# Profilul Forajului ~~Santului~~ / Borehole ~~Pit~~ Profile — Nr. S4-FP-1016

REZULTATELE ANALIZELOR DE LABORATOR
LABORATORY TEST RESULTS

**LUCRAREA / DESIGN:** Studiu geotehnic pentru revizuirea Studiului de fezabilitate Autostrada Sibiu-Pitesti - Sectiunea 4 (Valeni-Curtea de Arges)

**AMPLASAMENT / LOCATION:** Autostrada Sibiu-Pitesti X : 463574.83 Y: 416096.83

**DATA / DATE:** 07.09.2016

Cota fata de: 0.00 Foraj
Level vs: 0.00 Bore-hole (pit)

## Stratigraphy

| Adâncime / Depth (m) | Grosimea stratului / Stratum thickness (m) | Adancimea apei subterane / Underground water depth (m) | Denumirea stratului / Stratum description |
|---|---|---|---|
| 0.10 | 0.10 | | Pamant vegetal. |
| 1.95 | 1.85 | 1.10 | Pietris cu nisip cafeniu si rar bolovanis. |
| 8.00 | 6.05 | | Argila nisipoasa, cenusie, plastic vartoasa. |
| | | | Argila prafoasa, la 16.50 m argila, cafenie, plastic vartoasa - tare. |

## Laboratory results

Sample types: ☐ Borcan / Jar; ☒ Stut / Tube; ■ Carota / Core

### Grain size and plasticity

| Nr. proba / Sample | Adâncimea / Depth (m) | Argila / Clay <0.002 | Praf / Silt 0.063 | Nisip fin / Fine sand 0.2 | Nisip mediu / Medium sand 0.63 | Nisip mare / Coarse sand 2 | Pietris mic / Small gravel 6.3 | Pietris mediu / Medium gravel 20 | Pietris mare / Coarse gravel 63 | Bolovanis / Cobbles 200 | Un=d60/d10 | $W_L$ | $W_P$ | $I_P$ | w % | $I_C$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1* (Stut) | 4.4-4.6 | 17 | 23 | 15 | 36 | 9 | | | | | | 31.7 | 12.9 | 18.8 | 13.7 / 14.0 | 0.96 |
| 2 (Stut) | 8.3-8.5 | 28 | 58 | 11 | 2 | 1 | | | | | | 47.9 | 15.4 | 32.5 | 17.1 / 17.1 | 0.95 |
| 3 (Stut) | 12.2-12.5 | 27 | 59 | 9 | 4 | 1 | | | | | | 46.8 | 14.7 | 32.1 | 20.6 / 20.6 | 0.81 |

### Physical state and shrinkage-swelling (Contractilitatea)

| Nr. proba / Sample | $\rho_s$ | γ (kN/m³) | $\gamma_d$ (kN/m³) | n % | e | Sr | $U_L$ | $w_{15}$ | $C_v$ | $w_s$ | Pu (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1* | | 20.7 | 18.2 | 31.32 | 0.46 | 0.81 | 78.3 | | | | |
| 2 | | 21.1 | 18.1 | 30.36 | 0.44 | 1.00 | | | | | |
| 3 | | 21.1 | 17.5 | 35.55 | 0.55 | 1.00 | | | | | 52 |

### Compressibility (Compresibilitatea)

| Nr. proba / Sample | $M_{200-300}$ (kPa) | $\varepsilon_{200}$ % | $m_v$ | $a_{v\,200-300}$ (1/kPa) | $im_{200}$ % | σ (kPa) | RSC | $c_v$ (cm²/sec) |
|---|---|---|---|---|---|---|---|---|
| 1* | 13641.1 | 3.52 | | 0.00011 | | | | |
| 3 | 9852.2<br>12578.6<br>18518.5 | 1.71<br>2.50<br>3.33 | | 0.00016<br>0.00012<br>0.00008 | | 200<br>300<br>500 | 0.50 | 3.83*10[illegible]<br>3.42*10[illegible]<br>3.09*10[illegible] |

### Shear strength, permeability and SPT

| Nr. proba / Sample | Efort / Effective stress σ/τ 1 | 2 | 3 | Φ (°) | c (kPa) | Felul determinarii / Type of test | $p_c$ (kPa) | k (cm/s) | CaCO3 % |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 100 / 76.6 | 200 / 126.7 | 300 / 180.3 | 27°23' | 24.3 | FCU i. | | | |
| 3 | | | | | | | | 3.96*10[illegible]<br>2.80*10[illegible]<br>1.73*10[illegible] | |

| Adancime / Depth (m) | Penetrarea dinamica standard / Standard penetration test (N/30 cm) |
|---|---|
| 2.00 | 34/R |
| 6.10 | R |
| 10.30 | R |
| 14.50 | R |

Forajul continua

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# Profilul ~~Forajului~~ ~~Santului~~ Nr. S4-FP-1016
# ~~Borehole~~ ~~Pit~~ Profile continuare

REZULTATELE ANALIZELOR DE LABORATOR
LABORATORY TEST RESULTS

LUCRAREA / DESIGN: Studiu geotehnic pentru revizuirea Studiului de fezabilitate Autostrada Sibiu-Pitesti - Sectiunea 4 (Valeni-Curtea de Arges)

AMPLASAMENT / LOCATION: Autostrada Sibiu-Pitesti
X : 463574.83 Y: 416096.83

DATA / DATE: 07.09.2016

Cota fata de: 16.0 Foraj

Level vs: 16.0 Bore-hole (pit)

| Grosimea stratului / Stratum thickness (m) | Adancimea apei subterane / Underground water depth (m) | Stratificatia / Stratification | Formatiunea geologica / Geological formation | DENUMIREA STRATULUI (conform Stas 1243-88 si SR EN ISO 14688/2-2005) / STRATUM DESCRIPTION (eccording to Stas 1243-88 and SR EN ISO 14688/2-2005) |
|---|---|---|---|---|
| 16.00 | | | | |
| 4.00 | | | | Argila praoasa, la 16.50 m argila, cafenie, plastic vartoasa - tare. |
| 8.00 | | | | |
| 12.00 | | | | |
| 2.10 | | | | Nisip cenusiu. |
| 22.10 | | | | |
| 1.00 | | | | Argila nisipoasa, cenusie. |
| 23.10 | | | | |
| 2.90 | | | | Nisip cenusiu. |
| 26.00 | | | | |
| 2.40 | | | | Argila nisipoasa, cenusie, plastic vartoasa. |
| 28.40 | | | | |
| | | | | Nisip cenusiu, pe alocuri grezificat si cu lentile argiloase. |

Borcan / Stut / Carota — Jar / Tube / Core

| Numarul probei / Number and type of samples | Adancimea / Depth (m) | Compozitie granulometrica (d. in mm) SR EN ISO 14688/2-2005: Argila <0.002 | Praf 0.063 | Nisip fin 0.2 | Nisip mediu 0.63 | Nisip mare 2 | Pietris mic 6.3 | Pietris mediu 20 | Pietris mare 63 | Bolovanis 200 | Coeficientul de neuniformitate Una d60/d10 | Limitele Atterberg: Limita de curgere $W_L$ | Limita de plasticitate $W_P$ | Indicele de plasticitate $I_P$ | Umiditatea w % | Indicele de consistenta $I_C$ | Densitatea scheletului mineral $\rho_s$ | Greutatea volumica $\gamma$ kN/m³ | Greutatea volumica in stare uscata $\gamma_d$ kN/m³ | Porozitatea n % | Indicele porilor e | Gradul de umiditate Sr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 16.5-16.7 | 41 | 50 | 5 | 2 | 2 | | | | | | 67.3 | 20.8 | 46.5 | 17.4 | >1 | | 21.1 | 18.0 | 30.76 | 0.44 | 1.00 |
| | | | | | | | | | | | | | | | 16.5 | | | | | | | |
| | | | | | | | | | | | | | | | 17.3 | | | 21.1 | 18.0 | 30.62 | 0.44 | 1.00 |
| 5 | 19.2-20.4 | 2 | 12 | 32 | 53 | 1 | | | | | 6.8 | | | | 16.7 | | | | | | | |
| 6 | 24.0-24.2 | 11 | 32 | 48 | 7 | 1 | | | | | <6 | | | | 19.7 | | | | | | | |
| 7 | 28-28.2 | 35 | 25 | 14 | 16 | 9 | 1 | | | | | 37.4 | 13.6 | 23.7 | 17.6 | 0.83 | | | | | | |

Particle size distribution SR EN ISO 14688/2-2005: Clay / Silt / Fine sand / Medium sand / Coarse sand / Small gravel / Medium gravel / Coarse gravel / Cobbles

Non-uniformity coefficient

Atterberg's limits: Liquid limit / Plastic limit / Plasticity index

Water content / Consistency index / Skeletal mineral density / Unit weight / Unit dry weight / Porosity / Void ratio / Degree of saturation

**Contractilitatea / Shrinkage-swelling**

| Umflarea libera / Unconfined swelling | Succiunea 15 bari / Suction 15 bars | Tulb. / Netulb. | Contractia volumica / Volume shrinkage | Limita de contractie / Shrinkage limit | Presiunea de umflare / Swelling pressure |
|---|---|---|---|---|---|
| $U_L$ | $w_{15}$ | | $C_v$ | $w_s$ | $P_U$ kPa |

**Compresibilitatea / Compressibility**

| Modulul de deformatie edometrica / Oedometer deformation modulus $M_{200-300}$ kPa | Tasare specifica la 200 kPa / Specific settlement at 200 kPa $\varepsilon_{200}$ % | Coef. compresibilitate volumica / Coefficient of volume change $m_v$ $X10^{-3}$ kPa | Coeficientul de compresibilitate / Coefficient of compressibility $a_{v\ 200-300}$ 1/ kPa | Sensibilitatea la umezire / Susceptibility to swelling $Im_{300}$ % | Efort / Stress σ kPa | Indice de recompresiune / Recompression index RSC | Coeficientul de consolidare / Coefficient of consolidation $c_v$ cm²/ sec |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| 11764.7 | 2.70 | | 0.00011 | | | | |

**Rezistenta la forfecare / Shear strength**

Efort / Effective stress σ/τ

| 1 | 2 | 3 | Unghiul de frecare int. / Angle of int. friction Φ ° | Coeziunea / Cohesion c kPa |
|---|---|---|---|---|
| | | | | |
| 150 / 84.2 | 250 / 113.1 | 350 / 135.5 | 14°23 | 46.8 |

Felul determinarii / Type of test: FCU i.

Rezistenta la compresiune cu deformatie laterala libera / Unconfined compressive strength $p_c$ kPa

Coeficient de permeabilitate / Permeability coefficient k cm/s

Continutul in CaCO3 / CaCO3 content %: 3.89

Penetrarea dinamica standard / Standard penetration test $\frac{N}{10\ cm}$: 13.30 R; 22.50 R; 26.50 R

Forajul continua

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REZULTATELE ANALIZELOR DE LABORATOR
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**LUCRAREA DESIGN**: Studiu geotehnic pentru revizuirea Studiului de fezabilitate Autostrada Sibiu-Pitesti - Sectiunea 4 (Valeni-Curtea de Arges)

**AMPLASAMENT LOCATION**: Autostrada Sibiu-Pitesti
X : 463574.83 Y: 416096.83

**DATA DATE**: 07.09.2016

Cota fata de: 32.0 Foraj

Level vs: 32.0 Bore-hole (plt)

| Grosimea stratului / Stratum thickness | Adancimea apei subterane / Underground water depth | Stratificatia / Stratification | Formatiunea geologica / Geological formation | DENUMIREA STRATULUI (conform Stas 1243-88 si SR EN ISO 14688/2-2005) / STRATUM DESCRIPTION (according to Stas 1243-88 and SR EN ISO 14688/2-2005) | Numarul probelor / Number and type of samples | Adancimea / Depth |
|---|---|---|---|---|---|---|
| m | m | | | | | m |
| | | | | | ☐ Borcan ☒ Stut ■ Carota / ☐ Jar ☒ Tube ■ Core | |
| 35.00 - 6.60 | | | | Nisip cenusiu, pe alocuri grezificat si cu lentile argiloase. | 8 ☐ | 32.3-32.4 |

**Compozitia granulometrica (d. in mm) SR EN ISO 14688/2-2005 / Particle size distribution SR EN ISO 14688/2-2005**

| Argila / Clay <0.002 | Praf / Silt 0.063 | Nisip fin / Fine sand 0.2 | Nisip mediu / Medium sand 0.63 | Nisip mare / Coarse sand 2 | Pietris mic / Small gravel 6.3 | Pietris mediu / Medium gravel 20 | Pietris mare / Coarse gravel 63 | Bolovanis / Cobbles 200 | Coeficientul de neuniformitate / Non-uniformity coefficient $U=\frac{d60}{d10}$ |
|---|---|---|---|---|---|---|---|---|---|
| 4 | 9 | 36 | 50 | 1 | | | | | 6.3 |

**Limitele Atterberg / Atterberg's limits**

| Limita de curgere / Liquid limit $W_L$ | Limita de plasticitate / Plastic limit $W_p$ | Indicele de plasticitate / Plasticity index $I_p$ | Umiditatea / Water content w % | Indicele de consistenta / Consistency index $I_c$ | Densitatea scheletului mineral / Skeletal mineral density $\rho_s$ |
|---|---|---|---|---|---|
| | | | 20.4 | | |

| Greutatea volumica / Unit weight kN/m³ $\gamma$ | Greutatea volumica in stare uscata / Unit dry weight kN/m³ $\gamma_d$ | Porozitatea / Porosity n % | Indicele porilor / Void ratio e | Gradul de umiditate / Degree of saturation Sr |
|---|---|---|---|---|
| | | | | |

**Contractilitatea / Shrinkage-swelling**

| Umflarea libera / Unconfined swelling $U_L$ | Sucțiunea 15 bari / Suction 15 bars $w_{15}$ | Contracția volumica / Volume shrinkage $C_v$ | Tulb. / Dist. | Netulb. / Undist. | Limita de contractie / Shrinkage limit $w_s$ | Presiunea de umflare / Swelling pressure Pu kPa |
|---|---|---|---|---|---|---|
| | | | | | | |

**Compresibilitatea / Compressibility**

| Modulul de deformatie edometrica / Oedometer deformation modulus $M_{200-300}$ kPa | Tasare specifica la 200 kPa / Specific settlement at 200 kPa $\varepsilon_{200}$ % | Coef. compresibilitate volumica / Coefficient of volumo change $m_v$ 1/kPa | Coeficientul de compresibilitate / Coefficient of compressibility $a_{v\ 200-300}$ 1/kPa | Sensibilitatea la umezire / Susceptibility to wetting $im_{300}$ % | Efort / Stress σ kPa | Indice de recompresiune / Recompression index RSC | Coeficientul de consolidare / Coefficient of consolidation c cm²/sec |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

**Rezistenta la forfecare / Shear strength**

| Efort / Effective stress σ/τ 1 | 2 | 3 | Unghiul de frecare int. / Angle of int. friction Φ ° | Coeziunea / Cohesion c kPa |
|---|---|---|---|---|
| | | | | |

| Felul determinarii / Type of test | Rezistenta la compresiune cu deformatie laterala libera / Unconfined compressive strength $p_c$ kPa | Coeficient de permeabilitate / Permeability coefficient k m/s | Continutul in material organic / Organic matter content % | Penetrarea dinamica standard / Standard penetration test N/30 cm |
|---|---|---|---|---|
| | | | | |

Nota:
FCU I. = Forfecare consolidata nedrenata inundata
(*) - Esantion comparabil PNT (proba netulburata) - rezultat informativ

Intocmit: ing. V. Marin

Verificat: ing. A. Diaconu