

## Appendix C: Investigation Logs

Client: Colliers Project Leaders Ltd  
Project: Southern Links Stage 1 Residential Area  
Site Location: Deanwell, Hamilton  
Project No.: HAM2024-0017  
Date: 22/04/2025



|                                  |                          |                              |
|----------------------------------|--------------------------|------------------------------|
| Position: 444996.1mE; 694922.2mN | Projection: Mt Eden 2000 | Pit Dimensions: 4.0m by 1.0m |
| Elevation: 40.00m                | Datum: NZVD 2016         | Survey Source: Hand-held GPS |

22-04-2025

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 5 - August 2024.



# PHOTOGRAPH SHEET - TP25-01

Client:  
Project: Southern Links  
Location: Hamilton  
Project ID: HAM2024-0017  
Date: 22/04/2025



TP25-01:



TP25-01:

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.

TEST PIT LOG - TP25-02

Client: Colliers Project Leaders Ltd  
Project: Southern Links Stage 1 Residential Area  
Site Location: Deanwell, Hamilton  
Project No.: HAM2024-0017  
Date: 22/04/2025  
Test Pit Location: Refer to Site Plan



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Logged by: DB    Checked by: MM    Scale: 1:25    Sheet 1 of 1

Position: 445162.4mE; 694941.1mN    Projection: Mt Eden 2000    Pit Dimensions: 4.0m by 1.0m  
Elevation: 40.60m    Datum: NZVD 2016    Survey Source: Hand-held GPS

| Groundwater     | Samples & Insitu Tests |                                   | RL (m) | Depth (m) | Graphic Log | Material Description<br>Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit)<br>Rock: Colour; fabric; rock name; additional comments. (origin/geological unit) | Moisture Condition | Consistency/Relative Density | Dynamic Cone Penetrometer (Blows/100mm) |    |    |    | Structure & Other Observations<br>Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks |
|-----------------|------------------------|-----------------------------------|--------|-----------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------------------------|-----------------------------------------|----|----|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | Depth                  | Type & Results                    |        |           |             |                                                                                                                                                                                                                                            |                    |                              | 5                                       | 10 | 15 | 20 |                                                                                                                                                                                          |
| 22-04-2025<br>▼ | 0.7                    | Peak = 156kPa<br>Residual = 27kPa | 40.6   |           |             | ML: Organic SILT: brown. Low plasticity. (Topsoil)                                                                                                                                                                                         | D                  |                              |                                         |    |    |    |                                                                                                                                                                                          |
|                 |                        |                                   | 40.5   |           |             | SW: Silty fine to coarse SAND: with some cobbles. brown. Well graded. (Uncontrolled Fill)                                                                                                                                                  |                    |                              |                                         |    |    |    |                                                                                                                                                                                          |
|                 |                        |                                   | 40.1   |           |             | OL: Organic SILT: brown. Low plasticity. (Topsoil)                                                                                                                                                                                         |                    |                              |                                         |    |    |    | 4                                                                                                                                                                                        |
|                 |                        |                                   | 39.9   |           |             | ML: SILT: with minor clay. Brown. Low plasticity. (Hinuera Formation)                                                                                                                                                                      |                    |                              |                                         |    |    |    | 5                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 4                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 3                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             | ... from 0.90m to 1.00m, Lens of organic silt.                                                                                                                                                                                             | VSt                |                              |                                         |    |    |    | 1                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 2                                                                                                                                                                                        |
|                 |                        |                                   | 39.4   |           |             | SP: Fine SAND: with some silt. Light brown. Poorly graded. (Hinuera Formation)                                                                                                                                                             | M                  |                              |                                         |    |    |    | 1                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 1                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 2                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 7                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 9                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 14                                                                                                                                                                                       |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 10                                                                                                                                                                                       |
|                 |                        |                                   | 38.8   |           |             | SW: Fine to coarse SAND: with trace silt. Light brownish grey. Well graded. (Hinuera Formation)                                                                                                                                            |                    |                              |                                         |    |    |    | 7                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 7                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 6                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 7                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 5                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            | W                  |                              |                                         |    |    |    | 6                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 9                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 6                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 8                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 8                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 8                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 7                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 9                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 9                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 6                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            | S                  |                              |                                         |    |    |    | 7                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 8                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 6                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 5                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 6                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             | Test pit terminated at 3.50 m                                                                                                                                                                                                              |                    |                              |                                         |    |    |    | 8                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 6                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 7                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 7                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 7                                                                                                                                                                                        |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 12                                                                                                                                                                                       |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 12                                                                                                                                                                                       |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 12                                                                                                                                                                                       |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 10                                                                                                                                                                                       |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 10                                                                                                                                                                                       |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 11                                                                                                                                                                                       |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 11                                                                                                                                                                                       |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 12                                                                                                                                                                                       |
|                 |                        |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 12                                                                                                                                                                                       |

Termination Reason: Pit collapse.  
Shear Vane No: 2955    DCP No: 34  
Remarks: Groundwater encountered at 2.8m.



# PHOTOGRAPH SHEET - TP25-02

Client:  
Project: Southern Links  
Location: Hamilton  
Project ID: HAM2024-0017  
Date: 22/04/2025



TP25-02:



TP25-02:

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.

Client: Colliers Project Leaders Ltd  
Project: Southern Links Stage 1 Residential Area  
Site Location: Deanwell, Hamilton  
Project No.: HAM2024-0017  
Date: 23/04/2025



|                                  |                          |                              |
|----------------------------------|--------------------------|------------------------------|
| Position: 445393.1mE; 694982.1mN | Projection: Mt Eden 2000 | Pit Dimensions: 4.0m by 1.0m |
| Elevation: 39.60m                | Datum: NZVD 2016         | Survey Source: Hand-held GPS |

23-04-2025

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 5 - August 2024.



# PHOTOGRAPH SHEET - TP25-03

Client:  
Project: Southern Links  
Location: Hamilton  
Project ID: HAM2024-0017  
Date: 23/04/2025



TP25-03:



TP25-03:

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.

Client: Colliers Project Leaders Ltd  
Project: Southern Links Stage 1 Residential Area  
Site Location: Deanwell, Hamilton  
Project No.: HAM2024-0017  
Date: 22/04/2025



|                                  |                          |                              |
|----------------------------------|--------------------------|------------------------------|
| Position: 445420.7mE; 694852.2mN | Projection: Mt Eden 2000 | Pit Dimensions: 4.0m by 1.0m |
| Elevation: 41.60m                | Datum: NZVD 2016         | Survey Source: Hand-held GPS |

22-04-2025

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 5 - August 2024.



# PHOTOGRAPH SHEET - TP25-04

Client:  
Project: Southern Links  
Location: Hamilton  
Project ID: HAM2024-0017  
Date: 22/04/2025



TP25-04:



TP25-04:

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.

TEST PIT LOG - TP25-05

Client: Colliers Project Leaders Ltd  
Project: Southern Links Stage 1 Residential Area  
Site Location: Deanwell, Hamilton  
Project No.: HAM2024-0017  
Date: 23/04/2025  
Test Pit Location: Refer to Site Plan



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Logged by: DB    Checked by: MM    Scale: 1:35    Sheet 1 of 1

Position: 445606.0mE; 694880.3mN    Projection: Mt Eden 2000    Pit Dimensions: 4.0m by 1.0m  
Elevation: 42.00m    Datum: NZVD 2016    Survey Source: Hand-held GPS

| Groundwater                       | Samples & Insitu Tests           |                                   | RL (m) | Depth (m) | Graphic Log | Material Description<br>Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit)<br>Rock: Colour; fabric; rock name; additional comments. (origin/geological unit) | Moisture Condition | Consistency/<br>Relative Density | Dynamic Cone Penetrometer (Blows/100mm) |    |    |    | Structure & Other Observations<br>Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks |  |
|-----------------------------------|----------------------------------|-----------------------------------|--------|-----------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------------------------|-----------------------------------------|----|----|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                                   | Depth                            | Type & Results                    |        |           |             |                                                                                                                                                                                                                                            |                    |                                  | 5                                       | 10 | 15 | 20 |                                                                                                                                                                                          |  |
| <div>23-04-2025</div> <div></div> | 0.4                              | Peak = 133kPa<br>Residual = 22kPa | 42.0   |           |             | OL: Organic SILT: brown. Low plasticity. (Topsoil)                                                                                                                                                                                         | D                  | VSt                              |                                         |    |    |    | 2                                                                                                                                                                                        |  |
|                                   |                                  |                                   | 41.8   |           |             | ML: Fine sandy SILT: light brownish grey. Low plasticity. (Hinuera Formation)<br>... at 0.30m, Becoming orange and grey.                                                                                                                   |                    |                                  |                                         |    |    |    | 2                                                                                                                                                                                        |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    | 3                                                                                                                                                                                        |  |
|                                   | 2.1                              | Peak = 65kPa<br>Residual = 44kPa  | 41.2   | 1         |             | SW: Fine to coarse SAND: with minor fine to medium gravel. Light grey. Well graded. Gravel; pumiceous. (Hinuera Formation)                                                                                                                 |                    | MD                               |                                         |    |    |    | 3                                                                                                                                                                                        |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    | 6                                                                                                                                                                                        |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    | 5                                                                                                                                                                                        |  |
|                                   | 2.3                              | Peak = 59kPa<br>Residual = 24kPa  | 39.9   | 2         |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    | 5                                                                                                                                                                                        |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    | 5                                                                                                                                                                                        |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    | 5                                                                                                                                                                                        |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  | 39.7   | 3         |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    | 5                                                                                                                                                                                        |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    | 5                                                                                                                                                                                        |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    | 5                                                                                                                                                                                        |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  | 38.9   | 4         |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    | 5                                                                                                                                                                                        |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    | 6                                                                                                                                                                                        |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    | 6                                                                                                                                                                                        |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  | 36.0   | 6         |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    | 6                                                                                                                                                                                        |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    | 6                                                                                                                                                                                        |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    | 6                                                                                                                                                                                        |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  | 35.8   | 7         |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    | 5                                                                                                                                                                                        |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    | 6                                                                                                                                                                                        |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    | 7                                                                                                                                                                                        |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   | 2.8                              | Peak = 68kPa<br>Residual = 32kPa  |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8                               | Peak = 68kPa<br>Residual = 32kPa |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
|                                   |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |
| 2.8</                             |                                  |                                   |        |           |             |                                                                                                                                                                                                                                            |                    |                                  |                                         |    |    |    |                                                                                                                                                                                          |  |



# PHOTOGRAPH SHEET - TP25-05

Client:  
Project: Southern Links  
Location: Hamilton  
Project ID: HAM2024-0017  
Date: 23/04/2025



TP25-05:



TP25-05:

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.

# TEST PIT LOG - TP25-05 B

Client: Colliers Project Leaders Ltd  
Project: Southern Links Stage 1 Residential Area  
Site Location: Deanwell, Hamilton  
Project No.: HAM2024-0017  
Date: 23/04/2025



Test Pit Location: Refer to Site Plan      Logged by: DB      Checked by: MM      Scale: 1:25      Sheet 1 of 1  
Position: 445572.8mE; 694859.8mN      Projection: Mt Eden 2000      Pit Dimensions: 4.0m by 1.0m  
Elevation: 41.60m      Datum: NZVD 2016      Survey Source: Hand-held GPS

| Groundwater     | Samples & Insitu Tests |                                  | RL (m) | Depth (m) | Graphic Log | Material Description<br>Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit)<br>Rock: Colour; fabric; rock name; additional comments. (origin/geological unit) | Moisture Condition | Consistency/Relative Density | Dynamic Cone Penetrometer (Blows/100mm) |    |    |    | Structure & Other Observations<br>Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks |
|-----------------|------------------------|----------------------------------|--------|-----------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------------------------|-----------------------------------------|----|----|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                 | Depth                  | Type & Results                   |        |           |             |                                                                                                                                                                                                                                            |                    |                              | 5                                       | 10 | 15 | 20 |                                                                                                                                                                                          |
| 23-04-2025<br>▼ | 3.3                    | Peak = 44kPa<br>Residual = 29kPa | 41.6   |           |             | OL: Organic SILT: brown. Low plasticity. (Topsoil)                                                                                                                                                                                         | D                  |                              |                                         |    |    |    | 2                                                                                                                                                                                        |
|                 |                        |                                  | 41.3   |           |             | SP: Silty fine to medium SAND: light brown. Poorly graded. (Recent Alluvium)                                                                                                                                                               |                    | L                            |                                         |    |    |    | 1                                                                                                                                                                                        |
|                 |                        |                                  | 41.1   |           |             | OL: Organic sandy SILT: brown. No plasticity. (Topsoil)                                                                                                                                                                                    |                    | F                            |                                         |    |    |    | 2                                                                                                                                                                                        |
|                 |                        |                                  | 41.0   |           |             | SW: Fine to coarse SAND: with some fine to medium gravel. Light grey streaked orange. Well graded. (Hinuera Formation)                                                                                                                     |                    | L                            |                                         |    |    |    | 1                                                                                                                                                                                        |
|                 |                        |                                  |        | 1         |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 1                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 3                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 7                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 7                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 8                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 6                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             | ... from 1.40m to 1.50m, Becoming slightly iron stained.                                                                                                                                                                                   |                    |                              |                                         |    |    |    | 5                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 6                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 6                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 4                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 7                                                                                                                                                                                        |
|                 |                        |                                  |        | 2         |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 7                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 7                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 8                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 6                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 6                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 9                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 9                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 9                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 9                                                                                                                                                                                        |
|                 |                        |                                  | 38.6   | 3         |             | OL: Organic SILT: with some fine to medium sand. Dark brown. Low plasticity. Insensitive. (Hinuera Formation)                                                                                                                              | S                  |                              |                                         |    |    |    | 5                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 5                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 6                                                                                                                                                                                        |
|                 |                        |                                  | 38.1   |           |             | ML: SILT: with some clay. Grey. Low plasticity. (Hinuera Formation)                                                                                                                                                                        | M                  |                              |                                         |    |    |    | 7                                                                                                                                                                                        |
|                 |                        |                                  | 38.0   |           |             | SP: Silty fine to medium SAND: brownish grey. Poorly graded. (Hinuera Formation)                                                                                                                                                           |                    |                              |                                         |    |    |    | 7                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 10                                                                                                                                                                                       |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 10                                                                                                                                                                                       |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 10                                                                                                                                                                                       |
|                 |                        |                                  |        | 4         |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 14                                                                                                                                                                                       |
|                 |                        |                                  |        |           |             | Test pit terminated at 4.10 m                                                                                                                                                                                                              |                    |                              |                                         |    |    |    | 13                                                                                                                                                                                       |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 11                                                                                                                                                                                       |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 9                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 11                                                                                                                                                                                       |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 12                                                                                                                                                                                       |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 12                                                                                                                                                                                       |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 17                                                                                                                                                                                       |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 2                                                                                                                                                                                        |
|                 |                        |                                  |        |           |             |                                                                                                                                                                                                                                            |                    |                              |                                         |    |    |    | 0                                                                                                                                                                                        |

Termination Reason: Pit collapse.  
Shear Vane No: 2955      DCP No: 34  
Remarks: Groundwater encountered at 2.8m.  
This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 5 - August 2024.



# PHOTOGRAPH SHEET - TP25-05 B

Client:  
Project: Southern Links  
Location: Hamilton  
Project ID: HAM2024-0017  
Date: 23/04/2025



TP25-05 B:



TP25-05 B:

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.



Client: Colliers Project Leaders Ltd  
Project: Southern Links Stage 1 Residential Area  
Site Location: Deanwell, Hamilton  
Project No.: HAM2024-0017  
Date: 23/04/2025



|                                  |                          |                              |
|----------------------------------|--------------------------|------------------------------|
| Position: 445089.8mE; 694801.3mN | Projection: Mt Eden 2000 | Pit Dimensions: 4.0m by 1.0m |
| Elevation: 40.00m                | Datum: NZVD 2016         | Survey Source: Hand-held GPS |

23-04-2025

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 5 - August 2024.

# PHOTOGRAPH SHEET - TP25-06

Client:  
Project: Southern Links  
Location: Hamilton  
Project ID: HAM2024-0017  
Date: 23/04/2025



TP25-06:



TP25-06:

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.

Client: Colliers Project Leaders Ltd  
Project: Southern Links Stage 1 Residential Area  
Site Location: Deanwell, Hamilton  
Project No.: HAM2024-0017  
Date: 22/04/2025



|                                  |                          |                              |
|----------------------------------|--------------------------|------------------------------|
| Position: 445224.1mE; 694820.4mN | Projection: Mt Eden 2000 | Pit Dimensions: 4.0m by 1.0m |
| Elevation: 40.00m                | Datum: NZVD 2016         | Survey Source: Hand-held GPS |

22-04-2025

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 5 - August 2024.



# PHOTOGRAPH SHEET - TP25-07

Client:  
Project: Southern Links  
Location: Hamilton  
Project ID: HAM2024-0017  
Date: 22/04/2025



TP25-07:

TEST PIT LOG - TP25-08

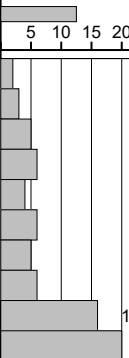
Client: Colliers Project Leaders Ltd  
Project: Southern Links Stage 1 Residential Area  
Site Location: Deanwell, Hamilton  
Project No.: HAM2024-0017  
Date: 22/04/2025  
Test Pit Location: Refer to Site Plan



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Logged by: DB    Checked by: MM    Scale: 1:25    Sheet 1 of 1

Position: 445406.9mE; 694754.4mN    Projection: Mt Eden 2000    Pit Dimensions: 4.0m by 1.0m  
Elevation: 40.70m    Datum: NZVD 2016    Survey Source: Hand-held GPS

| Groundwater                       | Samples & Insitu Tests |                | RL (m) | Depth (m)                                                                         | Graphic Log                                                                                    | Material Description<br>Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit)<br>Rock: Colour; fabric; rock name; additional comments. (origin/geological unit) | Moisture Condition | Consistency/<br>Relative Density | Dynamic Cone Penetrometer<br>(Blows/100mm)                                          | Structure & Other Observations<br>Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks |
|-----------------------------------|------------------------|----------------|--------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                   | Depth                  | Type & Results |        |                                                                                   |                                                                                                |                                                                                                                                                                                                                                            |                    |                                  |                                                                                     |                                                                                                                                                                                          |
| <div>22-04-2025</div> <div></div> | 0.5                    | Peak = UTP     | 40.7   |                                                                                   |               | OL: Organic SILT: Brown. Low plasticity. (Topsoil)                                                                                                                                                                                         | D                  | H                                |  |                                                                                                                                                                                          |
|                                   |                        |                | 40.4   |  | ML: Fine sandy SILT: light grey. Low plasticity. (Hinuera Formation)                           | 6                                                                                                                                                                                                                                          |                    |                                  |                                                                                     |                                                                                                                                                                                          |
|                                   |                        |                | 40.1   |  | SW: Fine to coarse SAND: with trace fine gravel. Light brown. Well graded. (Hinuera Formation) | 6                                                                                                                                                                                                                                          |                    |                                  |                                                                                     |                                                                                                                                                                                          |
|                                   |                        |                |        | ... from 0.90m to 1.20m, Becoming light brown and slightly iron stained.          |                                                                                                |                                                                                                                                                                                                                                            | 16                 |                                  |                                                                                     |                                                                                                                                                                                          |
|                                   | 1                      |                |        |                                                                                   |                                                                                                |                                                                                                                                                                                                                                            | 2                  |                                  |                                                                                     |                                                                                                                                                                                          |
|                                   |                        |                |        |                                                                                   |                                                                                                |                                                                                                                                                                                                                                            | 0                  |                                  |                                                                                     |                                                                                                                                                                                          |
|                                   |                        |                |        |                                                                                   |                                                                                                |                                                                                                                                                                                                                                            |                    |                                  |                                                                                     |                                                                                                                                                                                          |
|                                   | 2                      |                |        | ... at 2.00m, Becoming grey.                                                      |                                                                                                |                                                                                                                                                                                                                                            |                    |                                  |                                                                                     |                                                                                                                                                                                          |
|                                   |                        |                |        |                                                                                   |                                                                                                |                                                                                                                                                                                                                                            |                    |                                  |                                                                                     |                                                                                                                                                                                          |
|                                   |                        |                |        |                                                                                   |                                                                                                |                                                                                                                                                                                                                                            |                    |                                  |                                                                                     |                                                                                                                                                                                          |
|                                   |                        |                |        |                                                                                   |                                                                                                |                                                                                                                                                                                                                                            |                    |                                  |                                                                                     |                                                                                                                                                                                          |
|                                   |                        |                |        |                                                                                   |                                                                                                |                                                                                                                                                                                                                                            |                    |                                  |                                                                                     |                                                                                                                                                                                          |
|                                   |                        |                |        |                                                                                   |                                                                                                |                                                                                                                                                                                                                                            |                    |                                  |                                                                                     |                                                                                                                                                                                          |
|                                   |                        |                |        |                                                                                   |                                                                                                |                                                                                                                                                                                                                                            |                    |                                  |                                                                                     |                                                                                                                                                                                          |
|                                   |                        |                |        |                                                                                   |                                                                                                |                                                                                                                                                                                                                                            |                    |                                  |                                                                                     |                                                                                                                                                                                          |
|                                   |                        |                |        |                                                                                   |                                                                                                |                                                                                                                                                                                                                                            |                    |                                  |                                                                                     |                                                                                                                                                                                          |
|                                   |                        |                |        |                                                                                   |                                                                                                |                                                                                                                                                                                                                                            |                    |                                  |                                                                                     |                                                                                                                                                                                          |
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Termination Reason: Pit collapse.  
Shear Vane No: 2955    DCP No: 34  
Remarks: Groundwater encountered at 3.9m.

# PHOTOGRAPH SHEET - TP25-08

Client:  
Project: Southern Links  
Location: Hamilton  
Project ID: HAM2024-0017  
Date: 22/04/2025



TP25-08:



TP25-08:

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.



Client: Colliers Project Leaders Ltd  
Project: Southern Links Stage 1 Residential Area  
Site Location: Deanwell, Hamilton  
Project No.: HAM2024-0017  
Date: 23/04/2025



|                                  |                          |                              |
|----------------------------------|--------------------------|------------------------------|
| Position: 445575.6mE; 694684.9mN | Projection: Mt Eden 2000 | Pit Dimensions: 4.0m by 1.0m |
| Elevation: 42.50m                | Datum: NZVD 2016         | Survey Source: Hand-held GPS |

23-04-2025

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 5 - August 2024.

# PHOTOGRAPH SHEET - TP25-09

Client:  
Project: Southern Links  
Location: Hamilton  
Project ID: HAM2024-0017  
Date: 23/04/2025



TP25-09:



TP25-09:

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.

Client: Colliers Project Leaders Ltd  
Project: Southern Links Stage 1 Residential Area  
Site Location: Deanwell, Hamilton  
Project No.: HAM2024-0017  
Date: 23/04/2025



|                                  |                          |                              |
|----------------------------------|--------------------------|------------------------------|
| Position: 445692.0mE; 694719.0mN | Projection: Mt Eden 2000 | Pit Dimensions: 4.0m by 1.0m |
| Elevation: 40.40m                | Datum: NZVD 2016         | Survey Source: Hand Held GPS |

23-04-2025

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 5 - August 2024.



# PHOTOGRAPH SHEET - TP25-10

Client:  
Project: Southern Links  
Location: Hamilton  
Project ID: HAM2024-0017  
Date: 23/04/2025



TP25-10:



TP25-10:

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.

# TEST PIT LOG - TP25-11

Client: Colliers Project Leaders Ltd  
Project: Southern Links Stage 1 Residential Area  
Site Location: Deanwell, Hamilton  
Project No.: HAM2024-0017  
Date: 23/04/2025



Test Pit Location: Refer to Site Plan      Logged by: DB      Checked by: MM      Scale: 1:25      Sheet 1 of 1  
Position: 445066.9mE; 694588.0mN      Projection: Mt Eden 2000      Pit Dimensions: 4.0m by 1.0m  
Elevation: 40.50m      Datum: NZVD 2016      Survey Source: Hand-held GPS

| Groundwater     | Samples & Insitu Tests |                                  | RL (m) | Depth (m) | Graphic Log                                        | Material Description<br>Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit)<br>Rock: Colour; fabric; rock name; additional comments. (origin/geological unit) | Moisture Condition | Consistency/<br>Relative Density | Dynamic Cone Penetrometer (Blows/100mm) |    |    |    | Structure & Other Observations<br>Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|-----------------|------------------------|----------------------------------|--------|-----------|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------------------------|-----------------------------------------|----|----|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|                 | Depth                  | Type & Results                   |        |           |                                                    |                                                                                                                                                                                                                                            |                    |                                  | 5                                       | 10 | 15 | 20 |                                                                                                                                                                                          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 23-04-2025<br>▼ | 2.3                    | Peak = 44kPa<br>Residual = 15kPa | 40.5   |           | OL: Organic SILT: brown. Low plasticity. (Topsoil) | M                                                                                                                                                                                                                                          | F                  |                                  | 2                                       | 2  | 1  | 1  | 3                                                                                                                                                                                        | 7 | 7 | 5 | 5 | 6 | 4 | 4 | 4 | 6 | 6 | 7 | 5 | 6 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 4 | 3 |

Termination Reason: Pit collapse.

Shear Vane No: 2955      DCP No: 34

Remarks: Groundwater encountered at 2.0m.



# PHOTOGRAPH SHEET - TP25-11

Client:  
Project: Southern Links  
Location: Hamilton  
Project ID: HAM2024-0017  
Date: 23/04/2025



TP25-11:



TP25-11:

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.



Client: Colliers Project Leaders Ltd  
Project: Southern Links Stage 1 Residential Area  
Site Location: Deanwell, Hamilton  
Project No.: HAM2024-0017  
Date: 22/04/2025



Test Pit Location: Refer to Site Plan      Logged by: DB    Checked by: MM    Scale:    1:25      Sheet 1 of 1

|                                  |                          |                              |
|----------------------------------|--------------------------|------------------------------|
| Position: 445335.2mE; 694583.7mN | Projection: Mt Eden 2000 | Pit Dimensions: 4.0m by 1.0m |
| Elevation: 40.00m                | Datum: NZVD 2016         | Survey Source: Hand-held GPS |

| Groundwater     | Samples & Insitu Tests |                                  | RL (m) | Depth (m)                                                    | Graphic Log                                                                | Material Description<br>Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit)<br>Rock: Colour; fabric; rock name; additional comments. (origin/geological unit) | Moisture Condition | Consistency/<br>Relative Density | Dynamic Cone Penetrometer<br>(Blows/100mm)                             | Structure & Other Observations<br>Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
|-----------------|------------------------|----------------------------------|--------|--------------------------------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------------------------|------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---------------------------------------------------------------------|---|--|---|-------------------------------|------------------------------------------------------------------------|---|--|--|--|--|
|                 | Depth                  | Type & Results                   |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
| 22-04-2025<br>▼ | 0.4                    | Peak = 74kPa<br>Residual = 12kPa | 40.0   |                                                              | OL: Organic SILT: brown. Low plasticity. (Topsoil)                         | M                                                                                                                                                                                                                                          | St                 |                                  | 2                                                                      |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
|                 |                        |                                  | 39.8   |                                                              | ML: SILT: with some clay. Light brown. Low plasticity. (Hinuera Formation) |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          | 2 |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
|                 |                        |                                  | 0.8    |                                                              | Peak = 85kPa<br>Residual = 18kPa                                           |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   | SP: Silty fine SAND: light grey. Poorly graded. (Hinuera Formation) | F |  | 1 |                               |                                                                        |   |  |  |  |  |
|                 |                        |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   | 39.0                          | 1                                                                      | 1 |  |  |  |  |
|                 |                        |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   | 38.2                          | 2                                                                      | 1 |  |  |  |  |
|                 |                        |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   | 38.0                          | 2                                                                      | 1 |  |  |  |  |
|                 | 1.9                    | Peak = 47kPa<br>Residual = 27kPa |        | ML: SILT: light brown. Low plasticity. (Hinuera Formation)   | MD to D                                                                    |                                                                                                                                                                                                                                            | 3                  |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
|                 |                        |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    | 37.6                             | OL: Organic SILT: black. Low plasticity. (Hinuera Formation)           |                                                                                                                                                                                          | 6 |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
|                 |                        |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    | 37.3                             | ML: SILT: with some clay. Grey. Low plasticity. (Hinuera Formation)    |                                                                                                                                                                                          | 5 |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
|                 |                        |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    | 36.9                             | SW: Fine to coarse SAND: bluish grey. Well graded. (Hinuera Formation) |                                                                                                                                                                                          | 7 |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
|                 | 2.4                    | Peak = 22kPa<br>Residual = 15kPa |        | OL: Organic SILT: black. Low plasticity. (Hinuera Formation) | S                                                                          |                                                                                                                                                                                                                                            | 2                  |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
|                 |                        |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    | 37.3                             | ML: SILT: with some clay. Grey. Low plasticity. (Hinuera Formation)    |                                                                                                                                                                                          | 2 |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
|                 |                        |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    | 2.7                              | Peak = 41kPa<br>Residual = 18kPa                                       |                                                                                                                                                                                          |   | ML: SILT: with some clay. Grey. Low plasticity. (Hinuera Formation) | F |  | 4 |                               |                                                                        |   |  |  |  |  |
|                 |                        |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   | 36.9                          | SW: Fine to coarse SAND: bluish grey. Well graded. (Hinuera Formation) | 7 |  |  |  |  |
|                 |                        |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   | Test pit terminated at 3.70 m |                                                                        |   |  |  |  |  |
|                 |                        |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
|                 | 5                      |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
|                 |                        |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    | 5                                | 5                                                                      |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
|                 |                        |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    | 6                                | 6                                                                      |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
|                 |                        |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    | 7                                | 7                                                                      |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
|                 |                        |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    | 8                                | 8                                                                      |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
|                 |                        |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    | 9                                | 9                                                                      |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
| 10              | 10                     |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
| 11              | 11                     |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
| 12              | 12                     |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
| 13              | 13                     |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
| 14              | 14                     |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
| 15              | 15                     |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
| 16              | 16                     |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
| 17              | 17                     |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
| 18              | 18                     |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
| 19              | 19                     |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
| 20              | 20                     |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
| 21              | 21                     |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |
| 22              | 22                     |                                  |        |                                                              |                                                                            |                                                                                                                                                                                                                                            |                    |                                  |                                                                        |                                                                                                                                                                                          |   |                                                                     |   |  |   |                               |                                                                        |   |  |  |  |  |

Termination Reason: Pit collapse.

Shear Vane No: 2955                      DCP No: 34

Remarks: Groundwater encountered at 3.2m.

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 5 - August 2024.

# PHOTOGRAPH SHEET - TP25-12

Client:  
Project: Southern Links  
Location: Hamilton  
Project ID: HAM2024-0017  
Date: 22/04/2025



TP25-12:



TP25-12:

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.

Client: Colliers Project Leaders Ltd  
Project: Southern Links Stage 1 Residential Area  
Site Location: Deanwell, Hamilton  
Project No.: HAM2024-0017  
Date: 23/04/2025



|                                  |                          |                              |
|----------------------------------|--------------------------|------------------------------|
| Position: 445521.1mE; 694557.2mN | Projection: Mt Eden 2000 | Pit Dimensions: 4.0m by 1.0m |
| Elevation: 42.50m                | Datum: NZVD 2016         | Survey Source: Hand-held GPS |

23-04-2025

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 5 - August 2024.



# PHOTOGRAPH SHEET - TP25-13

Client:  
Project: Southern Links  
Location: Hamilton  
Project ID: HAM2024-0017  
Date: 23/04/2025



TP25-13:



TP25-13:

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.

Client: Colliers Project Leaders Ltd  
Project: Southern Links Stage 1 Residential Area  
Site Location: Deanwell, Hamilton  
Project No.: HAM2024-0017  
Date: 22/04/2025



|                                  |                          |                              |
|----------------------------------|--------------------------|------------------------------|
| Position: 445254.3mE; 694473.1mN | Projection: Mt Eden 2000 | Pit Dimensions: 4.0m by 1.0m |
| Elevation: 40.40m                | Datum: NZVD 2016         | Survey Source: Hand-held GPS |

22-04-2025

This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 5 - August 2024.



# PHOTOGRAPH SHEET - TP25-14

Client:  
Project: Southern Links  
Location: Hamilton  
Project ID: HAM2024-0017  
Date: 22/04/2025



TP25-14:



TP25-14:

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.



# TEST PIT LOG - TP25-15

Client: Colliers Project Leaders Ltd  
Project: Southern Links Stage 1 Residential Area  
Site Location: Deanwell, Hamilton  
Project No.: HAM2024-0017  
Date: 23/04/2025



Test Pit Location: Refer to Site Plan      Logged by: DB      Checked by: MM      Scale: 1:25      Sheet 1 of 1  
Position: 445438.0mE; 694394.1mN      Projection: Mt Eden 2000      Pit Dimensions: 4.0m by 1.0m  
Elevation: 40.70m      Datum: NZVD 2016      Survey Source: Hand-held GPS

| Groundwater                   | Samples & Insitu Tests |                                                                                    | RL (m)                                                                                                                 | Depth (m)                        | Graphic Log                                                          | Material Description<br>Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit)<br>Rock: Colour; fabric; rock name; additional comments. (origin/geological unit) | Moisture Condition | Consistency/<br>Relative Density | Dynamic Cone Penetrometer<br>(Blows/100mm) | Structure & Other Observations<br>Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks |   |
|-------------------------------|------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|----------------------------------|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------------------------|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
|                               | Depth                  | Type & Results                                                                     |                                                                                                                        |                                  |                                                                      |                                                                                                                                                                                                                                            |                    |                                  |                                            |                                                                                                                                                                                          |   |
|                               |                        |                                                                                    |                                                                                                                        |                                  |                                                                      |                                                                                                                                                                                                                                            |                    |                                  |                                            |                                                                                                                                                                                          |   |
| 22-04-2025                    | 0.5                    | Peak = UTP                                                                         | 40.7                                                                                                                   |                                  | OL: Organic SILT: brown. Low plasticity. (Topsoil)                   | D                                                                                                                                                                                                                                          | H                  |                                  | 2                                          |                                                                                                                                                                                          |   |
|                               |                        |                                                                                    | 40.4                                                                                                                   |                                  | ML: Fine sandy SILT: light grey. Low plasticity. (Hinuera Formation) |                                                                                                                                                                                                                                            |                    |                                  | 6                                          |                                                                                                                                                                                          |   |
|                               |                        |                                                                                    | ...                                                                                                                    |                                  | ... at 0.60m, 50mm lens of fine to medium sand.                      |                                                                                                                                                                                                                                            |                    |                                  | 5                                          |                                                                                                                                                                                          |   |
|                               |                        | 40.0                                                                               | ML: SILT: with some clay and trace fine sand. Light brownish grey streaked orange. Low plasticity. (Hinuera Formation) |                                  |                                                                      |                                                                                                                                                                                                                                            |                    | 4                                |                                            |                                                                                                                                                                                          |   |
|                               |                        | 1.3                                                                                | Peak = 44kPa<br>Residual = 18kPa                                                                                       |                                  |                                                                      |                                                                                                                                                                                                                                            |                    | 1                                |                                            |                                                                                                                                                                                          |   |
|                               |                        |                                                                                    |                                                                                                                        |                                  |                                                                      |                                                                                                                                                                                                                                            |                    | 3                                |                                            |                                                                                                                                                                                          |   |
|                               | 2.8                    |                                                                                    |                                                                                                                        | Peak = 83kPa<br>Residual = 32kPa | 38.9                                                                 | SP: Silty fine to medium SAND: light grey. Poorly graded. (Hinuera Formation)                                                                                                                                                              | M                  | MD to D                          |                                            |                                                                                                                                                                                          | 4 |
|                               |                        |                                                                                    |                                                                                                                        |                                  |                                                                      | 9                                                                                                                                                                                                                                          |                    |                                  |                                            |                                                                                                                                                                                          |   |
|                               |                        |                                                                                    |                                                                                                                        |                                  |                                                                      | 9                                                                                                                                                                                                                                          |                    |                                  |                                            |                                                                                                                                                                                          |   |
|                               |                        |                                                                                    |                                                                                                                        |                                  |                                                                      | 7                                                                                                                                                                                                                                          |                    |                                  |                                            |                                                                                                                                                                                          |   |
|                               |                        |                                                                                    | 6                                                                                                                      |                                  |                                                                      |                                                                                                                                                                                                                                            |                    |                                  |                                            |                                                                                                                                                                                          |   |
|                               |                        |                                                                                    | 6                                                                                                                      |                                  |                                                                      |                                                                                                                                                                                                                                            |                    |                                  |                                            |                                                                                                                                                                                          |   |
|                               | 38.0                   | ML: SILT: with minor clay and fine sand. Grey. Low plasticity. (Hinuera Formation) | St                                                                                                                     |                                  | 6                                                                    |                                                                                                                                                                                                                                            |                    |                                  |                                            |                                                                                                                                                                                          |   |
|                               | 37.8                   | SP: Silty fine to medium SAND: bluish grey. Poorly graded. (Hinuera Formation)     | D                                                                                                                      |                                  | 10                                                                   |                                                                                                                                                                                                                                            |                    |                                  |                                            |                                                                                                                                                                                          |   |
|                               |                        | 11                                                                                 |                                                                                                                        |                                  |                                                                      |                                                                                                                                                                                                                                            |                    |                                  |                                            |                                                                                                                                                                                          |   |
|                               |                        | 12                                                                                 |                                                                                                                        |                                  |                                                                      |                                                                                                                                                                                                                                            |                    |                                  |                                            |                                                                                                                                                                                          |   |
|                               | 37.4                   | ML: SILT: with minor clay and fine sand. Grey. Low plasticity. (Hinuera Formation) | S                                                                                                                      | St                               |                                                                      | 7                                                                                                                                                                                                                                          |                    |                                  |                                            |                                                                                                                                                                                          |   |
|                               |                        | 4                                                                                  |                                                                                                                        |                                  |                                                                      |                                                                                                                                                                                                                                            |                    |                                  |                                            |                                                                                                                                                                                          |   |
|                               |                        | 5                                                                                  |                                                                                                                        |                                  |                                                                      |                                                                                                                                                                                                                                            |                    |                                  |                                            |                                                                                                                                                                                          |   |
|                               | 36.9                   | OL: Organic SILT: black. Low plasticity. (Hinuera Formation)                       | M                                                                                                                      | F                                |                                                                      | 5                                                                                                                                                                                                                                          |                    |                                  |                                            |                                                                                                                                                                                          |   |
|                               | 36.7                   | ML: SILT: with some clay and fine sand. Grey. Low plasticity. (Hinuera Formation)  |                                                                                                                        |                                  | 12                                                                   |                                                                                                                                                                                                                                            |                    |                                  |                                            |                                                                                                                                                                                          |   |
|                               |                        | 15                                                                                 |                                                                                                                        |                                  |                                                                      |                                                                                                                                                                                                                                            |                    |                                  |                                            |                                                                                                                                                                                          |   |
|                               | 36.5                   | SW: Silty fine to coarse SAND: brownish grey. Well graded. (Hinuera Formation)     | S                                                                                                                      | MD to D                          |                                                                      | 6                                                                                                                                                                                                                                          |                    |                                  |                                            |                                                                                                                                                                                          |   |
|                               | 36.2                   | SW: Fine to coarse SAND: bluish grey. Well graded. (Hinuera Formation)             |                                                                                                                        | D                                |                                                                      | 10                                                                                                                                                                                                                                         |                    |                                  |                                            |                                                                                                                                                                                          |   |
|                               |                        |                                                                                    |                                                                                                                        |                                  |                                                                      | 9                                                                                                                                                                                                                                          |                    |                                  |                                            |                                                                                                                                                                                          |   |
|                               |                        |                                                                                    |                                                                                                                        |                                  | 10                                                                   |                                                                                                                                                                                                                                            |                    |                                  |                                            |                                                                                                                                                                                          |   |
| Test pit terminated at 4.80 m |                        |                                                                                    |                                                                                                                        |                                  |                                                                      |                                                                                                                                                                                                                                            |                    |                                  | 9                                          |                                                                                                                                                                                          |   |
|                               |                        |                                                                                    |                                                                                                                        |                                  |                                                                      |                                                                                                                                                                                                                                            |                    |                                  |                                            |                                                                                                                                                                                          |   |

Termination Reason: Pit collapse.  
Shear Vane No: 2955      DCP No: 34  
Remarks: Groundwater encountered at 3.5m.  
This report is based on the attached field description for soil and rock, CMW Geosciences - Field Logging Guide, Revision 5 - August 2024.

# PHOTOGRAPH SHEET - TP25-15

Client:  
Project: Southern Links  
Location: Hamilton  
Project ID: HAM2024-0017  
Date: 23/04/2025



TP25-15:



TP25-15:

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.



## Appendix D: Geotechnical Hazards Register Methods

## NATURAL HAZARDS RISK ASSESSMENT

SOUTHERN LINKS DEVELOPMENT – RESIDENTIAL STAGE 1, SAXBYS ROAD, HAMILTON

### 11 CONTEXT

This appendix to CMW report reference HAM2025-0056AD Rev 2 sets out the criteria for and presents the results of an assessment of the geotechnical-related natural hazards associated with this proposed development.

Section 106 of the Resource Management Act (RMA) requires an assessment of the risk from natural hazards to be carried out when considering the granting of a subdivision consent. S106 RMA specifically states that the assessment must consider the combined effect of the natural hazard likelihood and material damage to land, other land, or structures (consequence).

Section 2 of the RMA defines natural hazards as any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment.

The National Policy Statement for Natural Hazards 2025 (NPS-NH) provides direction under the Resource Management Act 1991 for assessing the risk associated with natural hazards for subdivision, use and development.

### 12 BASIS OF ASSESSMENT

#### 12.1 Risk Classification

The occurrence of natural hazards and their potential impacts on the proposed subdivision development is assessed in terms of risk significance, which is based on likelihood and consequence factors. A risk matrix is used to assess the likelihood and consequence factors, the form of which used by CMW for this project is presented in Table B1 which is derived from Appendix 1 of the NPS-NH.

Table B1: Risk Matrix

|              | Almost certain<br>Up to 10<br>AEP<br>10% or more | Very Likely<br>10-20<br>10% to 5% | Likely<br>20 – 50<br>5% to 2% | Possible<br>50 – 100<br>2% to 1% | Unlikely<br>100 – 500<br>1% to 0.2% | Rare<br>500 – 5000<br>0.2% to 0.02% | Very rare<br>>5000<br><0.02% |
|--------------|--------------------------------------------------|-----------------------------------|-------------------------------|----------------------------------|-------------------------------------|-------------------------------------|------------------------------|
| Catastrophic | Very High                                        | Very High                         | Very High                     | High                             | Medium                              | Medium                              | Medium                       |
| Major        | Very High                                        | Very High                         | High                          | High                             | Medium                              | Medium                              | Medium                       |
| Moderate     | High                                             | High                              | High                          | Medium                           | Medium                              | Low                                 | Low                          |
| Minor        | Medium                                           | Medium                            | Medium                        | Medium                           | Low                                 | Low                                 | Low                          |
| Negligible   | Low                                              | Low                               | Low                           | Low                              | Low                                 | Low                                 | Low                          |



## 12.2 Likelihood

With respect to assessing the likelihood or chance of the risk occurring, the qualitative definitions used by CMW for this project are provided in Table B2 for each likelihood classification, which is derived from Appendix 1 of the NPS-NH.

Table B2: Likelihood Classification (extract from NPS-NH)

| Likelihood level | Annual exceedance probability (AEP) | Average recurrence interval (ARI) or 'return period' |
|------------------|-------------------------------------|------------------------------------------------------|
| Almost certain   | 10% or more                         | Up to and including 10 years                         |
| Very likely      | 10% to 5%                           | Over 10 and up to and including 20 years             |
| Likely           | 5% to 2%                            | Over 20 and up to and including 50 years             |
| Possible         | 2% to 1%                            | Over 50 and up to and including 100 years            |
| Unlikely         | 1% to 0.2%                          | Over 100 and up to and including 500 years           |
| Rare             | 0.2% to 0.02%                       | Over 500 and up to and including 5,000 years         |
| Very rare        | Less than 0.02%                     | More than 5,000 years                                |

## 12.3 Consequence

In terms of determining the consequence or severity of the natural hazard occurring, the qualitative definitions used by CMW for this project are provided in Table B3 for each consequence classification, which is derived from Appendix 1 of the NPS-NH.

Table B3: Consequence Table (extract from NPS-NH)

| Consequence Level | Damage to Property                                                                                                                                         | Potential for Injury or Fatalities                                                           |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| Catastrophic      | Severe damage to land and building(s), potential for collapse or total destruction of structures. Building(s) need to be demolished, rebuilt or relocated. | High threat to life safety, with probable fatalities and/or critical injuries.               |
| Major             | Major damage to land and building(s), including structural damage. Loss of use and substantial repair required.                                            | Unsafe for people, with potential for many injuries, or critical injuries and/or fatalities. |
| Moderate          | Some damage to land and non-structural damage to building(s). Limited loss of use, repairs required.                                                       | Unsafe for people, with potential for injuries, although expected to be minor.               |

|            |                                                                                 |                                   |
|------------|---------------------------------------------------------------------------------|-----------------------------------|
| Minor      | Minor damage to land and building(s). No loss of use, minimal repairs required. | Isolated minor injuries possible. |
| Negligible | No loss of use, no building repairs required.                                   | No injuries.                      |

## 12.4 Proportionate Management of Natural Hazard Risk

It is recognised that the natural hazard risk assessment provided herein is qualitative and, due to the wide range of possible geohazards that could occur, is somewhat subjective. Decision-makers must consider the scale and detail of information necessary to assess the risk by having regard to the anticipated level of risk.

Other methods are available to quantitatively assess an acceptable level of geotechnical related natural hazard risk, such as defining an acceptable factor of safety with respect to slope stability or acceptable differential ground settlements with respect to recommended building code limits.

When managing natural hazard risk associated with subdivision, use and development, decision-makers must apply mitigation measures, including location and design, for the purposes of ensuring that:

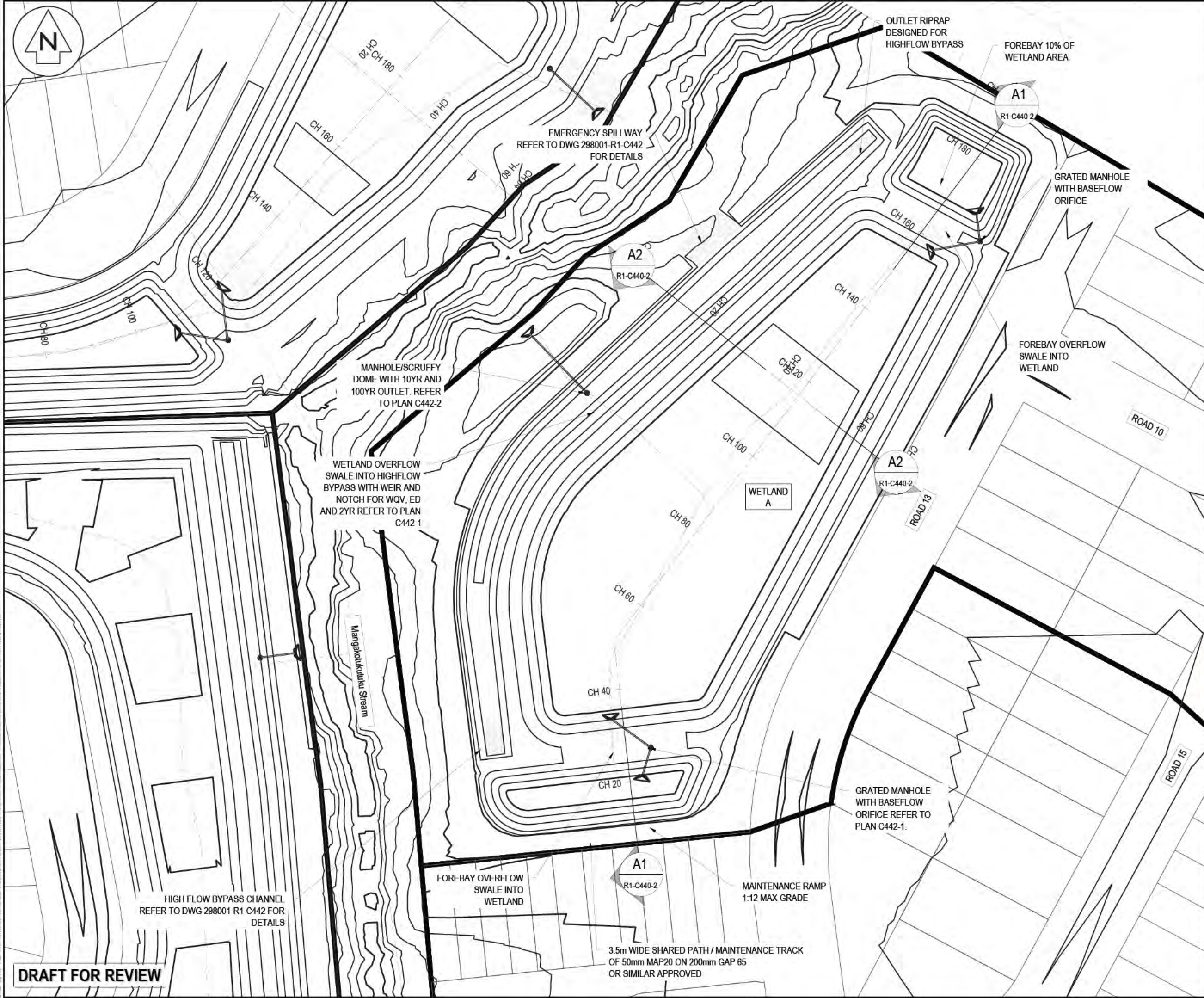
- (a) very high natural hazard risk is avoided;
- (b) high or medium natural hazard risk is avoided or mitigated proportionate to the level of risk; and
- (c) any creation of, or increase in, significant natural hazard risk on other sites is avoided or mitigated proportionate to the level of natural hazard risk.

Results of this assessment are presented in **Table 5** (Section 7).



## Appendix E: Swale Slope Stability





NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
2. CO-ORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016. CONVERSION TO MOTURIKI 1953 CAN BE ACHIEVED BY ADDING 777m.
3. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ALL SERVICES THAT MAY BE AFFECTED BY HIS OPERATIONS.
4. ALL CONCRETE SW PIPE TO BE INSTALLED IN ACCORDANCE WITH AS/NZS 3725:2007 FOR BURIED CONCRETE PIPES AND AS/NZ 4058:2007 FOR PRECAST CONCRETE PIPES (PRESSURE AND NON-PRESSURE) AS STIPULATED IN THE RITS 2018.
5. APPROVED HARDFILL IS TO BE USED IN BACKFILLING OF ALL STORMWATER LINES WITHIN THE ROAD RESERVE.
6. HEAVY DUTY MANHOLE LIDS AND FRAMES TO BE USED IN TRAFFICKED AREAS.
7. ALL CESSPIT LEADS SHALL HAVE MIN COVER 0.9m.
8. ALL LINES ARE TO BE CLASS4 RCRRJ UNLESS SHOWN OTHERWISE.
9. ALL LINES TO BE ABANDONED SHALL BE SEALED AT EACH END. TIMING OF ALL SEALING TO BE COORDINATED WITH COUNCIL STAFF.

LEGEND

EX BOUNDARY

PROP BOUNDARY

|         |             |      |         |
|---------|-------------|------|---------|
| C       | DRAFT       | MJRA | 02/2026 |
| B       | DRAFT       | MJRA | 02/2026 |
| A       | DRAFT       | MJRA | 11/2025 |
| Rev     | Description | By   | Date    |
|         |             | By   | Date    |
| Survey  | MAVEN       |      | 06/2025 |
| Design  | MKS         |      | 07/2025 |
| Drawn   | MJRA        |      | 11/2025 |
| Checked | DJM         |      | 11/2025 |

**Maven Waikato**  
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info@maven.co.nz  
www.maven.co.nz  
Level 1 286 Victoria Street, Hamilton  
New Zealand

Project

**SOUTHERN LINKS 1  
RESIDENTIAL STAGE 1  
HAMILTON, WAIKATO  
FOR  
SL1 CONSORTIUM GROUP**

Title

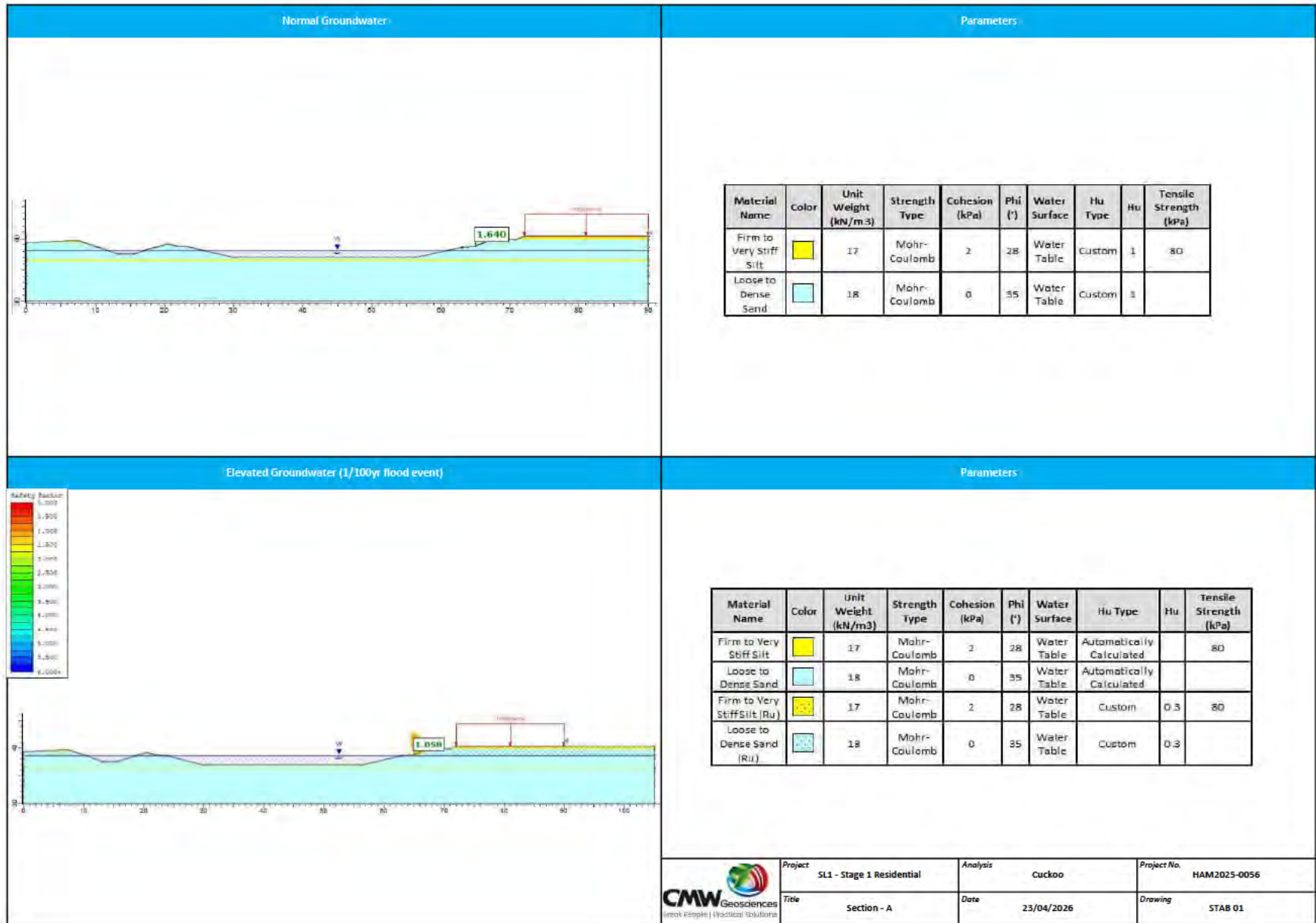
**PROPOSED STORMWATER  
WETLAND A  
PLAN**

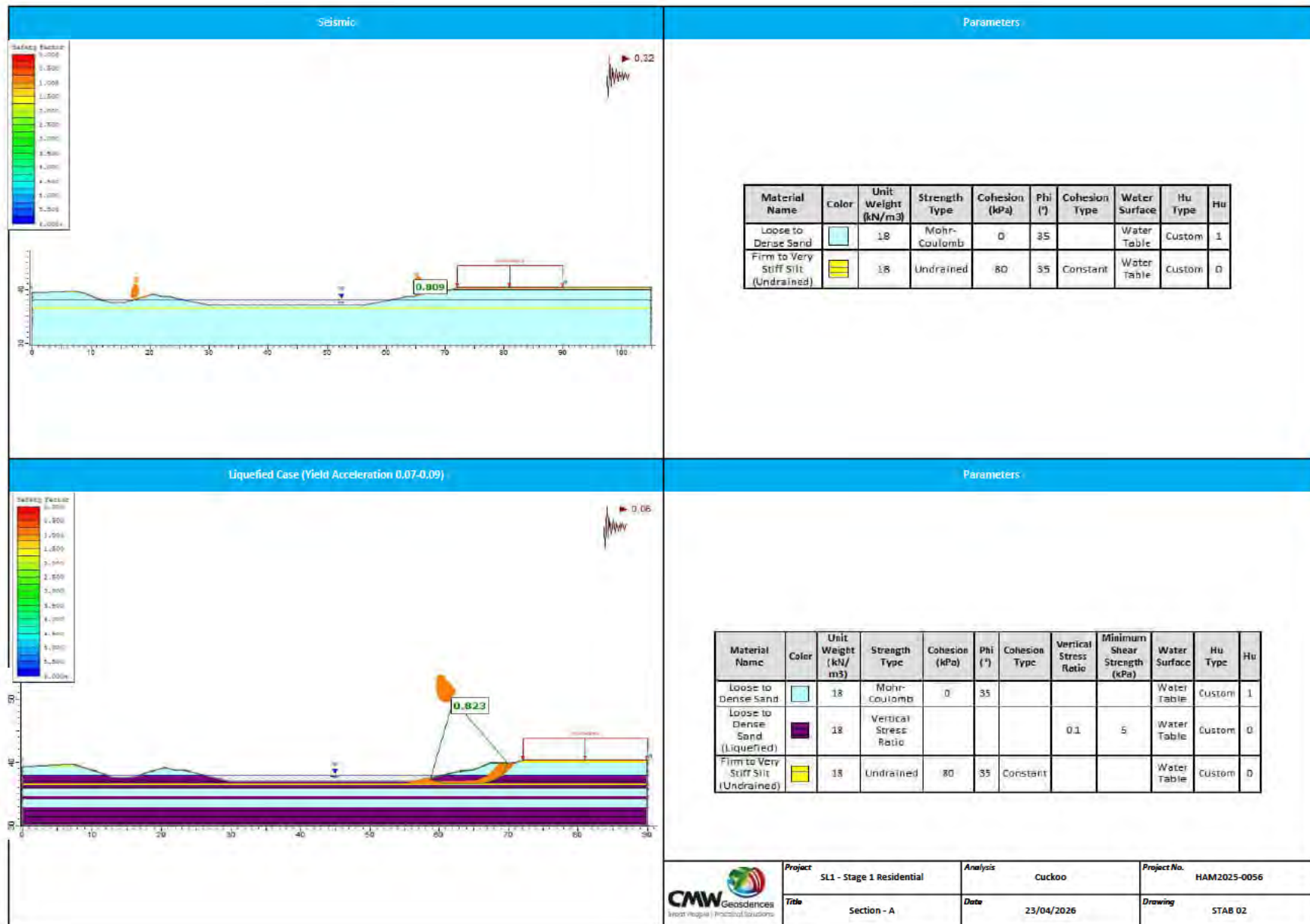
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| Drawing no. | R1-C440-1                     |
| Rev         | C                             |

DRAFT FOR REVIEW

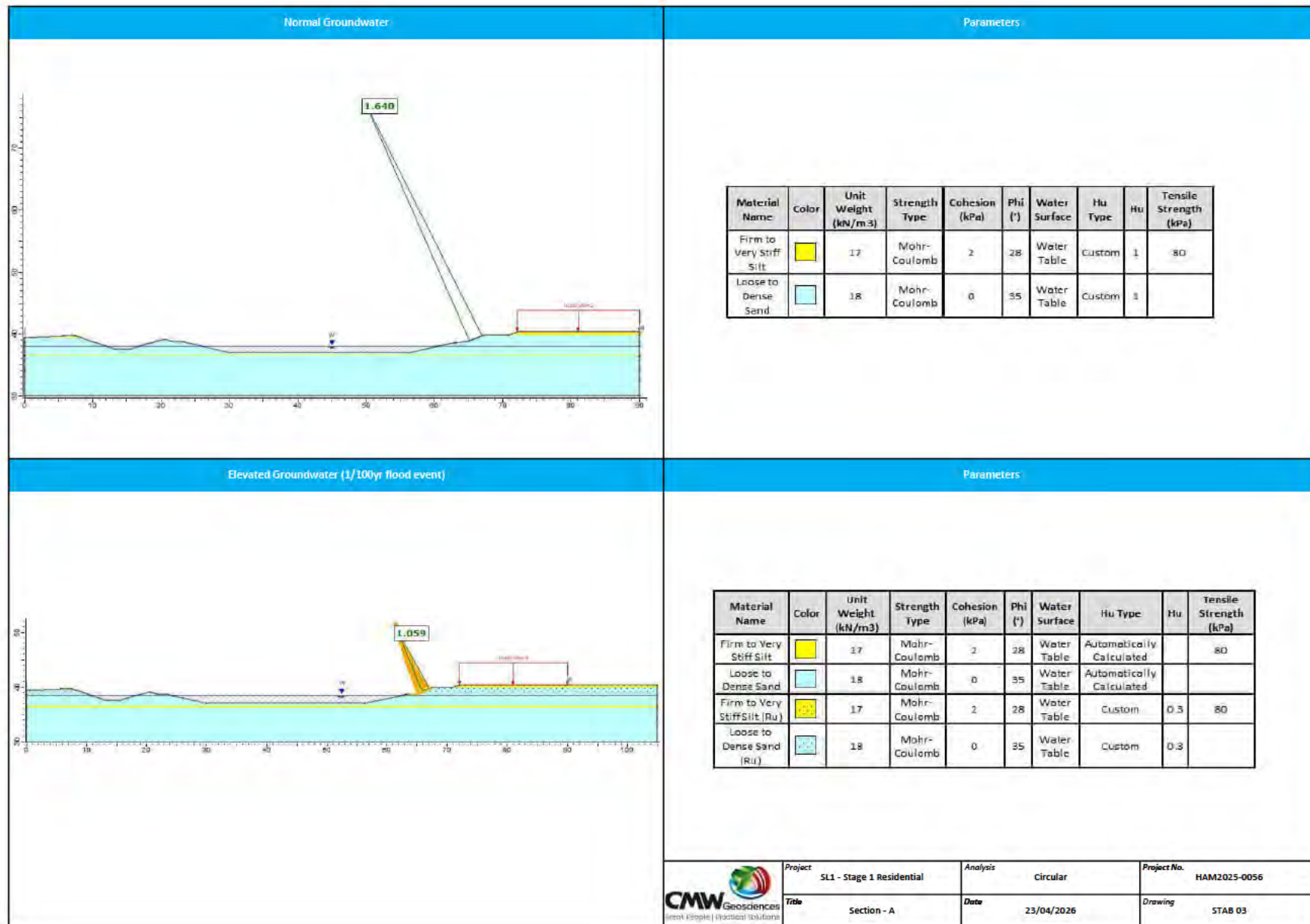
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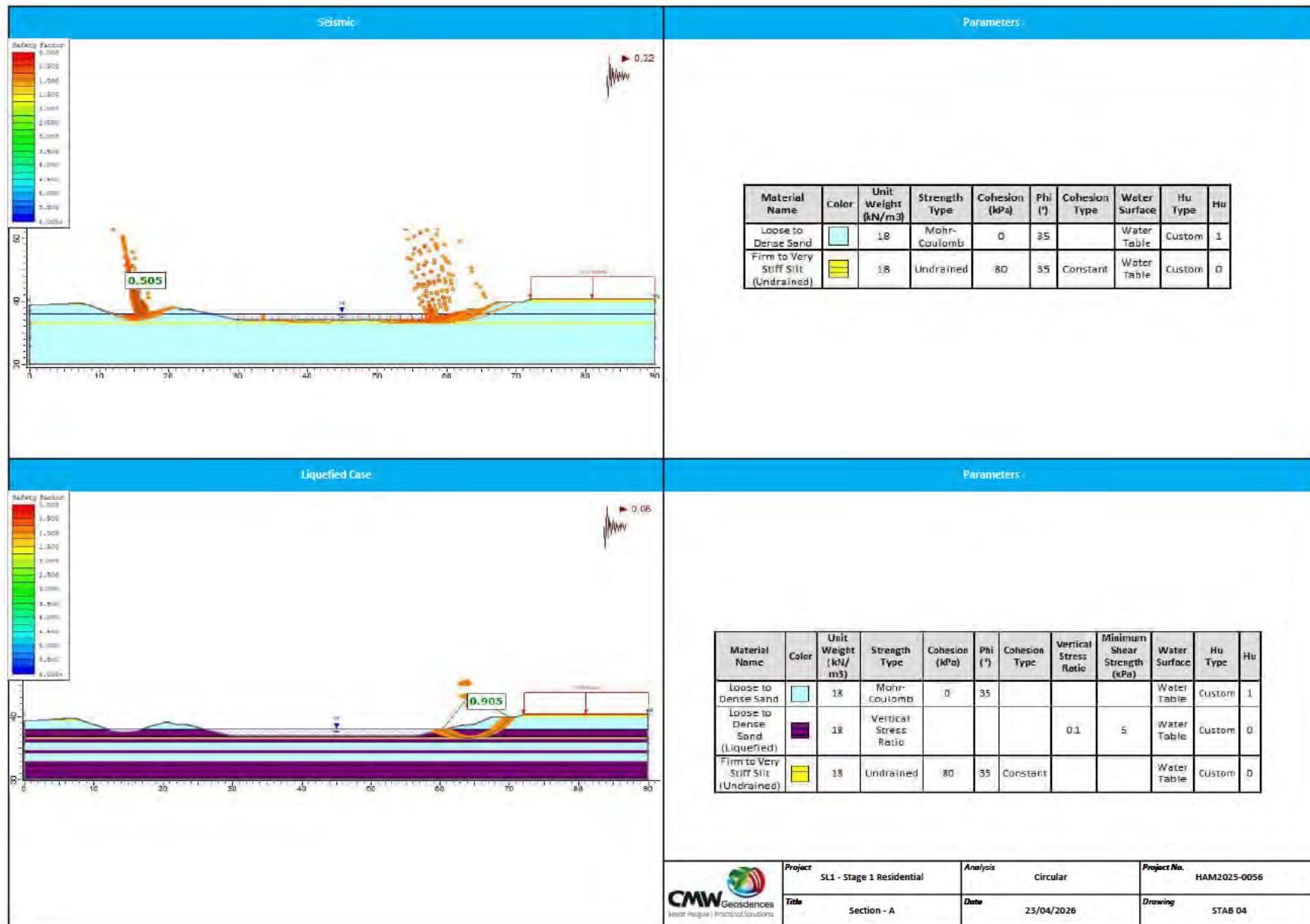




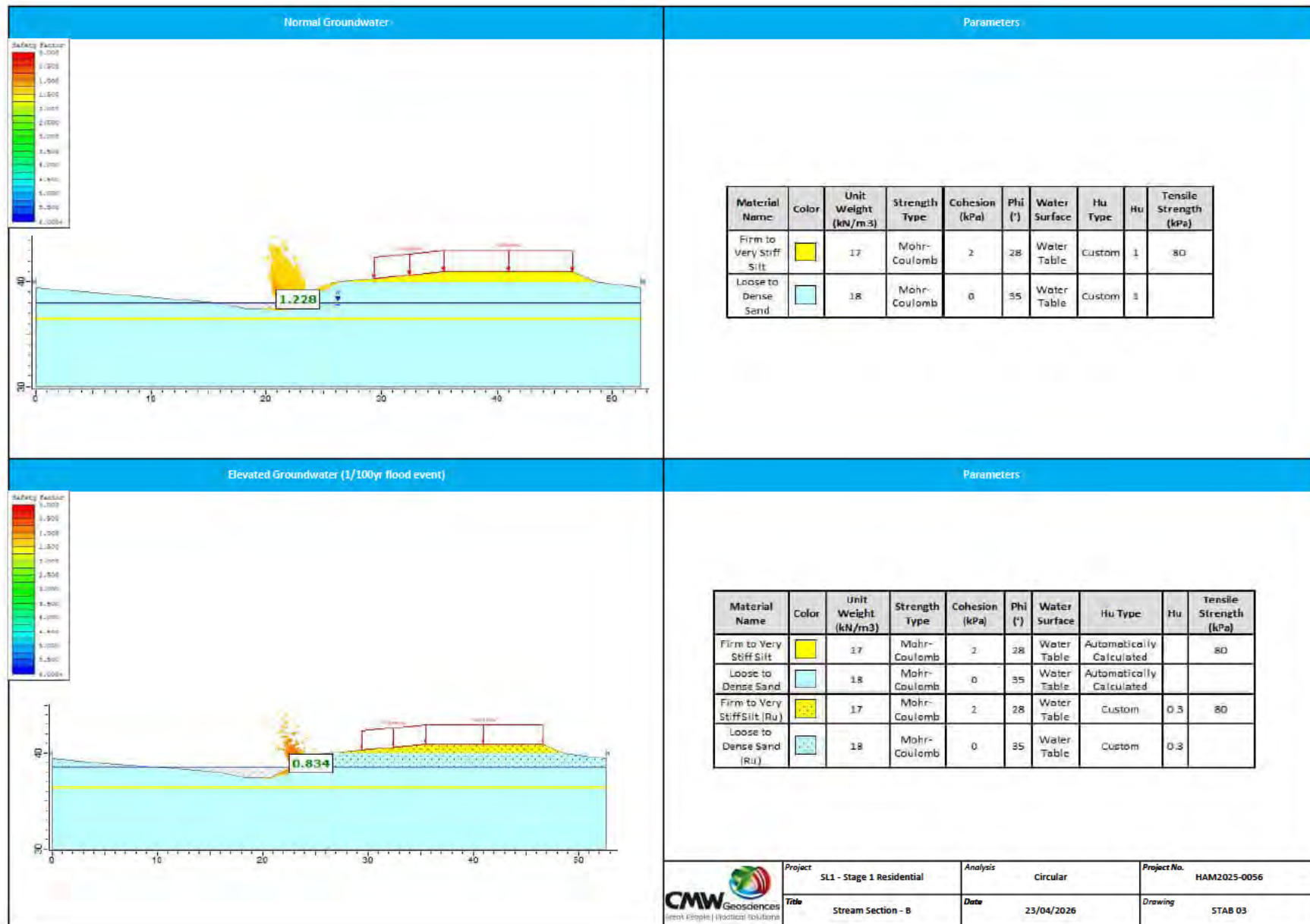


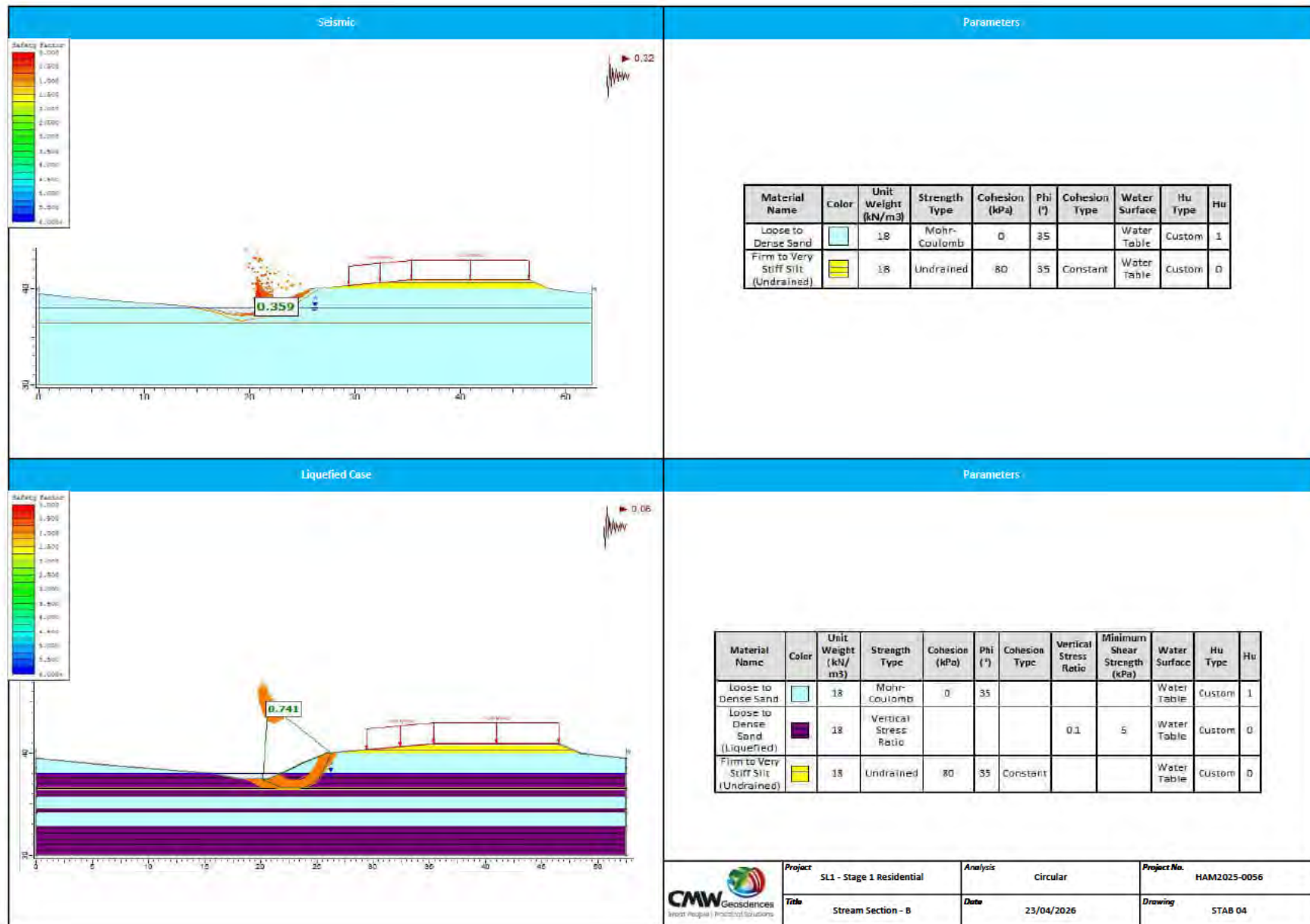




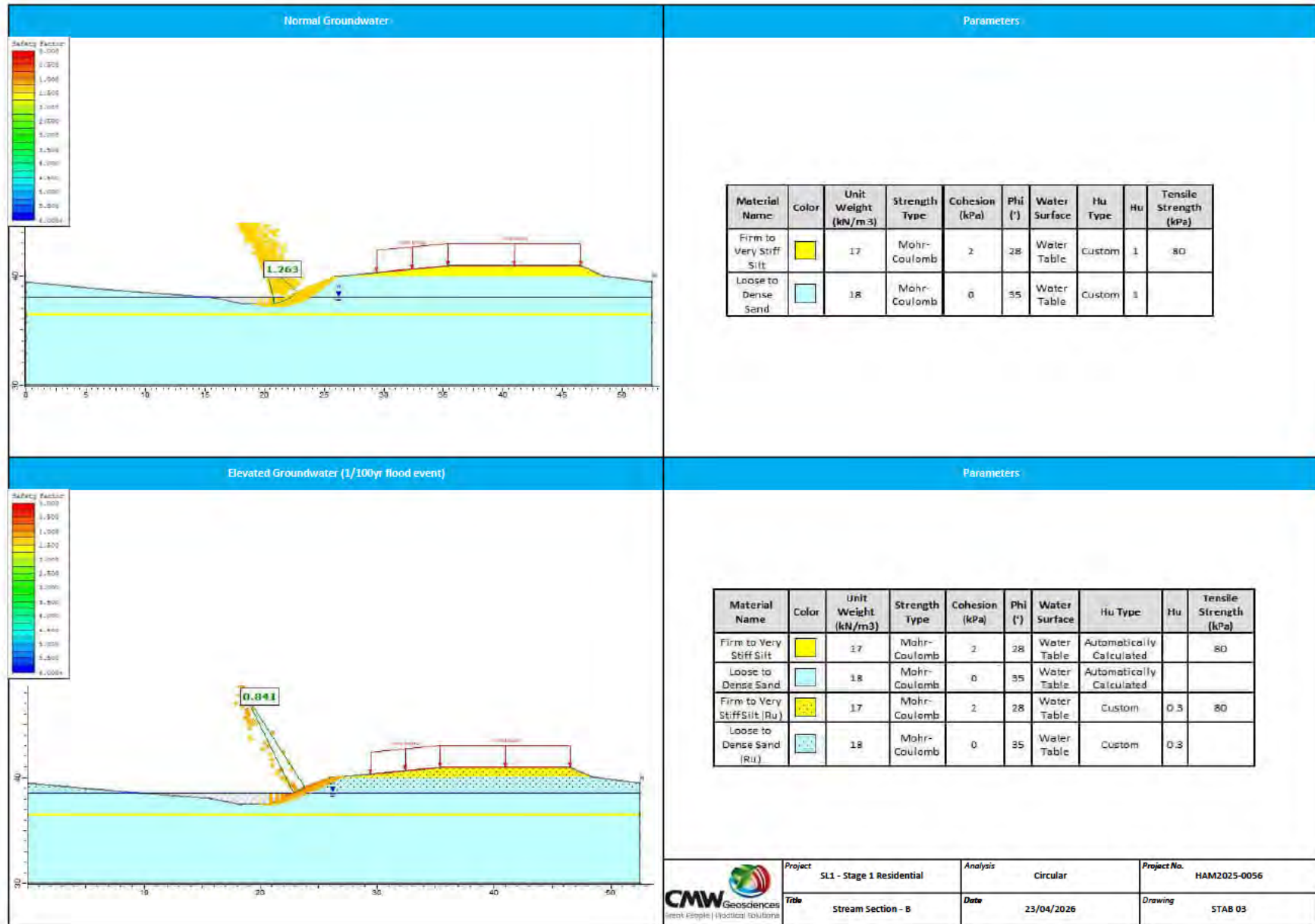


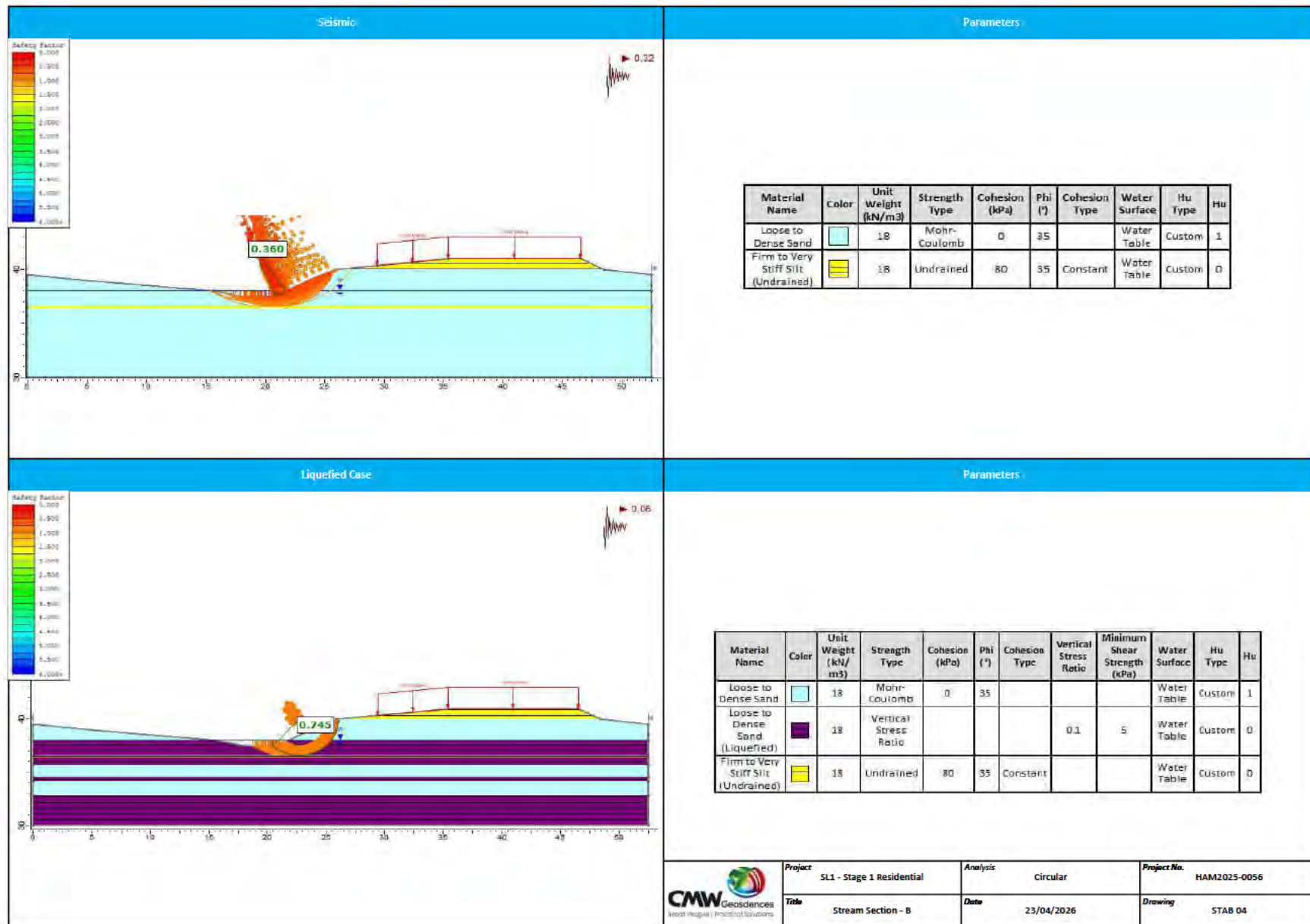
















Notes  
1. See plan C250 for all notes.

| Legend |                         |
|--------|-------------------------|
|        | EX BDY                  |
|        | PROP BDY                |
|        | RETAINING WALL 0.0-1.0m |
|        | RETAINING WALL 1.0-1.5m |
|        | RETAINING WALL 1.5-2.0m |
|        | RETAINING WALL 2.0-2.5m |

|         |             |                |         |         |
|---------|-------------|----------------|---------|---------|
| A       |             | FAST TRACK APP | MJRA    | 06/2026 |
| Rev     | Description | By             | Date    |         |
|         |             | By             | Date    |         |
| Survey  | MAVEN       |                | 06/2025 |         |
| Design  | MJRA        |                | 04/2026 |         |
| Drawn   | MJRA        |                | 04/2026 |         |
| Checked | MKJ/DJM     |                | 04/2026 |         |



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Project  
**SOUTHERN LINKS 1  
RESIDENTIAL STAGE 1  
HAMILTON, WAIKATO  
FOR  
SAXBY RD JV LIMITED**

Title  
**PROPOSED  
RETAINING WALL  
PLAN**

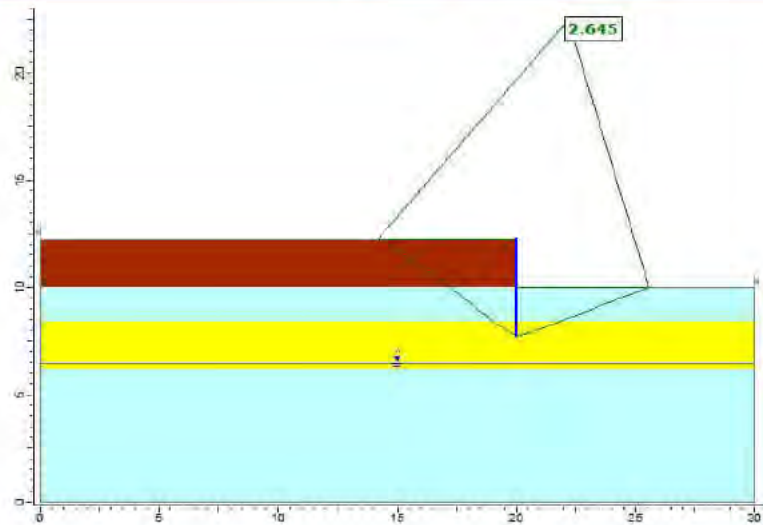
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| Drawing no. | R1-C250-1                         |
| Rev         | A                                 |

**RW 1**  
**NOTE:** BUILD BACK OF  
RETAINING WALL ON THE  
EDGE OF JOAL & LOT  
BOUNDARY. NO NEED TO  
APPLY THE 0.5m SETBACK  
SPECIFIED ON THE RETAINING  
WALL TYPICAL SECTION

**RESOURCE CONSENT**

DATE: 09/05/2025 FILEPATH: F:\Maven\Hamilton\Projects\Southern Links 1 Residential Stage 1\Drawings\Retaining Walls\DWG

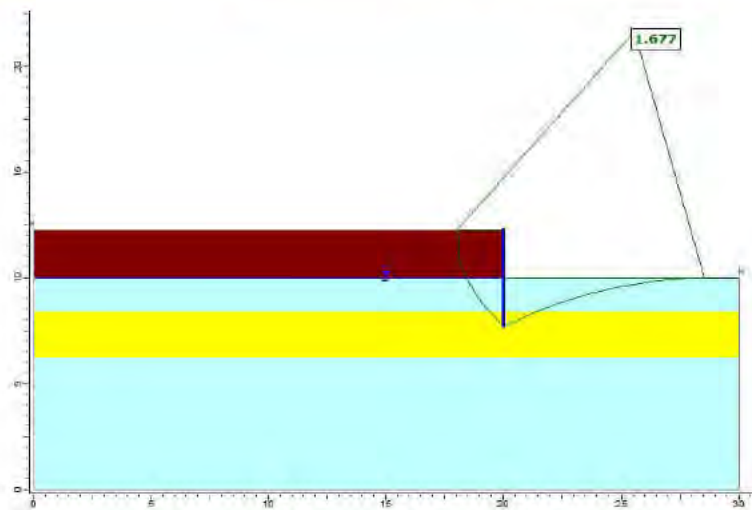
Normal Groundwater



Parameters

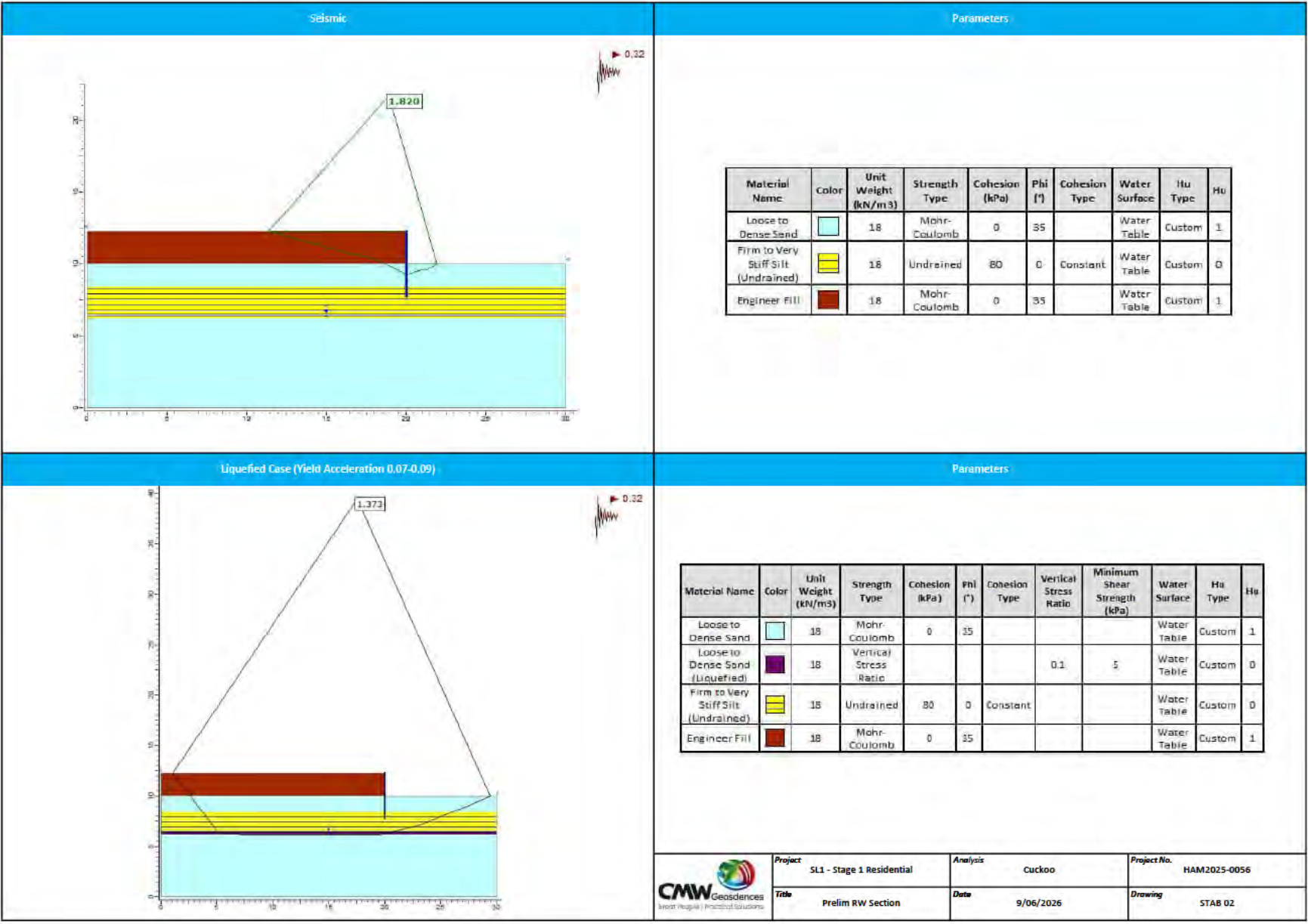
| Material Name           | Color | Unit Weight (kN/m <sup>3</sup> ) | Strength Type | Cohesion (kPa) | Phi (°) | Water Surface | Hu Type | Hu | Tensile Strength (kPa) |
|-------------------------|-------|----------------------------------|---------------|----------------|---------|---------------|---------|----|------------------------|
| Firm to Very Stiff Silt |       | 17                               | Mohr-Coulomb  | 2              | 28      | Water Table   | Custom  | 1  | 80                     |
| Loose to Dense Sand     |       | 18                               | Mohr-Coulomb  | 0              | 35      | Water Table   | Custom  | 1  |                        |
| Engineer Fill           |       | 18                               | Mohr-Coulomb  | 0              | 35      | Water Table   | Custom  | 1  |                        |

Elevated Groundwater (1/100yr flood event)



Parameters

| Material Name           | Color | Unit Weight (kN/m <sup>3</sup> ) | Strength Type | Cohesion (kPa) | Phi (°) | Water Surface | Hu Type                  | Hu  | Tensile Strength (kPa) |
|-------------------------|-------|----------------------------------|---------------|----------------|---------|---------------|--------------------------|-----|------------------------|
| Firm to Very Stiff Silt |       | 17                               | Mohr-Coulomb  | 2              | 28      | Water Table   | Automatically Calculated |     | 80                     |
| Loose to Dense Sand     |       | 18                               | Mohr-Coulomb  | 0              | 35      | Water Table   | Automatically Calculated |     |                        |
| Engineer Fill (Ru)      |       | 18                               | Mohr-Coulomb  | 0              | 35      | Water Table   | Custom                   | 0.3 |                        |



Liquefied Case (Yield Acceleration 0.07-0.09)

Liquefied Case (Yield Acceleration 0.07-0.09) plot showing a cross-section of soil layers. The plot includes a seismic wave and a peak value of 1.373. The layers are labeled: Loose to Dense Sand, Loose to Dense Sand (Liquefied), Firm to Very Stiff Silt (Undrained), and Engineer Fill.

Parameters

| Material Name                       | Color | Unit Weight (kN/m3) | Strength Type         | Cohesion (kPa) | Phi (°) | Cohesion Type | Vertical Stress Ratio | Minimum Shear Strength (kPa) | Water Surface | Hu Type | Hu |
|-------------------------------------|-------|---------------------|-----------------------|----------------|---------|---------------|-----------------------|------------------------------|---------------|---------|----|
| Loose to Dense Sand                 |       | 18                  | Mohr-Coulomb          | 0              | 35      |               |                       |                              | Water Table   | Custom  | 1  |
| Loose to Dense Sand (Liquefied)     |       | 18                  | Vertical Stress Ratio |                |         |               | 0.1                   | 5                            | Water Table   | Custom  | 0  |
| Firm to Very Stiff Silt (Undrained) |       | 18                  | Undrained             | 80             | 0       | Constant      |                       |                              | Water Table   | Custom  | 0  |
| Engineer Fill                       |       | 18                  | Mohr-Coulomb          | 0              | 35      |               |                       |                              | Water Table   | Custom  | 1  |

CMW Geosidences  
Smart People. Practical Solutions.

Project

SL1 - Stage 1 Residential

Analysis

Cuckoo

Project No.

HAM2025-0056

Title

Prelim RW Section

Date

9/06/2026

Drawing

STAB 02



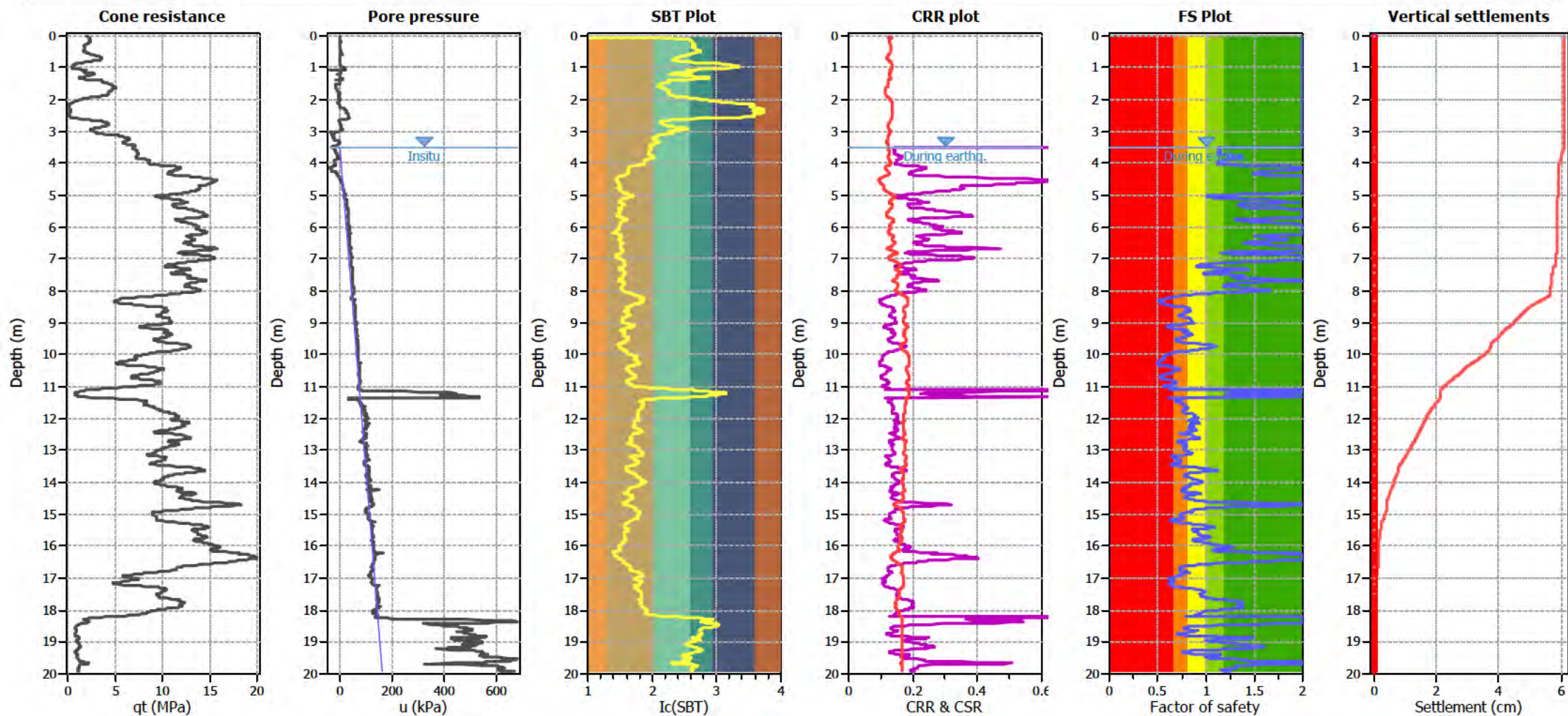
## Appendix F: Liquefaction Analysis Results Summary

**Project:**

**Location:**

**CPT: CPT-01**

Total depth: 19.92 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.25

G.W.T. (in-situ): 3.50 m  
G.W.T. (earthq.): 3.50 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_\sigma$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

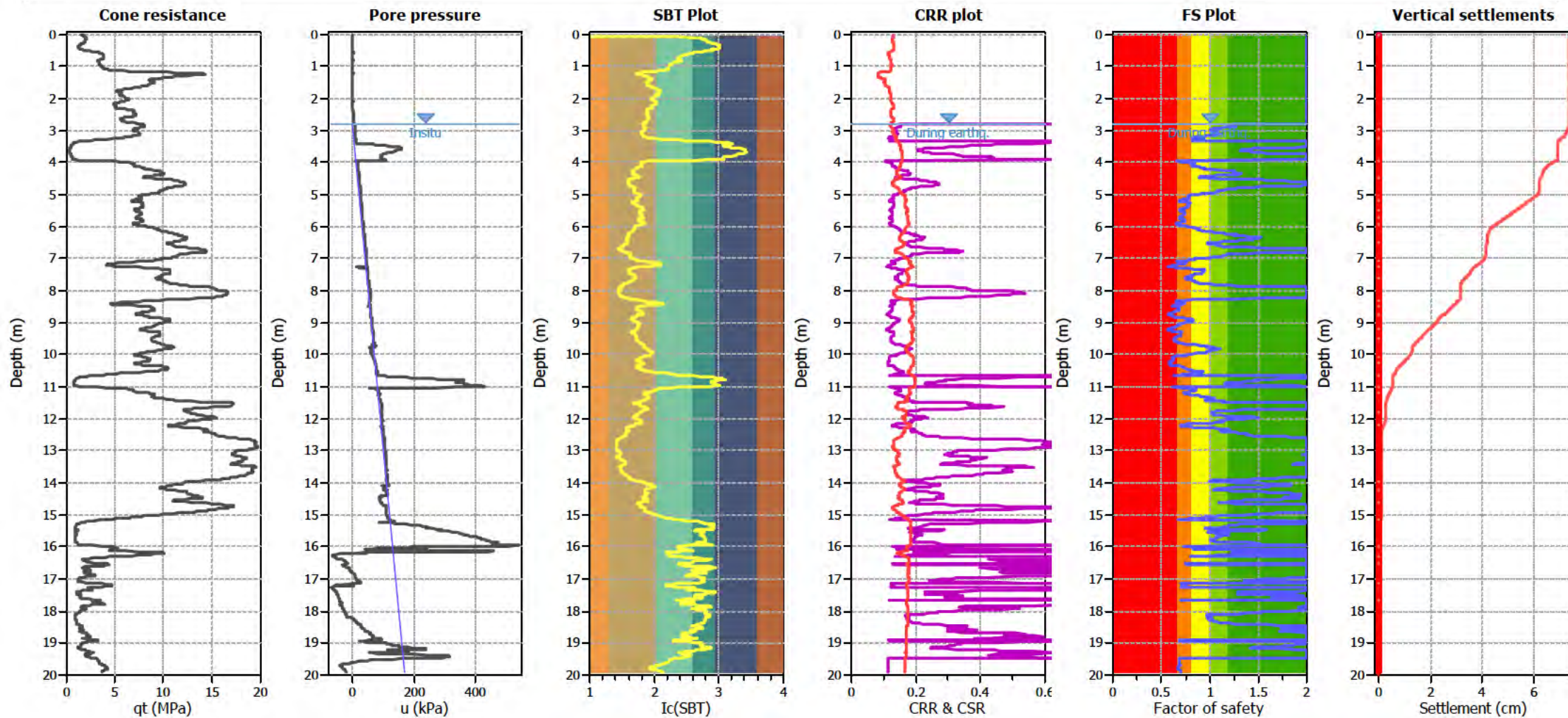


**Project:**

**Location:**

**CPT: CPT-02**

Total depth: 19.92 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.25

G.W.T. (in-situ): 2.80 m  
G.W.T. (earthq.): 2.80 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_o$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

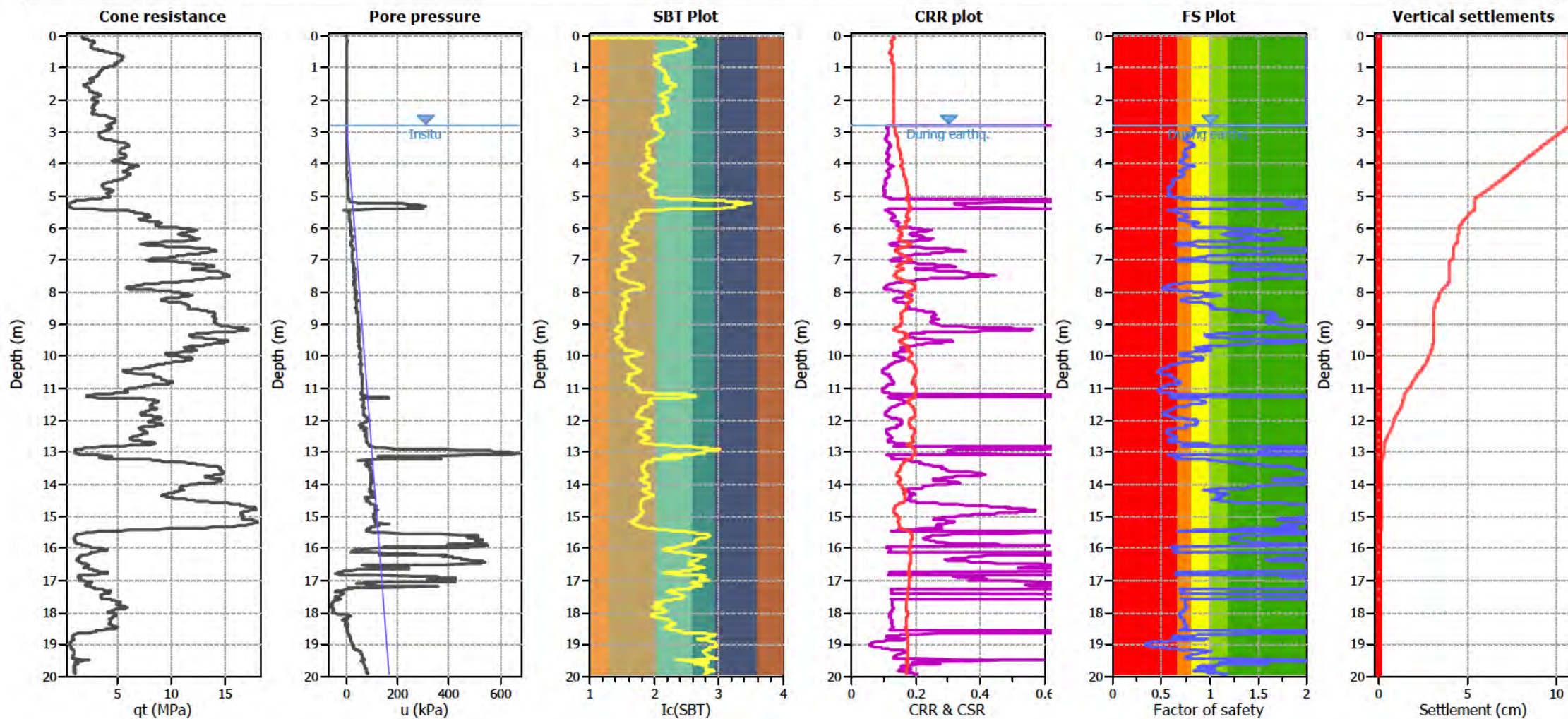


Project:

Location:

**CPT: CPT-03**

Total depth: 19.92 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.25

G.W.T. (in-situ): 2.80 m  
G.W.T. (earthq.): 2.80 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_\sigma$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

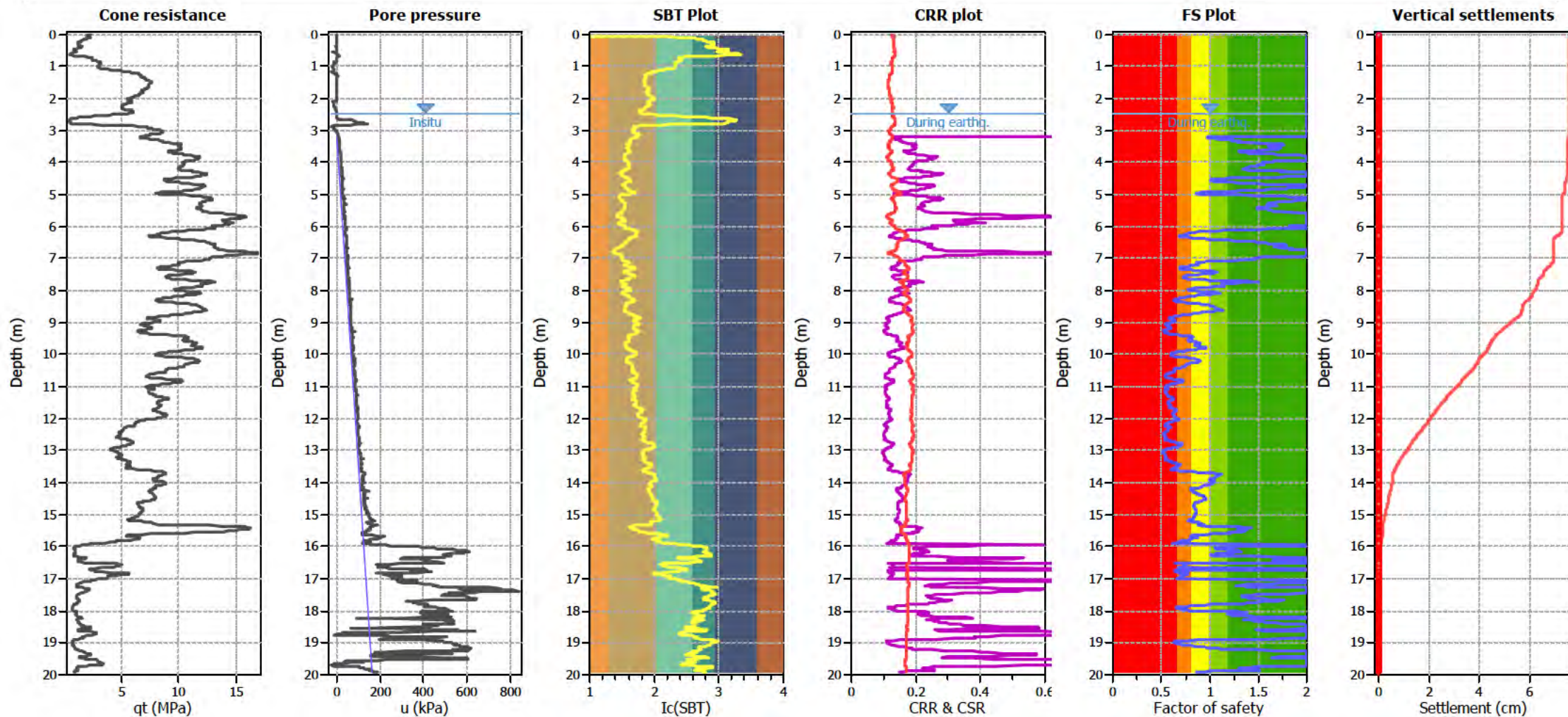


**Project:**

**Location:**

**CPT: CPT-04**

Total depth: 19.92 m



|                              |                   |                           |              |
|------------------------------|-------------------|---------------------------|--------------|
| Analysis method:             | B&I (2014)        | G.W.T. (in-situ):         | 2.50 m       |
| Fines correction method:     | B&I (2014)        | G.W.T. (earthq.):         | 2.50 m       |
| Points to test:              | Based on Ic value | Average results interval: | 3            |
| Earthquake magnitude $M_w$ : | 5.90              | Ic cut-off value:         | 2.60         |
| Peak ground acceleration:    | 0.25              | Unit weight calculation:  | Based on SBT |

|                         |     |
|-------------------------|-----|
| Use fill:               | No  |
| Fill height:            | N/A |
| Fill weight:            | N/A |
| Trans. detect. applied: | No  |
| $K_\sigma$ applied:     | Yes |

|                             |              |
|-----------------------------|--------------|
| Clay like behavior applied: | .            |
| Limit depth applied:        | No           |
| Limit depth:                | N/A          |
| MSF method:                 | Method based |

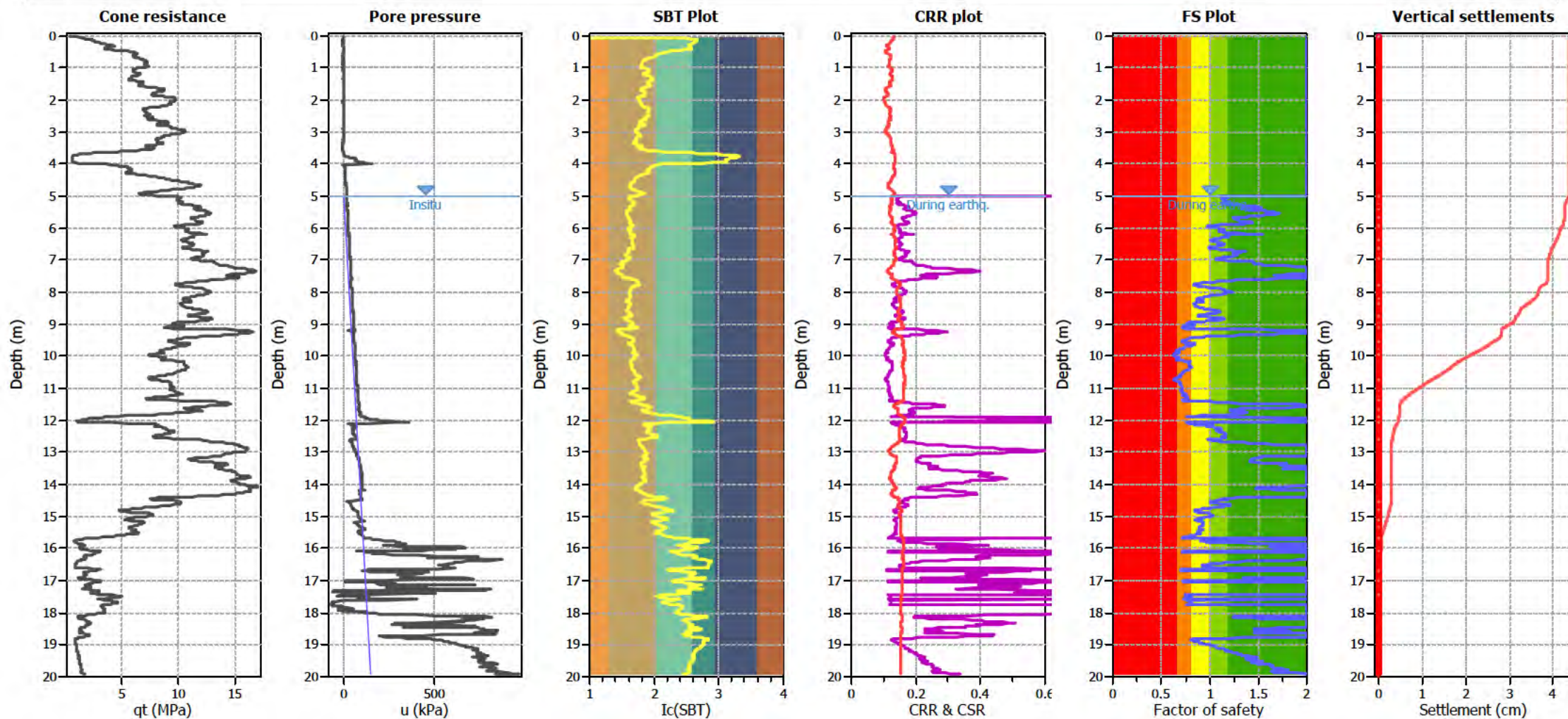


**Project:**

**Location:**

**CPT: CPT-05**

Total depth: 19.92 m



|                              |                   |                           |              |                         |     |                      |              |
|------------------------------|-------------------|---------------------------|--------------|-------------------------|-----|----------------------|--------------|
| Analysis method:             | B&I (2014)        | G.W.T. (in-situ):         | 5.00 m       | Use fill:               | No  | Clay like behavior   |              |
| Fines correction method:     | B&I (2014)        | G.W.T. (earthq.):         | 5.00 m       | Fill height:            | N/A | applied:             | .            |
| Points to test:              | Based on Ic value | Average results interval: | 3            | Fill weight:            | N/A | Limit depth applied: | No           |
| Earthquake magnitude $M_w$ : | 5.90              | Ic cut-off value:         | 2.60         | Trans. detect. applied: | No  | Limit depth:         | N/A          |
| Peak ground acceleration:    | 0.25              | Unit weight calculation:  | Based on SBT | $K_\sigma$ applied:     | Yes | MSF method:          | Method based |

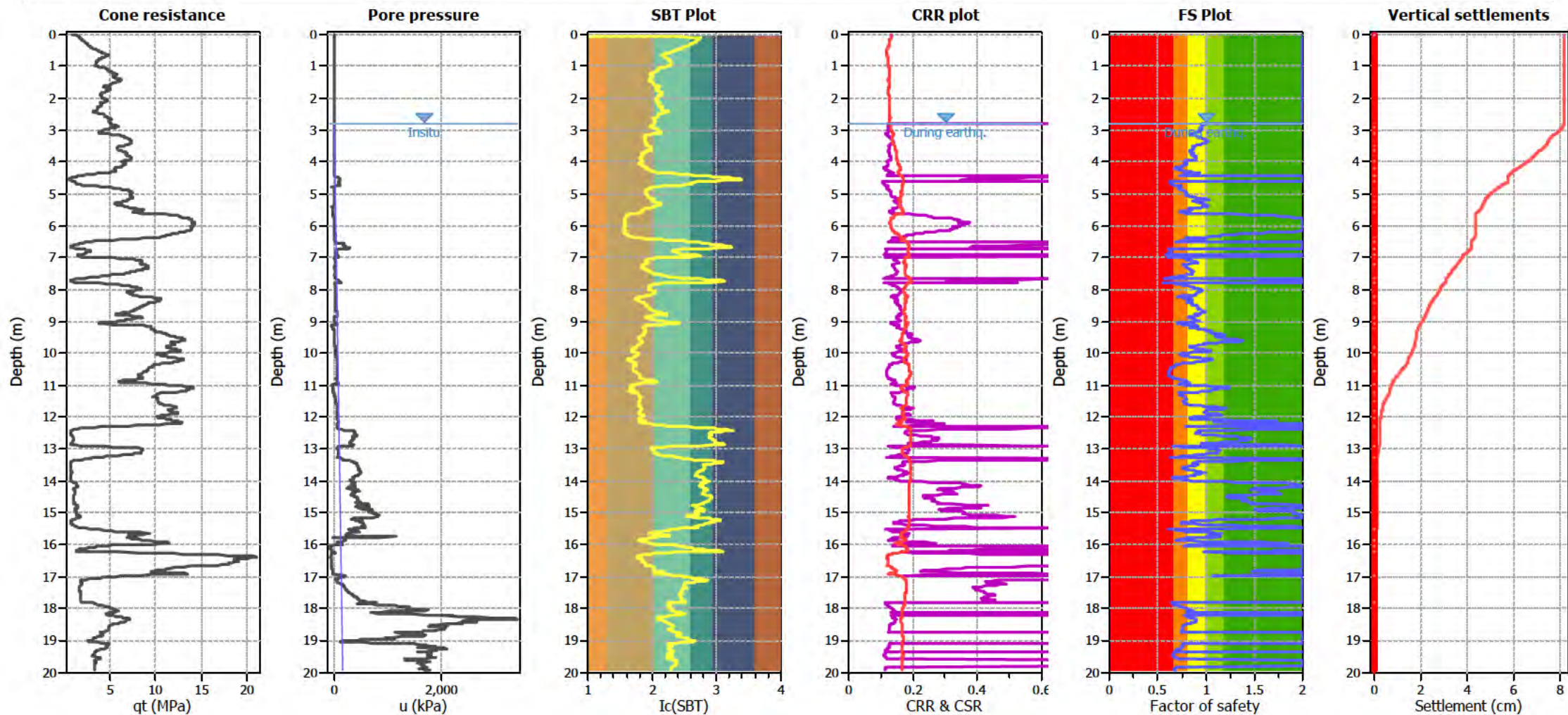


Project:

Location:

**CPT: CPT-06**

Total depth: 19.93 m



|                              |                   |                           |              |
|------------------------------|-------------------|---------------------------|--------------|
| Analysis method:             | B&I (2014)        | G.W.T. (in-situ):         | 2.80 m       |
| Fines correction method:     | B&I (2014)        | G.W.T. (earthq.):         | 2.80 m       |
| Points to test:              | Based on Ic value | Average results interval: | 3            |
| Earthquake magnitude $M_w$ : | 5.90              | Ic cut-off value:         | 2.60         |
| Peak ground acceleration:    | 0.25              | Unit weight calculation:  | Based on SBT |

|                         |     |
|-------------------------|-----|
| Use fill:               | No  |
| Fill height:            | N/A |
| Fill weight:            | N/A |
| Trans. detect. applied: | No  |
| $K_\sigma$ applied:     | Yes |

|                             |              |
|-----------------------------|--------------|
| Clay like behavior applied: | .            |
| Limit depth applied:        | No           |
| Limit depth:                | N/A          |
| MSF method:                 | Method based |

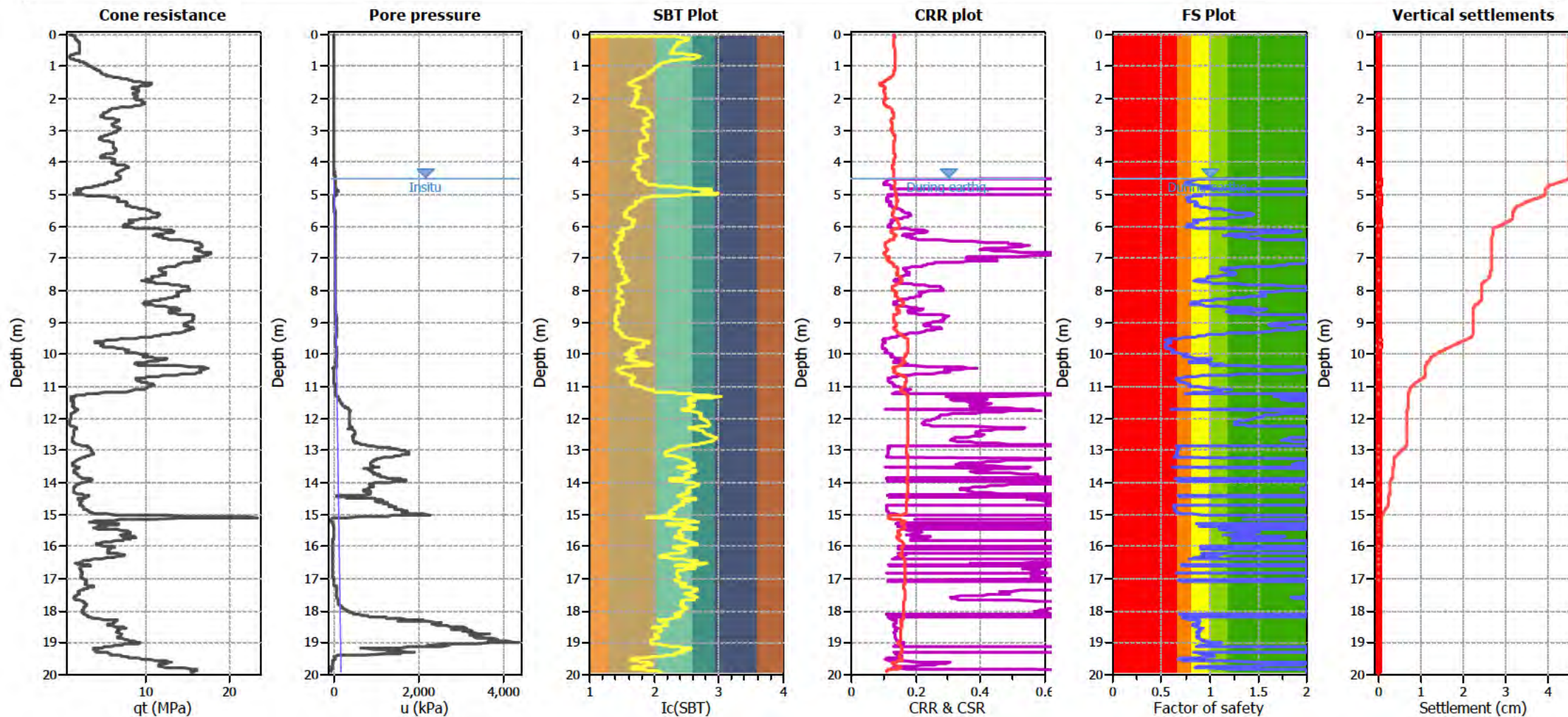


**Project:**

**Location:**

**CPT: CPT-07**

Total depth: 19.92 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.25

G.W.T. (in-situ): 4.50 m  
G.W.T. (earthq.): 4.50 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_\sigma$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

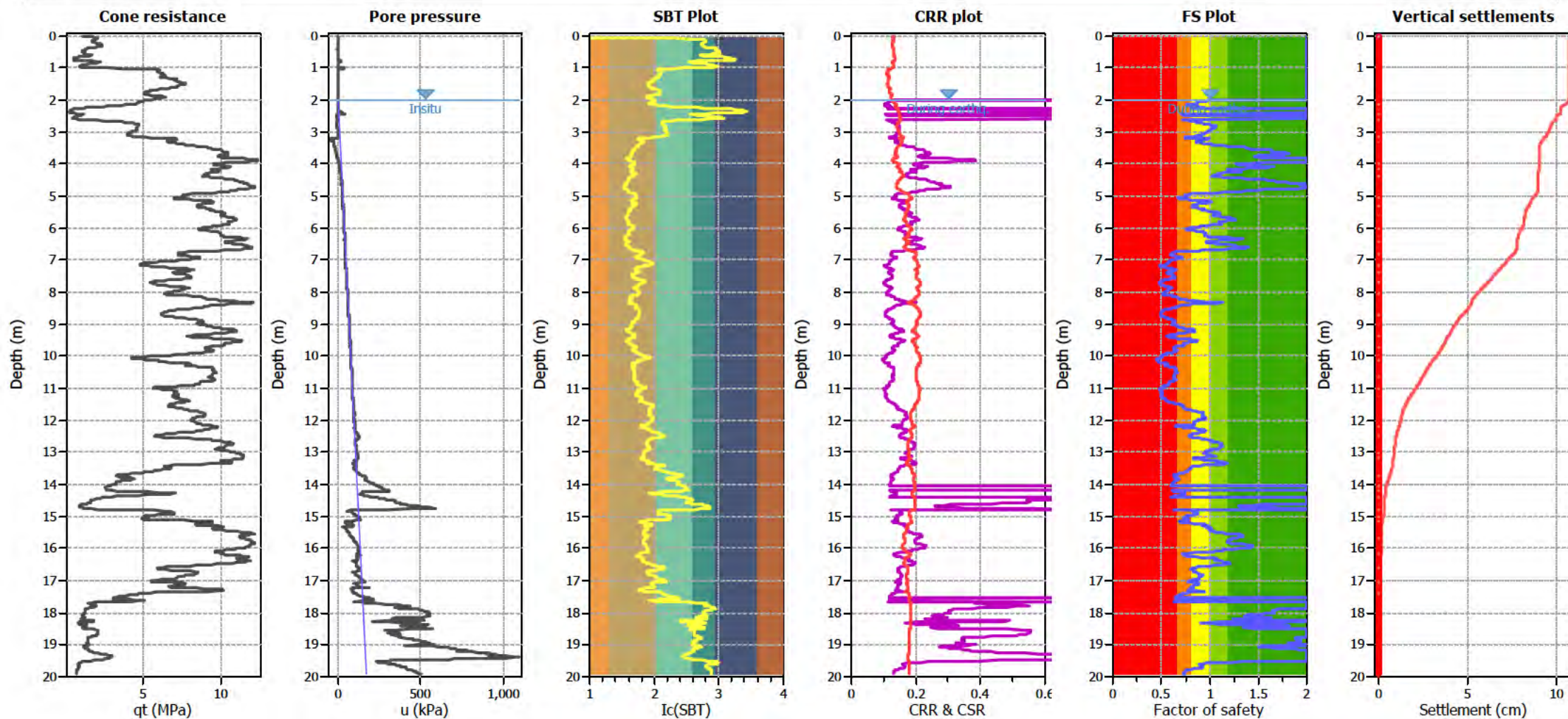


Project:

Location:

**CPT: CPT-08**

Total depth: 19.92 m



|                              |                   |                           |              |                         |     |                      |              |
|------------------------------|-------------------|---------------------------|--------------|-------------------------|-----|----------------------|--------------|
| Analysis method:             | B&I (2014)        | G.W.T. (in-situ):         | 2.00 m       | Use fill:               | No  | Clay like behavior   |              |
| Fines correction method:     | B&I (2014)        | G.W.T. (earthq.):         | 2.00 m       | Fill height:            | N/A | applied:             | .            |
| Points to test:              | Based on Ic value | Average results interval: | 3            | Fill weight:            | N/A | Limit depth applied: | No           |
| Earthquake magnitude $M_w$ : | 5.90              | Ic cut-off value:         | 2.60         | Trans. detect. applied: | No  | Limit depth:         | N/A          |
| Peak ground acceleration:    | 0.25              | Unit weight calculation:  | Based on SBT | $K_\sigma$ applied:     | Yes | MSF method:          | Method based |

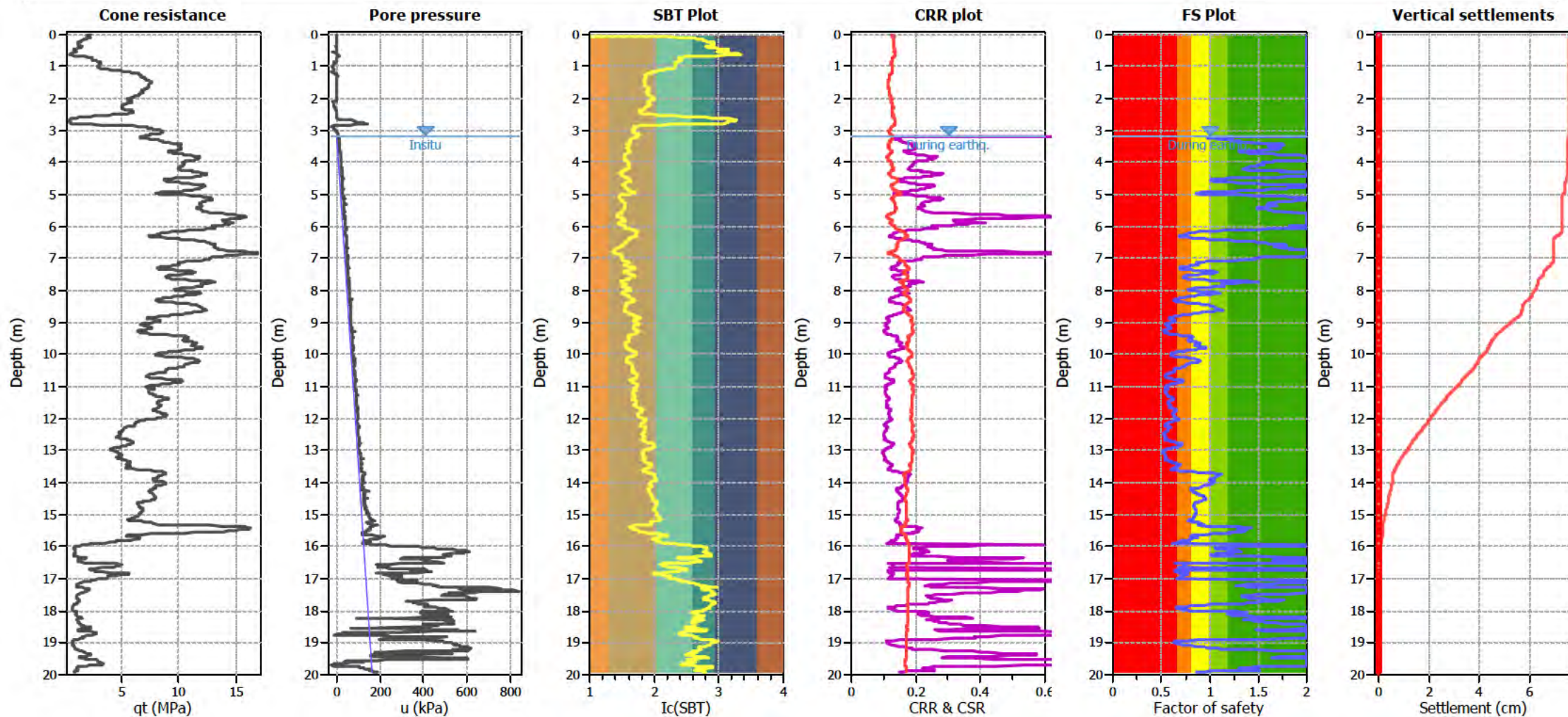


**Project:**

**Location:**

**CPT: CPT-09**

Total depth: 19.92 m



|                              |                   |                           |              |
|------------------------------|-------------------|---------------------------|--------------|
| Analysis method:             | B&I (2014)        | G.W.T. (in-situ):         | 3.20 m       |
| Fines correction method:     | B&I (2014)        | G.W.T. (earthq.):         | 3.20 m       |
| Points to test:              | Based on Ic value | Average results interval: | 3            |
| Earthquake magnitude $M_w$ : | 5.90              | Ic cut-off value:         | 2.60         |
| Peak ground acceleration:    | 0.25              | Unit weight calculation:  | Based on SBT |

|                         |     |
|-------------------------|-----|
| Use fill:               | No  |
| Fill height:            | N/A |
| Fill weight:            | N/A |
| Trans. detect. applied: | No  |
| $K_\sigma$ applied:     | Yes |

|                             |              |
|-----------------------------|--------------|
| Clay like behavior applied: | .            |
| Limit depth applied:        | No           |
| Limit depth:                | N/A          |
| MSF method:                 | Method based |

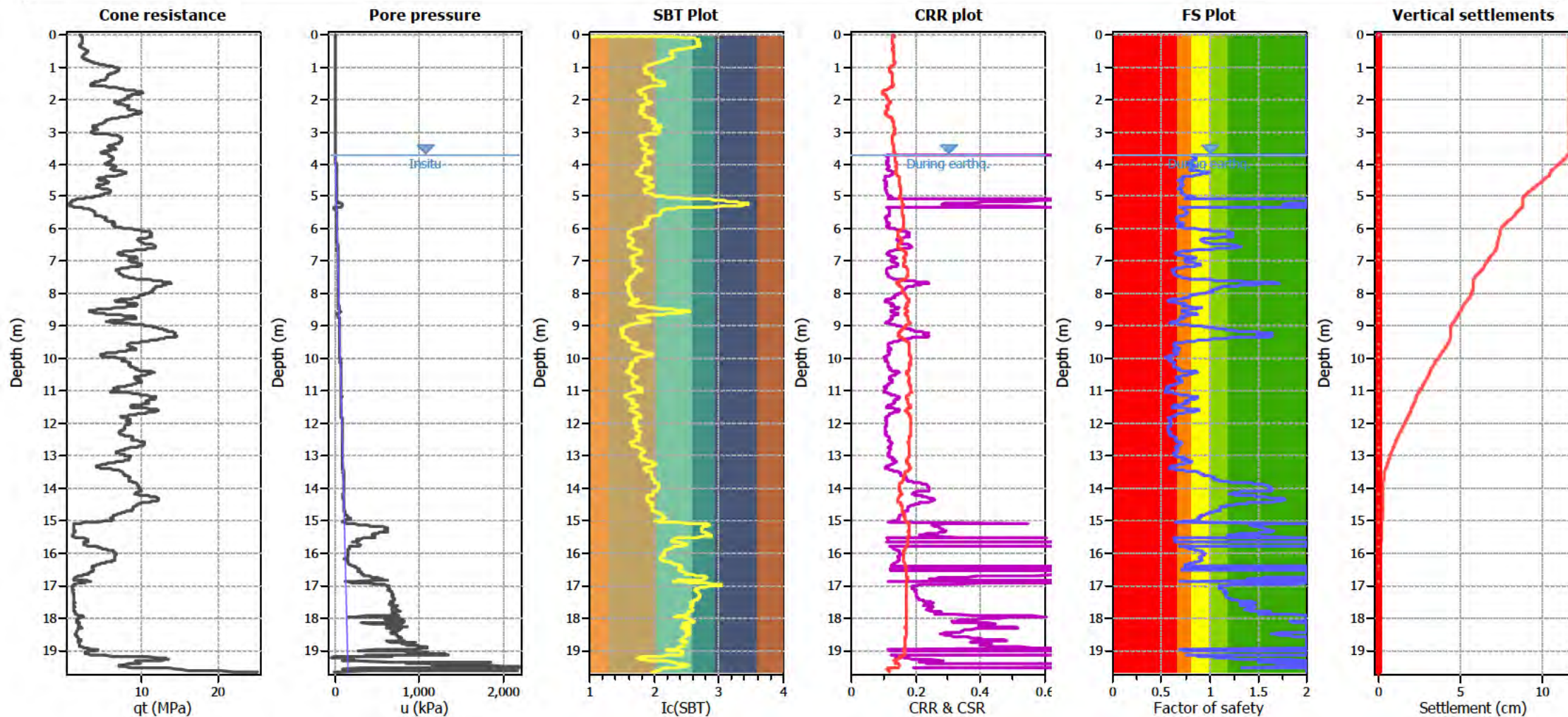


**Project:**

**Location:**

**CPT: CPT-10**

Total depth: 19.67 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on  $I_c$  value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.25

G.W.T. (in-situ): 3.70 m  
G.W.T. (earthq.): 3.70 m  
Average results interval: 3  
 $I_c$  cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_\sigma$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

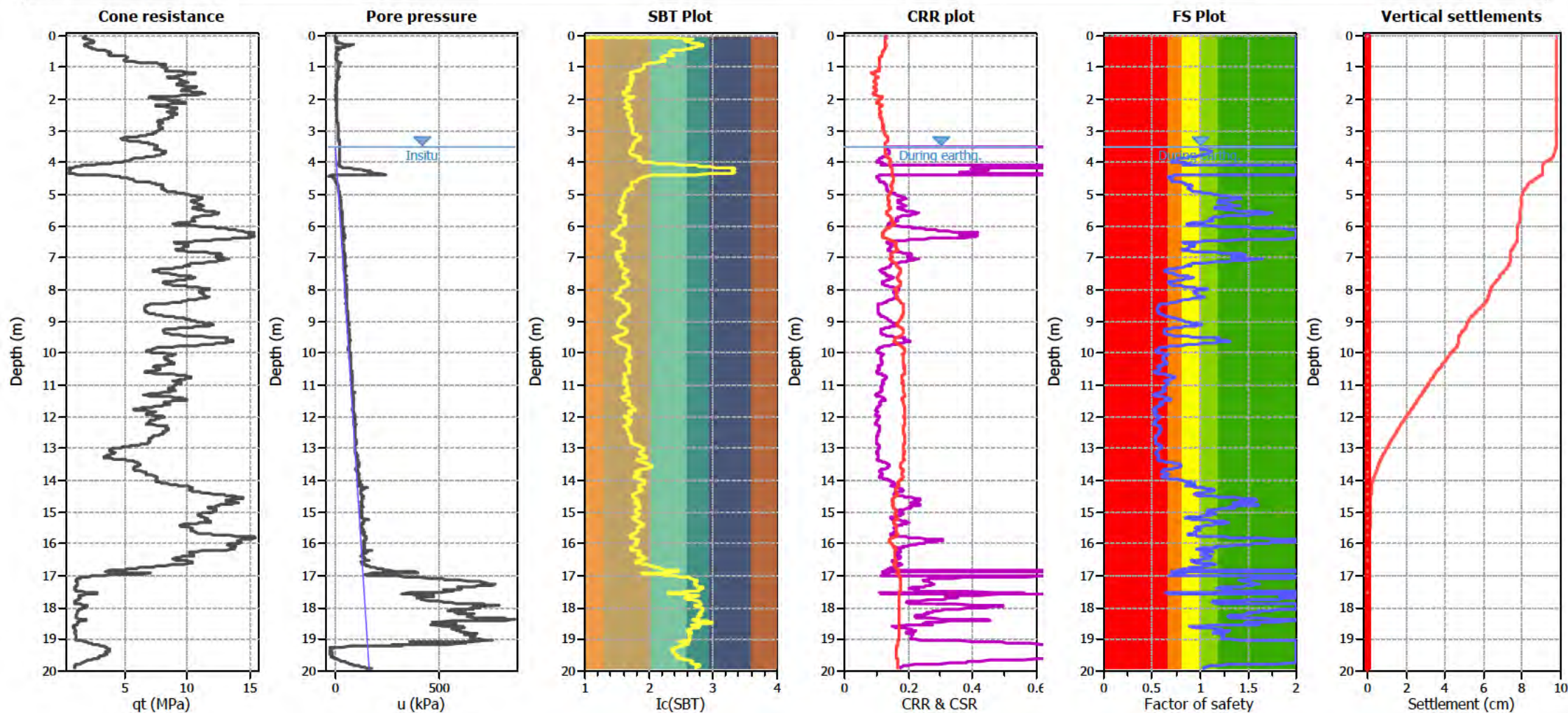


**Project:**

**Location:**

**CPT: CPT-11**

Total depth: 19.92 m



|                              |                   |                           |              |                         |     |                      |              |
|------------------------------|-------------------|---------------------------|--------------|-------------------------|-----|----------------------|--------------|
| Analysis method:             | B&I (2014)        | G.W.T. (in-situ):         | 3.50 m       | Use fill:               | No  | Clay like behavior   |              |
| Fines correction method:     | B&I (2014)        | G.W.T. (earthq.):         | 3.50 m       | Fill height:            | N/A | applied:             | .            |
| Points to test:              | Based on Ic value | Average results interval: | 3            | Fill weight:            | N/A | Limit depth applied: | No           |
| Earthquake magnitude $M_w$ : | 5.90              | Ic cut-off value:         | 2.60         | Trans. detect. applied: | No  | Limit depth:         | N/A          |
| Peak ground acceleration:    | 0.25              | Unit weight calculation:  | Based on SBT | $K_0$ applied:          | Yes | MSF method:          | Method based |

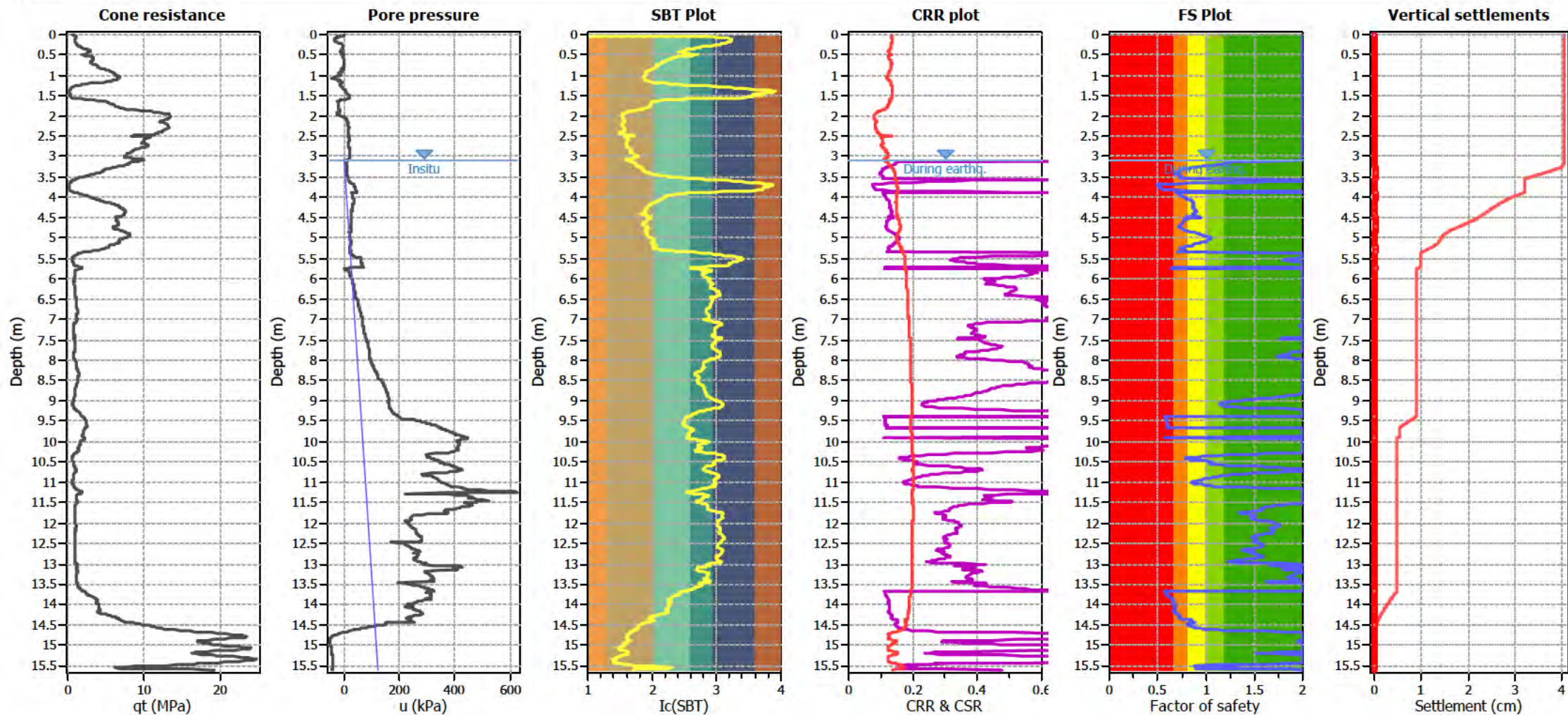


**Project:**

**Location:**

**CPT: CPT\_87646**

Total depth: 15.61 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on  $I_c$  value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.25

G.W.T. (in-situ): 3.10 m  
G.W.T. (earthq.): 3.10 m  
Average results interval: 3  
 $I_c$  cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_o$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

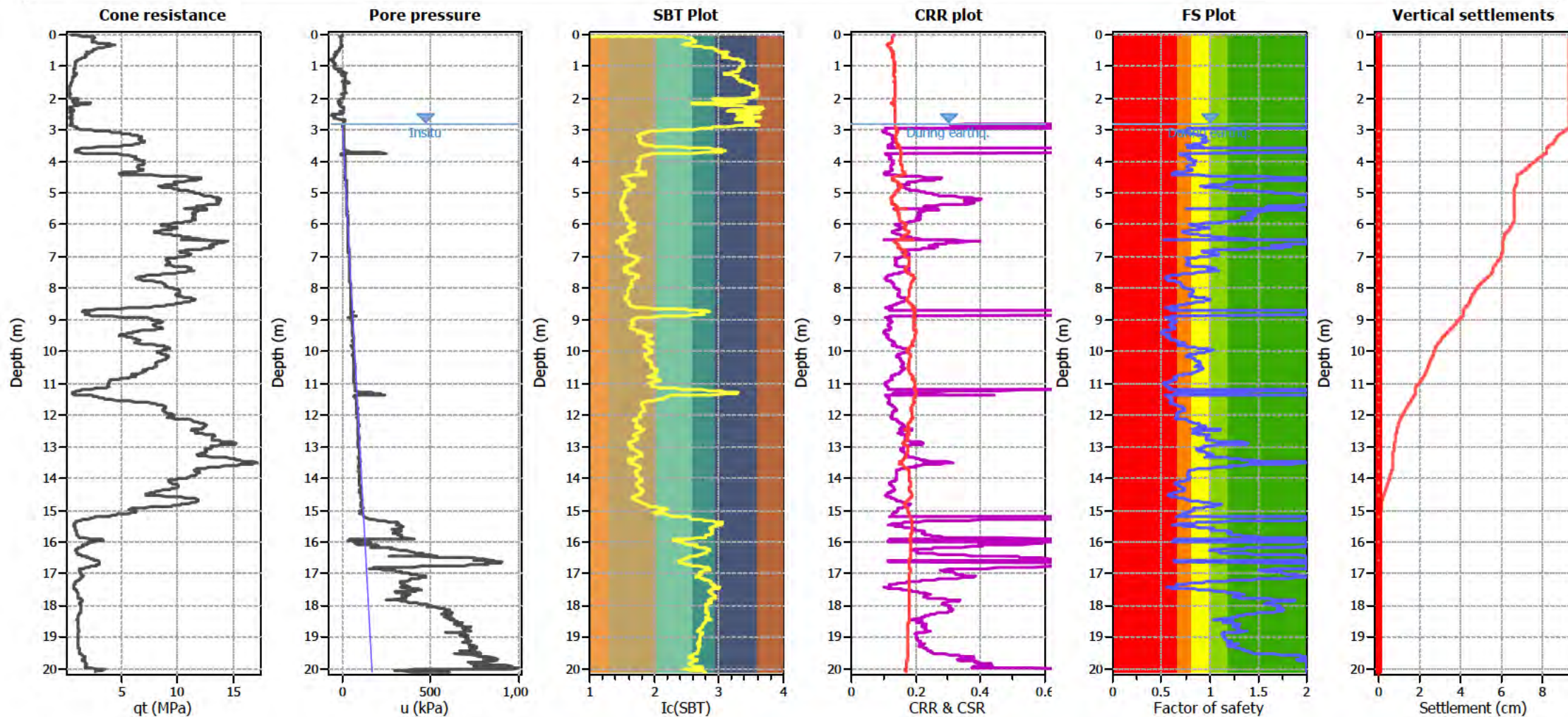


**Project:**

**Location:**

**CPT: CPT\_87648**

Total depth: 20.10 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on  $I_c$  value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.25

G.W.T. (in-situ): 2.80 m  
G.W.T. (earthq.): 2.80 m  
Average results interval: 3  
 $I_c$  cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_\sigma$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

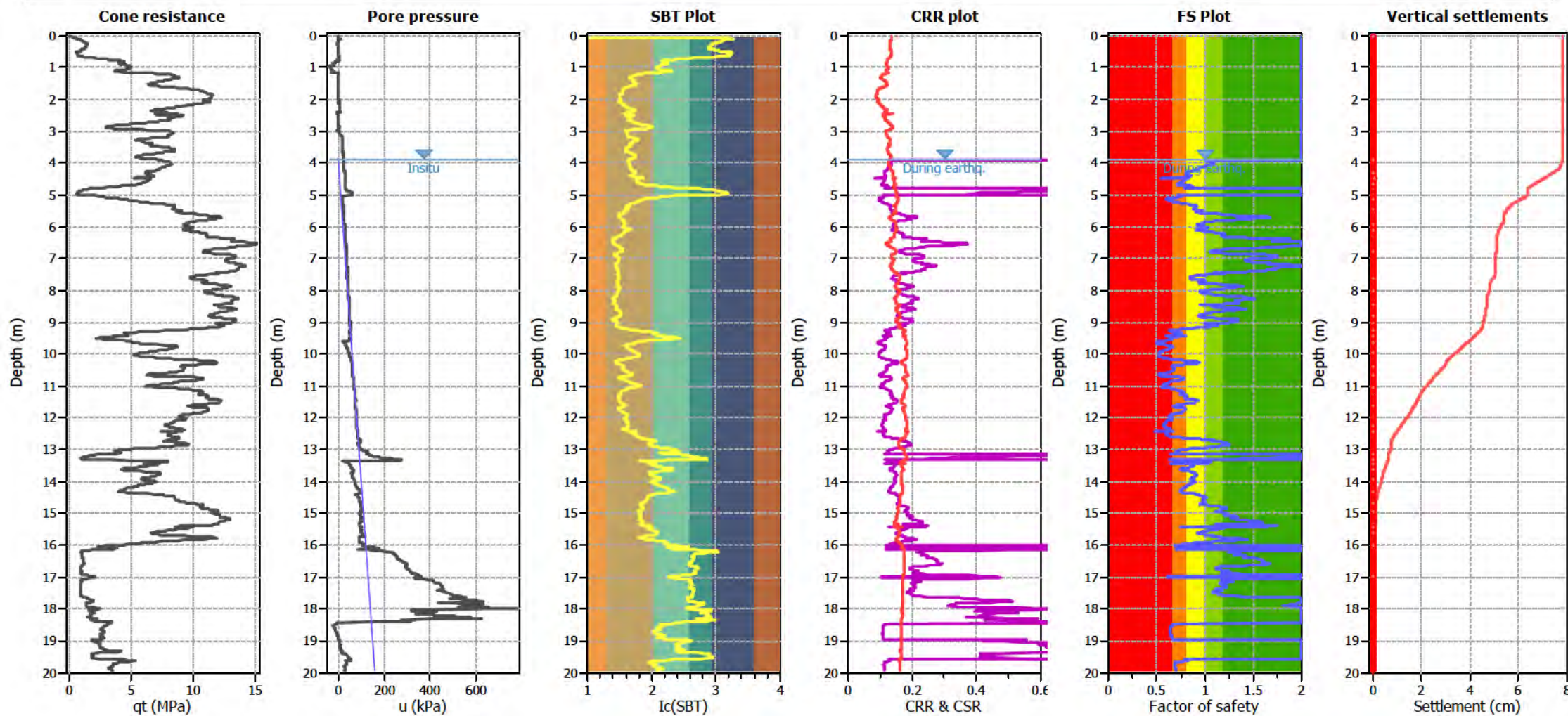


**Project:**

**Location:**

**CPT: CPT\_87650**

Total depth: 19.93 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.25

G.W.T. (in-situ): 3.90 m  
G.W.T. (earthq.): 3.90 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_\sigma$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

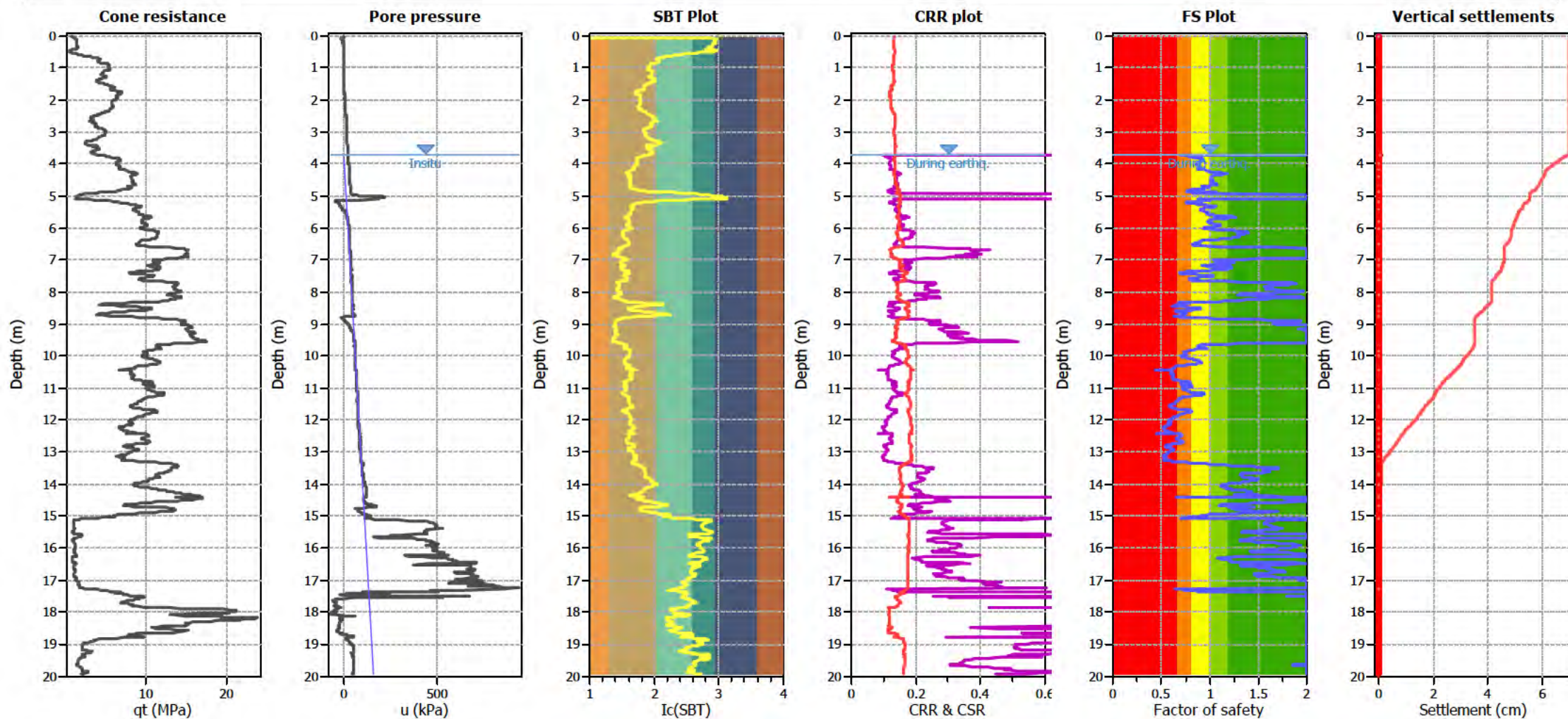


**Project:**

**Location:**

**CPT: CPT\_87652**

Total depth: 19.93 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.25

G.W.T. (in-situ): 3.70 m  
G.W.T. (earthq.): 3.70 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_\sigma$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

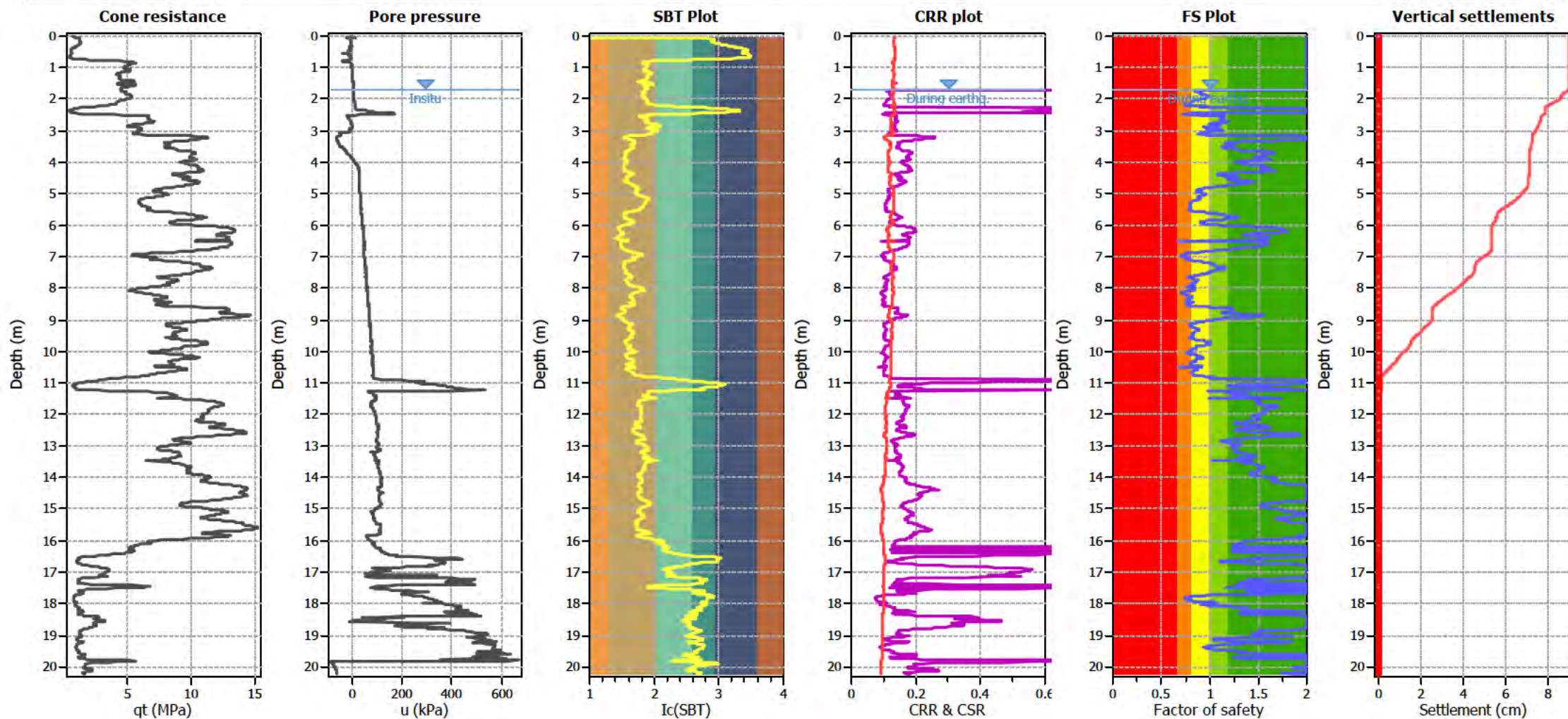


**Project:**

**Location:**

**CPT: CPT\_87654**

Total depth: 20.23 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on  $I_c$  value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.25

G.W.T. (in-situ): 1.70 m  
G.W.T. (earthq.): 1.70 m  
Average results interval: 3  
 $I_c$  cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_\sigma$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

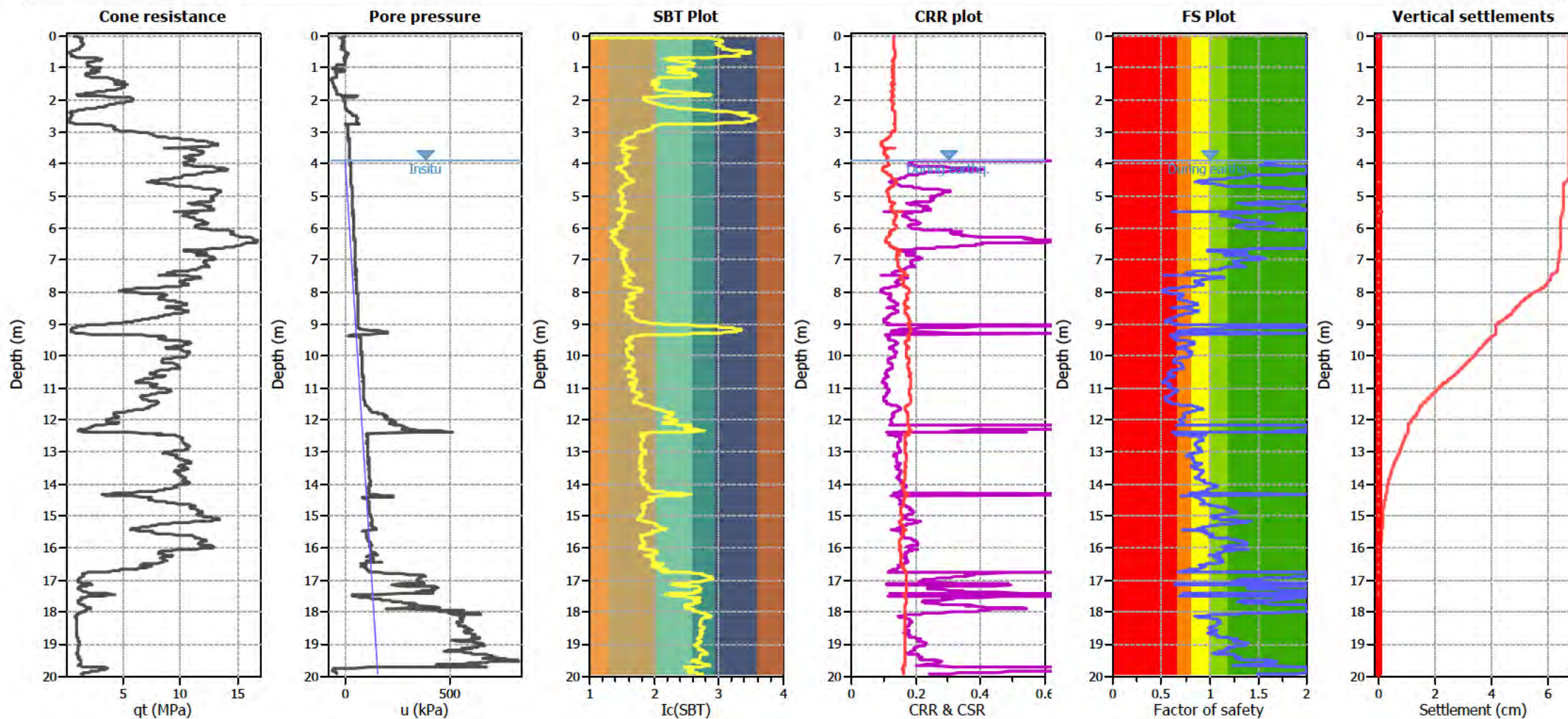


**Project:**

**Location:**

**CPT: CPT\_87655**

Total depth: 19.93 m



|                              |                   |                           |              |
|------------------------------|-------------------|---------------------------|--------------|
| Analysis method:             | B&I (2014)        | G.W.T. (in-situ):         | 3.90 m       |
| Fines correction method:     | B&I (2014)        | G.W.T. (earthq.):         | 3.90 m       |
| Points to test:              | Based on Ic value | Average results interval: | 3            |
| Earthquake magnitude $M_w$ : | 5.90              | Ic cut-off value:         | 2.60         |
| Peak ground acceleration:    | 0.25              | Unit weight calculation:  | Based on SBT |

|                         |     |
|-------------------------|-----|
| Use fill:               | No  |
| Fill height:            | N/A |
| Fill weight:            | N/A |
| Trans. detect. applied: | No  |
| $K_\sigma$ applied:     | Yes |

|                             |              |
|-----------------------------|--------------|
| Clay like behavior applied: | .            |
| Limit depth applied:        | No           |
| Limit depth:                | N/A          |
| MSF method:                 | Method based |

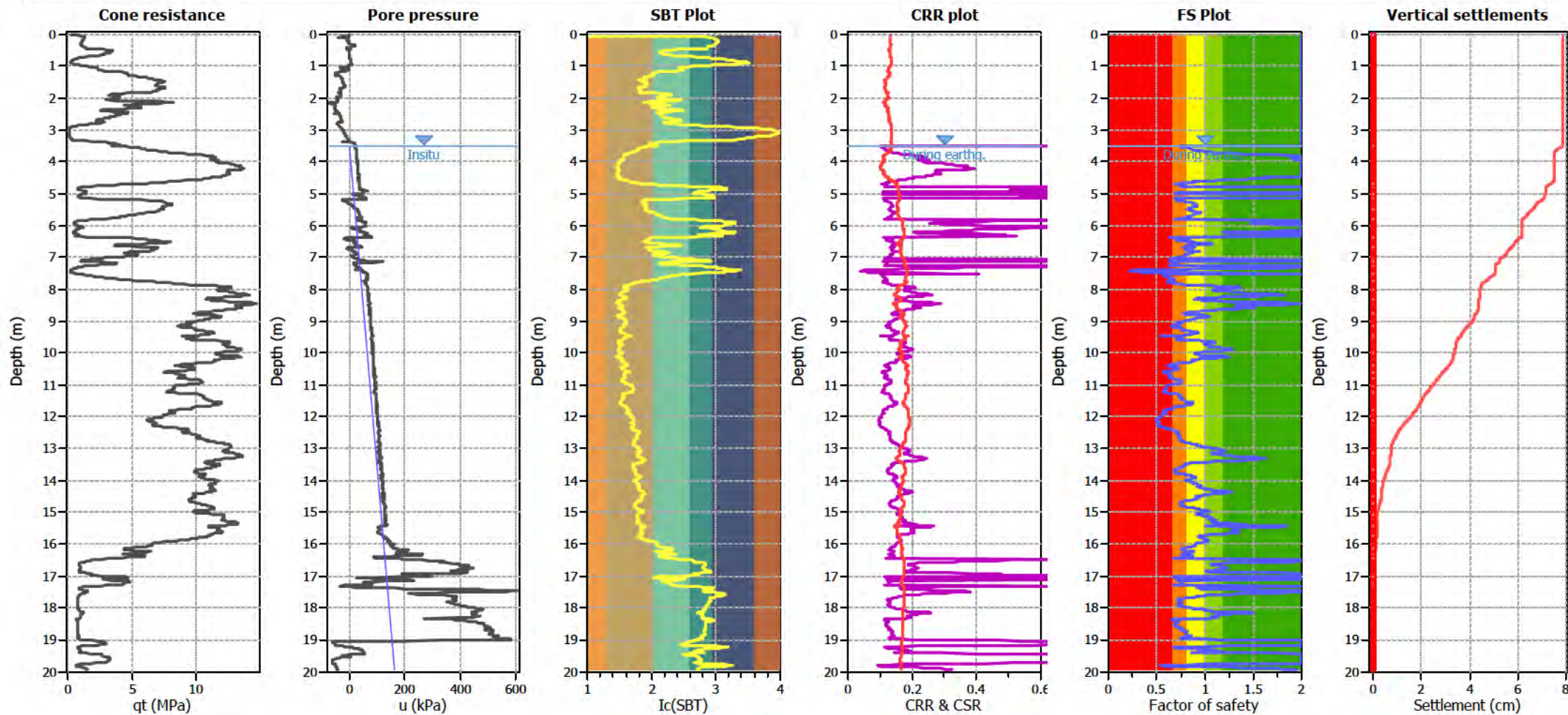


**Project:**

**Location:**

**CPT: CPT\_87659**

Total depth: 19.93 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.25

G.W.T. (in-situ): 3.50 m  
G.W.T. (earthq.): 3.50 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_\sigma$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

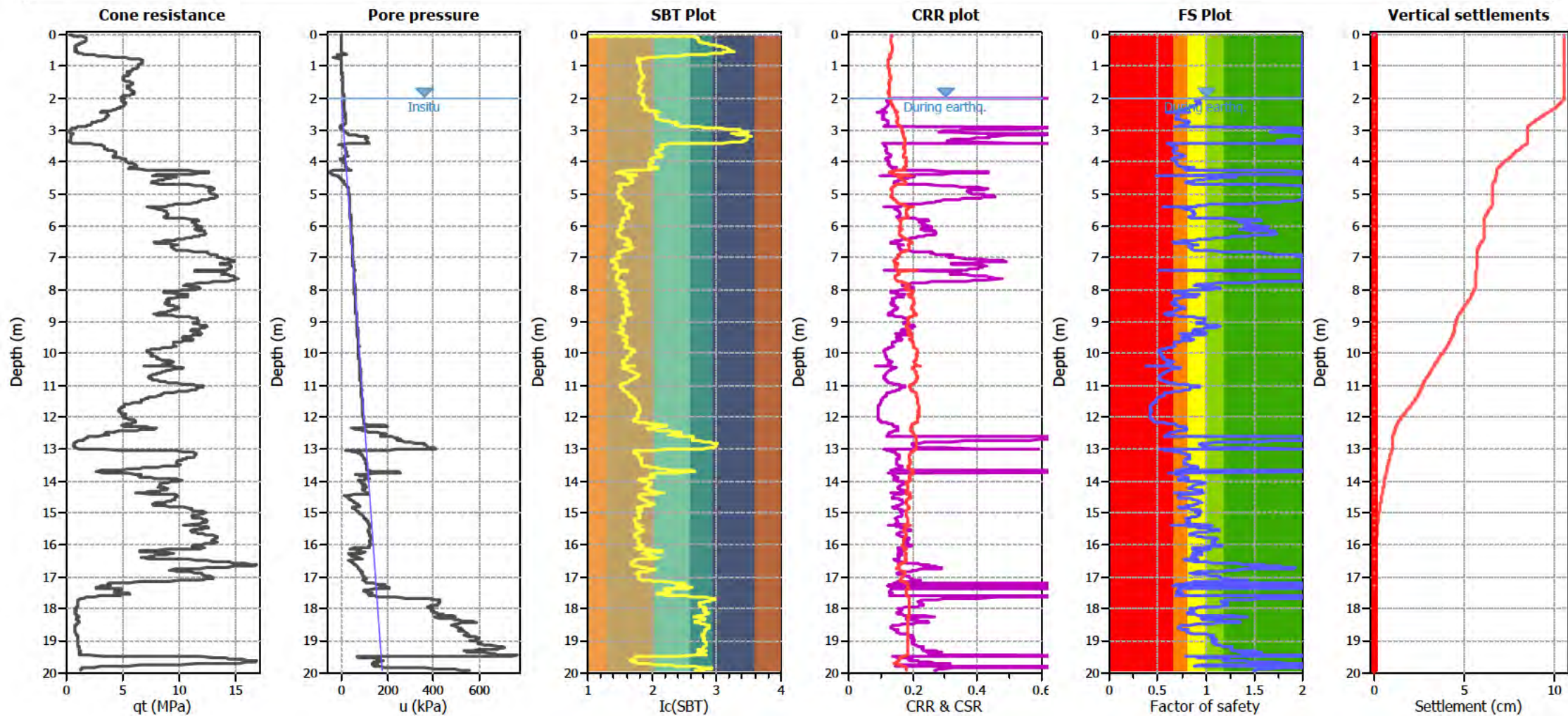


Project:

Location:

**CPT: CPT\_87660**

Total depth: 19.93 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on  $I_c$  value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.25

G.W.T. (in-situ): 2.00 m  
G.W.T. (earthq.): 2.00 m  
Average results interval: 3  
 $I_c$  cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_a$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

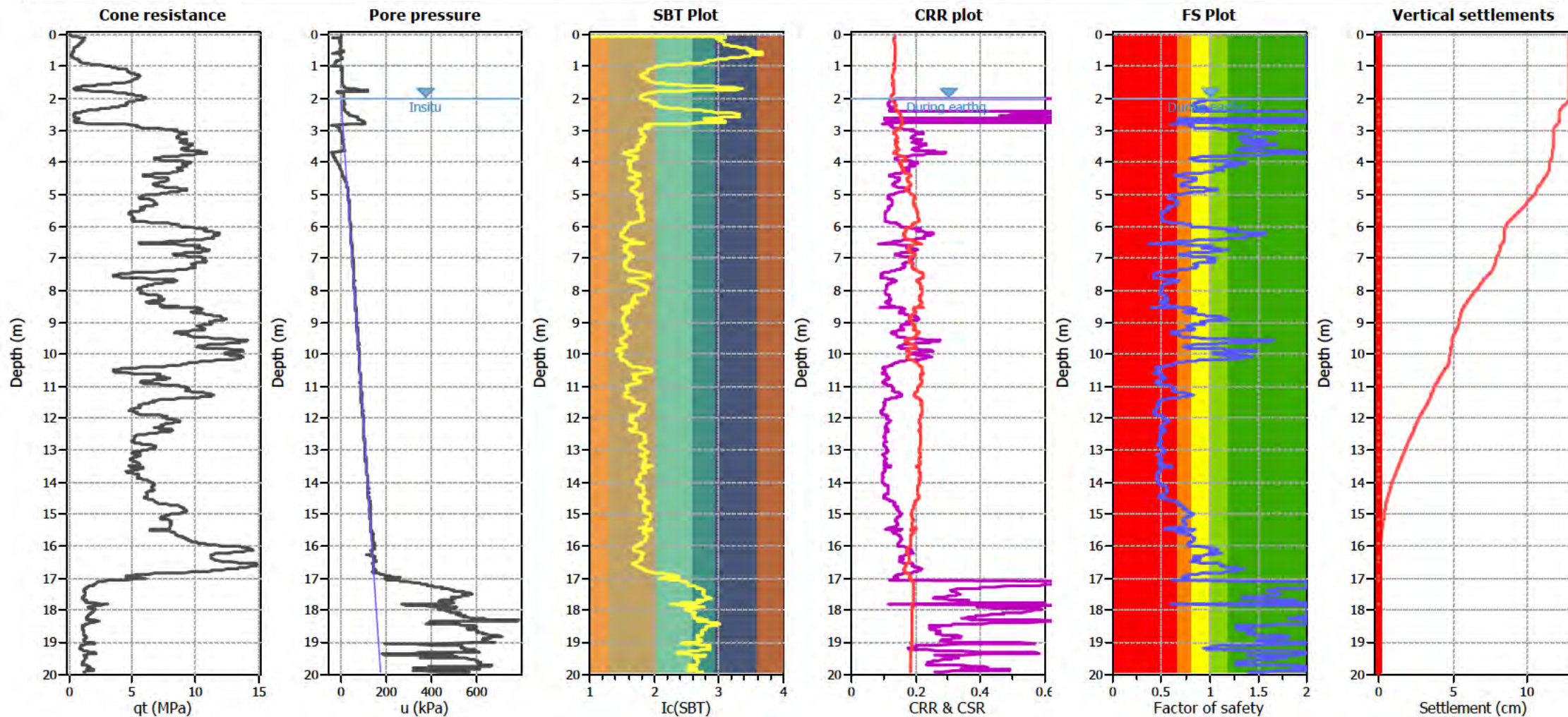


**Project:**

**Location:**

**CPT: CPT\_87661**

Total depth: 19.93 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.25

G.W.T. (in-situ): 2.00 m  
G.W.T. (earthq.): 2.00 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_\sigma$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

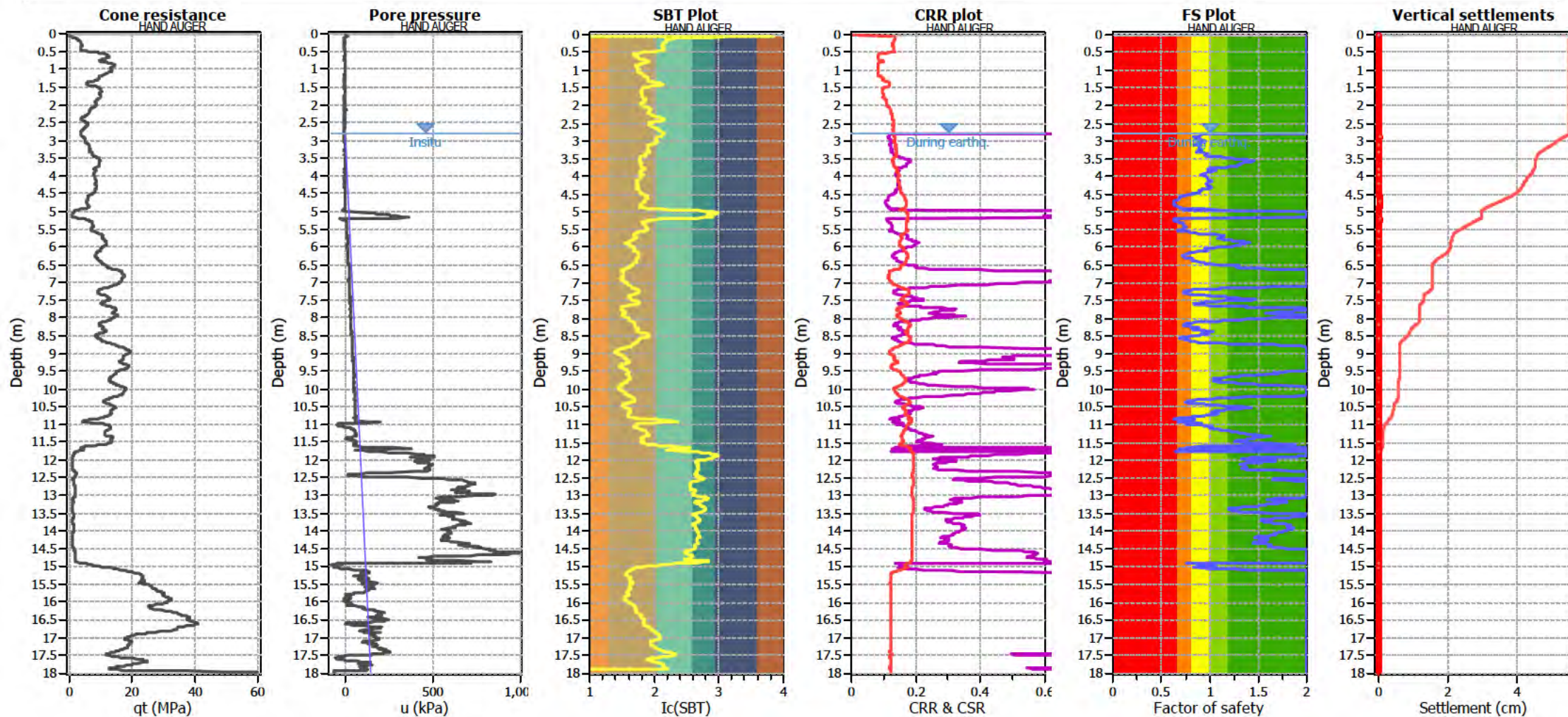


**Project:**

**Location:**

**CPT: CPT\_181275**

Total depth: 17.97 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.25

G.W.T. (in-situ): 2.80 m  
G.W.T. (earthq.): 2.80 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_\sigma$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

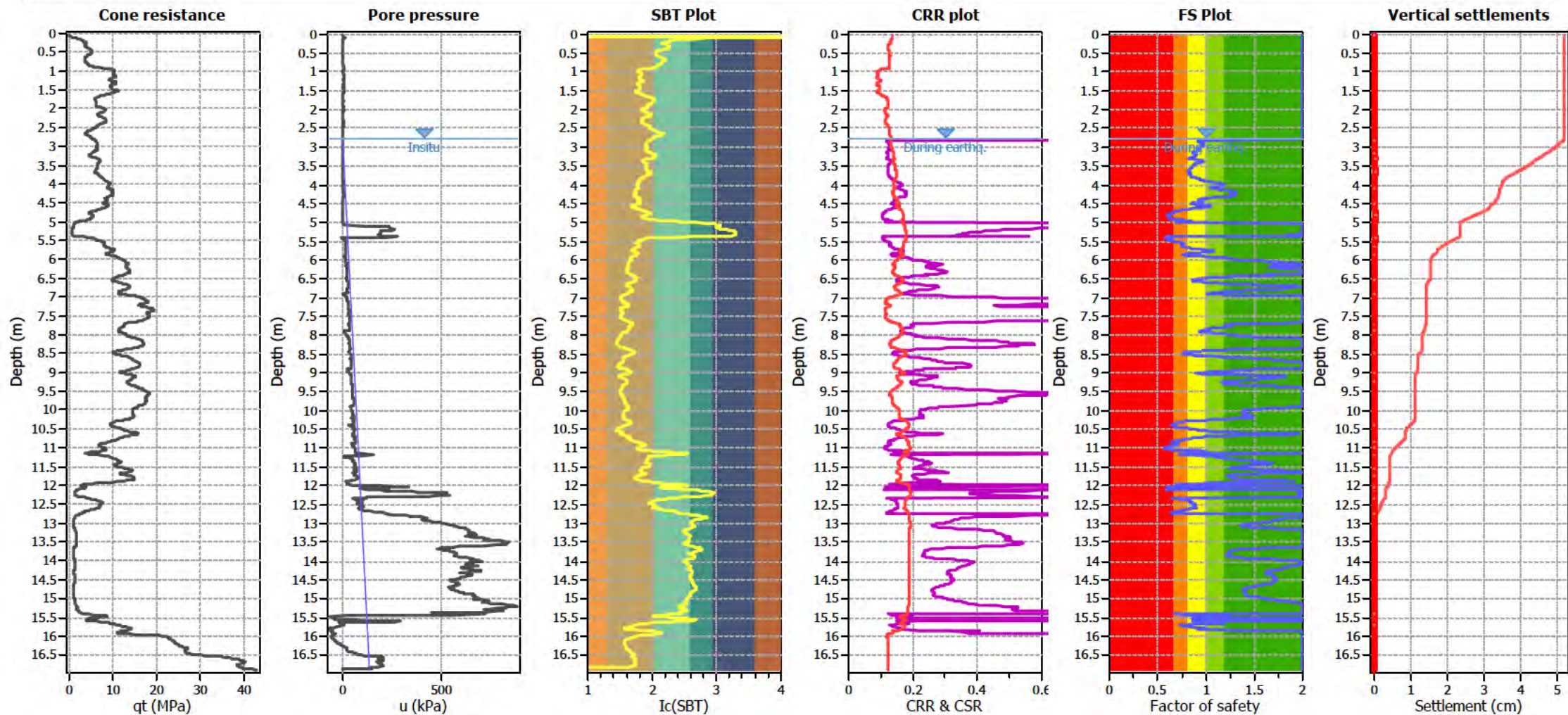


**Project:**

**Location:**

**CPT: CPT\_181276**

Total depth: 16.90 m



|                              |                   |                           |              |                         |     |                             |              |
|------------------------------|-------------------|---------------------------|--------------|-------------------------|-----|-----------------------------|--------------|
| Analysis method:             | B&I (2014)        | G.W.T. (in-situ):         | 2.80 m       | Use fill:               | No  | Clay like behavior applied: |              |
| Fines correction method:     | B&I (2014)        | G.W.T. (earthq.):         | 2.80 m       | Fill height:            | N/A | Limit depth applied:        | No           |
| Points to test:              | Based on Ic value | Average results interval: | 3            | Fill weight:            | N/A | Limit depth:                | N/A          |
| Earthquake magnitude $M_w$ : | 5.90              | Ic cut-off value:         | 2.60         | Trans. detect. applied: | No  | MSF method:                 | Method based |
| Peak ground acceleration:    | 0.25              | Unit weight calculation:  | Based on SBT | $K_0$ applied:          | Yes |                             |              |

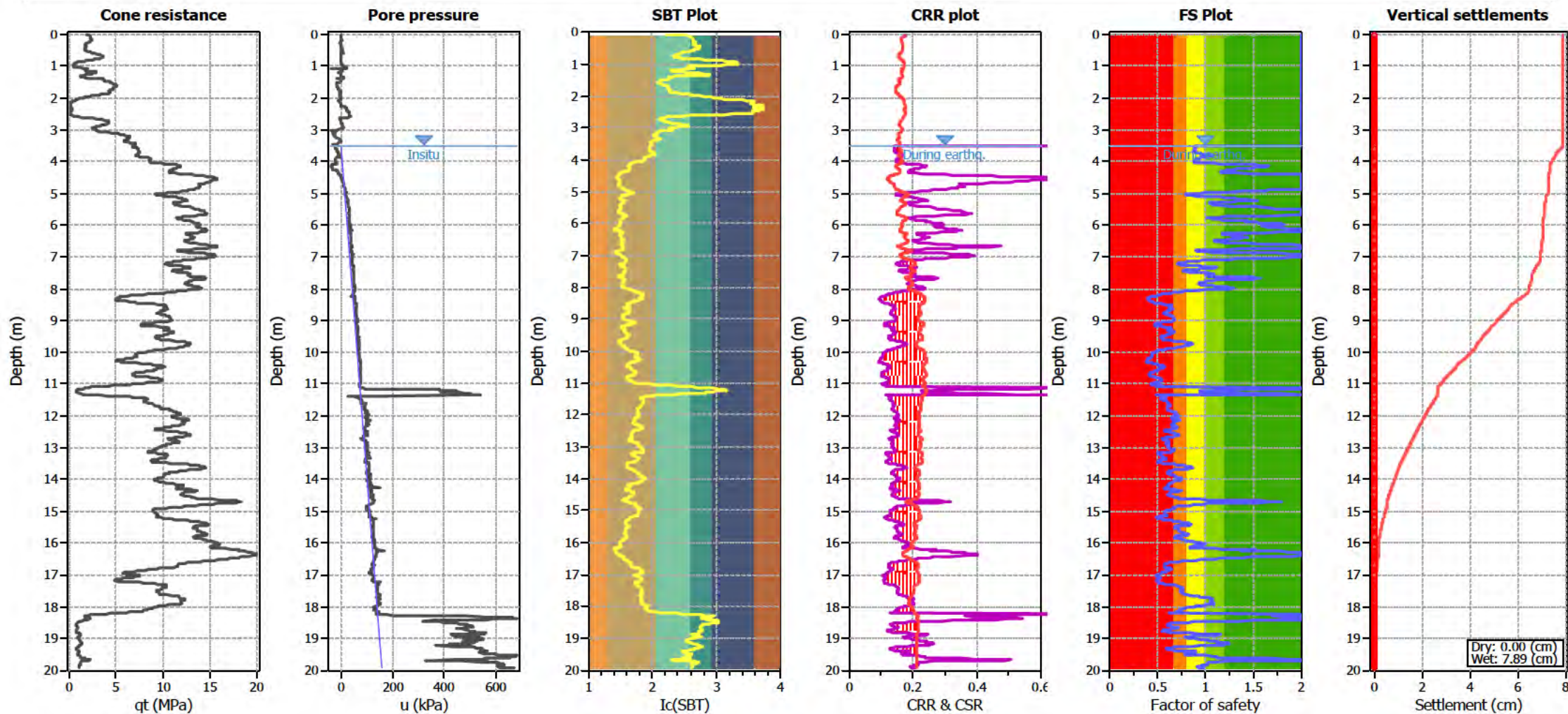


Project:

Location:

**CPT: CPT-01**

Total depth: 19.92 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on  $I_c$  value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.32

G.W.T. (in-situ): 3.50 m  
G.W.T. (earthq.): 3.50 m  
Average results interval: 3  
 $I_c$  cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_\sigma$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

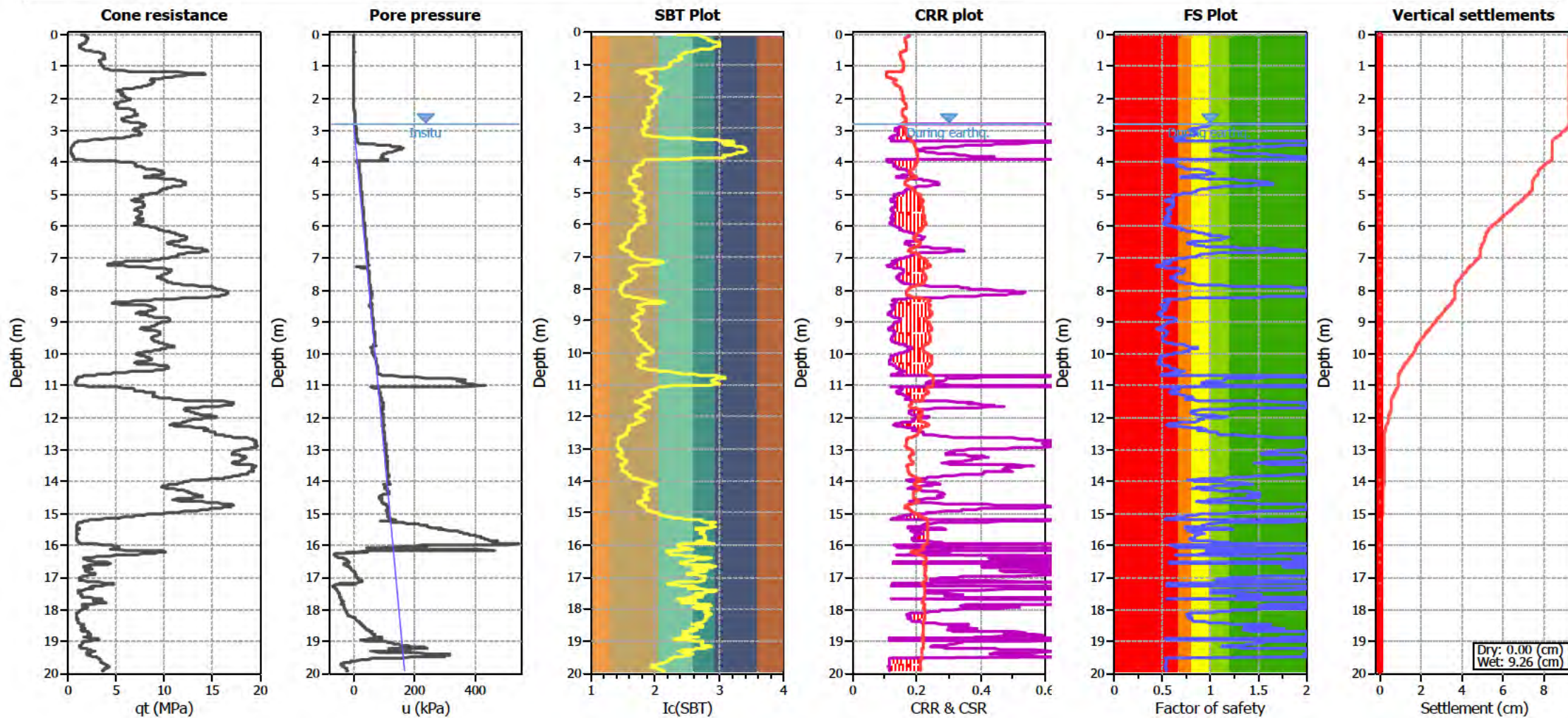


Project:

Location:

**CPT: CPT-02**

Total depth: 19.92 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.32

G.W.T. (in-situ): 2.80 m  
G.W.T. (earthq.): 2.80 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_0$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

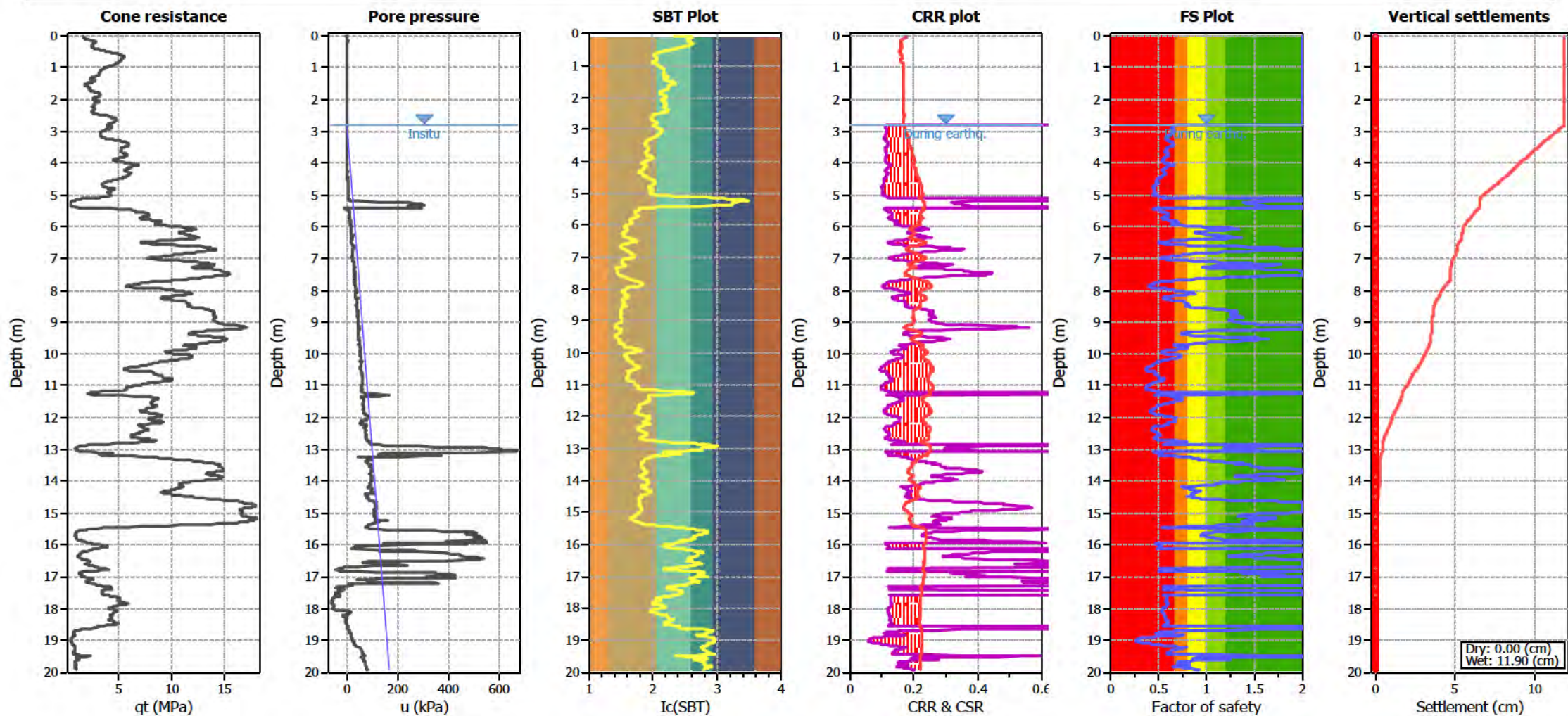


Project:

Location:

**CPT: CPT-03**

Total depth: 19.92 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on  $I_c$  value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.32

G.W.T. (in-situ): 2.80 m  
G.W.T. (earthq.): 2.80 m  
Average results interval: 3  
 $I_c$  cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_0$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

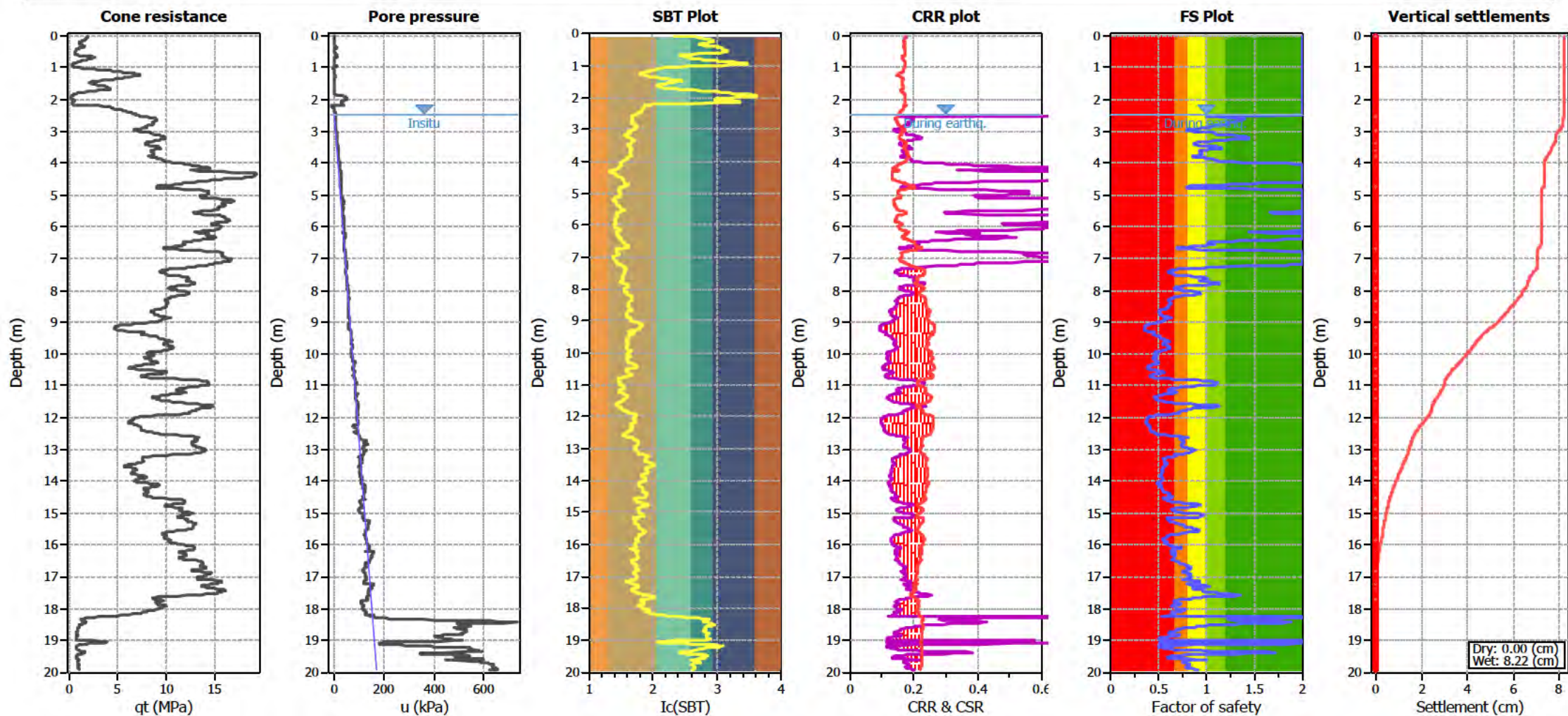


**Project:**

**Location:**

**CPT: CPT-04**

Total depth: 19.92 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.32

G.W.T. (in-situ): 2.50 m  
G.W.T. (earthq.): 2.50 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_0$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

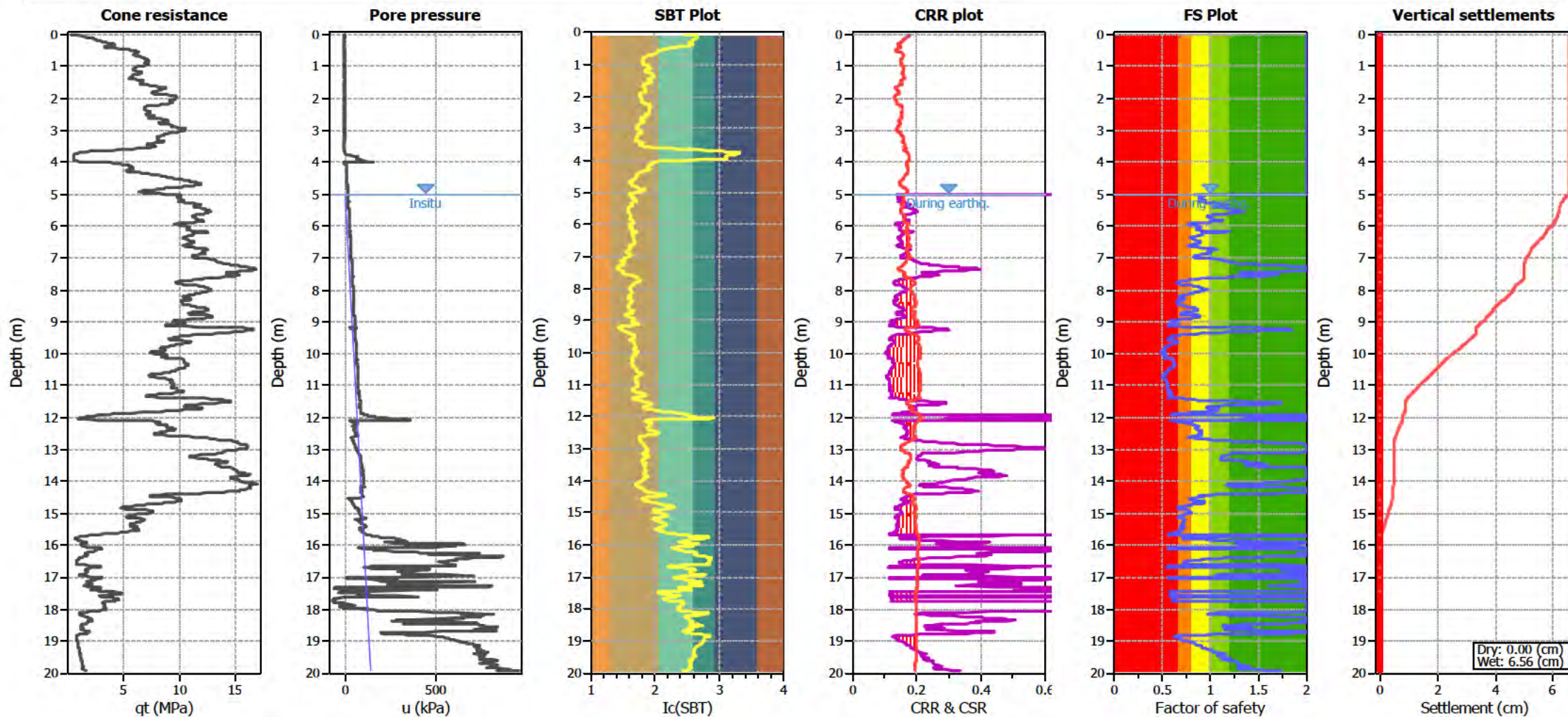


**Project:**

**Location:**

**CPT: CPT-05**

Total depth: 19.92 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.32

G.W.T. (in-situ): 5.00 m  
G.W.T. (earthq.): 5.00 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_0$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

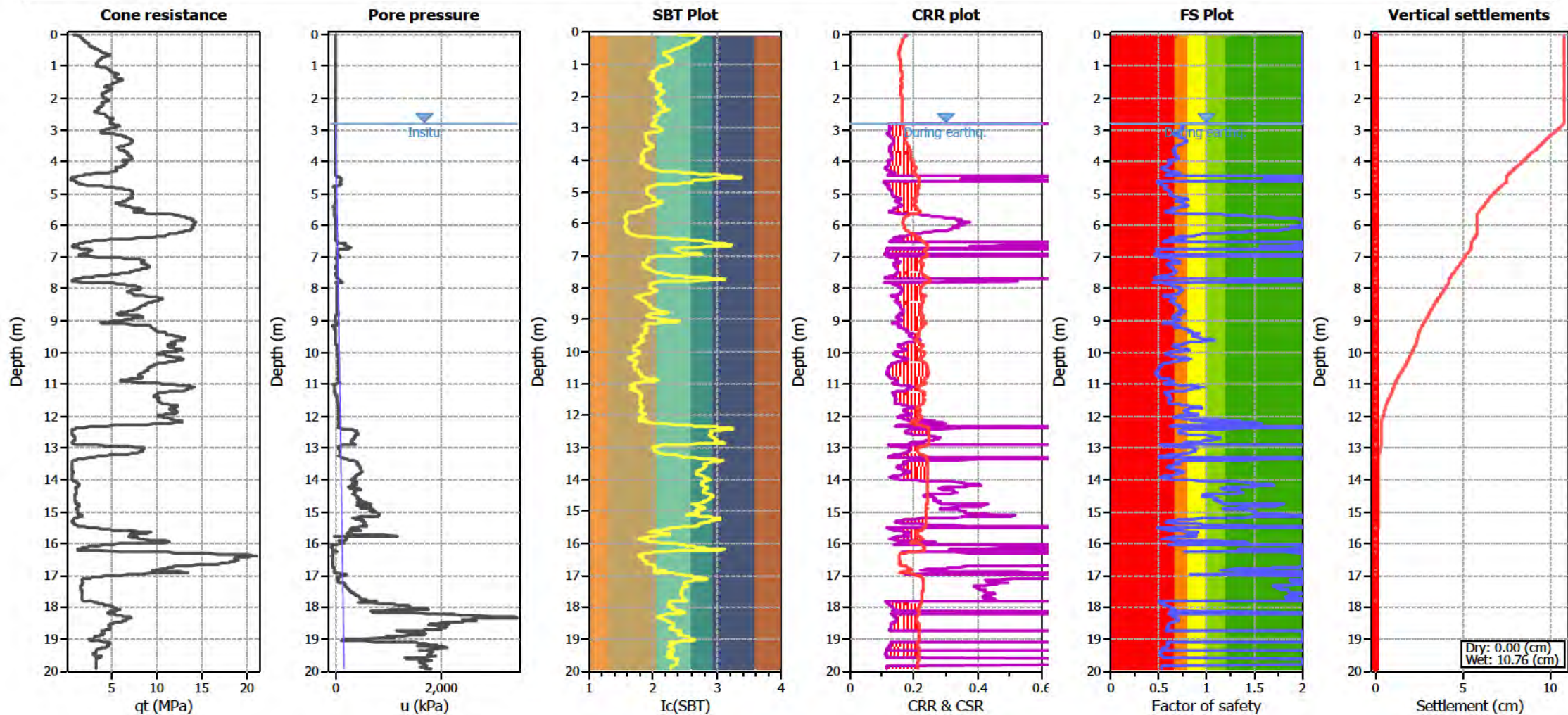


Project:

Location:

**CPT: CPT-06**

Total depth: 19.93 m



|                              |                   |                           |              |                         |     |                      |              |
|------------------------------|-------------------|---------------------------|--------------|-------------------------|-----|----------------------|--------------|
| Analysis method:             | B&I (2014)        | G.W.T. (in-situ):         | 2.80 m       | Use fill:               | No  | Clay like behavior   |              |
| Fines correction method:     | B&I (2014)        | G.W.T. (earthq.):         | 2.80 m       | Fill height:            | N/A | applied:             | .            |
| Points to test:              | Based on Ic value | Average results interval: | 3            | Fill weight:            | N/A | Limit depth applied: | No           |
| Earthquake magnitude $M_w$ : | 5.90              | Ic cut-off value:         | 2.60         | Trans. detect. applied: | No  | Limit depth:         | N/A          |
| Peak ground acceleration:    | 0.32              | Unit weight calculation:  | Based on SBT | $K_0$ applied:          | Yes | MSF method:          | Method based |

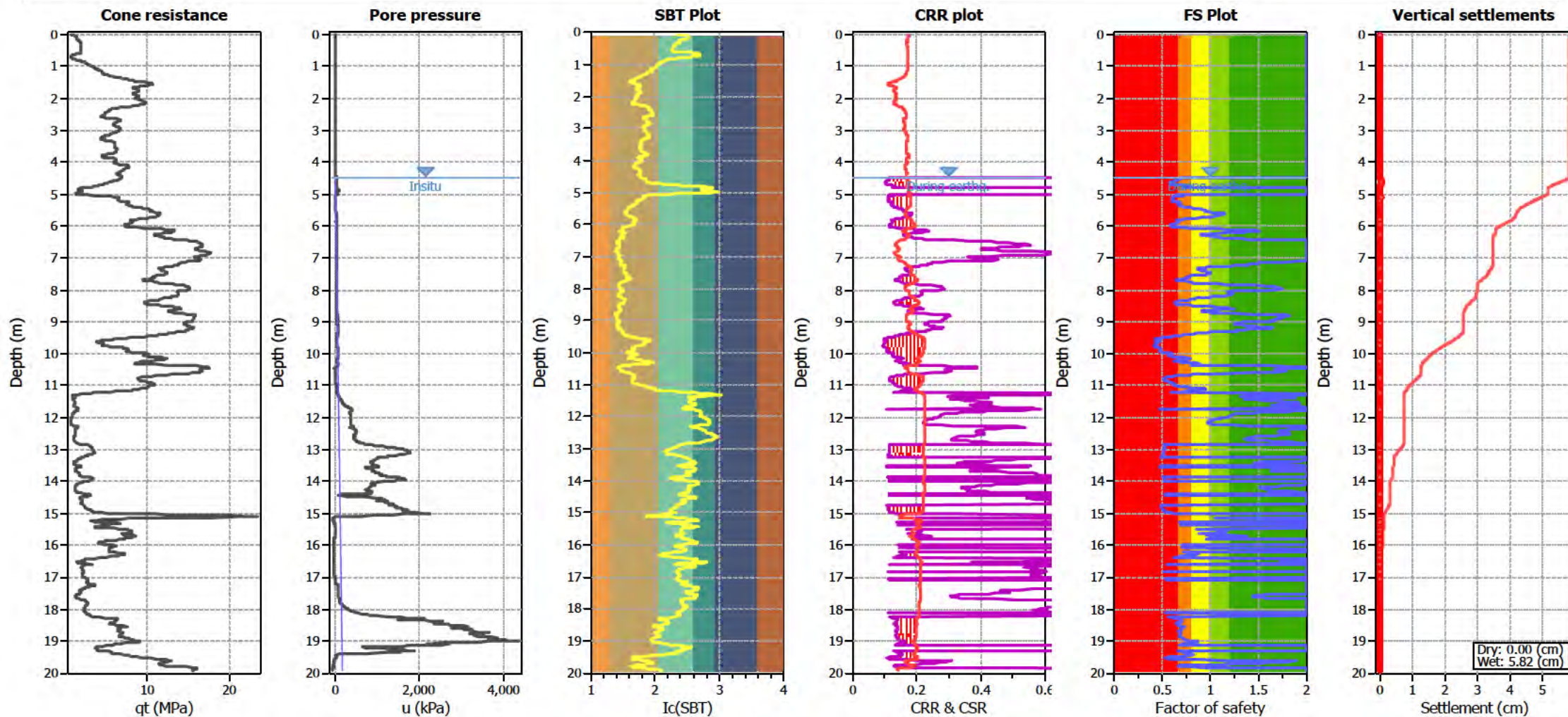


Project:

Location:

**CPT: CPT-07**

Total depth: 19.92 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.32

G.W.T. (in-situ): 4.50 m  
G.W.T. (earthq.): 4.50 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_0$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

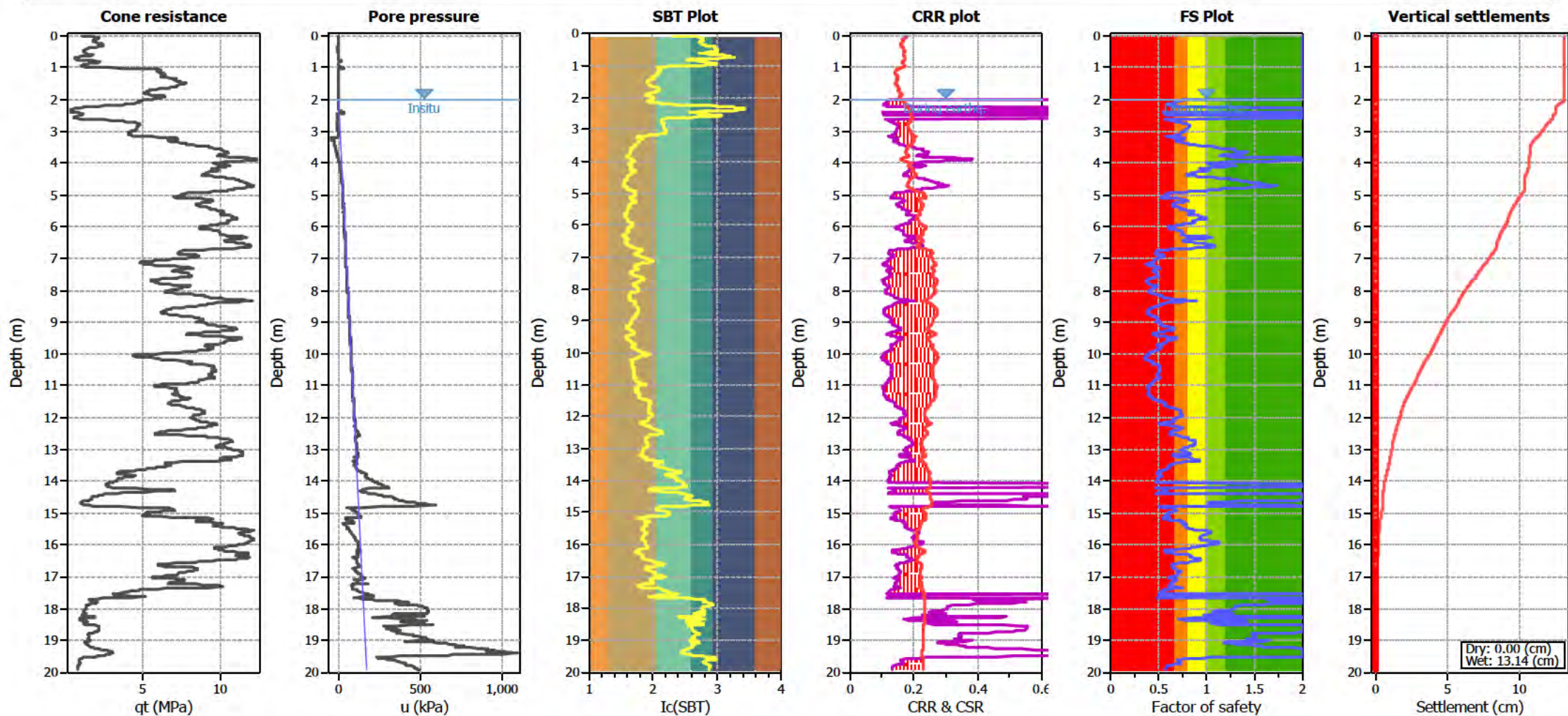


Project:

Location:

**CPT: CPT-08**

Total depth: 19.92 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.32

G.W.T. (in-situ): 2.00 m  
G.W.T. (earthq.): 2.00 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_0$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

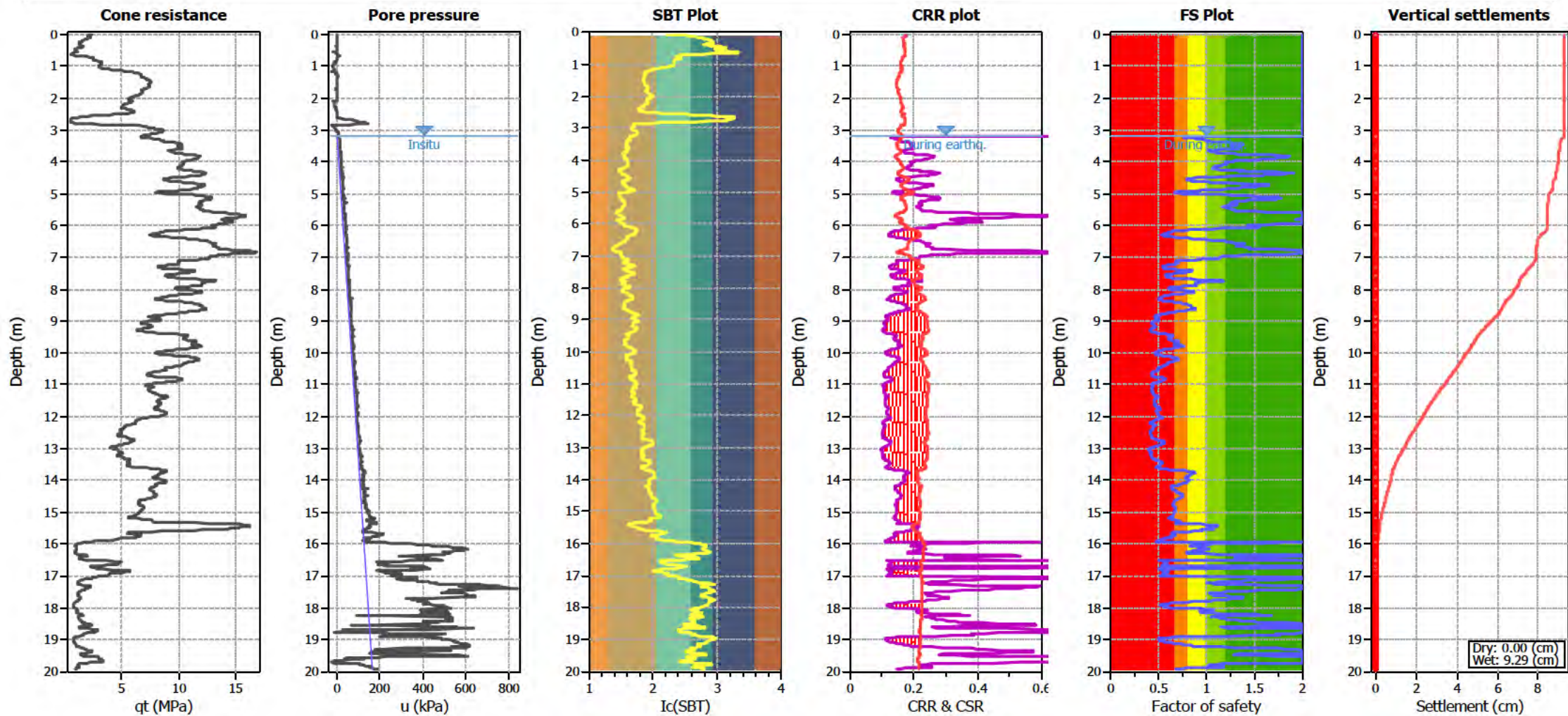


Project:

Location:

**CPT: CPT-09**

Total depth: 19.92 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on  $I_c$  value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.32

G.W.T. (in-situ): 3.20 m  
G.W.T. (earthq.): 3.20 m  
Average results interval: 3  
 $I_c$  cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_\sigma$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

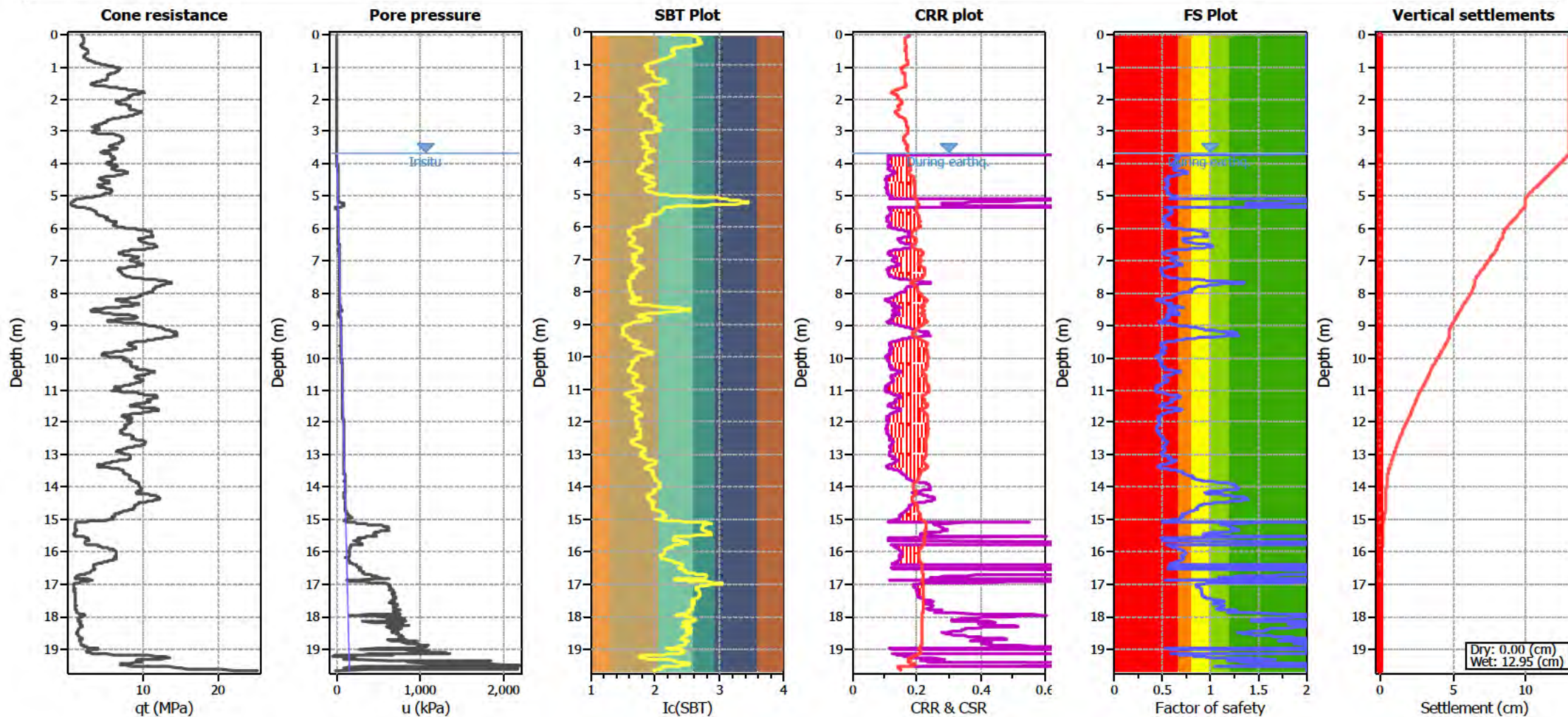


Project:

Location:

**CPT: CPT-10**

Total depth: 19.67 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.32

G.W.T. (in-situ): 3.70 m  
G.W.T. (earthq.): 3.70 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_0$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

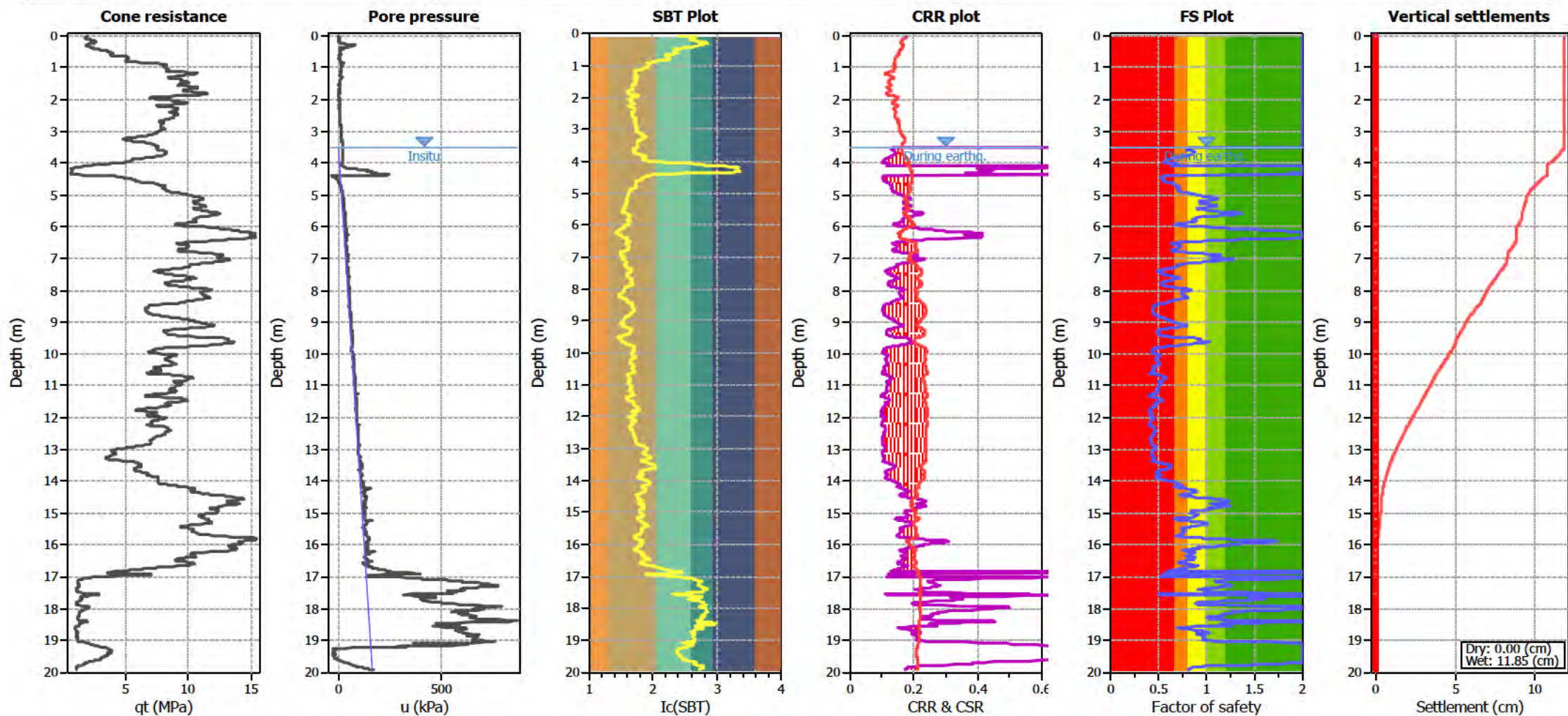


**Project:**

**Location:**

**CPT: CPT-11**

Total depth: 19.92 m



|                              |                   |                           |              |                         |     |                      |              |
|------------------------------|-------------------|---------------------------|--------------|-------------------------|-----|----------------------|--------------|
| Analysis method:             | B&I (2014)        | G.W.T. (in-situ):         | 3.50 m       | Use fill:               | No  | Clay like behavior   |              |
| Fines correction method:     | B&I (2014)        | G.W.T. (earthq.):         | 3.50 m       | Fill height:            | N/A | applied:             | .            |
| Points to test:              | Based on Ic value | Average results interval: | 3            | Fill weight:            | N/A | Limit depth applied: | No           |
| Earthquake magnitude $M_w$ : | 5.90              | Ic cut-off value:         | 2.60         | Trans. detect. applied: | No  | Limit depth:         | N/A          |
| Peak ground acceleration:    | 0.32              | Unit weight calculation:  | Based on SBT | $K_0$ applied:          | Yes | MSF method:          | Method based |

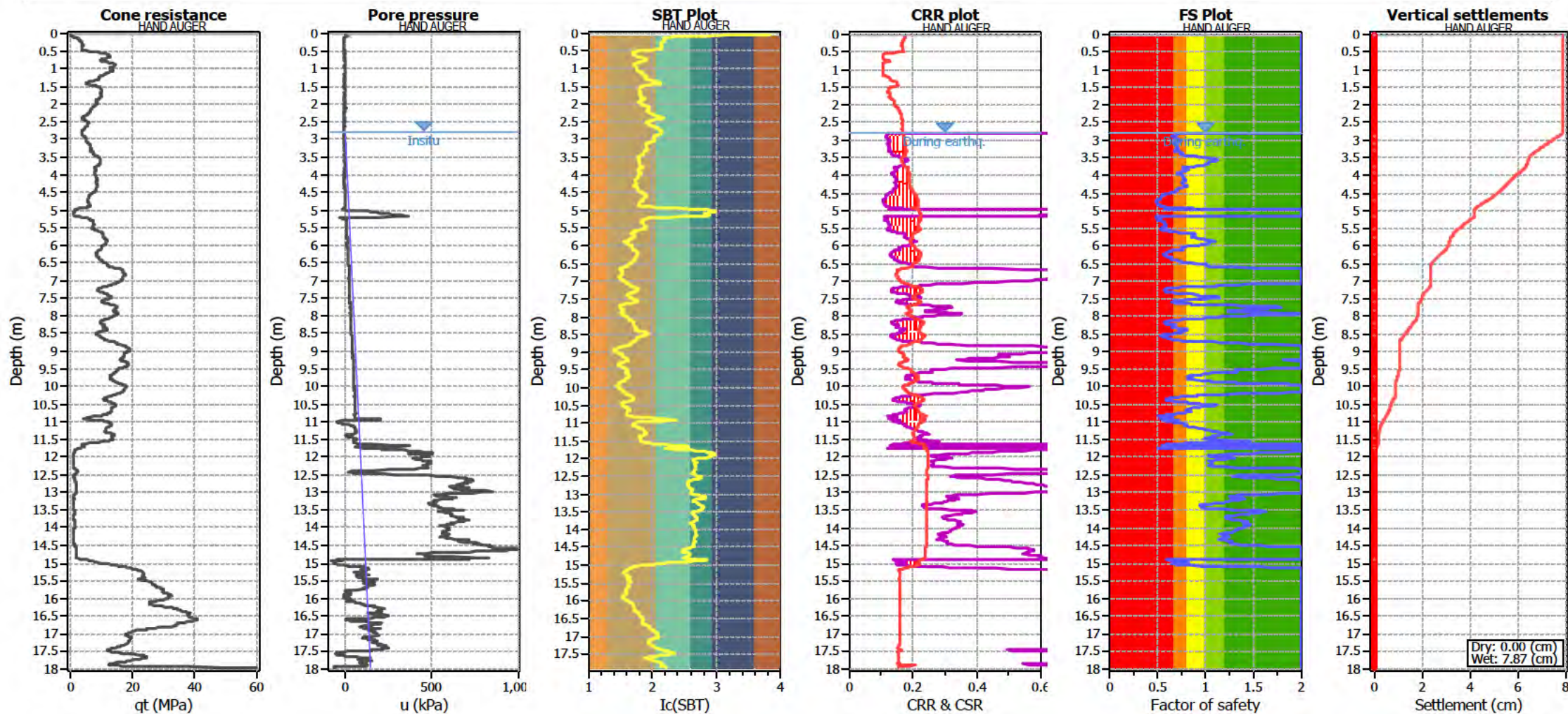


**Project:**

**Location:**

**CPT: CPT\_181275**

Total depth: 17.97 m



|                              |                   |                           |              |                         |     |                      |              |
|------------------------------|-------------------|---------------------------|--------------|-------------------------|-----|----------------------|--------------|
| Analysis method:             | B&I (2014)        | G.W.T. (in-situ):         | 2.80 m       | Use fill:               | No  | Clay like behavior   |              |
| Fines correction method:     | B&I (2014)        | G.W.T. (earthq.):         | 2.80 m       | Fill height:            | N/A | applied:             | .            |
| Points to test:              | Based on Ic value | Average results interval: | 3            | Fill weight:            | N/A | Limit depth applied: | No           |
| Earthquake magnitude $M_w$ : | 5.90              | Ic cut-off value:         | 2.60         | Trans. detect. applied: | No  | Limit depth:         | N/A          |
| Peak ground acceleration:    | 0.32              | Unit weight calculation:  | Based on SBT | $K_0$ applied:          | Yes | MSF method:          | Method based |

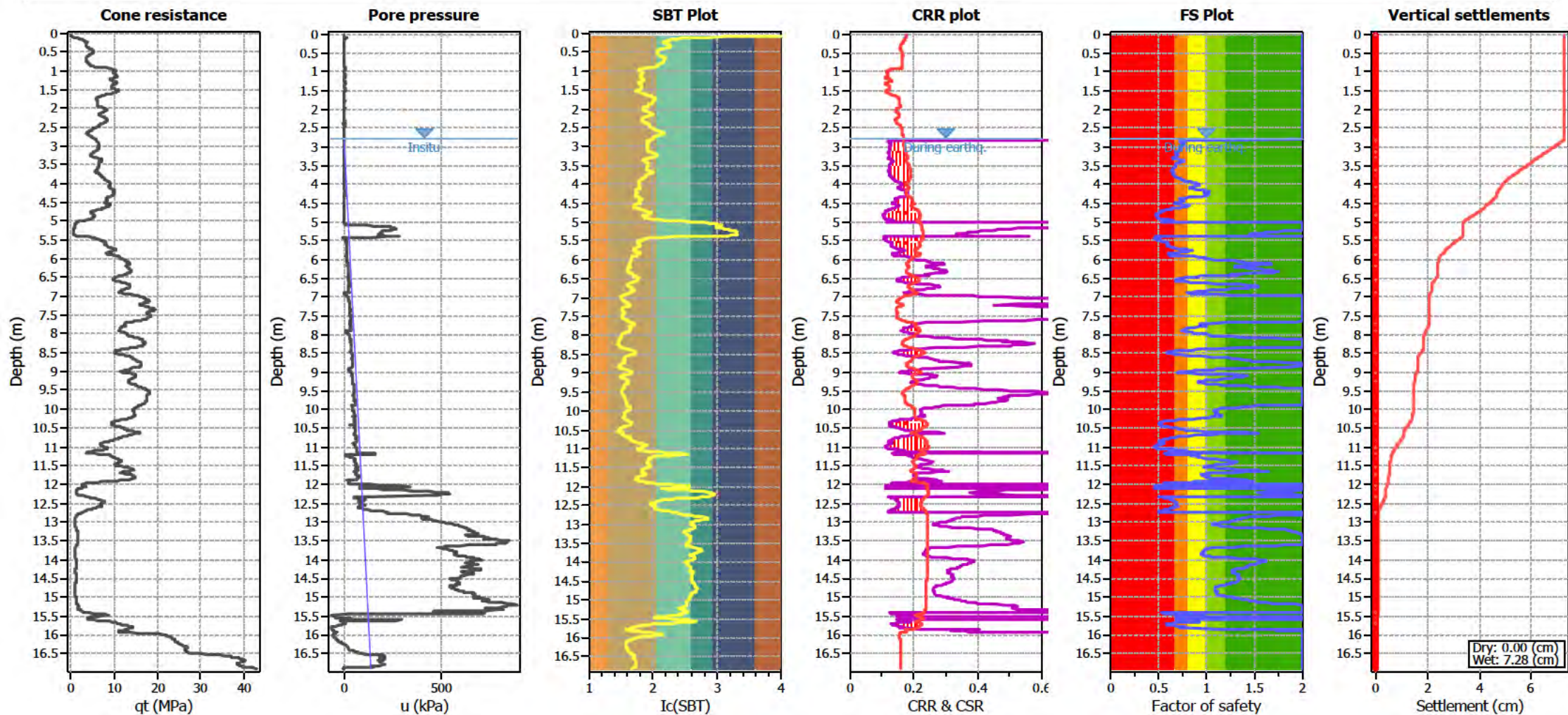


Project:

Location:

CPT: CPT\_181276

Total depth: 16.90 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.32

G.W.T. (in-situ): 2.80 m  
G.W.T. (earthq.): 2.80 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_0$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

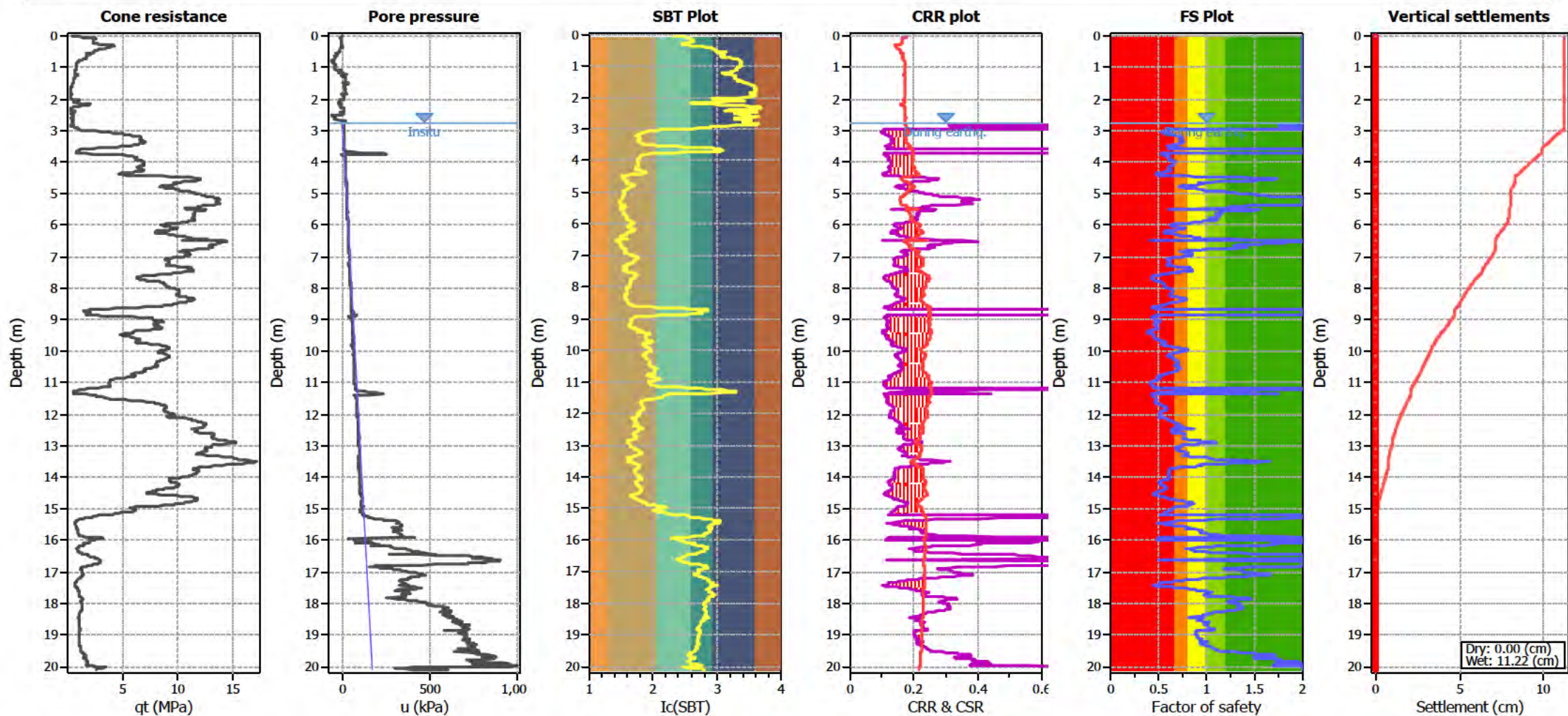


Project:

Location:

CPT: CPT\_87648

Total depth: 20.10 m



|                              |                   |                           |              |                         |     |                      |              |
|------------------------------|-------------------|---------------------------|--------------|-------------------------|-----|----------------------|--------------|
| Analysis method:             | B&I (2014)        | G.W.T. (in-situ):         | 2.80 m       | Use fill:               | No  | Clay like behavior   |              |
| Fines correction method:     | B&I (2014)        | G.W.T. (earthq.):         | 2.80 m       | Fill height:            | N/A | applied:             | .            |
| Points to test:              | Based on Ic value | Average results interval: | 3            | Fill weight:            | N/A | Limit depth applied: | No           |
| Earthquake magnitude $M_w$ : | 5.90              | Ic cut-off value:         | 2.60         | Trans. detect. applied: | No  | Limit depth:         | N/A          |
| Peak ground acceleration:    | 0.32              | Unit weight calculation:  | Based on SBT | $K_0$ applied:          | Yes | MSF method:          | Method based |

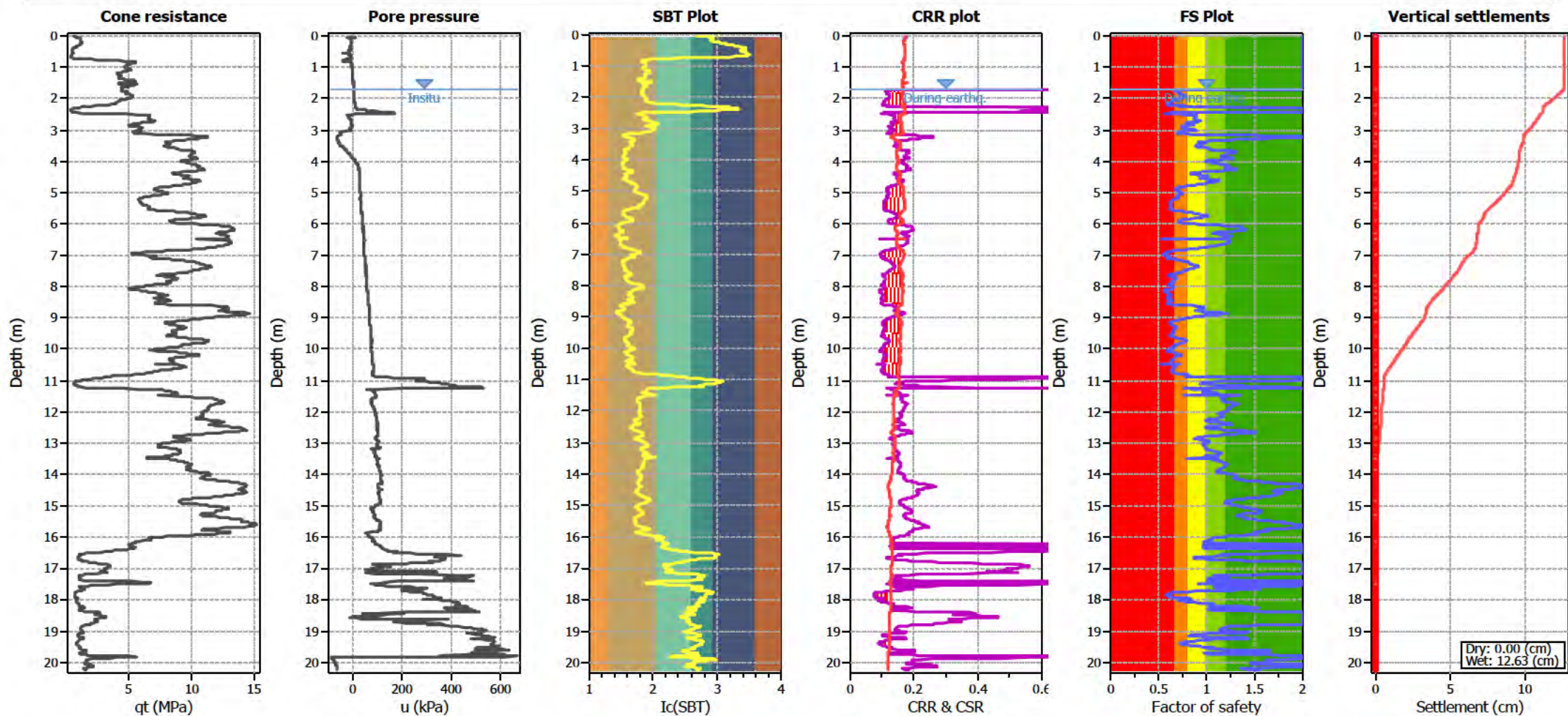


Project:

Location:

**CPT: CPT\_87654**

Total depth: 20.23 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.32

G.W.T. (in-situ): 1.70 m  
G.W.T. (earthq.): 1.70 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_0$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

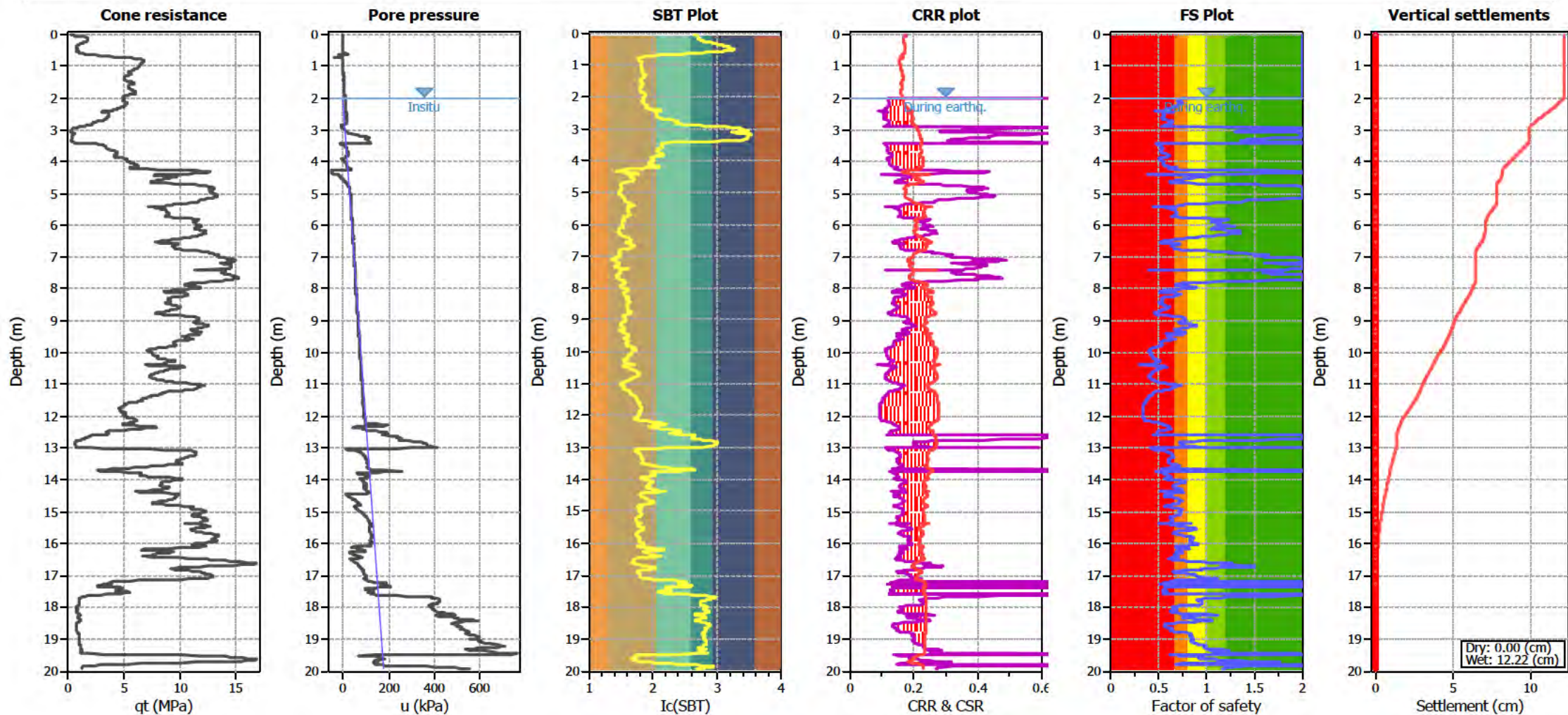


**Project:**

**Location:**

**CPT: CPT\_87660**

Total depth: 19.93 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.32

G.W.T. (in-situ): 2.00 m  
G.W.T. (earthq.): 2.00 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_0$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

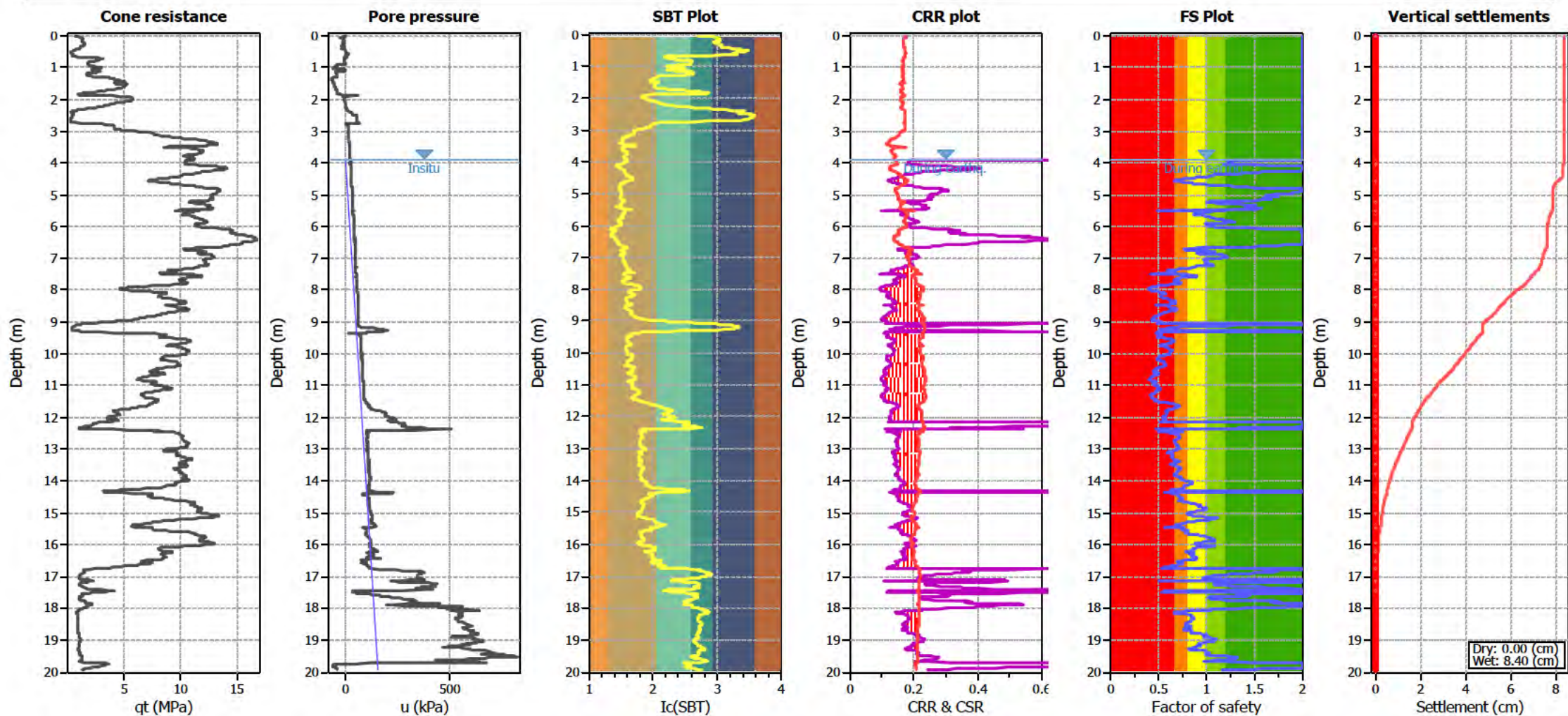


**Project:**

**Location:**

**CPT: CPT\_87655**

Total depth: 19.93 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.32

G.W.T. (in-situ): 3.90 m  
G.W.T. (earthq.): 3.90 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_0$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

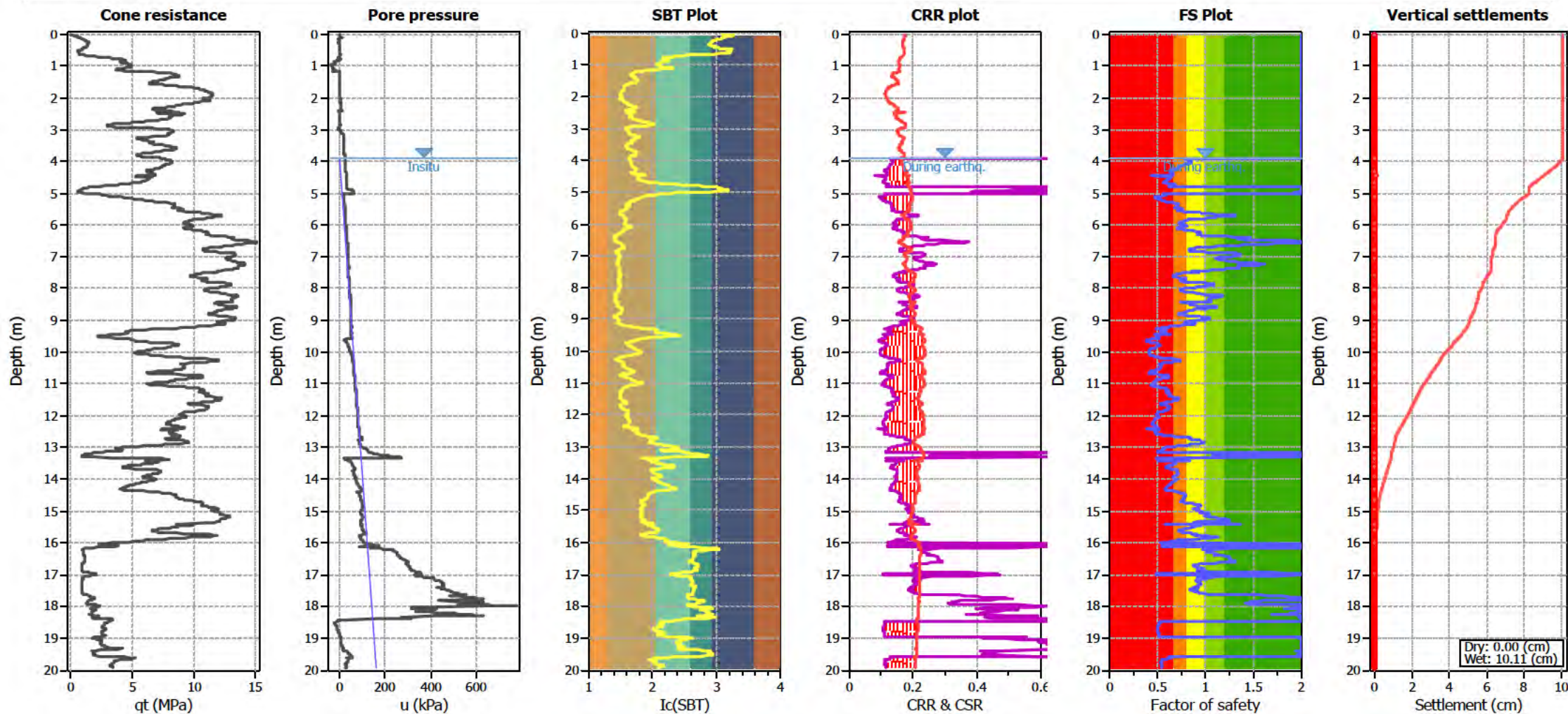


Project:

Location:

CPT: CPT\_87650

Total depth: 19.93 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.32

G.W.T. (in-situ): 3.90 m  
G.W.T. (earthq.): 3.90 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_0$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

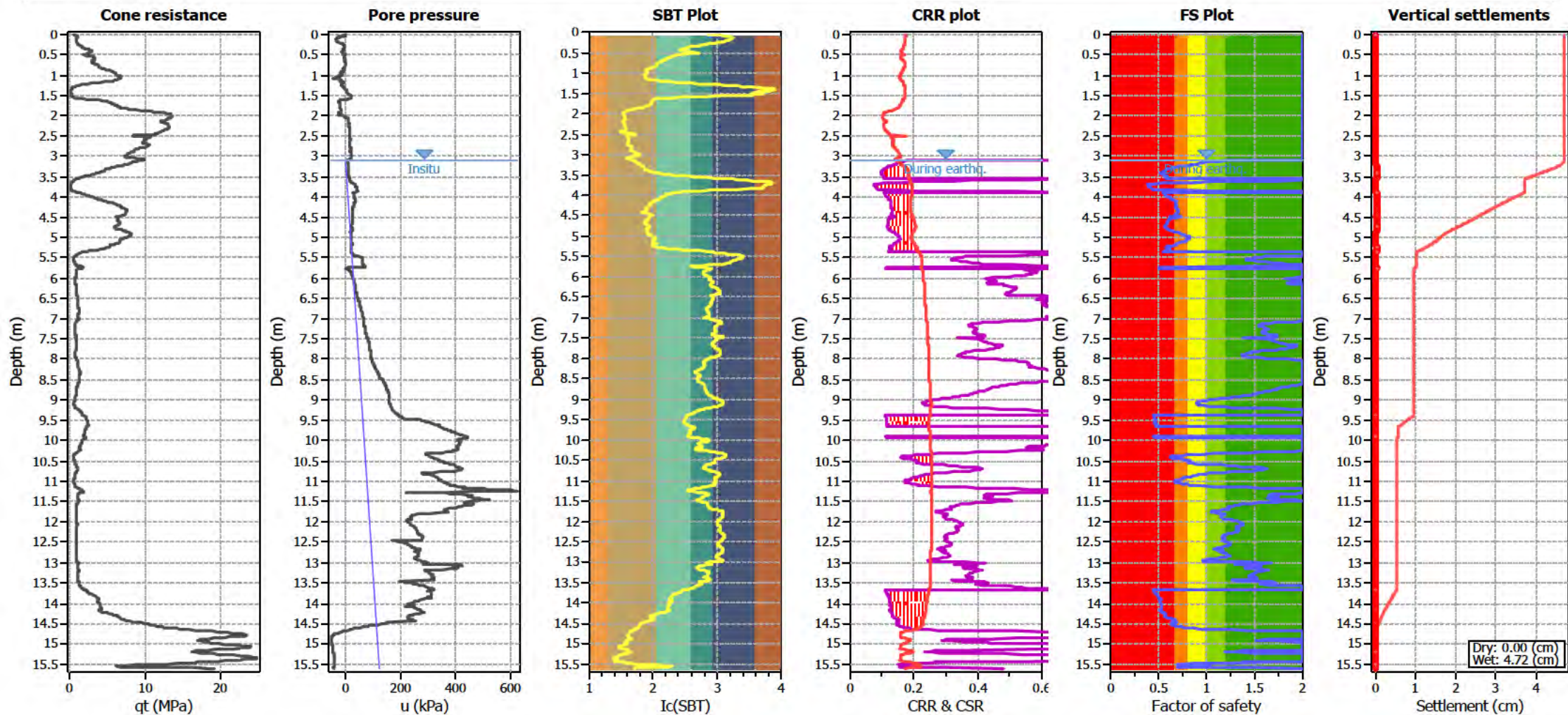


Project:

Location:

CPT: CPT\_87646

Total depth: 15.61 m



|                              |                   |                           |              |
|------------------------------|-------------------|---------------------------|--------------|
| Analysis method:             | B&I (2014)        | G.W.T. (in-situ):         | 3.10 m       |
| Fines correction method:     | B&I (2014)        | G.W.T. (earthq.):         | 3.10 m       |
| Points to test:              | Based on Ic value | Average results interval: | 3            |
| Earthquake magnitude $M_w$ : | 5.90              | Ic cut-off value:         | 2.60         |
| Peak ground acceleration:    | 0.32              | Unit weight calculation:  | Based on SBT |

|                         |     |
|-------------------------|-----|
| Use fill:               | No  |
| Fill height:            | N/A |
| Fill weight:            | N/A |
| Trans. detect. applied: | No  |
| $K_0$ applied:          | Yes |

|                             |              |
|-----------------------------|--------------|
| Clay like behavior applied: | .            |
| Limit depth applied:        | No           |
| Limit depth:                | N/A          |
| MSF method:                 | Method based |

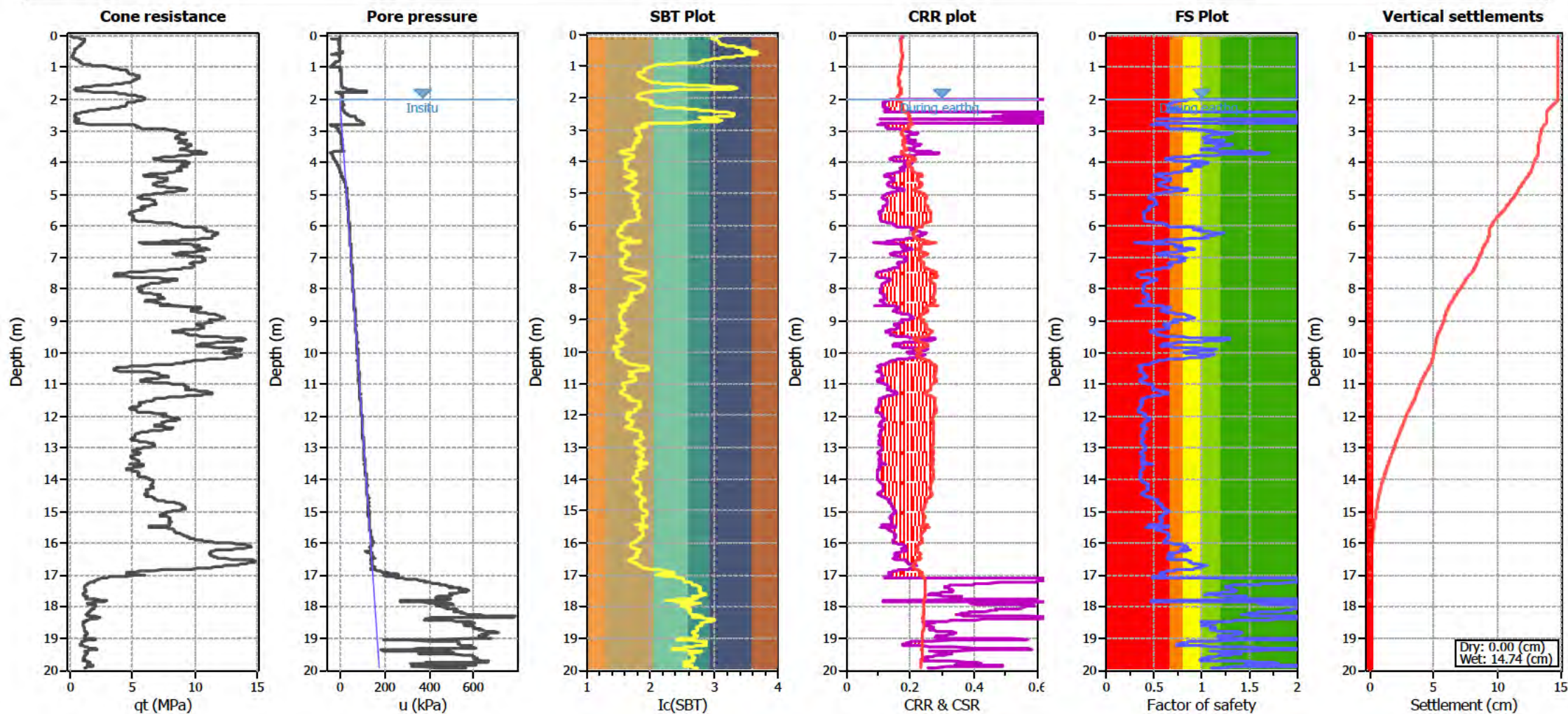


Project:

Location:

CPT: CPT\_87661

Total depth: 19.93 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.32

G.W.T. (in-situ): 2.00 m  
G.W.T. (earthq.): 2.00 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_0$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

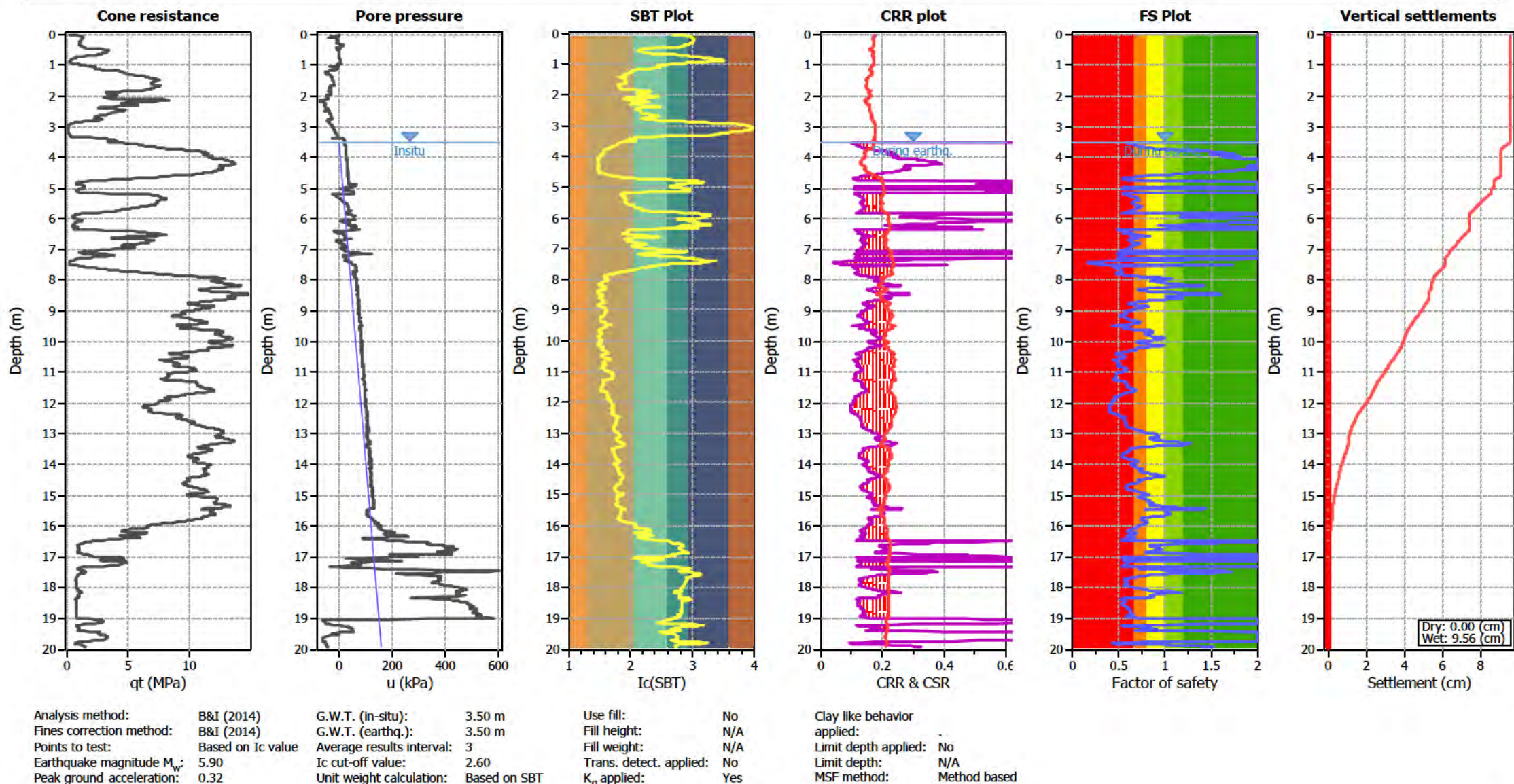


Project:

Location:

CPT: CPT\_87659

Total depth: 19.93 m



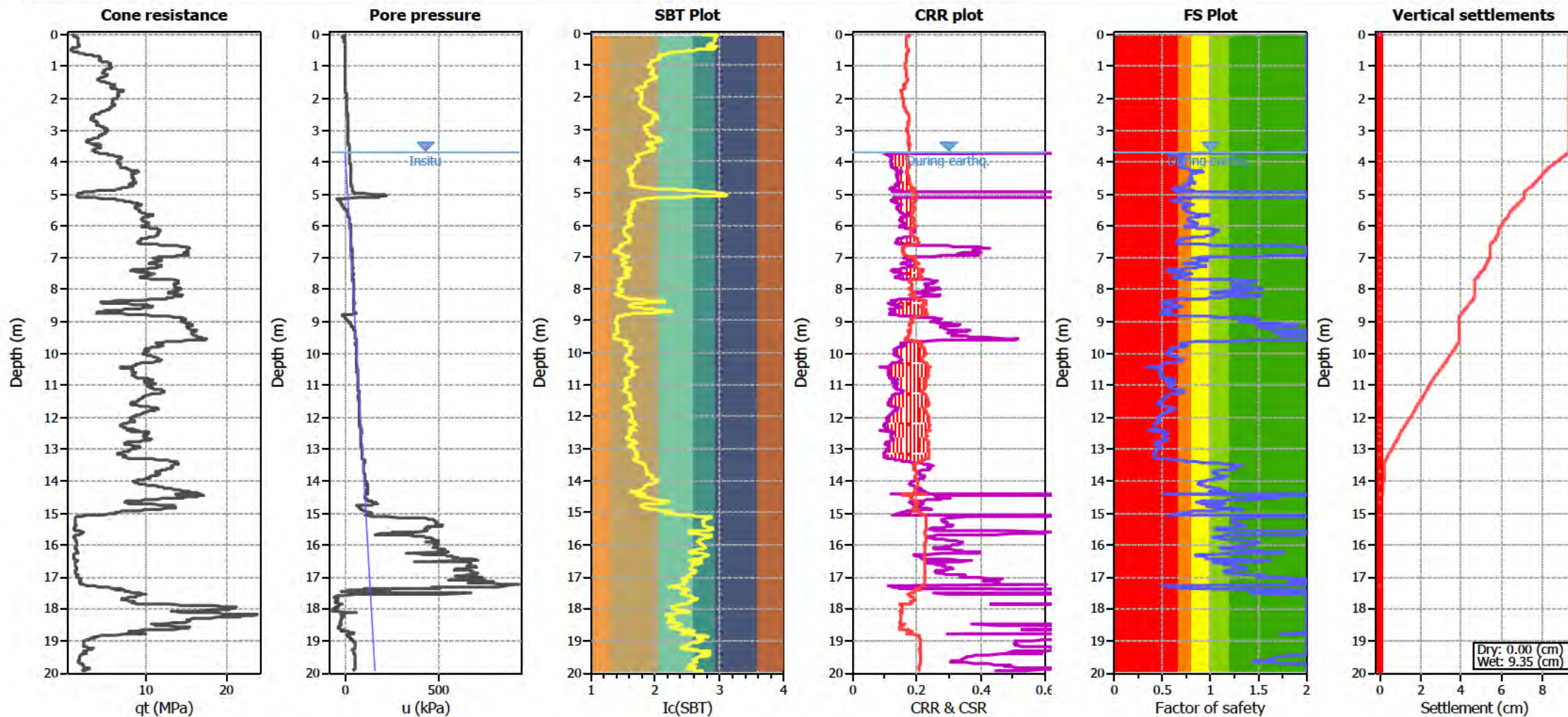


Project:

Location:

CPT: CPT\_87652

Total depth: 19.93 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on Ic value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.32

G.W.T. (in-situ): 3.70 m  
G.W.T. (earthq.): 3.70 m  
Average results interval: 3  
Ic cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_0$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

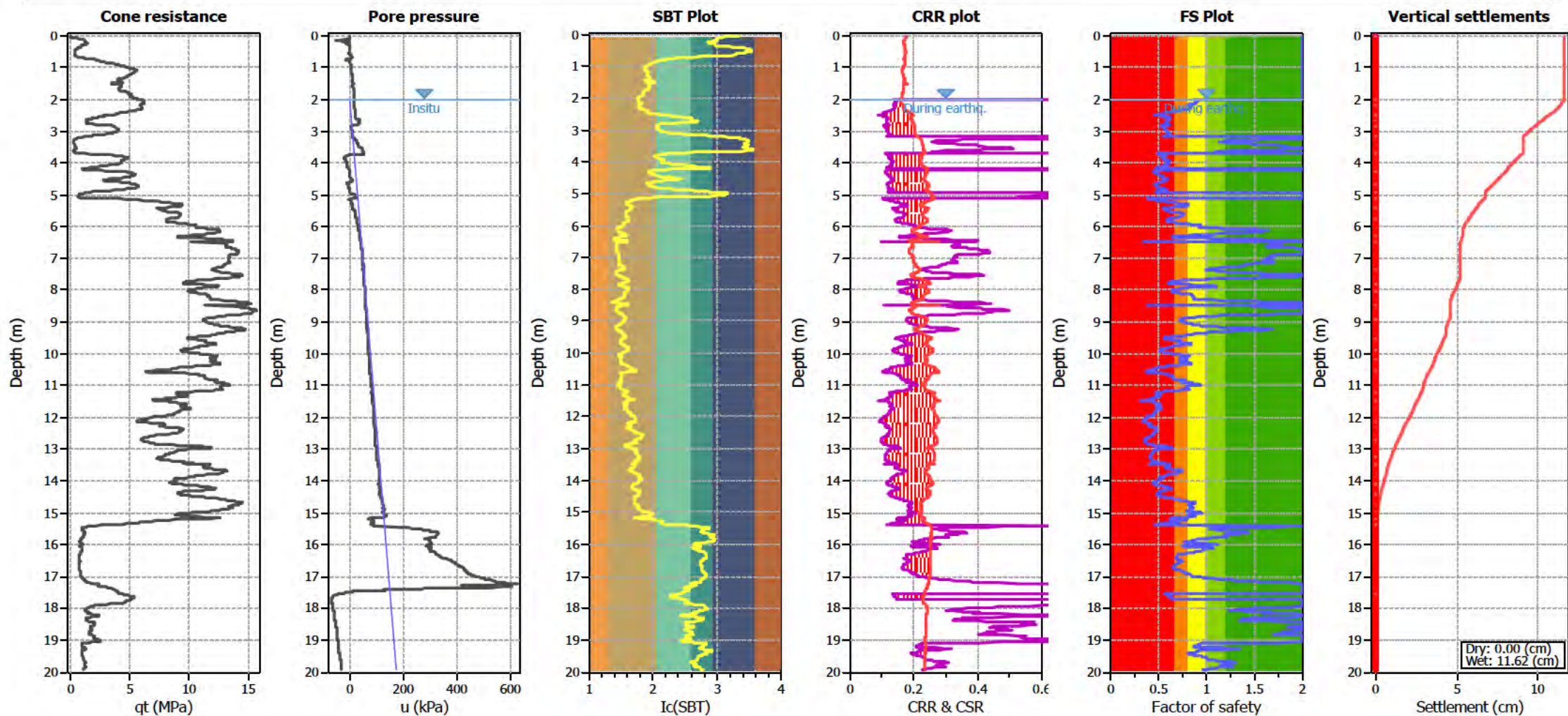


Project:

Location:

**CPT: CPT\_87663**

Total depth: 19.93 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on  $I_c$  value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.32

G.W.T. (in-situ): 2.00 m  
G.W.T. (earthq.): 2.00 m  
Average results interval: 3  
 $I_c$  cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_0$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based

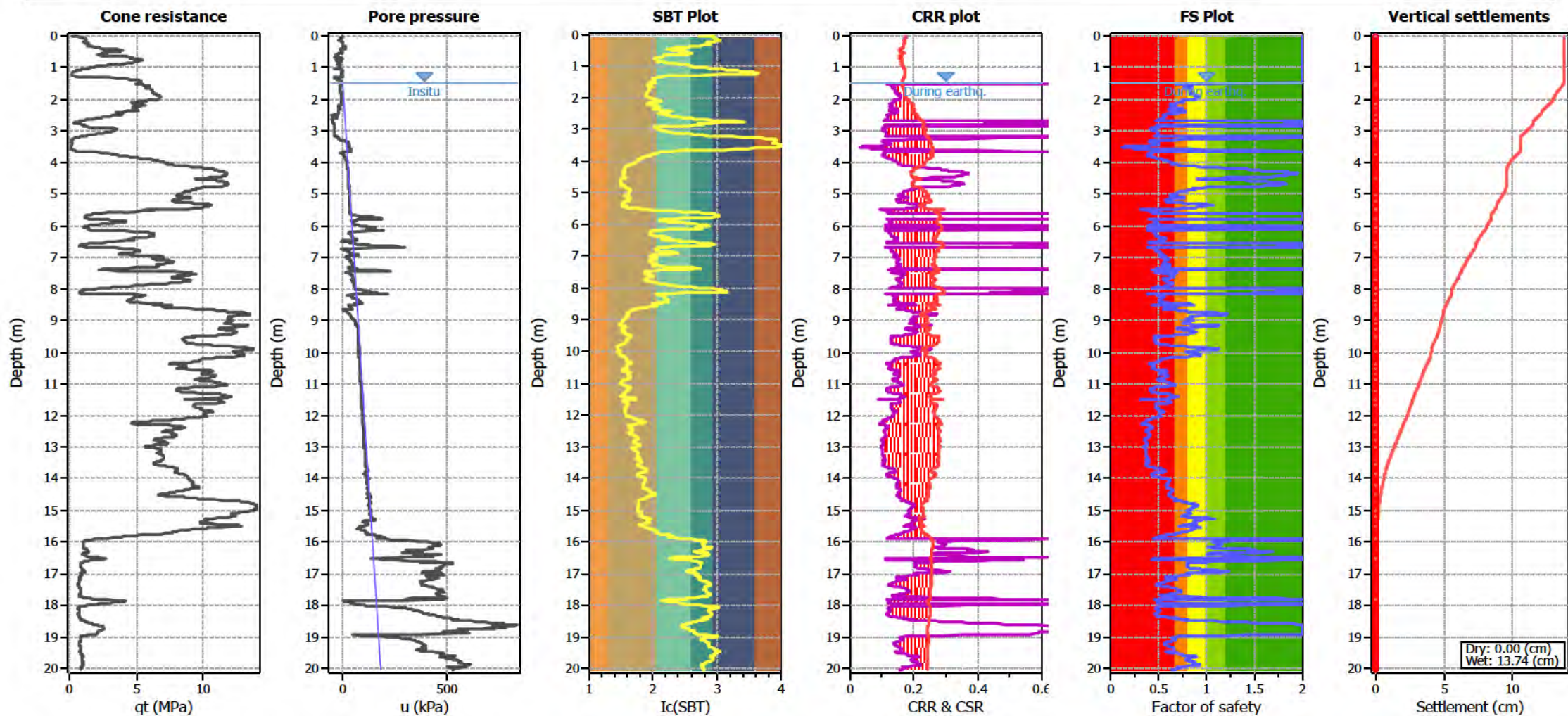


Project:

Location:

CPT: CPT\_87662

Total depth: 20.03 m



Analysis method: B&I (2014)  
Fines correction method: B&I (2014)  
Points to test: Based on  $I_c$  value  
Earthquake magnitude  $M_w$ : 5.90  
Peak ground acceleration: 0.32

G.W.T. (in-situ): 1.50 m  
G.W.T. (earthq.): 1.50 m  
Average results interval: 3  
 $I_c$  cut-off value: 2.60  
Unit weight calculation: Based on SBT

Use fill: No  
Fill height: N/A  
Fill weight: N/A  
Trans. detect. applied: No  
 $K_\sigma$  applied: Yes

Clay like behavior applied: .  
Limit depth applied: No  
Limit depth: N/A  
MSF method: Method based



## Appendix G: Lateral Stretch Summary

|                                                                                   |          |                                      |           |              |
|-----------------------------------------------------------------------------------|----------|--------------------------------------|-----------|--------------|
|  | CLIENT:  | Saxby Road JV Limited                | DESIGNER: | MM           |
|                                                                                   | PROJECT: | Southern Links - Stage 1 Residential | CHECKED:  | DMM          |
|                                                                                   |          |                                      | REVISION: | 7            |
|                                                                                   | TITLE:   | COSEISMIC DISPLACEMENTS - SECTION A  | DATE:     | 21/04/2026   |
|                                                                                   |          |                                      | PROJECT:  | HAM2025-0056 |

#### WHEN TO USE THIS SHEET:

Use this sheet when calculating the coseismic displacements of a block using liquefied strengths

#### 1. CALCULATE THE PERIOD OF THE SLIDING MASS ( $T_s$ )

|           |          |                                                                           |
|-----------|----------|---------------------------------------------------------------------------|
| 1D or 2D? | 1D       | Generally 1D, but see guidance tab for details                            |
| H         | 2.2 m    | Maximum height of the sliding mass, measured from within the sliding mass |
| $V_s$     | 180 m/s  | Average shear wave velocity of the sliding mass                           |
| $T_s$     | 0.0489 s |                                                                           |

#### 2. SEISMIC PARAMETERS

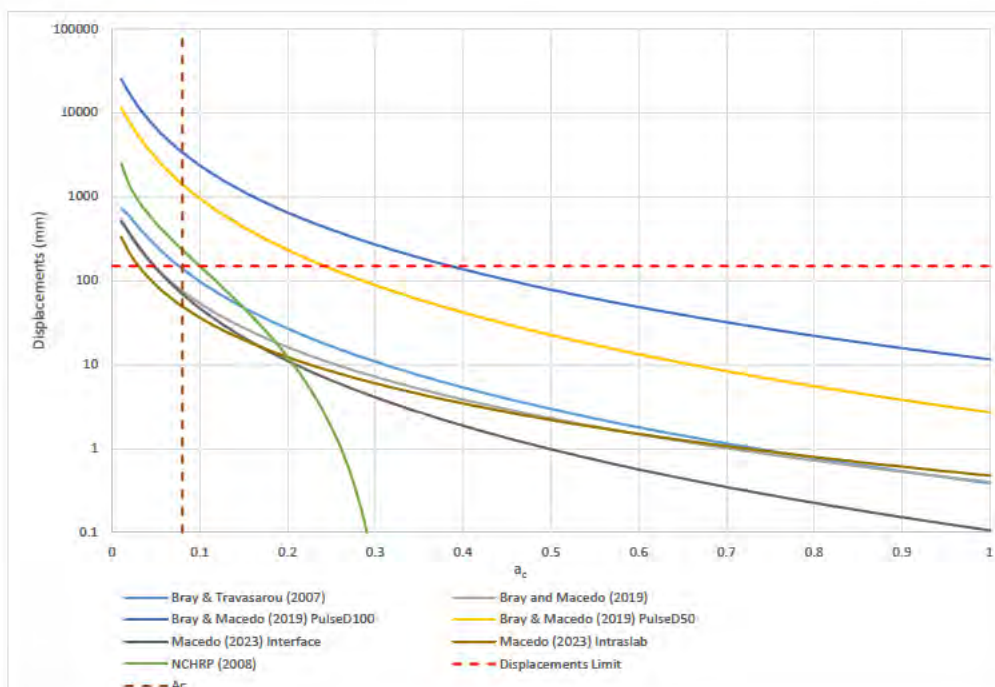
|                             |                         |                                                                                                              |
|-----------------------------|-------------------------|--------------------------------------------------------------------------------------------------------------|
| Case                        | Ordinary Ground Motions | Only applicable to Bray and Macedo (2019). Almost always ordinary ground motions, see guidance tab re pulses |
| Yield Coefficient ( $a_y$ ) | 0.08 g                  |                                                                                                              |
| Magnitude ( $M_w$ )         | 5.9                     |                                                                                                              |
| PGA                         | 0.32 g                  |                                                                                                              |
| $S_a(1.3T_s)$               | 0.55 g                  | Required for Bray (2019) and Macedo (2023)                                                                   |
| $S_a(1.5T_s)$               | 0.55 g                  | Required for Bray (2007)                                                                                     |
| PGV                         | 160 cm/s                | Only required For Bray (2019) pulses                                                                         |
| Source Distance, d          | 30 km                   | Only required for NCHRP (2008)                                                                               |

#### 3. RESULTS

| Probability of Exceedence:             | Bray & Travararou (2007) | Bray and Macedo (2019) | Macedo et al. (2023) | Macedo et al. (2023) |  |
|----------------------------------------|--------------------------|------------------------|----------------------|----------------------|--|
| Probability of Negligible Displacement | 0%                       | 0%                     | 0%                   | 1%                   |  |
| 50%                                    | 139 mm                   | 75 mm                  | 70 mm                | 49 mm                |  |
| 16%                                    | 268 mm                   | 154 mm                 | 147 mm               | 92 mm                |  |
| 5%                                     | 412 mm                   | 246 mm                 | 239 mm               | 137 mm               |  |
| 2.5%                                   | 507 mm                   | 308 mm                 | 303 mm               | 167 mm               |  |
| 0.5%                                   | 761 mm                   | 480 mm                 | 481 mm               | 244 mm               |  |
| Applicable Seismic Source              | Shallow Crustal          | Shallow Crustal        | Subduction Interface | Subduction Intralab  |  |

#### 4. CHART OPTIONS

Displacements Limit 150





|                                                                                   |          |                                       |           |              |
|-----------------------------------------------------------------------------------|----------|---------------------------------------|-----------|--------------|
|  | CLIENT:  | Saxby Road JV Limited                 | DESIGNER: | MM           |
|                                                                                   | PROJECT: | Southern Links - Stage 1 Residential  | CHECKED:  | DMM          |
|                                                                                   |          |                                       | REVISION: | 7            |
|                                                                                   | TITLE:   | COSEISMIC LATERAL STRETCH - SECTION A | DATE:     | 21/04/2026   |
|                                                                                   |          |                                       | PROJECT:  | HAM2025-0056 |

#### WHEN TO USE THIS SHEET:

Use this sheet when calculating the coseismic stretch across a block using liquefied strengths

#### 1. CALCULATE THE PERIOD OF THE SLIDING MASS ( $T_s$ )

|           |          |                                                                           |
|-----------|----------|---------------------------------------------------------------------------|
| 1D or 2D? | 1D       | Generally 1D, but see guidance tab for details                            |
| H         | 2.2 m    | Maximum height of the sliding mass, measured from within the sliding mass |
| $V_s$     | 180 m/s  | Average shear wave velocity of the sliding mass                           |
| $T_s$     | 0.0489 s |                                                                           |

#### 2. SEISMIC PARAMETERS

|                     |        |                                          |
|---------------------|--------|------------------------------------------|
| Magnitude ( $M_w$ ) | 5.9    |                                          |
| PGA                 | 0.32 g |                                          |
| $S_a(1.3T_s)$       | 0.43 g | Required for Bray (2019)                 |
| $S_a(1.5T_s)$       | 0.43 g | Required for Bray (2007) and Bray (2018) |
| Source Distance, d  | 3 km   | Only required for NCHRP (2008)           |

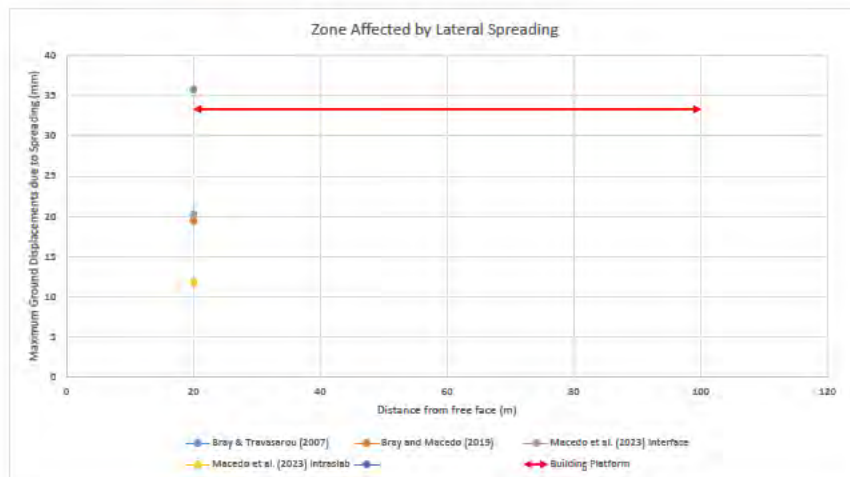
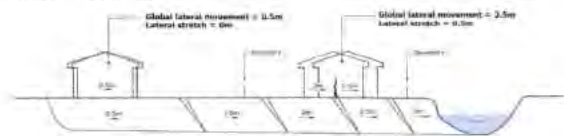
#### 3. RESULTS

| Distance from Crest of Slope (m): | $a_h$ (  $\eta$  ) | Bray & Trassarou (2007) |              | Bray and Macedo (2019) |              | Macedo et al. (2023) Interface |              | Macedo et al. (2023) Intralab |              |  |  |
|-----------------------------------|--------------------|-------------------------|--------------|------------------------|--------------|--------------------------------|--------------|-------------------------------|--------------|--|--|
|                                   |                    | Displacement (mm)       | Stretch (mm) | Displacement (mm)      | Stretch (mm) | Displacement (mm)              | Stretch (mm) | Displacement (mm)             | Stretch (mm) |  |  |
| 0                                 | 0.07               | 107                     |              | 58                     |              | 55                             |              | 38                            |              |  |  |
| 20                                | 0.09               | 71                      | 36           | 38                     | 19           | 34                             | 20           | 26                            | 12           |  |  |
| Seismic Source                    |                    | Shallow Crustal         |              | Shallow Crustal        |              | Subduction Interface           |              | Subduction Intralab           |              |  |  |

#### 4. CHART OPTIONS

|                                                    |     |
|----------------------------------------------------|-----|
| Building platform edge (closest to slope crest)    | 20  |
| Building platform edge (furthest from slope crest) | 100 |

Figure 12.1: Simplified cross-section showing components of lateral ground movement (values illustrative only)



|                                                                                   |          |                                      |           |              |
|-----------------------------------------------------------------------------------|----------|--------------------------------------|-----------|--------------|
|  | CLIENT:  | Saxby Road JV Limited                | DESIGNER: | MM           |
|                                                                                   | PROJECT: | Southern Links - Stage 1 Residential | CHECKED:  | DMM          |
|                                                                                   |          |                                      | REVISION: | 7            |
|                                                                                   | TITLE:   | COSEISMIC DISPLACEMENTS              | DATE:     | 23/04/2026   |
|                                                                                   |          |                                      | PROJECT:  | HAM2025-0056 |

#### WHEN TO USE THIS SHEET:

Use this sheet when calculating the coseismic displacements of a block using liquefied strengths

#### 1. CALCULATE THE PERIOD OF THE SLIDING MASS ( $T_s$ )

|           |          |                                                                           |
|-----------|----------|---------------------------------------------------------------------------|
| 1D or 2D? | 1D       | Generally 1D, but see guidance tab for details                            |
| H         | 4 m      | Maximum height of the sliding mass, measured from within the sliding mass |
| $V_s$     | 180 m/s  | Average shear wave velocity of the sliding mass                           |
| $T_s$     | 0.0889 s |                                                                           |

#### 2. SEISMIC PARAMETERS

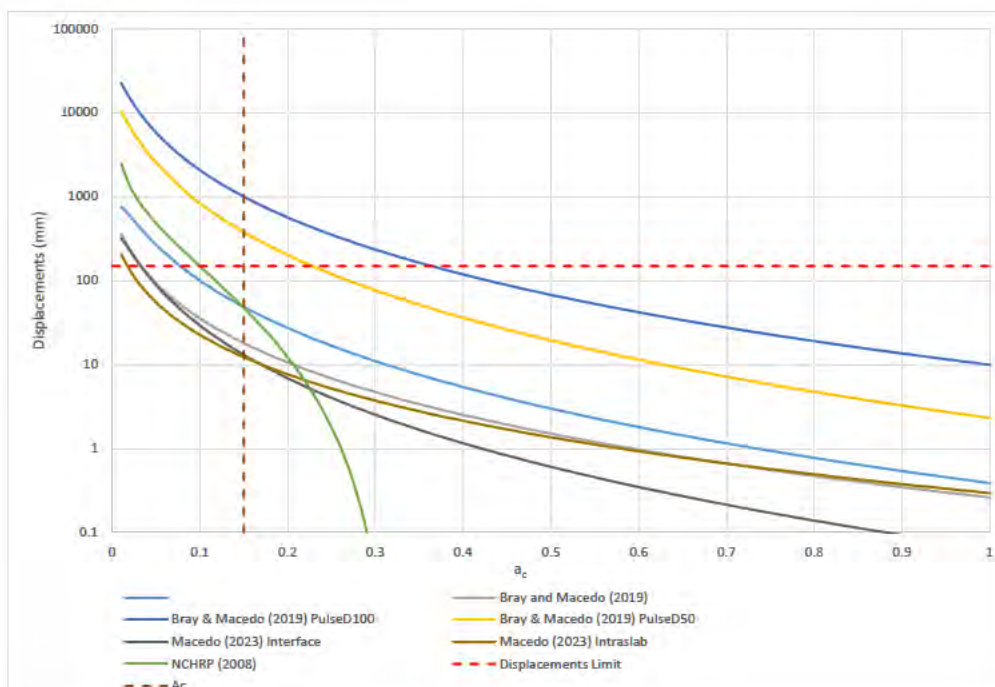
|                             |                         |                                                                                                              |
|-----------------------------|-------------------------|--------------------------------------------------------------------------------------------------------------|
| Case                        | Ordinary Ground Motions | Only applicable to Bray and Macedo (2019). Almost always ordinary ground motions, see guidance tab re pulses |
| Yield Coefficient ( $a_y$ ) | 0.15 g                  |                                                                                                              |
| Magnitude ( $M_w$ )         | 5.9                     |                                                                                                              |
| PGA                         | 0.32 g                  |                                                                                                              |
| $S_a(1.3T_s)$               | 0.54 g                  | Required for Bray (2019) and Macedo (2023)                                                                   |
| $S_a(1.5T_s)$               | 0.54 g                  | Required for Bray (2007)                                                                                     |
| PGV                         | 160 cm/s                | Only required For Bray (2019) pulses                                                                         |
| Source Distance, d          | 30 km                   | Only required for NCHRP (2008)                                                                               |

#### 3. RESULTS

| Probability of Exceedence:             |  | Bray and Macedo (2019) | Macedo et al. (2023) | Macedo et al. (2023) |  |
|----------------------------------------|--|------------------------|----------------------|----------------------|--|
| Probability of Negligible Displacement |  | 10%                    | 6%                   | 8%                   |  |
| 50%                                    |  | 16 mm                  | 13 mm                | 12 mm                |  |
| 16%                                    |  | 35 mm                  | 28 mm                | 24 mm                |  |
| 5%                                     |  | 57 mm                  | 47 mm                | 36 mm                |  |
| 2.5%                                   |  | 72 mm                  | 59 mm                | 43 mm                |  |
| 0.5%                                   |  | 112 mm                 | 94 mm                | 64 mm                |  |
| Applicable Seismic Source              |  | Shallow Crustal        | Subduction Interface | Subduction Intraslab |  |

#### 4. CHART OPTIONS

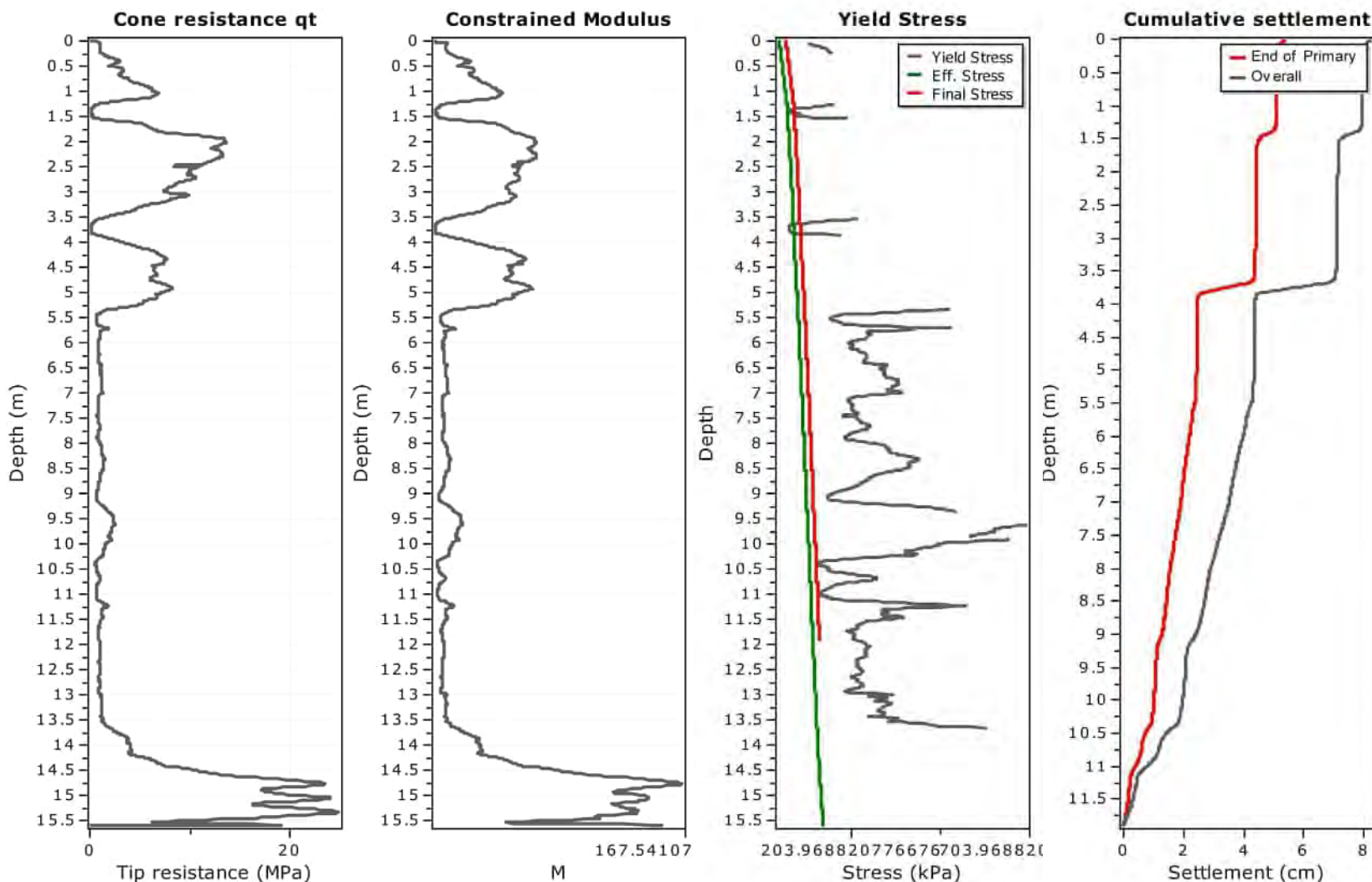
Displacements Limit 150





## Appendix H: Static Settlement Summary

### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 19.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( 1 - e^{-\frac{t}{t_p}} \right)$$

where  $t_p$  is the duration of primary consolidation



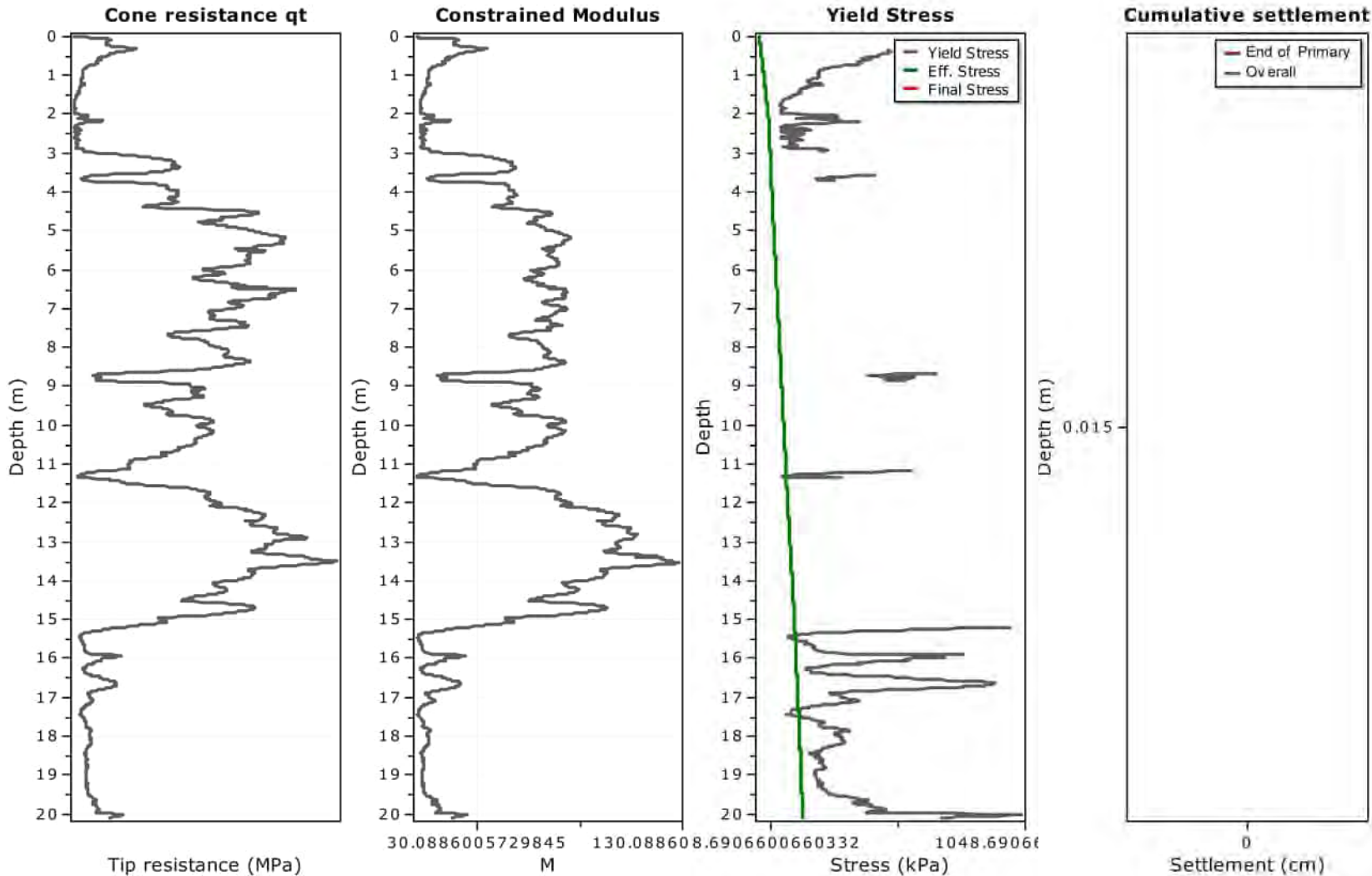
**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 19.00         | 0.37                     | 1.00 | 0.051           | 0.000                   | 0.051                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 19.00         | 0.52                     | 1.00 | 0.036           | 0.000                   | 0.036                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 19.00         | 0.72                     | 1.00 | 0.026           | 0.000                   | 0.026                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 19.00         | 0.85                     | 1.00 | 0.022           | 0.000                   | 0.022                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 19.00         | 0.90                     | 1.00 | 0.021           | 0.000                   | 0.021                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 19.00         | 7.94                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 19.00         | 7.87                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 19.00         | 7.76                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 19.00         | 7.60                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 19.00         | 7.44                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 19.00         | 7.29                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 19.00         | 7.21                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 19.00         | 7.17                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 19.00         | 7.19                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 19.00         | 7.24                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 19.00         | 7.28                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 19.00         | 7.34                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 19.00         | 7.37                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 19.00         | 7.45                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 19.00         | 7.50                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 19.00         | 7.61                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 19.00         | 7.78                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 19.00         | 8.05                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 19.00         | 8.35                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 19.00         | 8.68                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 19.00         | 9.18                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 19.00         | 9.87                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 19.00         | 10.69                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 19.00         | 11.44                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 19.00         | 12.19                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 19.00         | 12.93                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 19.00         | 13.74                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 19.00         | 14.64                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 19.00         | 15.93                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 19.00         | 17.21                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 19.00         | 18.51                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 19.00         | 19.63                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 19.00         | 20.81                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 19.00         | 21.89                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 19.00         | 22.71                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 19.00         | 23.23                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 19.00         | 23.32                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 19.00         | 22.79                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 19.00         | 21.83                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 19.00         | 20.59                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 19.00         | 19.30                    | 1.00 | 0.001           | 0.000                   | 0.001                   |

| :: Tabular results :: |                    |                  |                  |                          |                  |                             |    |                    |                               |                               |
|-----------------------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|----|--------------------|-------------------------------|-------------------------------|
| Point No              | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|                       |                    |                  |                  |                          |                  |                             |    |                    |                               |                               |
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|                       |                    |                  |                  |                          |                  |                             |    |                    |                               |                               |
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|                       |                    |                  |                  |                          |                  |                             |    |                    |                               |                               |
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|                       |                    |                  |                  |                          |                  |                             |    |                    |                               |                               |
|                       |                    |                  |                  |                          |                  |                             |    |                    |                               |                               |
|                       |                    |                  |                  |                          |                  |                             |    |                    |                               |                               |
|                       |                    |                  |                  |                          |                  |                             |    |                    |                               |                               |



### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 0.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation

:: Tabular results ::

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 1        | 0.01               | 0.02             | 0.01             | 0.01                     | 0.00             | 0.39                        | 1.00 | 0.000              | 0.000                         | 0.000                         |

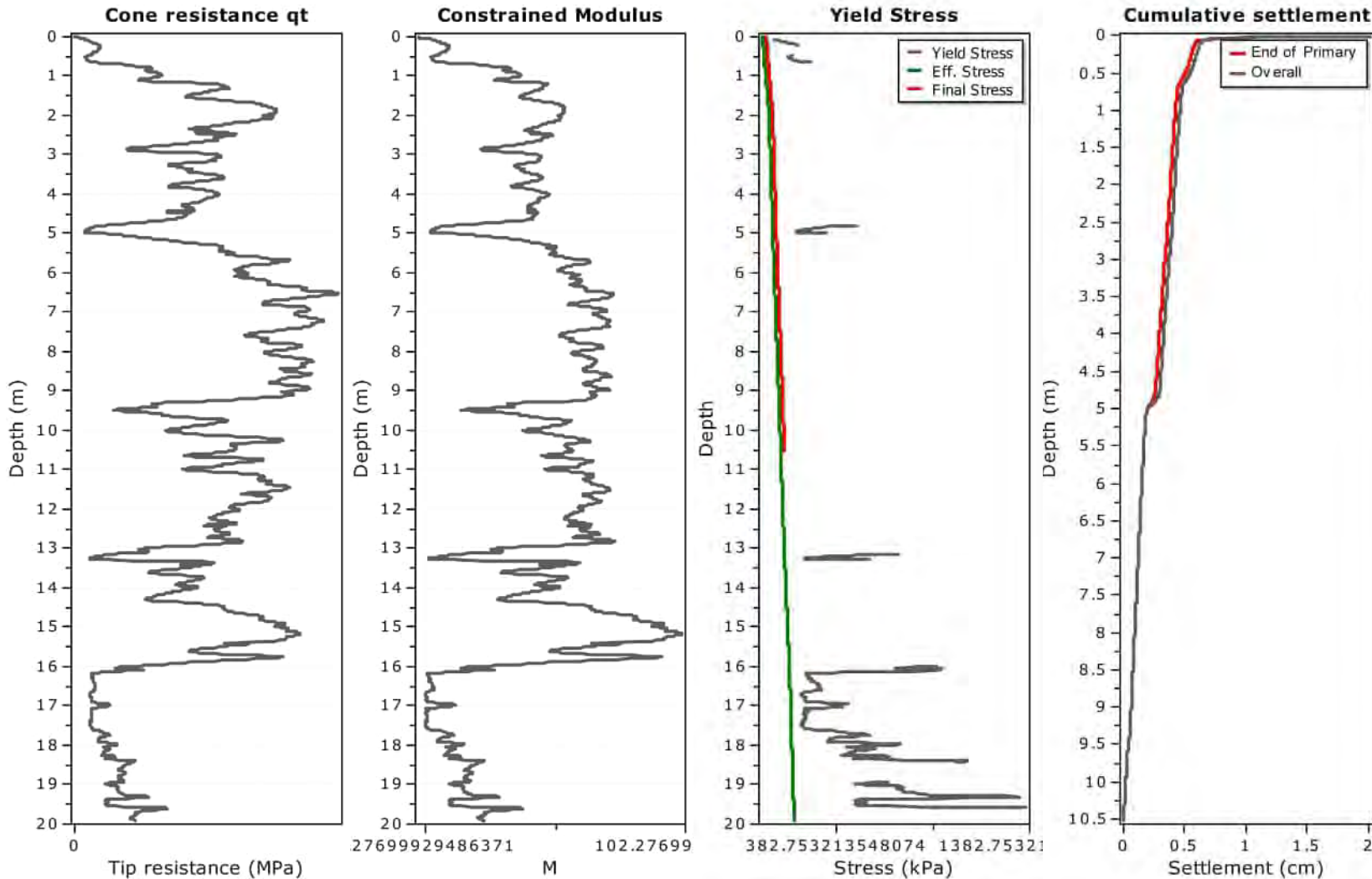
**Total primary settlement: 0.00**  
**Total secondary settlement: 0.00**  
**Total calculated settlement: 0.00**

Abbreviations

- Start depth:
- End depth:
- Thickness:
- Relative depth:
- Iz:
- Delta P:
- Eff. stress:
- M<sub>(CPT)</sub>:
- Settlement:
- Second. settlement:
- Start depth of soil layer (penetration depth measured from ground free surface)
- End depth of soil layer (penetration depth measured from ground free surface)
- Thickness of soil layer
- Depth of calculation relative to footing
- Stress influence factor
- Footing imposed stress:
- Effective stress
- Constrained modulus from CPT
- Primary settlement
- Secondary settlement due to creep



**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 19.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation

**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 19.00         | 0.02                     | 1.00 | 0.897           | 0.000                   | 0.897                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 19.00         | 0.08                     | 1.00 | 0.240           | 0.000                   | 0.240                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 19.00         | 0.16                     | 1.00 | 0.120           | 0.000                   | 0.120                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 19.00         | 0.28                     | 1.00 | 0.067           | 0.000                   | 0.067                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 19.00         | 0.38                     | 1.00 | 0.050           | 0.000                   | 0.050                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 19.00         | 4.16                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 19.00         | 4.58                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 19.00         | 4.87                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 19.00         | 5.22                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 19.00         | 5.66                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 19.00         | 6.36                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 19.00         | 7.00                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 19.00         | 7.60                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 19.00         | 7.91                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 19.00         | 8.19                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 19.00         | 8.57                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 19.00         | 8.95                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 19.00         | 9.40                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 19.00         | 9.79                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 19.00         | 10.23                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 19.00         | 10.63                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 19.00         | 10.98                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 19.00         | 11.26                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 19.00         | 11.50                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 19.00         | 11.65                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 19.00         | 11.67                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 19.00         | 11.59                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 19.00         | 11.49                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 19.00         | 11.36                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 19.00         | 11.24                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 19.00         | 11.08                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 19.00         | 10.99                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 19.00         | 10.86                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 19.00         | 10.78                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 19.00         | 10.70                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 19.00         | 10.62                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 19.00         | 10.49                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 19.00         | 10.30                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 19.00         | 10.03                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 19.00         | 9.49                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 19.00         | 8.94                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 19.00         | 8.47                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 19.00         | 8.28                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 19.00         | 8.13                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 19.00         | 7.98                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 19.00         | 7.72                     | 1.00 | 0.002           | 0.000                   | 0.002                   |



| :: Tabular results :: |                    |                  |                  |                          |                  |                             |    |                    |                               |                               |
|-----------------------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|----|--------------------|-------------------------------|-------------------------------|
| Point No              | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |

Total primary settlement: 1.98

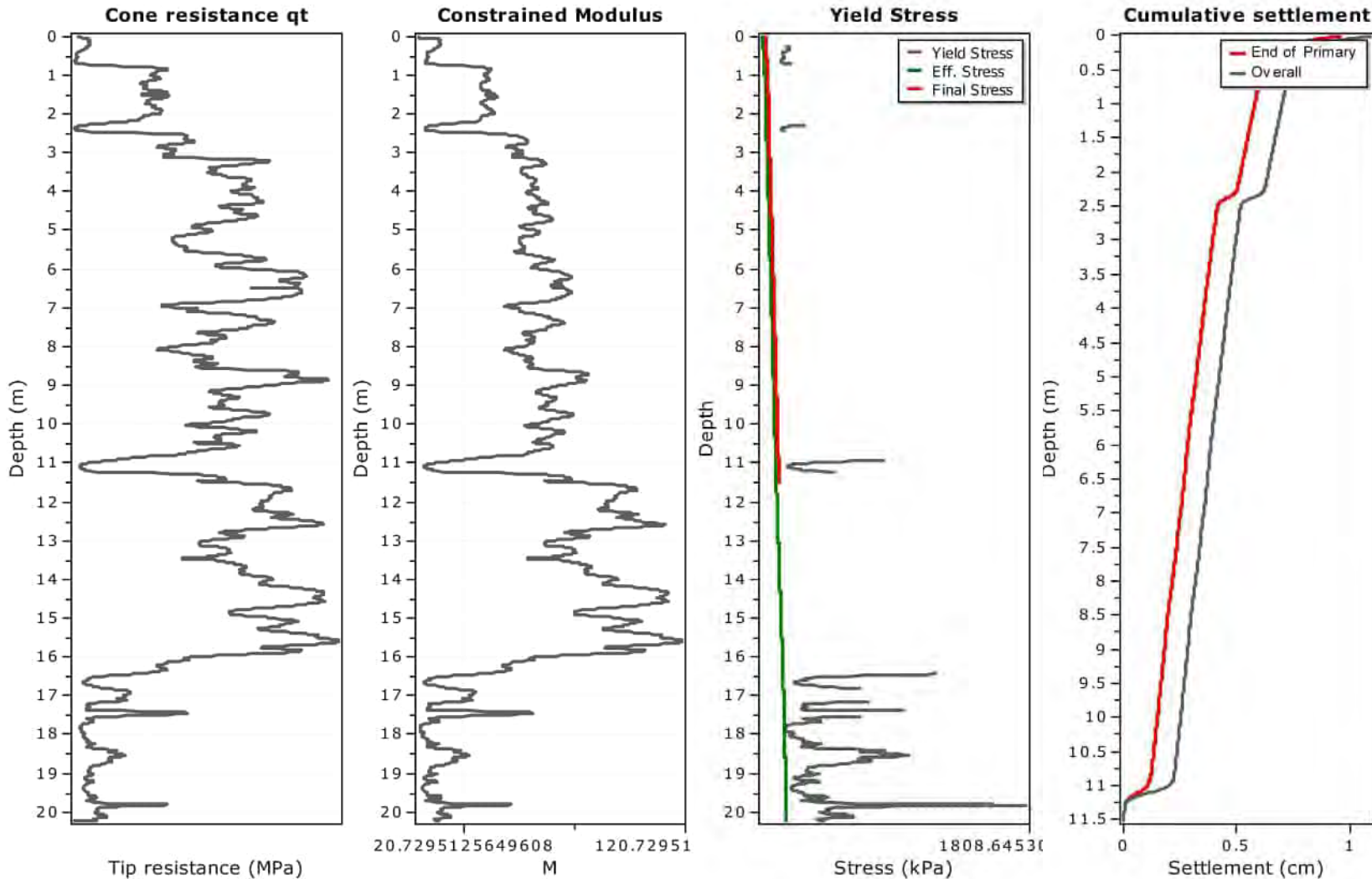
Total secondary settlement: 0.04

Total calculated settlement: 2.02

Abbreviations

- Start depth:Start depth of soil layer (penetration depth measured from ground free surface)
- End depth:End depth of soil layer (penetration depth measured from ground free surface)
- Thickness:Thickness of soil layer
- Relative depth:Depth of calculation relative to footing
- Iz:Stress influence factor
- Delta P:Footing imposed stress:
- Eff. stress:Effective stress
- M<sub>(CPT)</sub>:Constrained modulus from CPT
- Settlement:Primary settlement
- Second. settlement:Secondary settlements due to creep

**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 19.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



| :: Tabular results :: |                 |               |               |                    |               |                          |      |                 |                         |                         |
|-----------------------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| Point No              | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
| 1                     | 0.01            | 0.02          | 0.01          | 0.01               | 19.00         | 0.56                     | 1.00 | 0.034           | 0.000                   | 0.034                   |
| 2                     | 0.02            | 0.03          | 0.01          | 0.03               | 19.00         | 0.59                     | 1.00 | 0.032           | 0.000                   | 0.032                   |
| 3                     | 0.03            | 0.04          | 0.01          | 0.04               | 19.00         | 0.69                     | 1.00 | 0.028           | 0.000                   | 0.028                   |
| 4                     | 0.04            | 0.05          | 0.01          | 0.04               | 19.00         | 0.80                     | 1.00 | 0.024           | 0.000                   | 0.024                   |
| 5                     | 0.05            | 0.06          | 0.01          | 0.06               | 19.00         | 0.95                     | 1.00 | 0.020           | 0.000                   | 0.020                   |
| 6                     | 0.06            | 0.07          | 0.01          | 0.07               | 19.00         | 9.35                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 7                     | 0.07            | 0.08          | 0.01          | 0.07               | 19.00         | 9.68                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 8                     | 0.08            | 0.09          | 0.01          | 0.09               | 19.00         | 9.98                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 9                     | 0.09            | 0.10          | 0.01          | 0.09               | 19.00         | 10.10                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 10                    | 0.10            | 0.11          | 0.01          | 0.10               | 19.00         | 9.96                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 11                    | 0.11            | 0.12          | 0.01          | 0.12               | 19.00         | 9.76                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 12                    | 0.12            | 0.13          | 0.01          | 0.13               | 19.00         | 9.55                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 13                    | 0.13            | 0.14          | 0.01          | 0.14               | 19.00         | 9.51                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 14                    | 0.14            | 0.15          | 0.01          | 0.14               | 19.00         | 9.55                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 15                    | 0.15            | 0.16          | 0.01          | 0.15               | 19.00         | 9.71                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 16                    | 0.16            | 0.17          | 0.01          | 0.17               | 19.00         | 9.94                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 17                    | 0.17            | 0.18          | 0.01          | 0.17               | 19.00         | 10.18                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 18                    | 0.18            | 0.19          | 0.01          | 0.18               | 19.00         | 10.37                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 19                    | 0.19            | 0.20          | 0.01          | 0.20               | 19.00         | 10.43                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 20                    | 0.20            | 0.21          | 0.01          | 0.20               | 19.00         | 10.42                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 21                    | 0.21            | 0.22          | 0.01          | 0.21               | 19.00         | 10.31                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 22                    | 0.22            | 0.23          | 0.01          | 0.23               | 19.00         | 10.21                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 23                    | 0.23            | 0.24          | 0.01          | 0.24               | 19.00         | 10.00                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 24                    | 0.24            | 0.25          | 0.01          | 0.25               | 19.00         | 9.80                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 25                    | 0.25            | 0.26          | 0.01          | 0.26               | 19.00         | 9.62                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 26                    | 0.26            | 0.27          | 0.01          | 0.27               | 19.00         | 9.46                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 27                    | 0.27            | 0.28          | 0.01          | 0.28               | 19.00         | 9.22                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 28                    | 0.28            | 0.29          | 0.01          | 0.28               | 19.00         | 8.92                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 29                    | 0.29            | 0.30          | 0.01          | 0.29               | 19.00         | 8.63                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 30                    | 0.30            | 0.31          | 0.01          | 0.30               | 19.00         | 8.47                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 31                    | 0.31            | 0.32          | 0.01          | 0.32               | 19.00         | 8.32                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 32                    | 0.32            | 0.33          | 0.01          | 0.33               | 19.00         | 8.11                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 33                    | 0.33            | 0.34          | 0.01          | 0.34               | 19.00         | 7.73                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 34                    | 0.34            | 0.35          | 0.01          | 0.34               | 19.00         | 7.35                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 35                    | 0.35            | 0.36          | 0.01          | 0.35               | 19.00         | 7.00                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 36                    | 0.36            | 0.37          | 0.01          | 0.36               | 19.00         | 6.75                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 37                    | 0.37            | 0.38          | 0.01          | 0.37               | 19.00         | 6.47                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 38                    | 0.38            | 0.39          | 0.01          | 0.38               | 19.00         | 6.05                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 39                    | 0.39            | 0.40          | 0.01          | 0.39               | 19.00         | 5.60                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 40                    | 0.40            | 0.41          | 0.01          | 0.40               | 19.00         | 5.15                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 41                    | 0.41            | 0.42          | 0.01          | 0.41               | 19.00         | 4.86                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 42                    | 0.42            | 0.43          | 0.01          | 0.42               | 19.00         | 4.65                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 43                    | 0.43            | 0.44          | 0.01          | 0.43               | 19.00         | 4.46                     | 1.00 | 0.004           | 0.000                   | 0.005                   |
| 44                    | 0.44            | 0.45          | 0.01          | 0.44               | 19.00         | 4.34                     | 1.00 | 0.004           | 0.000                   | 0.005                   |
| 45                    | 0.45            | 0.46          | 0.01          | 0.45               | 19.00         | 4.24                     | 1.00 | 0.004           | 0.000                   | 0.005                   |
| 46                    | 0.46            | 0.47          | 0.01          | 0.46               | 19.00         | 4.24                     | 1.00 | 0.004           | 0.000                   | 0.005                   |

:: Tabular results ::

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 1151     | 11.51              | 11.52            | 0.01             | 11.52                    | 18.84            | 73.74                       | 0.99 | 0.000              | 0.000                         | 0.000                         |

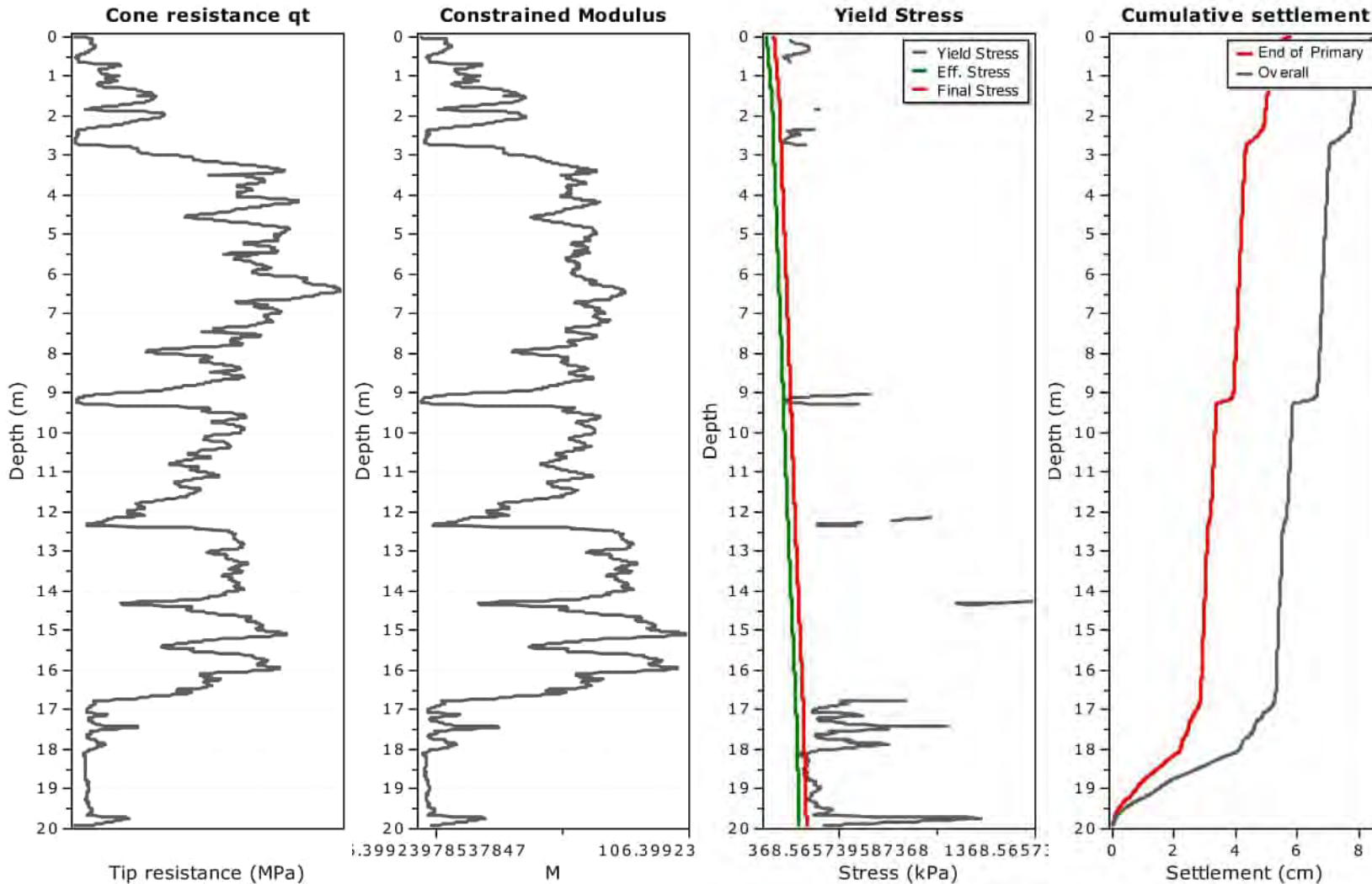
**Total primary settlement: 0.96**  
**Total secondary settlement: 0.13**  
**Total calculated settlement: 1.09**

Abbreviations

- Start depth:
- End depth:
- Thickness:
- Relative depth:
- Iz:
- Delta P:
- Eff. stress:
- M<sub>(CPT)</sub>:
- Settlement:
- Second. settlement:
- Start depth of soil layer (penetration depth measured from ground free surface)
- End depth of soil layer (penetration depth measured from ground free surface)
- Thickness of soil layer
- Depth of calculation relative to footing
- Stress influence factor
- Footing imposed stress:
- Effective stress
- Constrained modulus from CPT
- Primary settlement
- Secondary settlement due to creep



**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 38.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( 1 - e^{-t/t_p} \right)$$

where  $t_p$  is the duration of primary consolidation

**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 38.00         | 0.64                     | 1.00 | 0.060           | 0.000                   | 0.060                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 38.00         | 0.75                     | 1.00 | 0.051           | 0.000                   | 0.051                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 38.00         | 0.88                     | 1.00 | 0.043           | 0.000                   | 0.043                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 38.00         | 1.01                     | 1.00 | 0.038           | 0.000                   | 0.038                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 38.00         | 1.09                     | 1.00 | 0.035           | 0.000                   | 0.035                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 38.00         | 10.36                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 38.00         | 10.82                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 38.00         | 10.93                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 38.00         | 10.87                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 38.00         | 10.78                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 38.00         | 10.67                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 38.00         | 10.54                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 38.00         | 10.37                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 38.00         | 10.19                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 38.00         | 10.00                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 38.00         | 9.88                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 38.00         | 9.88                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 38.00         | 10.18                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 38.00         | 10.64                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 38.00         | 11.17                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 38.00         | 11.58                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 38.00         | 12.00                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 38.00         | 12.40                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 38.00         | 12.58                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 38.00         | 12.42                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 38.00         | 12.03                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 38.00         | 11.70                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 38.00         | 11.42                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 38.00         | 11.18                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 38.00         | 10.92                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 38.00         | 10.69                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 38.00         | 10.48                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 38.00         | 10.14                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 38.00         | 9.80                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 38.00         | 9.50                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 38.00         | 9.36                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 38.00         | 9.28                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 38.00         | 9.16                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 38.00         | 8.83                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 38.00         | 8.36                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 38.00         | 7.74                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 38.00         | 7.16                     | 1.00 | 0.005           | 0.000                   | 0.006                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 38.00         | 6.54                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 38.00         | 5.82                     | 1.00 | 0.007           | 0.000                   | 0.007                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 38.00         | 5.13                     | 1.00 | 0.007           | 0.000                   | 0.008                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 38.00         | 4.52                     | 1.00 | 0.008           | 0.000                   | 0.009                   |



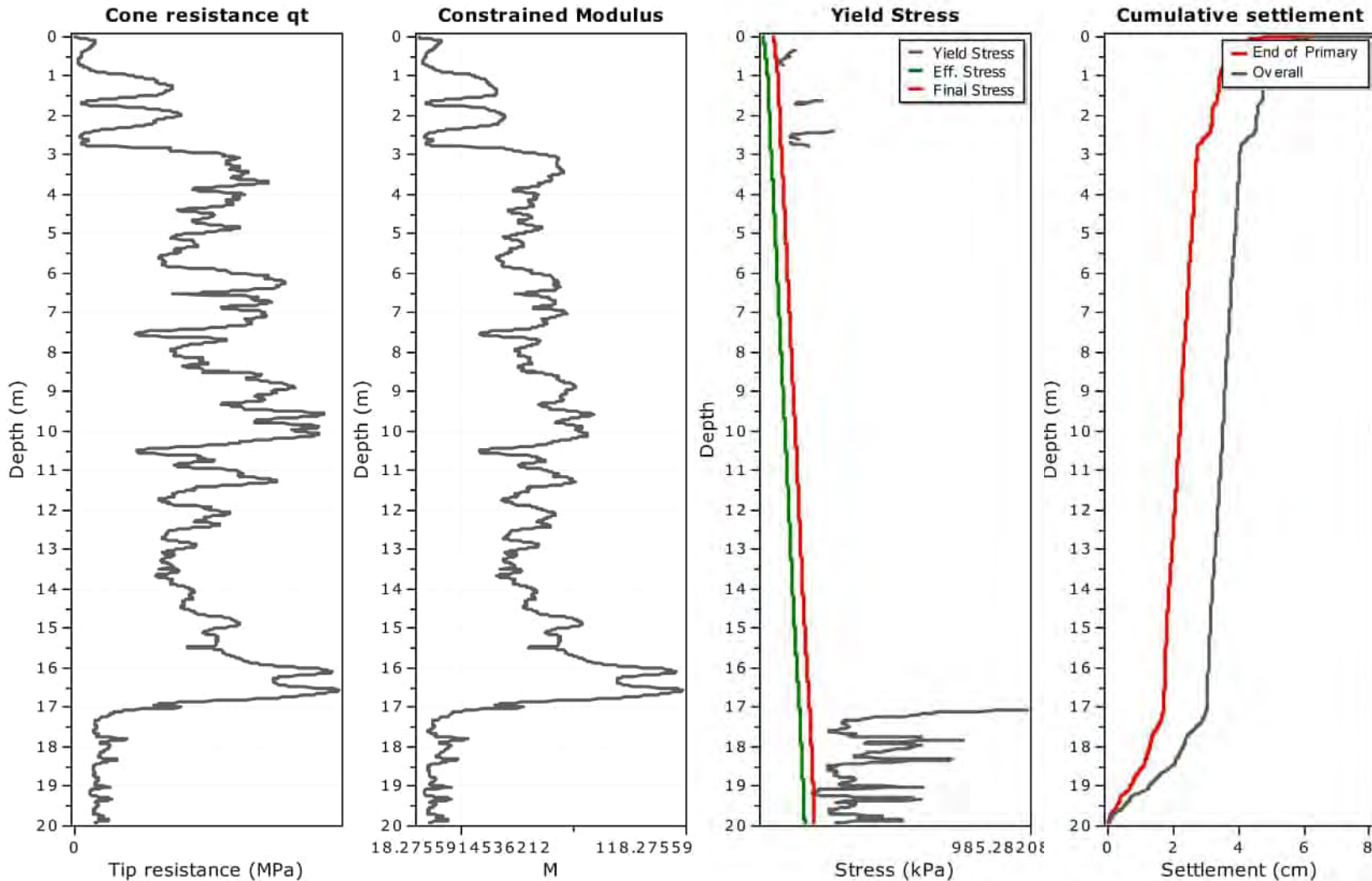
**:: Tabular results ::**

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 1979     | 19.79              | 19.80            | 0.01             | 19.80                    | 36.54            | 22.71                       | 0.96 | 0.002              | 0.001                         | 0.003                         |
| 1980     | 19.80              | 19.81            | 0.01             | 19.81                    | 36.53            | 21.48                       | 0.96 | 0.002              | 0.002                         | 0.003                         |
| 1981     | 19.81              | 19.82            | 0.01             | 19.82                    | 36.53            | 20.29                       | 0.96 | 0.002              | 0.002                         | 0.003                         |
| 1982     | 19.82              | 19.83            | 0.01             | 19.83                    | 36.53            | 19.39                       | 0.96 | 0.002              | 0.002                         | 0.004                         |
| 1983     | 19.83              | 19.84            | 0.01             | 19.84                    | 36.53            | 18.46                       | 0.96 | 0.002              | 0.002                         | 0.004                         |
| 1984     | 19.84              | 19.85            | 0.01             | 19.85                    | 36.53            | 17.18                       | 0.96 | 0.002              | 0.002                         | 0.004                         |
| 1985     | 19.85              | 19.86            | 0.01             | 19.86                    | 36.52            | 15.86                       | 0.96 | 0.002              | 0.002                         | 0.004                         |
| 1986     | 19.86              | 19.87            | 0.01             | 19.87                    | 36.52            | 14.49                       | 0.96 | 0.003              | 0.002                         | 0.005                         |
| 1987     | 19.87              | 19.88            | 0.01             | 19.88                    | 36.52            | 13.44                       | 0.96 | 0.003              | 0.002                         | 0.005                         |
| 1988     | 19.88              | 19.89            | 0.01             | 19.89                    | 36.52            | 12.10                       | 0.96 | 0.003              | 0.003                         | 0.006                         |
| 1989     | 19.89              | 19.90            | 0.01             | 19.90                    | 36.52            | 10.90                       | 0.96 | 0.003              | 0.003                         | 0.006                         |
| 1990     | 19.90              | 19.91            | 0.01             | 19.91                    | 36.51            | 8.98                        | 0.96 | 0.004              | 0.004                         | 0.008                         |
| 1991     | 19.91              | 19.92            | 0.01             | 19.92                    | 36.51            | 7.73                        | 0.96 | 0.005              | 0.004                         | 0.009                         |
| 1992     | 19.92              | 19.93            | 0.01             | 19.93                    | 36.51            | 5.98                        | 0.96 | 0.006              | 0.006                         | 0.012                         |

**Total primary settlement: 5.78****Total secondary settlement: 2.83****Total calculated settlement: 8.61****Abbreviations**

|                      |                                                                                 |
|----------------------|---------------------------------------------------------------------------------|
| Start depth:         | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:           | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:           | Thickness of soil layer                                                         |
| Relative depth:      | Depth of calculation relative to footing                                        |
| Iz:                  | Stress influence factor                                                         |
| Delta P:             | Footing imposed stress:                                                         |
| Eff. stress:         | Effective stress                                                                |
| M <sub>(CPT)</sub> : | Constrained modulus from CPT                                                    |
| Settlement:          | Primary settlement                                                              |
| Second. settlement:  | Secondary settlements due to creep                                              |

**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 38.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 38.00         | 0.03                     | 1.00 | 1.291           | 0.000                   | 1.291                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 38.00         | 0.07                     | 1.00 | 0.554           | 0.000                   | 0.554                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 38.00         | 0.15                     | 1.00 | 0.257           | 0.000                   | 0.257                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 38.00         | 0.28                     | 1.00 | 0.138           | 0.000                   | 0.138                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 38.00         | 0.39                     | 1.00 | 0.097           | 0.000                   | 0.097                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 38.00         | 4.55                     | 1.00 | 0.008           | 0.000                   | 0.008                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 38.00         | 5.52                     | 1.00 | 0.007           | 0.000                   | 0.007                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 38.00         | 6.71                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 38.00         | 7.89                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 38.00         | 8.88                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 38.00         | 9.46                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 38.00         | 9.65                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 38.00         | 9.62                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 38.00         | 9.54                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 38.00         | 9.45                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 38.00         | 9.27                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 38.00         | 9.09                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 38.00         | 8.89                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 38.00         | 8.73                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 38.00         | 8.50                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 38.00         | 8.26                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 38.00         | 7.99                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 38.00         | 7.79                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 38.00         | 7.61                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 38.00         | 7.50                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 38.00         | 7.39                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 38.00         | 7.29                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 38.00         | 7.08                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 38.00         | 6.84                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 38.00         | 6.55                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 38.00         | 6.31                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 38.00         | 6.05                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 38.00         | 5.72                     | 1.00 | 0.007           | 0.000                   | 0.007                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 38.00         | 5.48                     | 1.00 | 0.007           | 0.000                   | 0.007                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 38.00         | 5.14                     | 1.00 | 0.007           | 0.000                   | 0.008                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 38.00         | 4.87                     | 1.00 | 0.008           | 0.000                   | 0.008                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 38.00         | 4.52                     | 1.00 | 0.008           | 0.000                   | 0.009                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 38.00         | 4.27                     | 1.00 | 0.009           | 0.000                   | 0.009                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 38.00         | 4.03                     | 1.00 | 0.009           | 0.000                   | 0.010                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 38.00         | 3.79                     | 1.00 | 0.010           | 0.000                   | 0.010                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 38.00         | 3.51                     | 1.00 | 0.011           | 0.000                   | 0.011                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 38.00         | 3.28                     | 1.00 | 0.012           | 0.000                   | 0.012                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 38.00         | 3.10                     | 1.00 | 0.012           | 0.000                   | 0.013                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 38.00         | 3.01                     | 1.00 | 0.013           | 0.000                   | 0.013                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 38.00         | 2.96                     | 1.00 | 0.013           | 0.001                   | 0.013                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 38.00         | 2.92                     | 1.00 | 0.013           | 0.001                   | 0.014                   |

**:: Tabular results ::**

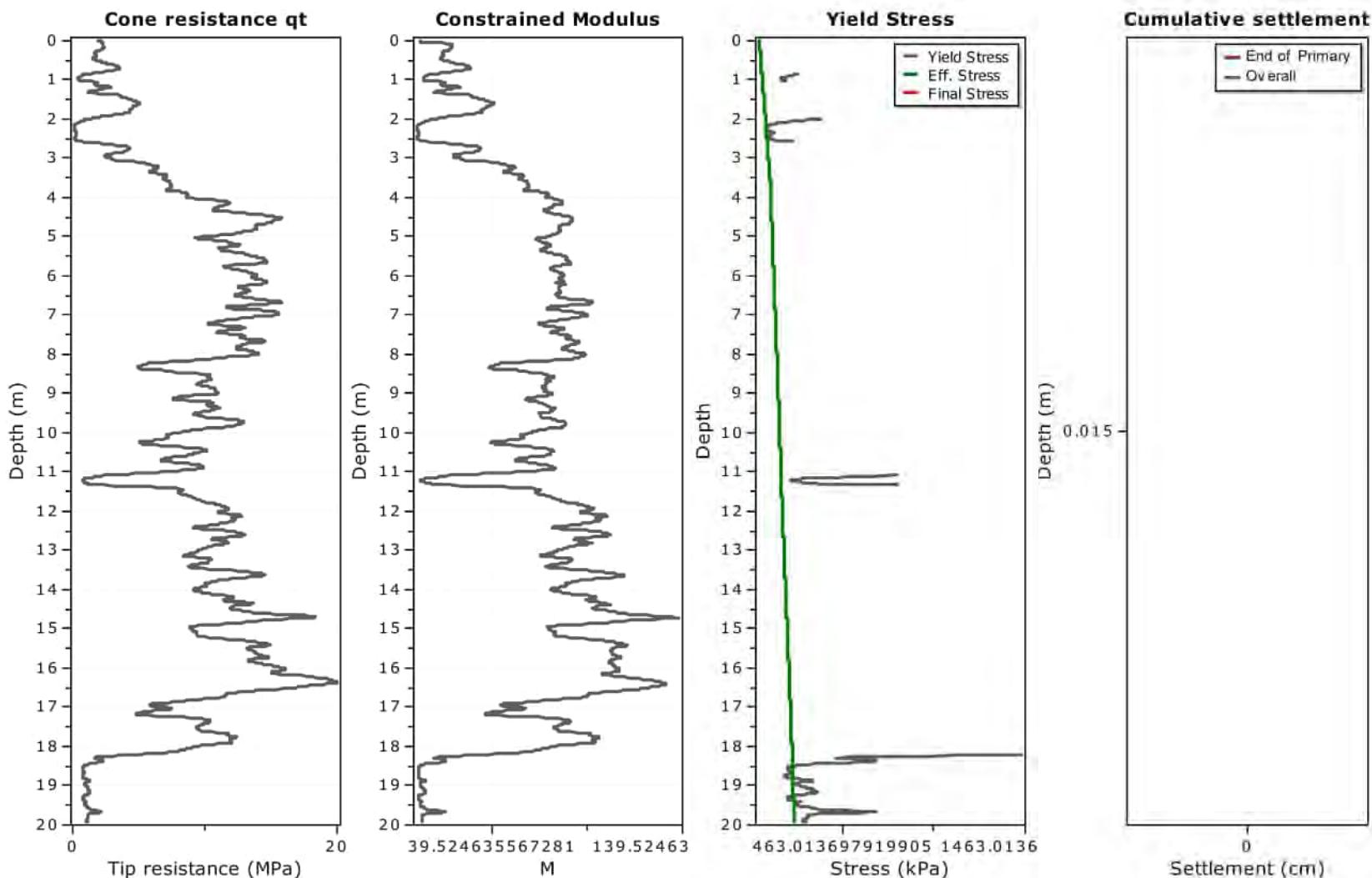
| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 1979     | 19.79              | 19.80            | 0.01             | 19.80                    | 36.54            | 10.30                       | 0.96 | 0.004              | 0.003                         | 0.006                         |
| 1980     | 19.80              | 19.81            | 0.01             | 19.81                    | 36.53            | 9.65                        | 0.96 | 0.004              | 0.003                         | 0.007                         |
| 1981     | 19.81              | 19.82            | 0.01             | 19.82                    | 36.53            | 7.93                        | 0.96 | 0.005              | 0.004                         | 0.008                         |
| 1982     | 19.82              | 19.83            | 0.01             | 19.83                    | 36.53            | 7.41                        | 0.96 | 0.005              | 0.004                         | 0.009                         |
| 1983     | 19.83              | 19.84            | 0.01             | 19.84                    | 36.53            | 8.82                        | 0.96 | 0.004              | 0.003                         | 0.008                         |
| 1984     | 19.84              | 19.85            | 0.01             | 19.85                    | 36.53            | 10.47                       | 0.96 | 0.003              | 0.003                         | 0.006                         |
| 1985     | 19.85              | 19.86            | 0.01             | 19.86                    | 36.52            | 11.73                       | 0.96 | 0.003              | 0.003                         | 0.006                         |
| 1986     | 19.86              | 19.87            | 0.01             | 19.87                    | 36.52            | 12.33                       | 0.96 | 0.003              | 0.002                         | 0.005                         |
| 1987     | 19.87              | 19.88            | 0.01             | 19.88                    | 36.52            | 12.33                       | 0.96 | 0.003              | 0.002                         | 0.005                         |
| 1988     | 19.88              | 19.89            | 0.01             | 19.89                    | 36.52            | 11.24                       | 0.96 | 0.003              | 0.003                         | 0.006                         |
| 1989     | 19.89              | 19.90            | 0.01             | 19.90                    | 36.52            | 9.60                        | 0.96 | 0.004              | 0.003                         | 0.007                         |
| 1990     | 19.90              | 19.91            | 0.01             | 19.91                    | 36.51            | 6.64                        | 0.96 | 0.005              | 0.005                         | 0.010                         |
| 1991     | 19.91              | 19.92            | 0.01             | 19.92                    | 36.51            | 5.24                        | 0.96 | 0.007              | 0.006                         | 0.013                         |
| 1992     | 19.92              | 19.93            | 0.01             | 19.93                    | 36.51            | 4.59                        | 0.96 | 0.008              | 0.007                         | 0.015                         |

**Total primary settlement: 6.68****Total secondary settlement: 1.41****Total calculated settlement: 8.08****Abbreviations**

|                      |                                                                                 |
|----------------------|---------------------------------------------------------------------------------|
| Start depth:         | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:           | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:           | Thickness of soil layer                                                         |
| Relative depth:      | Depth of calculation relative to footing                                        |
| Iz:                  | Stress influence factor                                                         |
| Delta P:             | Footing imposed stress:                                                         |
| Eff. stress:         | Effective stress                                                                |
| M <sub>(CPT)</sub> : | Constrained modulus from CPT                                                    |
| Settlement:          | Primary settlement                                                              |
| Second. settlement:  | Secondary settlements due to creep                                              |



### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 0.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation

:: Tabular results ::

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 1        | 0.01               | 0.02             | 0.01             | 0.01                     | 0.00             | 1.68                        | 1.00 | 0.000              | 0.000                         | 0.000                         |

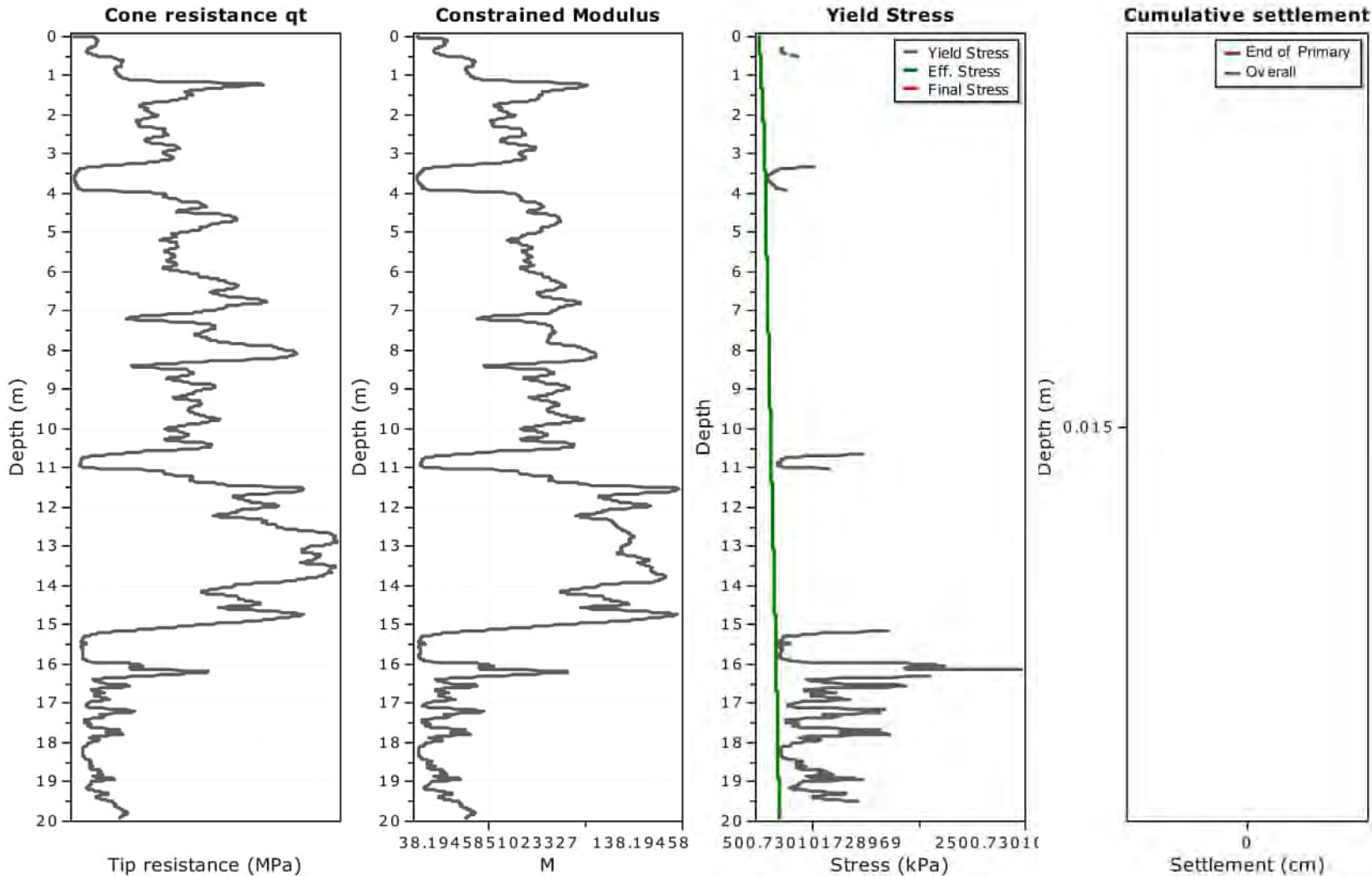
**Total primary settlement: 0.00**  
**Total secondary settlement: 0.00**  
**Total calculated settlement: 0.00**

Abbreviations

- Start depth:
- End depth:
- Thickness:
- Relative depth:
- Iz:
- Delta P:
- Eff. stress:
- M<sub>(CPT)</sub>:
- Settlement:
- Second. settlement:
- Start depth of soil layer (penetration depth measured from ground free surface)
- End depth of soil layer (penetration depth measured from ground free surface)
- Thickness of soil layer
- Depth of calculation relative to footing
- Stress influence factor
- Footing imposed stress:
- Effective stress
- Constrained modulus from CPT
- Primary settlement
- Secondary settlement due to creep



**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 0.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation

:: Tabular results ::

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 1        | 0.01               | 0.02             | 0.01             | 0.01                     | 0.00             | 1.25                        | 1.00 | 0.000              | 0.000                         | 0.000                         |

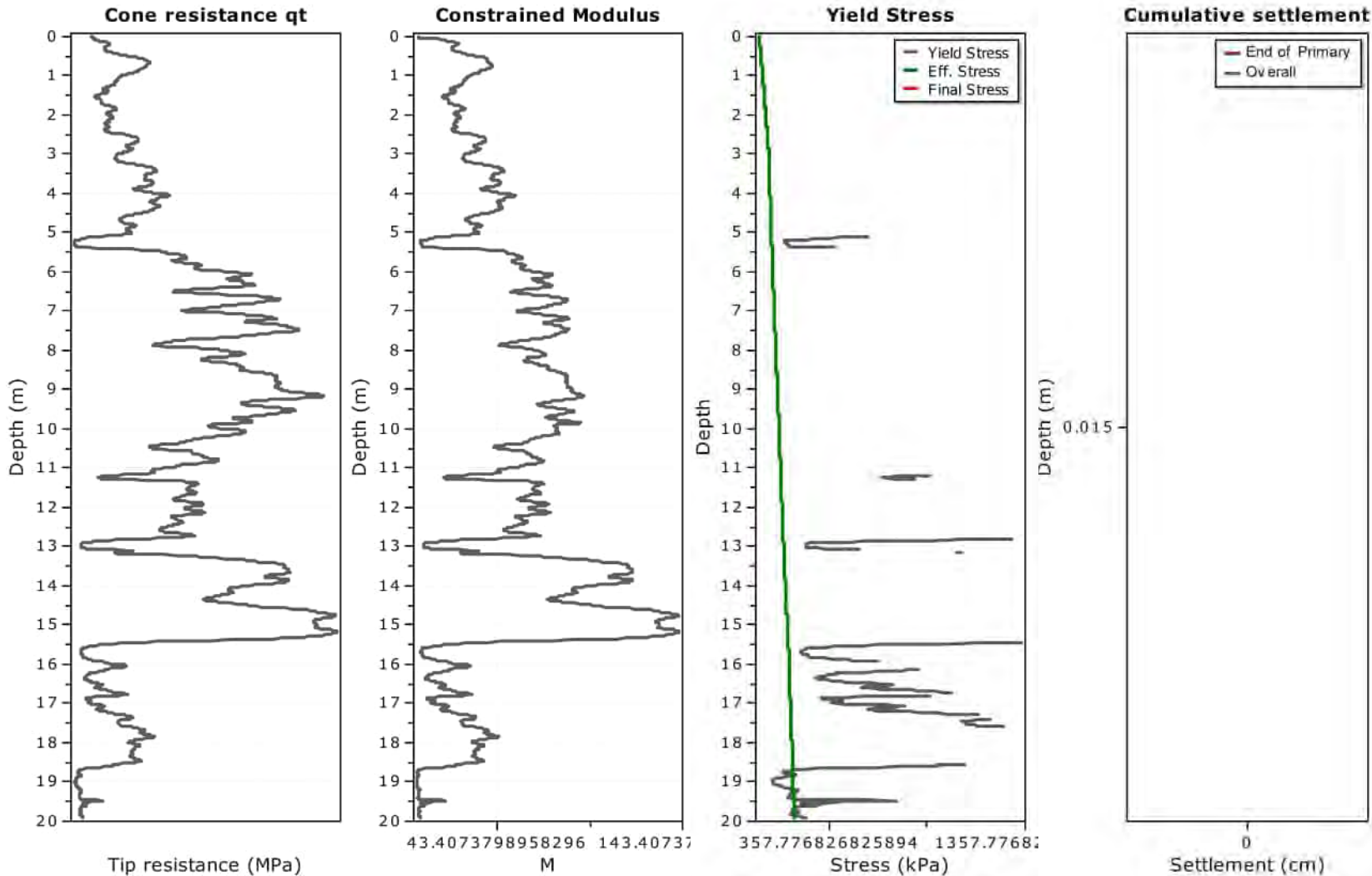
**Total primary settlement: 0.00**  
**Total secondary settlement: 0.00**  
**Total calculated settlement: 0.00**

Abbreviations

- Start depth:
- End depth:
- Thickness:
- Relative depth:
- Iz:
- Delta P:
- Eff. stress:
- M<sub>(CPT)</sub>:
- Settlement:
- Second. settlement:
- Start depth of soil layer (penetration depth measured from ground free surface)
- End depth of soil layer (penetration depth measured from ground free surface)
- Thickness of soil layer
- Depth of calculation relative to footing
- Stress influence factor
- Footing imposed stress:
- Effective stress
- Constrained modulus from CPT
- Primary settlement
- Secondary settlement due to creep



### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 0.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation

:: Tabular results ::

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 1        | 0.01               | 0.02             | 0.01             | 0.01                     | 0.00             | 1.45                        | 1.00 | 0.000              | 0.000                         | 0.000                         |

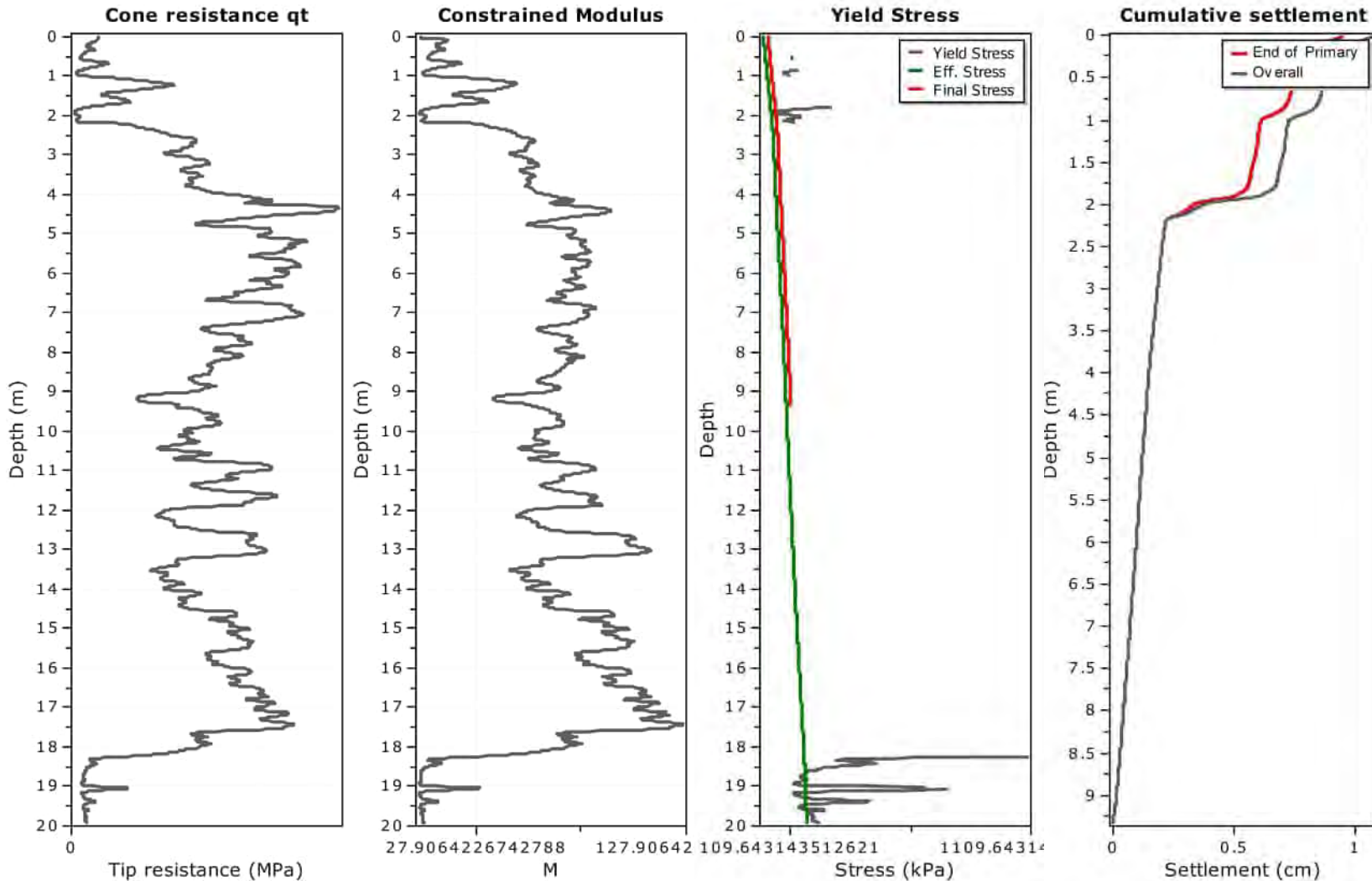
**Total primary settlement: 0.00**  
**Total secondary settlement: 0.00**  
**Total calculated settlement: 0.00**

Abbreviations

- Start depth:
- End depth:
- Thickness:
- Relative depth:
- Iz:
- Delta P:
- Eff. stress:
- M<sub>(CPT)</sub>:
- Settlement:
- Second. settlement:
- Start depth of soil layer (penetration depth measured from ground free surface)
- End depth of soil layer (penetration depth measured from ground free surface)
- Thickness of soil layer
- Depth of calculation relative to footing
- Stress influence factor
- Footing imposed stress:
- Effective stress
- Constrained modulus from CPT
- Primary settlement
- Secondary settlement due to creep



**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 19.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation

| :: Tabular results :: |                 |               |               |                    |               |                          |      |                 |                         |                         |
|-----------------------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| Point No              | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
| 1                     | 0.01            | 0.02          | 0.01          | 0.01               | 19.00         | 1.69                     | 1.00 | 0.011           | 0.000                   | 0.011                   |
| 2                     | 0.02            | 0.03          | 0.01          | 0.03               | 19.00         | 1.70                     | 1.00 | 0.011           | 0.000                   | 0.011                   |
| 3                     | 0.03            | 0.04          | 0.01          | 0.04               | 19.00         | 1.70                     | 1.00 | 0.011           | 0.000                   | 0.011                   |
| 4                     | 0.04            | 0.05          | 0.01          | 0.04               | 19.00         | 1.70                     | 1.00 | 0.011           | 0.000                   | 0.011                   |
| 5                     | 0.05            | 0.06          | 0.01          | 0.06               | 19.00         | 1.69                     | 1.00 | 0.011           | 0.000                   | 0.011                   |
| 6                     | 0.06            | 0.07          | 0.01          | 0.07               | 19.00         | 1.67                     | 1.00 | 0.011           | 0.000                   | 0.011                   |
| 7                     | 0.07            | 0.08          | 0.01          | 0.07               | 19.00         | 11.32                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 8                     | 0.08            | 0.09          | 0.01          | 0.09               | 19.00         | 14.42                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 9                     | 0.09            | 0.10          | 0.01          | 0.09               | 19.00         | 14.32                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 10                    | 0.10            | 0.11          | 0.01          | 0.10               | 19.00         | 14.11                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 11                    | 0.11            | 0.12          | 0.01          | 0.12               | 19.00         | 13.80                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 12                    | 0.12            | 0.13          | 0.01          | 0.13               | 19.00         | 13.41                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 13                    | 0.13            | 0.14          | 0.01          | 0.14               | 19.00         | 12.85                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 14                    | 0.14            | 0.15          | 0.01          | 0.14               | 19.00         | 12.26                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 15                    | 0.15            | 0.16          | 0.01          | 0.15               | 19.00         | 11.64                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 16                    | 0.16            | 0.17          | 0.01          | 0.17               | 19.00         | 11.03                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 17                    | 0.17            | 0.18          | 0.01          | 0.17               | 19.00         | 10.42                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 18                    | 0.18            | 0.19          | 0.01          | 0.18               | 19.00         | 9.86                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 19                    | 0.19            | 0.20          | 0.01          | 0.20               | 19.00         | 9.34                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 20                    | 0.20            | 0.21          | 0.01          | 0.20               | 19.00         | 8.92                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 21                    | 0.21            | 0.22          | 0.01          | 0.21               | 19.00         | 8.62                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 22                    | 0.22            | 0.23          | 0.01          | 0.23               | 19.00         | 8.48                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 23                    | 0.23            | 0.24          | 0.01          | 0.24               | 19.00         | 8.45                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 24                    | 0.24            | 0.25          | 0.01          | 0.25               | 19.00         | 8.57                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 25                    | 0.25            | 0.26          | 0.01          | 0.26               | 19.00         | 8.78                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 26                    | 0.26            | 0.27          | 0.01          | 0.27               | 19.00         | 9.13                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 27                    | 0.27            | 0.28          | 0.01          | 0.28               | 19.00         | 9.60                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 28                    | 0.28            | 0.29          | 0.01          | 0.28               | 19.00         | 10.16                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 29                    | 0.29            | 0.30          | 0.01          | 0.29               | 19.00         | 10.81                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 30                    | 0.30            | 0.31          | 0.01          | 0.30               | 19.00         | 11.45                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 31                    | 0.31            | 0.32          | 0.01          | 0.32               | 19.00         | 12.12                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 32                    | 0.32            | 0.33          | 0.01          | 0.33               | 19.00         | 12.63                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 33                    | 0.33            | 0.34          | 0.01          | 0.34               | 19.00         | 12.80                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 34                    | 0.34            | 0.35          | 0.01          | 0.34               | 19.00         | 12.55                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 35                    | 0.35            | 0.36          | 0.01          | 0.35               | 19.00         | 11.79                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 36                    | 0.36            | 0.37          | 0.01          | 0.36               | 19.00         | 10.82                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 37                    | 0.37            | 0.38          | 0.01          | 0.37               | 19.00         | 9.62                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 38                    | 0.38            | 0.39          | 0.01          | 0.38               | 19.00         | 8.69                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 39                    | 0.39            | 0.40          | 0.01          | 0.39               | 19.00         | 8.01                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 40                    | 0.40            | 0.41          | 0.01          | 0.40               | 19.00         | 7.64                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 41                    | 0.41            | 0.42          | 0.01          | 0.41               | 19.00         | 7.28                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 42                    | 0.42            | 0.43          | 0.01          | 0.42               | 19.00         | 6.86                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 43                    | 0.43            | 0.44          | 0.01          | 0.43               | 19.00         | 6.50                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 44                    | 0.44            | 0.45          | 0.01          | 0.44               | 19.00         | 6.20                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 45                    | 0.45            | 0.46          | 0.01          | 0.45               | 19.00         | 5.99                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 46                    | 0.46            | 0.47          | 0.01          | 0.46               | 19.00         | 5.77                     | 1.00 | 0.003           | 0.000                   | 0.003                   |



**:: Tabular results ::**

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | $M_{(CPT)}$<br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|----------------------|------|--------------------|-------------------------------|-------------------------------|
| 921      | 9.21               | 9.22             | 0.01             | 9.22                     | 18.91            | 36.59                | 1.00 | 0.001              | 0.000                         | 0.001                         |
| 922      | 9.22               | 9.23             | 0.01             | 9.23                     | 18.91            | 37.02                | 1.00 | 0.001              | 0.000                         | 0.001                         |
| 923      | 9.23               | 9.24             | 0.01             | 9.24                     | 18.91            | 37.51                | 1.00 | 0.001              | 0.000                         | 0.001                         |
| 924      | 9.24               | 9.25             | 0.01             | 9.25                     | 18.91            | 37.95                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 925      | 9.25               | 9.26             | 0.01             | 9.26                     | 18.91            | 38.75                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 926      | 9.26               | 9.27             | 0.01             | 9.27                     | 18.91            | 40.12                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 927      | 9.27               | 9.28             | 0.01             | 9.28                     | 18.91            | 43.53                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 928      | 9.28               | 9.29             | 0.01             | 9.29                     | 18.91            | 45.87                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 929      | 9.29               | 9.30             | 0.01             | 9.30                     | 18.91            | 48.20                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 930      | 9.30               | 9.31             | 0.01             | 9.31                     | 18.91            | 50.13                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 931      | 9.31               | 9.32             | 0.01             | 9.32                     | 18.91            | 51.50                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 932      | 9.32               | 9.33             | 0.01             | 9.33                     | 18.91            | 52.58                | 1.00 | 0.000              | 0.000                         | 0.000                         |

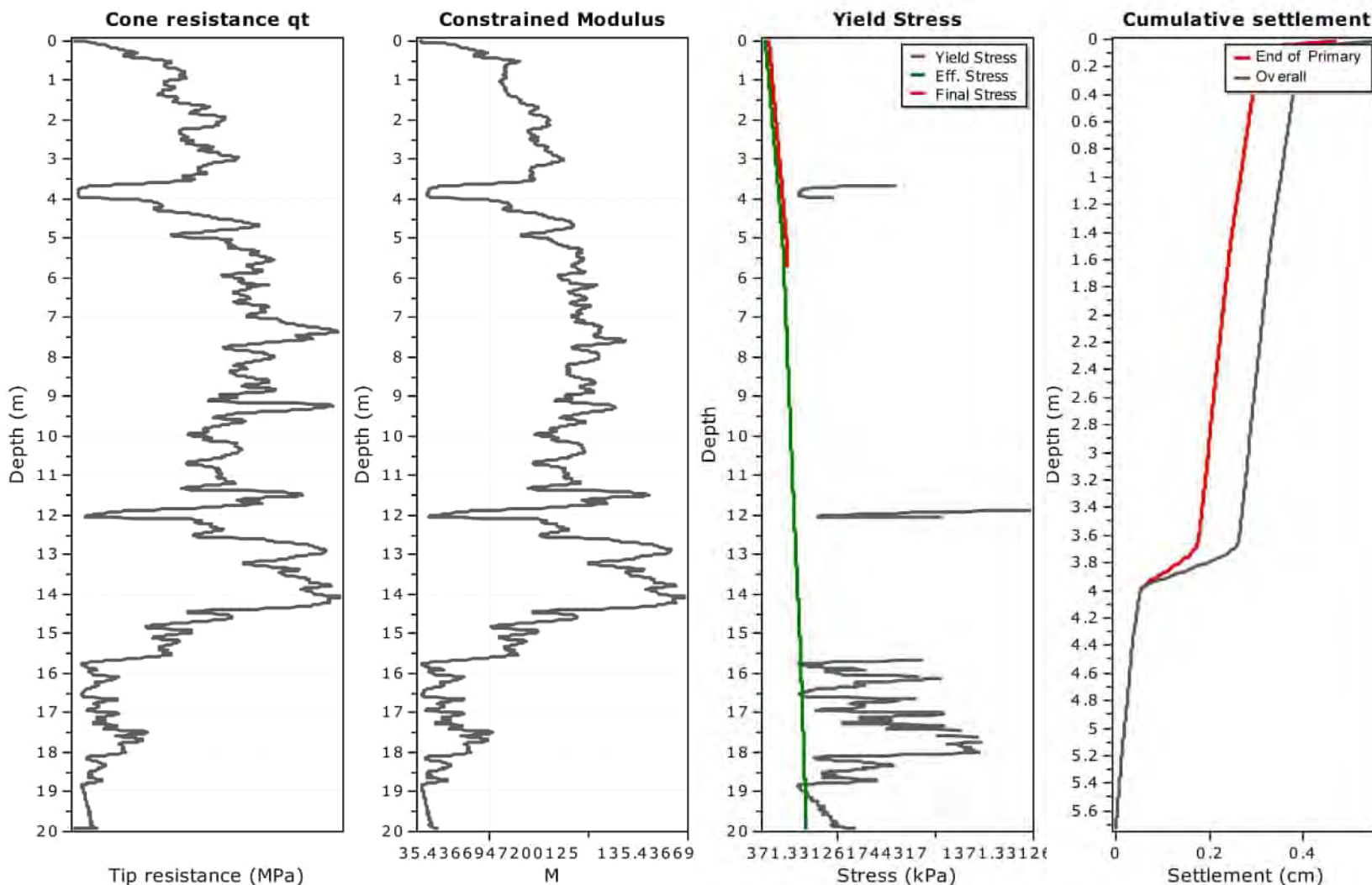
**Total primary settlement: 0.94**  
**Total secondary settlement: 0.13**

**Total calculated settlement: 1.07**

**Abbreviations**

|                     |                                                                                 |
|---------------------|---------------------------------------------------------------------------------|
| Start depth:        | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:          | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:          | Thickness of soil layer                                                         |
| Relative depth:     | Depth of calculation relative to footing                                        |
| Iz:                 | Stress influence factor                                                         |
| Delta P:            | Footing imposed stress:                                                         |
| Eff. stress:        | Effective stress                                                                |
| $M_{(CPT)}$ :       | Constrained modulus from CPT                                                    |
| Settlement:         | Primary settlement                                                              |
| Second. settlement: | Secondary settlements due to creep                                              |

### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 19.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 19.00         | 0.35                     | 1.00 | 0.055           | 0.000                   | 0.055                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 19.00         | 0.58                     | 1.00 | 0.033           | 0.000                   | 0.033                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 19.00         | 0.92                     | 1.00 | 0.021           | 0.000                   | 0.021                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 19.00         | 1.28                     | 1.00 | 0.015           | 0.000                   | 0.015                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 19.00         | 1.40                     | 1.00 | 0.014           | 0.000                   | 0.014                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 19.00         | 1.47                     | 1.00 | 0.013           | 0.000                   | 0.013                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 19.00         | 11.85                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 19.00         | 14.49                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 19.00         | 16.05                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 19.00         | 17.46                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 19.00         | 18.49                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 19.00         | 18.92                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 19.00         | 19.23                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 19.00         | 19.59                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 19.00         | 20.10                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 19.00         | 20.71                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 19.00         | 21.47                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 19.00         | 22.25                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 19.00         | 23.18                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 19.00         | 24.09                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 19.00         | 25.06                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 19.00         | 25.93                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 19.00         | 26.69                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 19.00         | 27.43                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 19.00         | 28.13                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 19.00         | 28.89                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 19.00         | 29.86                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 19.00         | 31.72                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 19.00         | 33.46                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 19.00         | 34.52                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 19.00         | 34.31                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 19.00         | 33.70                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 19.00         | 32.77                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 19.00         | 31.52                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 19.00         | 30.09                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 19.00         | 28.84                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 19.00         | 27.90                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 19.00         | 27.52                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 19.00         | 27.55                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 19.00         | 28.32                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 19.00         | 29.76                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 19.00         | 32.02                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 19.00         | 34.59                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 19.00         | 37.22                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 19.00         | 39.77                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 19.00         | 42.07                    | 1.00 | 0.000           | 0.000                   | 0.000                   |

**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 553      | 5.53            | 5.54          | 0.01          | 5.54               | 18.98         | 82.81                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 554      | 5.54            | 5.55          | 0.01          | 5.55               | 18.98         | 82.93                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 555      | 5.55            | 5.56          | 0.01          | 5.56               | 18.98         | 82.74                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 556      | 5.56            | 5.57          | 0.01          | 5.57               | 18.98         | 82.35                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 557      | 5.57            | 5.58          | 0.01          | 5.58               | 18.98         | 81.60                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 558      | 5.58            | 5.59          | 0.01          | 5.59               | 18.98         | 81.06                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 559      | 5.59            | 5.60          | 0.01          | 5.60               | 18.98         | 80.59                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 560      | 5.60            | 5.61          | 0.01          | 5.61               | 18.98         | 80.39                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 561      | 5.61            | 5.62          | 0.01          | 5.62               | 18.98         | 80.02                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 562      | 5.62            | 5.63          | 0.01          | 5.63               | 18.98         | 79.66                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 563      | 5.63            | 5.64          | 0.01          | 5.64               | 18.98         | 79.15                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 564      | 5.64            | 5.65          | 0.01          | 5.65               | 18.98         | 78.48                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 565      | 5.65            | 5.66          | 0.01          | 5.66               | 18.98         | 77.57                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 566      | 5.66            | 5.67          | 0.01          | 5.67               | 18.98         | 76.81                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 567      | 5.67            | 5.68          | 0.01          | 5.68               | 18.98         | 76.45                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 568      | 5.68            | 5.69          | 0.01          | 5.69               | 18.98         | 76.50                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 569      | 5.69            | 5.70          | 0.01          | 5.70               | 18.98         | 76.69                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 570      | 5.70            | 5.71          | 0.01          | 5.71               | 18.98         | 77.13                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 571      | 5.71            | 5.72          | 0.01          | 5.72               | 18.98         | 77.82                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 572      | 5.72            | 5.73          | 0.01          | 5.73               | 18.98         | 78.42                    | 1.00 | 0.000           | 0.000                   | 0.000                   |

**Total primary settlement: 0.47**  
**Total secondary settlement: 0.09**

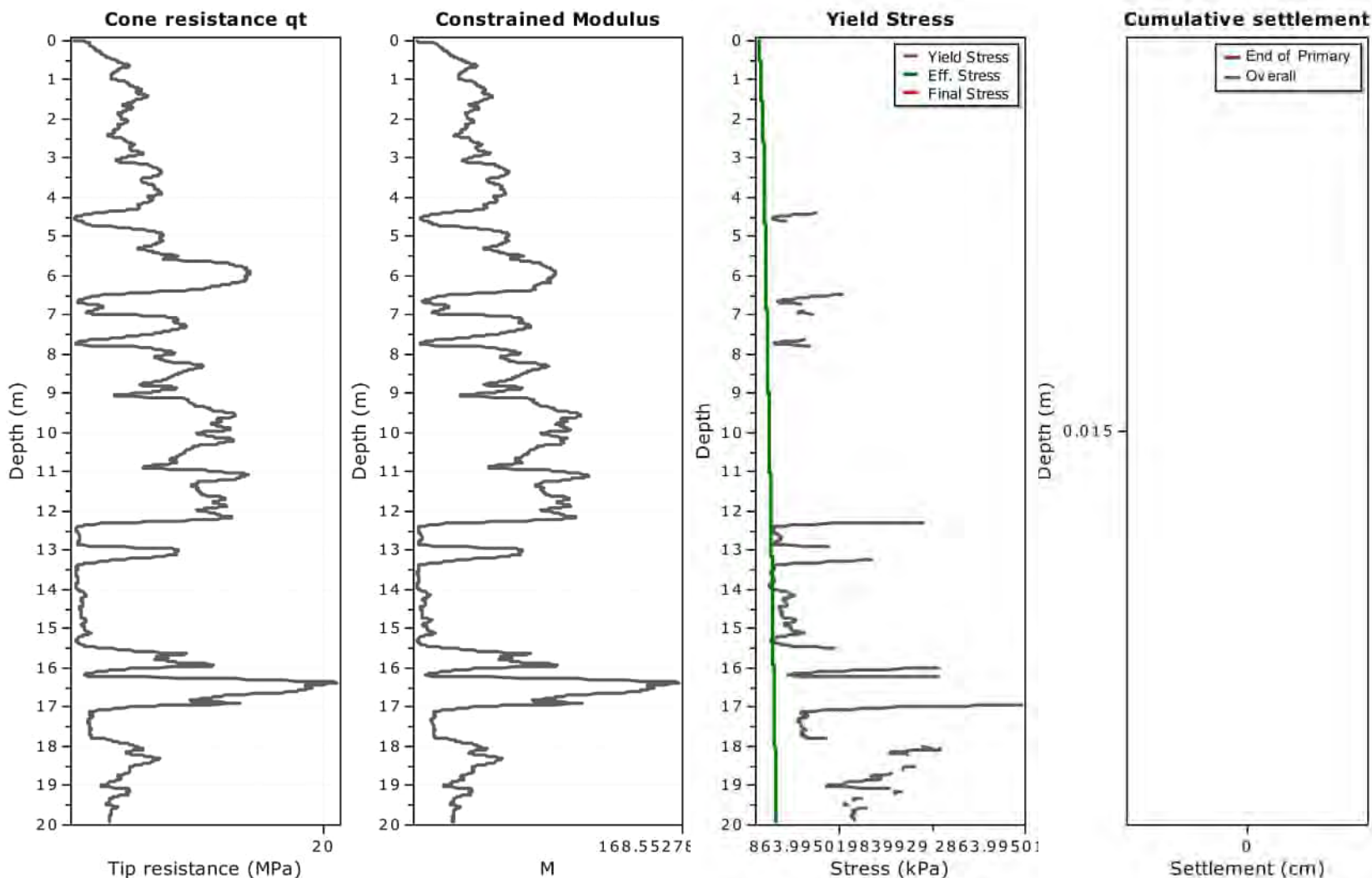
**Total calculated settlement: 0.55**

**Abbreviations**

|                      |                                                                                 |
|----------------------|---------------------------------------------------------------------------------|
| Start depth:         | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:           | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:           | Thickness of soil layer                                                         |
| Relative depth:      | Depth of calculation relative to footing                                        |
| Iz:                  | Stress influence factor                                                         |
| Delta P:             | Footing imposed stress:                                                         |
| Eff. stress:         | Effective stress                                                                |
| M <sub>(CPT)</sub> : | Constrained modulus from CPT                                                    |
| Settlement:          | Primary settlement                                                              |
| Second. settlement:  | Secondary settlements due to creep                                              |



**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 0.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation

| :: Tabular results :: |                    |                  |                  |                          |                  |                             |      |                    |                               |                               |
|-----------------------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| Point No              | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
| 1                     | 0.01               | 0.02             | 0.01             | 0.01                     | 0.00             | 0.72                        | 1.00 | 0.000              | 0.000                         | 0.000                         |

Total primary settlement: 0.00

Total secondary settlement: 0.00

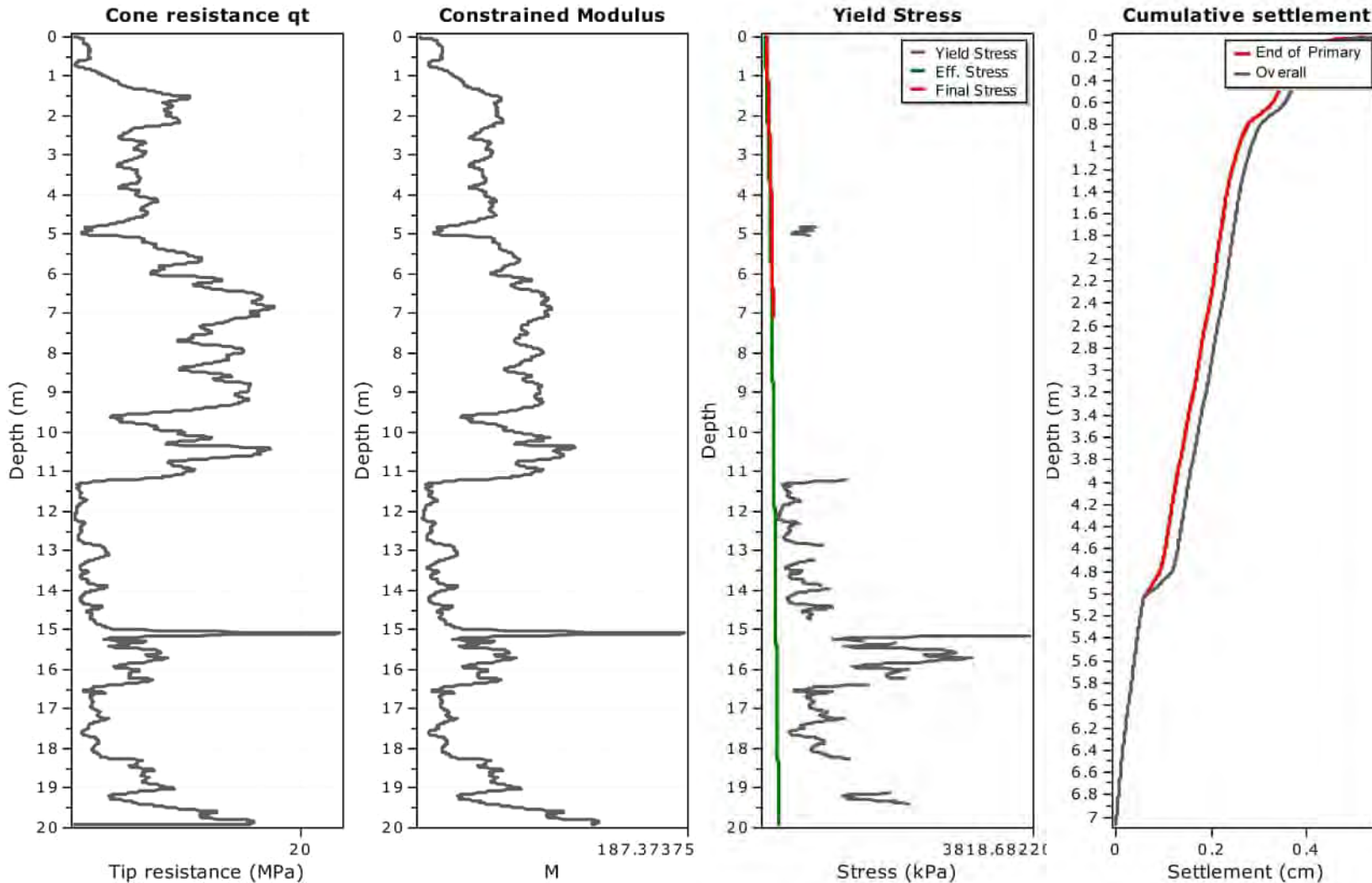
Total calculated settlement: 0.00

Abbreviations

- Start depth: Start depth of soil layer (penetration depth measured from ground free surface)
- End depth: End depth of soil layer (penetration depth measured from ground free surface)
- Thickness: Thickness of soil layer
- Relative depth: Depth of calculation relative to footing
- Iz: Stress influence factor
- Delta P: Footing imposed stress:
- Eff. stress: Effective stress
- M<sub>(CPT)</sub>: Constrained modulus from CPT
- Settlement: Primary settlement
- Second. settlement: Secondary settlement due to creep



**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 19.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( 1 - e^{-t/t_p} \right)$$

where  $t_p$  is the duration of primary consolidation

**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 19.00         | 0.69                     | 1.00 | 0.027           | 0.000                   | 0.027                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 19.00         | 0.81                     | 1.00 | 0.023           | 0.000                   | 0.023                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 19.00         | 0.98                     | 1.00 | 0.019           | 0.000                   | 0.019                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 19.00         | 1.11                     | 1.00 | 0.017           | 0.000                   | 0.017                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 19.00         | 1.19                     | 1.00 | 0.016           | 0.000                   | 0.016                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 19.00         | 1.24                     | 1.00 | 0.015           | 0.000                   | 0.015                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 19.00         | 8.45                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 19.00         | 9.57                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 19.00         | 10.87                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 19.00         | 11.65                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 19.00         | 11.90                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 19.00         | 12.01                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 19.00         | 12.10                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 19.00         | 12.17                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 19.00         | 12.22                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 19.00         | 12.37                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 19.00         | 12.61                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 19.00         | 12.96                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 19.00         | 13.32                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 19.00         | 13.71                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 19.00         | 14.07                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 19.00         | 14.41                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 19.00         | 14.56                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 19.00         | 14.77                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 19.00         | 15.41                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 19.00         | 15.64                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 19.00         | 15.70                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 19.00         | 15.80                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 19.00         | 15.89                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 19.00         | 15.98                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 19.00         | 15.94                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 19.00         | 15.87                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 19.00         | 15.83                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 19.00         | 15.88                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 19.00         | 15.92                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 19.00         | 15.99                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 19.00         | 16.00                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 19.00         | 15.96                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 19.00         | 15.88                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 19.00         | 15.80                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 19.00         | 15.74                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 19.00         | 15.67                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 19.00         | 15.62                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 19.00         | 15.55                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 19.00         | 15.44                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 19.00         | 15.34                    | 1.00 | 0.001           | 0.000                   | 0.001                   |



**:: Tabular results ::**

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | $M_{(CPT)}$<br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|----------------------|------|--------------------|-------------------------------|-------------------------------|
| 691      | 6.91               | 6.92             | 0.01             | 6.92                     | 18.96            | 90.90                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 692      | 6.92               | 6.93             | 0.01             | 6.93                     | 18.96            | 89.80                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 693      | 6.93               | 6.94             | 0.01             | 6.94                     | 18.96            | 88.70                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 694      | 6.94               | 6.95             | 0.01             | 6.95                     | 18.96            | 88.01                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 695      | 6.95               | 6.96             | 0.01             | 6.96                     | 18.96            | 87.63                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 696      | 6.96               | 6.97             | 0.01             | 6.97                     | 18.96            | 87.65                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 697      | 6.97               | 6.98             | 0.01             | 6.98                     | 18.96            | 87.62                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 698      | 6.98               | 6.99             | 0.01             | 6.99                     | 18.96            | 87.88                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 699      | 6.99               | 7.00             | 0.01             | 7.00                     | 18.96            | 88.06                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 700      | 7.00               | 7.01             | 0.01             | 7.01                     | 18.96            | 88.41                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 701      | 7.01               | 7.02             | 0.01             | 7.02                     | 18.96            | 88.65                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 702      | 7.02               | 7.03             | 0.01             | 7.03                     | 18.96            | 88.81                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 703      | 7.03               | 7.04             | 0.01             | 7.04                     | 18.96            | 88.97                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 704      | 7.04               | 7.05             | 0.01             | 7.05                     | 18.96            | 89.22                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 705      | 7.05               | 7.06             | 0.01             | 7.06                     | 18.96            | 89.67                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 706      | 7.06               | 7.07             | 0.01             | 7.07                     | 18.96            | 90.10                | 1.00 | 0.000              | 0.000                         | 0.000                         |

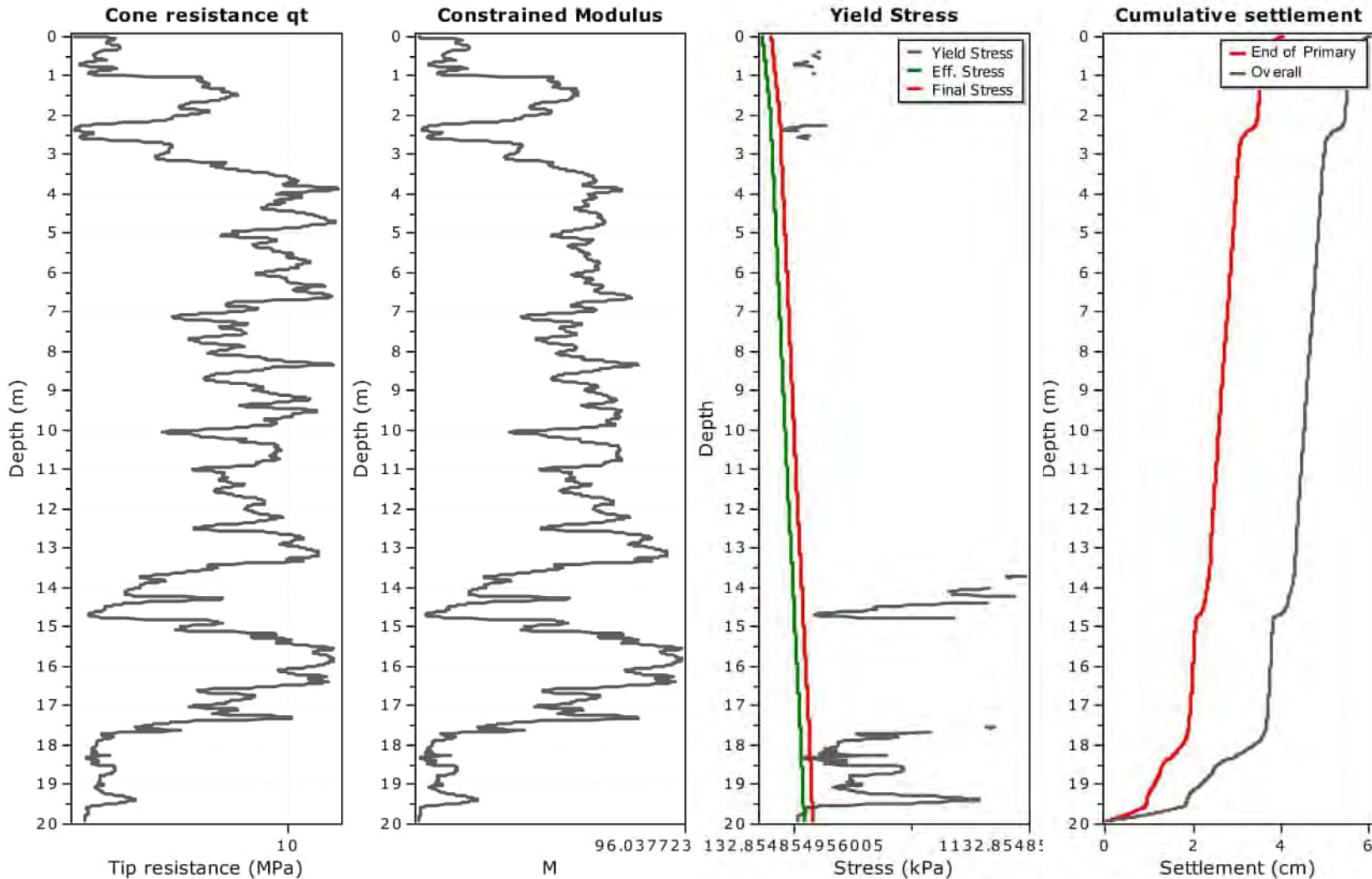
**Total primary settlement: 0.52**  
**Total secondary settlement: 0.03**

**Total calculated settlement: 0.54**

**Abbreviations**

|                     |                                                                                 |
|---------------------|---------------------------------------------------------------------------------|
| Start depth:        | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:          | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:          | Thickness of soil layer                                                         |
| Relative depth:     | Depth of calculation relative to footing                                        |
| Iz:                 | Stress influence factor                                                         |
| Delta P:            | Footing imposed stress:                                                         |
| Eff. stress:        | Effective stress                                                                |
| $M_{(CPT)}$ :       | Constrained modulus from CPT                                                    |
| Settlement:         | Primary settlement                                                              |
| Second. settlement: | Secondary settlements due to creep                                              |

### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 38.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 38.00         | 0.98                     | 1.00 | 0.039           | 0.000                   | 0.039                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 38.00         | 1.29                     | 1.00 | 0.029           | 0.000                   | 0.029                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 38.00         | 1.61                     | 1.00 | 0.024           | 0.000                   | 0.024                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 38.00         | 1.75                     | 1.00 | 0.022           | 0.000                   | 0.022                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 38.00         | 1.87                     | 1.00 | 0.020           | 0.000                   | 0.020                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 38.00         | 1.95                     | 1.00 | 0.020           | 0.000                   | 0.020                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 38.00         | 13.31                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 38.00         | 16.39                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 38.00         | 15.88                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 38.00         | 15.35                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 38.00         | 14.96                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 38.00         | 14.65                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 38.00         | 14.38                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 38.00         | 14.16                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 38.00         | 14.07                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 38.00         | 14.05                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 38.00         | 14.14                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 38.00         | 14.35                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 38.00         | 14.93                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 38.00         | 15.57                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 38.00         | 16.27                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 38.00         | 16.85                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 38.00         | 17.61                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 38.00         | 18.31                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 38.00         | 18.78                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 38.00         | 18.97                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 38.00         | 18.98                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 38.00         | 19.00                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 38.00         | 18.99                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 38.00         | 19.00                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 38.00         | 18.96                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 38.00         | 18.68                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 38.00         | 17.96                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 38.00         | 16.81                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 38.00         | 15.73                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 38.00         | 14.46                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 38.00         | 13.19                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 38.00         | 11.96                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 38.00         | 11.39                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 38.00         | 11.19                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 38.00         | 10.99                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 38.00         | 10.64                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 38.00         | 10.25                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 38.00         | 9.86                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 38.00         | 9.69                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 38.00         | 9.44                     | 1.00 | 0.004           | 0.000                   | 0.004                   |

**:: Tabular results ::**

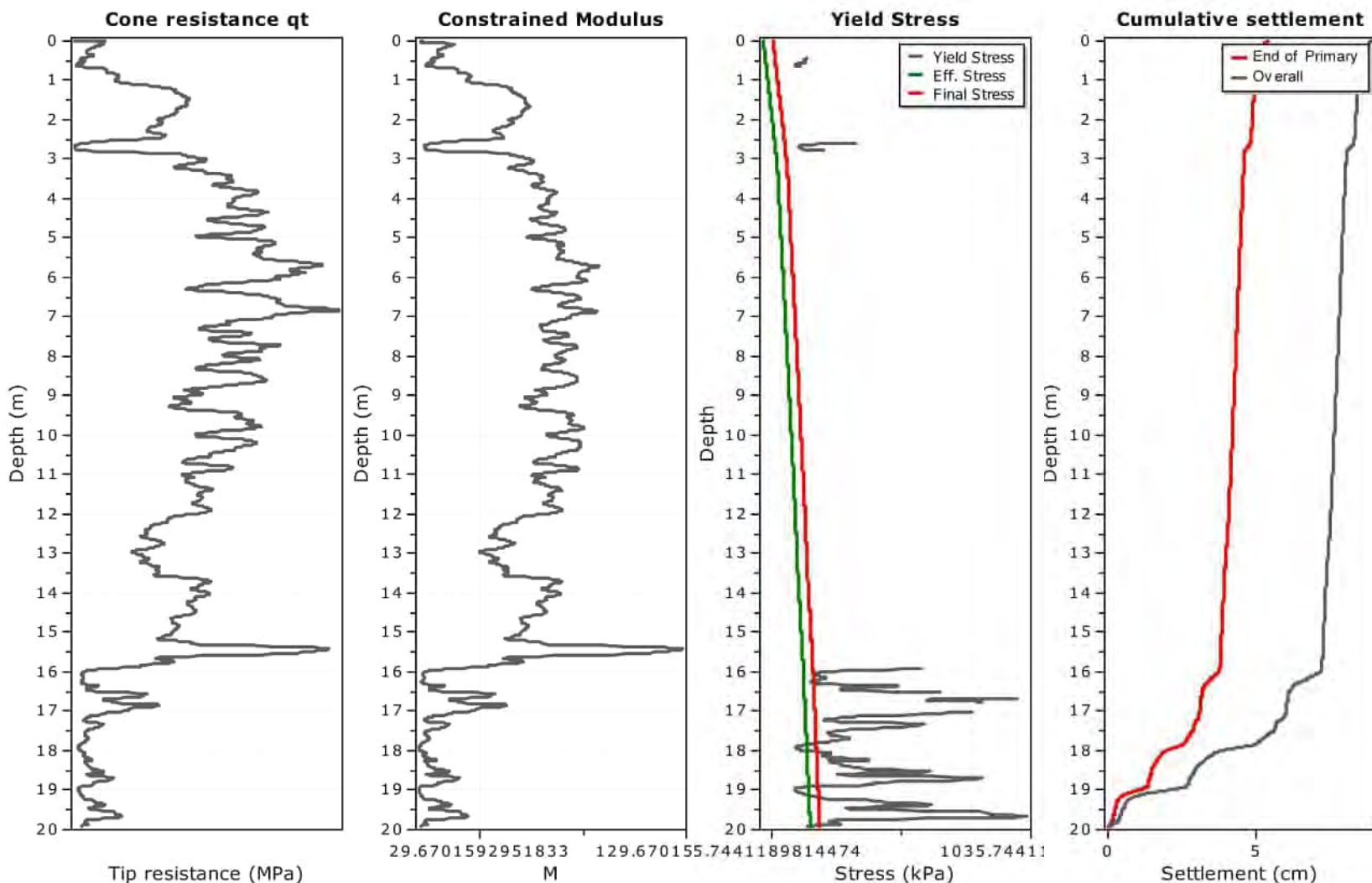
| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | $M_{(CPT)}$<br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|----------------------|------|--------------------|-------------------------------|-------------------------------|
| 1979     | 19.79              | 19.80            | 0.01             | 19.80                    | 36.54            | 1.24                 | 0.96 | 0.029              | 0.028                         | 0.058                         |
| 1980     | 19.80              | 19.81            | 0.01             | 19.81                    | 36.53            | 1.21                 | 0.96 | 0.030              | 0.029                         | 0.059                         |
| 1981     | 19.81              | 19.82            | 0.01             | 19.82                    | 36.53            | 1.20                 | 0.96 | 0.030              | 0.029                         | 0.060                         |
| 1982     | 19.82              | 19.83            | 0.01             | 19.83                    | 36.53            | 1.19                 | 0.96 | 0.031              | 0.030                         | 0.060                         |
| 1983     | 19.83              | 19.84            | 0.01             | 19.84                    | 36.53            | 1.19                 | 0.96 | 0.031              | 0.030                         | 0.061                         |
| 1984     | 19.84              | 19.85            | 0.01             | 19.85                    | 36.53            | 1.18                 | 0.96 | 0.031              | 0.030                         | 0.061                         |
| 1985     | 19.85              | 19.86            | 0.01             | 19.86                    | 36.52            | 1.17                 | 0.96 | 0.031              | 0.030                         | 0.061                         |
| 1986     | 19.86              | 19.87            | 0.01             | 19.87                    | 36.52            | 1.16                 | 0.96 | 0.031              | 0.030                         | 0.062                         |
| 1987     | 19.87              | 19.88            | 0.01             | 19.88                    | 36.52            | 1.15                 | 0.96 | 0.032              | 0.031                         | 0.062                         |
| 1988     | 19.88              | 19.89            | 0.01             | 19.89                    | 36.52            | 1.15                 | 0.96 | 0.032              | 0.031                         | 0.062                         |
| 1989     | 19.89              | 19.90            | 0.01             | 19.90                    | 36.52            | 1.14                 | 0.96 | 0.032              | 0.031                         | 0.063                         |
| 1990     | 19.90              | 19.91            | 0.01             | 19.91                    | 36.51            | 1.14                 | 0.96 | 0.032              | 0.031                         | 0.063                         |
| 1991     | 19.91              | 19.92            | 0.01             | 19.92                    | 36.51            | 1.15                 | 0.96 | 0.032              | 0.031                         | 0.063                         |

**Total primary settlement: 4.03****Total secondary settlement: 2.00****Total calculated settlement: 6.03****Abbreviations**

|                     |                                                                                 |
|---------------------|---------------------------------------------------------------------------------|
| Start depth:        | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:          | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:          | Thickness of soil layer                                                         |
| Relative depth:     | Depth of calculation relative to footing                                        |
| Iz:                 | Stress influence factor                                                         |
| Delta P:            | Footing imposed stress:                                                         |
| Eff. stress:        | Effective stress                                                                |
| $M_{(CPT)}$ :       | Constrained modulus from CPT                                                    |
| Settlement:         | Primary settlement                                                              |
| Second. settlement: | Secondary settlements due to creep                                              |



### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 38.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation

**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 38.00         | 2.07                     | 1.00 | 0.018           | 0.000                   | 0.018                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 38.00         | 1.94                     | 1.00 | 0.020           | 0.000                   | 0.020                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 38.00         | 1.82                     | 1.00 | 0.021           | 0.000                   | 0.021                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 38.00         | 1.77                     | 1.00 | 0.021           | 0.000                   | 0.021                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 38.00         | 1.84                     | 1.00 | 0.021           | 0.000                   | 0.021                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 38.00         | 1.93                     | 1.00 | 0.020           | 0.000                   | 0.020                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 38.00         | 12.77                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 38.00         | 15.88                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 38.00         | 17.87                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 38.00         | 17.50                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 38.00         | 16.79                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 38.00         | 16.00                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 38.00         | 15.15                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 38.00         | 14.44                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 38.00         | 13.89                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 38.00         | 13.39                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 38.00         | 12.95                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 38.00         | 12.56                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 38.00         | 12.23                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 38.00         | 11.83                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 38.00         | 11.35                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 38.00         | 10.85                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 38.00         | 10.35                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 38.00         | 9.96                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 38.00         | 9.74                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 38.00         | 9.68                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 38.00         | 9.64                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 38.00         | 9.52                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 38.00         | 9.43                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 38.00         | 9.37                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 38.00         | 9.45                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 38.00         | 9.61                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 38.00         | 9.91                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 38.00         | 10.43                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 38.00         | 11.20                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 38.00         | 12.15                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 38.00         | 12.55                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 38.00         | 12.44                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 38.00         | 11.82                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 38.00         | 11.16                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 38.00         | 10.37                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 38.00         | 9.34                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 38.00         | 8.41                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 38.00         | 7.63                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 38.00         | 7.12                     | 1.00 | 0.005           | 0.000                   | 0.006                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 38.00         | 6.65                     | 1.00 | 0.006           | 0.000                   | 0.006                   |



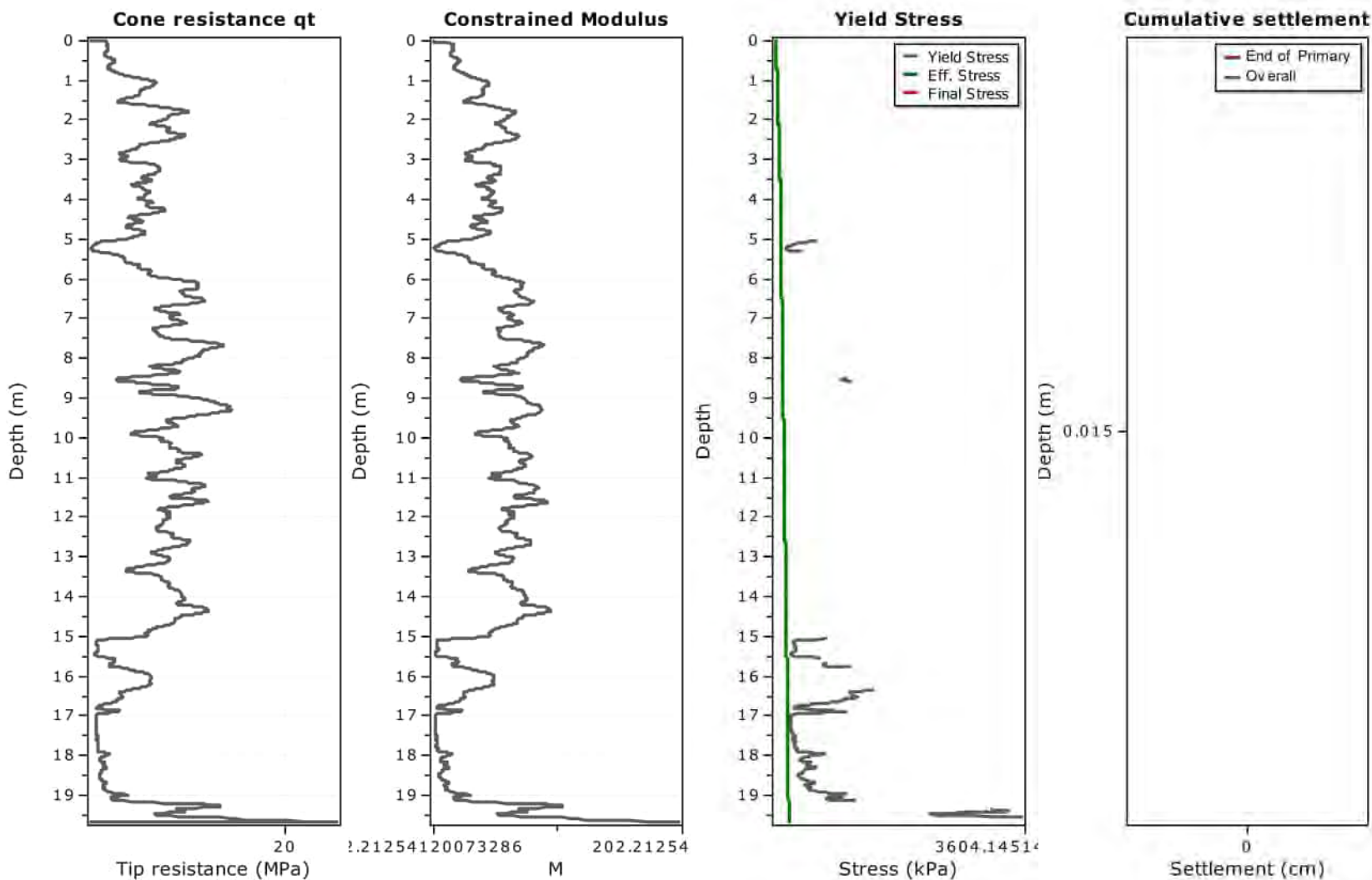
**:: Tabular results ::**

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | $M_{(CPT)}$<br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|----------------------|------|--------------------|-------------------------------|-------------------------------|
| 1979     | 19.79              | 19.80            | 0.01             | 19.80                    | 36.54            | 3.59                 | 0.96 | 0.010              | 0.010                         | 0.020                         |
| 1980     | 19.80              | 19.81            | 0.01             | 19.81                    | 36.53            | 3.39                 | 0.96 | 0.011              | 0.011                         | 0.021                         |
| 1981     | 19.81              | 19.82            | 0.01             | 19.82                    | 36.53            | 3.30                 | 0.96 | 0.011              | 0.011                         | 0.022                         |
| 1982     | 19.82              | 19.83            | 0.01             | 19.83                    | 36.53            | 3.36                 | 0.96 | 0.011              | 0.011                         | 0.022                         |
| 1983     | 19.83              | 19.84            | 0.01             | 19.84                    | 36.53            | 3.66                 | 0.96 | 0.010              | 0.010                         | 0.020                         |
| 1984     | 19.84              | 19.85            | 0.01             | 19.85                    | 36.53            | 4.07                 | 0.96 | 0.009              | 0.009                         | 0.018                         |
| 1985     | 19.85              | 19.86            | 0.01             | 19.86                    | 36.52            | 4.43                 | 0.96 | 0.008              | 0.008                         | 0.016                         |
| 1986     | 19.86              | 19.87            | 0.01             | 19.87                    | 36.52            | 4.50                 | 0.96 | 0.008              | 0.008                         | 0.016                         |
| 1987     | 19.87              | 19.88            | 0.01             | 19.88                    | 36.52            | 3.82                 | 0.96 | 0.010              | 0.009                         | 0.019                         |
| 1988     | 19.88              | 19.89            | 0.01             | 19.89                    | 36.52            | 2.93                 | 0.96 | 0.012              | 0.012                         | 0.025                         |
| 1989     | 19.89              | 19.90            | 0.01             | 19.90                    | 36.52            | 2.15                 | 0.96 | 0.017              | 0.017                         | 0.034                         |
| 1990     | 19.90              | 19.91            | 0.01             | 19.91                    | 36.51            | 1.76                 | 0.96 | 0.021              | 0.021                         | 0.041                         |
| 1991     | 19.91              | 19.92            | 0.01             | 19.92                    | 36.51            | 1.57                 | 0.96 | 0.023              | 0.023                         | 0.046                         |

**Total primary settlement: 5.40****Total secondary settlement: 3.46****Total calculated settlement: 8.86****Abbreviations**

|                     |                                                                                 |
|---------------------|---------------------------------------------------------------------------------|
| Start depth:        | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:          | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:          | Thickness of soil layer                                                         |
| Relative depth:     | Depth of calculation relative to footing                                        |
| Iz:                 | Stress influence factor                                                         |
| Delta P:            | Footing imposed stress:                                                         |
| Eff. stress:        | Effective stress                                                                |
| $M_{(CPT)}$ :       | Constrained modulus from CPT                                                    |
| Settlement:         | Primary settlement                                                              |
| Second. settlement: | Secondary settlements due to creep                                              |

### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 0.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



:: Tabular results ::

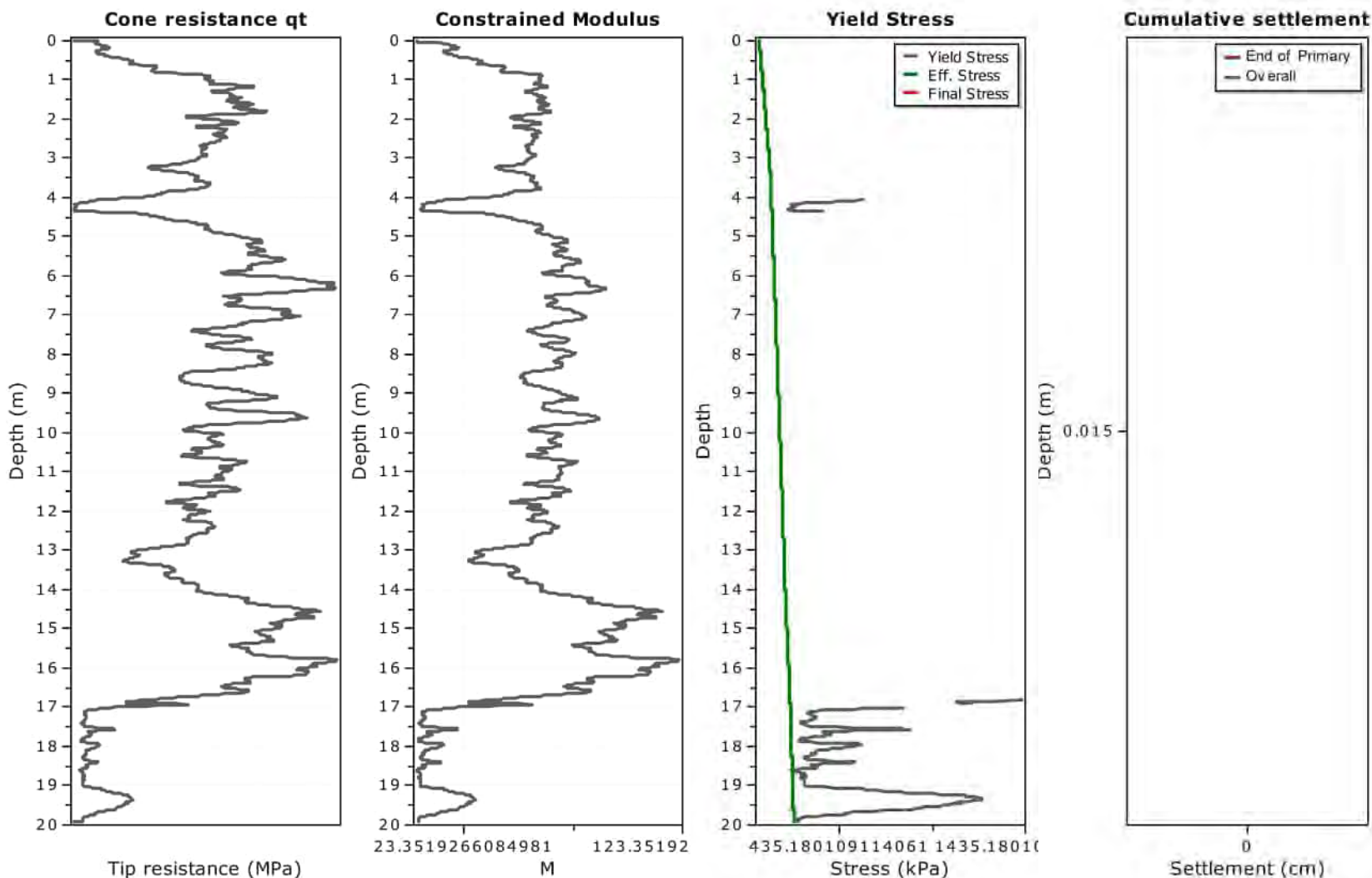
| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 1        | 0.01               | 0.02             | 0.01             | 0.01                     | 0.00             | 1.57                        | 1.00 | 0.000              | 0.000                         | 0.000                         |

**Total primary settlement: 0.00**  
**Total secondary settlement: 0.00**  
**Total calculated settlement: 0.00**

Abbreviations

- Start depth:
- End depth:
- Thickness:
- Relative depth:
- Iz:
- Delta P:
- Eff. stress:
- M<sub>(CPT)</sub>:
- Settlement:
- Second. settlement:
- Start depth of soil layer (penetration depth measured from ground free surface)
- End depth of soil layer (penetration depth measured from ground free surface)
- Thickness of soil layer
- Depth of calculation relative to footing
- Stress influence factor
- Footing imposed stress:
- Effective stress
- Constrained modulus from CPT
- Primary settlement
- Secondary settlement due to creep

### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 0.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



:: Tabular results ::

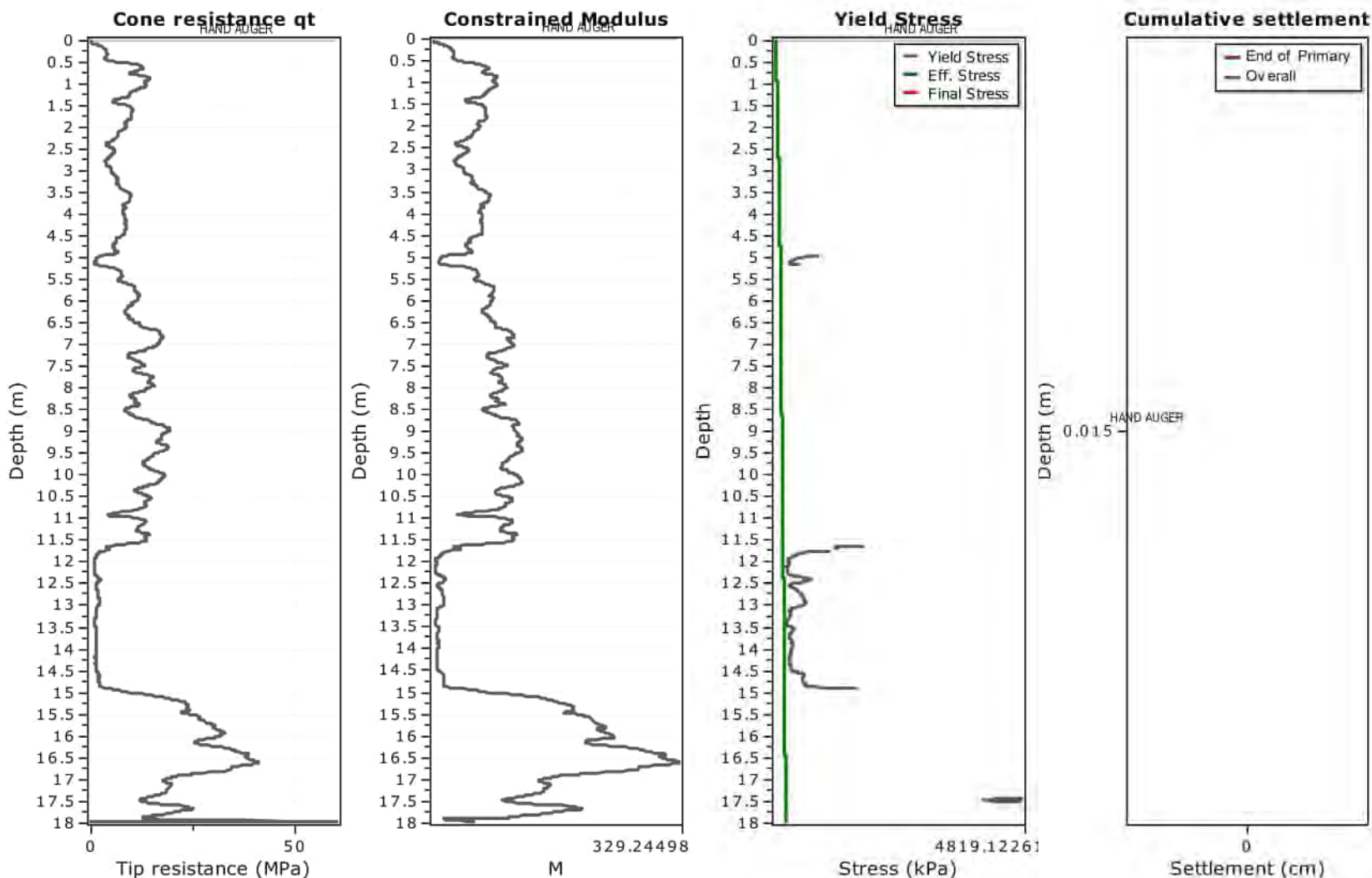
| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 1        | 0.01               | 0.02             | 0.01             | 0.01                     | 0.00             | 1.63                        | 1.00 | 0.000              | 0.000                         | 0.000                         |

**Total primary settlement: 0.00**  
**Total secondary settlement: 0.00**  
**Total calculated settlement: 0.00**

Abbreviations

- Start depth:
- End depth:
- Thickness:
- Relative depth:
- Iz:
- Delta P:
- Eff. stress:
- M<sub>(CPT)</sub>:
- Settlement:
- Second. settlement:
- Start depth of soil layer (penetration depth measured from ground free surface)
- End depth of soil layer (penetration depth measured from ground free surface)
- Thickness of soil layer
- Depth of calculation relative to footing
- Stress influence factor
- Footing imposed stress:
- Effective stress
- Constrained modulus from CPT
- Primary settlement
- Secondary settlement due to creep

### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 0.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( 1 - e^{-t/t_p} \right)$$

where  $t_p$  is the duration of primary consolidation



:: Tabular results ::

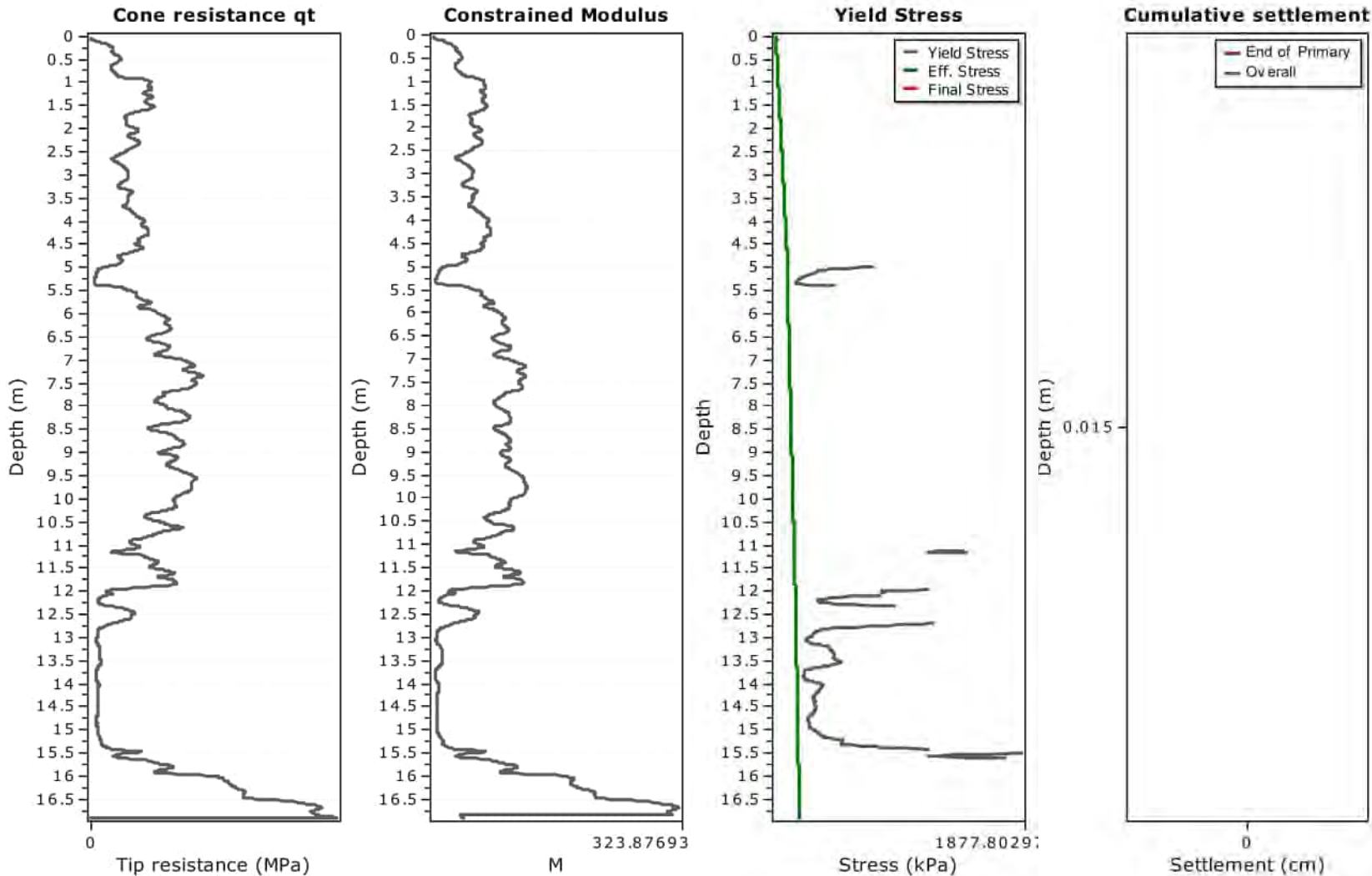
| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 1        | 0.01               | 0.02             | 0.01             | 0.01                     | 0.00             | 0.00                        | 1.00 | 0.000              | 0.000                         | 0.000                         |

**Total primary settlement: 0.00**  
**Total secondary settlement: 0.00**  
**Total calculated settlement: 0.00**

Abbreviations

- Start depth:
- End depth:
- Thickness:
- Relative depth:
- Iz:
- Delta P:
- Eff. stress:
- M<sub>(CPT)</sub>:
- Settlement:
- Second. settlement:
- Start depth of soil layer (penetration depth measured from ground free surface)
- End depth of soil layer (penetration depth measured from ground free surface)
- Thickness of soil layer
- Depth of calculation relative to footing
- Stress influence factor
- Footing imposed stress:
- Effective stress
- Constrained modulus from CPT
- Primary settlement
- Secondary settlement due to creep

**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 0.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



:: Tabular results ::

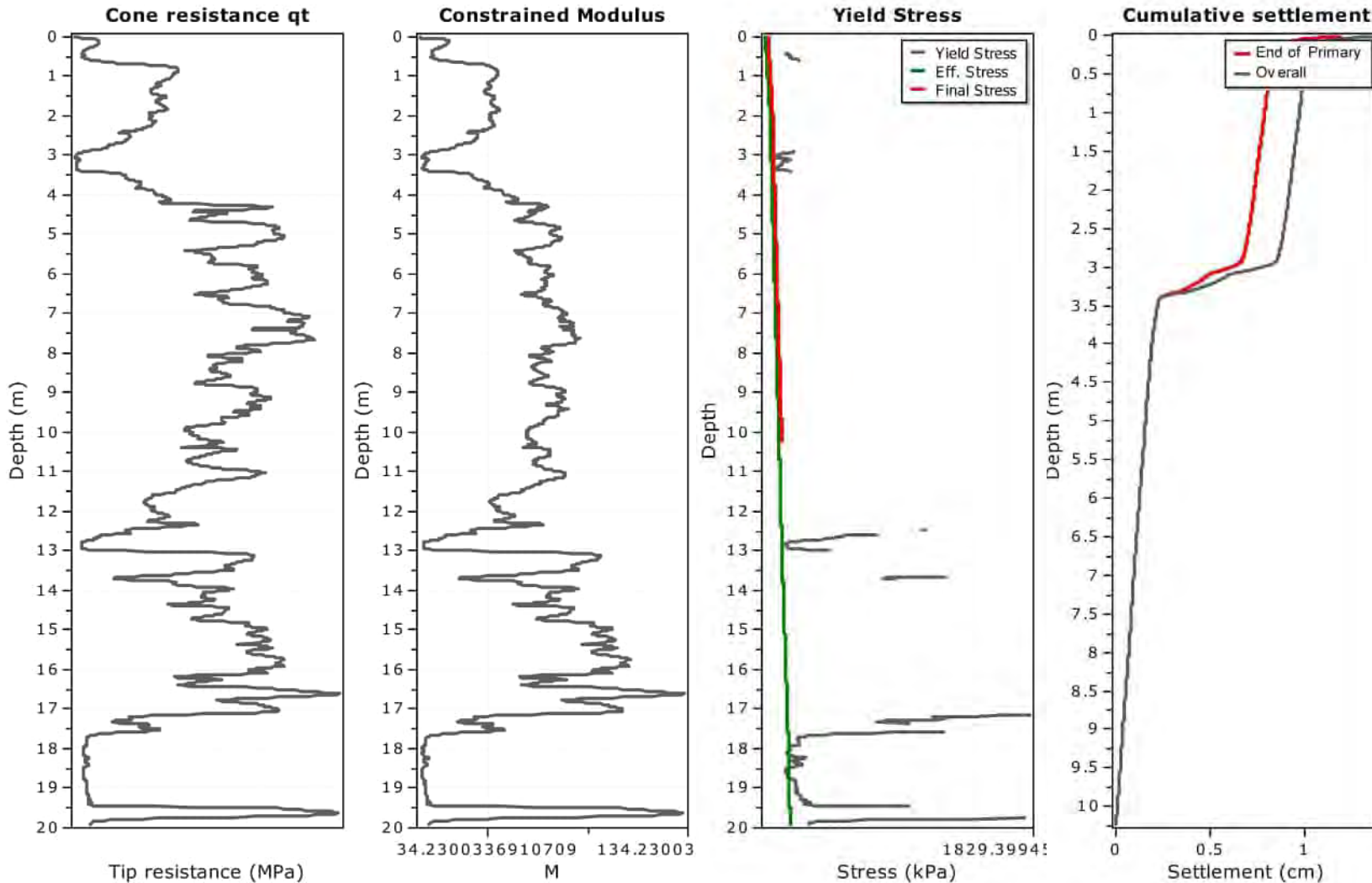
| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 1        | 0.01               | 0.02             | 0.01             | 0.01                     | 0.00             | 0.00                        | 1.00 | 0.000              | 0.000                         | 0.000                         |

**Total primary settlement: 0.00**  
**Total secondary settlement: 0.00**  
**Total calculated settlement: 0.00**

Abbreviations

- Start depth:
- End depth:
- Thickness:
- Relative depth:
- Iz:
- Delta P:
- Eff. stress:
- M<sub>(CPT)</sub>:
- Settlement:
- Second. settlement:
- Start depth of soil layer (penetration depth measured from ground free surface)
- End depth of soil layer (penetration depth measured from ground free surface)
- Thickness of soil layer
- Depth of calculation relative to footing
- Stress influence factor
- Footing imposed stress:
- Effective stress
- Constrained modulus from CPT
- Primary settlement
- Secondary settlement due to creep

### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 19.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 19.00         | 0.22                     | 1.00 | 0.086           | 0.000                   | 0.086                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 19.00         | 0.30                     | 1.00 | 0.063           | 0.000                   | 0.063                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 19.00         | 0.44                     | 1.00 | 0.044           | 0.000                   | 0.044                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 19.00         | 0.60                     | 1.00 | 0.032           | 0.000                   | 0.032                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 19.00         | 0.83                     | 1.00 | 0.023           | 0.000                   | 0.023                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 19.00         | 9.69                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 19.00         | 11.80                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 19.00         | 13.24                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 19.00         | 13.98                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 19.00         | 14.17                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 19.00         | 14.20                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 19.00         | 14.15                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 19.00         | 14.11                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 19.00         | 14.03                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 19.00         | 13.97                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 19.00         | 13.93                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 19.00         | 13.94                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 19.00         | 13.94                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 19.00         | 13.83                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 19.00         | 13.61                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 19.00         | 13.23                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 19.00         | 12.74                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 19.00         | 12.19                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 19.00         | 11.82                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 19.00         | 11.41                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 19.00         | 10.96                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 19.00         | 10.37                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 19.00         | 9.80                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 19.00         | 9.11                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 19.00         | 8.44                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 19.00         | 7.86                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 19.00         | 7.50                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 19.00         | 7.16                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 19.00         | 6.87                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 19.00         | 6.61                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 19.00         | 6.39                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 19.00         | 6.19                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 19.00         | 6.05                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 19.00         | 5.96                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 19.00         | 5.86                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 19.00         | 5.76                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 19.00         | 5.71                     | 1.00 | 0.003           | 0.000                   | 0.004                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 19.00         | 5.73                     | 1.00 | 0.003           | 0.000                   | 0.004                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 19.00         | 5.88                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 19.00         | 6.15                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 19.00         | 6.48                     | 1.00 | 0.003           | 0.000                   | 0.003                   |

**:: Tabular results ::**

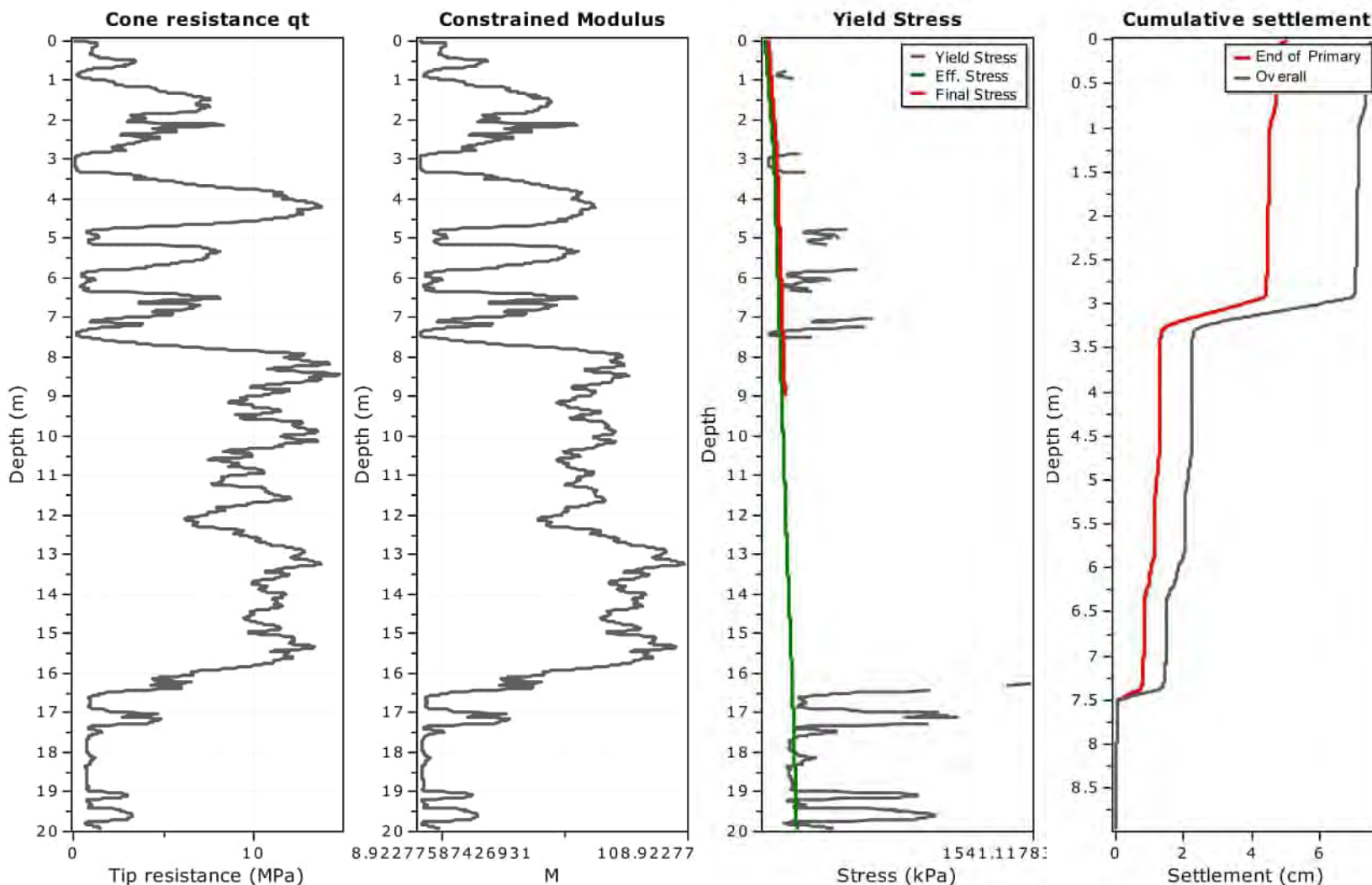
| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 1013     | 10.13              | 10.14            | 0.01             | 10.14                    | 18.89            | 53.62                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1014     | 10.14              | 10.15            | 0.01             | 10.15                    | 18.89            | 53.59                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1015     | 10.15              | 10.16            | 0.01             | 10.16                    | 18.89            | 53.87                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1016     | 10.16              | 10.17            | 0.01             | 10.17                    | 18.89            | 53.98                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1017     | 10.17              | 10.18            | 0.01             | 10.18                    | 18.89            | 54.50                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1018     | 10.18              | 10.19            | 0.01             | 10.19                    | 18.89            | 54.95                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1019     | 10.19              | 10.20            | 0.01             | 10.20                    | 18.89            | 55.75                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1020     | 10.20              | 10.21            | 0.01             | 10.21                    | 18.89            | 55.95                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1021     | 10.21              | 10.22            | 0.01             | 10.22                    | 18.88            | 56.08                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1022     | 10.22              | 10.23            | 0.01             | 10.23                    | 18.88            | 56.12                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1023     | 10.23              | 10.24            | 0.01             | 10.24                    | 18.88            | 56.55                       | 0.99 | 0.000              | 0.000                         | 0.000                         |

**Total primary settlement: 1.18****Total secondary settlement: 0.19****Total calculated settlement: 1.37****Abbreviations**

|                      |                                                                                 |
|----------------------|---------------------------------------------------------------------------------|
| Start depth:         | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:           | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:           | Thickness of soil layer                                                         |
| Relative depth:      | Depth of calculation relative to footing                                        |
| Iz:                  | Stress influence factor                                                         |
| Delta P:             | Footing imposed stress:                                                         |
| Eff. stress:         | Effective stress                                                                |
| M <sub>(CPT)</sub> : | Constrained modulus from CPT                                                    |
| Settlement:          | Primary settlement                                                              |
| Second. settlement:  | Secondary settlements due to creep                                              |



### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 19.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation

**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 19.00         | 0.23                     | 1.00 | 0.081           | 0.000                   | 0.081                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 19.00         | 0.41                     | 1.00 | 0.046           | 0.000                   | 0.046                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 19.00         | 0.65                     | 1.00 | 0.029           | 0.000                   | 0.029                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 19.00         | 0.86                     | 1.00 | 0.022           | 0.000                   | 0.022                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 19.00         | 1.01                     | 1.00 | 0.019           | 0.000                   | 0.019                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 19.00         | 9.82                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 19.00         | 10.25                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 19.00         | 10.52                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 19.00         | 10.65                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 19.00         | 10.64                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 19.00         | 10.41                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 19.00         | 10.20                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 19.00         | 9.95                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 19.00         | 9.77                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 19.00         | 9.58                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 19.00         | 9.39                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 19.00         | 9.23                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 19.00         | 9.05                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 19.00         | 8.83                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 19.00         | 8.60                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 19.00         | 8.44                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 19.00         | 8.37                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 19.00         | 8.34                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 19.00         | 8.34                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 19.00         | 8.36                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 19.00         | 8.40                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 19.00         | 8.38                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 19.00         | 8.29                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 19.00         | 8.15                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 19.00         | 7.93                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 19.00         | 7.76                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 19.00         | 7.68                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 19.00         | 7.83                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 19.00         | 8.14                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 19.00         | 8.52                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 19.00         | 8.91                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 19.00         | 9.33                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 19.00         | 9.78                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 19.00         | 10.25                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 19.00         | 10.65                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 19.00         | 10.88                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 19.00         | 10.98                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 19.00         | 11.45                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 19.00         | 12.77                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 19.00         | 15.29                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 19.00         | 18.70                    | 1.00 | 0.001           | 0.000                   | 0.001                   |



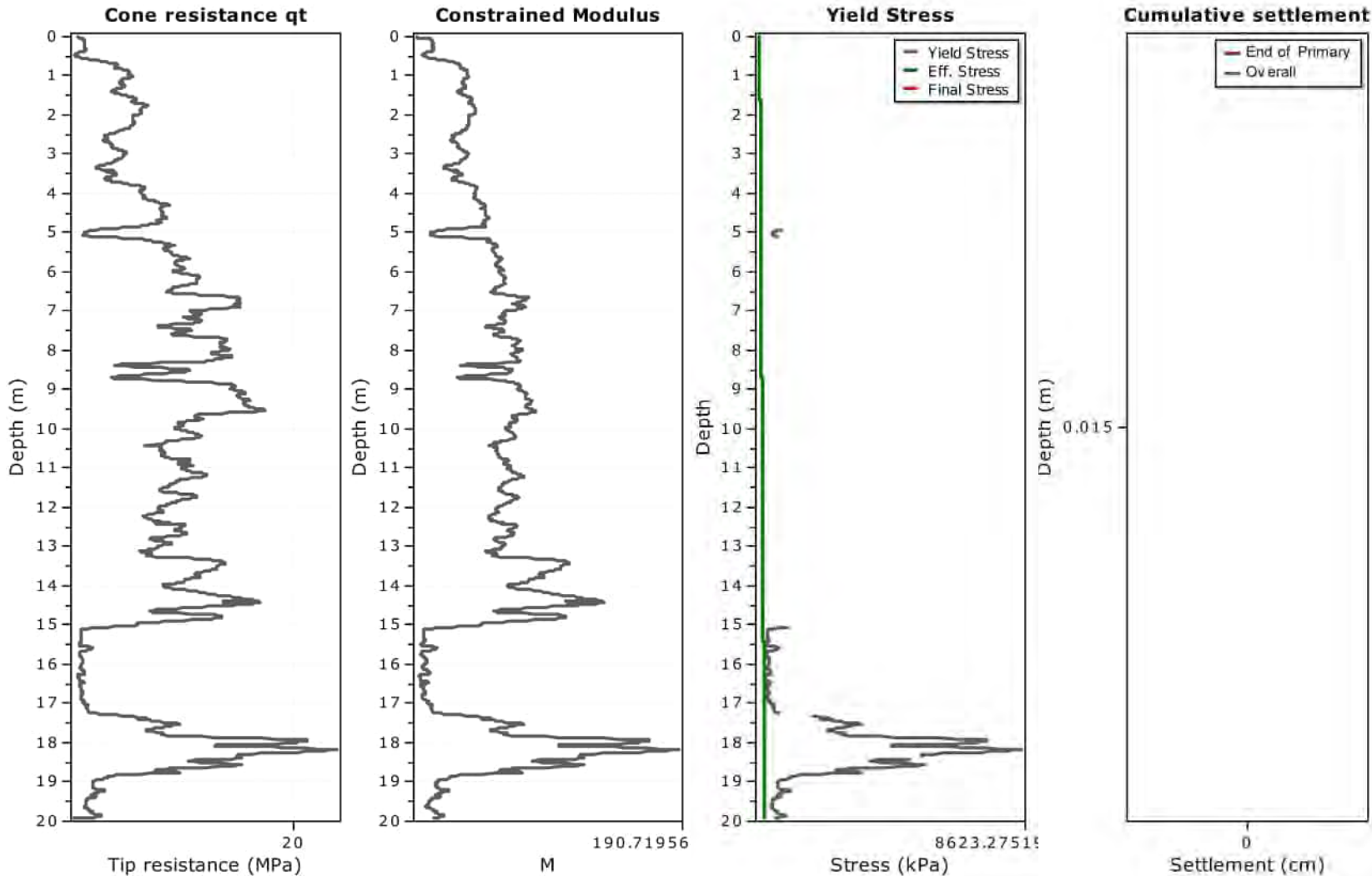
**:: Tabular results ::**

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 875      | 8.75               | 8.76             | 0.01             | 8.76                     | 18.93            | 62.71                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 876      | 8.76               | 8.77             | 0.01             | 8.77                     | 18.93            | 61.95                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 877      | 8.77               | 8.78             | 0.01             | 8.78                     | 18.93            | 61.57                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 878      | 8.78               | 8.79             | 0.01             | 8.79                     | 18.93            | 61.47                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 879      | 8.79               | 8.80             | 0.01             | 8.80                     | 18.93            | 61.84                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 880      | 8.80               | 8.81             | 0.01             | 8.81                     | 18.93            | 62.67                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 881      | 8.81               | 8.82             | 0.01             | 8.82                     | 18.92            | 63.89                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 882      | 8.82               | 8.83             | 0.01             | 8.83                     | 18.92            | 65.18                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 883      | 8.83               | 8.84             | 0.01             | 8.84                     | 18.92            | 66.37                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 884      | 8.84               | 8.85             | 0.01             | 8.85                     | 18.92            | 67.85                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 885      | 8.85               | 8.86             | 0.01             | 8.86                     | 18.92            | 69.19                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 886      | 8.86               | 8.87             | 0.01             | 8.87                     | 18.92            | 70.29                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 887      | 8.87               | 8.88             | 0.01             | 8.88                     | 18.92            | 70.75                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 888      | 8.88               | 8.89             | 0.01             | 8.89                     | 18.92            | 71.17                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 889      | 8.89               | 8.90             | 0.01             | 8.90                     | 18.92            | 71.34                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 890      | 8.90               | 8.91             | 0.01             | 8.91                     | 18.92            | 71.37                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 891      | 8.91               | 8.92             | 0.01             | 8.92                     | 18.92            | 70.93                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 892      | 8.92               | 8.93             | 0.01             | 8.93                     | 18.92            | 70.45                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 893      | 8.93               | 8.94             | 0.01             | 8.94                     | 18.92            | 70.13                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 894      | 8.94               | 8.95             | 0.01             | 8.95                     | 18.92            | 70.04                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 895      | 8.95               | 8.96             | 0.01             | 8.96                     | 18.92            | 70.04                       | 1.00 | 0.000              | 0.000                         | 0.000                         |

**Total primary settlement: 5.00****Total secondary settlement: 2.64****Total calculated settlement: 7.64****Abbreviations**

|                      |                                                                                 |
|----------------------|---------------------------------------------------------------------------------|
| Start depth:         | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:           | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:           | Thickness of soil layer                                                         |
| Relative depth:      | Depth of calculation relative to footing                                        |
| Iz:                  | Stress influence factor                                                         |
| Delta P:             | Footing imposed stress:                                                         |
| Eff. stress:         | Effective stress                                                                |
| M <sub>(CPT)</sub> : | Constrained modulus from CPT                                                    |
| Settlement:          | Primary settlement                                                              |
| Second. settlement:  | Secondary settlements due to creep                                              |

### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 0.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 600 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



:: Tabular results ::

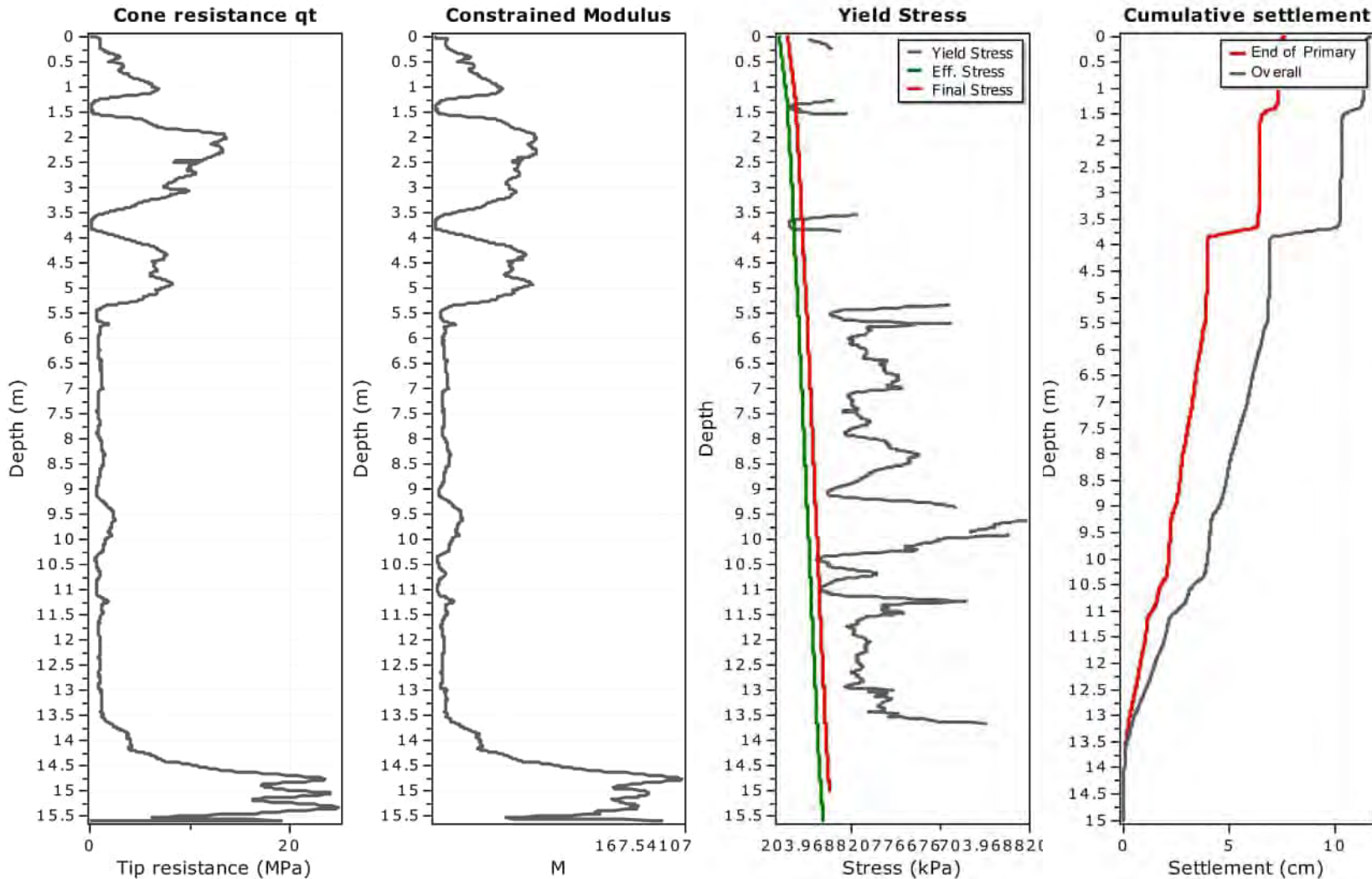
| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 1        | 0.01               | 0.02             | 0.01             | 0.01                     | 0.00             | 0.72                        | 1.00 | 0.000              | 0.000                         | 0.000                         |

**Total primary settlement: 0.00**  
**Total secondary settlement: 0.00**  
**Total calculated settlement: 0.00**

Abbreviations

- Start depth:
- End depth:
- Thickness:
- Relative depth:
- Iz:
- Delta P:
- Eff. stress:
- M<sub>(CPT)</sub>:
- Settlement:
- Second. settlement:
- Start depth of soil layer (penetration depth measured from ground free surface)
- End depth of soil layer (penetration depth measured from ground free surface)
- Thickness of soil layer
- Depth of calculation relative to footing
- Stress influence factor
- Footing imposed stress:
- Effective stress
- Constrained modulus from CPT
- Primary settlement
- Secondary settlement due to creep

**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 24.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



| :: Tabular results :: |                 |               |               |                    |               |                          |      |                 |                         |                         |
|-----------------------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| Point No              | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
| 1                     | 0.01            | 0.02          | 0.01          | 0.01               | 24.00         | 0.37                     | 1.00 | 0.064           | 0.000                   | 0.064                   |
| 2                     | 0.02            | 0.03          | 0.01          | 0.03               | 24.00         | 0.52                     | 1.00 | 0.046           | 0.000                   | 0.046                   |
| 3                     | 0.03            | 0.04          | 0.01          | 0.04               | 24.00         | 0.72                     | 1.00 | 0.033           | 0.000                   | 0.033                   |
| 4                     | 0.04            | 0.05          | 0.01          | 0.04               | 24.00         | 0.85                     | 1.00 | 0.028           | 0.000                   | 0.028                   |
| 5                     | 0.05            | 0.06          | 0.01          | 0.06               | 24.00         | 0.90                     | 1.00 | 0.027           | 0.000                   | 0.027                   |
| 6                     | 0.06            | 0.07          | 0.01          | 0.07               | 24.00         | 7.94                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 7                     | 0.07            | 0.08          | 0.01          | 0.07               | 24.00         | 7.87                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 8                     | 0.08            | 0.09          | 0.01          | 0.09               | 24.00         | 7.76                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 9                     | 0.09            | 0.10          | 0.01          | 0.09               | 24.00         | 7.60                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 10                    | 0.10            | 0.11          | 0.01          | 0.10               | 24.00         | 7.44                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 11                    | 0.11            | 0.12          | 0.01          | 0.12               | 24.00         | 7.29                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 12                    | 0.12            | 0.13          | 0.01          | 0.13               | 24.00         | 7.21                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 13                    | 0.13            | 0.14          | 0.01          | 0.14               | 24.00         | 7.17                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 14                    | 0.14            | 0.15          | 0.01          | 0.14               | 24.00         | 7.19                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 15                    | 0.15            | 0.16          | 0.01          | 0.15               | 24.00         | 7.24                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 16                    | 0.16            | 0.17          | 0.01          | 0.17               | 24.00         | 7.28                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 17                    | 0.17            | 0.18          | 0.01          | 0.17               | 24.00         | 7.34                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 18                    | 0.18            | 0.19          | 0.01          | 0.18               | 24.00         | 7.37                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 19                    | 0.19            | 0.20          | 0.01          | 0.20               | 24.00         | 7.45                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 20                    | 0.20            | 0.21          | 0.01          | 0.20               | 24.00         | 7.50                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 21                    | 0.21            | 0.22          | 0.01          | 0.21               | 24.00         | 7.61                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 22                    | 0.22            | 0.23          | 0.01          | 0.23               | 24.00         | 7.78                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 23                    | 0.23            | 0.24          | 0.01          | 0.24               | 24.00         | 8.05                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 24                    | 0.24            | 0.25          | 0.01          | 0.25               | 24.00         | 8.35                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 25                    | 0.25            | 0.26          | 0.01          | 0.26               | 24.00         | 8.68                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 26                    | 0.26            | 0.27          | 0.01          | 0.27               | 24.00         | 9.18                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 27                    | 0.27            | 0.28          | 0.01          | 0.28               | 24.00         | 9.87                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 28                    | 0.28            | 0.29          | 0.01          | 0.28               | 24.00         | 10.69                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 29                    | 0.29            | 0.30          | 0.01          | 0.29               | 24.00         | 11.44                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 30                    | 0.30            | 0.31          | 0.01          | 0.30               | 24.00         | 12.19                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 31                    | 0.31            | 0.32          | 0.01          | 0.32               | 24.00         | 12.93                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 32                    | 0.32            | 0.33          | 0.01          | 0.33               | 24.00         | 13.74                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 33                    | 0.33            | 0.34          | 0.01          | 0.34               | 24.00         | 14.64                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 34                    | 0.34            | 0.35          | 0.01          | 0.34               | 24.00         | 15.93                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 35                    | 0.35            | 0.36          | 0.01          | 0.35               | 24.00         | 17.21                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 36                    | 0.36            | 0.37          | 0.01          | 0.36               | 24.00         | 18.51                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 37                    | 0.37            | 0.38          | 0.01          | 0.37               | 24.00         | 19.63                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 38                    | 0.38            | 0.39          | 0.01          | 0.38               | 24.00         | 20.81                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 39                    | 0.39            | 0.40          | 0.01          | 0.39               | 24.00         | 21.89                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 40                    | 0.40            | 0.41          | 0.01          | 0.40               | 24.00         | 22.71                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 41                    | 0.41            | 0.42          | 0.01          | 0.41               | 24.00         | 23.23                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 42                    | 0.42            | 0.43          | 0.01          | 0.42               | 24.00         | 23.32                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 43                    | 0.43            | 0.44          | 0.01          | 0.43               | 24.00         | 22.79                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 44                    | 0.44            | 0.45          | 0.01          | 0.44               | 24.00         | 21.83                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 45                    | 0.45            | 0.46          | 0.01          | 0.45               | 24.00         | 20.59                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 46                    | 0.46            | 0.47          | 0.01          | 0.46               | 24.00         | 19.30                    | 1.00 | 0.001           | 0.000                   | 0.001                   |

**:: Tabular results ::**

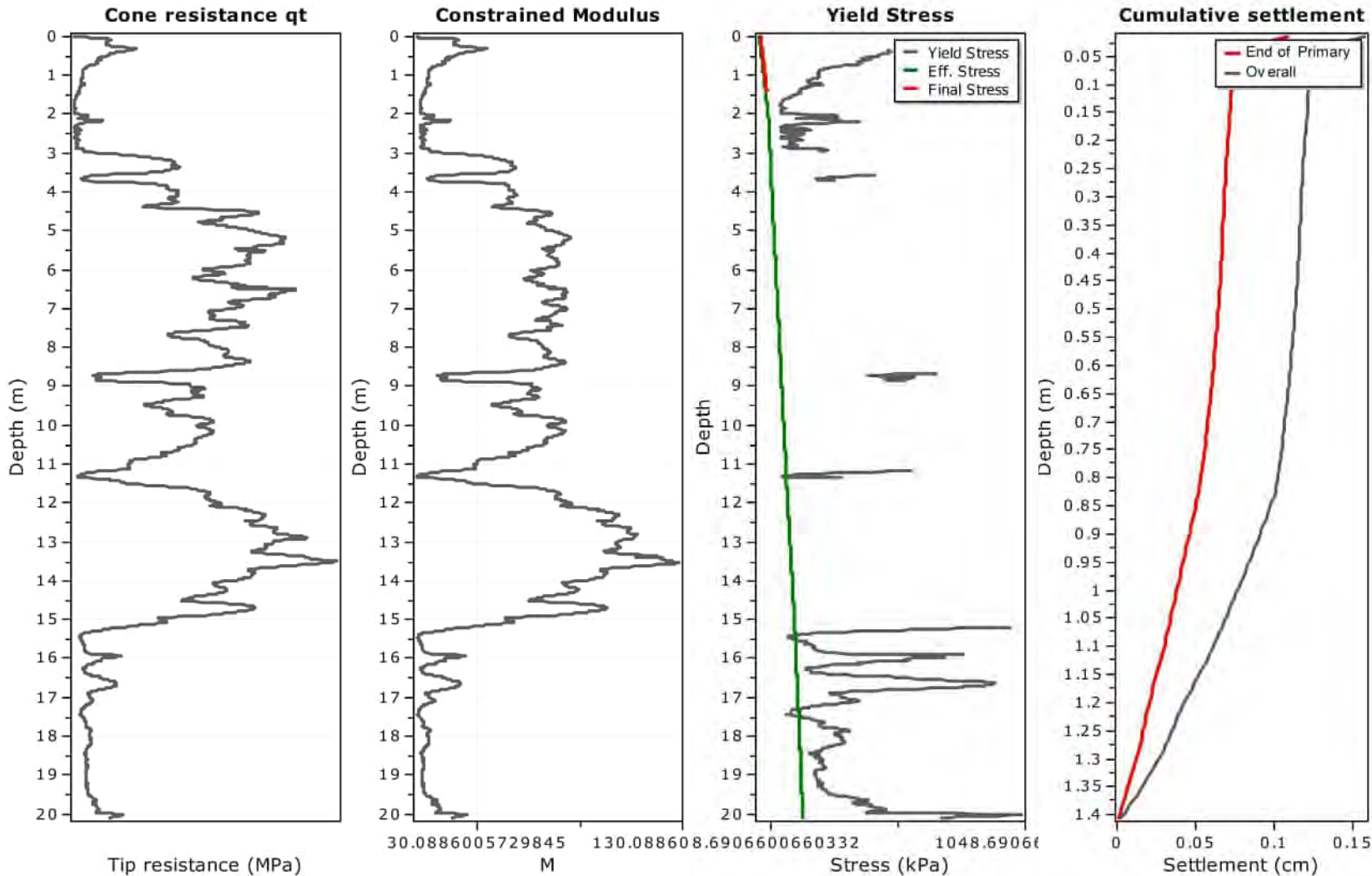
| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1473     | 14.73           | 14.74         | 0.01          | 14.74              | 23.59         | 155.66                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1474     | 14.74           | 14.75         | 0.01          | 14.75              | 23.59         | 157.88                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1475     | 14.75           | 14.76         | 0.01          | 14.76              | 23.58         | 160.25                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1476     | 14.76           | 14.77         | 0.01          | 14.77              | 23.58         | 162.08                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1477     | 14.77           | 14.78         | 0.01          | 14.78              | 23.58         | 164.05                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1478     | 14.78           | 14.79         | 0.01          | 14.79              | 23.58         | 165.00                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1479     | 14.79           | 14.80         | 0.01          | 14.80              | 23.58         | 165.29                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1480     | 14.80           | 14.81         | 0.01          | 14.81              | 23.58         | 164.35                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1481     | 14.81           | 14.82         | 0.01          | 14.82              | 23.58         | 160.36                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1482     | 14.82           | 14.83         | 0.01          | 14.83              | 23.58         | 155.37                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1483     | 14.83           | 14.84         | 0.01          | 14.84              | 23.58         | 150.15                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1484     | 14.84           | 14.85         | 0.01          | 14.85              | 23.58         | 146.99                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1485     | 14.85           | 14.86         | 0.01          | 14.86              | 23.58         | 143.62                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1486     | 14.86           | 14.87         | 0.01          | 14.87              | 23.58         | 140.31                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1487     | 14.87           | 14.88         | 0.01          | 14.88              | 23.58         | 137.15                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1488     | 14.88           | 14.89         | 0.01          | 14.89              | 23.57         | 134.84                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1489     | 14.89           | 14.90         | 0.01          | 14.90              | 23.57         | 131.09                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1490     | 14.90           | 14.91         | 0.01          | 14.91              | 23.57         | 127.33                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1491     | 14.91           | 14.92         | 0.01          | 14.92              | 23.57         | 123.87                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1492     | 14.92           | 14.93         | 0.01          | 14.93              | 23.57         | 122.08                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1493     | 14.93           | 14.94         | 0.01          | 14.94              | 23.57         | 120.22                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1494     | 14.94           | 14.95         | 0.01          | 14.95              | 23.57         | 119.05                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1495     | 14.95           | 14.96         | 0.01          | 14.96              | 23.57         | 118.84                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1496     | 14.96           | 14.97         | 0.01          | 14.97              | 23.57         | 120.69                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1497     | 14.97           | 14.98         | 0.01          | 14.98              | 23.57         | 123.12                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1498     | 14.98           | 14.99         | 0.01          | 14.99              | 23.57         | 127.05                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1499     | 14.99           | 15.00         | 0.01          | 15.00              | 23.57         | 131.77                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1500     | 15.00           | 15.01         | 0.01          | 15.01              | 23.56         | 137.01                   | 0.98 | 0.000           | 0.000                   | 0.000                   |
| 1501     | 15.01           | 15.02         | 0.01          | 15.02              | 23.56         | 140.02                   | 0.98 | 0.000           | 0.000                   | 0.000                   |

**Total primary settlement: 7.61****Total secondary settlement: 4.02****Total calculated settlement: 11.63****Abbreviations**

|                      |                                                                                 |
|----------------------|---------------------------------------------------------------------------------|
| Start depth:         | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:           | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:           | Thickness of soil layer                                                         |
| Relative depth:      | Depth of calculation relative to footing                                        |
| Iz:                  | Stress influence factor                                                         |
| Delta P:             | Footing imposed stress:                                                         |
| Eff. stress:         | Effective stress                                                                |
| M <sub>(CPT)</sub> : | Constrained modulus from CPT                                                    |
| Settlement:          | Primary settlement                                                              |
| Second. settlement:  | Secondary settlements due to creep                                              |



### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 5.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation

**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 5.00          | 0.39                     | 1.00 | 0.013           | 0.000                   | 0.013                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 5.00          | 0.59                     | 1.00 | 0.008           | 0.000                   | 0.008                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 5.00          | 0.89                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 5.00          | 1.19                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 5.00          | 1.56                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 5.00          | 13.48                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 5.00          | 17.99                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 5.00          | 20.42                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 5.00          | 20.81                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 5.00          | 20.53                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 5.00          | 19.92                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 5.00          | 19.35                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 5.00          | 19.03                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 5.00          | 18.75                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 5.00          | 18.55                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 5.00          | 18.52                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 5.00          | 18.73                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 5.00          | 18.98                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 5.00          | 18.96                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 5.00          | 18.72                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 5.00          | 18.68                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 5.00          | 18.84                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 5.00          | 19.33                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 5.00          | 20.21                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 5.00          | 21.44                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 5.00          | 22.91                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 5.00          | 24.38                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 5.00          | 27.14                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 5.00          | 30.26                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 5.00          | 33.20                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 5.00          | 34.43                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 5.00          | 34.42                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 5.00          | 33.67                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 5.00          | 32.44                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 5.00          | 31.36                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 5.00          | 30.34                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 5.00          | 29.52                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 5.00          | 28.39                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 5.00          | 27.01                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 5.00          | 25.38                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 5.00          | 24.10                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 5.00          | 23.07                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 5.00          | 22.39                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 5.00          | 21.74                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 5.00          | 21.03                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 5.00          | 20.42                    | 1.00 | 0.000           | 0.000                   | 0.000                   |



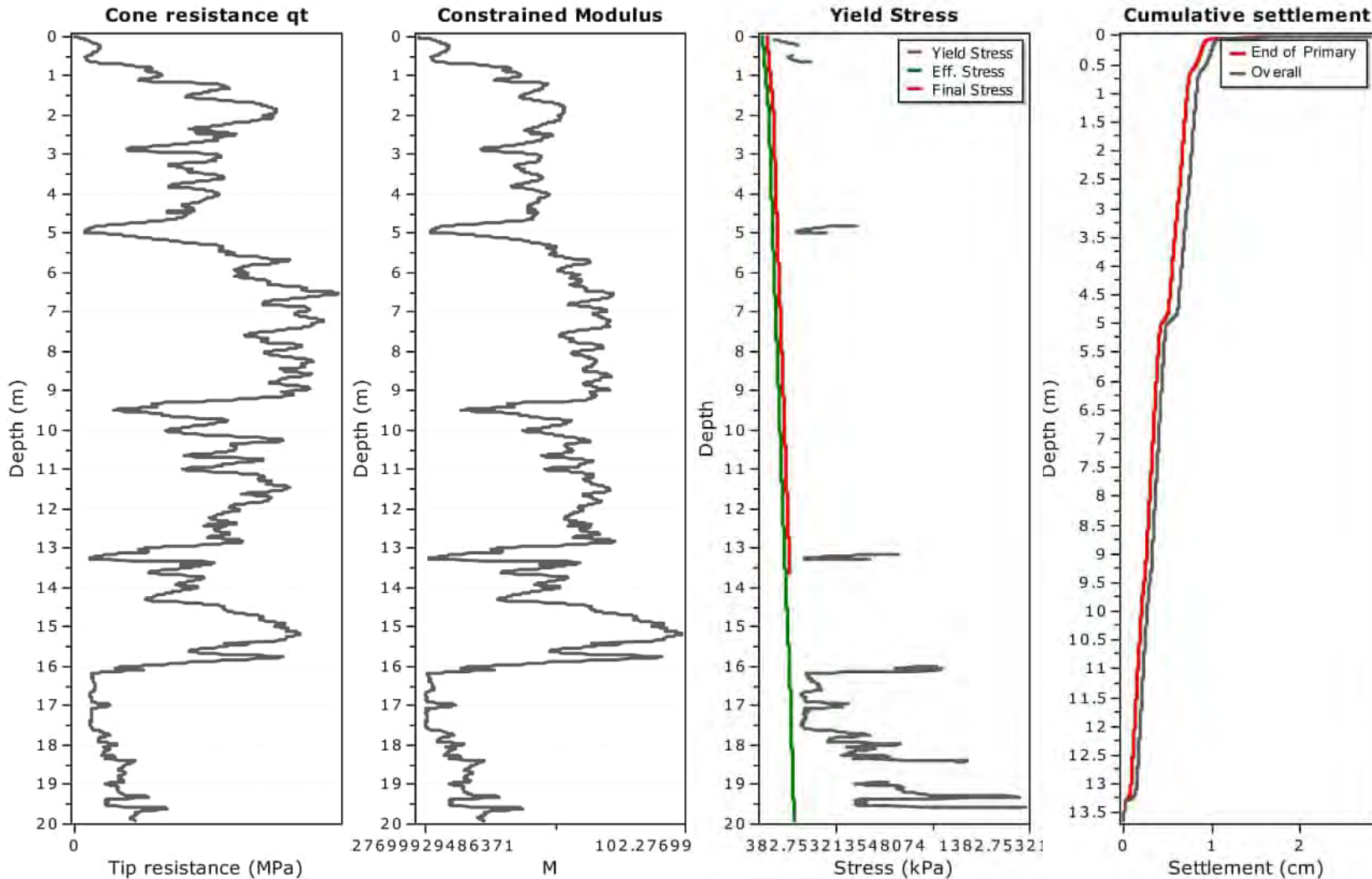
**:: Tabular results ::**

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 139      | 1.39               | 1.40             | 0.01             | 1.39                     | 5.00             | 4.24                        | 1.00 | 0.001              | 0.001                         | 0.003                         |
| 140      | 1.40               | 1.41             | 0.01             | 1.40                     | 5.00             | 4.27                        | 1.00 | 0.001              | 0.001                         | 0.003                         |

**Total primary settlement: 0.11****Total secondary settlement: 0.05****Total calculated settlement: 0.16****Abbreviations**

|                      |                                                                                 |
|----------------------|---------------------------------------------------------------------------------|
| Start depth:         | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:           | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:           | Thickness of soil layer                                                         |
| Relative depth:      | Depth of calculation relative to footing                                        |
| Iz:                  | Stress influence factor                                                         |
| Delta P:             | Footing imposed stress:                                                         |
| Eff. stress:         | Effective stress                                                                |
| M <sub>(CPT)</sub> : | Constrained modulus from CPT                                                    |
| Settlement:          | Primary settlement                                                              |
| Second. settlement:  | Secondary settlements due to creep                                              |

### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 24.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



| :: Tabular results :: |                 |               |               |                    |               |                          |      |                 |                         |                         |
|-----------------------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| Point No              | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
| 1                     | 0.01            | 0.02          | 0.01          | 0.01               | 24.00         | 0.02                     | 1.00 | 1.133           | 0.000                   | 1.133                   |
| 2                     | 0.02            | 0.03          | 0.01          | 0.03               | 24.00         | 0.08                     | 1.00 | 0.303           | 0.000                   | 0.303                   |
| 3                     | 0.03            | 0.04          | 0.01          | 0.04               | 24.00         | 0.16                     | 1.00 | 0.151           | 0.000                   | 0.151                   |
| 4                     | 0.04            | 0.05          | 0.01          | 0.04               | 24.00         | 0.28                     | 1.00 | 0.085           | 0.000                   | 0.085                   |
| 5                     | 0.05            | 0.06          | 0.01          | 0.06               | 24.00         | 0.38                     | 1.00 | 0.063           | 0.000                   | 0.063                   |
| 6                     | 0.06            | 0.07          | 0.01          | 0.07               | 24.00         | 4.16                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 7                     | 0.07            | 0.08          | 0.01          | 0.07               | 24.00         | 4.58                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 8                     | 0.08            | 0.09          | 0.01          | 0.09               | 24.00         | 4.87                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 9                     | 0.09            | 0.10          | 0.01          | 0.09               | 24.00         | 5.22                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 10                    | 0.10            | 0.11          | 0.01          | 0.10               | 24.00         | 5.66                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 11                    | 0.11            | 0.12          | 0.01          | 0.12               | 24.00         | 6.36                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 12                    | 0.12            | 0.13          | 0.01          | 0.13               | 24.00         | 7.00                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 13                    | 0.13            | 0.14          | 0.01          | 0.14               | 24.00         | 7.60                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 14                    | 0.14            | 0.15          | 0.01          | 0.14               | 24.00         | 7.91                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 15                    | 0.15            | 0.16          | 0.01          | 0.15               | 24.00         | 8.19                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 16                    | 0.16            | 0.17          | 0.01          | 0.17               | 24.00         | 8.57                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 17                    | 0.17            | 0.18          | 0.01          | 0.17               | 24.00         | 8.95                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 18                    | 0.18            | 0.19          | 0.01          | 0.18               | 24.00         | 9.40                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 19                    | 0.19            | 0.20          | 0.01          | 0.20               | 24.00         | 9.79                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 20                    | 0.20            | 0.21          | 0.01          | 0.20               | 24.00         | 10.23                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 21                    | 0.21            | 0.22          | 0.01          | 0.21               | 24.00         | 10.63                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 22                    | 0.22            | 0.23          | 0.01          | 0.23               | 24.00         | 10.98                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 23                    | 0.23            | 0.24          | 0.01          | 0.24               | 24.00         | 11.26                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 24                    | 0.24            | 0.25          | 0.01          | 0.25               | 24.00         | 11.50                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 25                    | 0.25            | 0.26          | 0.01          | 0.26               | 24.00         | 11.65                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 26                    | 0.26            | 0.27          | 0.01          | 0.27               | 24.00         | 11.67                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 27                    | 0.27            | 0.28          | 0.01          | 0.28               | 24.00         | 11.59                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 28                    | 0.28            | 0.29          | 0.01          | 0.28               | 24.00         | 11.49                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 29                    | 0.29            | 0.30          | 0.01          | 0.29               | 24.00         | 11.36                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 30                    | 0.30            | 0.31          | 0.01          | 0.30               | 24.00         | 11.24                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 31                    | 0.31            | 0.32          | 0.01          | 0.32               | 24.00         | 11.08                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 32                    | 0.32            | 0.33          | 0.01          | 0.33               | 24.00         | 10.99                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 33                    | 0.33            | 0.34          | 0.01          | 0.34               | 24.00         | 10.86                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 34                    | 0.34            | 0.35          | 0.01          | 0.34               | 24.00         | 10.78                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 35                    | 0.35            | 0.36          | 0.01          | 0.35               | 24.00         | 10.70                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 36                    | 0.36            | 0.37          | 0.01          | 0.36               | 24.00         | 10.62                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 37                    | 0.37            | 0.38          | 0.01          | 0.37               | 24.00         | 10.49                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 38                    | 0.38            | 0.39          | 0.01          | 0.38               | 24.00         | 10.30                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 39                    | 0.39            | 0.40          | 0.01          | 0.39               | 24.00         | 10.03                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 40                    | 0.40            | 0.41          | 0.01          | 0.40               | 24.00         | 9.49                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 41                    | 0.41            | 0.42          | 0.01          | 0.41               | 24.00         | 8.94                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 42                    | 0.42            | 0.43          | 0.01          | 0.42               | 24.00         | 8.47                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 43                    | 0.43            | 0.44          | 0.01          | 0.43               | 24.00         | 8.28                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 44                    | 0.44            | 0.45          | 0.01          | 0.44               | 24.00         | 8.13                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 45                    | 0.45            | 0.46          | 0.01          | 0.45               | 24.00         | 7.98                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 46                    | 0.46            | 0.47          | 0.01          | 0.46               | 24.00         | 7.72                     | 1.00 | 0.003           | 0.000                   | 0.003                   |

**:: Tabular results ::**

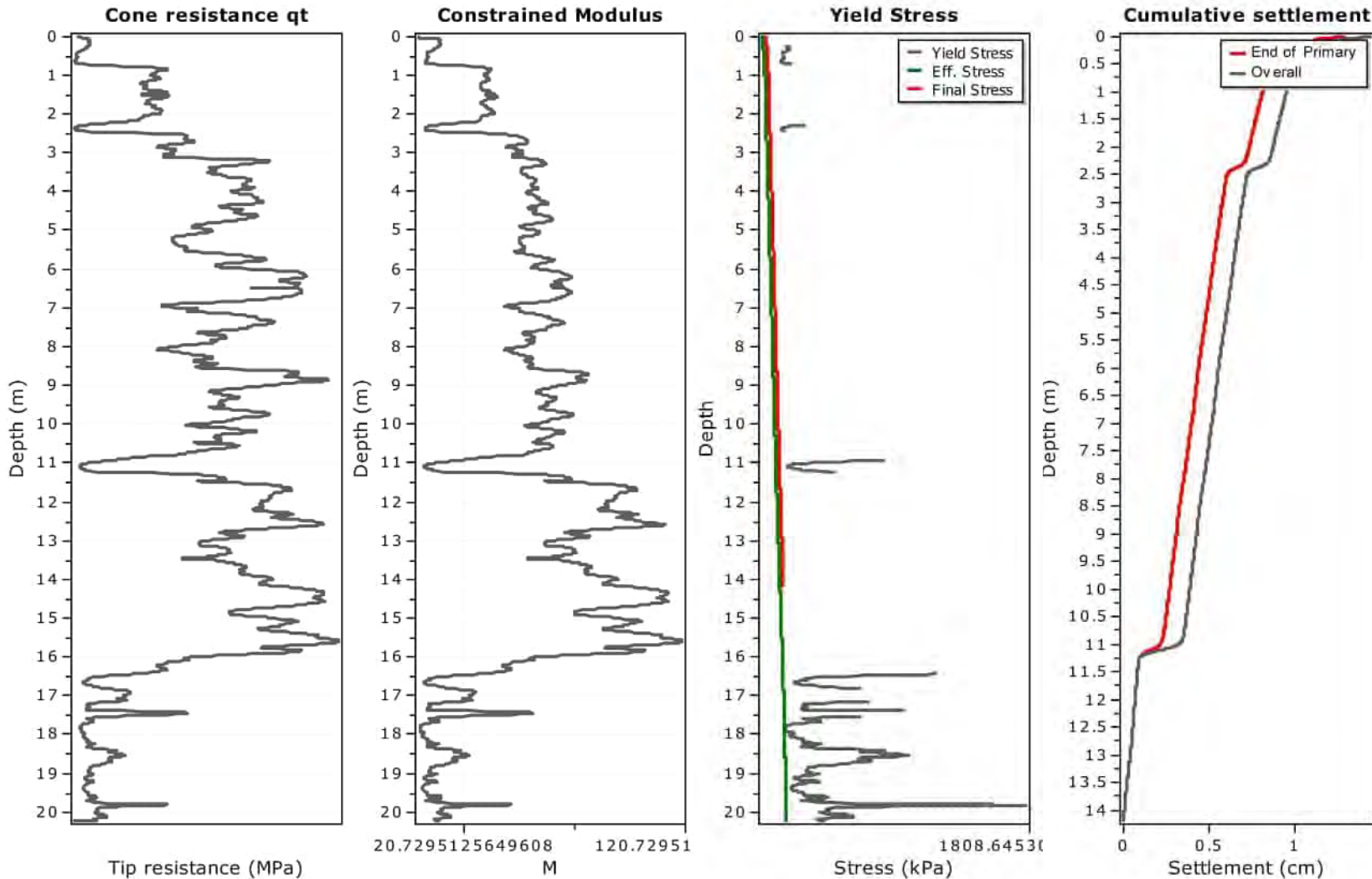
| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1335     | 13.35           | 13.36         | 0.01          | 13.36              | 23.69         | 56.95                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1336     | 13.36           | 13.37         | 0.01          | 13.37              | 23.69         | 60.08                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1337     | 13.37           | 13.38         | 0.01          | 13.38              | 23.68         | 61.43                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1338     | 13.38           | 13.39         | 0.01          | 13.39              | 23.68         | 61.85                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1339     | 13.39           | 13.40         | 0.01          | 13.40              | 23.68         | 61.43                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1340     | 13.40           | 13.41         | 0.01          | 13.41              | 23.68         | 60.29                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1341     | 13.41           | 13.42         | 0.01          | 13.42              | 23.68         | 48.76                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1342     | 13.42           | 13.43         | 0.01          | 13.43              | 23.68         | 47.39                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1343     | 13.43           | 13.44         | 0.01          | 13.44              | 23.68         | 46.57                    | 0.99 | 0.001           | 0.000                   | 0.001                   |
| 1344     | 13.44           | 13.45         | 0.01          | 13.45              | 23.68         | 55.80                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1345     | 13.45           | 13.46         | 0.01          | 13.46              | 23.68         | 54.98                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1346     | 13.46           | 13.47         | 0.01          | 13.47              | 23.68         | 54.23                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1347     | 13.47           | 13.48         | 0.01          | 13.48              | 23.68         | 53.44                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1348     | 13.48           | 13.49         | 0.01          | 13.49              | 23.68         | 52.49                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1349     | 13.49           | 13.50         | 0.01          | 13.50              | 23.68         | 51.13                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1350     | 13.50           | 13.51         | 0.01          | 13.51              | 23.68         | 49.89                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1351     | 13.51           | 13.52         | 0.01          | 13.52              | 23.68         | 48.34                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1352     | 13.52           | 13.53         | 0.01          | 13.53              | 23.67         | 46.76                    | 0.99 | 0.001           | 0.000                   | 0.001                   |
| 1353     | 13.53           | 13.54         | 0.01          | 13.54              | 23.67         | 45.09                    | 0.99 | 0.001           | 0.000                   | 0.001                   |
| 1354     | 13.54           | 13.55         | 0.01          | 13.55              | 23.67         | 43.54                    | 0.99 | 0.001           | 0.000                   | 0.001                   |
| 1355     | 13.55           | 13.56         | 0.01          | 13.56              | 23.67         | 41.18                    | 0.99 | 0.001           | 0.000                   | 0.001                   |
| 1356     | 13.56           | 13.57         | 0.01          | 13.57              | 23.67         | 38.57                    | 0.99 | 0.001           | 0.000                   | 0.001                   |
| 1357     | 13.57           | 13.58         | 0.01          | 13.58              | 23.67         | 36.05                    | 0.99 | 0.001           | 0.000                   | 0.001                   |
| 1358     | 13.58           | 13.59         | 0.01          | 13.59              | 23.67         | 34.43                    | 0.99 | 0.001           | 0.000                   | 0.001                   |
| 1359     | 13.59           | 13.60         | 0.01          | 13.60              | 23.67         | 33.33                    | 0.99 | 0.001           | 0.000                   | 0.001                   |
| 1360     | 13.60           | 13.61         | 0.01          | 13.61              | 23.67         | 32.44                    | 0.99 | 0.001           | 0.000                   | 0.001                   |
| 1361     | 13.61           | 13.62         | 0.01          | 13.62              | 23.67         | 32.02                    | 0.99 | 0.001           | 0.000                   | 0.001                   |
| 1362     | 13.62           | 13.63         | 0.01          | 13.63              | 23.67         | 31.75                    | 0.99 | 0.001           | 0.000                   | 0.001                   |
| 1363     | 13.63           | 13.64         | 0.01          | 13.64              | 23.67         | 32.35                    | 0.99 | 0.001           | 0.000                   | 0.001                   |

**Total primary settlement: 2.68****Total secondary settlement: 0.11****Total calculated settlement: 2.79****Abbreviations**

|                      |                                                                                 |
|----------------------|---------------------------------------------------------------------------------|
| Start depth:         | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:           | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:           | Thickness of soil layer                                                         |
| Relative depth:      | Depth of calculation relative to footing                                        |
| Iz:                  | Stress influence factor                                                         |
| Delta P:             | Footing imposed stress:                                                         |
| Eff. stress:         | Effective stress                                                                |
| M <sub>(CPT)</sub> : | Constrained modulus from CPT                                                    |
| Settlement:          | Primary settlement                                                              |
| Second. settlement:  | Secondary settlements due to creep                                              |



**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 24.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation

**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 24.00         | 0.56                     | 1.00 | 0.043           | 0.000                   | 0.043                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 24.00         | 0.59                     | 1.00 | 0.040           | 0.000                   | 0.040                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 24.00         | 0.69                     | 1.00 | 0.035           | 0.000                   | 0.035                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 24.00         | 0.80                     | 1.00 | 0.030           | 0.000                   | 0.030                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 24.00         | 0.95                     | 1.00 | 0.025           | 0.000                   | 0.025                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 24.00         | 9.35                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 24.00         | 9.68                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 24.00         | 9.98                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 24.00         | 10.10                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 24.00         | 9.96                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 24.00         | 9.76                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 24.00         | 9.55                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 24.00         | 9.51                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 24.00         | 9.55                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 24.00         | 9.71                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 24.00         | 9.94                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 24.00         | 10.18                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 24.00         | 10.37                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 24.00         | 10.43                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 24.00         | 10.42                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 24.00         | 10.31                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 24.00         | 10.21                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 24.00         | 10.00                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 24.00         | 9.80                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 24.00         | 9.62                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 24.00         | 9.46                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 24.00         | 9.22                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 24.00         | 8.92                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 24.00         | 8.63                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 24.00         | 8.47                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 24.00         | 8.32                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 24.00         | 8.11                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 24.00         | 7.73                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 24.00         | 7.35                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 24.00         | 7.00                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 24.00         | 6.75                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 24.00         | 6.47                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 24.00         | 6.05                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 24.00         | 5.60                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 24.00         | 5.15                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 24.00         | 4.86                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 24.00         | 4.65                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 24.00         | 4.46                     | 1.00 | 0.005           | 0.000                   | 0.006                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 24.00         | 4.34                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 24.00         | 4.24                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 24.00         | 4.24                     | 1.00 | 0.006           | 0.000                   | 0.006                   |



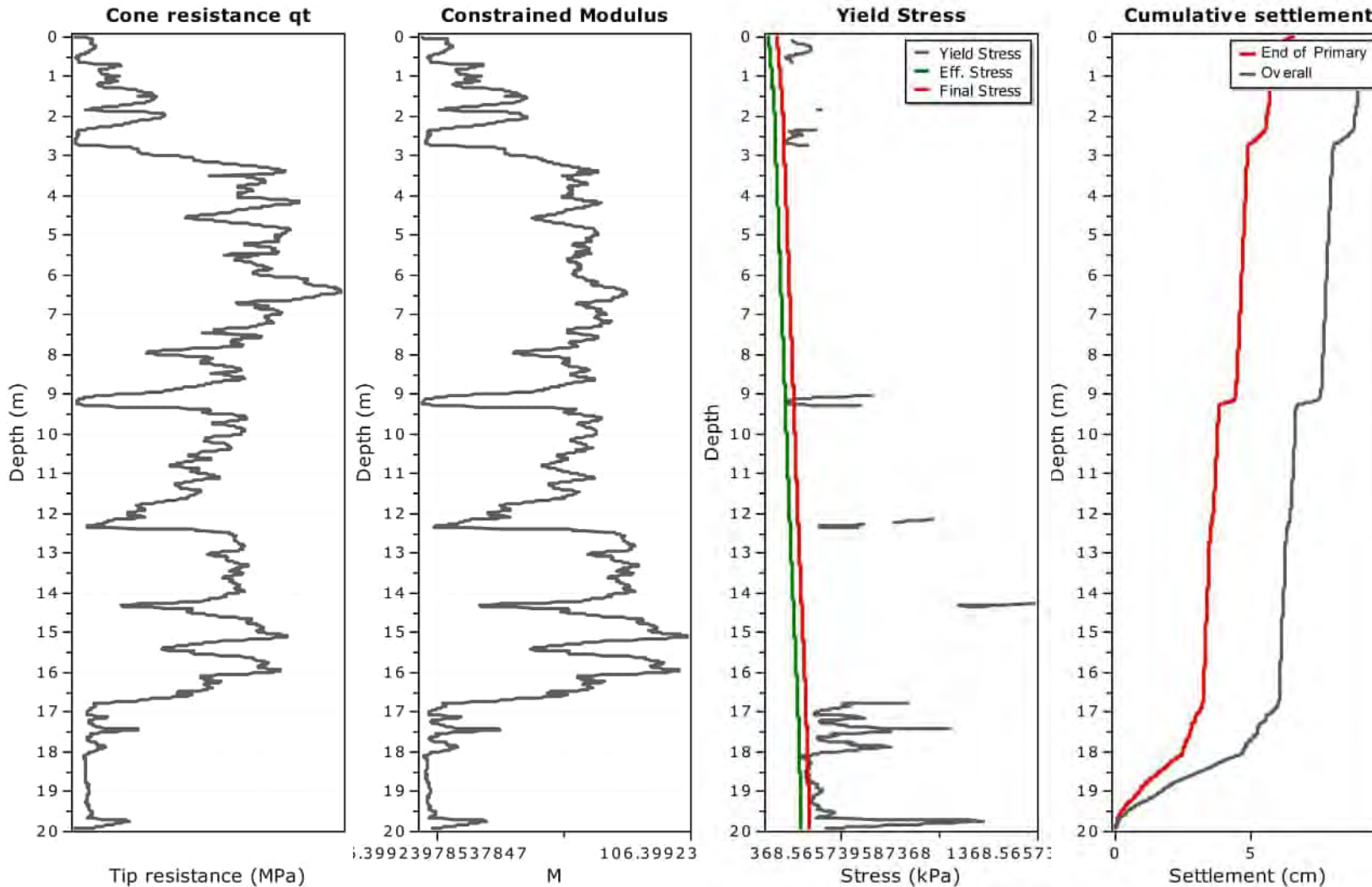
**:: Tabular results ::**

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|----|--------------------|-------------------------------|-------------------------------|
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|----|--------------------|-------------------------------|-------------------------------|

**Total primary settlement: 1.29****Total secondary settlement: 0.16****Total calculated settlement: 1.44****Abbreviations**

|                      |                                                                                 |
|----------------------|---------------------------------------------------------------------------------|
| Start depth:         | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:           | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:           | Thickness of soil layer                                                         |
| Relative depth:      | Depth of calculation relative to footing                                        |
| Iz:                  | Stress influence factor                                                         |
| Delta P:             | Footing imposed stress:                                                         |
| Eff. stress:         | Effective stress                                                                |
| M <sub>(CPT)</sub> : | Constrained modulus from CPT                                                    |
| Settlement:          | Primary settlement                                                              |
| Second. settlement:  | Secondary settlements due to creep                                              |

**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 43.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 43.00         | 0.64                     | 1.00 | 0.067           | 0.000                   | 0.067                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 43.00         | 0.75                     | 1.00 | 0.058           | 0.000                   | 0.058                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 43.00         | 0.88                     | 1.00 | 0.049           | 0.000                   | 0.049                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 43.00         | 1.01                     | 1.00 | 0.043           | 0.000                   | 0.043                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 43.00         | 1.09                     | 1.00 | 0.039           | 0.000                   | 0.039                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 43.00         | 10.36                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 43.00         | 10.82                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 43.00         | 10.93                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 43.00         | 10.87                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 43.00         | 10.78                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 43.00         | 10.67                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 43.00         | 10.54                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 43.00         | 10.37                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 43.00         | 10.19                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 43.00         | 10.00                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 43.00         | 9.88                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 43.00         | 9.88                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 43.00         | 10.18                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 43.00         | 10.64                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 43.00         | 11.17                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 43.00         | 11.58                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 43.00         | 12.00                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 43.00         | 12.40                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 43.00         | 12.58                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 43.00         | 12.42                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 43.00         | 12.03                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 43.00         | 11.70                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 43.00         | 11.42                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 43.00         | 11.18                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 43.00         | 10.92                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 43.00         | 10.69                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 43.00         | 10.48                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 43.00         | 10.14                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 43.00         | 9.80                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 43.00         | 9.50                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 43.00         | 9.36                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 43.00         | 9.28                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 43.00         | 9.16                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 43.00         | 8.83                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 43.00         | 8.36                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 43.00         | 7.74                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 43.00         | 7.16                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 43.00         | 6.54                     | 1.00 | 0.007           | 0.000                   | 0.007                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 43.00         | 5.82                     | 1.00 | 0.007           | 0.000                   | 0.008                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 43.00         | 5.13                     | 1.00 | 0.008           | 0.000                   | 0.009                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 43.00         | 4.52                     | 1.00 | 0.010           | 0.000                   | 0.010                   |

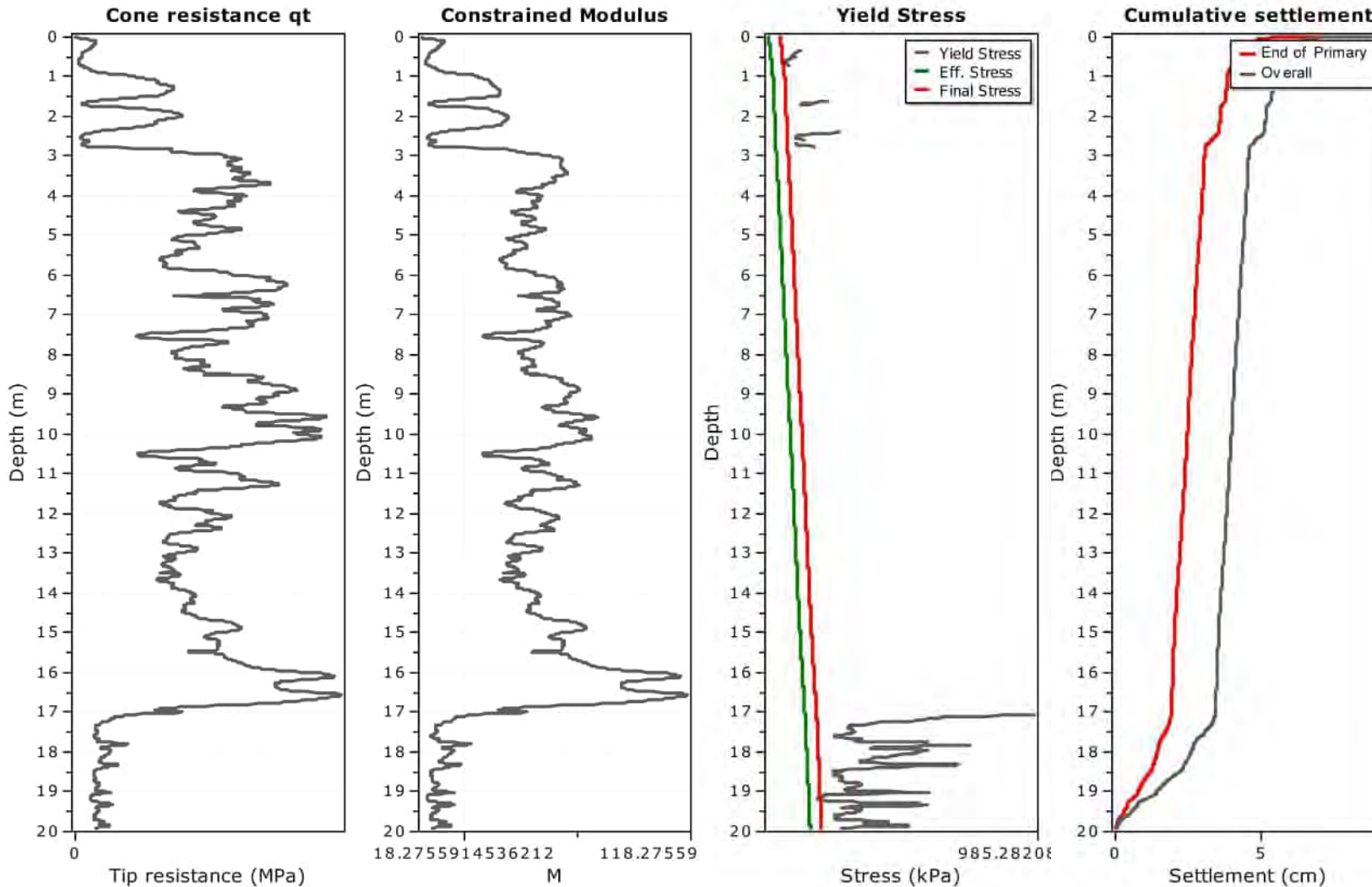
**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1979     | 19.79           | 19.80         | 0.01          | 19.80              | 41.34         | 22.71                    | 0.96 | 0.002           | 0.002                   | 0.004                   |
| 1980     | 19.80           | 19.81         | 0.01          | 19.81              | 41.34         | 21.48                    | 0.96 | 0.002           | 0.002                   | 0.004                   |
| 1981     | 19.81           | 19.82         | 0.01          | 19.82              | 41.34         | 20.29                    | 0.96 | 0.002           | 0.002                   | 0.004                   |
| 1982     | 19.82           | 19.83         | 0.01          | 19.83              | 41.34         | 19.39                    | 0.96 | 0.002           | 0.002                   | 0.004                   |
| 1983     | 19.83           | 19.84         | 0.01          | 19.84              | 41.33         | 18.46                    | 0.96 | 0.002           | 0.002                   | 0.004                   |
| 1984     | 19.84           | 19.85         | 0.01          | 19.85              | 41.33         | 17.18                    | 0.96 | 0.002           | 0.002                   | 0.005                   |
| 1985     | 19.85           | 19.86         | 0.01          | 19.86              | 41.33         | 15.86                    | 0.96 | 0.003           | 0.002                   | 0.005                   |
| 1986     | 19.86           | 19.87         | 0.01          | 19.87              | 41.33         | 14.49                    | 0.96 | 0.003           | 0.003                   | 0.006                   |
| 1987     | 19.87           | 19.88         | 0.01          | 19.88              | 41.32         | 13.44                    | 0.96 | 0.003           | 0.003                   | 0.006                   |
| 1988     | 19.88           | 19.89         | 0.01          | 19.89              | 41.32         | 12.10                    | 0.96 | 0.003           | 0.003                   | 0.007                   |
| 1989     | 19.89           | 19.90         | 0.01          | 19.90              | 41.32         | 10.90                    | 0.96 | 0.004           | 0.004                   | 0.007                   |
| 1990     | 19.90           | 19.91         | 0.01          | 19.91              | 41.32         | 8.98                     | 0.96 | 0.005           | 0.004                   | 0.009                   |
| 1991     | 19.91           | 19.92         | 0.01          | 19.92              | 41.32         | 7.73                     | 0.96 | 0.005           | 0.005                   | 0.010                   |
| 1992     | 19.92           | 19.93         | 0.01          | 19.93              | 41.31         | 5.98                     | 0.96 | 0.007           | 0.006                   | 0.013                   |

**Total primary settlement: 6.54****Total secondary settlement: 3.26****Total calculated settlement: 9.80****Abbreviations**

|                      |                                                                                 |
|----------------------|---------------------------------------------------------------------------------|
| Start depth:         | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:           | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:           | Thickness of soil layer                                                         |
| Relative depth:      | Depth of calculation relative to footing                                        |
| Iz:                  | Stress influence factor                                                         |
| Delta P:             | Footing imposed stress:                                                         |
| Eff. stress:         | Effective stress                                                                |
| M <sub>(CPT)</sub> : | Constrained modulus from CPT                                                    |
| Settlement:          | Primary settlement                                                              |
| Second. settlement:  | Secondary settlements due to creep                                              |

### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 43.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 43.00         | 0.03                     | 1.00 | 1.461           | 0.000                   | 1.461                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 43.00         | 0.07                     | 1.00 | 0.627           | 0.000                   | 0.627                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 43.00         | 0.15                     | 1.00 | 0.290           | 0.000                   | 0.290                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 43.00         | 0.28                     | 1.00 | 0.156           | 0.000                   | 0.156                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 43.00         | 0.39                     | 1.00 | 0.110           | 0.000                   | 0.110                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 43.00         | 4.55                     | 1.00 | 0.009           | 0.000                   | 0.009                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 43.00         | 5.52                     | 1.00 | 0.008           | 0.000                   | 0.008                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 43.00         | 6.71                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 43.00         | 7.89                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 43.00         | 8.88                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 43.00         | 9.46                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 43.00         | 9.65                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 43.00         | 9.62                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 43.00         | 9.54                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 43.00         | 9.45                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 43.00         | 9.27                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 43.00         | 9.09                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 43.00         | 8.89                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 43.00         | 8.73                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 43.00         | 8.50                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 43.00         | 8.26                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 43.00         | 7.99                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 43.00         | 7.79                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 43.00         | 7.61                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 43.00         | 7.50                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 43.00         | 7.39                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 43.00         | 7.29                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 43.00         | 7.08                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 43.00         | 6.84                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 43.00         | 6.55                     | 1.00 | 0.007           | 0.000                   | 0.007                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 43.00         | 6.31                     | 1.00 | 0.007           | 0.000                   | 0.007                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 43.00         | 6.05                     | 1.00 | 0.007           | 0.000                   | 0.007                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 43.00         | 5.72                     | 1.00 | 0.008           | 0.000                   | 0.008                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 43.00         | 5.48                     | 1.00 | 0.008           | 0.000                   | 0.008                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 43.00         | 5.14                     | 1.00 | 0.008           | 0.000                   | 0.009                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 43.00         | 4.87                     | 1.00 | 0.009           | 0.000                   | 0.009                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 43.00         | 4.52                     | 1.00 | 0.010           | 0.000                   | 0.010                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 43.00         | 4.27                     | 1.00 | 0.010           | 0.000                   | 0.010                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 43.00         | 4.03                     | 1.00 | 0.011           | 0.000                   | 0.011                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 43.00         | 3.79                     | 1.00 | 0.011           | 0.000                   | 0.012                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 43.00         | 3.51                     | 1.00 | 0.012           | 0.000                   | 0.013                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 43.00         | 3.28                     | 1.00 | 0.013           | 0.000                   | 0.014                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 43.00         | 3.10                     | 1.00 | 0.014           | 0.001                   | 0.014                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 43.00         | 3.01                     | 1.00 | 0.014           | 0.001                   | 0.015                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 43.00         | 2.96                     | 1.00 | 0.015           | 0.001                   | 0.015                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 43.00         | 2.92                     | 1.00 | 0.015           | 0.001                   | 0.015                   |

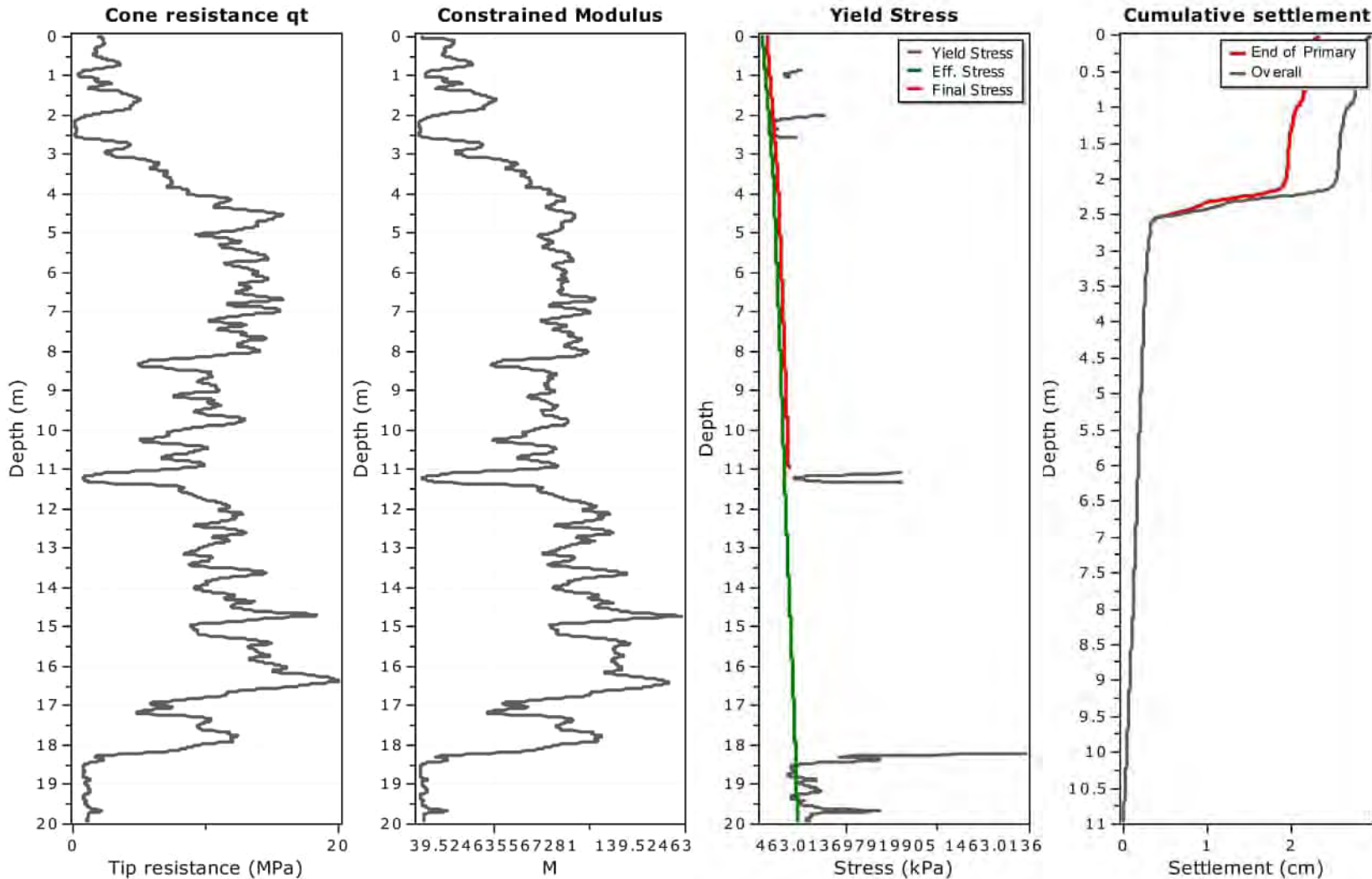
**:: Tabular results ::**

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 1979     | 19.79              | 19.80            | 0.01             | 19.80                    | 41.34            | 10.30                       | 0.96 | 0.004              | 0.003                         | 0.007                         |
| 1980     | 19.80              | 19.81            | 0.01             | 19.81                    | 41.34            | 9.65                        | 0.96 | 0.004              | 0.004                         | 0.008                         |
| 1981     | 19.81              | 19.82            | 0.01             | 19.82                    | 41.34            | 7.93                        | 0.96 | 0.005              | 0.004                         | 0.010                         |
| 1982     | 19.82              | 19.83            | 0.01             | 19.83                    | 41.34            | 7.41                        | 0.96 | 0.006              | 0.005                         | 0.010                         |
| 1983     | 19.83              | 19.84            | 0.01             | 19.84                    | 41.33            | 8.82                        | 0.96 | 0.005              | 0.004                         | 0.009                         |
| 1984     | 19.84              | 19.85            | 0.01             | 19.85                    | 41.33            | 10.47                       | 0.96 | 0.004              | 0.003                         | 0.007                         |
| 1985     | 19.85              | 19.86            | 0.01             | 19.86                    | 41.33            | 11.73                       | 0.96 | 0.004              | 0.003                         | 0.007                         |
| 1986     | 19.86              | 19.87            | 0.01             | 19.87                    | 41.33            | 12.33                       | 0.96 | 0.003              | 0.003                         | 0.006                         |
| 1987     | 19.87              | 19.88            | 0.01             | 19.88                    | 41.32            | 12.33                       | 0.96 | 0.003              | 0.003                         | 0.006                         |
| 1988     | 19.88              | 19.89            | 0.01             | 19.89                    | 41.32            | 11.24                       | 0.96 | 0.004              | 0.003                         | 0.007                         |
| 1989     | 19.89              | 19.90            | 0.01             | 19.90                    | 41.32            | 9.60                        | 0.96 | 0.004              | 0.004                         | 0.008                         |
| 1990     | 19.90              | 19.91            | 0.01             | 19.91                    | 41.32            | 6.64                        | 0.96 | 0.006              | 0.005                         | 0.011                         |
| 1991     | 19.91              | 19.92            | 0.01             | 19.92                    | 41.32            | 5.24                        | 0.96 | 0.008              | 0.007                         | 0.015                         |
| 1992     | 19.92              | 19.93            | 0.01             | 19.93                    | 41.31            | 4.59                        | 0.96 | 0.009              | 0.008                         | 0.017                         |

**Total primary settlement: 7.55****Total secondary settlement: 1.62****Total calculated settlement: 9.17****Abbreviations**

|                      |                                                                                 |
|----------------------|---------------------------------------------------------------------------------|
| Start depth:         | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:           | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:           | Thickness of soil layer                                                         |
| Relative depth:      | Depth of calculation relative to footing                                        |
| Iz:                  | Stress influence factor                                                         |
| Delta P:             | Footing imposed stress:                                                         |
| Eff. stress:         | Effective stress                                                                |
| M <sub>(CPT)</sub> : | Constrained modulus from CPT                                                    |
| Settlement:          | Primary settlement                                                              |
| Second. settlement:  | Secondary settlements due to creep                                              |

**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 24.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 24.00         | 1.68                     | 1.00 | 0.014           | 0.000                   | 0.014                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 24.00         | 1.78                     | 1.00 | 0.014           | 0.000                   | 0.014                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 24.00         | 1.90                     | 1.00 | 0.013           | 0.000                   | 0.013                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 24.00         | 2.00                     | 1.00 | 0.012           | 0.000                   | 0.012                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 24.00         | 2.02                     | 1.00 | 0.012           | 0.000                   | 0.012                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 24.00         | 2.03                     | 1.00 | 0.012           | 0.000                   | 0.012                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 24.00         | 13.14                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 24.00         | 16.52                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 24.00         | 18.46                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 24.00         | 18.31                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 24.00         | 18.25                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 24.00         | 18.22                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 24.00         | 18.25                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 24.00         | 18.40                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 24.00         | 18.65                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 24.00         | 18.86                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 24.00         | 18.91                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 24.00         | 18.76                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 24.00         | 18.66                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 24.00         | 18.44                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 24.00         | 18.29                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 24.00         | 17.95                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 24.00         | 17.66                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 24.00         | 17.24                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 24.00         | 16.62                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 24.00         | 15.87                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 24.00         | 15.07                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 24.00         | 14.50                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 24.00         | 13.96                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 24.00         | 13.58                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 24.00         | 13.27                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 24.00         | 13.24                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 24.00         | 13.34                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 24.00         | 13.65                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 24.00         | 13.96                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 24.00         | 14.20                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 24.00         | 14.27                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 24.00         | 14.22                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 24.00         | 14.17                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 24.00         | 14.13                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 24.00         | 14.04                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 24.00         | 13.82                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 24.00         | 13.40                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 24.00         | 12.98                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 24.00         | 12.70                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 24.00         | 12.62                    | 1.00 | 0.002           | 0.000                   | 0.002                   |

**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1059     | 10.59           | 10.60         | 0.01          | 10.60              | 23.84         | 66.98                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1060     | 10.60           | 10.61         | 0.01          | 10.61              | 23.84         | 64.25                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1061     | 10.61           | 10.62         | 0.01          | 10.62              | 23.84         | 62.15                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1062     | 10.62           | 10.63         | 0.01          | 10.63              | 23.84         | 59.53                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1063     | 10.63           | 10.64         | 0.01          | 10.64              | 23.84         | 57.87                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1064     | 10.64           | 10.65         | 0.01          | 10.65              | 23.84         | 55.86                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1065     | 10.65           | 10.66         | 0.01          | 10.66              | 23.84         | 54.73                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1066     | 10.66           | 10.67         | 0.01          | 10.67              | 23.84         | 53.87                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1067     | 10.67           | 10.68         | 0.01          | 10.68              | 23.83         | 53.14                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1068     | 10.68           | 10.69         | 0.01          | 10.69              | 23.83         | 52.53                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1069     | 10.69           | 10.70         | 0.01          | 10.70              | 23.83         | 52.13                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1070     | 10.70           | 10.71         | 0.01          | 10.71              | 23.83         | 51.98                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1071     | 10.71           | 10.72         | 0.01          | 10.72              | 23.83         | 52.14                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1072     | 10.72           | 10.73         | 0.01          | 10.73              | 23.83         | 52.69                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1073     | 10.73           | 10.74         | 0.01          | 10.74              | 23.83         | 53.75                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1074     | 10.74           | 10.75         | 0.01          | 10.75              | 23.83         | 55.18                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1075     | 10.75           | 10.76         | 0.01          | 10.76              | 23.83         | 57.54                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1076     | 10.76           | 10.77         | 0.01          | 10.77              | 23.83         | 58.75                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1077     | 10.77           | 10.78         | 0.01          | 10.78              | 23.83         | 60.07                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1078     | 10.78           | 10.79         | 0.01          | 10.79              | 23.83         | 61.39                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1079     | 10.79           | 10.80         | 0.01          | 10.80              | 23.83         | 62.75                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1080     | 10.80           | 10.81         | 0.01          | 10.81              | 23.83         | 63.89                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1081     | 10.81           | 10.82         | 0.01          | 10.82              | 23.83         | 64.98                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1082     | 10.82           | 10.83         | 0.01          | 10.83              | 23.83         | 66.71                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1083     | 10.83           | 10.84         | 0.01          | 10.84              | 23.83         | 68.23                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1084     | 10.84           | 10.85         | 0.01          | 10.85              | 23.83         | 69.51                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1085     | 10.85           | 10.86         | 0.01          | 10.86              | 23.83         | 69.92                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1086     | 10.86           | 10.87         | 0.01          | 10.87              | 23.83         | 70.43                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1087     | 10.87           | 10.88         | 0.01          | 10.88              | 23.83         | 70.93                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1088     | 10.88           | 10.89         | 0.01          | 10.89              | 23.83         | 71.88                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1089     | 10.89           | 10.90         | 0.01          | 10.90              | 23.82         | 72.66                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1090     | 10.90           | 10.91         | 0.01          | 10.91              | 23.82         | 73.10                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1091     | 10.91           | 10.92         | 0.01          | 10.92              | 23.82         | 72.85                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1092     | 10.92           | 10.93         | 0.01          | 10.93              | 23.82         | 72.39                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1093     | 10.93           | 10.94         | 0.01          | 10.94              | 23.82         | 71.88                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1094     | 10.94           | 10.95         | 0.01          | 10.95              | 23.82         | 70.98                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1095     | 10.95           | 10.96         | 0.01          | 10.96              | 23.82         | 68.83                    | 0.99 | 0.000           | 0.000                   | 0.000                   |

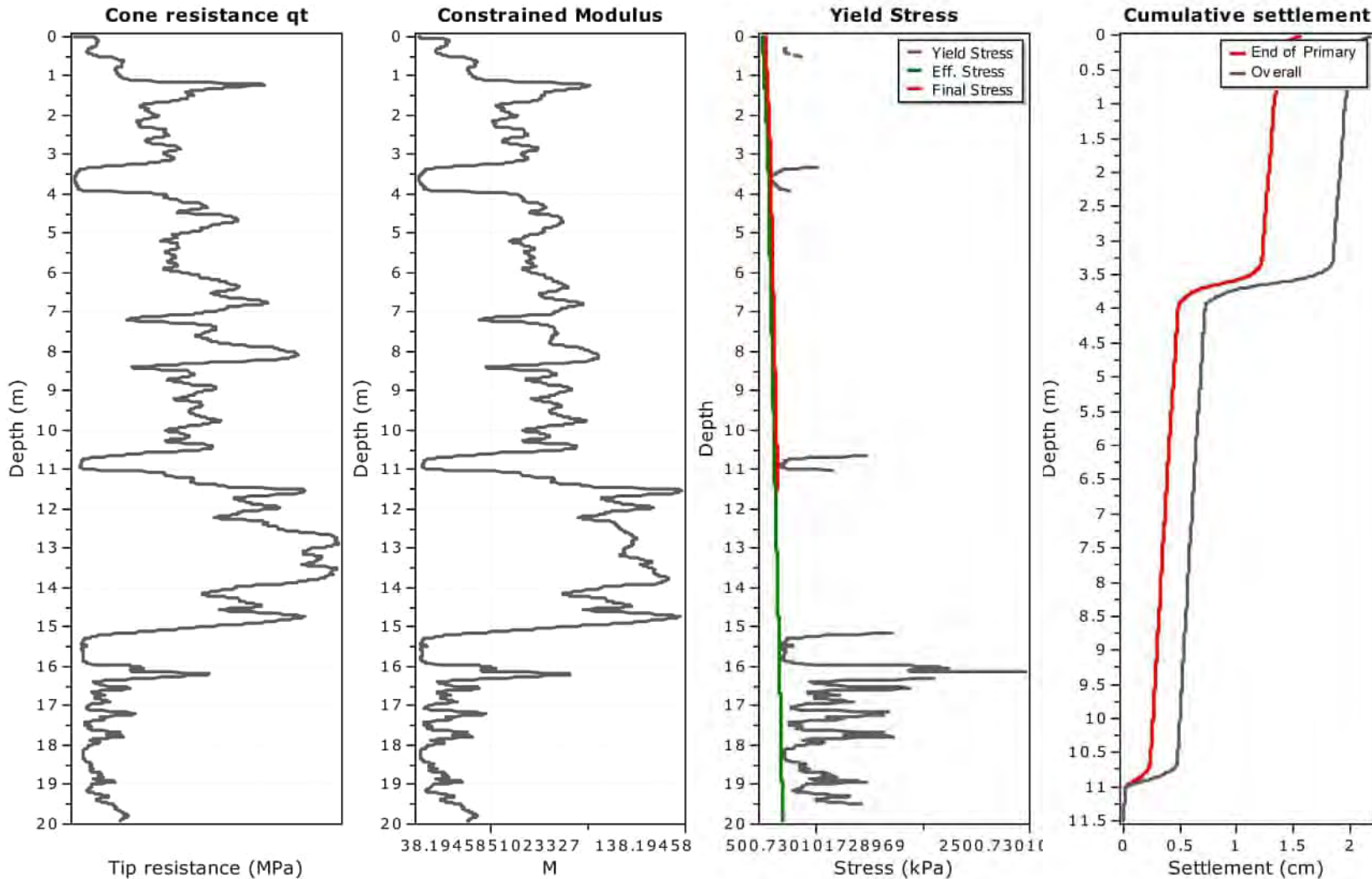
**Total primary settlement: 2.32**  
**Total secondary settlement: 0.61**

**Total calculated settlement: 2.94**

**Abbreviations**

|                      |                                                                                 |
|----------------------|---------------------------------------------------------------------------------|
| Start depth:         | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:           | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:           | Thickness of soil layer                                                         |
| Relative depth:      | Depth of calculation relative to footing                                        |
| Iz:                  | Stress influence factor                                                         |
| Delta P:             | Footing imposed stress:                                                         |
| Eff. stress:         | Effective stress                                                                |
| M <sub>(CPT)</sub> : | Constrained modulus from CPT                                                    |
| Settlement:          | Primary settlement                                                              |
| Second. settlement:  | Secondary settlement due to creep                                               |

**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 24.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( 1 - e^{-t/t_p} \right)$$

where  $t_p$  is the duration of primary consolidation



**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 24.00         | 1.25                     | 1.00 | 0.019           | 0.000                   | 0.019                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 24.00         | 1.36                     | 1.00 | 0.018           | 0.000                   | 0.018                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 24.00         | 1.54                     | 1.00 | 0.016           | 0.000                   | 0.016                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 24.00         | 1.61                     | 1.00 | 0.015           | 0.000                   | 0.015                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 24.00         | 1.69                     | 1.00 | 0.014           | 0.000                   | 0.014                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 24.00         | 1.73                     | 1.00 | 0.014           | 0.000                   | 0.014                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 24.00         | 12.68                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 24.00         | 16.08                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 24.00         | 16.26                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 24.00         | 16.34                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 24.00         | 16.27                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 24.00         | 16.19                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 24.00         | 15.85                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 24.00         | 15.46                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 24.00         | 15.08                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 24.00         | 14.90                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 24.00         | 14.82                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 24.00         | 14.79                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 24.00         | 14.82                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 24.00         | 14.98                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 24.00         | 15.19                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 24.00         | 15.35                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 24.00         | 15.15                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 24.00         | 14.66                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 24.00         | 14.12                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 24.00         | 13.63                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 24.00         | 13.11                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 24.00         | 12.49                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 24.00         | 11.85                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 24.00         | 11.25                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 24.00         | 10.69                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 24.00         | 10.19                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 24.00         | 9.93                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 24.00         | 9.86                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 24.00         | 9.85                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 24.00         | 9.84                     | 1.00 | 0.002           | 0.000                   | 0.003                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 24.00         | 9.72                     | 1.00 | 0.002           | 0.000                   | 0.003                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 24.00         | 9.64                     | 1.00 | 0.002           | 0.000                   | 0.003                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 24.00         | 9.56                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 24.00         | 9.59                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 24.00         | 9.78                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 24.00         | 10.03                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 24.00         | 10.54                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 24.00         | 11.43                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 24.00         | 12.24                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 24.00         | 12.80                    | 1.00 | 0.002           | 0.000                   | 0.002                   |

| :: Tabular results :: |                    |                  |                  |                          |                  |                             |    |                    |                               |                               |
|-----------------------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|----|--------------------|-------------------------------|-------------------------------|
| Point No              | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |

Total primary settlement: 1.55

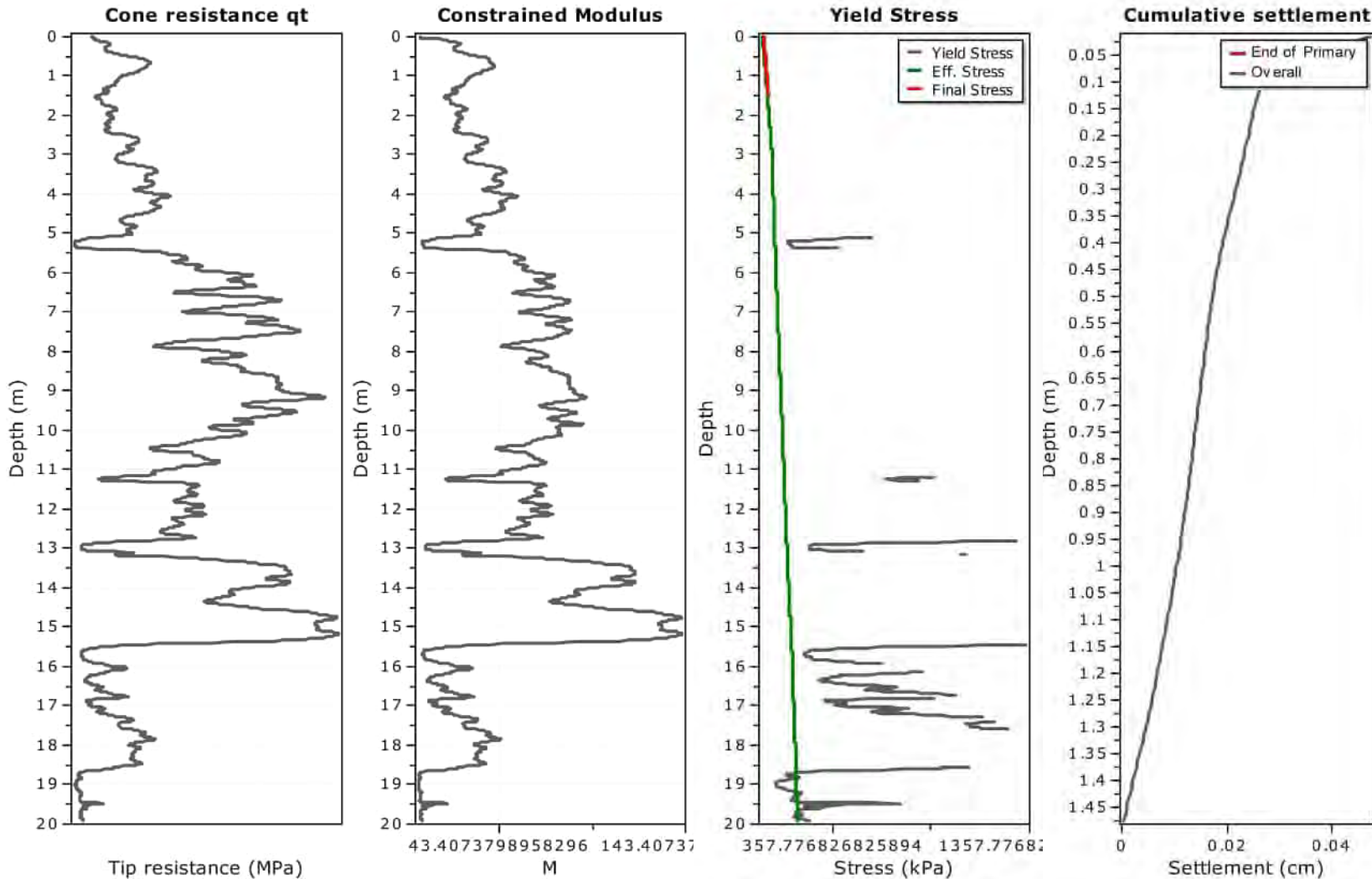
Total secondary settlement: 0.63

Total calculated settlement: 2.18

Abbreviations

- Start depth:Start depth of soil layer (penetration depth measured from ground free surface)
- End depth:End depth of soil layer (penetration depth measured from ground free surface)
- Thickness:Thickness of soil layer
- Relative depth:Depth of calculation relative to footing
- Iz:Stress influence factor
- Delta P:Footing imposed stress:
- Eff. stress:Effective stress
- M<sub>(CPT)</sub>:Constrained modulus from CPT
- Settlement:Primary settlement
- Second. settlement:Secondary settlements due to creep

### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 5.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 5.00          | 1.45                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 5.00          | 1.47                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 5.00          | 1.50                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 5.00          | 1.56                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 5.00          | 1.58                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 5.00          | 1.60                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 5.00          | 11.03                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 5.00          | 13.75                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 5.00          | 15.00                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 5.00          | 15.48                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 5.00          | 16.19                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 5.00          | 17.09                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 5.00          | 18.18                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 5.00          | 19.51                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 5.00          | 20.77                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 5.00          | 21.84                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 5.00          | 22.42                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 5.00          | 22.74                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 5.00          | 22.71                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 5.00          | 22.54                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 5.00          | 22.27                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 5.00          | 21.97                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 5.00          | 21.68                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 5.00          | 21.29                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 5.00          | 20.84                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 5.00          | 20.31                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 5.00          | 19.92                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 5.00          | 19.71                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 5.00          | 19.66                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 5.00          | 19.67                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 5.00          | 19.76                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 5.00          | 19.82                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 5.00          | 19.82                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 5.00          | 19.79                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 5.00          | 19.85                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 5.00          | 20.06                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 5.00          | 20.45                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 5.00          | 21.09                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 5.00          | 21.93                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 5.00          | 22.83                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 5.00          | 23.68                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 5.00          | 24.49                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 5.00          | 25.24                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 5.00          | 26.11                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 5.00          | 27.02                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 5.00          | 28.03                    | 1.00 | 0.000           | 0.000                   | 0.000                   |

**:: Tabular results ::**

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 139      | 1.39               | 1.40             | 0.01             | 1.39                     | 5.00             | 21.22                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 140      | 1.40               | 1.41             | 0.01             | 1.40                     | 5.00             | 21.54                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 141      | 1.41               | 1.42             | 0.01             | 1.41                     | 5.00             | 21.62                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 142      | 1.42               | 1.43             | 0.01             | 1.42                     | 5.00             | 21.52                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 143      | 1.43               | 1.44             | 0.01             | 1.43                     | 5.00             | 21.28                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 144      | 1.44               | 1.45             | 0.01             | 1.44                     | 5.00             | 20.84                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 145      | 1.45               | 1.46             | 0.01             | 1.45                     | 5.00             | 19.97                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 146      | 1.46               | 1.47             | 0.01             | 1.46                     | 5.00             | 19.00                       | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 147      | 1.47               | 1.48             | 0.01             | 1.47                     | 5.00             | 18.04                       | 1.00 | 0.000              | 0.000                         | 0.000                         |

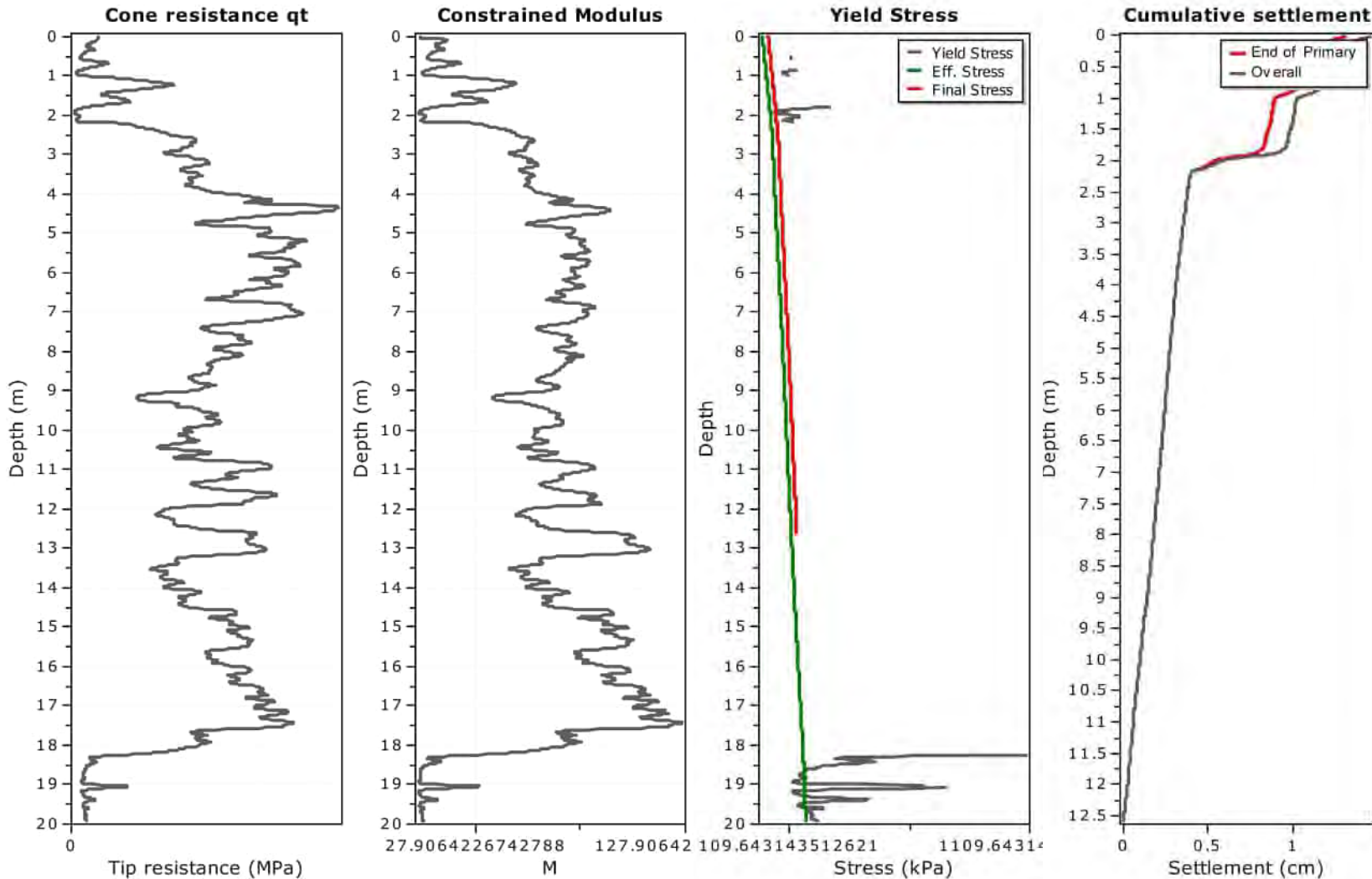
**Total primary settlement: 0.05**  
**Total secondary settlement: 0.00**

**Total calculated settlement: 0.05**

**Abbreviations**

- Start depth:
- End depth:
- Thickness:
- Relative depth:
- Iz:
- Delta P:
- Eff. stress:
- M<sub>(CPT)</sub>:
- Settlement:
- Second. settlement:
- Start depth of soil layer (penetration depth measured from ground free surface)
- End depth of soil layer (penetration depth measured from ground free surface)
- Thickness of soil layer
- Depth of calculation relative to footing
- Stress influence factor
- Footing imposed stress:
- Effective stress
- Constrained modulus from CPT
- Primary settlement
- Secondary settlement due to creep

**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 24.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 24.00         | 1.69                     | 1.00 | 0.014           | 0.000                   | 0.014                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 24.00         | 1.70                     | 1.00 | 0.014           | 0.000                   | 0.014                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 24.00         | 1.70                     | 1.00 | 0.014           | 0.000                   | 0.014                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 24.00         | 1.70                     | 1.00 | 0.014           | 0.000                   | 0.014                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 24.00         | 1.69                     | 1.00 | 0.014           | 0.000                   | 0.014                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 24.00         | 1.67                     | 1.00 | 0.014           | 0.000                   | 0.014                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 24.00         | 11.32                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 24.00         | 14.42                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 24.00         | 14.32                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 24.00         | 14.11                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 24.00         | 13.80                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 24.00         | 13.41                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 24.00         | 12.85                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 24.00         | 12.26                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 24.00         | 11.64                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 24.00         | 11.03                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 24.00         | 10.42                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 24.00         | 9.86                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 24.00         | 9.34                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 24.00         | 8.92                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 24.00         | 8.62                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 24.00         | 8.48                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 24.00         | 8.45                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 24.00         | 8.57                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 24.00         | 8.78                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 24.00         | 9.13                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 24.00         | 9.60                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 24.00         | 10.16                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 24.00         | 10.81                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 24.00         | 11.45                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 24.00         | 12.12                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 24.00         | 12.63                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 24.00         | 12.80                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 24.00         | 12.55                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 24.00         | 11.79                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 24.00         | 10.82                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 24.00         | 9.62                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 24.00         | 8.69                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 24.00         | 8.01                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 24.00         | 7.64                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 24.00         | 7.28                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 24.00         | 6.86                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 24.00         | 6.50                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 24.00         | 6.20                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 24.00         | 5.99                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 24.00         | 5.77                     | 1.00 | 0.004           | 0.000                   | 0.004                   |

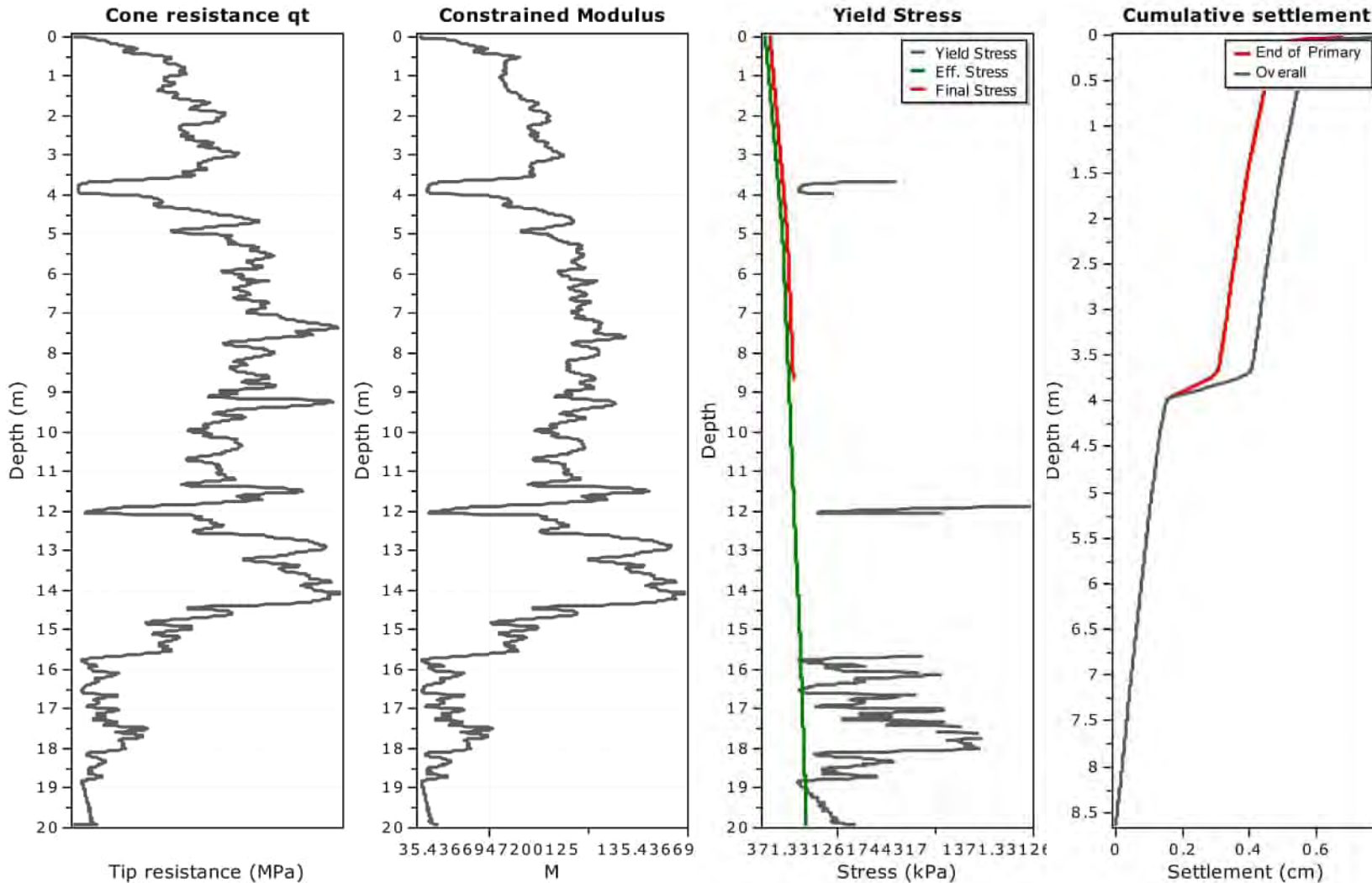
**:: Tabular results ::**

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 1243     | 12.43              | 12.44            | 0.01             | 12.44                    | 23.74            | 58.79                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1244     | 12.44              | 12.45            | 0.01             | 12.45                    | 23.74            | 59.86                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1245     | 12.45              | 12.46            | 0.01             | 12.46                    | 23.74            | 60.71                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1246     | 12.46              | 12.47            | 0.01             | 12.47                    | 23.74            | 61.09                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1247     | 12.47              | 12.48            | 0.01             | 12.48                    | 23.74            | 61.43                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1248     | 12.48              | 12.49            | 0.01             | 12.49                    | 23.74            | 61.77                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1249     | 12.49              | 12.50            | 0.01             | 12.50                    | 23.74            | 62.28                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1250     | 12.50              | 12.51            | 0.01             | 12.51                    | 23.74            | 63.30                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1251     | 12.51              | 12.52            | 0.01             | 12.52                    | 23.74            | 64.44                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1252     | 12.52              | 12.53            | 0.01             | 12.53                    | 23.74            | 65.75                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1253     | 12.53              | 12.54            | 0.01             | 12.54                    | 23.74            | 67.74                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1254     | 12.54              | 12.55            | 0.01             | 12.55                    | 23.74            | 69.99                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1255     | 12.55              | 12.56            | 0.01             | 12.56                    | 23.74            | 73.14                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1256     | 12.56              | 12.57            | 0.01             | 12.57                    | 23.74            | 76.22                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1257     | 12.57              | 12.58            | 0.01             | 12.58                    | 23.74            | 78.91                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1258     | 12.58              | 12.59            | 0.01             | 12.59                    | 23.73            | 81.37                       | 0.99 | 0.000              | 0.000                         | 0.000                         |

**Total primary settlement: 1.31****Total secondary settlement: 0.15****Total calculated settlement: 1.46****Abbreviations**

|                      |                                                                                 |
|----------------------|---------------------------------------------------------------------------------|
| Start depth:         | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:           | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:           | Thickness of soil layer                                                         |
| Relative depth:      | Depth of calculation relative to footing                                        |
| Iz:                  | Stress influence factor                                                         |
| Delta P:             | Footing imposed stress:                                                         |
| Eff. stress:         | Effective stress                                                                |
| M <sub>(CPT)</sub> : | Constrained modulus from CPT                                                    |
| Settlement:          | Primary settlement                                                              |
| Second. settlement:  | Secondary settlements due to creep                                              |

### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 24.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( 1 - e^{-t/t_p} \right)$$

where  $t_p$  is the duration of primary consolidation



**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 24.00         | 0.35                     | 1.00 | 0.069           | 0.000                   | 0.069                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 24.00         | 0.58                     | 1.00 | 0.041           | 0.000                   | 0.041                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 24.00         | 0.92                     | 1.00 | 0.026           | 0.000                   | 0.026                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 24.00         | 1.28                     | 1.00 | 0.019           | 0.000                   | 0.019                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 24.00         | 1.40                     | 1.00 | 0.017           | 0.000                   | 0.017                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 24.00         | 1.47                     | 1.00 | 0.016           | 0.000                   | 0.016                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 24.00         | 11.85                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 24.00         | 14.49                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 24.00         | 16.05                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 24.00         | 17.46                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 24.00         | 18.49                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 24.00         | 18.92                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 24.00         | 19.23                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 24.00         | 19.59                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 24.00         | 20.10                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 24.00         | 20.71                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 24.00         | 21.47                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 24.00         | 22.25                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 24.00         | 23.18                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 24.00         | 24.09                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 24.00         | 25.06                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 24.00         | 25.93                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 24.00         | 26.69                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 24.00         | 27.43                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 24.00         | 28.13                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 24.00         | 28.89                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 24.00         | 29.86                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 24.00         | 31.72                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 24.00         | 33.46                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 24.00         | 34.52                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 24.00         | 34.31                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 24.00         | 33.70                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 24.00         | 32.77                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 24.00         | 31.52                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 24.00         | 30.09                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 24.00         | 28.84                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 24.00         | 27.90                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 24.00         | 27.52                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 24.00         | 27.55                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 24.00         | 28.32                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 24.00         | 29.76                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 24.00         | 32.02                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 24.00         | 34.59                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 24.00         | 37.22                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 24.00         | 39.77                    | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 24.00         | 42.07                    | 1.00 | 0.001           | 0.000                   | 0.001                   |

**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 829      | 8.29            | 8.30          | 0.01          | 8.30               | 23.92         | 75.83                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 830      | 8.30            | 8.31          | 0.01          | 8.31               | 23.92         | 76.15                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 831      | 8.31            | 8.32          | 0.01          | 8.32               | 23.92         | 76.07                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 832      | 8.32            | 8.33          | 0.01          | 8.33               | 23.92         | 75.58                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 833      | 8.33            | 8.34          | 0.01          | 8.34               | 23.92         | 75.06                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 834      | 8.34            | 8.35          | 0.01          | 8.35               | 23.92         | 74.66                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 835      | 8.35            | 8.36          | 0.01          | 8.36               | 23.92         | 74.79                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 836      | 8.36            | 8.37          | 0.01          | 8.37               | 23.92         | 75.38                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 837      | 8.37            | 8.38          | 0.01          | 8.38               | 23.92         | 76.04                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 838      | 8.38            | 8.39          | 0.01          | 8.39               | 23.92         | 76.29                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 839      | 8.39            | 8.40          | 0.01          | 8.40               | 23.92         | 75.97                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 840      | 8.40            | 8.41          | 0.01          | 8.41               | 23.92         | 75.33                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 841      | 8.41            | 8.42          | 0.01          | 8.42               | 23.92         | 74.81                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 842      | 8.42            | 8.43          | 0.01          | 8.43               | 23.92         | 74.50                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 843      | 8.43            | 8.44          | 0.01          | 8.44               | 23.92         | 74.61                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 844      | 8.44            | 8.45          | 0.01          | 8.45               | 23.92         | 74.84                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 845      | 8.45            | 8.46          | 0.01          | 8.46               | 23.92         | 75.25                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 846      | 8.46            | 8.47          | 0.01          | 8.47               | 23.92         | 75.62                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 847      | 8.47            | 8.48          | 0.01          | 8.48               | 23.92         | 76.20                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 848      | 8.48            | 8.49          | 0.01          | 8.49               | 23.92         | 76.88                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 849      | 8.49            | 8.50          | 0.01          | 8.50               | 23.91         | 77.62                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 850      | 8.50            | 8.51          | 0.01          | 8.51               | 23.91         | 78.26                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 851      | 8.51            | 8.52          | 0.01          | 8.52               | 23.91         | 79.04                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 852      | 8.52            | 8.53          | 0.01          | 8.53               | 23.91         | 80.07                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 853      | 8.53            | 8.54          | 0.01          | 8.54               | 23.91         | 81.13                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 854      | 8.54            | 8.55          | 0.01          | 8.55               | 23.91         | 82.12                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 855      | 8.55            | 8.56          | 0.01          | 8.56               | 23.91         | 83.03                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 856      | 8.56            | 8.57          | 0.01          | 8.57               | 23.91         | 84.16                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 857      | 8.57            | 8.58          | 0.01          | 8.58               | 23.91         | 85.07                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 858      | 8.58            | 8.59          | 0.01          | 8.59               | 23.91         | 85.89                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 859      | 8.59            | 8.60          | 0.01          | 8.60               | 23.91         | 86.41                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 860      | 8.60            | 8.61          | 0.01          | 8.61               | 23.91         | 87.00                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 861      | 8.61            | 8.62          | 0.01          | 8.62               | 23.91         | 87.58                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 862      | 8.62            | 8.63          | 0.01          | 8.63               | 23.91         | 88.13                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 863      | 8.63            | 8.64          | 0.01          | 8.64               | 23.91         | 88.61                    | 1.00 | 0.000           | 0.000                   | 0.000                   |

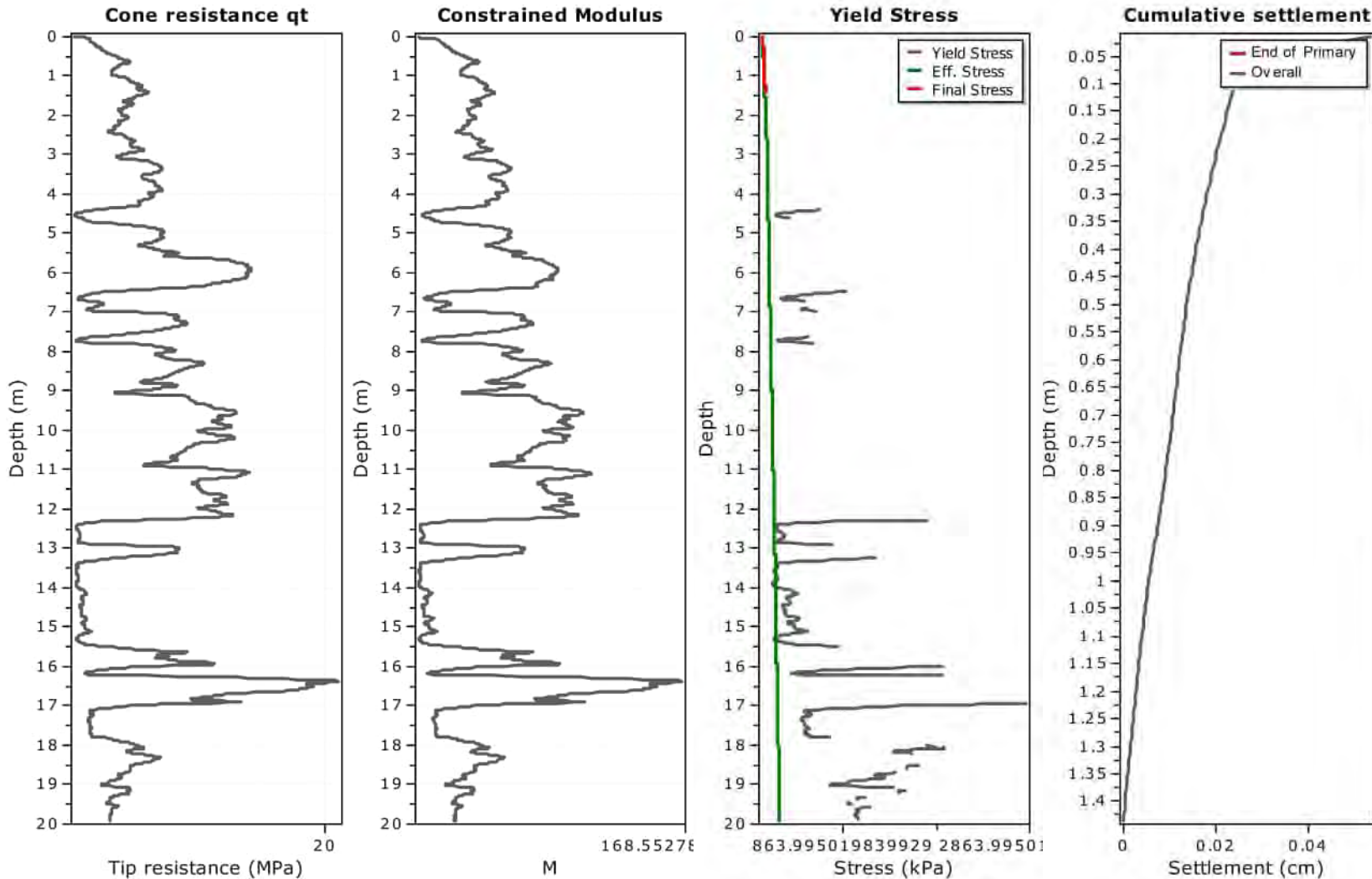
**Total primary settlement: 0.68**  
**Total secondary settlement: 0.10**

**Total calculated settlement: 0.78**

**Abbreviations**

|                      |                                                                                 |
|----------------------|---------------------------------------------------------------------------------|
| Start depth:         | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:           | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:           | Thickness of soil layer                                                         |
| Relative depth:      | Depth of calculation relative to footing                                        |
| Iz:                  | Stress influence factor                                                         |
| Delta P:             | Footing imposed stress:                                                         |
| Eff. stress:         | Effective stress                                                                |
| M <sub>(CPT)</sub> : | Constrained modulus from CPT                                                    |
| Settlement:          | Primary settlement                                                              |
| Second. settlement:  | Secondary settlements due to creep                                              |

### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 5.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 5.00          | 0.72                     | 1.00 | 0.007           | 0.000                   | 0.007                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 5.00          | 0.90                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 5.00          | 1.14                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 5.00          | 1.29                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 5.00          | 1.39                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 5.00          | 1.44                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 5.00          | 10.67                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 5.00          | 13.18                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 5.00          | 13.29                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 5.00          | 13.42                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 5.00          | 13.58                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 5.00          | 13.91                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 5.00          | 14.29                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 5.00          | 14.62                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 5.00          | 14.94                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 5.00          | 15.24                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 5.00          | 15.68                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 5.00          | 16.07                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 5.00          | 16.47                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 5.00          | 16.82                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 5.00          | 17.06                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 5.00          | 17.25                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 5.00          | 17.43                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 5.00          | 17.68                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 5.00          | 18.06                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 5.00          | 18.58                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 5.00          | 19.06                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 5.00          | 19.41                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 5.00          | 19.66                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 5.00          | 19.87                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 5.00          | 20.09                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 5.00          | 20.33                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 5.00          | 20.46                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 5.00          | 20.59                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 5.00          | 20.73                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 5.00          | 21.12                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 5.00          | 21.62                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 5.00          | 22.33                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 5.00          | 22.90                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 5.00          | 23.38                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 5.00          | 23.65                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 5.00          | 24.07                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 5.00          | 24.62                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 5.00          | 25.34                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 5.00          | 26.14                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 5.00          | 26.94                    | 1.00 | 0.000           | 0.000                   | 0.000                   |

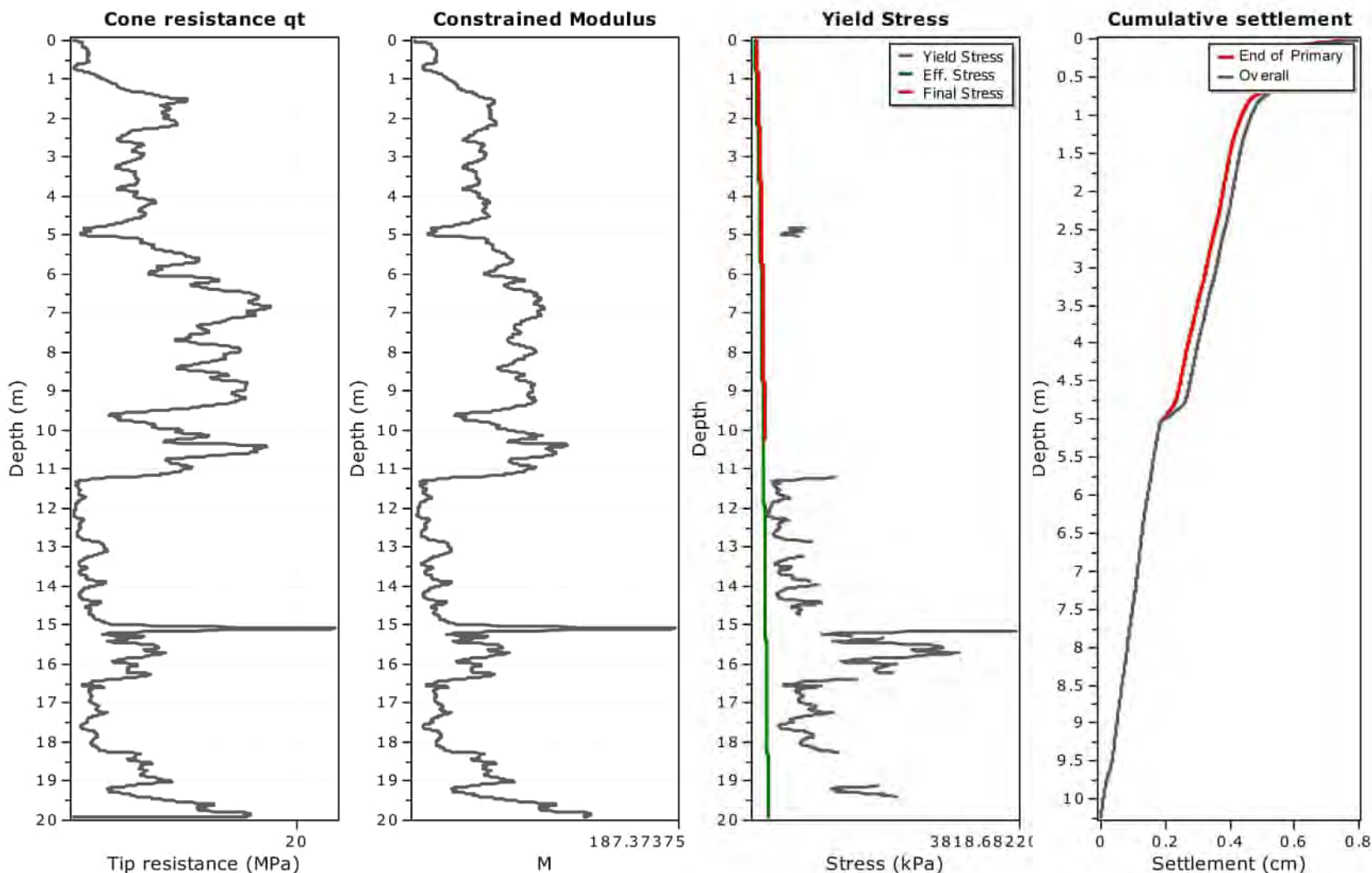
**:: Tabular results ::**

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | $M_{(CPT)}$<br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|----------------------|------|--------------------|-------------------------------|-------------------------------|
| 139      | 1.39               | 1.40             | 0.01             | 1.39                     | 5.00             | 46.02                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 140      | 1.40               | 1.41             | 0.01             | 1.40                     | 5.00             | 46.70                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 141      | 1.41               | 1.42             | 0.01             | 1.41                     | 5.00             | 47.21                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 142      | 1.42               | 1.43             | 0.01             | 1.42                     | 5.00             | 47.50                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 143      | 1.43               | 1.44             | 0.01             | 1.43                     | 5.00             | 47.71                | 1.00 | 0.000              | 0.000                         | 0.000                         |

**Total primary settlement: 0.05****Total secondary settlement: 0.00****Total calculated settlement: 0.05****Abbreviations**

|                     |                                                                                 |
|---------------------|---------------------------------------------------------------------------------|
| Start depth:        | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:          | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:          | Thickness of soil layer                                                         |
| Relative depth:     | Depth of calculation relative to footing                                        |
| Iz:                 | Stress influence factor                                                         |
| Delta P:            | Footing imposed stress:                                                         |
| Eff. stress:        | Effective stress                                                                |
| $M_{(CPT)}$ :       | Constrained modulus from CPT                                                    |
| Settlement:         | Primary settlement                                                              |
| Second. settlement: | Secondary settlements due to creep                                              |

### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 24.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



| :: Tabular results :: |                 |               |               |                    |               |                          |      |                 |                         |                         |
|-----------------------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| Point No              | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
| 1                     | 0.01            | 0.02          | 0.01          | 0.01               | 24.00         | 0.69                     | 1.00 | 0.035           | 0.000                   | 0.035                   |
| 2                     | 0.02            | 0.03          | 0.01          | 0.03               | 24.00         | 0.81                     | 1.00 | 0.030           | 0.000                   | 0.030                   |
| 3                     | 0.03            | 0.04          | 0.01          | 0.04               | 24.00         | 0.98                     | 1.00 | 0.024           | 0.000                   | 0.024                   |
| 4                     | 0.04            | 0.05          | 0.01          | 0.04               | 24.00         | 1.11                     | 1.00 | 0.022           | 0.000                   | 0.022                   |
| 5                     | 0.05            | 0.06          | 0.01          | 0.06               | 24.00         | 1.19                     | 1.00 | 0.020           | 0.000                   | 0.020                   |
| 6                     | 0.06            | 0.07          | 0.01          | 0.07               | 24.00         | 1.24                     | 1.00 | 0.019           | 0.000                   | 0.019                   |
| 7                     | 0.07            | 0.08          | 0.01          | 0.07               | 24.00         | 8.45                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 8                     | 0.08            | 0.09          | 0.01          | 0.09               | 24.00         | 9.57                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 9                     | 0.09            | 0.10          | 0.01          | 0.09               | 24.00         | 10.87                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 10                    | 0.10            | 0.11          | 0.01          | 0.10               | 24.00         | 11.65                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 11                    | 0.11            | 0.12          | 0.01          | 0.12               | 24.00         | 11.90                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 12                    | 0.12            | 0.13          | 0.01          | 0.13               | 24.00         | 12.01                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 13                    | 0.13            | 0.14          | 0.01          | 0.14               | 24.00         | 12.10                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 14                    | 0.14            | 0.15          | 0.01          | 0.14               | 24.00         | 12.17                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 15                    | 0.15            | 0.16          | 0.01          | 0.15               | 24.00         | 12.22                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 16                    | 0.16            | 0.17          | 0.01          | 0.17               | 24.00         | 12.37                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 17                    | 0.17            | 0.18          | 0.01          | 0.17               | 24.00         | 12.61                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 18                    | 0.18            | 0.19          | 0.01          | 0.18               | 24.00         | 12.96                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 19                    | 0.19            | 0.20          | 0.01          | 0.20               | 24.00         | 13.32                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 20                    | 0.20            | 0.21          | 0.01          | 0.20               | 24.00         | 13.71                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 21                    | 0.21            | 0.22          | 0.01          | 0.21               | 24.00         | 14.07                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 22                    | 0.22            | 0.23          | 0.01          | 0.23               | 24.00         | 14.41                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 23                    | 0.23            | 0.24          | 0.01          | 0.24               | 24.00         | 14.56                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 24                    | 0.24            | 0.25          | 0.01          | 0.25               | 24.00         | 14.77                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 25                    | 0.25            | 0.26          | 0.01          | 0.26               | 24.00         | 15.41                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 26                    | 0.26            | 0.27          | 0.01          | 0.27               | 24.00         | 15.64                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 27                    | 0.27            | 0.28          | 0.01          | 0.28               | 24.00         | 15.70                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 28                    | 0.28            | 0.29          | 0.01          | 0.28               | 24.00         | 15.80                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 29                    | 0.29            | 0.30          | 0.01          | 0.29               | 24.00         | 15.89                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 30                    | 0.30            | 0.31          | 0.01          | 0.30               | 24.00         | 15.98                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 31                    | 0.31            | 0.32          | 0.01          | 0.32               | 24.00         | 15.94                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 32                    | 0.32            | 0.33          | 0.01          | 0.33               | 24.00         | 15.87                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 33                    | 0.33            | 0.34          | 0.01          | 0.34               | 24.00         | 15.83                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 34                    | 0.34            | 0.35          | 0.01          | 0.34               | 24.00         | 15.88                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 35                    | 0.35            | 0.36          | 0.01          | 0.35               | 24.00         | 15.92                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 36                    | 0.36            | 0.37          | 0.01          | 0.36               | 24.00         | 15.99                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 37                    | 0.37            | 0.38          | 0.01          | 0.37               | 24.00         | 16.00                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 38                    | 0.38            | 0.39          | 0.01          | 0.38               | 24.00         | 15.96                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 39                    | 0.39            | 0.40          | 0.01          | 0.39               | 24.00         | 15.88                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 40                    | 0.40            | 0.41          | 0.01          | 0.40               | 24.00         | 15.80                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 41                    | 0.41            | 0.42          | 0.01          | 0.41               | 24.00         | 15.74                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 42                    | 0.42            | 0.43          | 0.01          | 0.42               | 24.00         | 15.67                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 43                    | 0.43            | 0.44          | 0.01          | 0.43               | 24.00         | 15.62                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 44                    | 0.44            | 0.45          | 0.01          | 0.44               | 24.00         | 15.55                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 45                    | 0.45            | 0.46          | 0.01          | 0.45               | 24.00         | 15.44                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 46                    | 0.46            | 0.47          | 0.01          | 0.46               | 24.00         | 15.34                    | 1.00 | 0.002           | 0.000                   | 0.002                   |

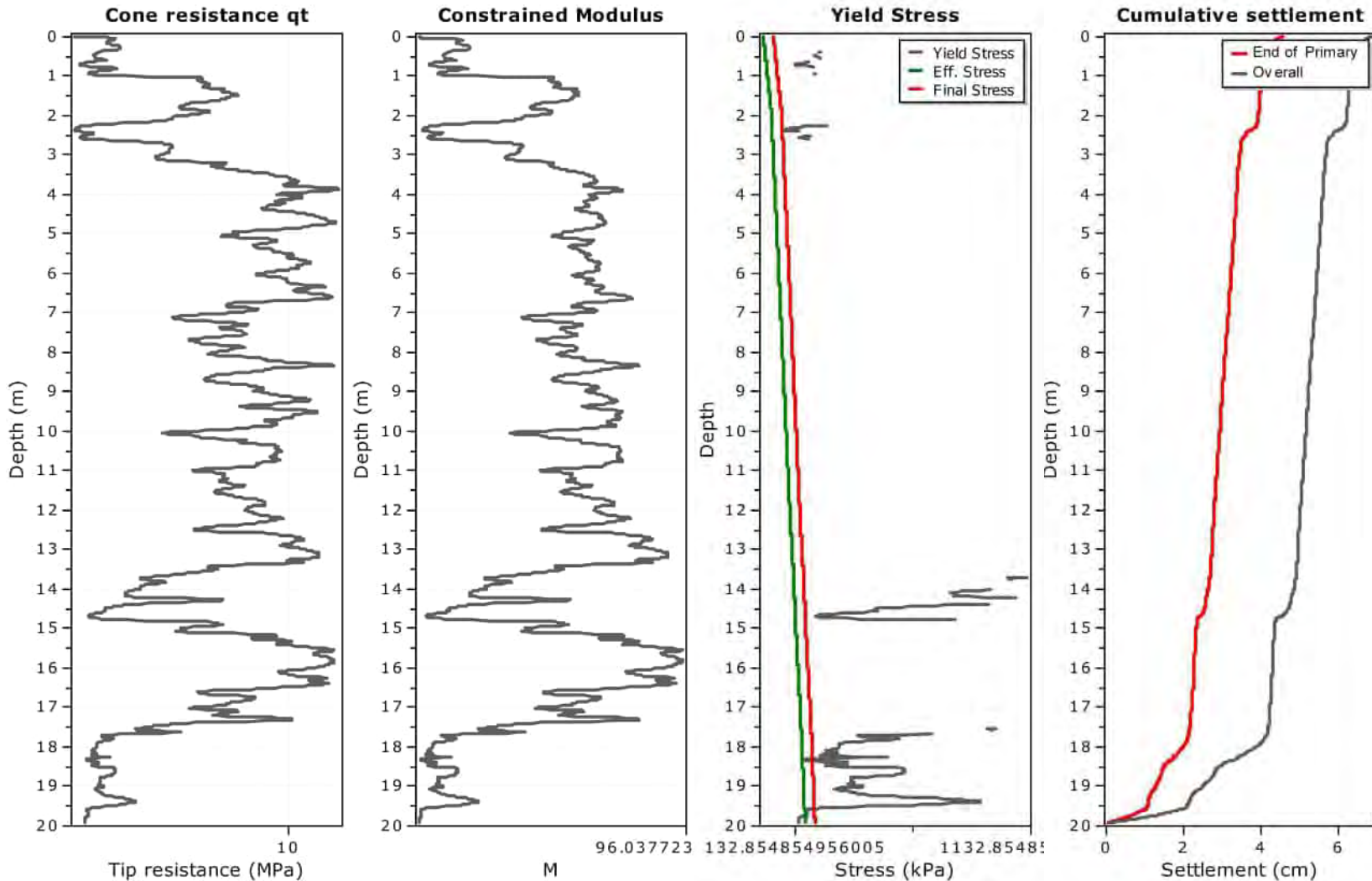
**:: Tabular results ::**

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 1013     | 10.13              | 10.14            | 0.01             | 10.14                    | 23.86            | 89.73                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1014     | 10.14              | 10.15            | 0.01             | 10.15                    | 23.86            | 91.44                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1015     | 10.15              | 10.16            | 0.01             | 10.16                    | 23.86            | 86.97                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1016     | 10.16              | 10.17            | 0.01             | 10.17                    | 23.86            | 84.39                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1017     | 10.17              | 10.18            | 0.01             | 10.18                    | 23.86            | 82.08                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1018     | 10.18              | 10.19            | 0.01             | 10.19                    | 23.86            | 85.40                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1019     | 10.19              | 10.20            | 0.01             | 10.20                    | 23.86            | 86.78                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1020     | 10.20              | 10.21            | 0.01             | 10.21                    | 23.85            | 86.47                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1021     | 10.21              | 10.22            | 0.01             | 10.22                    | 23.85            | 83.79                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1022     | 10.22              | 10.23            | 0.01             | 10.23                    | 23.85            | 81.05                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1023     | 10.23              | 10.24            | 0.01             | 10.24                    | 23.85            | 78.42                       | 0.99 | 0.000              | 0.000                         | 0.000                         |

**Total primary settlement: 0.76****Total secondary settlement: 0.03****Total calculated settlement: 0.79****Abbreviations**

|                      |                                                                                 |
|----------------------|---------------------------------------------------------------------------------|
| Start depth:         | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:           | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:           | Thickness of soil layer                                                         |
| Relative depth:      | Depth of calculation relative to footing                                        |
| Iz:                  | Stress influence factor                                                         |
| Delta P:             | Footing imposed stress:                                                         |
| Eff. stress:         | Effective stress                                                                |
| M <sub>(CPT)</sub> : | Constrained modulus from CPT                                                    |
| Settlement:          | Primary settlement                                                              |
| Second. settlement:  | Secondary settlements due to creep                                              |

**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 43.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 43.00         | 0.98                     | 1.00 | 0.044           | 0.000                   | 0.044                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 43.00         | 1.29                     | 1.00 | 0.033           | 0.000                   | 0.033                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 43.00         | 1.61                     | 1.00 | 0.027           | 0.000                   | 0.027                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 43.00         | 1.75                     | 1.00 | 0.025           | 0.000                   | 0.025                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 43.00         | 1.87                     | 1.00 | 0.023           | 0.000                   | 0.023                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 43.00         | 1.95                     | 1.00 | 0.022           | 0.000                   | 0.022                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 43.00         | 13.31                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 43.00         | 16.39                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 43.00         | 15.88                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 43.00         | 15.35                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 43.00         | 14.96                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 43.00         | 14.65                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 43.00         | 14.38                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 43.00         | 14.16                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 43.00         | 14.07                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 43.00         | 14.05                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 43.00         | 14.14                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 43.00         | 14.35                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 43.00         | 14.93                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 43.00         | 15.57                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 43.00         | 16.27                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 43.00         | 16.85                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 43.00         | 17.61                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 43.00         | 18.31                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 43.00         | 18.78                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 43.00         | 18.97                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 43.00         | 18.98                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 43.00         | 19.00                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 43.00         | 18.99                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 43.00         | 19.00                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 43.00         | 18.96                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 43.00         | 18.68                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 43.00         | 17.96                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 43.00         | 16.81                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 43.00         | 15.73                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 43.00         | 14.46                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 43.00         | 13.19                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 43.00         | 11.96                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 43.00         | 11.39                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 43.00         | 11.19                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 43.00         | 10.99                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 43.00         | 10.64                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 43.00         | 10.25                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 43.00         | 9.86                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 43.00         | 9.69                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 43.00         | 9.44                     | 1.00 | 0.005           | 0.000                   | 0.005                   |

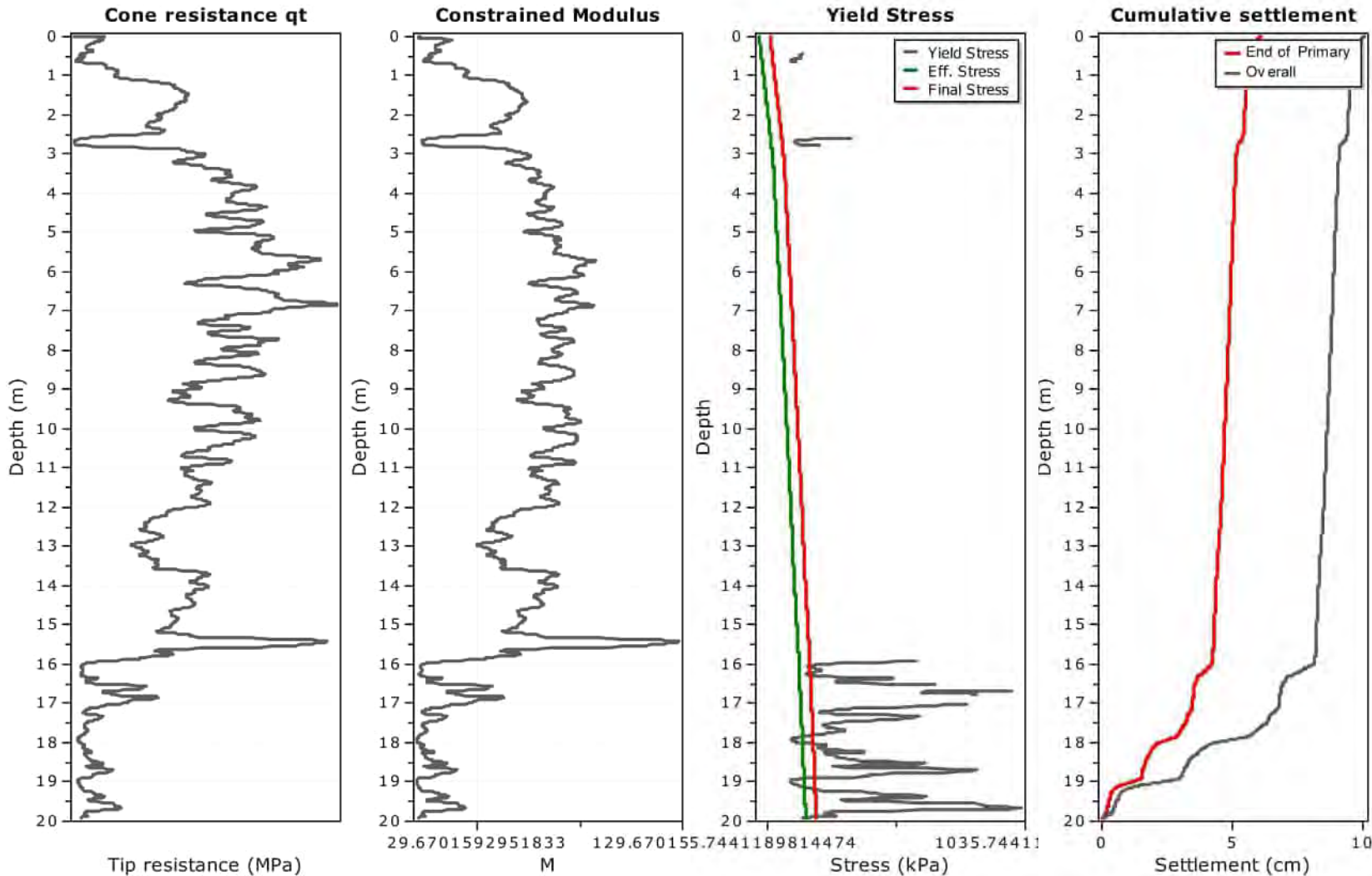
**:: Tabular results ::**

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | $M_{(CPT)}$<br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|----------------------|------|--------------------|-------------------------------|-------------------------------|
| 1979     | 19.79              | 19.80            | 0.01             | 19.80                    | 41.34            | 1.24                 | 0.96 | 0.033              | 0.033                         | 0.066                         |
| 1980     | 19.80              | 19.81            | 0.01             | 19.81                    | 41.34            | 1.21                 | 0.96 | 0.034              | 0.033                         | 0.067                         |
| 1981     | 19.81              | 19.82            | 0.01             | 19.82                    | 41.34            | 1.20                 | 0.96 | 0.034              | 0.034                         | 0.068                         |
| 1982     | 19.82              | 19.83            | 0.01             | 19.83                    | 41.34            | 1.19                 | 0.96 | 0.035              | 0.034                         | 0.069                         |
| 1983     | 19.83              | 19.84            | 0.01             | 19.84                    | 41.33            | 1.19                 | 0.96 | 0.035              | 0.034                         | 0.069                         |
| 1984     | 19.84              | 19.85            | 0.01             | 19.85                    | 41.33            | 1.18                 | 0.96 | 0.035              | 0.034                         | 0.069                         |
| 1985     | 19.85              | 19.86            | 0.01             | 19.86                    | 41.33            | 1.17                 | 0.96 | 0.035              | 0.035                         | 0.070                         |
| 1986     | 19.86              | 19.87            | 0.01             | 19.87                    | 41.33            | 1.16                 | 0.96 | 0.036              | 0.035                         | 0.071                         |
| 1987     | 19.87              | 19.88            | 0.01             | 19.88                    | 41.32            | 1.15                 | 0.96 | 0.036              | 0.035                         | 0.071                         |
| 1988     | 19.88              | 19.89            | 0.01             | 19.89                    | 41.32            | 1.15                 | 0.96 | 0.036              | 0.035                         | 0.071                         |
| 1989     | 19.89              | 19.90            | 0.01             | 19.90                    | 41.32            | 1.14                 | 0.96 | 0.036              | 0.036                         | 0.072                         |
| 1990     | 19.90              | 19.91            | 0.01             | 19.91                    | 41.32            | 1.14                 | 0.96 | 0.036              | 0.036                         | 0.072                         |
| 1991     | 19.91              | 19.92            | 0.01             | 19.92                    | 41.32            | 1.15                 | 0.96 | 0.036              | 0.035                         | 0.071                         |

**Total primary settlement: 4.56****Total secondary settlement: 2.30****Total calculated settlement: 6.86****Abbreviations**

|                     |                                                                                 |
|---------------------|---------------------------------------------------------------------------------|
| Start depth:        | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:          | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:          | Thickness of soil layer                                                         |
| Relative depth:     | Depth of calculation relative to footing                                        |
| Iz:                 | Stress influence factor                                                         |
| Delta P:            | Footing imposed stress:                                                         |
| Eff. stress:        | Effective stress                                                                |
| $M_{(CPT)}$ :       | Constrained modulus from CPT                                                    |
| Settlement:         | Primary settlement                                                              |
| Second. settlement: | Secondary settlements due to creep                                              |

**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 43.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 43.00         | 2.07                     | 1.00 | 0.021           | 0.000                   | 0.021                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 43.00         | 1.94                     | 1.00 | 0.022           | 0.000                   | 0.022                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 43.00         | 1.82                     | 1.00 | 0.024           | 0.000                   | 0.024                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 43.00         | 1.77                     | 1.00 | 0.024           | 0.000                   | 0.024                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 43.00         | 1.84                     | 1.00 | 0.023           | 0.000                   | 0.023                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 43.00         | 1.93                     | 1.00 | 0.022           | 0.000                   | 0.022                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 43.00         | 12.77                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 43.00         | 15.88                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 43.00         | 17.87                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 43.00         | 17.50                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 43.00         | 16.79                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 43.00         | 16.00                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 43.00         | 15.15                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 43.00         | 14.44                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 43.00         | 13.89                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 43.00         | 13.39                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 43.00         | 12.95                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 43.00         | 12.56                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 43.00         | 12.23                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 43.00         | 11.83                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 43.00         | 11.35                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 43.00         | 10.85                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 43.00         | 10.35                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 43.00         | 9.96                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 43.00         | 9.74                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 43.00         | 9.68                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 43.00         | 9.64                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 43.00         | 9.52                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 43.00         | 9.43                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 43.00         | 9.37                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 43.00         | 9.45                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 43.00         | 9.61                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 43.00         | 9.91                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 43.00         | 10.43                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 43.00         | 11.20                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 43.00         | 12.15                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 43.00         | 12.55                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 43.00         | 12.44                    | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 43.00         | 11.82                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 43.00         | 11.16                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 43.00         | 10.37                    | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 43.00         | 9.34                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 43.00         | 8.41                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 43.00         | 7.63                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 43.00         | 7.12                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 43.00         | 6.65                     | 1.00 | 0.006           | 0.000                   | 0.007                   |

**:: Tabular results ::**

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | $M_{(CPT)}$<br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|----------------------|------|--------------------|-------------------------------|-------------------------------|
| 1979     | 19.79              | 19.80            | 0.01             | 19.80                    | 41.34            | 3.59                 | 0.96 | 0.012              | 0.012                         | 0.023                         |
| 1980     | 19.80              | 19.81            | 0.01             | 19.81                    | 41.34            | 3.39                 | 0.96 | 0.012              | 0.012                         | 0.024                         |
| 1981     | 19.81              | 19.82            | 0.01             | 19.82                    | 41.34            | 3.30                 | 0.96 | 0.013              | 0.013                         | 0.025                         |
| 1982     | 19.82              | 19.83            | 0.01             | 19.83                    | 41.34            | 3.36                 | 0.96 | 0.012              | 0.012                         | 0.025                         |
| 1983     | 19.83              | 19.84            | 0.01             | 19.84                    | 41.33            | 3.66                 | 0.96 | 0.011              | 0.011                         | 0.023                         |
| 1984     | 19.84              | 19.85            | 0.01             | 19.85                    | 41.33            | 4.07                 | 0.96 | 0.010              | 0.010                         | 0.020                         |
| 1985     | 19.85              | 19.86            | 0.01             | 19.86                    | 41.33            | 4.43                 | 0.96 | 0.009              | 0.009                         | 0.019                         |
| 1986     | 19.86              | 19.87            | 0.01             | 19.87                    | 41.33            | 4.50                 | 0.96 | 0.009              | 0.009                         | 0.018                         |
| 1987     | 19.87              | 19.88            | 0.01             | 19.88                    | 41.32            | 3.82                 | 0.96 | 0.011              | 0.011                         | 0.022                         |
| 1988     | 19.88              | 19.89            | 0.01             | 19.89                    | 41.32            | 2.93                 | 0.96 | 0.014              | 0.014                         | 0.028                         |
| 1989     | 19.89              | 19.90            | 0.01             | 19.90                    | 41.32            | 2.15                 | 0.96 | 0.019              | 0.019                         | 0.039                         |
| 1990     | 19.90              | 19.91            | 0.01             | 19.91                    | 41.32            | 1.76                 | 0.96 | 0.024              | 0.024                         | 0.047                         |
| 1991     | 19.91              | 19.92            | 0.01             | 19.92                    | 41.32            | 1.57                 | 0.96 | 0.026              | 0.027                         | 0.053                         |

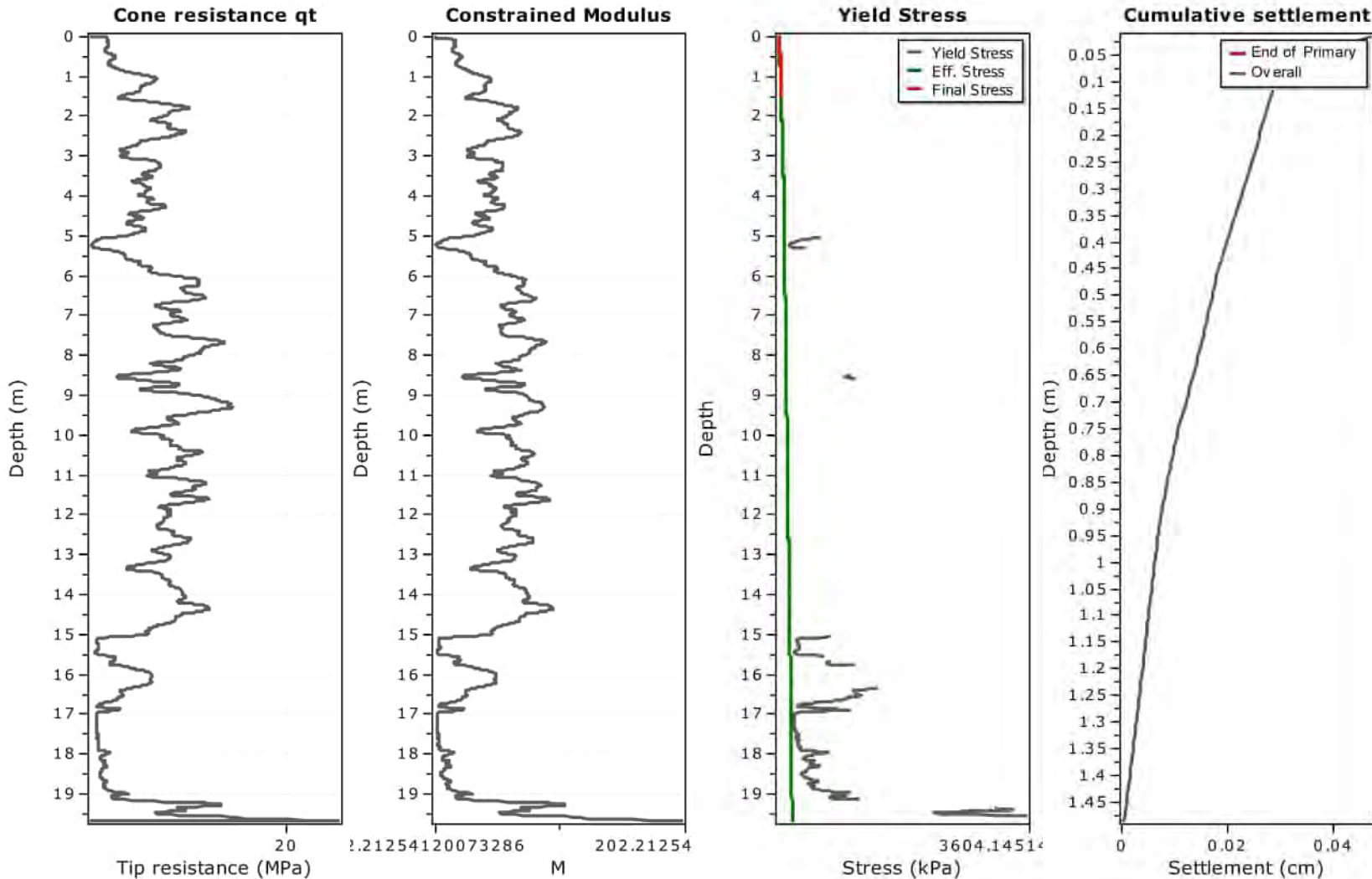
**Total primary settlement: 6.11**  
**Total secondary settlement: 3.98**

**Total calculated settlement: 10.09**

**Abbreviations**

|                     |                                                                                 |
|---------------------|---------------------------------------------------------------------------------|
| Start depth:        | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:          | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:          | Thickness of soil layer                                                         |
| Relative depth:     | Depth of calculation relative to footing                                        |
| Iz:                 | Stress influence factor                                                         |
| Delta P:            | Footing imposed stress:                                                         |
| Eff. stress:        | Effective stress                                                                |
| $M_{(CPT)}$ :       | Constrained modulus from CPT                                                    |
| Settlement:         | Primary settlement                                                              |
| Second. settlement: | Secondary settlements due to creep                                              |

**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 5.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 5.00          | 1.57                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 5.00          | 1.67                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 5.00          | 1.78                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 5.00          | 1.81                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 5.00          | 1.82                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 5.00          | 1.84                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 5.00          | 12.27                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 5.00          | 15.89                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 5.00          | 17.26                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 5.00          | 17.37                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 5.00          | 17.29                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 5.00          | 17.12                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 5.00          | 16.91                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 5.00          | 16.78                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 5.00          | 16.75                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 5.00          | 16.79                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 5.00          | 16.84                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 5.00          | 16.86                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 5.00          | 16.84                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 5.00          | 16.83                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 5.00          | 16.86                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 5.00          | 16.99                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 5.00          | 17.13                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 5.00          | 17.25                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 5.00          | 17.17                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 5.00          | 16.99                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 5.00          | 16.64                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 5.00          | 16.22                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 5.00          | 15.66                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 5.00          | 15.19                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 5.00          | 14.90                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 5.00          | 14.76                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 5.00          | 14.66                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 5.00          | 14.61                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 5.00          | 14.64                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 5.00          | 14.84                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 5.00          | 15.11                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 5.00          | 15.53                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 5.00          | 16.03                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 5.00          | 16.57                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 5.00          | 17.17                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 5.00          | 17.82                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 5.00          | 18.55                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 5.00          | 19.34                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 5.00          | 20.06                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 5.00          | 20.76                    | 1.00 | 0.000           | 0.000                   | 0.000                   |

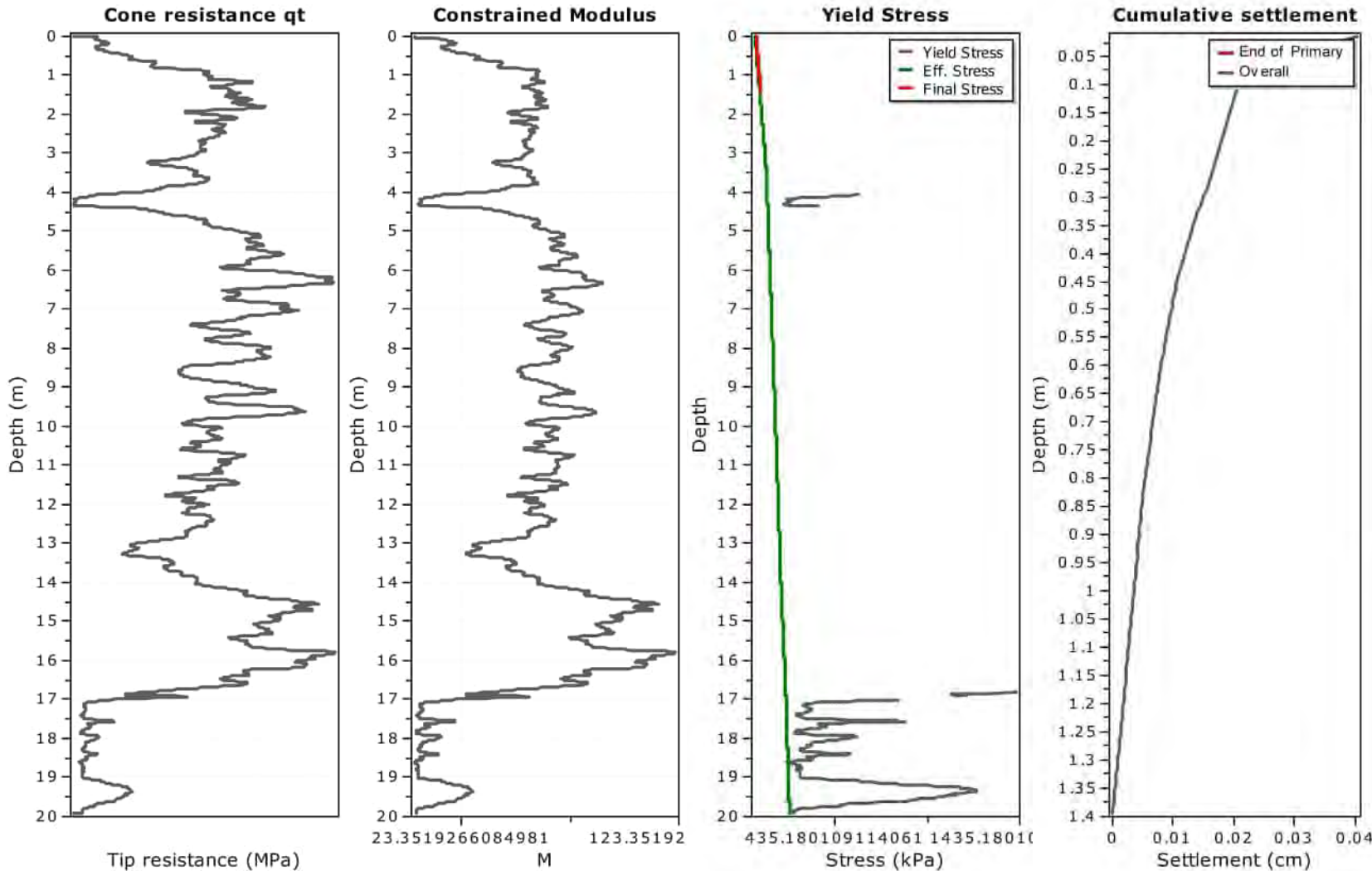
**:: Tabular results ::**

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | $M_{(CPT)}$<br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|----------------------|------|--------------------|-------------------------------|-------------------------------|
| 139      | 1.39               | 1.40             | 0.01             | 1.39                     | 5.00             | 40.71                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 140      | 1.40               | 1.41             | 0.01             | 1.40                     | 5.00             | 40.12                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 141      | 1.41               | 1.42             | 0.01             | 1.41                     | 5.00             | 38.74                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 142      | 1.42               | 1.43             | 0.01             | 1.42                     | 5.00             | 37.18                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 143      | 1.43               | 1.44             | 0.01             | 1.43                     | 5.00             | 35.20                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 144      | 1.44               | 1.45             | 0.01             | 1.44                     | 5.00             | 33.39                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 145      | 1.45               | 1.46             | 0.01             | 1.45                     | 5.00             | 31.87                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 146      | 1.46               | 1.47             | 0.01             | 1.46                     | 5.00             | 31.09                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 147      | 1.47               | 1.48             | 0.01             | 1.47                     | 5.00             | 30.46                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 148      | 1.48               | 1.49             | 0.01             | 1.48                     | 5.00             | 29.88                | 1.00 | 0.000              | 0.000                         | 0.000                         |

**Total primary settlement: 0.05****Total secondary settlement: 0.00****Total calculated settlement: 0.05****Abbreviations**

|                     |                                                                                 |
|---------------------|---------------------------------------------------------------------------------|
| Start depth:        | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:          | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:          | Thickness of soil layer                                                         |
| Relative depth:     | Depth of calculation relative to footing                                        |
| Iz:                 | Stress influence factor                                                         |
| Delta P:            | Footing imposed stress:                                                         |
| Eff. stress:        | Effective stress                                                                |
| $M_{(CPT)}$ :       | Constrained modulus from CPT                                                    |
| Settlement:         | Primary settlement                                                              |
| Second. settlement: | Secondary settlements due to creep                                              |

**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 5.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 5.00          | 1.63                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 5.00          | 1.69                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 5.00          | 1.73                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 5.00          | 1.61                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 5.00          | 1.56                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 5.00          | 1.53                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 5.00          | 11.18                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 5.00          | 14.18                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 5.00          | 14.78                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 5.00          | 15.46                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 5.00          | 16.10                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 5.00          | 16.72                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 5.00          | 17.46                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 5.00          | 18.32                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 5.00          | 18.95                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 5.00          | 19.51                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 5.00          | 19.93                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 5.00          | 20.41                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 5.00          | 20.49                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 5.00          | 20.20                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 5.00          | 19.61                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 5.00          | 18.88                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 5.00          | 18.04                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 5.00          | 16.93                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 5.00          | 15.96                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 5.00          | 15.08                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 5.00          | 14.50                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 5.00          | 14.13                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 5.00          | 13.96                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 5.00          | 14.08                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 5.00          | 14.31                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 5.00          | 14.74                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 5.00          | 15.28                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 5.00          | 15.97                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 5.00          | 16.62                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 5.00          | 17.38                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 5.00          | 17.96                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 5.00          | 18.45                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 5.00          | 18.59                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 5.00          | 19.08                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 5.00          | 19.80                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 5.00          | 20.92                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 5.00          | 22.14                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 5.00          | 23.51                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 5.00          | 25.17                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 5.00          | 26.55                    | 1.00 | 0.000           | 0.000                   | 0.000                   |

:: Tabular results ::

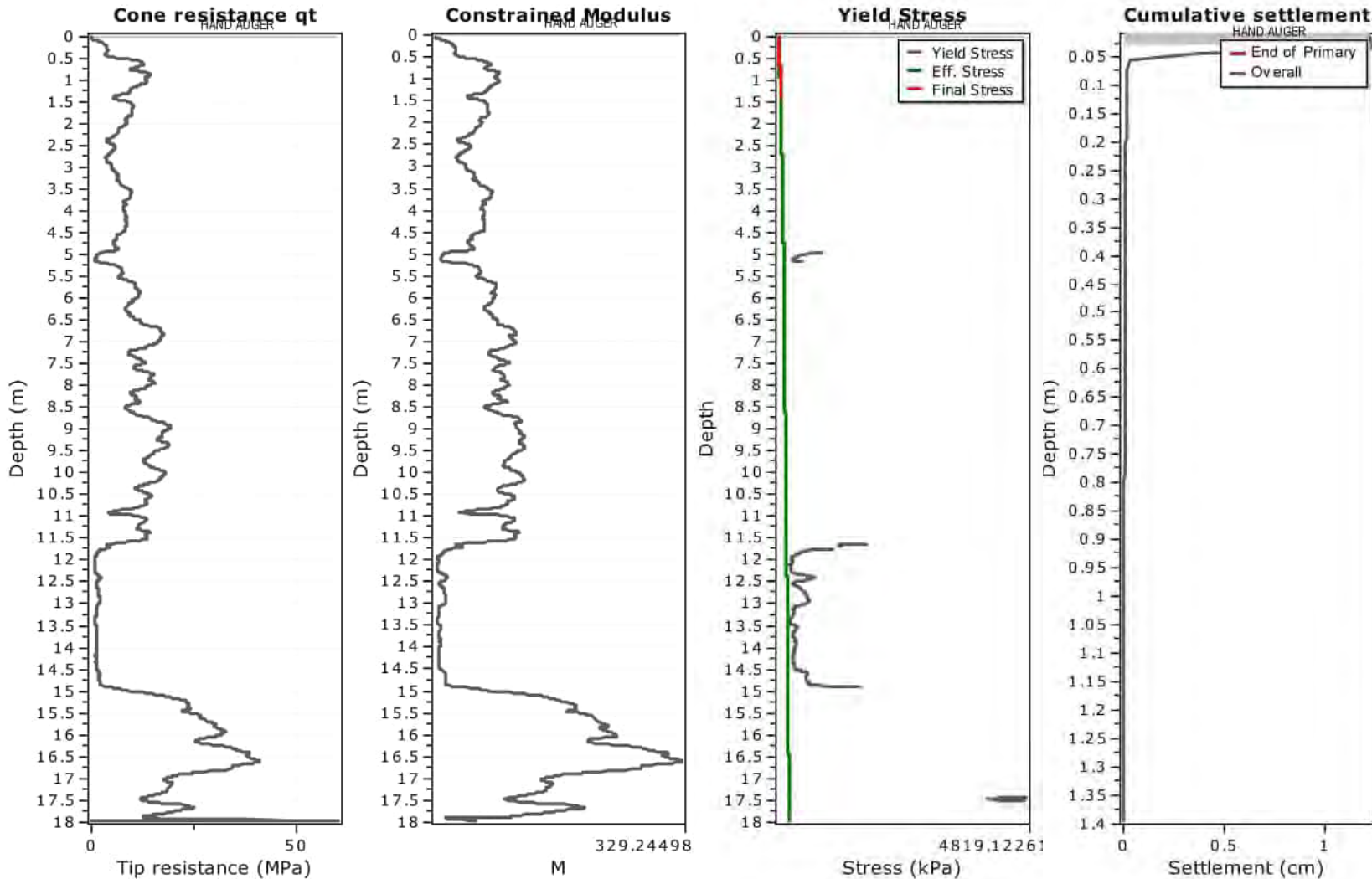
| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 139      | 1.39               | 1.40             | 0.01             | 1.39                     | 5.00             | 56.41                       | 1.00 | 0.000              | 0.000                         | 0.000                         |

**Total primary settlement: 0.04**  
**Total secondary settlement: 0.00**  
**Total calculated settlement: 0.04**

Abbreviations

- Start depth:
- End depth:
- Thickness:
- Relative depth:
- Iz:
- Delta P:
- Eff. stress:
- M<sub>(CPT)</sub>:
- Settlement:
- Second. settlement:
- Start depth of soil layer (penetration depth measured from ground free surface)
- End depth of soil layer (penetration depth measured from ground free surface)
- Thickness of soil layer
- Depth of calculation relative to footing
- Stress influence factor
- Footing imposed stress:
- Effective stress
- Constrained modulus from CPT
- Primary settlement
- Secondary settlement due to creep

**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 5.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( 1 - e^{-\frac{t}{t_p}} \right)$$

where  $t_p$  is the duration of primary consolidation



**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 5.00          | 0.00                     | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 5.00          | 0.00                     | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 5.00          | 0.01                     | 1.00 | 0.861           | 0.000                   | 0.861                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 5.00          | 0.02                     | 1.00 | 0.330           | 0.000                   | 0.330                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 5.00          | 0.36                     | 1.00 | 0.014           | 0.000                   | 0.014                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 5.00          | 1.56                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 5.00          | 3.51                     | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 5.00          | 5.85                     | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.10               | 5.00          | 7.51                     | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 5.00          | 9.06                     | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 5.00          | 10.60                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 5.00          | 12.53                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 5.00          | 13.83                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 5.00          | 15.86                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 5.00          | 17.16                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 5.00          | 18.13                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 5.00          | 19.12                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 5.00          | 20.16                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 5.00          | 21.15                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 5.00          | 21.83                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 5.00          | 22.72                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 5.00          | 23.53                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.23               | 5.00          | 24.19                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.24               | 5.00          | 24.47                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 5.00          | 24.97                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 5.00          | 25.46                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 5.00          | 25.89                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 5.00          | 26.26                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 5.00          | 26.58                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 5.00          | 26.86                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 5.00          | 27.02                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 5.00          | 27.06                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 5.00          | 27.06                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 5.00          | 26.89                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 5.00          | 26.72                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 5.00          | 26.45                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.38               | 5.00          | 26.20                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.39               | 5.00          | 25.96                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.40               | 5.00          | 25.79                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.41               | 5.00          | 25.54                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 5.00          | 25.37                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 5.00          | 25.25                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 5.00          | 25.44                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.45               | 5.00          | 25.72                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.46               | 5.00          | 26.45                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.47               | 5.00          | 27.36                    | 1.00 | 0.000           | 0.000                   | 0.000                   |

:: Tabular results ::

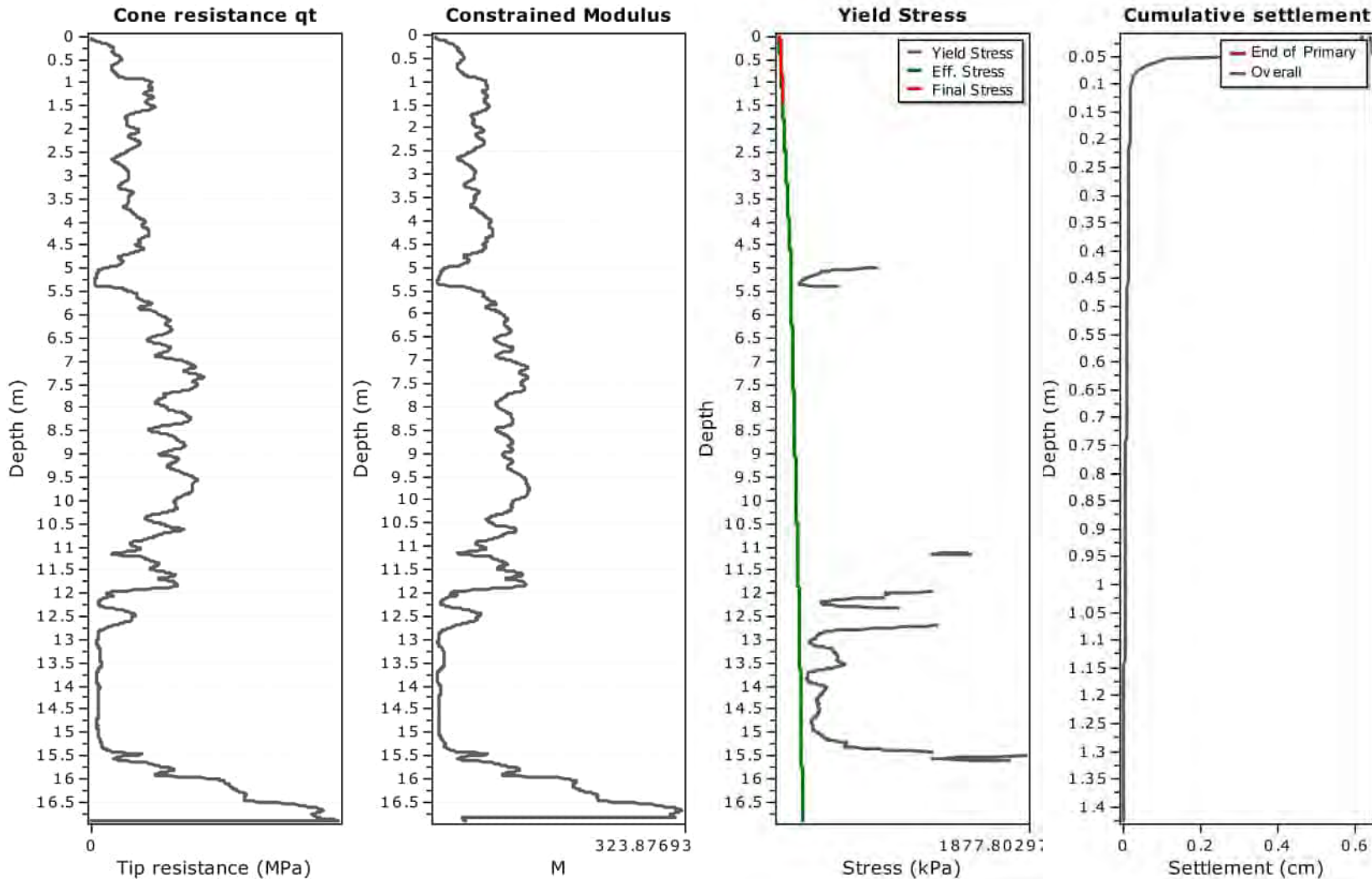
| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 139      | 1.39               | 1.40             | 0.01             | 1.40                     | 5.00             | 42.46                       | 1.00 | 0.000              | 0.000                         | 0.000                         |

**Total primary settlement: 1.23**  
**Total secondary settlement: 0.00**  
**Total calculated settlement: 1.23**

Abbreviations

- Start depth:
- End depth:
- Thickness:
- Relative depth:
- Iz:
- Delta P:
- Eff. stress:
- M<sub>(CPT)</sub>:
- Settlement:
- Second. settlement:
- Start depth of soil layer (penetration depth measured from ground free surface)
- End depth of soil layer (penetration depth measured from ground free surface)
- Thickness of soil layer
- Depth of calculation relative to footing
- Stress influence factor
- Footing imposed stress:
- Effective stress
- Constrained modulus from CPT
- Primary settlement
- Secondary settlement due to creep

**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 5.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 5.00          | 0.00                     | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 5.00          | 0.00                     | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 5.00          | 0.00                     | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 5.00          | 0.01                     | 1.00 | 0.508           | 0.018                   | 0.526                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 5.00          | 0.10                     | 1.00 | 0.050           | 0.002                   | 0.052                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 5.00          | 0.21                     | 1.00 | 0.024           | 0.001                   | 0.025                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 5.00          | 0.45                     | 1.00 | 0.011           | 0.001                   | 0.012                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 5.00          | 1.02                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.10               | 5.00          | 2.99                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 5.00          | 5.41                     | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 5.00          | 8.15                     | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 5.00          | 10.41                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 5.00          | 12.07                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 5.00          | 13.39                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 5.00          | 14.71                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 5.00          | 15.94                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 5.00          | 18.39                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 5.00          | 20.47                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 5.00          | 22.27                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 5.00          | 22.81                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 5.00          | 23.24                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 5.00          | 23.74                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.23               | 5.00          | 24.28                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.24               | 5.00          | 25.57                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 5.00          | 26.70                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 5.00          | 27.57                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 5.00          | 27.63                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 5.00          | 27.97                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 5.00          | 28.59                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 5.00          | 29.15                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 5.00          | 29.37                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 5.00          | 29.08                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 5.00          | 28.97                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 5.00          | 29.26                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 5.00          | 29.74                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 5.00          | 30.22                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.38               | 5.00          | 31.15                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.39               | 5.00          | 32.19                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.40               | 5.00          | 33.56                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.41               | 5.00          | 34.09                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 5.00          | 34.57                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 5.00          | 34.93                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 5.00          | 35.26                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.45               | 5.00          | 35.56                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.46               | 5.00          | 35.84                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.47               | 5.00          | 36.01                    | 1.00 | 0.000           | 0.000                   | 0.000                   |

**:: Tabular results ::**

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | $M_{(CPT)}$<br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|----------------------|------|--------------------|-------------------------------|-------------------------------|
| 139      | 1.39               | 1.40             | 0.01             | 1.40                     | 5.00             | 63.74                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 140      | 1.40               | 1.41             | 0.01             | 1.41                     | 5.00             | 63.73                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 141      | 1.41               | 1.42             | 0.01             | 1.42                     | 5.00             | 63.66                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 142      | 1.42               | 1.43             | 0.01             | 1.43                     | 5.00             | 63.68                | 1.00 | 0.000              | 0.000                         | 0.000                         |

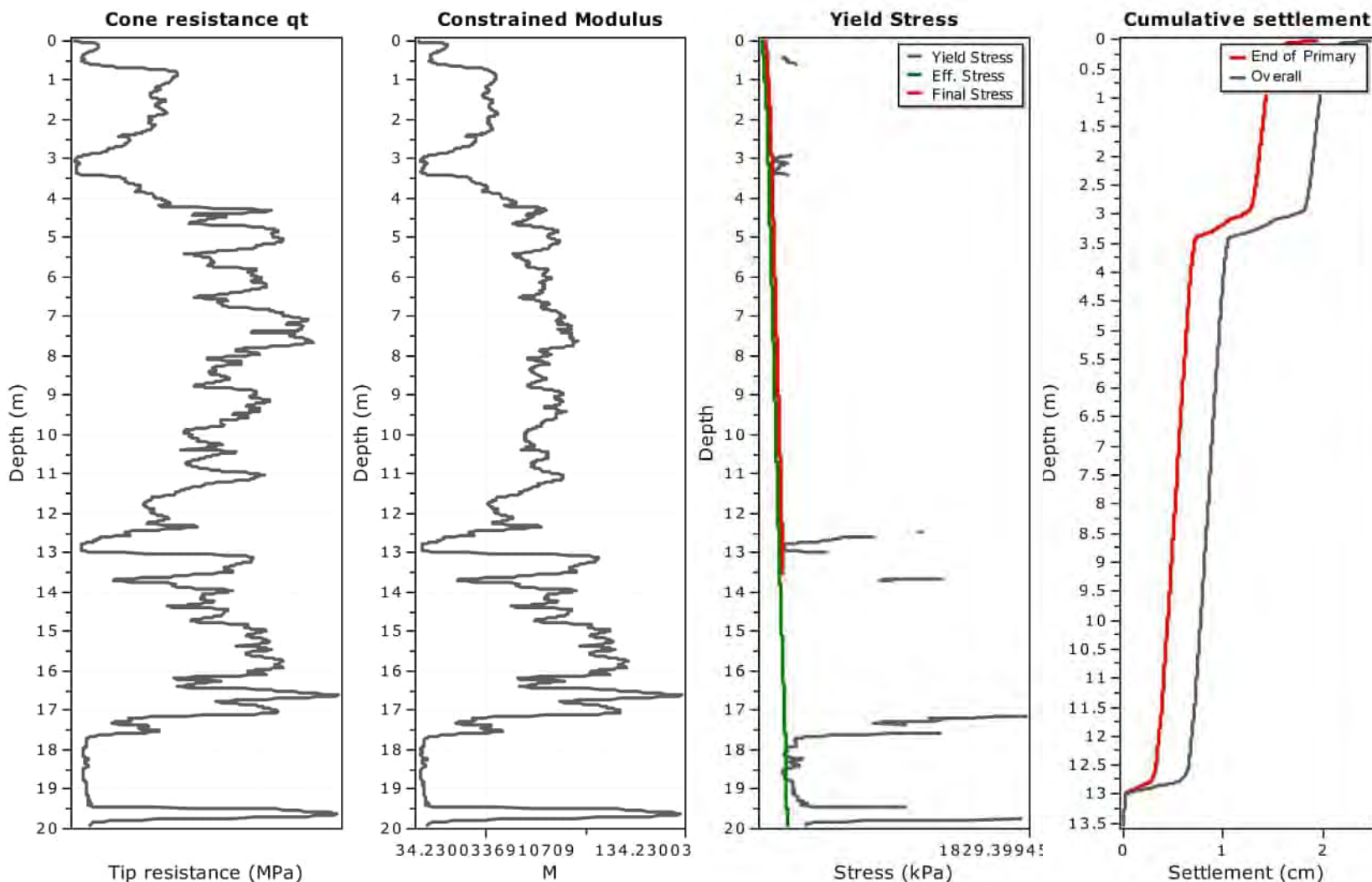
**Total primary settlement: 0.62**  
**Total secondary settlement: 0.02**

**Total calculated settlement: 0.64**

**Abbreviations**

|                     |                                                                                 |
|---------------------|---------------------------------------------------------------------------------|
| Start depth:        | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:          | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:          | Thickness of soil layer                                                         |
| Relative depth:     | Depth of calculation relative to footing                                        |
| Iz:                 | Stress influence factor                                                         |
| Delta P:            | Footing imposed stress:                                                         |
| Eff. stress:        | Effective stress                                                                |
| $M_{(CPT)}$ :       | Constrained modulus from CPT                                                    |
| Settlement:         | Primary settlement                                                              |
| Second. settlement: | Secondary settlements due to creep                                              |

**Settlements calculation according to theory of elasticity\***



**Calculation properties**

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 24.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 24.00         | 0.22                     | 1.00 | 0.109           | 0.000                   | 0.109                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 24.00         | 0.30                     | 1.00 | 0.079           | 0.000                   | 0.079                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 24.00         | 0.44                     | 1.00 | 0.055           | 0.000                   | 0.055                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 24.00         | 0.60                     | 1.00 | 0.040           | 0.000                   | 0.040                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 24.00         | 0.83                     | 1.00 | 0.029           | 0.000                   | 0.029                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 24.00         | 9.69                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 24.00         | 11.80                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 24.00         | 13.24                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 24.00         | 13.98                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 24.00         | 14.17                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 24.00         | 14.20                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 24.00         | 14.15                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 24.00         | 14.11                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 24.00         | 14.03                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 24.00         | 13.97                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 24.00         | 13.93                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 24.00         | 13.94                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 24.00         | 13.94                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 24.00         | 13.83                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 24.00         | 13.61                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 24.00         | 13.23                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 24.00         | 12.74                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 24.00         | 12.19                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 24.00         | 11.82                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 24.00         | 11.41                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 24.00         | 10.96                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 24.00         | 10.37                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 24.00         | 9.80                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 24.00         | 9.11                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 24.00         | 8.44                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 24.00         | 7.86                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 24.00         | 7.50                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 24.00         | 7.16                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 24.00         | 6.87                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 24.00         | 6.61                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 24.00         | 6.39                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 24.00         | 6.19                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 24.00         | 6.05                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 24.00         | 5.96                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 24.00         | 5.86                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 24.00         | 5.76                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 24.00         | 5.71                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 24.00         | 5.73                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 24.00         | 5.88                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 24.00         | 6.15                     | 1.00 | 0.004           | 0.000                   | 0.004                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 24.00         | 6.48                     | 1.00 | 0.004           | 0.000                   | 0.004                   |

**:: Tabular results ::**

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | M <sub>(CPT)</sub><br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|-----------------------------|------|--------------------|-------------------------------|-------------------------------|
| 1335     | 13.35              | 13.36            | 0.01             | 13.36                    | 23.69            | 78.56                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1336     | 13.36              | 13.37            | 0.01             | 13.37                    | 23.69            | 77.80                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1337     | 13.37              | 13.38            | 0.01             | 13.38                    | 23.68            | 76.76                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1338     | 13.38              | 13.39            | 0.01             | 13.39                    | 23.68            | 76.14                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1339     | 13.39              | 13.40            | 0.01             | 13.40                    | 23.68            | 75.78                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1340     | 13.40              | 13.41            | 0.01             | 13.41                    | 23.68            | 75.84                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1341     | 13.41              | 13.42            | 0.01             | 13.42                    | 23.68            | 75.85                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1342     | 13.42              | 13.43            | 0.01             | 13.43                    | 23.68            | 75.84                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1343     | 13.43              | 13.44            | 0.01             | 13.44                    | 23.68            | 75.89                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1344     | 13.44              | 13.45            | 0.01             | 13.45                    | 23.68            | 75.87                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1345     | 13.45              | 13.46            | 0.01             | 13.46                    | 23.68            | 76.13                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1346     | 13.46              | 13.47            | 0.01             | 13.47                    | 23.68            | 77.10                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1347     | 13.47              | 13.48            | 0.01             | 13.48                    | 23.68            | 78.25                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1348     | 13.48              | 13.49            | 0.01             | 13.49                    | 23.68            | 79.50                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1349     | 13.49              | 13.50            | 0.01             | 13.50                    | 23.68            | 79.54                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1350     | 13.50              | 13.51            | 0.01             | 13.51                    | 23.68            | 78.67                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1351     | 13.51              | 13.52            | 0.01             | 13.52                    | 23.68            | 76.74                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1352     | 13.52              | 13.53            | 0.01             | 13.53                    | 23.67            | 73.28                       | 0.99 | 0.000              | 0.000                         | 0.000                         |
| 1353     | 13.53              | 13.54            | 0.01             | 13.54                    | 23.67            | 69.79                       | 0.99 | 0.000              | 0.000                         | 0.000                         |

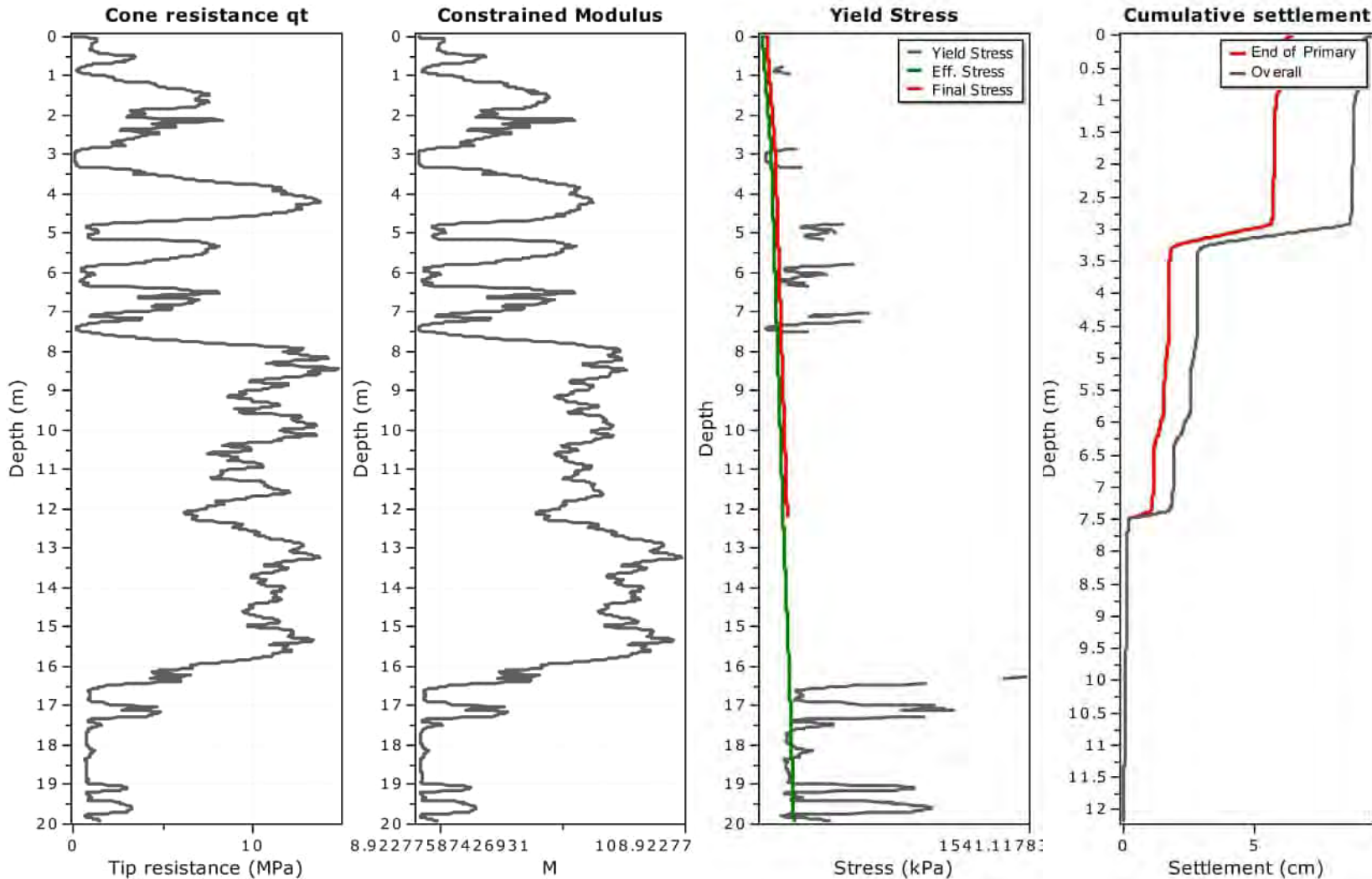
**Total primary settlement: 1.92**  
**Total secondary settlement: 0.55**

**Total calculated settlement: 2.47**

**Abbreviations**

|                      |                                                                                 |
|----------------------|---------------------------------------------------------------------------------|
| Start depth:         | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:           | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:           | Thickness of soil layer                                                         |
| Relative depth:      | Depth of calculation relative to footing                                        |
| Iz:                  | Stress influence factor                                                         |
| Delta P:             | Footing imposed stress:                                                         |
| Eff. stress:         | Effective stress                                                                |
| M <sub>(CPT)</sub> : | Constrained modulus from CPT                                                    |
| Settlement:          | Primary settlement                                                              |
| Second. settlement:  | Secondary settlements due to creep                                              |

### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 24.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( \frac{t}{t_p} \right)^n$$

where  $t_p$  is the duration of primary consolidation



**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 24.00         | 0.23                     | 1.00 | 0.103           | 0.000                   | 0.103                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 24.00         | 0.41                     | 1.00 | 0.058           | 0.000                   | 0.058                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 24.00         | 0.65                     | 1.00 | 0.037           | 0.000                   | 0.037                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 24.00         | 0.86                     | 1.00 | 0.028           | 0.000                   | 0.028                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 24.00         | 1.01                     | 1.00 | 0.024           | 0.000                   | 0.024                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 24.00         | 9.82                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 24.00         | 10.25                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 24.00         | 10.52                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 24.00         | 10.65                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 24.00         | 10.64                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 24.00         | 10.41                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 24.00         | 10.20                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 24.00         | 9.95                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 24.00         | 9.77                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 24.00         | 9.58                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 24.00         | 9.39                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 24.00         | 9.23                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 24.00         | 9.05                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 24.00         | 8.83                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 24.00         | 8.60                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 24.00         | 8.44                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 24.00         | 8.37                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 24.00         | 8.34                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 24.00         | 8.34                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 24.00         | 8.36                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 24.00         | 8.40                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 24.00         | 8.38                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 24.00         | 8.29                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 24.00         | 8.15                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 24.00         | 7.93                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 24.00         | 7.76                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 24.00         | 7.68                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 24.00         | 7.83                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 24.00         | 8.14                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 24.00         | 8.52                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 24.00         | 8.91                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 24.00         | 9.33                     | 1.00 | 0.003           | 0.000                   | 0.003                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 24.00         | 9.78                     | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 24.00         | 10.25                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 24.00         | 10.65                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 24.00         | 10.88                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 24.00         | 10.98                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 24.00         | 11.45                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 24.00         | 12.77                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 24.00         | 15.29                    | 1.00 | 0.002           | 0.000                   | 0.002                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 24.00         | 18.70                    | 1.00 | 0.001           | 0.000                   | 0.001                   |

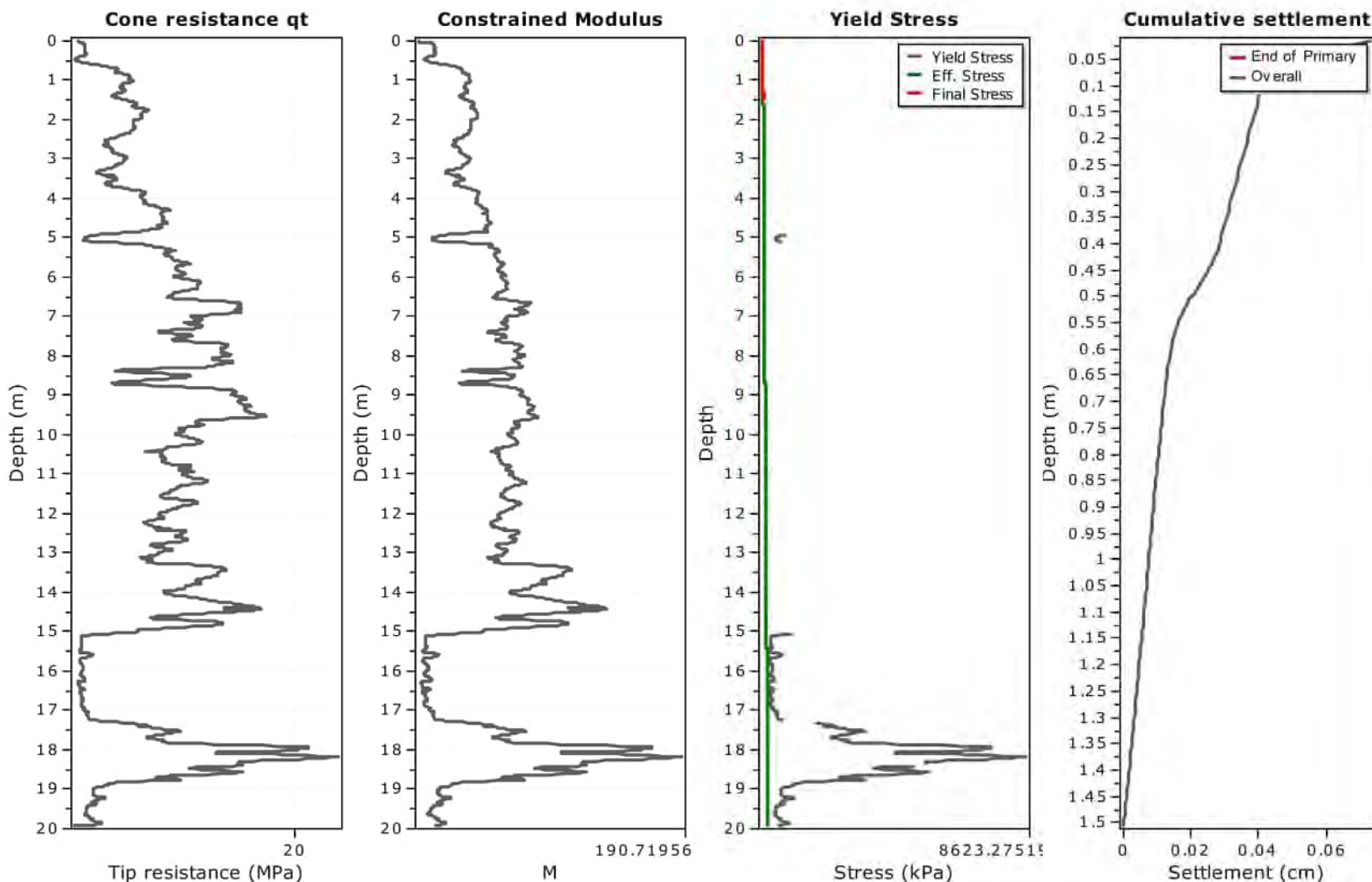
**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1197     | 11.97           | 11.98         | 0.01          | 11.98              | 23.77         | 57.70                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1198     | 11.98           | 11.99         | 0.01          | 11.99              | 23.77         | 57.75                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1199     | 11.99           | 12.00         | 0.01          | 12.00              | 23.77         | 57.64                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1200     | 12.00           | 12.01         | 0.01          | 12.01              | 23.77         | 57.47                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1201     | 12.01           | 12.02         | 0.01          | 12.02              | 23.77         | 57.07                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1202     | 12.02           | 12.03         | 0.01          | 12.03              | 23.77         | 56.43                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1203     | 12.03           | 12.04         | 0.01          | 12.04              | 23.77         | 54.92                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1204     | 12.04           | 12.05         | 0.01          | 12.05              | 23.77         | 53.17                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1205     | 12.05           | 12.06         | 0.01          | 12.06              | 23.77         | 51.38                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1206     | 12.06           | 12.07         | 0.01          | 12.07              | 23.76         | 50.22                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1207     | 12.07           | 12.08         | 0.01          | 12.08              | 23.76         | 49.20                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1208     | 12.08           | 12.09         | 0.01          | 12.09              | 23.76         | 48.50                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1209     | 12.09           | 12.10         | 0.01          | 12.10              | 23.76         | 48.03                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1210     | 12.10           | 12.11         | 0.01          | 12.11              | 23.76         | 47.93                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1211     | 12.11           | 12.12         | 0.01          | 12.12              | 23.76         | 47.99                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1212     | 12.12           | 12.13         | 0.01          | 12.13              | 23.76         | 48.28                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1213     | 12.13           | 12.14         | 0.01          | 12.14              | 23.76         | 48.77                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1214     | 12.14           | 12.15         | 0.01          | 12.15              | 23.76         | 49.69                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1215     | 12.15           | 12.16         | 0.01          | 12.16              | 23.76         | 50.59                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1216     | 12.16           | 12.17         | 0.01          | 12.17              | 23.76         | 51.55                    | 0.99 | 0.000           | 0.000                   | 0.000                   |
| 1217     | 12.17           | 12.18         | 0.01          | 12.18              | 23.76         | 52.13                    | 0.99 | 0.000           | 0.000                   | 0.000                   |

**Total primary settlement: 6.43****Total secondary settlement: 3.04****Total calculated settlement: 9.47****Abbreviations**

|                      |                                                                                 |
|----------------------|---------------------------------------------------------------------------------|
| Start depth:         | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:           | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:           | Thickness of soil layer                                                         |
| Relative depth:      | Depth of calculation relative to footing                                        |
| Iz:                  | Stress influence factor                                                         |
| Delta P:             | Footing imposed stress:                                                         |
| Eff. stress:         | Effective stress                                                                |
| M <sub>(CPT)</sub> : | Constrained modulus from CPT                                                    |
| Settlement:          | Primary settlement                                                              |
| Second. settlement:  | Secondary settlements due to creep                                              |

### Settlements calculation according to theory of elasticity\*



#### Calculation properties

Footing type: Rectangular  
Footing width: 100.00 (m)  
L/B: 1.0  
Footing pressure: 5.00 (kPa)  
Embedment depth: 0.00 (m)  
Footing is rigid: No  
Remove excavation load: No  
Apply 20% rule: Yes  
Calculate secondary settlements: Yes  
Time period for primary consolidation: 6 months  
Time period for second. settlements: 1200 months

\* Primary settlement calculation is performed according to the following formula:

$$S = \sum \frac{\Delta \sigma_v}{M_{CPT}} \Delta z$$

\* Secondary (creep) settlement calculation is performed according to the following formula:

$$S_c = S_p \left( 1 - e^{-\frac{t}{t_p}} \right)$$

where  $t_p$  is the duration of primary consolidation



**:: Tabular results ::**

| Point No | Start depth (m) | End depth (m) | Thickness (m) | Relative depth (m) | Delta P (kPa) | M <sub>(CPT)</sub> (MPa) | Iz   | Settlement (cm) | Second. settlement (cm) | Overall settlement (cm) |
|----------|-----------------|---------------|---------------|--------------------|---------------|--------------------------|------|-----------------|-------------------------|-------------------------|
| 1        | 0.01            | 0.02          | 0.01          | 0.01               | 5.00          | 0.72                     | 1.00 | 0.007           | 0.000                   | 0.007                   |
| 2        | 0.02            | 0.03          | 0.01          | 0.03               | 5.00          | 0.77                     | 1.00 | 0.007           | 0.000                   | 0.007                   |
| 3        | 0.03            | 0.04          | 0.01          | 0.04               | 5.00          | 0.82                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 4        | 0.04            | 0.05          | 0.01          | 0.04               | 5.00          | 0.90                     | 1.00 | 0.006           | 0.000                   | 0.006                   |
| 5        | 0.05            | 0.06          | 0.01          | 0.06               | 5.00          | 0.99                     | 1.00 | 0.005           | 0.000                   | 0.005                   |
| 6        | 0.06            | 0.07          | 0.01          | 0.07               | 5.00          | 9.60                     | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 7        | 0.07            | 0.08          | 0.01          | 0.07               | 5.00          | 10.07                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 8        | 0.08            | 0.09          | 0.01          | 0.09               | 5.00          | 10.41                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 9        | 0.09            | 0.10          | 0.01          | 0.09               | 5.00          | 10.72                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 10       | 0.10            | 0.11          | 0.01          | 0.10               | 5.00          | 10.97                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 11       | 0.11            | 0.12          | 0.01          | 0.12               | 5.00          | 11.21                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 12       | 0.12            | 0.13          | 0.01          | 0.13               | 5.00          | 11.40                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 13       | 0.13            | 0.14          | 0.01          | 0.14               | 5.00          | 11.61                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 14       | 0.14            | 0.15          | 0.01          | 0.14               | 5.00          | 11.87                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 15       | 0.15            | 0.16          | 0.01          | 0.15               | 5.00          | 12.06                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 16       | 0.16            | 0.17          | 0.01          | 0.17               | 5.00          | 12.13                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 17       | 0.17            | 0.18          | 0.01          | 0.17               | 5.00          | 12.06                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 18       | 0.18            | 0.19          | 0.01          | 0.18               | 5.00          | 11.92                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 19       | 0.19            | 0.20          | 0.01          | 0.20               | 5.00          | 11.80                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 20       | 0.20            | 0.21          | 0.01          | 0.20               | 5.00          | 11.69                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 21       | 0.21            | 0.22          | 0.01          | 0.21               | 5.00          | 11.67                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 22       | 0.22            | 0.23          | 0.01          | 0.23               | 5.00          | 11.71                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 23       | 0.23            | 0.24          | 0.01          | 0.24               | 5.00          | 11.80                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 24       | 0.24            | 0.25          | 0.01          | 0.25               | 5.00          | 11.92                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 25       | 0.25            | 0.26          | 0.01          | 0.26               | 5.00          | 12.02                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 26       | 0.26            | 0.27          | 0.01          | 0.27               | 5.00          | 12.10                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 27       | 0.27            | 0.28          | 0.01          | 0.28               | 5.00          | 12.14                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 28       | 0.28            | 0.29          | 0.01          | 0.28               | 5.00          | 12.15                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 29       | 0.29            | 0.30          | 0.01          | 0.29               | 5.00          | 12.13                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 30       | 0.30            | 0.31          | 0.01          | 0.30               | 5.00          | 12.11                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 31       | 0.31            | 0.32          | 0.01          | 0.32               | 5.00          | 12.07                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 32       | 0.32            | 0.33          | 0.01          | 0.33               | 5.00          | 12.17                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 33       | 0.33            | 0.34          | 0.01          | 0.34               | 5.00          | 12.30                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 34       | 0.34            | 0.35          | 0.01          | 0.34               | 5.00          | 12.49                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 35       | 0.35            | 0.36          | 0.01          | 0.35               | 5.00          | 12.42                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 36       | 0.36            | 0.37          | 0.01          | 0.36               | 5.00          | 12.07                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 37       | 0.37            | 0.38          | 0.01          | 0.37               | 5.00          | 11.55                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 38       | 0.38            | 0.39          | 0.01          | 0.38               | 5.00          | 11.13                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 39       | 0.39            | 0.40          | 0.01          | 0.39               | 5.00          | 10.74                    | 1.00 | 0.000           | 0.000                   | 0.000                   |
| 40       | 0.40            | 0.41          | 0.01          | 0.40               | 5.00          | 9.65                     | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 41       | 0.41            | 0.42          | 0.01          | 0.41               | 5.00          | 8.24                     | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 42       | 0.42            | 0.43          | 0.01          | 0.42               | 5.00          | 6.80                     | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 43       | 0.43            | 0.44          | 0.01          | 0.43               | 5.00          | 6.15                     | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 44       | 0.44            | 0.45          | 0.01          | 0.44               | 5.00          | 5.91                     | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 45       | 0.45            | 0.46          | 0.01          | 0.45               | 5.00          | 5.94                     | 1.00 | 0.001           | 0.000                   | 0.001                   |
| 46       | 0.46            | 0.47          | 0.01          | 0.46               | 5.00          | 6.05                     | 1.00 | 0.001           | 0.000                   | 0.001                   |

**:: Tabular results ::**

| Point No | Start depth<br>(m) | End depth<br>(m) | Thickness<br>(m) | Relative<br>depth<br>(m) | Delta P<br>(kPa) | $M_{(CPT)}$<br>(MPa) | Iz   | Settlement<br>(cm) | Second.<br>settlement<br>(cm) | Overall<br>settlement<br>(cm) |
|----------|--------------------|------------------|------------------|--------------------------|------------------|----------------------|------|--------------------|-------------------------------|-------------------------------|
| 139      | 1.39               | 1.40             | 0.01             | 1.39                     | 5.00             | 31.06                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 140      | 1.40               | 1.41             | 0.01             | 1.40                     | 5.00             | 30.34                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 141      | 1.41               | 1.42             | 0.01             | 1.41                     | 5.00             | 29.81                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 142      | 1.42               | 1.43             | 0.01             | 1.42                     | 5.00             | 29.68                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 143      | 1.43               | 1.44             | 0.01             | 1.43                     | 5.00             | 30.05                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 144      | 1.44               | 1.45             | 0.01             | 1.44                     | 5.00             | 30.72                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 145      | 1.45               | 1.46             | 0.01             | 1.45                     | 5.00             | 31.50                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 146      | 1.46               | 1.47             | 0.01             | 1.46                     | 5.00             | 32.14                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 147      | 1.47               | 1.48             | 0.01             | 1.47                     | 5.00             | 32.82                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 148      | 1.48               | 1.49             | 0.01             | 1.48                     | 5.00             | 33.50                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 149      | 1.49               | 1.50             | 0.01             | 1.49                     | 5.00             | 34.16                | 1.00 | 0.000              | 0.000                         | 0.000                         |
| 150      | 1.50               | 1.51             | 0.01             | 1.50                     | 5.00             | 34.65                | 1.00 | 0.000              | 0.000                         | 0.000                         |

**Total primary settlement: 0.07****Total secondary settlement: 0.00****Total calculated settlement: 0.07****Abbreviations**

|                     |                                                                                 |
|---------------------|---------------------------------------------------------------------------------|
| Start depth:        | Start depth of soil layer (penetration depth measured from ground free surface) |
| End depth:          | End depth of soil layer (penetration depth measured from ground free surface)   |
| Thickness:          | Thickness of soil layer                                                         |
| Relative depth:     | Depth of calculation relative to footing                                        |
| Iz:                 | Stress influence factor                                                         |
| Delta P:            | Footing imposed stress:                                                         |
| Eff. stress:        | Effective stress                                                                |
| $M_{(CPT)}$ :       | Constrained modulus from CPT                                                    |
| Settlement:         | Primary settlement                                                              |
| Second. settlement: | Secondary settlements due to creep                                              |

## Appendix I: Wetland Design Memorandum



## TECHNICAL MEMORANDUM

### WETLAND A DESIGN REVIEW

|           |                                                |           |                                 |
|-----------|------------------------------------------------|-----------|---------------------------------|
| To        | Southern Links 1 project team                  | From      | Mark McVinnie, David MacPherson |
| Attention | c/o Dillon Kelliher (Colliers Project Leaders) | Date      | 28 August 2026                  |
| Email     | [REDACTED]                                     | Reference | HAM2025-0056AK   Rev 4          |
| Cc        |                                                | Pages     | 8 (excluding the appendices)    |
| Subject   | Wetland A Design Review                        |           |                                 |

## 1.0 INTRODUCTION

The purpose of this memorandum is to analyse the effects of the confined aquifer on the stormwater design and support Maven's engineering designs.

This memorandum outlines the analysis results and provides preliminary design options for pond stability.

## 2.0 PROPOSED DEVELOPMENT

The proposed development for the Southern Links 1 Residential Development includes constructing approximately 938 lots with associated infrastructure across the 46Ha site. Original landform is to be modified with maximum proposed cut levels of 5m and proposed fill levels of up to 2m.

Six stormwater wetlands are proposed across the development. It is understood that they will be up to 4.8m deep with maximum batter slopes of 1V:3H. Plans provided by Maven Associates are attached in *Error! Reference source not found.A*.

## 3.0 HYDROGEOLOGY

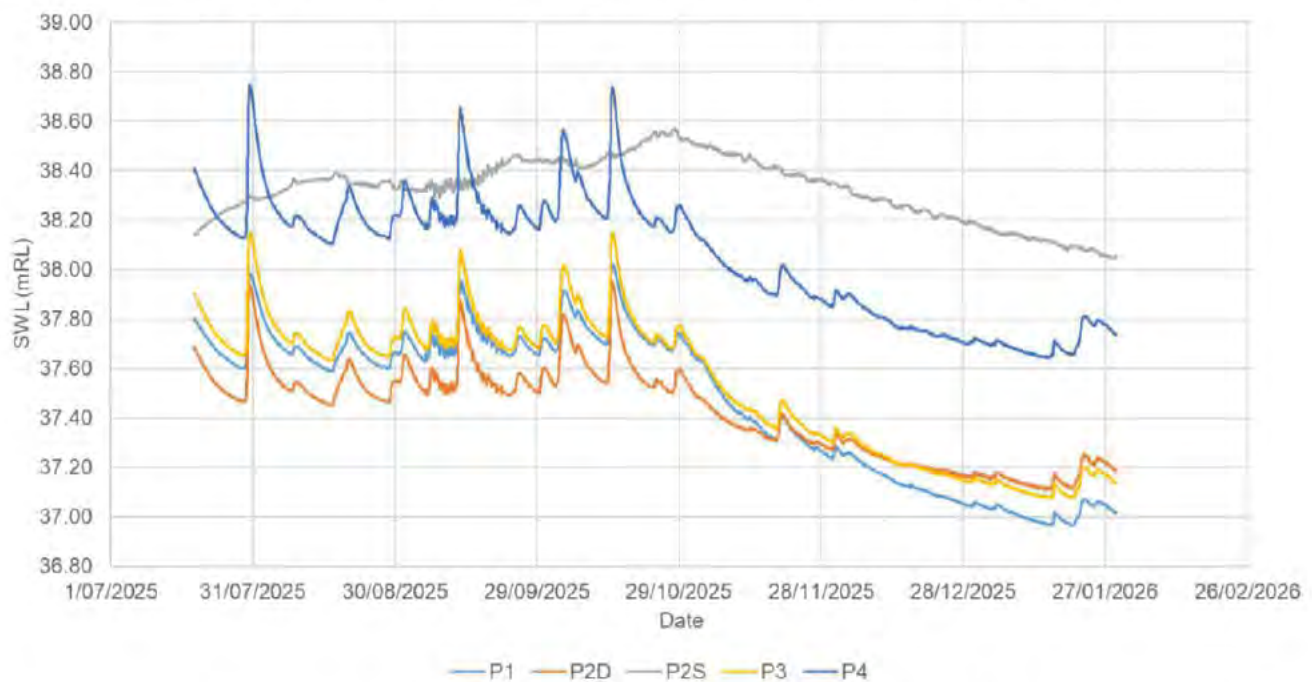
The WGA Hydrogeological Effects Assessment identified a low-permeability aquitard layer running beneath the site, which has a confining effect on the underlying deep aquifer, resulting in a measured pressure head of up to 1.35m above the deep aquifer. WGA carried out investigations, testing, and monitoring across the site at locations shown in *Appendix B*. This thin confining silt layer has been encountered across the site in investigations by CMW and WGA. The overall groundwater regime is shown in *Figure 1*.

Figure 1: Wetland A Hydrogeology. Source: WGA



Groundwater monitoring data is presented in **Figure 2**.

Figure 2: Groundwater Monitoring Data. P2 is within Wetland A. Source: WGA



Further discussion of the overall site hydrogeological regime is presented in the WGA Hydrological Effects Assessment.

Excavating the proposed stormwater ponds will remove the existing soil overburden pressure; and, without implementation of mitigation options (as later outlined in this memorandum), the uplift pressure from the confined aquifer could rupture the aquitard layer and destabilise the ponds.

The results of analyses of the field data have been utilised in the development of a 2D cross section model. Detailed descriptions of the hydrogeology and hydraulic testing of the site used to build the model are provided in the Hydrological Effects Assessment.



## 4.0 UPLIFT ASSESSMENT

An effective stress assessment was undertaken to assess the minimum thickness of overburden pressure that would need to be left in place when constructing the wetland. 13.9kPa uplift pressure is acting on the silt (using the measured maximum groundwater level). Adopting a factor of safety against uplift of 1.2, a minimum of 16.7kPa of overburden pressure would need to be maintained above the top of the silt layer. Using a unit weight of 16kN/m<sup>3</sup>, this equates to a minimum overburden thickness of 1.05m or an RL of 37.61m.

This would result in lifting the pond base by 1.31m (above the current proposed level) to maintain a suitable factor of safety against uplift.

Recommendations are discussed in Section 6.0.

## 5.0 SLOPE STABILITY ASSESSMENT

### 5.1 Design Criteria

The stability of the ponds under a range of design conditions is expressed in terms of a factor of safety, which is defined as the ratio of the resisting forces to destabilising forces acting on a slope. Table 1 below presents the recommended performance standards<sup>1</sup> for slope stability assessment:

Table 1: Slope Stability Factor of Safety Criteria

| Condition                                                                                  | Required Factor of Safety |
|--------------------------------------------------------------------------------------------|---------------------------|
| Static long-term conditions (drained soil conditions, normal groundwater)                  | 1.5                       |
| Transient short-term worst case conditions (elevated groundwater and pore water pressures) | 1.3                       |
| Seismic (ULS) case*                                                                        | 1.0                       |
| Note: *Factor of safety < 1.0 acceptable where displacement-based approach is adopted.     |                           |

### 5.2 Changes to the WGA Model

The following changes were made to the WGA groundwater model to assist with our analysis:

- The model size was reduced to focus on the Wetland A area. This improved model computation time significantly with little difference in the modelled water levels in the area of interest.
- The boundary conditions were altered slightly to include a fixed water pressure head of RL38m beneath the silt layer to more accurately represent the pore-water pressures around the toe of the batter slope.

These changes resulted in similar modelled water levels to WGA.

### 5.3 Analysis

Slope stability analyses were undertaken using the Morgenstern-Price method of slices under both circular and translational failure mechanisms using the proprietary software Slide2. Groundwater pressures were

<sup>1</sup> CoLab, (October 2025). Regional Infrastructure Technical Specification (RITS) V2, Table 16: Proposed factors for safety for different slope stability scenarios



calculated using the Slide2 finite element groundwater module and subsequently used for stability assessment. Analyses were completed for a various conditions stated in **Table 1** based on the following:

- Static long-term conditions were analysed for the prevailing case with the groundwater table based on the modelled groundwater table.
- When analysing transient conditions, the water pressure heads on the model boundary conditions were increased by 0.5m and a vertical infiltration provided by WGA was introduced to the model.
- Seismic displacements were estimated based on a Newmark Sliding Block approach using 50<sup>th</sup> percentile correlations published in Ambraseys & Srbulov (1995)<sup>2</sup> and Jibson (2007)<sup>3</sup> for thin, translational rigid sliding block cases, and Bray & Travarasrou (2007)<sup>4</sup> and Bray and Macedo (2019)<sup>5</sup> for flexible sliding mass cases.
- An additional static case was run modelling a 200mm wide gap in the confining silt layer to assess the affect on the hydraulic gradient.
- A 10 kPa dead load was used to model single-story residential dwellings at the crest of the slope.

The following slopes have been assessed:

- Section A: 4.8m deep artificial wetland (Wetland A – Section A2 on Maven Associates drawings) embankment with a maximum cut slope of 1V:3H.

## 5.4 Results

Selected stability printouts are attached in **Appendix C** with the factor of safety for each scenario outlined in **Table 1**

Table 2: Slope Stability Analyses Results

| Location                | Slope Stability Factor of Safety |           |               |                                                   |                    |          | Seismic Displacements (mm) |          |
|-------------------------|----------------------------------|-----------|---------------|---------------------------------------------------|--------------------|----------|----------------------------|----------|
|                         | Prevailing                       | Transient | Seismic (ULS) | Prevailing with broken silt (during construction) | Yield Acceleration |          | Pond Batter                | At Crest |
|                         |                                  |           |               |                                                   | Pond batter        | At crest |                            |          |
| Wetland A<br>Section A2 | 2.8                              | 1.8       | <1.0          | 2.8                                               | 0.1                | 0.2      | 15 - 20                    | <5       |

The results show that the Section A seismic case do not meet the requisite factor of safety, and displacements of 15 to 20mm are estimated for the structures closest to the wetland. Recommendations are discussed in Section 6 below.

<sup>2</sup> Ambraseys, N. and Srbulov, M. (1995) Earthquake induced displacement of slopes, *Journal of Soil Dynamics and Earthquake Engineering*, Vol 14

<sup>3</sup> Jibson, R.W., (2007) Regression models for estimating coseismic landslide displacement, *Journal of Engineering Geology*, Vol 91

<sup>4</sup> Bray, J. D., & Travarasrou, T. (2007). Simplified procedure for estimating earthquake-induced deviatoric slope displacements. *Journal of geotechnical and geoenvironmental engineering*, 133(4), 381-392.

<sup>5</sup> Bray, J.D., and Macedo, J. (2019) "Procedure for Estimating Shear-Induced Seismic Slope Displacement for Shallow Crustal Earthquakes," *J. of Geotechnical and Geoenvironmental Engineering*, ASCE, V. 145(12), doi: 10.1061/(ASCE)GT.1943-5606.0002143.

## 6.0 RECOMMENDATIONS

The following options have been considered and discussed with the wider project team to mitigate this hazard:

- Lifting the pond base by 1.31m to RL37.61m to leave a minimum of 1.05m overburden material above the confining silt layer. This option is not preferred due to the implications it has on the stormwater design.
- Using deep soil mixing to mix concrete into the soils to seal the aquifer off. Conceptually, this mixed layer would need to be 500mm to 1m thick. This, coupled with the construction challenges, mean this option is not preferred.
- Temporarily depressurisation of the confined aquifer to allow for jet grouting beneath the silt layer to seal it off beneath each wetland. This option would be very expensive.
- Installing sheet piles around the perimeter of the pond to isolate the pond from the surrounding aquifer. This option is discussed further in Section 6.1.1.
- Installing pressure relief valves at regular intervals across the ponds. These are discussed further in Section 6.2.1
- Temporary depressurisation of the confined aquifer through dewatering to allow construction of a continuous drainage blanket along the underside of the wetland, which would then be hydrologically separated by a Geosynthetic Clay Liner. This option is discussed further in Section 6.2.2.

### 6.1 Preferred Mitigation Option

In discussions with the project team, the following option is considered the most preferred option for mitigating uplift in the proposed artificial wetlands.

#### 6.1.1 Sheet Piles

Sheet piles could be adopted as a permanent groundwater cut-off system around the perimeter of the wetland. The intent of the sheet pile wall would be to hydraulically isolate the wetland excavation from the surrounding confined aquifer, allowing the confining silt layer to be locally penetrated during construction while maintaining control of artesian pressures and reducing the risk of base heave or uplift instability.

The sheet piles would need to extend continuously around the wetland perimeter and be embedded into the underlying Walton Subgroup to provide an effective seepage cut-off. The required embedment depth would need to be confirmed during detailed design, based on the interpreted depth to the Walton Subgroup, design artesian head, seepage gradients, constructability, and the required factor of safety against uplift and piping. Particular attention would be required at wall corners, terminations, service penetrations, outlet structures, and any localised gaps where preferential seepage paths could develop.

Either steel or vinyl sheet piles may be feasible, subject to detailed design and constructability assessment. Steel sheet piles would generally provide higher stiffness and improved driveability where deeper embedment is required, but would need to be designed for durability over the adopted design life, including corrosion allowance and/or protective measures. Vinyl sheet piles may offer durability advantages in a wetland environment, but their ability to achieve the required embedment into the Walton Subgroup would need to be confirmed.

Construction considerations would include potential disturbance or puncturing of the aquitard, the presence of obstructions, installation tolerances, and the need for groundwater monitoring during sheet pile installation and excavation. Monitoring should include piezometric levels inside and outside the sheet pile

perimeter, visual checks for seepage or boiling, and contingency measures if artesian pressures or seepage rates exceed design assumptions.

Additionally, vibration and noise effects will need to be considered during sheet pile installation (which could take several months) as sheet piling may exceed noise limits for neighbouring dwellings. Construction noise management could include; commencing sheet pile installation away from neighbouring buildings, and if noise is excessive, utilising smaller quieter plant to install the sheet piles, or alternatively by adopting another mitigation option that generates less construction noise.

Sheet piles have been adopted in the permanent design in several other projects across Hamilton, including the Whatukooruru Drive Stage 3 bridge, and the Peacocks Waikato River Bridge stormwater outfall. In both these cases, steel sheet piles were designed to withstand corrosion over their 100-year design life. This was achieved by oversizing the sheet pile thickness to allow for corrosion over the design life.

Alternative cutoff wall options could also be considered, such as a secant bored pile wall, a bentonite slurry wall, or a cutter soil mix wall.

## 6.2 Alternative Mitigation Options

In discussions with the project team, the following options were considered less favourable than the sheet pile option and are presented in this report as documentation of alternatives considered.

### 6.2.1 Pressure Relief Valve

Pressure relief valves or controlled relief wells through the aquitard could be installed to allow excess porewater pressure in the confined aquifer to dissipate in a controlled manner. The intent of this system would be to reduce the uplift pressure acting on the underside of the aquitard and maintain an acceptable factor of safety against base heave and uplift instability.

The pressure relief system would likely comprise a series of small-diameter wells or valves installed within the base of the wetland, extending through the aquitard and into the confined aquifer. These would discharge into the wetland or into a controlled drainage layer, subject to civil and stormwater design requirements. The spacing, diameter, discharge capacity, filter requirements, and long-term maintenance provisions would need to be confirmed by detailed hydrogeological design.

This option has the advantage of directly reducing the artesian pressure beneath the wetland, rather than relying solely on additional structural resistance. However, it would introduce a permanent hydraulic connection between the confined aquifer and the wetland.

In artificial wetlands A-C, and possibly D and E in winter conditions, the head pressure in the wells (RL38m) is higher than the outlet levels (presented in Table 3 below), so the water level in these ponds will remain at the low flow outlet level and there will be constant discharge flow using this mitigation method. This will reduce the total stormwater capacity of the artificial wetlands.



Table 3: Wetland Low Flow Outlet Levels provided by Maven Associates

| Wetland                                                                                                                                                                            | Low Flow Outlet (RLm) | Wetland | Low Flow Outlet (RLm) |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------|-----------------------|
| A                                                                                                                                                                                  | 37.77                 | D       | 38.1                  |
| B                                                                                                                                                                                  | 37.53                 | E       | 38.13                 |
| C                                                                                                                                                                                  | 37.91                 | F       | 39.37                 |
| Note: WGA calculate the head pressure of the confined aquifer to be RL38m, which is higher than the outflows in wetlands A to C, and possibly D and E in extremely wet conditions. |                       |         |                       |

For this option, the following would need to be considered:

- Confirmation of the design artesian head and required pressure reduction;
- Hydraulic assessment of expected discharge rates;
- Filter design to manage piping/internal erosion risk;
- Assessment of groundwater drawdown effects;
- Allowance for inspection, maintenance, and replacement of valves or wells; and
- Coordination with the hydrologist and stormwater designer to ensure the discharge arrangement is compatible with the wetland design.

### 6.2.2 Basal Drainage with Geosynthetic Clay Liner (GCL) Separation Layer

A basal drainage system could be constructed beneath the wetland to provide a permanent controlled drainage pathway for artesian groundwater pressures below the wetland base. This would likely require temporary depressurisation of the confined aquifer during construction to allow excavation, placement of the drainage blanket, and installation of the separation/lining system in a stable condition. Subsoil drains would be installed at regular intervals within the drainage layer to provide outlets for the underlying water pressure.

The drainage layer would need to be designed to collect and convey groundwater pressures to a controlled discharge point without allowing uncontrolled seepage, piping, or uplift of the wetland base. A geosynthetic clay liner could then be installed above the drainage layer to hydraulically separate the wetland from the underlying drainage system and reduce the potential for interaction between stormwater and groundwater.

For this option, the following would need to be considered:

- drainage capacity of the GCL
- discharge arrangements of the subsoil drains
- liner performance for constructability
- potential effects on surrounding groundwater levels and wetland water balance.

Long term, this system would perform similarly to the pressure relief valve option, where the groundwater would need to be discharged to a suitable location such as the wetland, which would reduce capacity.

## 7.0 CONCLUSION

Several options are capable of addressing the potential instability risk for the proposed stormwater ponds from artesian water pressures in the underlying confined aquifer below the subject site. Advantages and disadvantages for the three most preferable options are summarised below:

### 7.1 Sheet Piles

This option has the advantage of providing a passive, permanent cut-off system without relying on ongoing pressure relief infrastructure. However, it may introduce higher capital cost, constructability risk, and detailing complexity at penetrations and interfaces with the stormwater design.

### 7.2 Pressure Relief Valve

This option is likely the most economical solution of those presented as it avoids the need to reinforce the walls or base of the pond, however flows from the wells will require constant monitoring during construction and if the groundwater needs to be raised or lowered during construction it will need to be carried out slowly to maintain pond stability. The ongoing pressure relief into the wetland would reduce the stormwater capacity of the ponds.

### 7.3 Basal Drainage with GCL Layer

This option has the advantage of providing pressure relief beneath the wetland without requiring direct discharge through relief valves into the wetland. However, it would require careful detailing of the drainage outlet, filter compatibility, liner continuity, construction sequencing, and long-term inspection and maintenance. This option would also require extensive dewatering during construction, and additional testing such as pumping tests may be required to assess aquifer recharge and overall viability. Like the pressure relief valve option, the water discharged through this option would reduce pond capacity.

### 7.4 Construction Monitoring

All of these options will require settlement and groundwater level monitoring in the vicinity of the wetlands during construction to ensure stability is maintained. Requirements including alert levels to be specified during detailed design.

For and on behalf of CMW Geosciences

Prepared by:



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Project Engineering Geologist

Reviewed by:



David MacPherson  
Associate Geotechnical Engineer  
CMEngNZ, CPEng

Authorised by:



David Sullivan  
Principal Geotechnical Engineer  
CMEng, CPEng

Attachments: Appendix A: Development Plans  
Appendix B: WGA Piezometer Location Plan  
Appendix C: Slope Stability Results

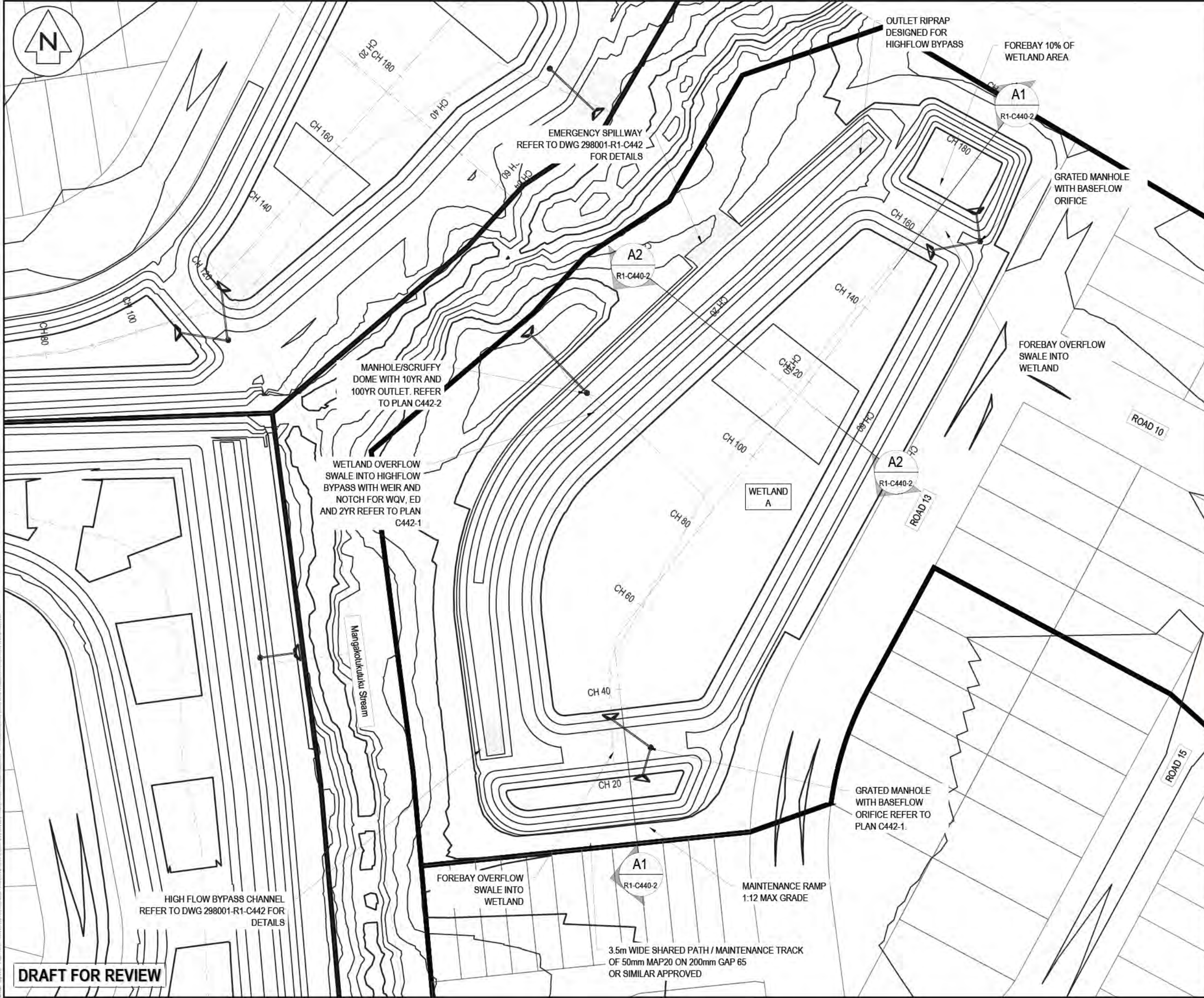




# APPENDIX A

## Maven Associates Design Drawings





NOTES

1. ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
2. CO-ORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016. CONVERSION TO MOTURIKI 1953 CAN BE ACHIEVED BY ADDING 777m.
3. IT IS THE CONTRACTORS RESPONSIBILITY TO LOCATE ALL SERVICES THAT MAY BE AFFECTED BY HIS OPERATIONS.
4. ALL CONCRETE SW PIPE TO BE INSTALLED IN ACCORDANCE WITH AS/NZS 3725:2007 FOR BURIED CONCRETE PIPES AND AS/NZS 4058:2007 FOR PRECAST CONCRETE PIPES (PRESSURE AND NON-PRESSURE) AS STIPULATED IN THE RITS 2018.
5. APPROVED HARDFILL IS TO BE USED IN BACKFILLING OF ALL STORMWATER LINES WITHIN THE ROAD RESERVE.
6. HEAVY DUTY MANHOLE LIDS AND FRAMES TO BE USED IN TRAFFICKED AREAS.
7. ALL CESSPIT LEADS SHALL HAVE MIN COVER 0.9m.
8. ALL LINES ARE TO BE CLASS4 RCRRJ UNLESS SHOWN OTHERWISE.
9. ALL LINES TO BE ABANDONED SHALL BE SEALED AT EACH END. TIMING OF ALL SEALING TO BE COORDINATED WITH COUNCIL STAFF.

LEGEND

EX BOUNDARY

PROP BOUNDARY

|         |             |      |         |
|---------|-------------|------|---------|
| C       | DRAFT       | MJRA | 02/2026 |
| B       | DRAFT       | MJRA | 02/2026 |
| A       | DRAFT       | MJRA | 11/2025 |
| Rev     | Description | By   | Date    |
|         |             | By   | Date    |
| Survey  | MAVEN       |      | 06/2025 |
| Design  | MKS         |      | 07/2025 |
| Drawn   | MJRA        |      | 11/2025 |
| Checked | DJM         |      | 11/2025 |



**Maven Waikato**  
07 242 0601  
info@maven.co.nz  
www.maven.co.nz  
Level 1 286 Victoria Street, Hamilton  
New Zealand

Project

**SOUTHERN LINKS 1  
RESIDENTIAL STAGE 1  
HAMILTON, WAIKATO  
FOR  
SL1 CONSORTIUM GROUP**

Title

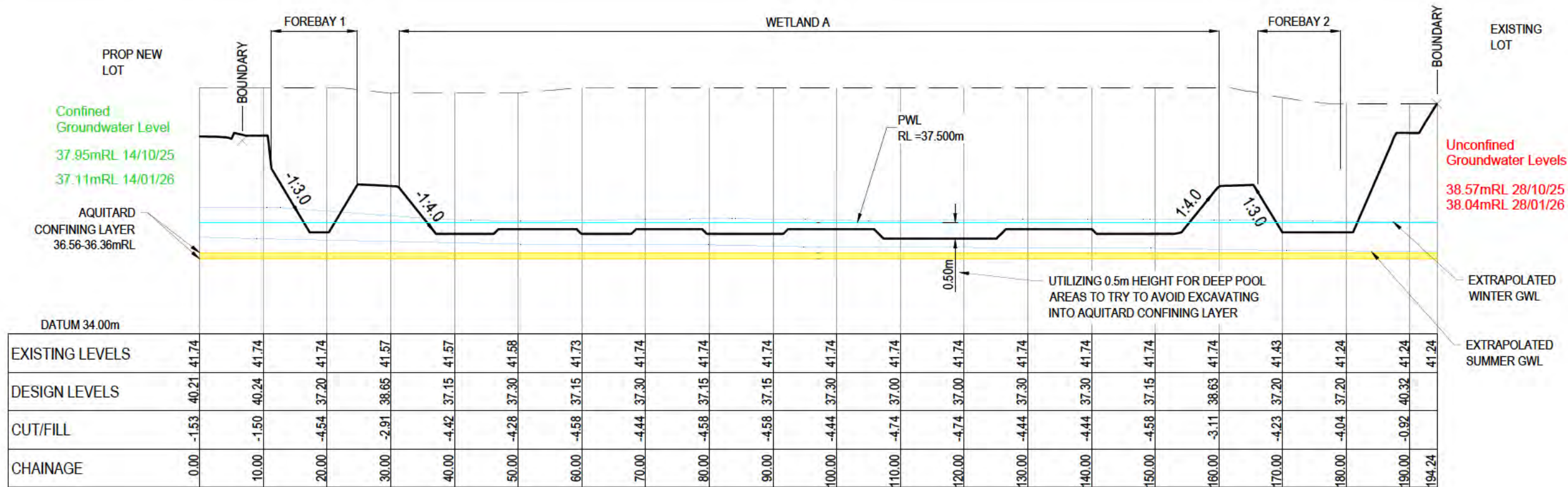
**PROPOSED STORMWATER  
WETLAND A  
PLAN**

|             |                               |     |   |
|-------------|-------------------------------|-----|---|
| Project no. | 298001-R1 SL1                 |     |   |
| Scale       | 1:750 @ A3                    |     |   |
| Cad file    | 298001-R1-C440 SW WETLAND.DWG |     |   |
| Drawing no. | R1-C440-1                     | Rev | C |

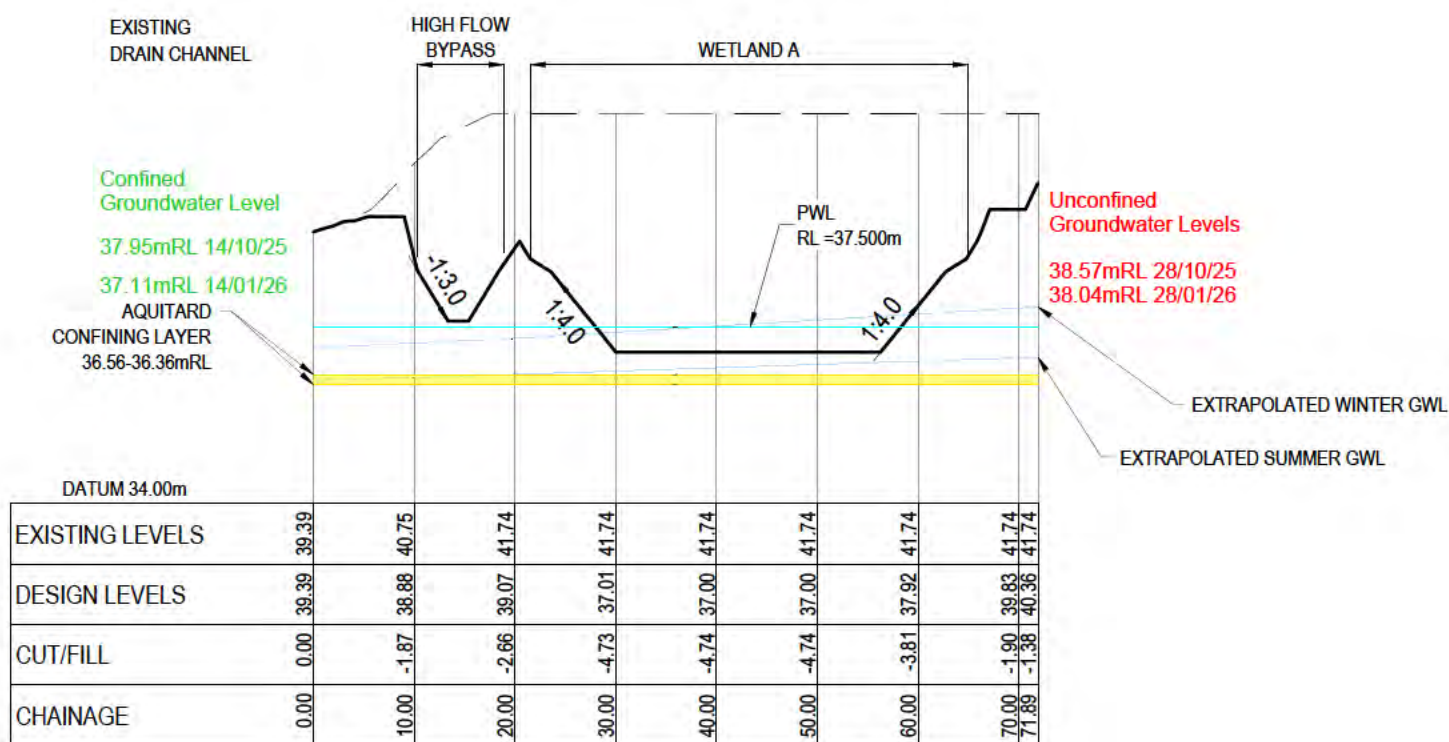
DRAFT FOR REVIEW

DATE: 09/08/25 FILE: R1-C440-1 SW WETLAND PLAN DWG PROJECT: SOUTHERN LINKS 1 RESIDENTIAL STAGE 1 HAMILTON, WAIKATO FOR SL1 CONSORTIUM GROUP





PROPOSED - Section - A1 CH 0+00.00 TO CH 1+94.24  
SCALE: 1:750 H / 1:150 V



PROPOSED - Section - A2 CH 0+00.00 TO CH 0+71.89  
SCALE: 1:750 H / 1:150 V

- NOTES
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Legend

- EX GROUND LEVEL
- PROP GROUND LEVEL
- 100YR - 10 YR LEVEL
- GROUNDWATER LEVEL

|         |             |      |         |
|---------|-------------|------|---------|
| C       | DRAFT       | MJRA | 02/2026 |
| B       | DRAFT       | MJRA | 02/2026 |
| A       | DRAFT       | MJRA | 11/2025 |
| Rev     | Description | By   | Date    |
|         |             | By   | Date    |
| Survey  | MAVEN       |      | 06/2025 |
| Design  | MKS         |      | 07/2025 |
| Drawn   | MJRA        |      | 11/2025 |
| Checked | DJM         |      | 11/2025 |



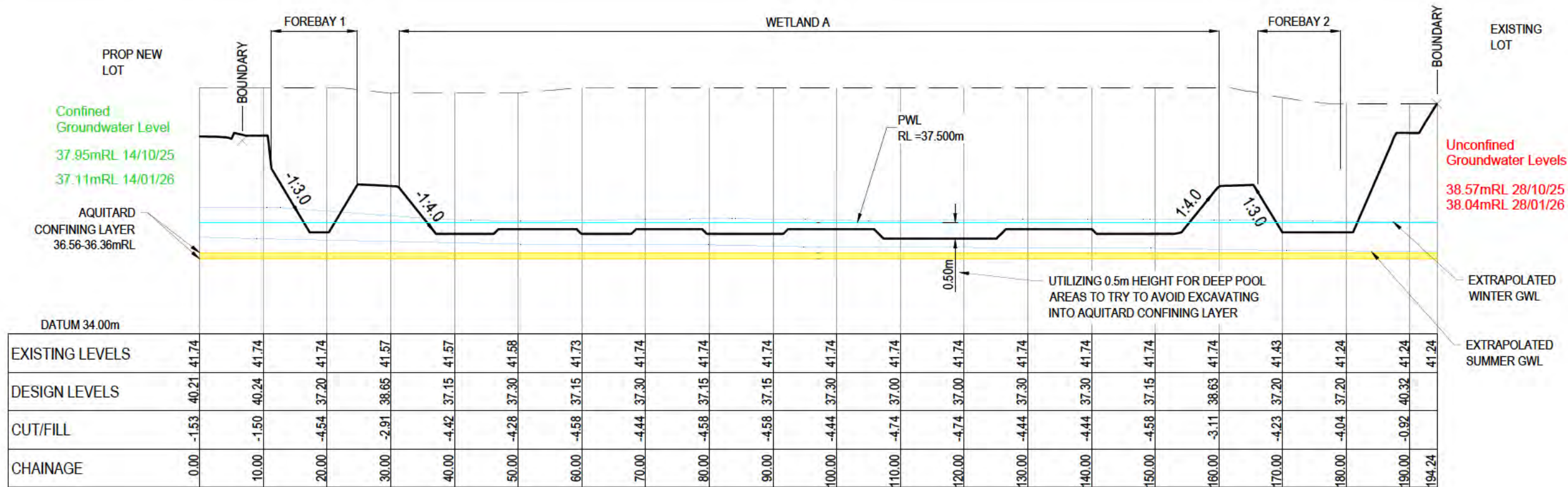
Project  
**SOUTHERN LINKS 1  
RESIDENTIAL STAGE 1  
HAMILTON, WAIKATO  
FOR  
SL1 CONSORTIUM GROUP**

Title  
**PROPOSED STORMWATER  
WETLAND A  
SECTIONS**

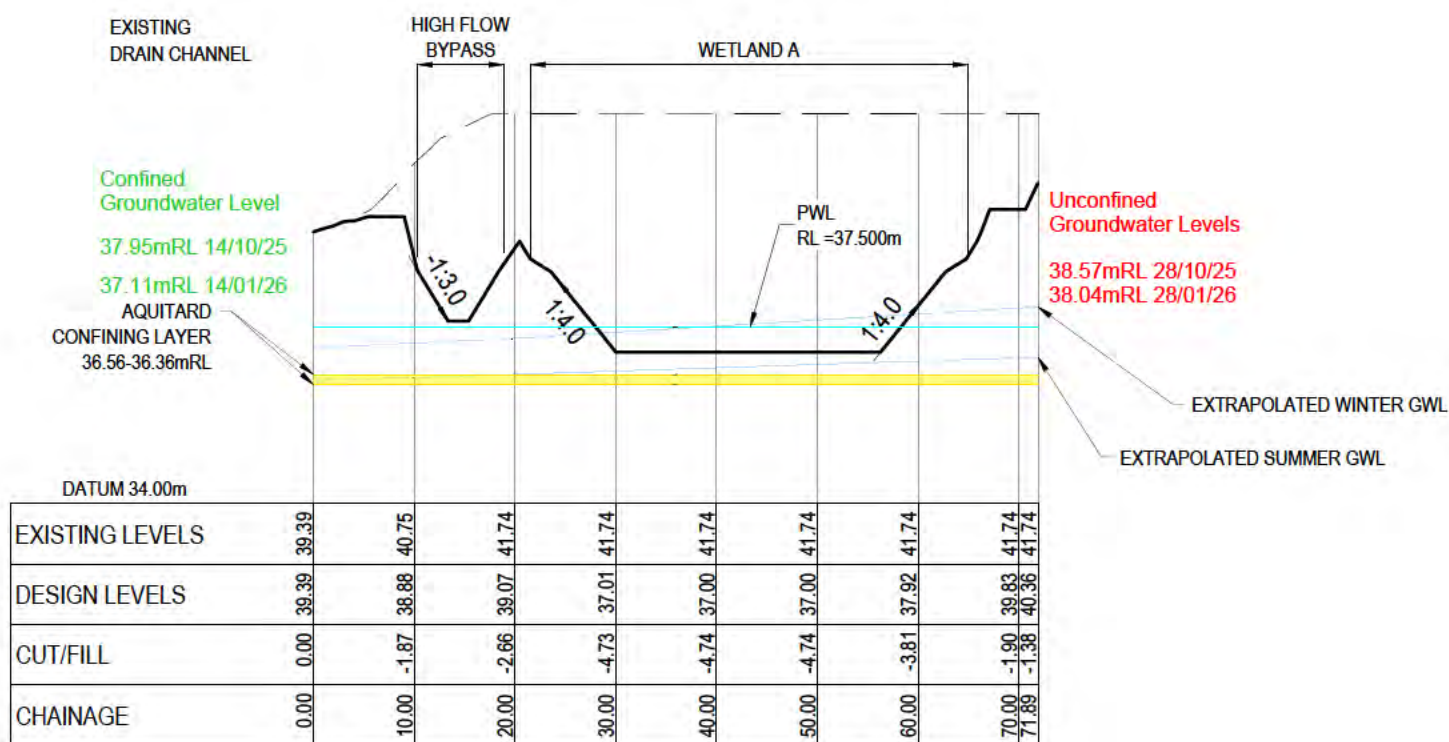
|             |                               |
|-------------|-------------------------------|
| Project no. | 298001-R1 SL1                 |
| Scale       | AS SHOWN                      |
| Cad file    | 298001-R1-C440 SW WETLAND.DWG |
| Drawing no. | R1-C440-2                     |
| Rev         | C                             |

DRAFT FOR REVIEW





PROPOSED - Section - A1 CH 0+00.00 TO CH 1+94.24  
SCALE: 1:750 H / 1:150 V



PROPOSED - Section - A2 CH 0+00.00 TO CH 0+71.89  
SCALE: 1:750 H / 1:150 V

- NOTES
- ALL WORKS TO BE IN ACCORDANCE WITH WAIKATO REGIONAL INFRASTRUCTURE TECHNICAL SPECIFICATIONS.
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Legend

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- PROP GROUND LEVEL
- 100YR - 10 YR LEVEL
- GROUNDWATER LEVEL

|         |             |      |         |
|---------|-------------|------|---------|
| C       | DRAFT       | MJRA | 02/2026 |
| B       | DRAFT       | MJRA | 02/2026 |
| A       | DRAFT       | MJRA | 11/2025 |
| Rev     | Description | By   | Date    |
| Survey  | MAVEN       |      | 06/2025 |
| Design  | MKS         |      | 07/2025 |
| Drawn   | MJRA        |      | 11/2025 |
| Checked | DJM         |      | 11/2025 |



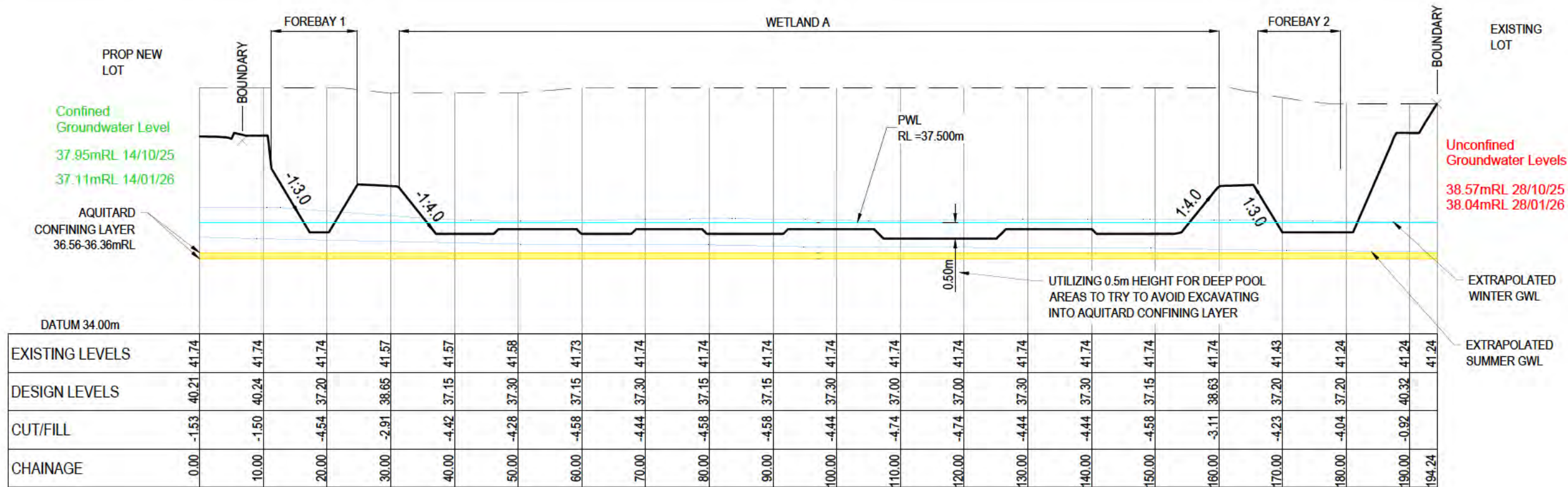
Project  
**SOUTHERN LINKS 1  
RESIDENTIAL STAGE 1  
HAMILTON, WAIKATO  
FOR  
SL1 CONSORTIUM GROUP**

Title  
**PROPOSED STORMWATER  
WETLAND A  
SECTIONS**

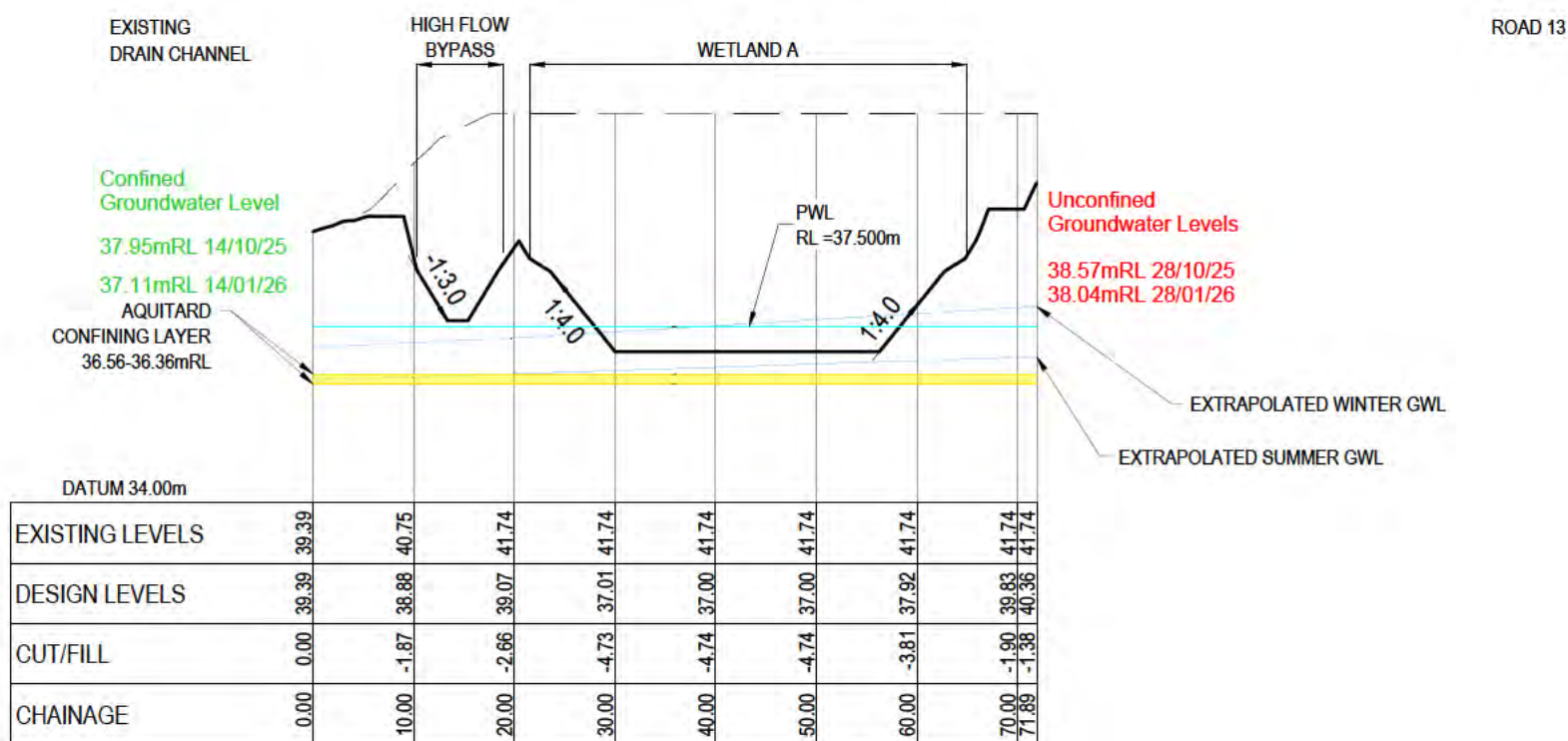
|             |                               |
|-------------|-------------------------------|
| Project no. | 298001-R1 SL1                 |
| Scale       | AS SHOWN                      |
| Cad file    | 298001-R1-C440 SW WETLAND.DWG |
| Drawing no. | R1-C440-2                     |
| Rev         | C                             |

DRAFT FOR REVIEW





PROPOSED - Section - A1 CH 0+00.00 TO CH 1+94.24  
SCALE: 1:750 H / 1:150 V



PROPOSED - Section - A2 CH 0+00.00 TO CH 0+71.89  
SCALE: 1:750 H / 1:150 V

DRAFT FOR REVIEW

- NOTES
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  - CO-ORDINATES IN TERMS OF NZ GEODETIC DATUM MT EDEN 2000. LEVELS IN TERMS OF THE NEW ZEALAND VERTICAL DATUM 2016. CONVERSION TO MOTURIKI 1953 CAN BE ACHIEVED BY ADDING 777m.
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- PROP GROUND LEVEL
- 100YR - 10 YR LEVEL
- GROUNDWATER LEVEL

| Rev     | Description | By   | Date    |
|---------|-------------|------|---------|
| C       | DRAFT       | MJRA | 02/2026 |
| B       | DRAFT       | MJRA | 02/2026 |
| A       | DRAFT       | MJRA | 11/2025 |
| Survey  | MAVEN       |      | 06/2025 |
| Design  | MKS         |      | 07/2025 |
| Drawn   | MJRA        |      | 11/2025 |
| Checked | DJM         |      | 11/2025 |



Project  
**SOUTHERN LINKS 1  
RESIDENTIAL STAGE 1  
HAMILTON, WAIKATO  
FOR  
SL1 CONSORTIUM GROUP**

Title  
**PROPOSED STORMWATER  
WETLAND A  
SECTIONS**

|             |                               |
|-------------|-------------------------------|
| Project no. | 298001-R1 SL1                 |
| Scale       | AS SHOWN                      |
| Cad file    | 298001-R1-C440 SW WETLAND.DWG |
| Drawing no. | R1-C440-2                     |
| Rev         | C                             |

# APPENDIX B

## WGA Piezomometer Location Plan



## WGA Piezometer – Southern Block Locations

### Maven Design Rev A

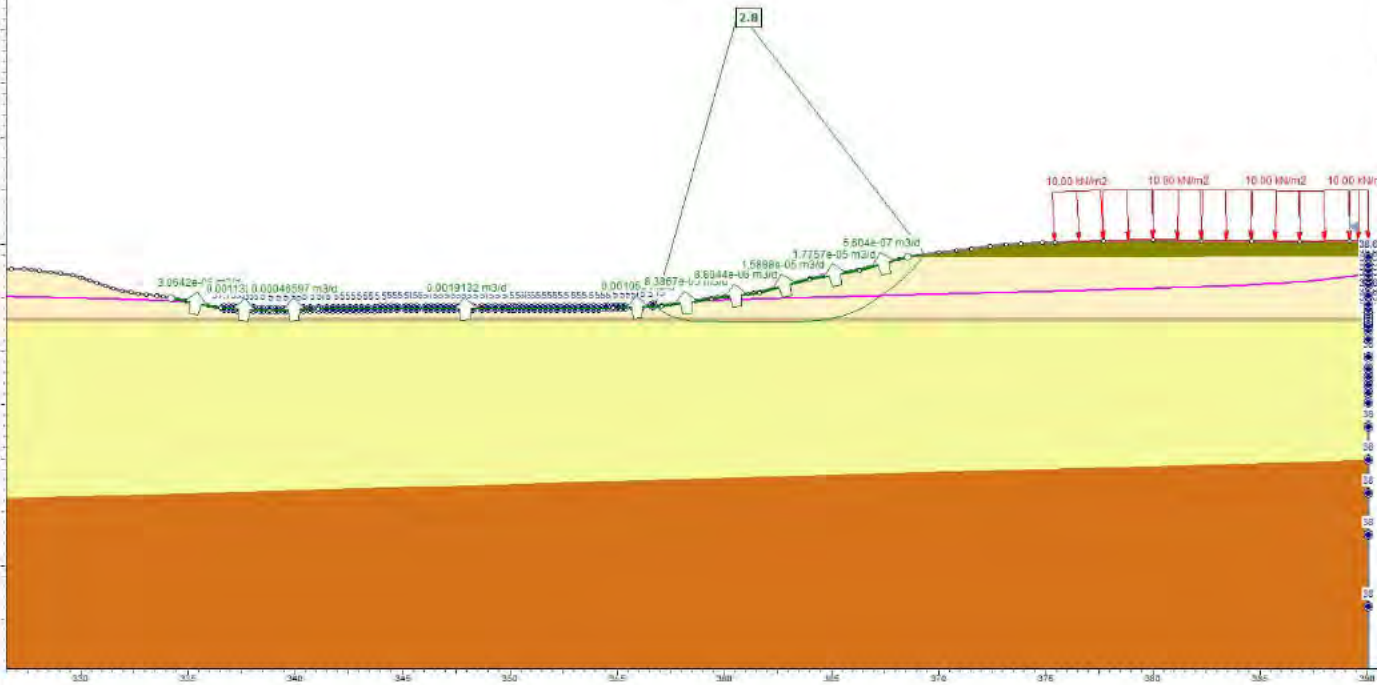




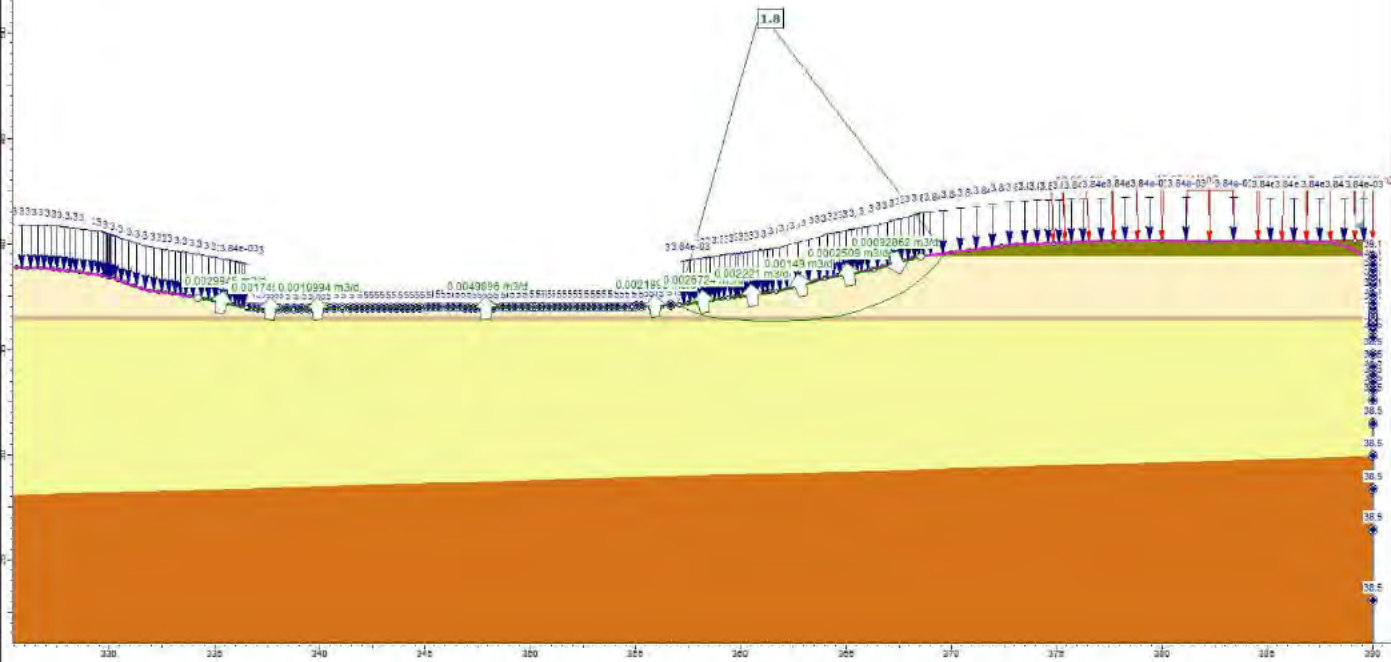
# APPENDIX C

## Slope Stability Assessment

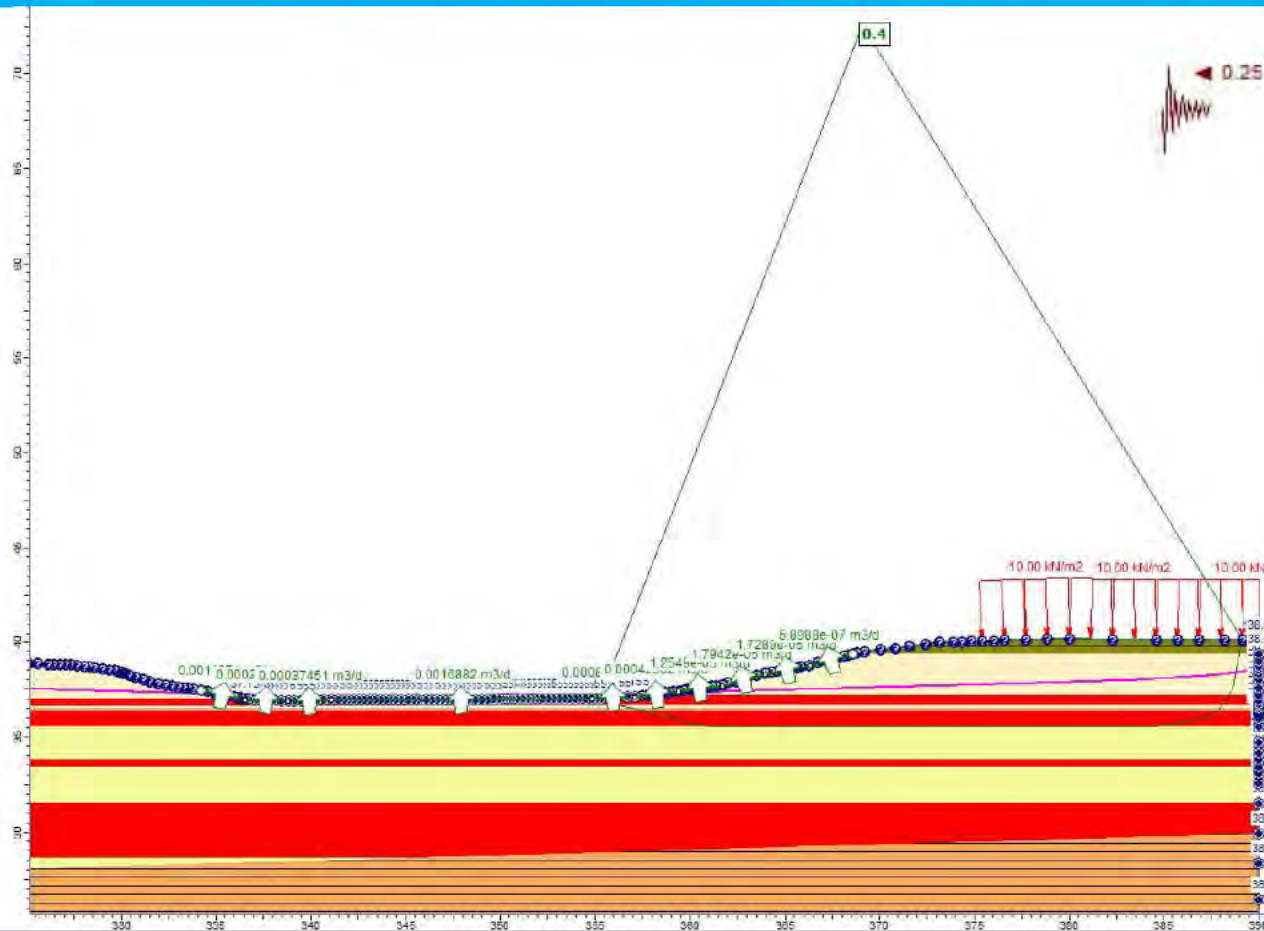
Proposed Profile - Normal Groundwater Conditions. Failures Filtered to FoS≤1.5



Proposed Profile - Worst Case Groundwater Conditions (+0.5m GWT increase and ground infiltration). Failures Filtered to FoS≤1.3



Proposed Profile - ULS Seismic Event. Failures Filtered to FoS≤1.0



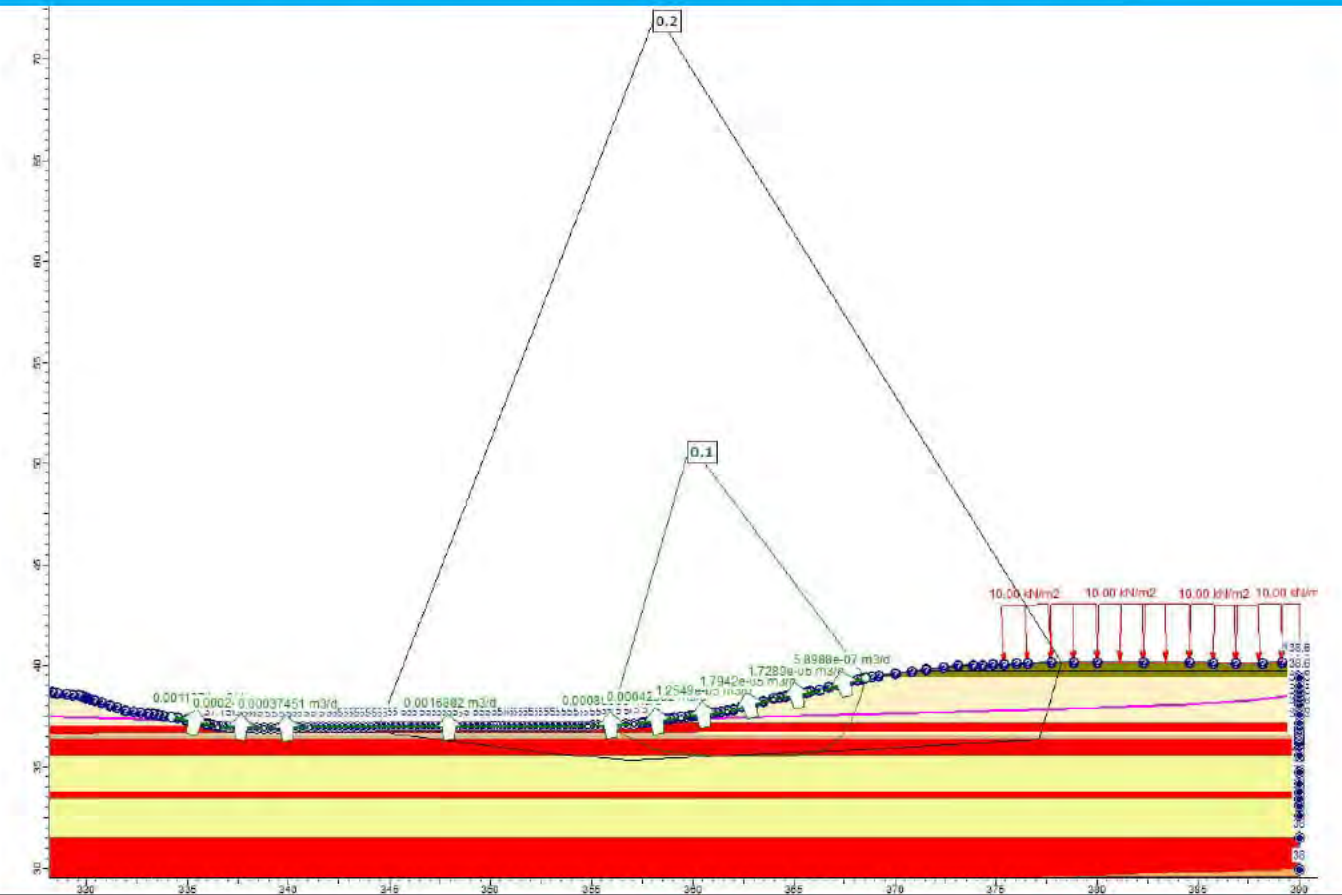
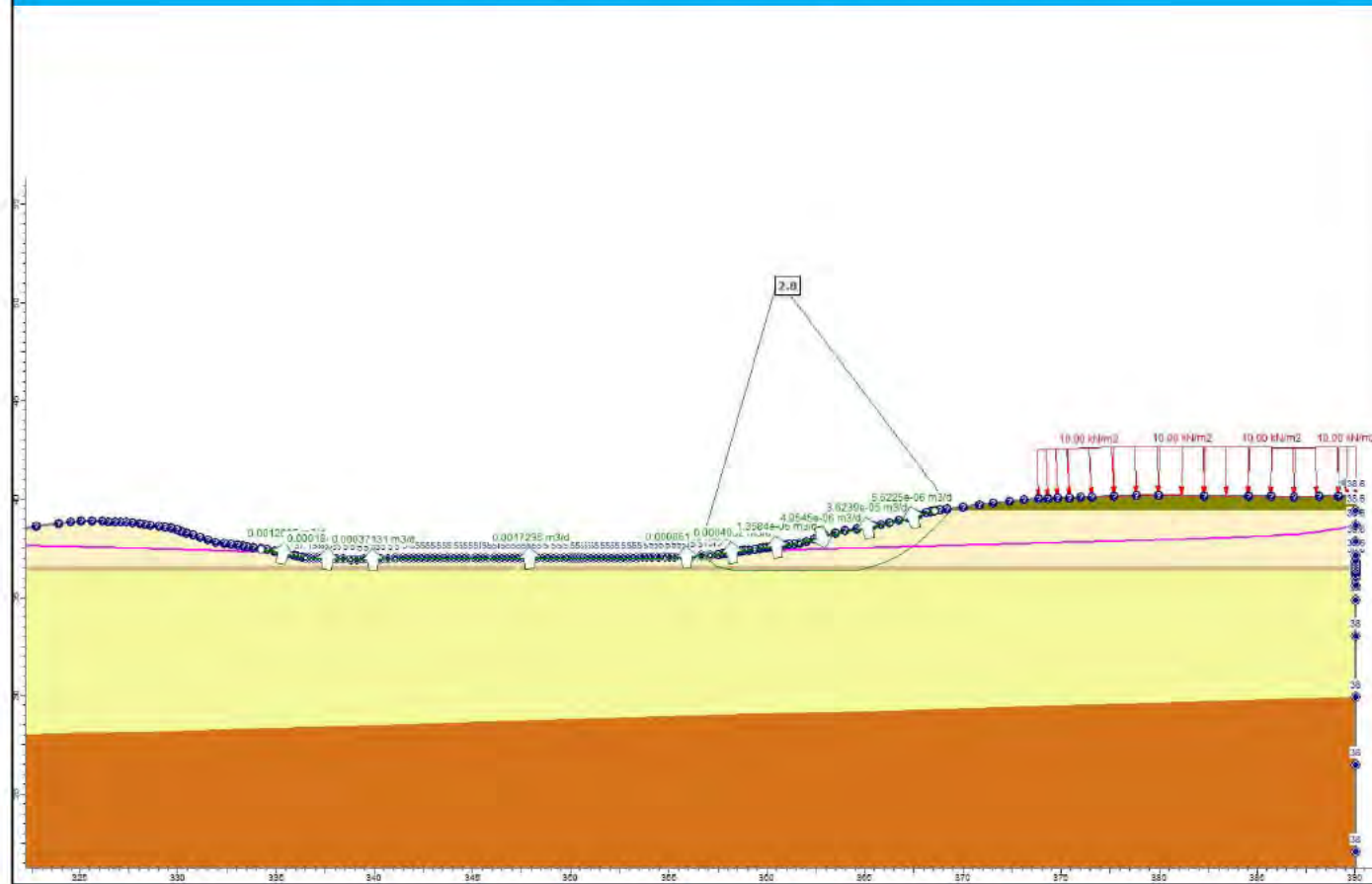
Parameters

| Material Name    | Color | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (°) | Phi b (°) | Air Entry Value (kPa) | Tensile Strength (kPa) |
|------------------|-------|---------------------|---------------|----------------|---------|-----------|-----------------------|------------------------|
| Top Silt         |       | 17                  | Mohr-Coulomb  | 2              | 28      | 0         | 0                     | 80                     |
| Shallow Aquifer  |       | 17                  | Mohr-Coulomb  | 1              | 35      | 0         | 0                     |                        |
| Aquitard         |       | 17                  | Mohr-Coulomb  | 2              | 28      | 0         | 0                     | 80                     |
| Deep Aquifer     |       | 20                  | Mohr-Coulomb  | 1              | 35      | 0         | 0                     |                        |
| Walton Clay/Silt |       | 17                  | Mohr-Coulomb  | 5              | 30      | 0         | 0                     | 140                    |

| Material Name                | Color | Unit Weight (kN/m3) | Strength Type         | Cohesion (kPa) | Phi (°) | Cohesion Type | Vertical Stress Ratio | Minimum Shear Strength (kPa) | Phi b (°) | Air Entry Value (kPa) | Tensile Strength (kPa) |
|------------------------------|-------|---------------------|-----------------------|----------------|---------|---------------|-----------------------|------------------------------|-----------|-----------------------|------------------------|
| Shallow Aquifer              |       | 17                  | Mohr-Coulomb          | 1              | 35      |               |                       |                              | 0         | 0                     |                        |
| Aquitard                     |       | 17                  | Mohr-Coulomb          | 2              | 28      |               |                       |                              | 0         | 0                     | 80                     |
| Deep Aquifer                 |       | 20                  | Mohr-Coulomb          | 1              | 35      |               |                       |                              | 0         | 0                     |                        |
| Top Silt - Undrained         |       | 17                  | Undrained             | 80             | 0       | Constant      |                       |                              | 0         | 0                     | 80                     |
| Walton Clay/Silt - undrained |       | 17                  | Undrained             | 140            | 0       | Constant      |                       |                              | 0         | 0                     | 140                    |
| Shallow Aquifer - Liquefied  |       | 17                  | Vertical Stress Ratio |                |         |               | 0.1                   | 5                            | 0         | 0                     |                        |
| Deep Aquifer - Liquefied     |       | 17                  | Vertical Stress Ratio |                |         |               | 0.1                   | 5                            | 0         | 0                     |                        |



**Proposed Profile - Yield Acceleration along the pond batter and at the crest, FoS filteres to 1.**



### Parameters

| Material Name    | Color                                                                                 | Unit Weight (kN/m3) | Strength Type | Cohesion (kPa) | Phi (°) | Phi b (°) | Air Entry Value (kPa) | Tensile Strength (kPa) |
|------------------|---------------------------------------------------------------------------------------|---------------------|---------------|----------------|---------|-----------|-----------------------|------------------------|
| Top Silt         |  | 17                  | Mohr-Coulomb  | 2              | 28      | 0         | 0                     | 80                     |
| Shallow Aquifer  |  | 17                  | Mohr-Coulomb  | 1              | 35      | 0         | 0                     |                        |
| Aquitard         |  | 17                  | Mohr-Coulomb  | 2              | 28      | 0         | 0                     | 80                     |
| Deep Aquifer     |  | 20                  | Mohr-Coulomb  | 1              | 35      | 0         | 0                     |                        |
| Walton Clay/Silt |  | 17                  | Mohr-Coulomb  | 5              | 30      | 0         | 0                     | 140                    |

| Material Name    | Color                                                                                 | Model  | KS (m/s) | K2/K1 | K1 Angle (deg) | Soil Type |
|------------------|---------------------------------------------------------------------------------------|--------|----------|-------|----------------|-----------|
| Top Silt         |  | Simple | 1e-07    | 1     | 0              | General   |
| Shallow Aquifer  |  | Simple | 1e-07    | 1     | 0              | General   |
| Aquitard         |  | Simple | 2e-08    | 1     | 0              | General   |
| Deep Aquifer     |  | Simple | 1e-07    | 1     | 0              | General   |
| Walton Clay/Silt |  | Simple | 1e-08    | 1     | 0              | General   |

|                                                                                   |          |                                                 |           |                |
|-----------------------------------------------------------------------------------|----------|-------------------------------------------------|-----------|----------------|
|  | CLIENT:  | Saxby Road JV                                   | DESIGNER: | PM             |
|                                                                                   | PROJECT: | Mexted Block - Southern Link Development        | CHECKED:  | DMM            |
|                                                                                   | TITLE:   | COSEISMIC DISPLACEMENTS - FLEXIBLE SLIDING MASS | REVISION: | 8              |
|                                                                                   |          |                                                 | DATE:     | 7/05/2026      |
|                                                                                   |          |                                                 | PROJECT:  | HAM2025-0056AK |

#### WHEN TO USE THIS SHEET:

Use this sheet when calculating the coseismic displacements of a block assuming a flexible sliding mass mechanism.

#### 1. CALCULATE THE PERIOD OF THE SLIDING MASS ( $T_s$ )

|           |          |                                                                           |
|-----------|----------|---------------------------------------------------------------------------|
| 1D or 2D? | 1D       | Generally 1D, but see guidance tab for details                            |
| H         | 3.7 m    | Maximum height of the sliding mass, measured from within the sliding mass |
| $V_s$     | 150 m/s  | Average shear wave velocity of the sliding mass                           |
| $T_s$     | 0.0987 s |                                                                           |

#### 2. SEISMIC PARAMETERS

|                             |                          |                                                                                                              |
|-----------------------------|--------------------------|--------------------------------------------------------------------------------------------------------------|
| Case                        | Ordinary Ground Motions  | Only applicable to Bray and Macedo (2019). Almost always ordinary ground motions, see guidance tab re pulses |
| Yield Coefficient ( $a_d$ ) | 0.1 g                    |                                                                                                              |
| Magnitude ( $M_w$ )         | 5.9                      |                                                                                                              |
| PGA                         | 0.25 g                   |                                                                                                              |
| PGA                         | 0.25 g                   |                                                                                                              |
| $S_a(1.3T_s)$               | 0.43 g                   | Required for Bray (2019) and Macedo (2023)                                                                   |
| $S_a(1.5T_s)$               | 0.43 g                   | Required for Bray (2007)                                                                                     |
| PGV                         | 23.33 cm/s               | Required for Rathje & Antonakos (2011) and Bray (2019) pulses.                                               |
| $T_m$                       | 0.53                     | Only required for Rathje & Antonakos (2011)                                                                  |
| CALS?                       | <input type="checkbox"/> | Multiplies $S_a(1.3T_s)$ , $S_a(1.5T_s)$ and PGA by 1.5, in accordance with BM v3.4                          |

#### Seismic Demand Parameters:

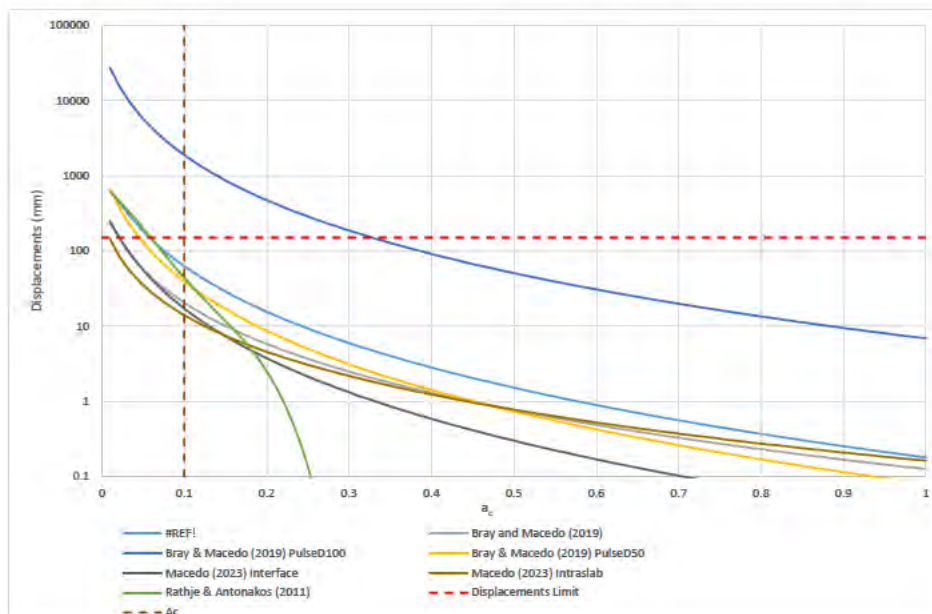
Hamilton  
Class D  
1/500

#### 3. RESULTS

| Probability of Exceedence:             | Bray and Macedo (2019) | Macedo et al. (2023) | Macedo et al. (2023) |
|----------------------------------------|------------------------|----------------------|----------------------|
| Probability of Negligible Displacement | 5%                     | 3%                   | 4%                   |
| 50%                                    | 20 mm                  | 17 mm                | 14 mm                |
| 16%                                    | 41 mm                  | 37 mm                | 26 mm                |
| 5%                                     | 66 mm                  | 60 mm                | 40 mm                |
| 2.5%                                   | 83 mm                  | 76 mm                | 48 mm                |
| 0.5%                                   | 129 mm                 | 121 mm               | 71 mm                |
| Applicable Seismic Source              | Shallow Crustal        | Subduction Interface | Subduction Intraslab |

#### 4. CHART OPTIONS

Displacements Limit 150





|                                                                                   |          |                                                 |           |                |
|-----------------------------------------------------------------------------------|----------|-------------------------------------------------|-----------|----------------|
|  | CLIENT:  | Saxby Road JV                                   | DESIGNER: | PM             |
|                                                                                   | PROJECT: | Mexted Block - Southern Link Development        | CHECKED:  | DMM            |
|                                                                                   | TITLE:   | COSEISMIC DISPLACEMENTS - FLEXIBLE SLIDING MASS | REVISION: | 8              |
|                                                                                   |          |                                                 | DATE:     | 7/05/2026      |
|                                                                                   |          |                                                 | PROJECT:  | HAM2025-0056AK |

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|           |          |                                                                           |
|-----------|----------|---------------------------------------------------------------------------|
| 1D or 2D? | 1D       | Generally 1D, but see guidance tab for details                            |
| H         | 3.7 m    | Maximum height of the sliding mass, measured from within the sliding mass |
| $V_s$     | 150 m/s  | Average shear wave velocity of the sliding mass                           |
| $T_s$     | 0.0987 s |                                                                           |

#### 2. SEISMIC PARAMETERS

|                             |                          |                                                                                                              |
|-----------------------------|--------------------------|--------------------------------------------------------------------------------------------------------------|
| Case                        | Ordinary Ground Motions  | Only applicable to Bray and Macedo (2019). Almost always ordinary ground motions, see guidance tab re pulses |
| Yield Coefficient ( $a_d$ ) | 0.2 g                    |                                                                                                              |
| Magnitude ( $M_w$ )         | 5.9                      |                                                                                                              |
| PGA                         | 0.25 g                   |                                                                                                              |
| PGA                         | 0.25 g                   |                                                                                                              |
| $S_a(1.3T_s)$               | 0.43 g                   | Required for Bray (2019) and Macedo (2023)                                                                   |
| $S_a(1.5T_s)$               | 0.43 g                   | Required for Bray (2007)                                                                                     |
| PGV                         | 23.33 cm/s               | Required for Rathje & Antonakos (2011) and Bray (2019) pulses.                                               |
| $T_m$                       | 0.53                     | Only required for Rathje & Antonakos (2011)                                                                  |
| CALS?                       | <input type="checkbox"/> | Multiplies $S_a(1.3T_s)$ , $S_a(1.5T_s)$ and PGA by 1.5, in accordance with BM v3.4                          |

#### Seismic Demand Parameters:

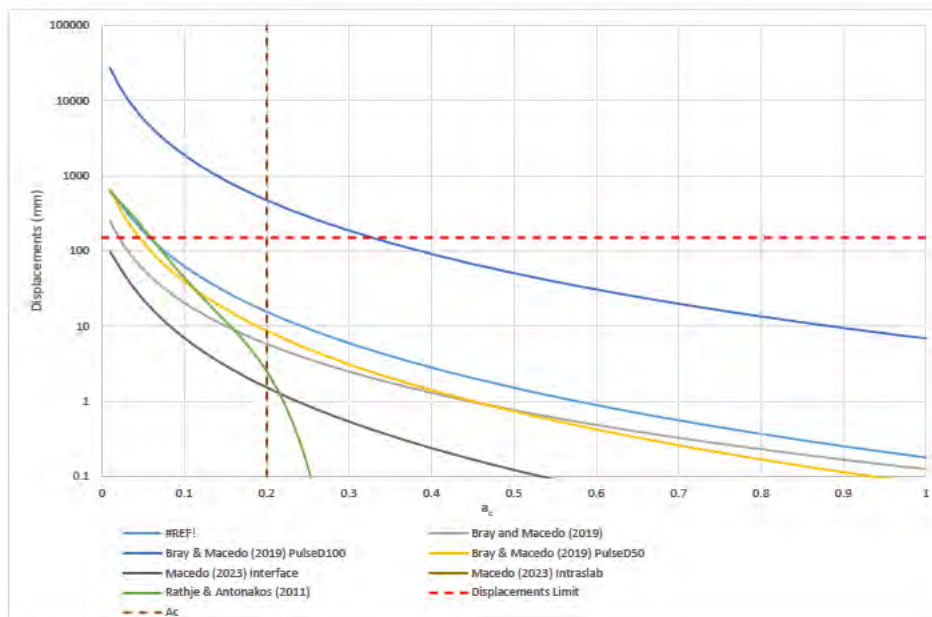
Hamilton  
Class D  
1/500

#### 3. RESULTS

| Probability of Exceedence:             | Bray and Macedo (2019) | Macedo et al. (2023) | Macedo et al. (2023) |
|----------------------------------------|------------------------|----------------------|----------------------|
| Probability of Negligible Displacement | 54%                    | 44%                  | 62%                  |
| 50%                                    | <5 mm                  | 2 mm                 | <5 mm                |
| 16%                                    | 8 mm                   | 6 mm                 | 5 mm                 |
| 5%                                     | 14 mm                  | 11 mm                | 9 mm                 |
| 2.5%                                   | 18 mm                  | 14 mm                | 12 mm                |
| 0.5%                                   | 30 mm                  | 23 mm                | 19 mm                |
| Applicable Seismic Source              | Shallow Crustal        | Subduction Interface | Subduction Intraslab |

#### 4. CHART OPTIONS

Displacements Limit 150





## USING YOUR CMW GEOTECHNICAL REPORT

Geotechnical reporting relies on interpretation of facts and collected information using experience, professional judgement, and opinion. As such it generally has a level of uncertainty attached to it, which is often far less exact than other engineering design disciplines. The notes below provide general advice on what can be reasonably expected from your report and the inherent limitations of a geotechnical report.

### Preparation of your report

Your geotechnical report has been written for your use on your project. The contents of your report may not meet the needs of others who may have different objectives or requirements. The report has been prepared using generally accepted Geotechnical Engineering and Engineering Geology practices and procedures. The opinions and conclusions reached in your report are made in accordance with these accepted principles. Specific items of geotechnical or geological importance are highlighted in the report.

In producing your report, we have relied on the information which is referenced or summarised in the report. If further information becomes available or the nature of your project changes, then the findings in this report may no longer be appropriate. In such cases the report must be reviewed, and any necessary changes must be made by us.

### Your geotechnical report is based on your project's requirements

Your geotechnical report has been developed based on your specific project requirements and only applies to the site in this report. Project requirements could include the type of works being undertaken; project locality, size and configuration; the location of any structures on or around the site; the presence of underground utilities; proposed design methodology; the duration or design life of the works; and construction method and/or sequencing.

The information or advice in your geotechnical report should not be applied to any other project given the intrinsic differences between different projects and site locations. Similarly geotechnical information, data and conclusions from other sites and projects may not be relevant or appropriate for your project.

### Interpretation of geotechnical data

Site investigations identify subsurface conditions at discrete locations. Additional geotechnical information (e.g. literature and external data source review, laboratory testing etc) are interpreted by Geologists or Engineers to provide an opinion about a site specific ground models, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist due to the variability of geological environments. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. Interpretation of factual data can be influenced by design and/or construction methods. Where these methods change review of the interpretation in the report may be required.

### Subsurface conditions can change

Subsurface conditions are created by natural processes and then can be altered anthropically or over time. For example, groundwater levels can vary with time or activities adjacent to your site, fill may be placed on a site, or the consistency of near surface conditions might be susceptible to seasonal changes. The report is based on conditions which existed at the time of investigation. It is important to confirm whether conditions may have changed, particularly when large periods of time have elapsed since the investigations were performed.

### Interpretation and use by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical report. To help avoid misinterpretations, it is important to retain the assistance of CMW to work with other project design professionals who are affected by the contents of your report. CMW staff can explain the report implications to design professionals and then review design plans and specifications to see that they have correctly incorporated the findings of this report.

### Your report's recommendations require confirmation during construction

Your report is based on site conditions as revealed through selective point sampling. Engineering judgement is then applied to assess how indicative of actual conditions throughout an area the point sampling might be. Any assumptions made cannot be substantiated until construction is complete. For this reason, you should retain geotechnical services throughout the construction stage, to identify variances from previous assumption, conduct additional tests if required and recommend solutions to problems encountered on site.

A Geotechnical Engineer, who is fully familiar with the site and the background information, can assess whether the report's recommendations remain valid and whether changes should be considered as the project develops. An unfamiliar party using this report increases the risk that the report will be misinterpreted.

### Environmental Matters Are Not Covered

Unless specifically discussed in your report environmental matters are not covered by a CMW Geotechnical Report. Environmental matters might include the level of contaminants present of the site covered by this report, potential uses or treatment of contaminated materials or the disposal of contaminated materials. These matters can be complex and are often governed by specific legislation.

The personnel, equipment, and techniques used to perform an environmental study can differ significantly from those used in this report. For that reason, our report does not provide environmental recommendations. Unanticipated subsurface environmental problems can have large consequences for your site. If you have not obtained your own environmental information about the project site, ask your CMW contact about how to find environmental risk-management guidance.



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