



Qualtest Geotechnical & Laboratory
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**Global Stability Analysis Report
Proposed Retaining Structures
#17 Courtney Drive
Upper Coomera QLD 4209**

August 27, 2026

Presented To

Courtney Upper Coomera Developments P/L

Qualtest Geotechnical and Laboratory

2/40 Boyland Avenue, Coopers Plains QLD 4108

3/64 Evans Drive, Caboolture QLD 4510

PO Box 733 Archerfield QLD 4108

(07) 3875 1898 qualtest@qualtestgeo.com

www.qualtestgeo.com

ABN 74 010 752 815



Qualtest Laboratory

Est. 1987

Courtney Upper Coomera Developments Pty Ltd

c/- CFMG Capital, 138 Mary Street, Brisbane City, Qld 4000

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Global Stability Analysis Report

Report Ref. No: 11610 Rev A – 25-474

August 27, 2026

COURTNEY UPPER COOMERA DEVELOPMENTS PTY LTD

ATTENTION: MR HARRY WILSON

Email: harryw@cfmgcapital.com.au

Qualtest Laboratory Pty Ltd

2/40 Boyland Avenue

Coopers Plains QLD 4108

Email: qualtest@qualtestgeo.com

Phone: 07 3875 1898

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Rev	Date	Author	Reviewer	Description
A	27/08/2026	Dennis Alazigha, RPEQ - 22169	Dennis Alazigha, RPEQ - 22169	Issued to Client
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1 Introduction

It is understood that Courtney Upper Coomera Developments Pty Ltd plans to design and construct retaining structures to support cut/fill batters within the property located at #17 Courtney Drive, Upper Coomera, QLD 4209.

Client-supplied information reveals that single and double-tier post & concrete sleeper walls are proposed for construction within the residential development.

Mr Harry Wilson, on behalf of Courtney Upper Coomera Developments Pty Ltd, engaged Qualtest to carry out a global stability analysis/certification of the proposed structures in accordance with Council requirements, with an email dated August 19, 2026.

This report presents the results of the global stability analysis/certification of the post & concrete sleeper retaining walls/batters proposed for construction at the development.

The geographical location of the site is presented in *Figure 1*.



Figure 1: The Geographical Location of the Site Highlighted in Red

1.1 Proposed Development

Client-supplied drawings, an excerpt of which is presented in *Figure 2*, show the extents of the proposed retaining walls.

The plan also indicates that the retaining walls would be a single/double-tier post & concrete sleeper structures of varying heights, typically between 1.0 to ~ 3.0m. Also shown in the drawings are cut/fill sections to create a building pad.

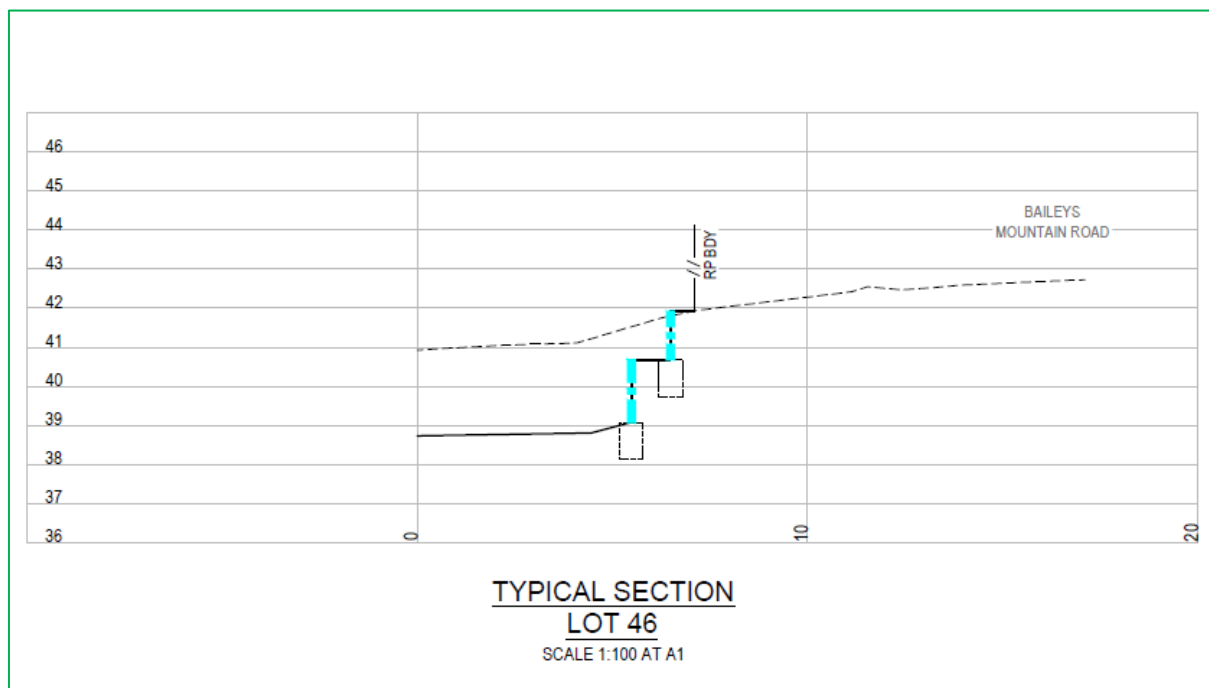


Figure 2: The Proposed Retaining Walls (Source: OSKA, 25/6/2026)

1.2 Scope of Work

It is understood that Courtney Upper Coomera Developments Pty Ltd has received an information request for the development application submitted for #17 Courtney Drive, Upper Coomera.

Though Qualtest has been privy to the request for information, Council has requested in Item 5 that the applicant should provide an amended geotechnical report ensuring global stability analysis for the critical retaining walls can demonstrate a long-term FOS of 1.5 or greater.

Based on the above, the following scope of work was completed:

- a. Development is carried out in accordance with a site-specific geotechnical report:
 - i. that includes a certification by a Registered Professional Engineer of Queensland specialising in geotechnical engineering that the development the subject of the report has a factor of safety greater than 1.5 against geotechnical failure;

1.3 Information Provided

The Client provided the following information to assist in preparing this report:

- Qualtest Report – Geotechnical Investigation & Landslide Risk Assessment, Proposed Residential Development, #17 Courtney Drive, Upper Coomera, QLD 4209, Report No: 9603 Rev D, 25-474, Dated March 18, 2026;
- Oska Consulting Group – Courtney Upper Coomera Developments Pty Ltd, Proposed Residential Subdivision, 17 Courtney Drive, Upper Coomera, QLD 4209, Preliminary Bulk Earthworks, Lots 44-48 Sections, Drawing No: OSK7105-P015, Revision 1, Dated 12-08-2026;
- City of Gold Coast – Amended Confirmation Notice and Information Request, 17 Courtney Drive, Upper Coomera QLD 4209, Courtney Upper Coomera Developments Pty Ltd, Reference No: ROL/2026/54, Dated 2 July 2026;
- Qualtest Report – Excavation Conditions, Sewer and Stormwater Trenches, Courtney Drive, Stage 5, Job No: 25-371 – 9189, Dated 11th September 2025.

2 Methodology

The methodology for the above scope of work included the following:

- Review of the engineering drawings/survey plan for the proposed development;
- Review of the previous geotechnical investigation reports prepared by Qualtest;
- Review of the previous landslide risk assessment report prepared by Qualtest;
- Geotechnical modelling of the retaining structures; and
- Global stability analysis of the retaining walls using Slide2D software; and
- Preparation of a global stability analysis report for the structures.

2.1 Site Investigation

The approved scope of work exempted site-specific geotechnical investigation, as previous geotechnical investigation reports were available to Qualtest for review.

2.1.1 Previous Geotechnical Investigation Reports

Qualtest had previously conducted a geotechnical investigation of the site with a report issued on March 18, 2026. A summary of the subsurface conditions reported is summarised below:

- Topsoil – observed at all borehole locations and was classified as loose to dense silty sand. The topsoil layer was noted to be relatively thin at most locations, ranging from 0.1 to 0.2m in thickness.
- Slopewash - Observed underneath the topsoil at all boreholes. These materials extended to a maximum depth of 0.6m. The slopewash materials were predominantly described as loose to medium dense silty sand with a localised section of silty sandy gravel. Slopewash is material that has been transported by gravity/run off and deposited downslope.
- Residual Soils - Observed in all boreholes, underneath the topsoil or slopewash. These materials were described as low to high plasticity sandy clay/clay of stiff to hard consistencies. The residual soils extended to depths ranging from 0.5 to 1.5m before grading into weathered rock.
- Weathered Sandstone – observed in all boreholes, these materials were identified as weathered sandstone rock recovered as dense to very dense clayey sand and were assessed to be extremely to highly weathered sandstone; however, at auger refusal depth, the materials are expected to be at least moderately weathered and of low to medium-strength rock.

In this report, a number of site features are considered, including the subsurface profile, the surface topography, existing vegetation, and the proposed development, in the classification of the site. Given that the site contains steep ground slopes and earthworks fill heights greater than 0.4m and planned removal of trees, the site was assigned **Class P** per AS2870-2011.

The site was also classified based on characteristic surface movement (ys) estimated in accordance with Clause 2.3 and applying Table 2.3 of AS2870-2011 and was assigned **Class S to M** site.

2.1.2 Groundwater

Standing groundwater was not reported in any of the boreholes. However, the presence of materials overlying residual clays was identified to be conducive for the development of perched water conditions following prolonged rainfall.

2.1.3 Material Parameters

The conservative geotechnical design parameters for the controlled fill, sand/clay-based residual soils and weathered sandstone used in this global stability analysis were derived from the previous geotechnical investigation report prepared by Qualtest 2026.

Design parameters not provided in the report were sought from published literature and engineering judgment. *Table 1* shows the adopted design parameters.

Table 1: Geotechnical Design Parameters for Global Stability Analysis

MaterialID	Geotechnical Design Parameters			
	γ (kN/m ³)	C' (kPa)	Φ' (Degrees)	S_u (kPa)
Controlled Fill	18	1	24	100
Impermeable Clay	17	0	18	50
Backfill Aggregate	20	0	29	NA
Sand-Based Soils	19	0	28	NA
Clay-Based Soils	18	2	26	150
Weathered Sandstone	21	6	28	NA
Reinforced Concrete Sleeper Block	24	1000	N/A	NA
Reinforced Concrete Piers	24	1000	N/A	NA

3 Global Stability Analysis

3.1 Design Cross-section

Global stability analyses have been carried out for the retaining structure proposed for construction at 14 Centurion Circuit, Holmview. The following design case scenarios at locations in cut were analysed:

- Design Case 1 – Cross Section A1, Lots 14-15
 - 5 kPa surcharge behind the crest
 - Wall Type – Double-Tier Post & Concrete Sleeper Wall
 - Total Wall Height – 1.9m
 - Retaining – Controlled Fill
 - Piers extended into Underlying Competent Materials.
- Design Case 2 – Cross Section C1, Lots 3-22
 - 5 kPa surcharge behind the crest
 - Wall Type – Double-Tier Post & Concrete Sleeper Wall
 - Total Wall Height – 3.0m
 - Retaining – Cut
 - Piers extended into Underlying Competent Materials.
- Design Case 3 – Cross Section D1, Lots 7-18
 - 5 kPa surcharge behind the crest
 - Wall Type – Double-Tier Post & Concrete Sleeper Wall
 - Total Wall Height – 3.0m
 - Retaining – Cut
 - Piers extended into Underlying Competent Materials.
- Design Case 4 – Cross Section E1, Lots 13-14
 - 5 kPa surcharge behind the crest
 - Wall Type – Double-Tier Post & Concrete Sleeper Wall
 - Total Wall Height – 2.2m
 - Retaining – Controlled Fill
 - Piers extended into Underlying Competent Materials.
- Design Case 5 – Cross Section E2, Lot 14 & Rd Reserve
 - 5 kPa surcharge behind the crest
 - Wall Type – Double-Tier Post & Concrete Sleeper Wall
 - Total Wall Height – 3.0m
 - Retaining – Controlled Fill
 - Piers extended into Underlying Competent Materials.
- Design Case 6 – Cross Section E3, Lot 36 & Basin
 - 5 kPa surcharge behind the crest
 - Wall Type – Double-Tier Post & Concrete Sleeper Wall
 - Total Wall Height – 3.0m
 - Retaining – Controlled Fill
 - Piers extended into Underlying Competent Materials.
- Design Case 7 – Lot 46
 - 5 kPa surcharge behind the crest
 - Wall Type – Double-Tier Post & Concrete Sleeper Wall
 - Total Wall Height – 3.0m
 - Retaining – Cut
 - Piers extended into Underlying Competent Materials.

3.2 Basis for Design

No specific design standard(s) are required to be used by Gold Coast City Council to complete the geotechnical analysis. To progress the assessment, the Department of Transport and Main Roads ("TMR") Geotechnical Design Standard (2022) has been used as the basis of this analysis. This standard is widely accepted by government agencies when assessing slope stability and is considered to be appropriate for this analysis.

3.2.1 Design Methodology

The stability of the retaining walls has been assessed using a Slide2D limit equilibrium analysis. The design philosophy includes:

- Limit equilibrium methods of assessment have been used to assess global stability.
- The subsurface materials have been modelled using drained strength parameters.
- Global stability assessment of retaining walls has considered a minimum FOS for long-term stability of 1.50.

The factors of safety (FoS) for the proposed retaining walls were assessed using the Morgenstern/ Price and Spencer methods, and the Circular Surface Type with Auto Refine Search Method were used to complete the analysis, with the lower FoS of the two adopted. The analysis was completed using the method of limit equilibrium analysis with the commercially available software package Slide2D Version 9.044 (by Rocscience).

The global stability of the retaining walls was assessed based on the Department of Transport and Main Roads ("TMR") Geotechnical Design Standard (2022) criteria per *Table 2*.

Table 2: Recommended Factor of Safety

Loading Condition	Recommended Minimum FoS	Reference
Static: everyday operating conditions – Long Term	1.5	Geotechnical Design Standard (2022)

Two (2) sections were used as the basis of the global stability analysis per Section 3.1 above.

3.2.2 Phreatic Surface

In the Qualtest 2026 report, groundwater was not recorded at drilled locations. However, for this analysis, groundwater was assumed to exist at 2.5m below the toe of the 2nd-tier wall.

3.2.3 Design Assumptions

The following assumptions were made in the modelling/analysis of the retaining structure:

- Groundwater exists at about 2.5m below the finish surface.
- All earthworks will be carried out in accordance with AS3798 across the site.
- The piers will be sufficiently socketed into the underlying hard to weathered sandstone rock.
- The adopted design parameters are conservative representations of current ground conditions.
- An undrained strength of 1000 kPa is adopted for the reinforced piers and concrete sleepers.

3.2.4 Design Loads

The following loading conditions have been used as the basis of the stability assessment:

- A 5kPa uniformly distributed load has been positioned on all relatively flat areas to account for the loads from maintenance/building/construction activities.

3.3 Results of Stability Analyses

The results of the global stability analyses of the seven (7) design cases under static loading conditions are presented in *Table 3*. Output from the analyses is shown in *Appendix A*.

All proposed structures are geotechnically stable in the long term.

Table 3: Stability Analysis Results for Static Loading Conditions

ID	Loading Condition	Required FoS	Achieved FoS	Remarks
Design Case 1	Static	1.50	2.31	Satisfactory Design
Design Case 2		1.50	1.99	Satisfactory Design
Design Case 3		1.50	2.11	Satisfactory Design
Design Case 4		1.50	2.16	Satisfactory Design
Design Case 5		1.50	2.26	Satisfactory Design
Design Case 6		1.50	1.85	Satisfactory Design
Design Case 7		1.50	1.67	Satisfactory Design

3.4 Certification/Discussion

Following the global stability analyses completed for the post & concrete sleeper retaining structures proposed for construction at 17 Courtney Drive, Upper Coomera, the long-term factor of safety (FoS) is calculated to be greater than 1.5 for all design cases.

Based on the above results, Qualtest attests that the proposed retaining structures are geotechnically stable in the long term and should be constructed as shown in the drawings/models.

It should be noted that the construction of the structures strictly complies with the drawings and materials used in the models. Deviation(s) from the models will render this report Invalid.

Retaining wall drainage is essential to building a good retaining wall. During the wall's construction, a drainage system must be built to drain water that is absorbed behind the wall. The weight of the earth or gravel behind the wall is an acting force that the retaining wall must withstand, and any water absorbed behind the wall adds compounding pressure that can result in shifting, bulging, or total collapse. For this reason, it is crucial that there is a passage for water to drain from and that the design of the wall can safely withstand the expected load.

It is recommended that a concreted Vee-drain be constructed uphill to divert surface runoff into the back of the wall.

If the ground conditions modelled in this stability analysis are different at the time of construction, Qualtest should be informed so that an inspection and, if necessary, further analyses can be completed.

Pier inspection and certification by a competent person during the construction phase is highly recommended.

Limitation

This report is for the sole benefit and use of Courtney Upper Coomera Developments Pty Ltd and its partners.

This report is for the purpose of providing geotechnical information for the global stability of the proposed concrete sleeper retaining structures at the proposed site located at 17 Courtney Drive, Upper Coomera, QLD (**The Project**). The report is only intended to address those issues expressly described in the scope of work. Qualtest is not the designer of the retaining walls.

Ground conditions can and often vary within a site. It should be noted that significant differences in ground conditions can exist; however, it is assumed that the subsurface profiles encountered in the boreholes are similar throughout the site.

This report should not be used as a project specification. This report provides conclusions following the Design Proof Check assessment.

For the avoidance of doubt, Qualtest cannot predict the ground conditions encountered at any untested location because the ground conditions within the site could differ, and it does not take responsibility for data provided by others.

Should you require further information regarding the above, please do not hesitate to contact this office.

Yours faithfully.



MICHAEL MORRISON

For and on behalf of

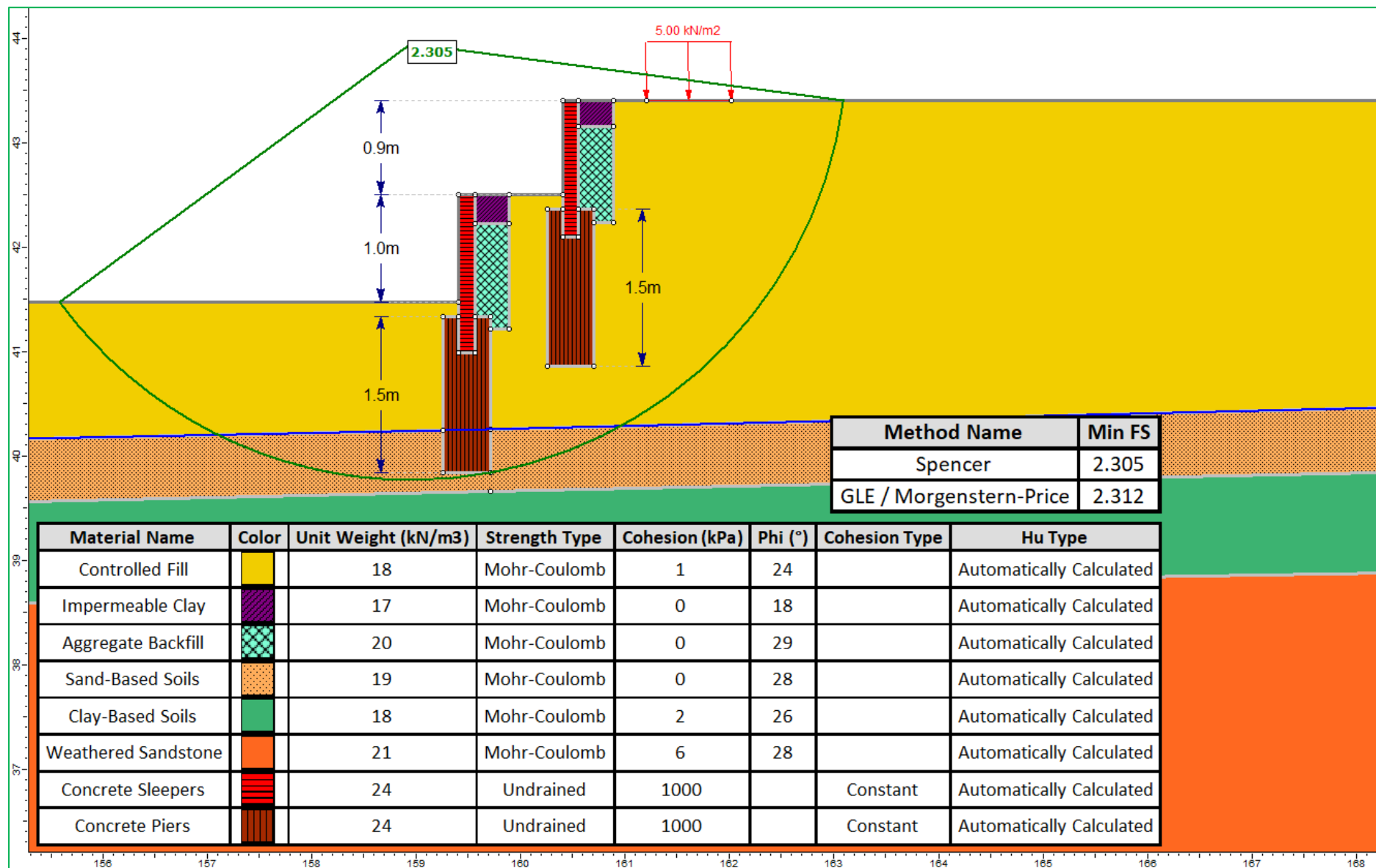
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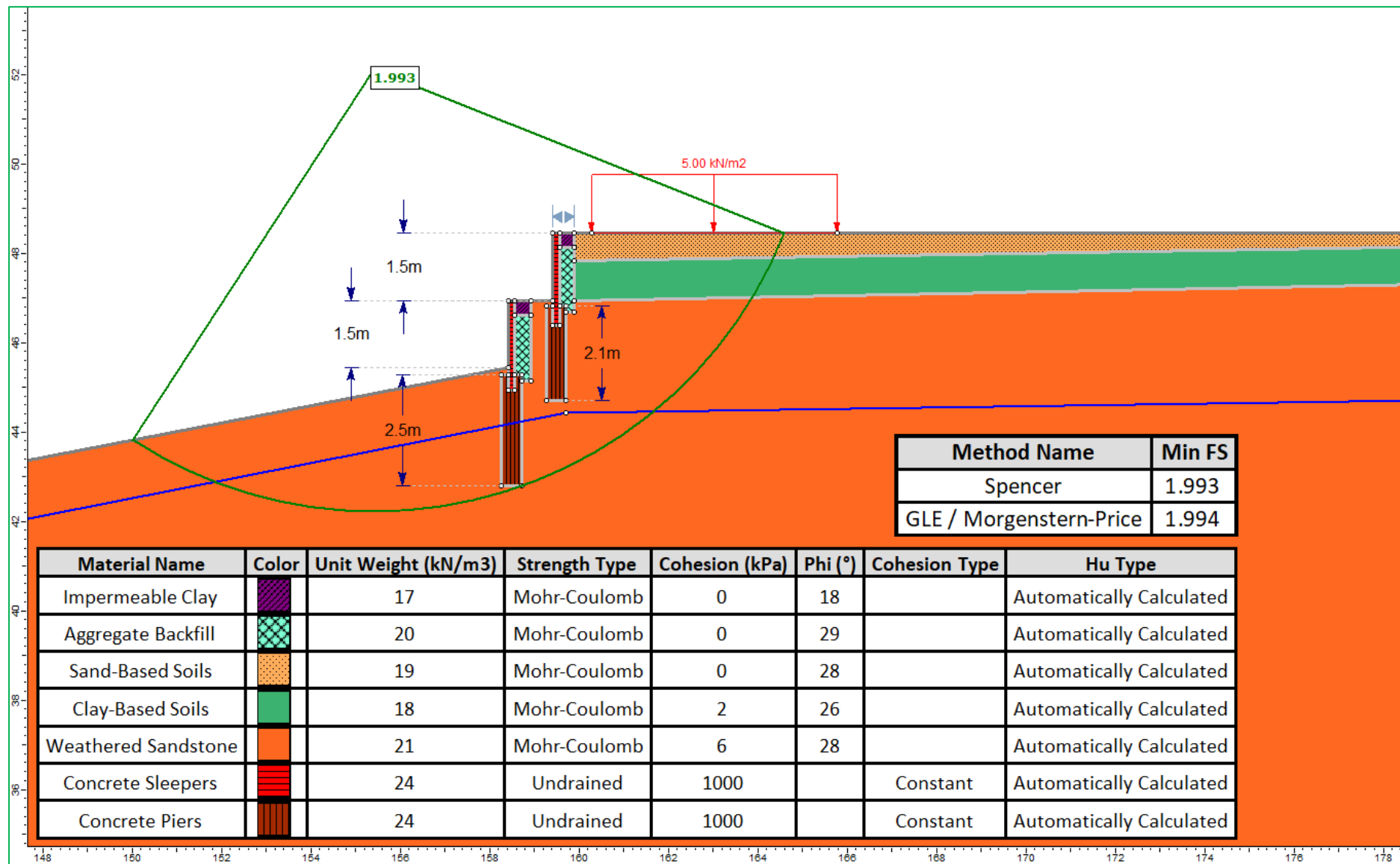
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Appendix A: Results of Global Stability Analyses

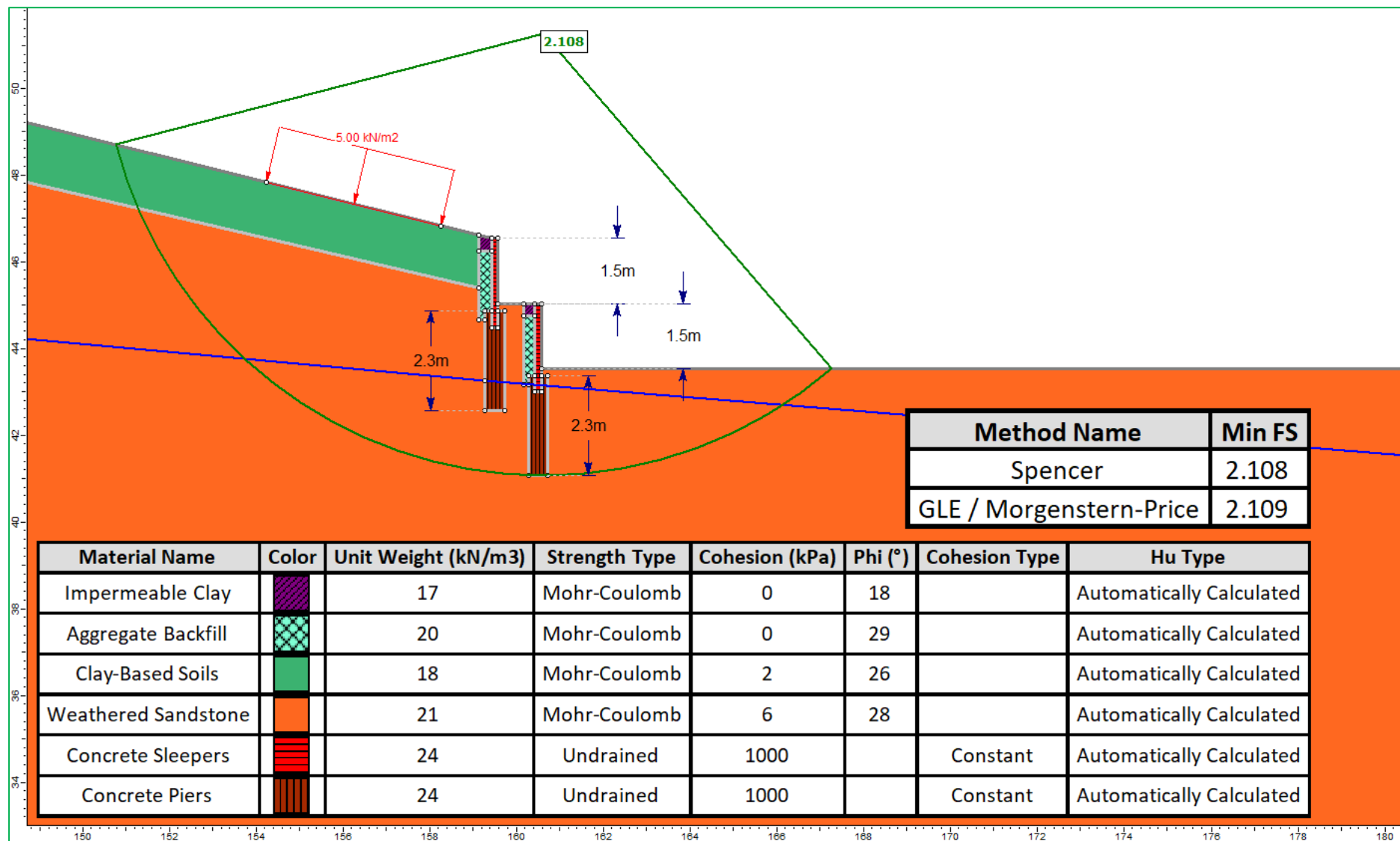
Appendix A – Global Stability Analysis Results



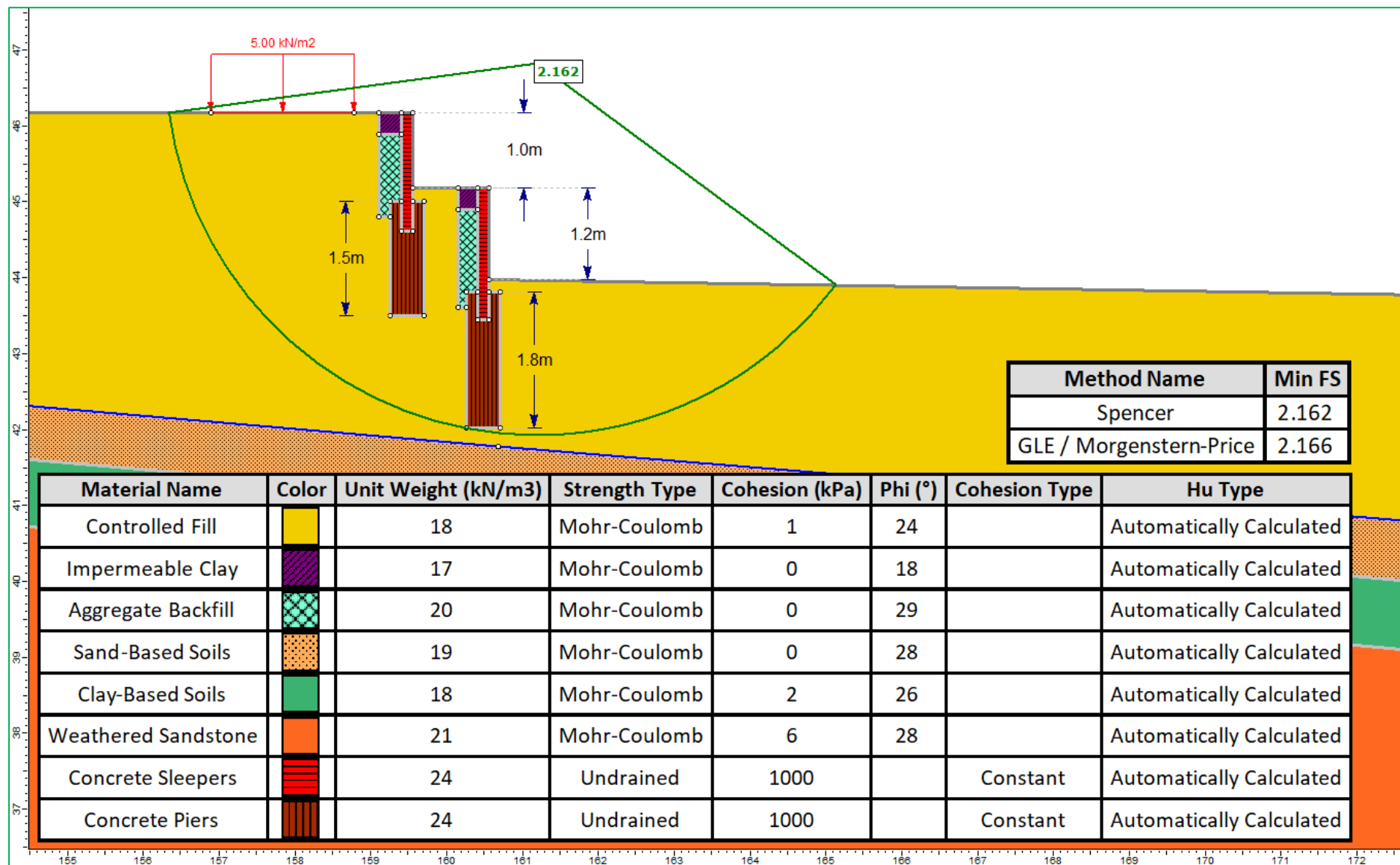
Appendix A1 – Design Case 1, Cross Section A1, Lots 14-15, Results of Global Stability Analysis



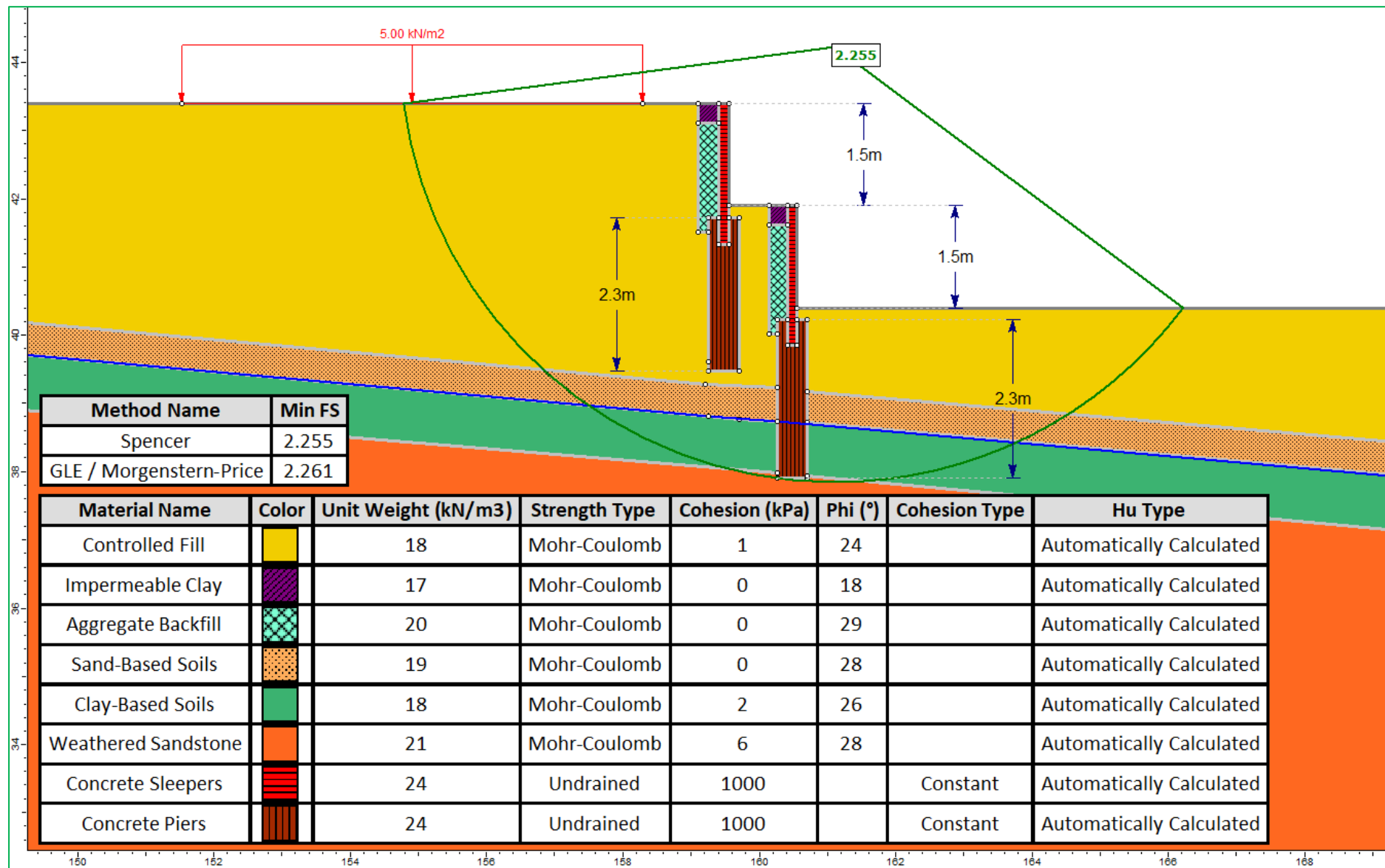
Appendix A2 – Design Case 2, Cross Section C1, Lots 3-22, Results of Global Stability Analysis



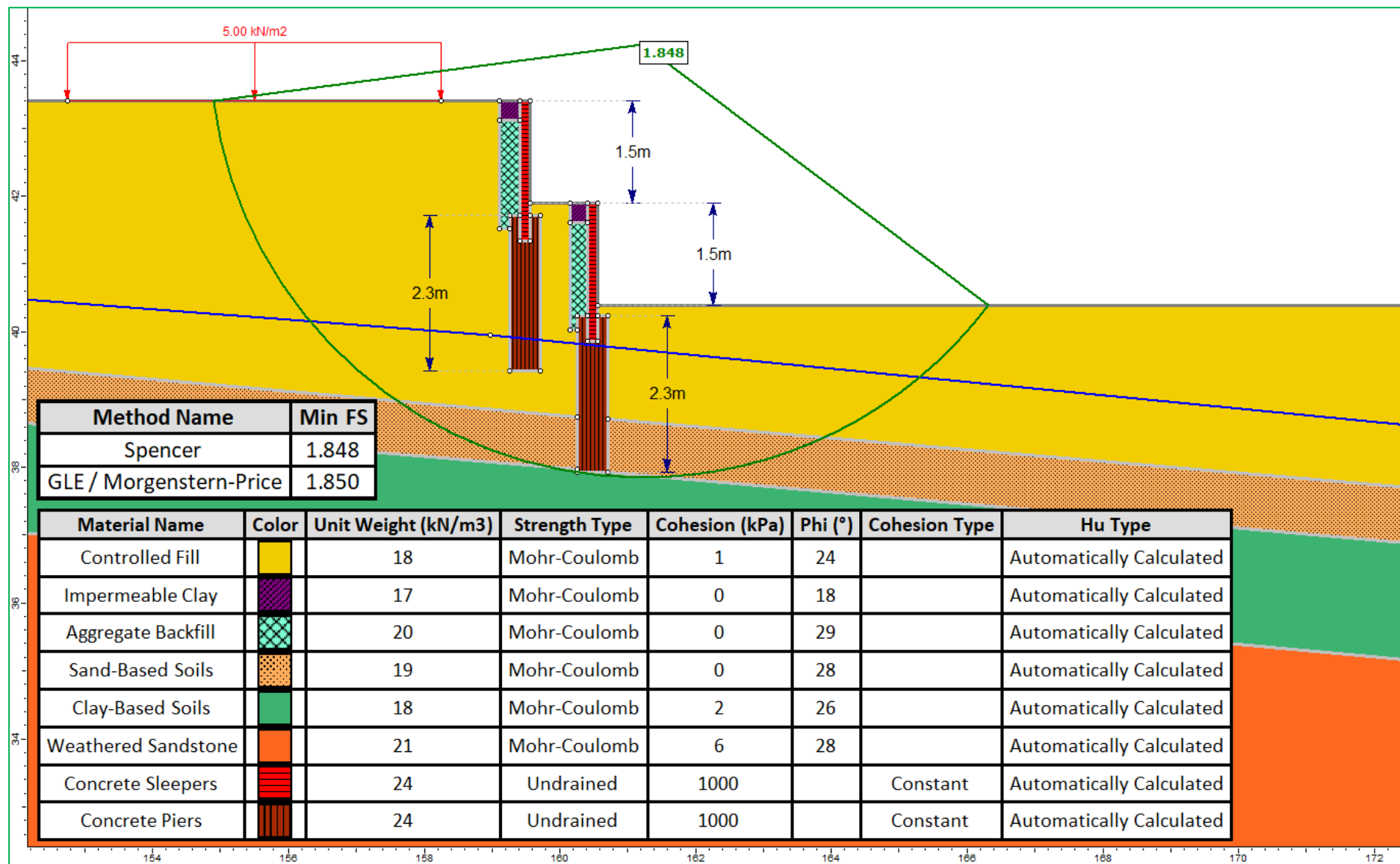
Appendix A3 – Design Case 3, Cross Section D1, Lots 7-18, Results of Global Stability Analysis



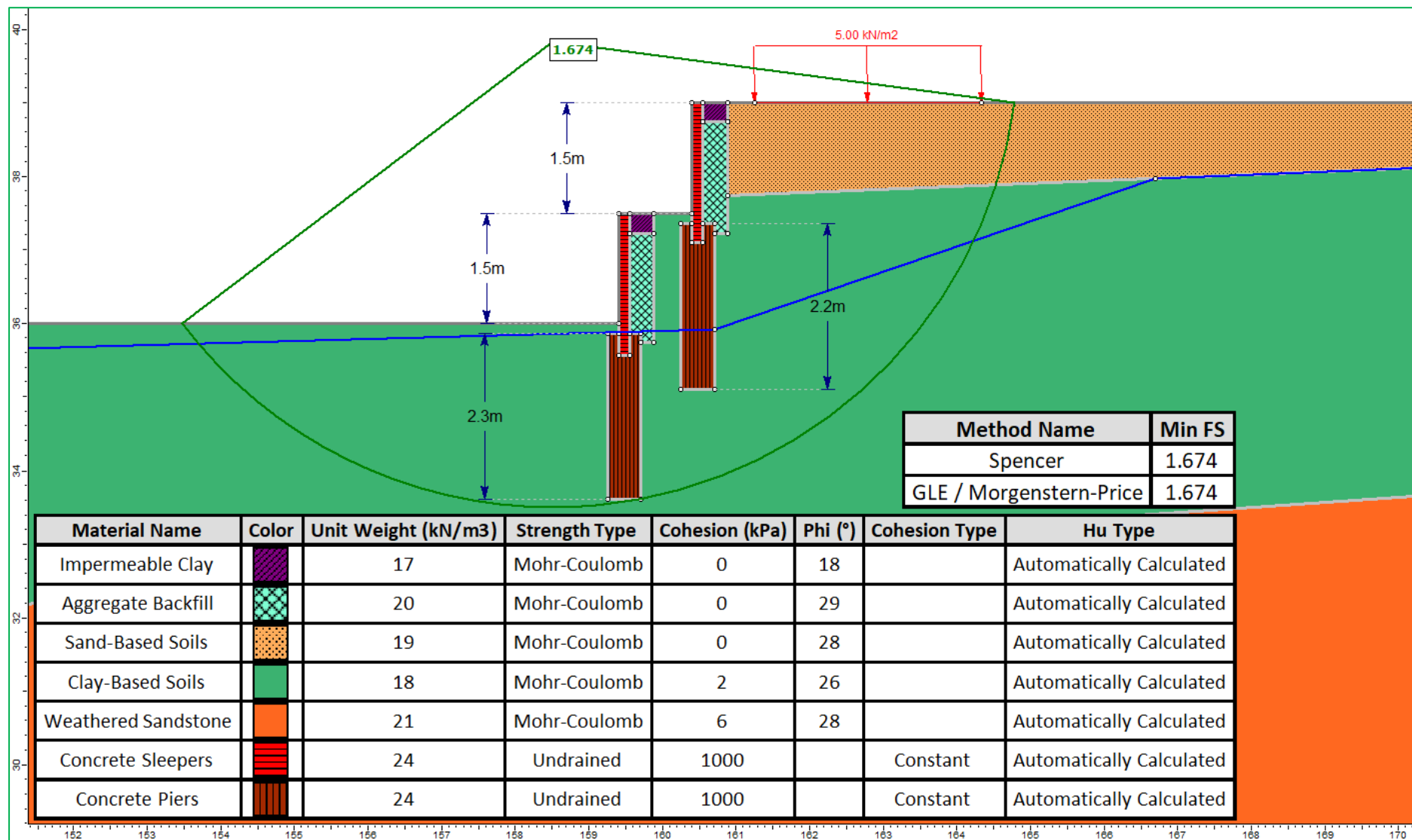
Appendix A4 – Design Case 4, Cross Section E1, Lots 13-14, Results of Global Stability Analysis



Appendix A5 – Design Case 5, Cross Section E2, Lot 14 & Rd Reserve, Results of Global Stability Analysis



Appendix A6 – Design Case 6, Cross Section E3, Lot 36 & Basin, Results of Global Stability Analysis



Appendix A7 – Design Case 7, Lot 46, Results of Global Stability Analysis