**Appendix:**

Appendix 1 Physical and mechanical properties of soil layer

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Number | Soil | Weight density/ kN/m3 | Elastic modulus/MPa | Cohesion/KPa | internal friction angle/degree | liquidity index |
| 3-1-1 | New loess | 16.2 | 7 | 27 | 24.5 | 0.17 |
| 3-2-1 | Paleosol | 17.4 | 10 | 45 | 24 | 0.15 |
| 4-1-1-1 | Old loess | 16.1 | 9 | 35 | 23 | 0.3 |
| 4-2-1 | Paleosol 2 | 17.6 | 11 | 44 | 23 | 0.31 |
| 4-1-1-2 | Old loess 2 | 16.9 | 10 | 36 | 22.5 | 0.44 |

Appendix 2 Soil properties from shallow to deep

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Soil | Thickness/m | Equivalent shear wave velocity m/s | Density kg/m3 |
| 3-1-1 | New loess | 7.3 | 223.8 | 1620 |
| 3-2-1 | Paleosol | 3 | 335.5 | 1740 |
| 3-1-1 | New loess | 8.8 | 348.4 | 1620 |
| 3-2-1 | Paleosol | 4.2 | 354 | 1740 |
| 3-1-1 | New loess | 3.3 | 360 | 1620 |
| 3-2-1 | Paleosol | 3.6 | 361.7 | 1740 |
| 3-1-1 | New loess | 3.6 | 371.9 | 1620 |
| 4-2-1 | Paleosol 2 | 5.1 | 384.9 | 1760 |
| 3-1-1 | New loess | 2.6 | 403.8 | 1620 |
| 4-2-1 | Paleosol 2 | 2.3 | 422.8 | 1760 |
| 4-1-1-1 | Old loess | 4 | 422.8 | 1610 |
| 4-2-1 | Paleosol 2 | 2.1 | 458.5 | 1760 |
| 4-1-1-1 | Old loess | 3.2 | 465 | 1610 |
| 4-2-1 | Paleosol 2 | 2.5 | 465.3 | 1760 |
| 4-1-1-1 | Old loess | 8 | 475.7 | 1610 |
| 4-2-1 | Paleosol 2 | 1.6 | 483.5 | 1760 |
| 4-1-1-2 | Old loess 2 | 4.8 | 488.6 | 1690 |