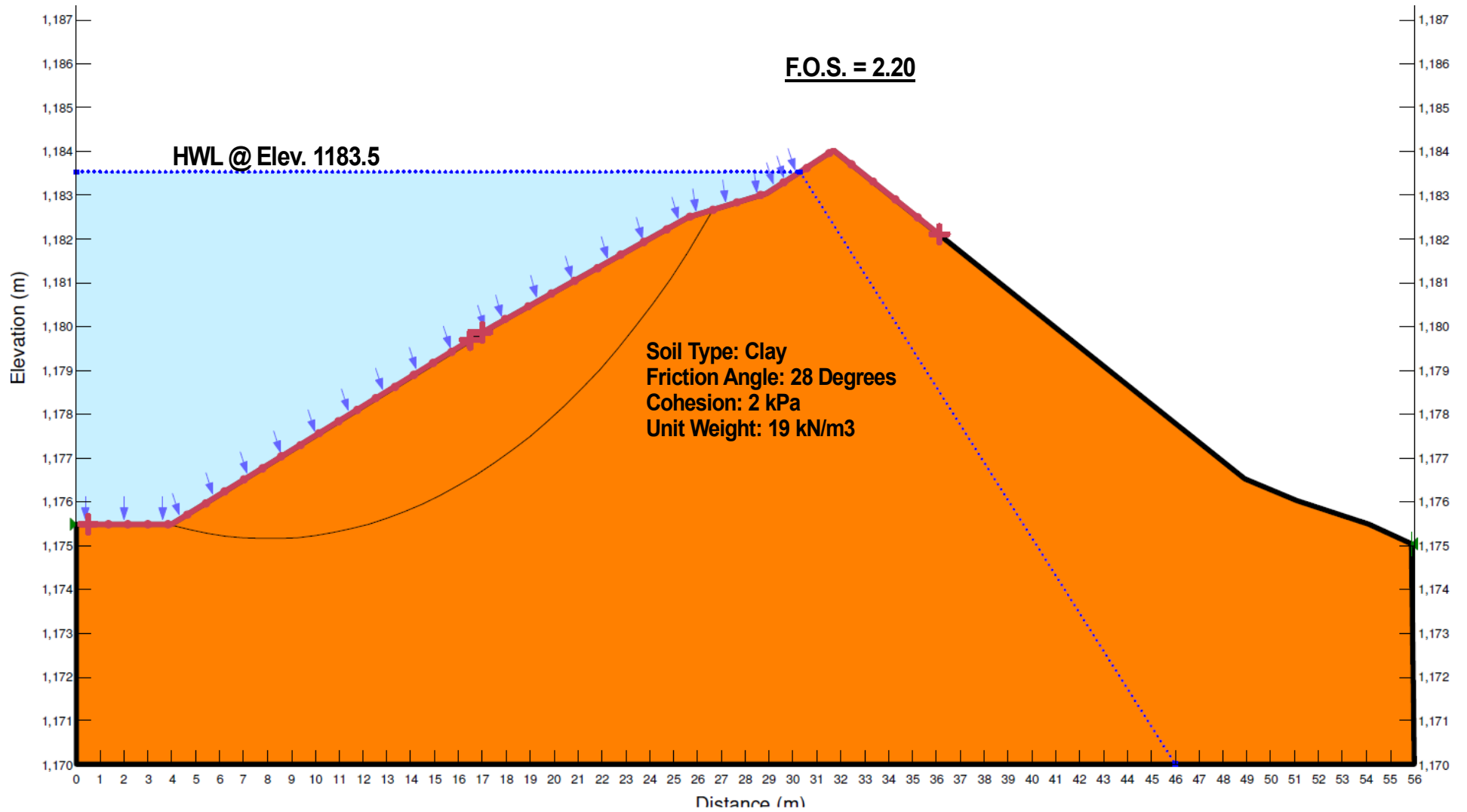


Figure 8
Pond 6 - Section C - HWL 1183.5

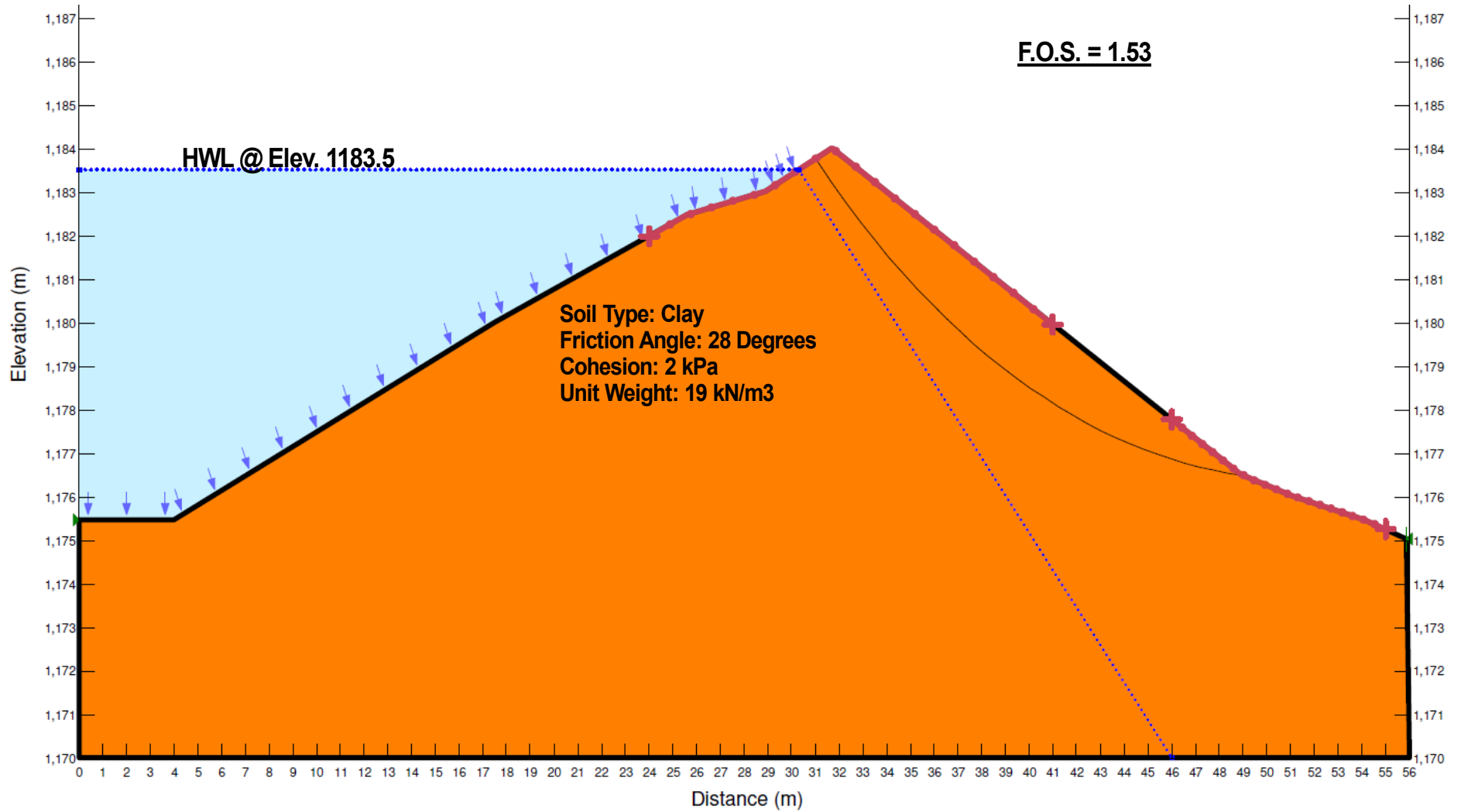


Figure 9
Pond 6 - Section C - HWL 1183.5