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*proiect:* **Consolidare DN 1km 204**

*beneficiar:* **NV Construct**

*faza:* **studiu geotehnic**







Braşov,
2015-05-01

# BORDEROU

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întocmit,
ing. Medesan Onica

# MEMORIU GEOTEHNIC

## 1. DATE GENERALE

**1.1 Denumirea obiectivului**: DN1 km 204, jud. Braşov

**1.2 Adresa amplasamentului:** Amplasamentul terenului studiat se află pe drumul național 1 Braşov – Sibiu, între km 204+445-205+250.

**1.3 Beneficiarul:** NV Construct S.R.L.

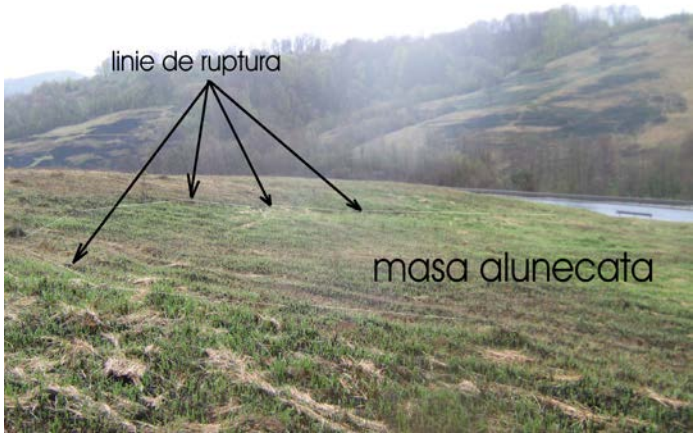
**1.4 Date despre obiectiv:** Sectorul din DN 1 la KM 204+445 la 205+250 este afectat de o deplasare lentă a terenului.

Pentru o mai bună descriere a fenomenului am delimitat în amplasamentul studiat mai multe zone (vezi planul de zonare „geotehnică”- denumire improprie pe care ne-o asumăm totuşi):

A. zona cu material argilos de umplutură la suprafață, cu caracteristici mecanice slabe;
B. zona de eroziune de suprafață accentuată
C. zona cu masă alunecată cu caracteristici mecanice slabe
D. zona de alunecare activă
E. zona de eroziune de suprafață accentuată – aval
F. zona cu apa subterana cu nivel piezometric, cu nivel artezian

Există mai multe fenomene legate de teren care afectează exploatarea normală a drumului național pe sectorul respectiv:

O alunecare activă (zona D) care face ca de mai multe zeci de ani să fie necesară repararea drumului datorită deformării sale lente. Rata deplasărilor variază în funcție de anotimp cu până la maxim 2 mm/lună.




În zonă C datorită diferenței mari de cotă dintre carosabil şi piciorul taluzului, terenul a cedat, în asfalt fiind vizibilă o crăpătură semicirculară şi o tasare a materialului din interiorul său.




În zona A, - în exteriorul curbei spre dreapta, de la km 204+580 la 204+820, care se doreşte a fi extinsă prin mărirea razei, terenul de la suprafață are caracteristici mecanice, respectiv compresibilitate foarte redusă. Presupunem că, deşi aparent terenul are acelaşi aspect cu depozitele superficiale din zonă, materialul de aici a fost adus şi depozitat ca urmare a lucrărilor efectuate de-a lungul timpului la execuția drumului

Zona E, valea torentului din nordul amplasamentului indică prin aspectul frământat, neregulat, că este în mişcare, fapt confirmat şi din observațiile din înclinometrul 3, care la o adâncime de cca. 9 metri prezintă o flexiune evidentă.

**1.5 Documente primite de la beneficiar –** tema de proiectare, plan de situație

**1.6 Date morfologice-topografice** Amplasamentul se află într-o zonă colinară din pasul Perşani. Terenul prezintă o cădere accentuată spre Nord-vest, cu un unghi general de 7°, însă cu o lungime foarte mare, de peste 300 metri, perpendicular pe curbele de nivel. La limita nordică amplasamentul este străbătut de o vale a unui torent, iar pe partea stângă a drumului, la km 204+900 există de asemenea un făgaş adânc săpat de torenți, cu o direcție Est-vest.

**1.7 Date geologice-geomorfologice asupra zonei**

Zona cercetată se încadrează din punct de vedere geomorfologic culoarului Dumbrăvița-Vlădeni, caracterizat printr-un relief colinar, cu pante domoale. Din punct de vedere geologic alcătuirea acestei unități este relativ complicată, aceasta făcând trecerea de la unitatea Carpaților Orientali, de care aparțin şi munții Perşani, la cei Meridionali.

În succesiunea litologică, la suprafață se întâlnesc depozite Oligocene formate din argile, gresii, şisturi disodilice, iar peste acestea s-a format o pătură de alterare eluvială, care, în special pe amplasamentul propus, are o grosime apreciabilă, datorită reliefului.

Amplasamentul studiat prezintă la suprafață o pătură de alterare eluvial-deluvială coezivă, iar roca de bază este reprezentată de un pachet de marne (praf argilos – din punct de vedere granulometric) supraconsolidate.

## 2. SINTEZA INFORMAȚIILOR OBȚINUTE DIN INVESTIGAREA TERENULUI

### 2.1 Volumul de lucrări efectuate:

Pentru lucrarea de față s-au executat 5 foraje cu adâncimi cuprinse între 10-12.00 metri cu carotaj continuu. S-au recoltat 13 probe netulburate, din care s-au efectuat pe teren teste cu acid clorhidric în marnele din bază, iar în laborator granulometrii, plasticități, forfecări directe consolidat-nedrenate CU, compresibilitate in edometru în stare inundată

Pentru a determina structura rutieră existentă s-au efertuat două carotaje cu diametru $\phi$=100 mm.

Totodată s-a măsurat din nou nivelul apei din piezometrele existente şi s-au studiat lucrările anterioare.

**2.2 Metode şi utilaje folosite** Forajele s-au executat cu instalația tip FSC 2,5 în sistem de lucru uscat, probele netulburate fiind recoltate în ştuțuri cu diametru de 120 mm, iar carotele tulburate în lădițe de PVC. .

Granulometriile s-au efectuat prin metoda sedimentării (metoda areometrului).

Limitele de plasticitate s-au determinat prin metoda cilindrilor (umiditatea limită inferioară) şi cu metoda cu cupa Casagrande (umiditatea limită superioară).

Indicii rezistenței la forfecare au fost determinați prin încercări consolidat - nedrenate la viteze de 0,02 mm/min.

Încercările în edometru s-au făcut în stare inundată, în trepte, până la presiunea de 594 Kpa.

**2.3 Stratificația terenului.**

Sondajele efectuate au întâlnit o stratificație neomogenă, diferită, în funcție de zona în care au fost executate.

**Foraj E (zona cu material argilos de umplutură la suprafață )**

- 0.00-0.30 m sol vegetal;
- 0.30-1.00 m argila nisipoasă, cafeniu închis, plastic consistentă;
- 1.00-3.70 m argila prăfoasa,gălbui-roşcată cu intercalații cenuşii, plastic;consistentă (până aici materialul e amestecat,probabil alunecat);
- 3.70-4.80 m argila cenuşie-gălbuie cu intruziuni prăfoase, plastic consistentă;
- 4,80-10,20 m argila cenuşiu-deschis cu intruziuni feruginoase plastic consistentă spre plastic vârtoasă;
- 10.20-12.00 m argila prăfoasa cu filme nisipoase,negricioasa, tare.

**Foraj F** (zona de alunecare activă)

- 0.00-0.30 m sol vegetal;
- 0.30-2,00 m praf argilos, gălbui-cenuşiu, tare;
- 2.00-10.00 m praf argilos cenuşiu, tare,

*de la 6.70 m nivele grezoase, semicimentat

**Foraj G** (zona de alunecare activă)

- 0.00-0.30 sol vegetal;
- 0.30-1.00 m argila nisipoasa cu rar pietriş,cafeniu închis, plastic consistent;
- 1.00-3.00 m argila gălbuie, cu resturi vegetale;
- 3,00-4,00 m nisip prăfos gălbui-cafeniu;

- 4,00-6,80 m argilă prăfoasă cenuşie cu zone nisipoase, plastic vârtoasă;
- 6.80-9.00 m complex marnos:argila marnoasa, cenuşie ,tare intercalate cu nisip cenuşiu ,îndesat.

**FH** (zona C - cu masă alunecată cu caracteristici mecanice slabe – )

- 0.00-0.30 m sol vegetal;
- 0.30-3.60 m argila prăfoasă,cafenie,plastic vârtoasă-tare;
- 3.60-8.00 m praf argilos cenuşiu;

**Foraj I** (zona F - din interiorul curbei km 204+768)

- 0.00-0.30 m sol vegetal;
- 0.30-3,00 m argila gălbui – cenuşie cu resturi vegetale,vârtoasă;
- 3,00-7,10 argilă prăfoasa cu intercalații nisipoase, gălbui cu intercalații cenuşiii, plastic consistentă;
- 7.10-10.00 m argilă prăfoasa cu intercalații nisipoase,cenuşiu cu intercalații ruginii, tare.

## 2.4 Date hidrologice-hidrogeologice (nivelul apei subterane şi caracterul acesteia)

Apa subterană se prezintă sub două forme:

- Apa de infiltrații care se găseşte în apropierea suprafeței terenului şi are un caracter descendent cu nivel liber; la momentul efectuării studiului – aprilie 2015 a fost întâlnită la 1,50 -2,20 m adâncime în parte din amonte a amplasamentului.
- Apă captivă sub presiune, cu caracter artezian în zona F, de la km 204+500 la 204+900; Dacă la execuția forajelor adâncimea apei a fost întâlnită la circa 5-6 metri de la suprafața terenului, după o lună nivelul acesteia a crescut până aproape de suprafață, sau în cazul forajelor B şi D deasupra acesteia.

După o perioada de un an de monitorizare a piezometrelor s-a observat o modificare a adâncimii apei:

- în forajul A apa a crescut constant către suprafață

- în forajul B nu pot fi trase deocamdată concluzii ferme
- in forajul C nivelul apei a scăzut uşor pe perioada verii
- in forajul D-2 cu filtrul la -5,60 m nivelul apei a crescut către suprafață pe timpul verii, în timp ce în D-1 cu filtrul la -4,40 m nivelul apei a scăzut uşor pe timpul verii.

Aceste tendințe s-au menținut şi la nivelul anului 2015, ceea ce duce la concluzia că lucrările anterioare nu au rezolvat problema prezenței apei subterane astfel încât să nu afecteze comportarea versantului.

### 2.4.1 Caracteristici de agresivitate a apei subterane

Din datele cunoscute, apele de infiltrație din zonă nu au caracter agresiv. Pentru studiul prezent nu au putut fi colectate ape subterane.

### 2.4.2 Caracteristici de permeabilitate

Coeficientul de permeabilitate general al terenului este de $10^{-6}$ – $10^{-7}$ cm/sec.

## 2.5 Date seismice

Conform normativului P100-1/2006, privind proiectarea antiseismică a construcțiilor, amplasamentul în studiu se încadrează în zona seismică cu caracteristica ag=0,20 şi perioada de colț Tc=1,0 sec.

## 2.6 Încadrarea lucrării

| Factorul avut în vedere | Încadrare | Punctaj |
|---|---|---|
| Condiții de teren | Teren dificil | 6 |
| Apa subterană | Cu epuizmente normale | 2 |
| Clasificarea construcției după importanță | Normala | 2 |
| Vecinătăți | Fără riscuri | 1 |
| Accelerația terenului | Ag =0,2 | 1 |
| Riscul geotehnic | Moderat | 12 |

Categoria geotehnică **– 2- risc geotehnic moderat**.

# 3. CONCLUZII ŞI RECOMANDĂRI

În sectorul din DN 1 la KM 204+445 la 205+250 există mai multe fenomene legate de teren care afectează exploatarea normală a drumului național.

Stratificația sistemului rutier existent determinată în cele două sondaje este relativ generoasă, având o grosime totală 110 cm circa, din care 28-29 cm mixtura asfaltică (vezi planșa GE-04).

Amplasamentul se află într-o zonă colinară din pasul Perşani. Terenul prezintă o cădere accentuată spre Nord-vest, ci o pantă generală de 7°, însă cu o lungime foarte mare, de peste 300 metri, perpendicular pe curbele de nivel. La limita nordică amplasamentul este străbătut de o vale a unui torent, iar pe partea stângă a drumului, la km 204+900 există de asemenea un făgaş adânc săpat de torenți, ce o direcție Est-vest.

Terenul este constituit la suprafață o pătură de alterare eluvial-deluvială coezivă, de culoare gălbuie, iar roca de bază este reprezentată de un pachet de marne cenuşii-albăstrui (praf argilos – din punct de vedere granulometric) supraconsolidate.

Apa subterană se prezintă sub două forme:

- Apa de infiltrații care se găseşte în apropierea suprafeței terenului şi are un caracter descendent cu nivel liber; la momentul efectuării studiului – aprilie 2015 a fost întâlnită la 1,50 -2,20 m adâncime în parte din amonte a amplasamentului.
- Apă captivă sub presiune, cu caracter artezian în zona F, de la km 204+500 la 204+900; Dacă la execuția forajelor adâncimea apei a fost întâlnită la circa 5-6 metri de la suprafața terenului, după o lună nivelul acesteia a crescut până aproape de suprafață, sau în cazul forajelor B şi D deasupra acesteia.

Pentru o mai bună descriere a fenomenului am delimitat în amplasamentul studiat mai multe zone (vezi planul de zonare „geotehnică”- denumire improprie pe care ne-o asumăm totuşi):

<u>Zona A, -în exteriorul curbei spre dreapta, de la km 204+580 la 204+820, care se doreşte a fi extinsă prin mărirea razei</u>

Terenul de la suprafață are caracteristici mecanice, respectiv compresibilitate foarte redusă. Presupunem că, deşi aparent are acelaşi aspect cu depozitele superficiale din zonă, materialul de aici a fost adus şi depozitat ca urmare a lucrărilor efectuate de-a lungul timpului la execuția drumului.

Pentru modificarea traseului recomandăm excavarea terenului de la suprafață pe o adâncime de la 2 la maxim 3 metri spre exteriorul curbei şi completarea cu un pământ armat cu geogrile. Taluzul astfel creat se va executa în strate elementare de maxim 50 de centimetri grosime şi va fi umplut cu material granular cu sortul maxim 0-63. Se vor avea în vedere prevederile GP 93 din 2006.

Zona B nu pune probleme pentru moment traficului fiind ranforsată cu elemente de sprijin suficiente.

În zona C (km 205+126 – 205+220 dreapta) datorită diferenței mari de cotă dintre carosabil şi piciorul taluzului, terenul a cedat, în asfalt fiind vizibilă o crăpătură semicirculară şi o tasare a materialului din interiorul său.

Fenomenul poate fi datorat eroziunii din aval care a lipsit de sprijinul necesar taluzul creat artificial, şi care nu a fost sprijinit în nici un fel. Astfel la un unghi de taluz de cca. 20° se poate adăuga în mod virtual înălțime unei prisme echivalente de 1,50 m înălțime datorată suprasarcinii provenite din trafic.

Este necesar ca urmare protejarea taluzului fie printr-o sprijinire cu pământ armat, fie printr-un zid de sprijin la care vor fi luate în calcul următoarele caracteristici:

Unghiul de frecare internă (rezidual) $\phi$=6°;

Coeziunea rezidual㠠c = 10 Kpa;

Greutatea volumică $\gamma$ = 20,20 KN/m$^3$.

Adâncimea de fundare va fi de minim 1,20 metri şi se va lua în calcul o presiune convențională de 240 Kpa.

În zona D (km 205+100 - 205+160) o alunecare activă face ca de mai multe zeci de ani să fie necesară repararea drumului datorită deformării sale lente. Rata deplasărilor variază în funcție de anotimp cu până la maxim 2 mm/lună.

Terenul de la suprafață este reprezentat de o masă alunecată, în curs de stabilizare sau, cu alte cuvinte, parțial stabilizată. Presupunem că fenomenul de alunecare s-a produs cu un oarecare timp geologic în urmă, masa alunecată şi-a refăcut geometria în aşa fel încât să ajungă în stare de echilibru, însă factorii favorizanți acționează în continuare. Ca urmare procesul de destabilizare este în dinamică, ciclic: rearanjare a

maselor – destabilizare. Acest ciclu trebuie întrerupt, chiar dacă virtual, conform calculelor există o rezervă de stabilitate.

Considerăm că fenomenul se datorează, pe lângă bineînțeles gravitației, următorilor factori:

- Eroziunii pe care o produce în mod continuu torentul de la piciorul versantului;
- Prezența apei subterane sub presiune, care favorizează alunecarea prin reducerea caracteristicilor mecanice, în special a unghiului de frecare internă a terenului şi prin subpresiunea care acționează pe planul de alunecare;
- Natura terenului - respectiv a complexului argilos-prăfos de culoare gălbuie de la suprafață cu o consistență mult mai redusă şi care contrastează puternic cu cea a rocii de bază. Acest contrast care presupune diferențe între permeabilități, rigidități şi rezistente la forfecare, a dus în zona de contact pătură de alterare-roca de bază la crearea unei zone cu exces de umiditate care a activat potențialul de alunecare.
- Roca de bază, marna – denumire care are doar o semnificație petrografică, fiind un amestec continuu de argilă şi carbonați, din punct de vedere geotehnic fiind un praf argilos plastic, tare – prezintă evidente caracteristici ale unui pământ supraconsolidat. Aspectul ei este şistos, cu oglinzi de fricțiune la o distanță de 2-3 mm una de alta. Testele cu acid clorhidric au arătat o creştere a conținutului de carbonați pe măsură ce creşte adâncimea. Prezența carbonaților sete de natură a submina rezistența rocii, un factor ce se poate adăuga la ceilalți favorizanți ai alunecării.

Măsurătorile de înclinometrie au evidențiat prezența planului (deşi probabil nu este vorba de un singur plan, ci probabil de un orizont cu o grosime de peste un metru) în aval de drum la cca. 10 metri de carosabil la o adâncime de 9 metri (înclinometru 3),

Cu ocazia prezentei lucrări s-a putut observa mai bine forma alunecării vezi planul de situație), respectiv fața de desprindere a masei alunecate, vegetația fiind arsă.

S-a efectuat calcul al stabilității versantului pornind de la următoarele ipoteze:

- Alunecarea este deja produsă;
- Pe planul de alunecare rezistența la forfecare este redusă şi astfel s-au luat în calcul parametrii rezultați direct din încercările din forajul F (executat în

masa alunecată) care s-au coroborat cu celelalte încercări efectuate probabil pe terenul nederanjat, însă ca rezistență reziduală, cu 1/3 din valorile inițiale (unghiul de frecare internă (rezidual) $\phi$=6°; coeziunea reziduală c = 10 Kpa);

- Devierea reacțiunii pe planul de alunecare de la normală este de 5,4°;
- Greutatea volumică a masei alunecate, în condițiile cele mai defavorabile, este de 20,2 KN/m$^3$ ($X_M$=19,97; s=0,327; $V_x$=0,016, k=0,82 – vezi NP 122);
- A rezultat o rezervă de stabilitate de 1168 KN;
- Nu s-a luat în calcul suprasarcina dată de trafic si presiunea apei din pori.

Dată fiind valoare mare a forței necesare pentru stabilizarea fenomenului credem că problema nu poate fi rezolvată doar abordând efectele deplasării terenului, ci eliminând în primul rând unele cauze amintite mai sus.

Eroziunea produsă de torentul de la piciorul versantului poate fi redusă prin lucrări de amenajare a torentelor. De aceea propunem crearea unor praguri care să reducă pe de-o parte puterea de transport a viiturilor, iar pe de altă parte prin colmatarea cu material va fi adusă o masă care va reprezenta un aport la momentul de stabilitate a versantului.

Apa subterană trebuie eliminată de pe planul de alunecare. Dată fiind adâncimea relativ mare a planului, precum şi faptul că este sub presiune, propunem realizarea unor drenuri cu ajutorul unor foraje înclinate (orizontale) în spic pe toată suprafața masei alunecate care să urmărească planul de alunecare (vezi planul de situație cu propunerile).

Pentru o drenare mai rapidă şi eficientă capetele din amonte ale drenurilor pot fi conectate la coloane de balast executate prin forare verticală. Pentru dimensionarea sistemului de asecare se va avea în vedere coeficientul de permeabilitate redus al terenului, de $10^{-6}$-$10^{-7}$ cm/sec. Acest lucru înseamnă apa are nevoie de circa şase luni că pentru a parcurge o distanță de 20 metri între drenuri. Se va avea în vedere faptul că rata de deformare a terenului de 2 mm/lună, care ar putea afecta integritatea drenurilor.

Recomandăm de asemenea reactivarea şi îngrădirea plantației de pomi care a fost inițiată în urmă cu cinci ani, care are menirea pe de o parte de a reduce umiditatea de la suprafață a terenului, iar pe de altă parte aceea de a reține şi împiedica infiltrarea apelor de precipitații. Menționăm că deşi s-au plantat pomi conform unui studiu bine fundamentat, aceştia nu s-au putut dezvolta datorită faptului că în fiecare an localnicii dau foc păşunii pentru a o elibera de resturi vegetale.

Stabilitatea generala mai poate fi îmbunatatita prin executia unui sir de coloane forate cu tubaj metalic definitiv în zona de la km 205+100 la 205+160. Coloanele vor trebui dimensionate astfel încât sa preia împingerea dintre fâsiile 4-5 (vezi plansa GE-02) respectiv 250 KN (plus suprasarcina data de trafic de 25 KN). În acest caz pentru terenul stabil – marna - se vor lua în consideratie urmatoarele valori caracteristice:

Unghiul de frecare interna (rezidual) $\phi_{rez}$=16°;

Coeziunea reziduala $c_{rez}$ = 84 Kpa;

Greutatea volumica $\gamma$ = 20 KN/m$^3$.

ÎNTOCMIT,

Ing. geol. Medesan Onica

SOCIETATEA COMERCIALA GLOB CONSULT INTERNAȚIONAL SRL BRAŞOV ROMANIA

*Brasov*
*Aprilie 2015*

# Plan pozitionare foraje

## DN 1 KM 204

scara 1:1000

Foraj E

| | ϕ | c | |
|---|---|---|---|
| | 15.5 | 46.1 | 2,0–2.3 |
| | 16 | 39 | 4.0–4.3 |
| | 15.4 | 72.3 | 8,0–8.3 |

Foraj H ϕ c
27.3 116.9
6.2 131.7

Foraj G ϕ c
23.5 41.9
17 22

Foraj F
27.3 116.9
6.2 131.7

Foraj I
8.0 74.9
20 21

I S L A Z

D N 1 (a s f a l t)

Profil Piezometru

Profil Inclinometru

profil geotehnic

linie de despământare

alunecare

Fagaras

propus

dren adânc
de minim 6,0m

hm7 hm8 hm9 hm1 hm2

B1 B2 B3

D D1 D2

km 205

Brasov

Tabel caracteristic pentru Piezometrul B

| Piezom | Adancime filtru | Cota |
|---|---|---|
| B | – | 599.46 |
| B 1 | 8.30–9 m | 600.25 |
| B 2 | 6.30–6 m | 599.84 |
| B 3 | 2.30–3 m | 599.76 |

Tabel caracteristic pentru Piezometrul D

| Piezom | Adancime filtru(m) | Cota |
|---|---|---|
| D | – | 572.85 |
| D 1 | 3.70–4.40 | 573.71 |
| D 2 | 4.90–5.60 | 573.53 |

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| | | | |
|---|---|---|---|
| proiect: Consolidare DN1 km 204 | | beneficiar: NV Construct | contr. nr. 4/2015 |
| proiectat: Mantulescu Marius | scara 1:1000 | plansa: Plan de situatie si foraje geo | faza: st. geo |
| | data 23.04.15 | | nr. planse: GE–01 |

# Zonare geotehnica si propuneri

## DN 1 KM 204

scara 1:1000

Foraj E

| | ϕ | c | |
|---|---|---|---|
| | 15.5° | 46.1 | 2,0–2.3 |
| | 16° | 39 | 4.0–4.3 |
| | 15.4° | 72.3 | 8,0–8.3 |

A – zona cu material argilos de umplutura la suprafata, cu car. mecanice slabe

B – zona de eroziune de suprafată accentuată

C–zona cu masa alunecata cu caracteristici mecanice slabe

D– zona de alunecare activă

E–zona de eroziune de suprafată accentuată

F – apa subterana cu nivel piezometric care depaseste suprafata terenului

zid de sprijin propus

dren adânc de minim 6,0m

Zid de gabioane

Zid de gabioane

Foraj H

Foraj G

Foraj F

Foraj I

Profil Piezometru

Profil Inclinometru

dren cu adancimea de la 5 la 9 metri de la cota terenului

dren cu adancimea de 5 - 7 metri de la cota terenului

dren cu adancimea (foraj orizontal)

alunecare

linie de despindere

hm1

hm2

hm7

hm8

hm9

km 205

DN 1 (asfalt)

Brasov

Fagaras

Tabel caracteristic pentru Piezometrul B

| Piezom | Adancime filtru | Cota |
|---|---|---|
| B | – | 599.46 |
| B 1 | 8.30–9 m | 600.25 |
| B 2 | 6.30–6 m | 599.84 |
| B 3 | 2.30–3 m | 599.76 |

Tabel caracteristic pentru Piezometrul D

| Piezom | Adancime filtru(m) | Cota |
|---|---|---|
| D | – | 572.85 |
| D 1 | 3.70–4.40 | 573.71 |
| D 2 | 4.90–5.60 | 573.53 |

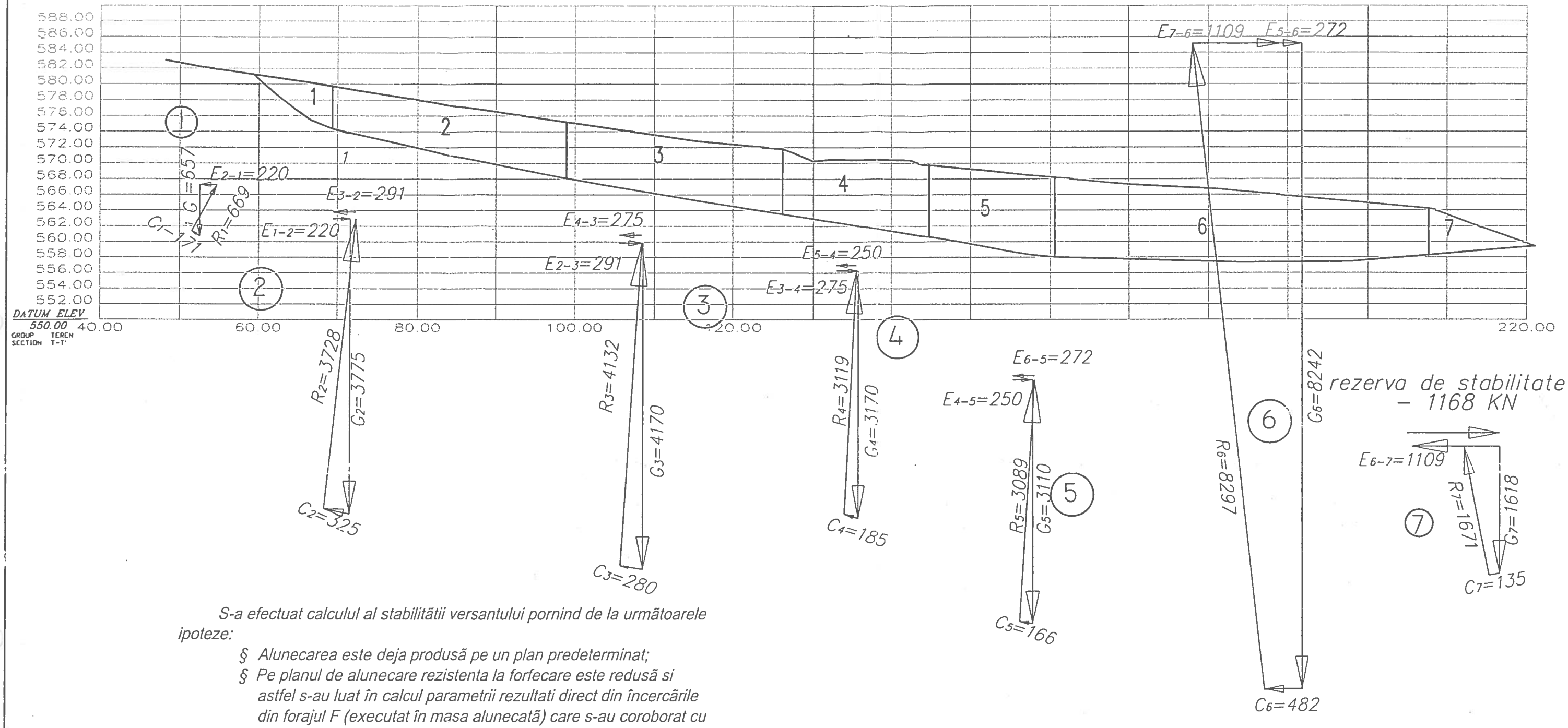
## Legenda

- Inclinometru
- Piezometru
- Capac dren
- Borne km, hm
- Foraj F — Foroje geotehnice

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| | | | |
|---|---|---|---|
| proiect: Consolidare DN1 km 204 | | beneficiar: NV Construct | contr. nr. 4/2015 |
| proiectat: Mantulescu Marius | scara: 1:1000 | plansa: ZONARE GEOTEHNICA SI PROPUNERI | faza: st geo |
| | data: 23.04.15 | | nr. plansa: GE 02 |




*S-a efectuat calculul al stabilitãtii versantului pornind de la urmãtoarele ipoteze:*

- *§ Alunecarea este deja produsã pe un plan predeterminat;*
- *§ Pe planul de alunecare rezistenta la forfecare este redusã si astfel s-au luat în calcul parametrii rezultati direct din încercãrile din forajul F (executat în masa alunecatã) care s-au coroborat cu celelalte încercãri efectuate probabil pe terenul nederanjat, însã ca rezistentã rezidualã, cu 1/3 din valorile initiale (unghiul de frecare internã rezidual $\varphi$=6°; coeziunea rezidualã c = 10 Kpa);*
- *§ Devierea reacțiunii pe planul de alunecare de la normalã este de 6 °;*
- *§ Greutatea volumicã a masei alunecate, în condițiile cele mai defavorabile, este de 20,2 KN/m3 (XM=19,97; s=0,327; Vx=0,016, k=0,82 - vezi NP 122);*
- *§ A rezultat o rezerva de stabilitate important de 1168 KN;*
- *§ Nu s-a luat în calcul suprasarcina datã de trafic si presiunea apei din pori .*
- *§ Valorile sunt exprimate in KN*

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| | | | |
|---|---|---|---|
| proiect: Consolidare DN1 km 204 | | beneficiar: NV Construct | contr. nr. 4/2015 |
| proiectat: Mantulescu Marius | scara: 1:1000 | planșa: CALCULUL STABILITATII VERSANTULUI | faza: st. geo |
| | data: 23.04.15 | | nr. planșa: GE 03 |

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Braşov, str. Iuliu Maniu nr.47, tel-fax: 0268-417631, tel: 0745 082356, site: www.globconsult.ro, e-mail: office@globconsult.ro

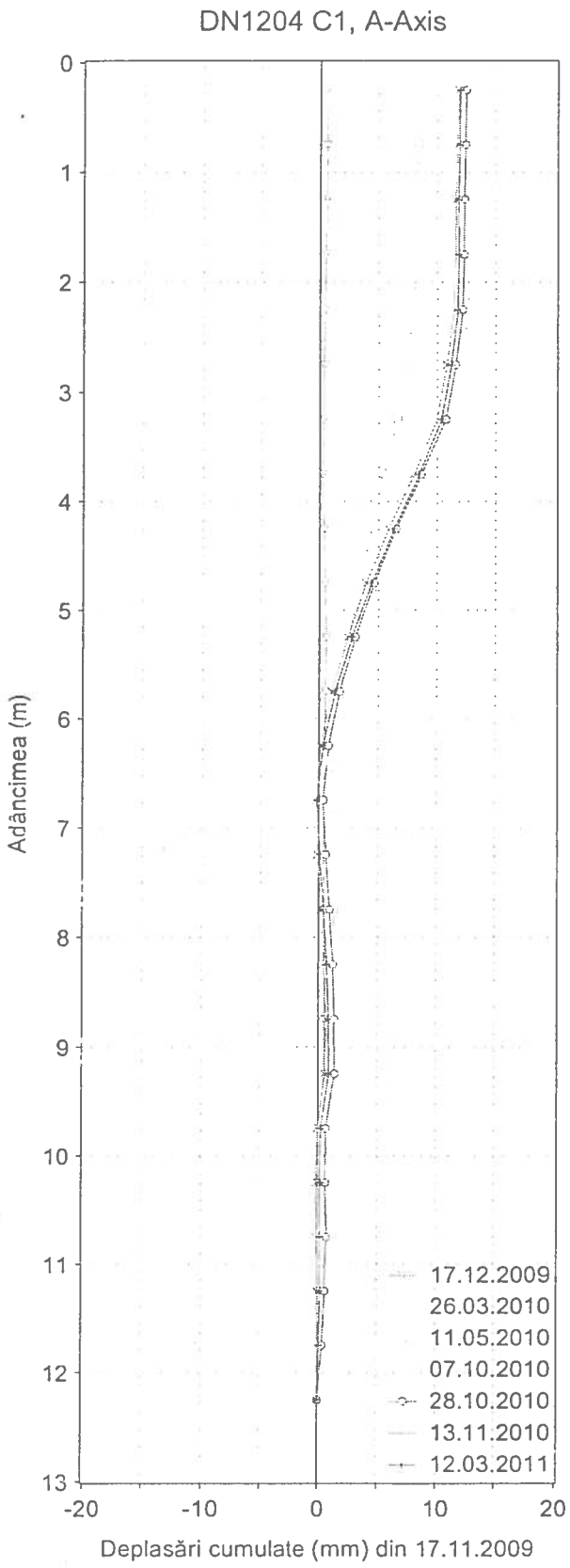
# TABEL CITIRE PIEZOMETRE

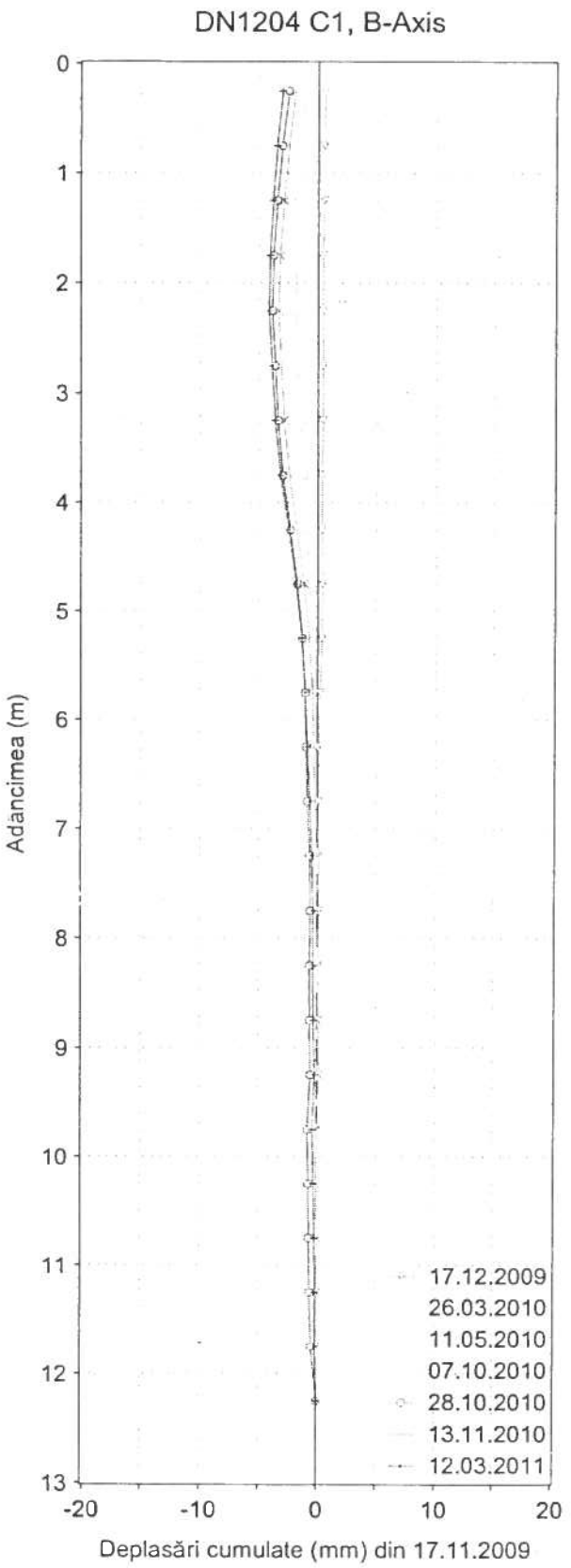
| Foraj / Data | A ad. filtr(-10.1m) z=613.08 | | B 1 ad. filtr(-8.60m) z=600.25 | | B 2 ad. filtr(-5.80m) z=599.84 | | B 3 ad. filtr(-3.90m) z=599.76 | | C ad. filtr(-10.9m) z=582.23 | | D 1 ad. filtr(-4.40m) z=573.71 | | D 2 ad. filtr(-5.60m) z=573.53 | | Inclinometru 3 ad. filtr(-12m) z=568.46 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | cota absoluta | adîncimea | cota absoluta | adîncimea | cota absoluta | adîncimea | cota absoluta | adîncimea | cota absoluta | adîncimea | cota absoluta | adîncimea | cota absoluta | adîncimea | cota absoluta | adîncimea |
| 17.11.2009 | 610.15 | 2.93 | - | - | - | - | - | - | 580.43 | -1.80 | - | - | - | - | - | - |
| 26.11.2009 | 610.18 | -2.90 | 600.25 | 0 | 595.14 | -4.70 | 596.76 | -3.00 | 580.53 | -1.70 | 573.41 | -0.30 | 572.23 | -1.30 | - | - |
| 01.12.2009 | 610.03 | -3.05 | 600.76 | 0.51 | 599.19 | -0.65 | 598.07 | -1.69 | 580.73 | -1.50 | 573.49 | -0.22 | 573.14 | -0.39 | - | - |
| 10.12.2009 | 609.98 | -3.10 | 600.77 | 0.52 | 599.69 | -0.15 | 597.94 | -1.82 | 580.65 | -1.58 | 573.15 | -0.56 | 573.18 | -0.35 | - | - |
| 17.12.2009 | 609.95 | -3.13 | înghețat | înghețat | înghețat | înghețat | 599.16 | -0.60 | 580.68 | -1.55 | 573.07 | -0.64 | 573.15 | -0.38 | 564.93 | -3.53 |
| 04.03.2010 | 609.92 | -3.16 | 600.25 | 0 | - | - | 599.25 | -0.51 | 580.9 | -1.33 | 573.13 | -0.58 | 573.12 | -0.41 | - | - |
| 26.03.2010 | 610.14 | -2.94 | 600.25 | 0 | - | - | 599.21 | -0.55 | 580.98 | -1.25 | 573.17 | -0.54 | 573.12 | -0.41 | - | - |

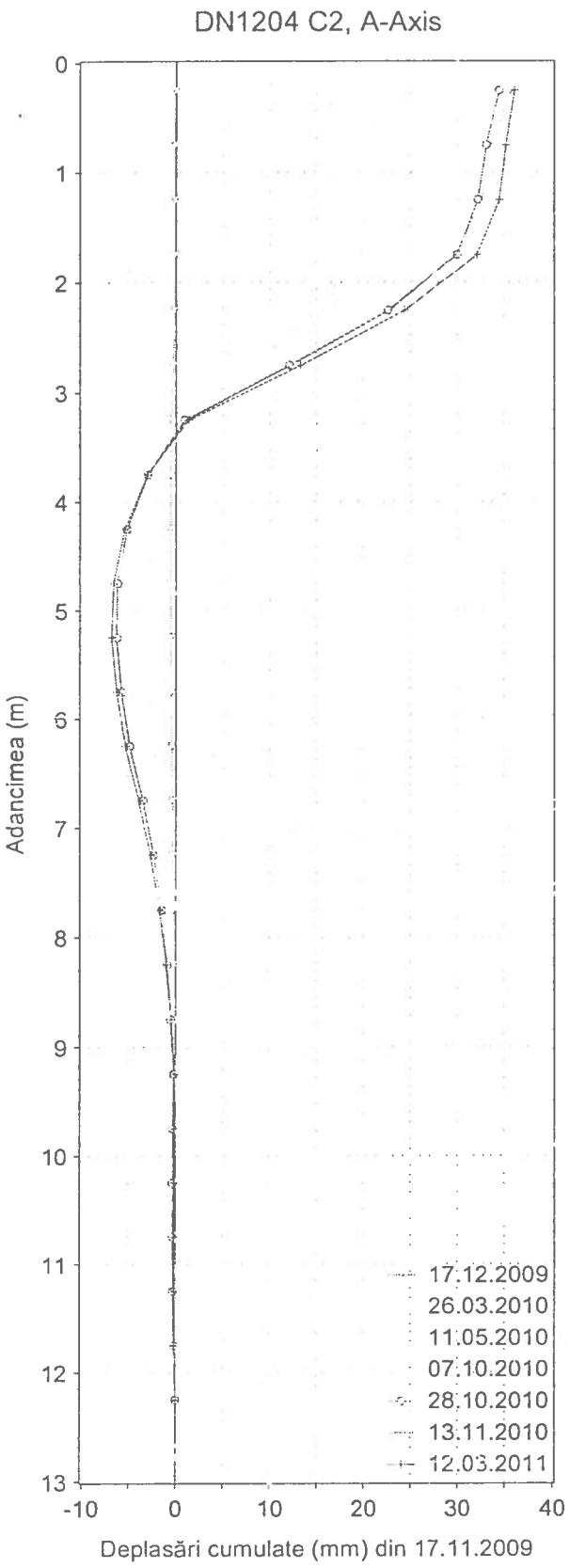
Verificat: dr.ing. Mantulescu Marius

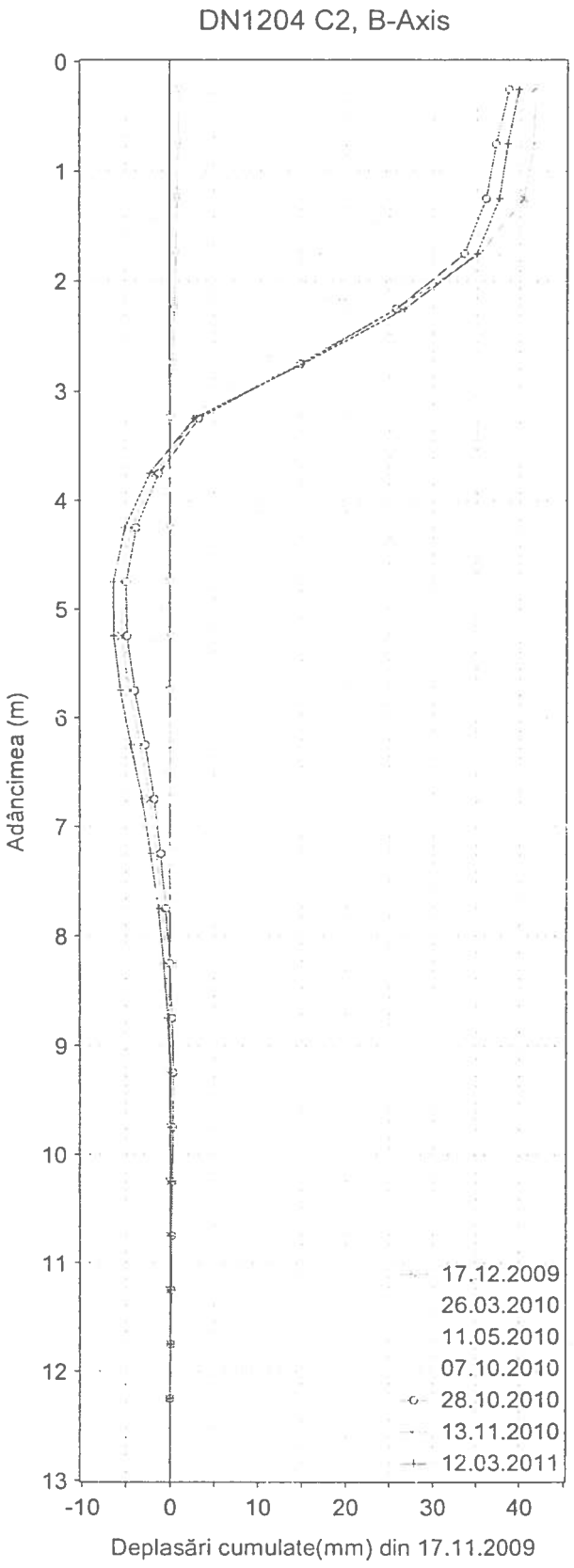
SOCIETATEA COMERCIALĂ GLOB CONSULT INTERNAȚIONAL SRL BRAȘOV ROMÂNIA

Intocmit: ing. Cirlig Alexandru

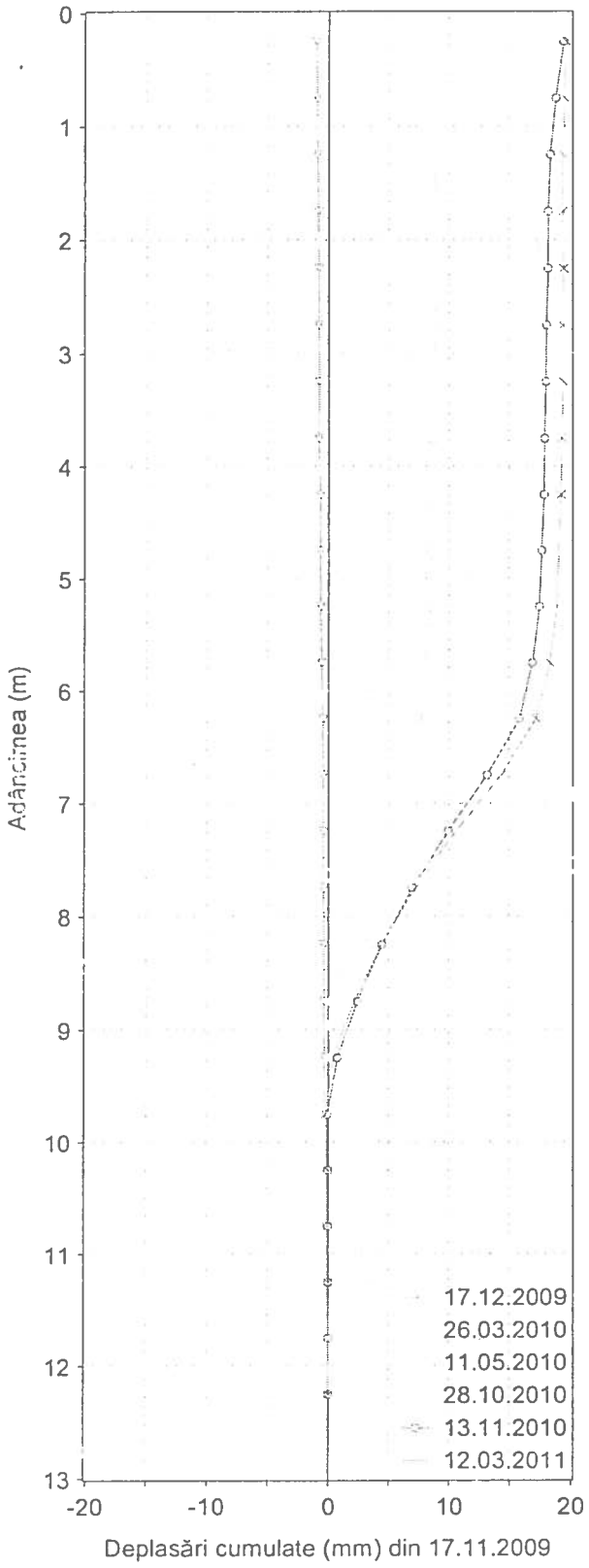

DN1204 C1, A-Axis
Adâncimea (m)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
-20
-10
0
10
20
Deplasări cumulate (mm) din 17.11.2009
17.12.2009
26.03.2010
11.05.2010
07.10.2010
28.10.2010
13.11.2010
12.03.2011


DN1204 C1, B-Axis
Adâncimea (m)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
-20
-10
0
10
20
Deplasări cumulate (mm) din 17.11.2009
17.12.2009
26.03.2010
11.05.2010
07.10.2010
28.10.2010
13.11.2010
12.03.2011

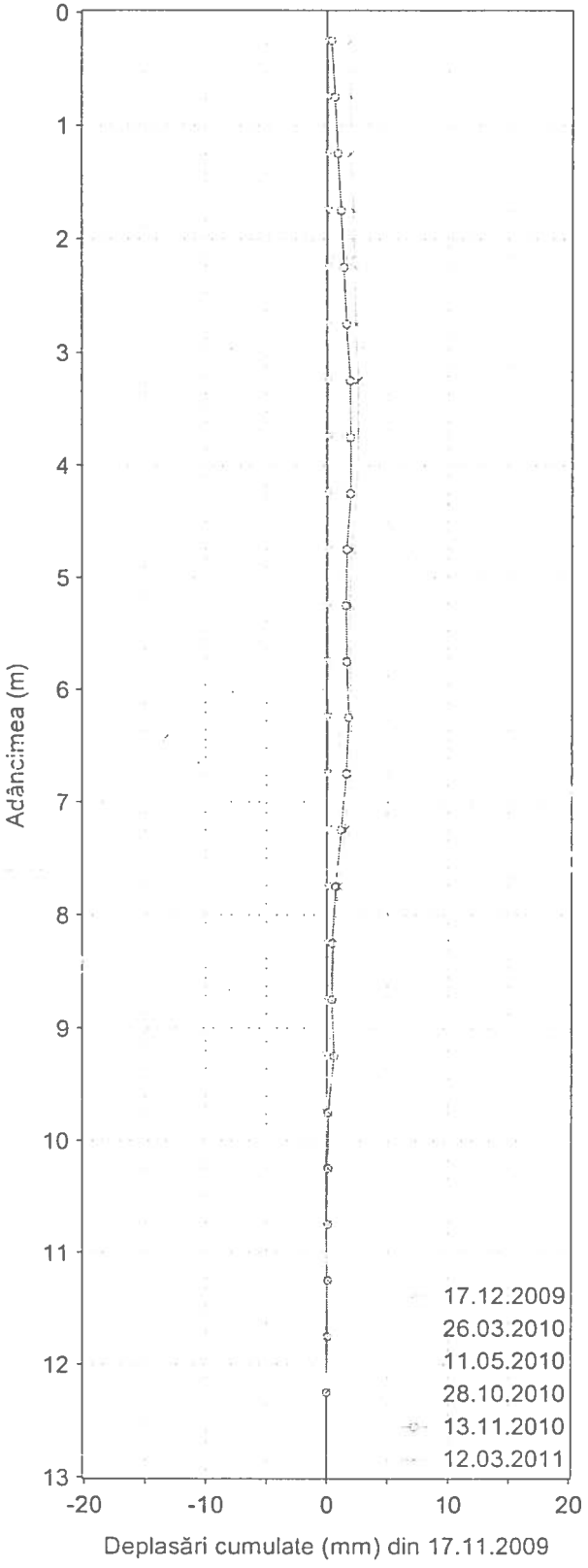

DN1204 C2, A-Axis
Adancimea (m)
Deplasări cumulate (mm) din 17.11.2009
17.12.2009
26.03.2010
11.05.2010
07.10.2010
28.10.2010
13.11.2010
12.03.2011


DN1204 C2, B-Axis
Adâncimea (m)
Deplasări cumulate(mm) din 17.11.2009
17.12.2009
26.03.2010
11.05.2010
07.10.2010
28.10.2010
13.11.2010
12.03.2011

DN1204 C3, A-Axis




DN1204 C3, B-Axis



# CENTRALIZATOR

REZULTATELE INCERCARILOR DE LABORATOR

Lucrarea: Consolidare DN 1, km 204-205

| FORAJUL | cota apei | stratificatia | Denumirea stratelor | Proba Nr. si felul | Proba cota | Granulozitatea Bolovanis >20 % | Pietris 0-2 % | Nisip 2-0.05 % | Praf 0.5-0.02 % | Argila <0.02 % | U= $U_A$ | Wf — W/Ip — Wc (10 20 30 40 50 60 70 80 90) % | Consistenta Curgator 0.33 | Moale 0.5 | Consistent 0.75 | Vartos 1.0 | Tare | Greutatea volumica aparenta $\gamma$ | Porozitate n % | Indice pori e | Gradul de umiditate $S_r$ | Greut. volumica uscata $\gamma_d$ | Compresibilitate M E | tasare $M_{2-3}$ | tasare $\varepsilon_2$ % | Permeabilitatea K | Forfecare unghiul de frecare $\phi$ 0 | Forfecare coeziunea C KPa | Granulozitatea Presiune umflare $P_u$ | Limita contractie $W_s$ % | contractie volumica $C_v$ % | Umflare libera $U_l$ % | SPT COTA | SPT PENETRARE DINAMICA STANDARD (STP) | OBSERVATII |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FORAJ E | NI-1.5 | | argila prafoasa galbui roscata cu intruziuni cenusii | 2 | 2,0-2,3 | | 7.8 | 50.4 | 41.7 | 9.4 | 22.6 | 30.2 / 21.8 — 44.4 | | | | | 0.65 | 18.7 | 49.5 | 0.98 | 0.99 | 13.7 | | | | | 15.5 | 46.1 | | | | | | | |
| | 2.80 | | argila cenusie- galbuie cu intruziuni prafoase, plastic vartoasa | 3 | 4.0-4.3 | 1 | 7 | 44 | 48 | 9.4 | | 25.8 | | | | | | 19.7 | 41.4 | 0.7 | 0.99 | 15.6 | | 15200 | 3.06 | | 16 | 39 | x | | | | | | |
| | NA-6.70 | | argila cenusiu deschis cu intruziuni feruginoase | 8 | 8,0-8,3 | 7 | 10.3 | 56.6 | 25.4 | 16.2 | 25 | 20.2 / 21.9 — 47 | | | | | 1.2 | 20.9 | 36.1 | 0.57 | 0.97 | 17.4 | | | | | 15.4 | 72.3 | | | | | | | |
| FORAJ F | 2.20 | | praf argilos galbui-cenusiu tare | 3 | 2,0-2,3 | | 3.5 | 71.1 | 25.4 | 12.4 | 24 | 21.9 / 19.8 — 44 | | | | | 1.1 | 20.5 | 34.9 | 0.53 | 0.9 | 17.4 | | | | | 27.3 | 116.9 | | | | | | | |
| | NA-6.50 | | praf argilos cenusiu, tare | 5 | 4,0-4,3 | | 9.4 | 66.1 | 24.5 | | 22.5 | 12.3 / 21.3 — 43.8 | | | | | 1.5 | 20.1 | 35.1 | 0.54 | 0.8 | 17.3 | | | | | 6.2 | 131.7 | | | | | | | |
| FORAJ G | NI-2.7 | | argila galbuie cu resturi vegetale | 2 | 2,0-2,3 | | 1.6 | 38.8 | 59.5 | 3.42 | 27.5 | 38.9 / 49 — 76.5 | | | | | 0.77 | 19.5 | 4( | 0.81 | 1.0 | 15.0 | | | | | 8.0 | 74.9 | | | | | | | |
| | 2.7 | | nisip prafos galbui-cafeniu | 3 | 3,0-3,3 | 3.2 | 49 | 32 | 14 | 64.08 | 13.4 | 21.3 / 13.0 — 27.3 | | | | | 0.8 | | | | | | | | | | 23.5 | 41.9 | | | | | | | |
| | NA-6.50 | | argila prafoasa cenusie cu zone nisipoase, plastic vartoasa | 4 | 4.0-4.3 | 0 | 4 | 62 | 34 | | | 25.5 | | | | | | 19.7 | 41.1 | 0.7 | 0.99 | 15.6 | | 12600 | 2.0 | | 20 | 21 | x | | | | | | |
| FORAJ H | | | argila prafoasa galbuie | 2 | 2,0-2,3 | 1 | 13.9 | 51.4 | 34.5 | 11.9 | 22.8 | 28.5 / 30.9 — 53.7 | | | | | 0.8 | 19.9 | 41.2 | 0.7 | 1.0 | 15.7 | | 15384 x | | | 23.5 | 41.9 | | | | | | | |
| | | | argila prafoasa, cafenie, plastic vartoasa-tare | 3 | 3.7-4.0 | 0 | 4 | 64 | 32 | | | 19.3 | | | | | | 19.9 | 37.1 | 0.6 | 0.88 | 16.6 | | 20500 | 2.46 | | 17 | 22 | x | | | | | | |
| | | | praf argilos cenusiu | 8 | 8,0-8,3 | | 5.9 | 72.5 | 21 | 12.3 | 22.2 | 12.5 / 18.5 — 40.7 | | | | | 1.5 | 20.0 | 41.1 | 0.7 | 1.0 | 15.7 | | | | | | | | | | | | | |
| FORAJ I | 2.10 | | argila galbui-cenusie cu resturi vegetale, vartoasa | 2 | 2,0-2,3 | 1 | 14 | 51 | 35 | 11 | 23.2 | 26.2 / 35.1 — 58.3 | | | | | 0.91 | 20.1 | 41.3 | 0.7 | 1.0 | 15.0 | | 10101 x | | | 11.1 | 75.8 | | | | | | | |
| | NA-4.50 | | argila prafoasa, galbuie-cenusie cu zone nisipoase, plastic vartoasa | 4 | 4.0-4.3 | 2 | 8 | 52 | 28 | | | 21.9 | | | | | | 19.9 | 38.3 | 0.6 | 0.95 | 16.3 | | 14200 | 2.83 | | 15 | 22 | x | | | | | | |
| | | | argila cenusie tare | 8 | 7.8-8.0 | | 8 | 59.5 | 32.5 | 11.8 | 20.1 | 20.7 / 23.7 — 43.8 | | | | | 0.97 | 20.5 | 37 | 0.59 | 1.0 | 16.8 | | 13513 | | | 9.3 | 113.9 | | | | | | | |
| | | | praf argilos cenusiu, plastic tare | 10 | 10 10.3 | | 5.9 | 75.7 | 18.4 | 12.2 | 20.6 | 12.7 / 21.7 — 42.3 | | | | | 1.36 | | | | | | | | | | | | | | | | | | |

x- proba inundata

SOCIETATEA COMERCIALA GLOB CONSULT INTERNATIONAL SRL BUCURESTI ROMANIA

LABORATORUL GEOTEHNIC

# ANALIZA GRANULOMETRICĂ

CERNERE

Consolidare DN1 – Vladeni

RAPORT NR.71.g/28.04.2015

foraj: FE
proba: 2
cota: 2.00–2.30 m
data: 2015-27-4

| ϕ | m | % | %cuml |
|---|---|---|---|
| 20 | | 0.00 | 100.00 |
| 10 | | 0.00 | 100.00 |
| 5 | | 0.00 | 100.00 |
| 2 | | 0.00 | 100.00 |
| 1 | 0.02 | 0.04 | 99.96 |
| 0.5 | 0.08 | 0.16 | 99.80 |
| 0.25 | 0.13 | 0.26 | 99.54 |
| 0.1 | 0.74 | 1.48 | 98.06 |
| 0.063 | 1.73 | 3.46 | 94.60 |
| rest | 0.01 | | |
| suma | 2.70 | | |
| pierderi | 47.29 | | |

SEDIMENTARE

| ore citirii | Timpul cuml. | Temperatura | Citirea pe areometru |
|---|---|---|---|
| | 30'' | 20 | 27.5 |
| | 1' | | 27 |
| | 2' | | 26.5 |
| | 4' | | 25 |
| | 10' | | 23.5 |
| | 15' | | 22.25 |
| | 30' | | 20.75 |
| | 1h | | 19 |
| | 2h | | 17.5 |
| | 4h | | 15.5 |
| | 8h | | 14 |
| | 12h | | 13 |
| | 20h | | 12 |

Greutatea probei : 50 g
nr.capsulă 4

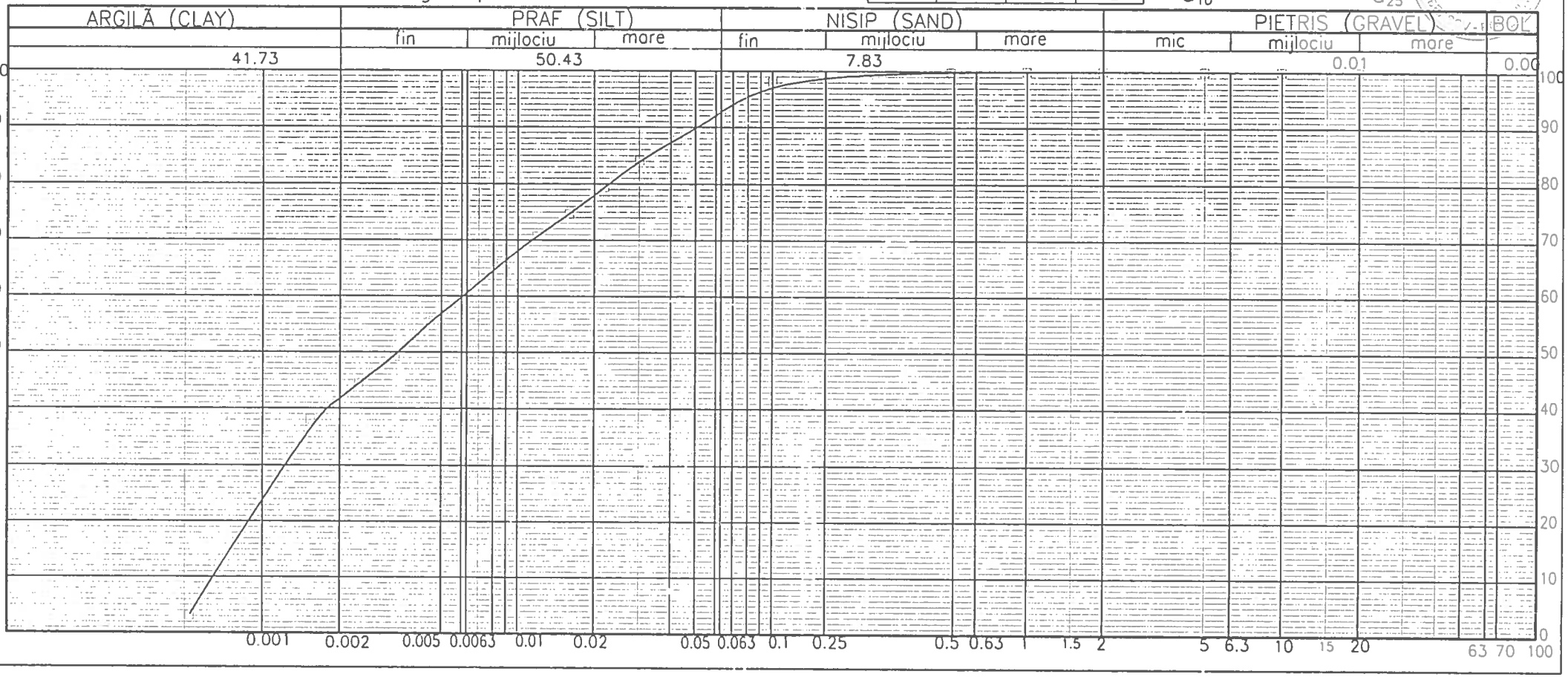
operator: ing. Lixandroiu

sef laborator: dr.ing. Marius Mantulescu

LABORATORUL GEOTEHNIC TRANSILV.

$U = \frac{d_{60}}{d_{10}} = 9.40$ $Cd = \frac{d_{75}}{d_{25}} = 15.62$

DENUMIREA MATERIALULUI argila prafoasa



S.C. GEO-TECH SRL GHEORGHENI
LABORATOR GEOTEHNIC DE GRAD II
Autorizatie Nr. 2657 Data: 20.12.2012
Gheorgheni str.Carierei nr. 6 jud.Harghita-RO

Foraj nr./ Boring no: **FE**
Proba nr / Sample no.: **P1**
Adâncime/ Depth: **4.00-4.3 m**

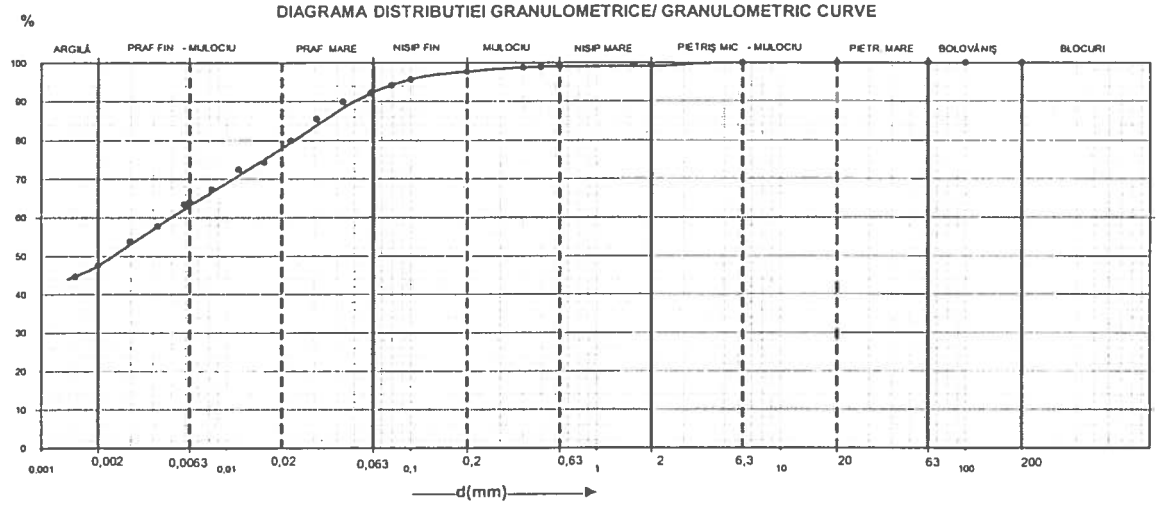
**CONSOLIDARE DN1**

## BULETIN DE ANALIZĂ nr./ ANALYSIS REPORT no. L.1209 .grP1 / 17.04.2015

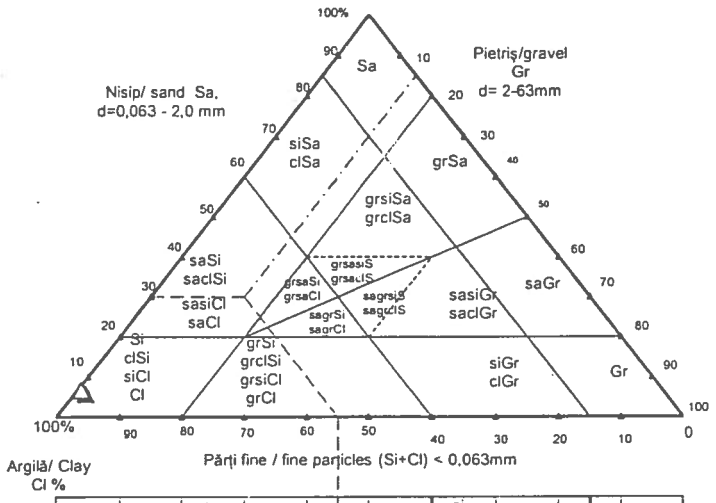
Determinarea granulozităţii prin metoda cernerii şi sedimentării conform STAS 1913/5-85 ;

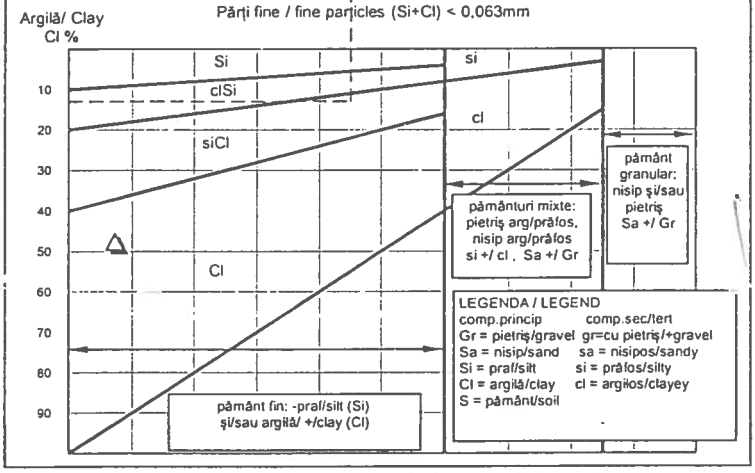
Particle size analysis of soil by sieving and sedimentation according to STAS 1913/5-85 ;

**DIAGRAMA DISTRIBUTIEI GRANULOMETRICE/ GRANULOMETRIC CURVE**




**Clasificarea pământului / classification of soil**
**(% Cl+Si, Sa, Gr)**
SR EN ISO 14688-2:2005




Clasificarea pământului conform
SR EN ISO 14688-2:2005

| d mm | tip păm./ soil's type | | % | % |
|---|---|---|---|---|
| d≤0,002 | argilă/ clay | | 47,6 | 48,0 |
| 0,002 < d < 0,0063 | praf / silt | fin/ fine | 16,5 | 44,0 |
| 0,0063< d < 0,02 | | mijlociu/ medium | 13,8 | |
| 0,02< d < 0,063 | | mare/ coarse | 14,9 | |
| 0,063< d < 0,2 | nisip/ sand | fin/ fine | 4,9 | 7,0 |
| 0,2 < d < 0,63 | | mijlociu/ medium | 1,4 | |
| 0,63< d < 2,0 | | mare/ coarse | 0,4 | |
| 2,0 < d <6,3 | pietriş/ gravel | mic/ small | 0,5 | 1,0 |
| 6,3 < d <20 | | mijlociu / | 0,0 | |
| 20< d <63,0 | | mare/ coarse | 0,0 | |
| 63,0 < d < 200,0 | bolovăniş/ cobbles | | 0,0 | 0,0 |
| d > 200,0 | blocuri/ boulder | | 0,0 | 0,0 |
| | | | total | 100,0 |

Descrierea probei / Sample description:
**Argilă cenuşie-gălbuie cu intercalaţii prăfoase-fin nisipoase, plastic vârtoasă**

Întocmit:
ing.geol. Török Tiberiu

LABORATORUL GEOTEHNIC

# ANALIZA GRANULOMETRICĂ

CERNERE

| ϕ | m | % | %cuml |
|---|---|---|---|
| 20 | | 0.00 | 100.00 |
| 10 | | 0.00 | 100.00 |
| 5 | | 0.00 | 100.00 |
| 2 | 4.11 | 8.22 | 91.78 |
| 1 | 1.58 | 3.16 | 88.62 |
| 0.5 | 0.99 | 1.98 | 86.64 |
| 0.25 | 0.58 | 1.16 | 85.48 |
| 0.1 | 0.68 | 1.36 | 84.12 |
| 0.063 | 1.29 | 2.58 | 81.54 |
| rest | 0.01 | | |
| suma | 9.23 | | |
| pierderi | | | |

SEDIMENTARE

| ore citirii | Timpul cuml. | Temperatura | Citirea pe areometru |
|---|---|---|---|
| | 30" | 20 | 26 |
| | 1' | | 25 |
| | 2' | | 24 |
| | 4' | | 22.5 |
| | 10' | | 20 |
| | 15' | | 19 |
| | 30' | | 17.5 |
| | 1h | | 15.75 |
| | 2h | | 13.5 |
| | 4h | | 11 |
| | 8h | | 9 |
| | 12h | | 8 |
| | 20h | | 7.5 |

Consolidare DN1 – Vladeni

RAPORT NR.72.g/28.04.2015

foraj: FE
proba: 8
cota: 8.00–8.30 m
data: 2015-27-4

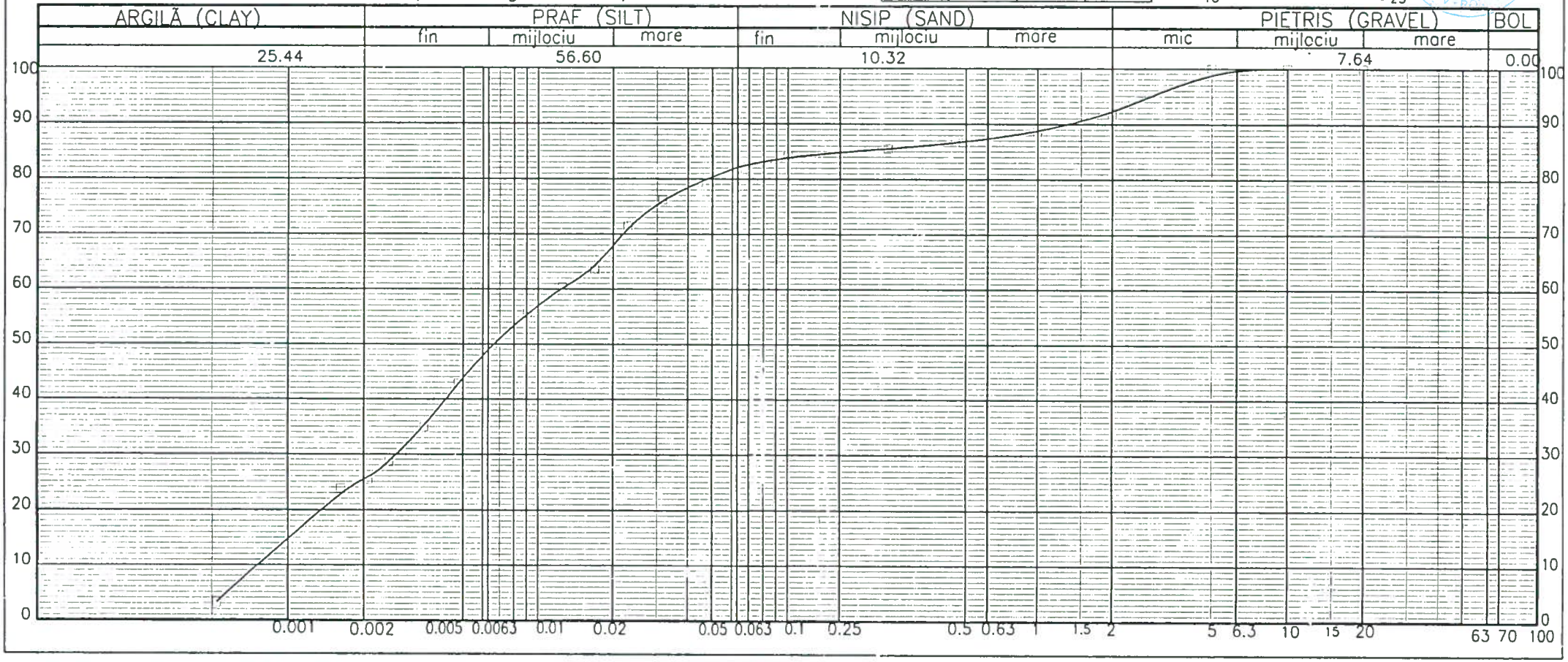
Greutatea probei : 50 g
nr.capsulă 38B

operator: ing. Lixandroiu C.

sef laborator: ing. Lixandroiu C.

DENUMIREA MATERIALULUI praf argilos cu pietris, cenusiu deschis

$U = \frac{d_{60}}{d_{10}} = 16.24$ $Cd = \frac{d_{75}}{d_{25}} = 15.31$



LABORATORUL GEOTEHNIC

# ANALIZA GRANULOMETRICĂ

Consolidare DN1 – Vladeni

RAPORT NR.73.g/28.04.2015

foraj: FF
proba: 3
cota: 2.00–2.30 m
data: 2015-27-4 ora 10:08am

CERNERE

| ϕ | m | % | %cuml |
|---|---|---|---|
| 20 | | 0.00 | 100.00 |
| 10 | | 0.00 | 100.00 |
| 5 | | 0.00 | 100.00 |
| 2 | | 0.00 | 100.00 |
| 1 | 0.01 | 0.02 | 99.98 |
| 0.5 | 0.02 | 0.04 | 99.94 |
| 0.25 | 0.07 | 0.14 | 99.80 |
| 0.1 | 0.21 | 0.42 | 99.38 |
| 0.063 | 0.4 | 0.80 | 98.58 |
| rest | | | |
| suma | 0.71 | | |
| pierderi | 49.29 | | |

SEDIMENTARE

| ora citirii | Timpul cuml. | Temperatura | Citirea pe areometru |
|---|---|---|---|
| | 30'' | 20 | 29 |
| | 1' | | 28 |
| | 2' | | 27 |
| | 4' | | 25.5 |
| | 10' | | 22.5 |
| | 15' | | 20.75 |
| | 30' | | 18.5 |
| | 1h | | 15.5 |
| | 2h | | 14 |
| | 4h | | 11.5 |
| | 8h | | 9 |
| | 12h | | 8 |
| | 20h | | 7.5 |

Greutatea probei : 50 g
nr.capsulă 38

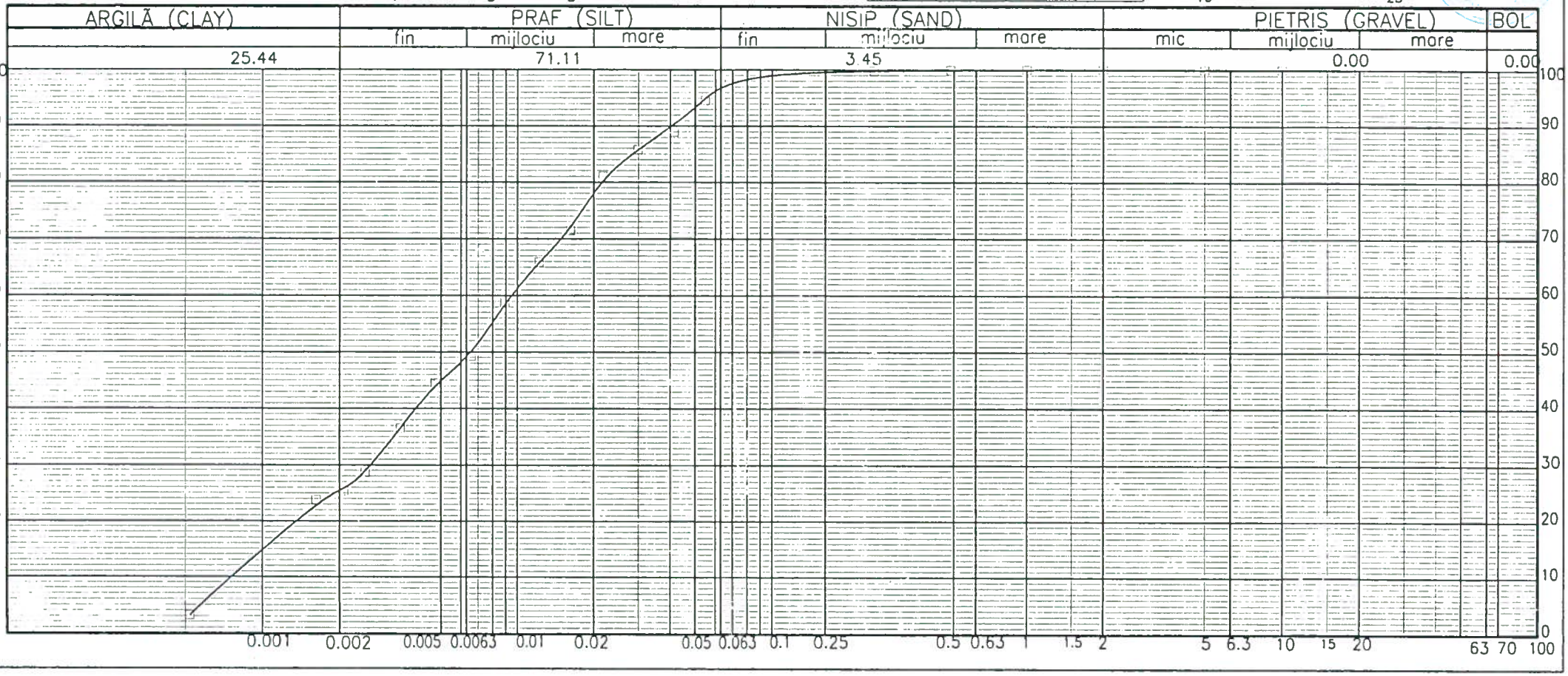
operator: ing. Lixandroiu C.

sef laborator: dr.ng. Marius Mantulescu

LABORATORUL GEOTEHNIC SILVICULTURA

DENUMIREA MATERIALULUI praf argilos, galbui-cenusiu

$U = \frac{d_{60}}{d_{10}} = 12.47$ $Cd = \frac{d_{75}}{d_{25}} = 9.39$



LABORATORUL GEOTEHNIC

# ANALIZA GRANULOMETRICĂ

CERNERE

| ϕ | m | % | %cuml |
|---|---|---|---|
| 20 | | 0.00 | 100.00 |
| 10 | | 0.00 | 100.00 |
| 5 | | 0.00 | 100.00 |
| 2 | | 0.00 | 100.00 |
| 1 | | 0.00 | 100.00 |
| 0.5 | 0.02 | 0.04 | 99.96 |
| 0.25 | 0.09 | 0.18 | 99.78 |
| 0.1 | 0.86 | 1.72 | 98.06 |
| 0.063 | 2.42 | 4.84 | 93.22 |
| rest | 0.01 | | |
| suma | 3.39 | | |
| pierderi | 46.60 | | |

SEDIMENTARE

| ora citirii | Timpul cuml. | Temperatura | Citirea pe areometru |
|---|---|---|---|
| | 30" | 20 | 27 |
| | 1' | | 26 |
| | 2' | | 25 |
| | 4' | | 23.5 |
| | 10' | | 21.5 |
| | 15' | | 20.5 |
| | 30' | | 18.5 |
| | 1h | | 16.5 |
| | 2h | | 15.0 |
| | 4h | | 12.75 |
| | 8h | | 10.0 |
| | 12h | | 8 |
| | 20h | | 6 |

Consolidare DN1 – Vladeni

RAPORT NR.74.g/28.04.2015

foraj: FF
proba: 5
cota: 4.00–4.30 m
data: 2015-27-4 ora 10:22am

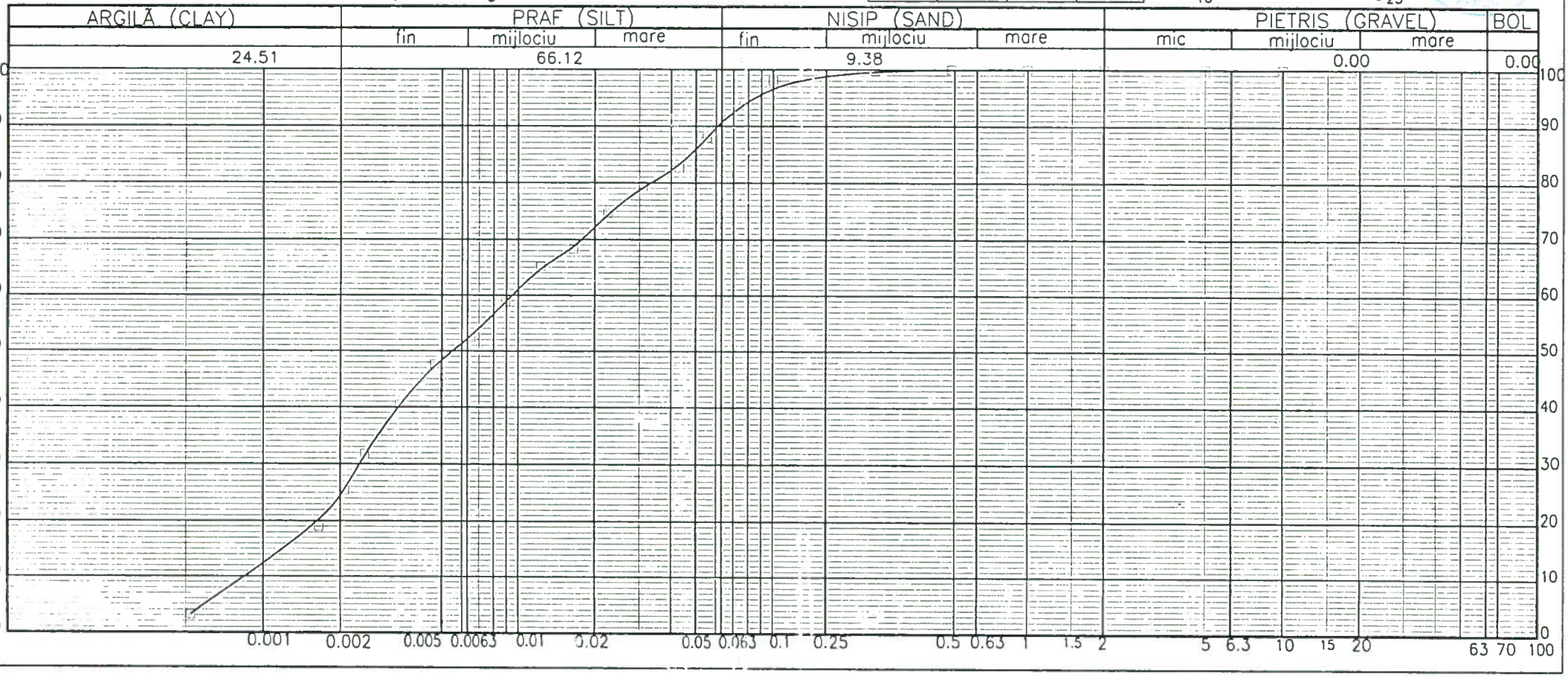
Greutatea probei : 50 g
nr.capsulă 12A

operator: ing. Lixandroiu C.

sef laborator: dr.ing. Marius Mantulescu

DENUMIREA MATERIALULUI praf argilos, cenusiu

$U = \frac{d_{60}}{d_{10}} = 11.17$ $Cd = \frac{d_{75}}{d_{25}} = 11.49$



LABORATORUL GEOTEHNIC

# ANALIZA GRANULOMETRICĂ

Consolidare DN1 – Vladeni

RAPORT NR.75.g/28.04.2015

foraj: FG
proba: 2
cota: 2.00–2.30 m
data: 2015–27–4 ora 12:05pm

CERNERE

| ϕ | m | % | %cuml |
|---|---|---|---|
| 20 | | 0.00 | 100.00 |
| 10 | | 0.00 | 100.00 |
| 5 | | 0.00 | 100.00 |
| 2 | | 0.00 | 100.00 |
| 1 | | 0.00 | 100.00 |
| 0.5 | 0.03 | 0.06 | 99.94 |
| 0.25 | 0.06 | 0.12 | 99.82 |
| 0.1 | 0.20 | 0.40 | 99.42 |
| 0.063 | 0.64 | 1.28 | 98.14 |
| rest | 0.01 | | |
| suma | 0.93 | | |
| pierderi | 49.06 | | |

SEDIMENTARE

| ora citirii | Timpul cuml. | Temperatura | Citirea pe areometru |
|---|---|---|---|
| | 30'' | 20 | 31 |
| | 1' | | 30.5 |
| | 2' | | 30 |
| | 4' | | 29.5 |
| | 10' | | 28 |
| | 15' | | 27 |
| | 30' | | 26 |
| | 1h | | 24.5 |
| | 2h | | 22.5 |
| | 4h | | 21 |
| | 8h | | 19.5 |
| | 12h | | 18 |
| | 20h | | 17 |

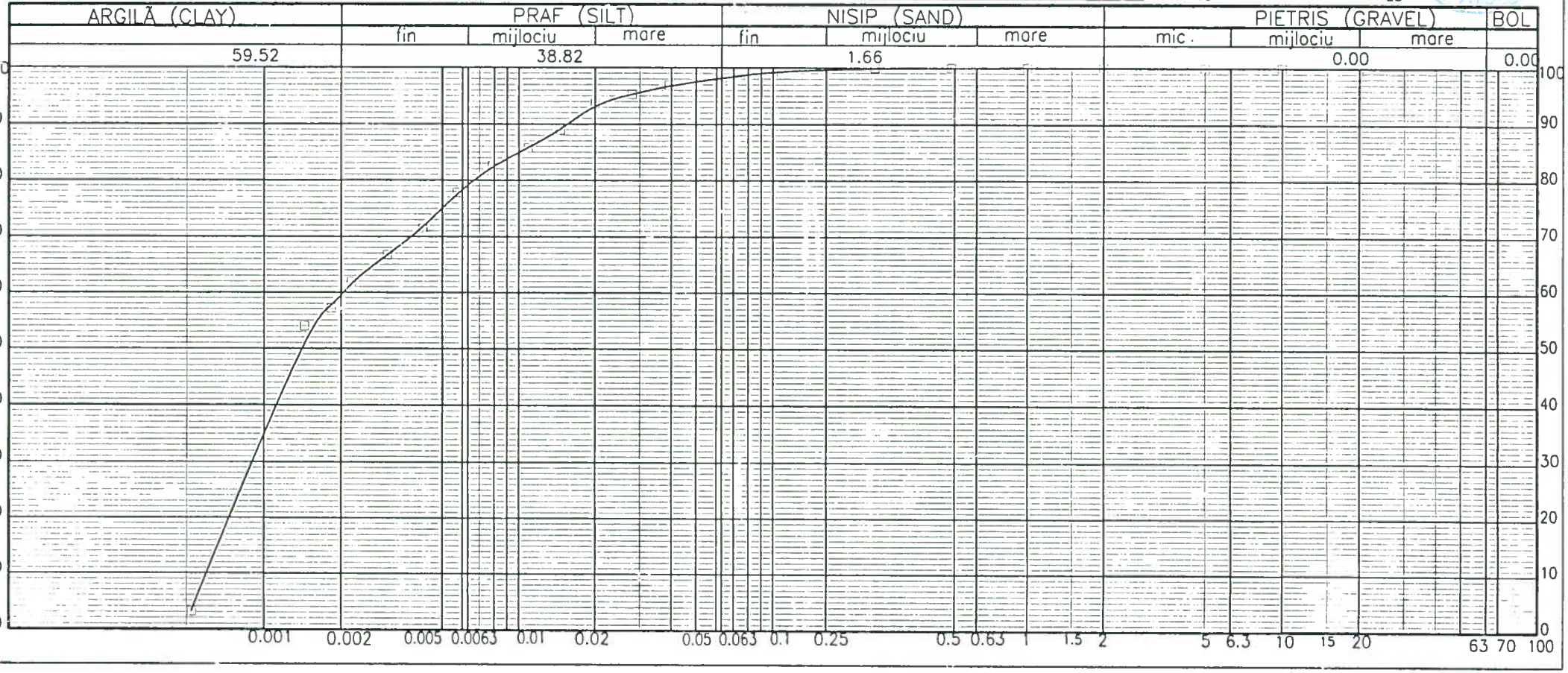
Greutatea probei : g
nr.capsulă 14

operator: ing. Lixandroiu C.

sef laborator: dr.ing. Marias Mantulescu

DENUMIREA MATERIALULUI argila

$U = \frac{d_{60}}{d_{10}} = 3.42$ $C_d = \frac{d_{75}}{d_{25}} = 6.13$



S.C. GEO-TECH SRL GHEORGHENI
LABORATOR GEOTEHNIC DE GRAD II
Autorizatie Nr. 2657 Data: 20.12.2012
Gheorgheni str.Carierei nr. 6 jud.Harghita-RO

Foraj nr./ Boring no: **FG**
Proba nr / Sample no.: **P2**
Adâncime/ Depth: **4.00-4.3** m

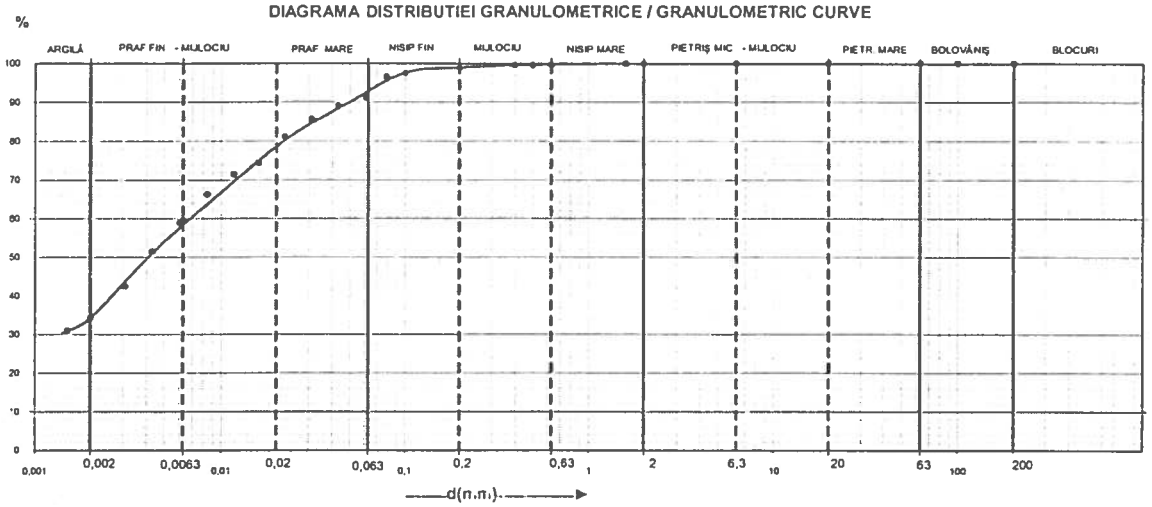
**CONSOLIDARE DN1**

## BULETIN DE ANALIZĂ nr./ ANALYSIS REPORT no. L.1209 .grP2 / 17.04.2015

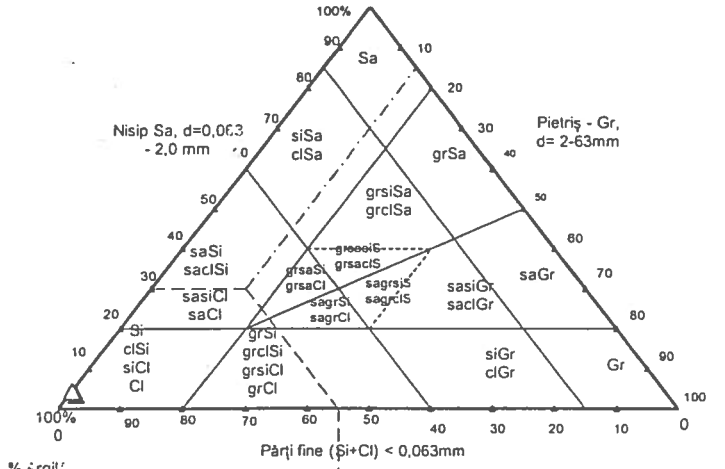
Determinarea granulozității prin metoda cernerii şi sedimentării conform STAS 1913/5-85 ;

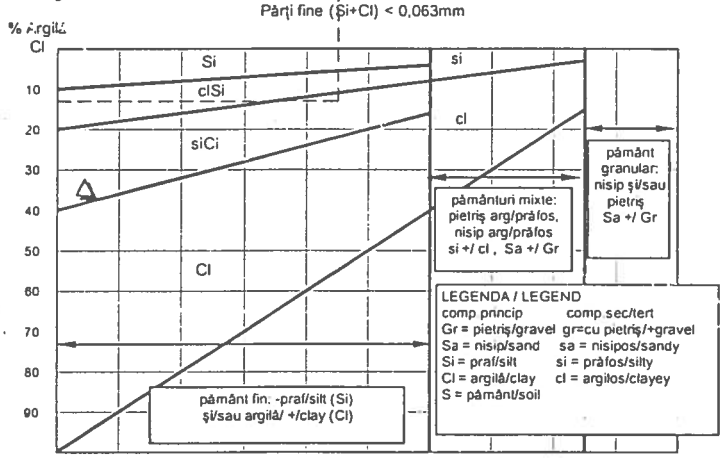
Particle size analysis of soil by sieving and sedimentation according to STAS 1913/5-85 ;

**DIAGRAMA DISTRIBUTIEI GRANULOMETRICE / GRANULOMETRIC CURVE**




**Clasificarea pământului/classification of soil**
**(% Cl+Si, Sa, Gr)**
SR EN ISO 14688-2:2005




Clasificarea pământului conform
SR EN ISO 14688-2:2005

| d mm | tip pământ/ soil's type/ % | | % | % |
|---|---|---|---|---|
| d≤0,002 | argilă/ clay | | 34,3 | 34,0 |
| 0,002 < d < 0,0063 | praf / silt | fin/ fine | 25,5 | 62,0 |
| 0,0063< d < 0,02 | | mijlociu/ medium | 19,0 | |
| 0,02< d < 0,063 | | mare/ coarse | 16,9 | |
| 0,063< d < 0,2 | nisip/ sand | fin/ fine | 3,3 | 4,0 |
| 0,2 < d < 0,63 | | mijlociu/ medium | 0,8 | |
| 0,63< d < 2,0 | | mare/ coarse | 0,2 | |
| 2,0 < d <6,3 | pietriş/ gravel | mic/ small | 0,0 | 0,0 |
| 6,3 < d <20 | | mijlociu / | 0,0 | |
| 20< d <63,0 | | mare/ coarse | 0,0 | |
| 63,0 < d < 200,0 | bolovăniş/ cobbles | | 0,0 | 0,0 |
| d > 200,0 | blocuri/ boulder | | 0,0 | 0,0 |
| | | | total | 100,0 |

Descrierea probei / Sample description:
**Argilă prăfoasă cenuşie cu zone nisipose gălbui-ruginii, plastic consistentă-vârtoasă**

Întocmit:
ing.geol. Török Tiberiu

LABORATORUL GEOTEHNIC

# ANALIZA GRANULOMETRICĂ

CERNERE

| ϕ | m | % | %cuml |
|---|---|---|---|
| 20 | | 0.00 | 100.00 |
| 10 | | 0.00 | 100.00 |
| 5 | | 0.00 | 100.00 |
| 2 | 0.22 | 0.44 | 99.56 |
| 1 | 0.53 | 1.06 | 98.50 |
| 0.5 | 0.86 | 1.72 | 96.78 |
| 0.25 | 1.35 | 2.70 | 94.08 |
| 0.1 | 2.38 | 4.76 | 89.32 |
| 0.063 | 2.09 | 4.18 | 85.14 |
| rest | 0.02 | | |
| suma | 7.43 | | |
| pierderi | 42.55 | | |

Consolidare DN1 – Vladeni

RAPORT NR.77.g/28.04.2014

foraj: FH
proba: 2
cota: 2.00–2.30 m
data: 2015-27-4

SEDIMENTARE

| ora citirii | Timpul cuml. | Temperatura | Citirea pe areometru |
|---|---|---|---|
| | 30'' | 20 | 27 |
| | 1' | | 26 |
| | 2' | | 25 |
| | 4' | | 23 |
| | 10' | | 21.5 |
| | 15' | | 20.5 |
| | 30' | | 19.5 |
| | 1h | | 17.25 |
| | 2h | | 15.5 |
| | 4h | | 13 |
| | 8h | | 11.75 |
| | 12h | | 10.75 |
| | 20h | | 9.75 |

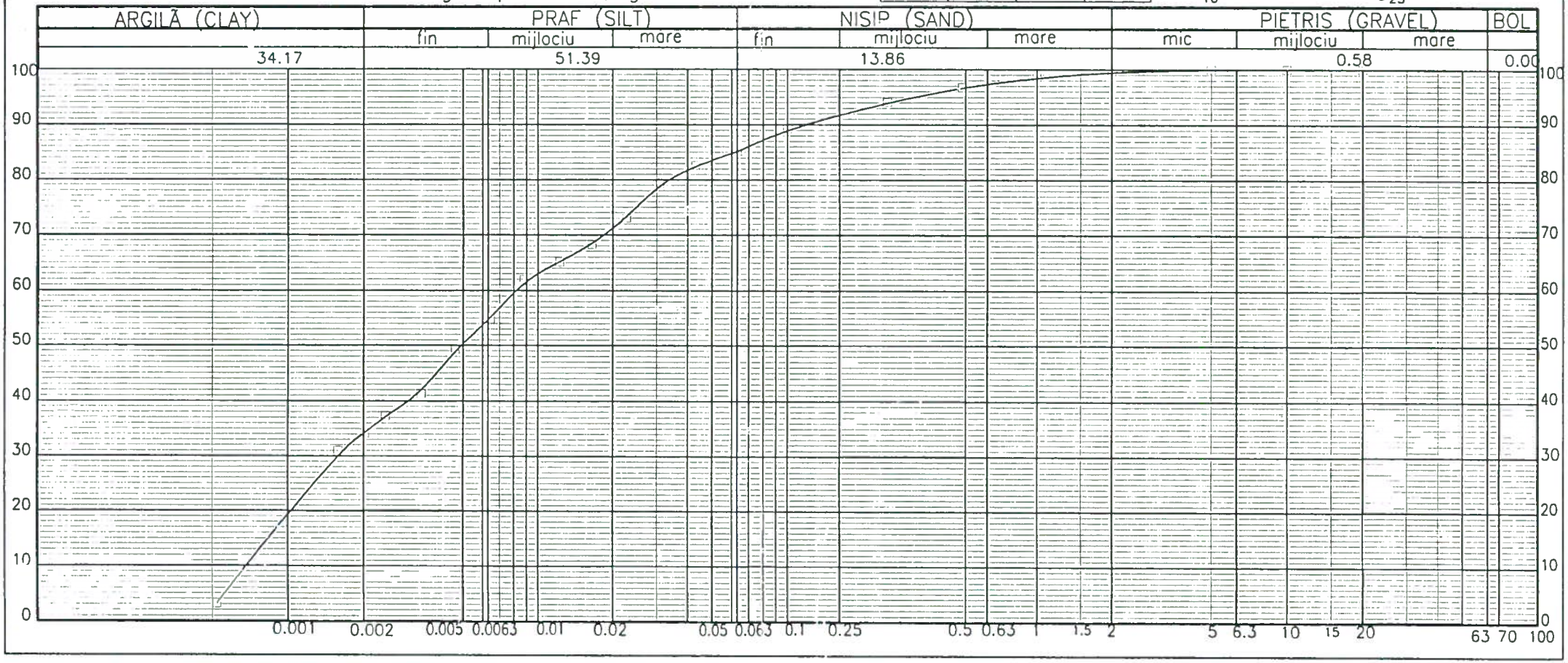
Greutatea probei : 50 g
nr.capsulă 26A

operator: ing. Lixandroiu C.

sef laborator: dr. ing. Marius Mantulescu

DENUMIREA MATERIALULUI argila prafoasa, galbuie

$U = \frac{d_{60}}{d_{10}} = 11.93$ $Cd = \frac{d_{75}}{d_{25}} = 19.53$



S.C. GEO-TECH SRL GHEORGHENI
LABORATOR GEOTEHNIC DE GRAD II
Autorizatie Nr. 2657 Data: 20.12.2012
Gheorgheni str.Carierei nr. 6 jud.Harghita-RO

Foraj nr./ Boring no: FH
Proba nr / Sample no.: P3
Adâncime/ Depth: 3.70-4.( m

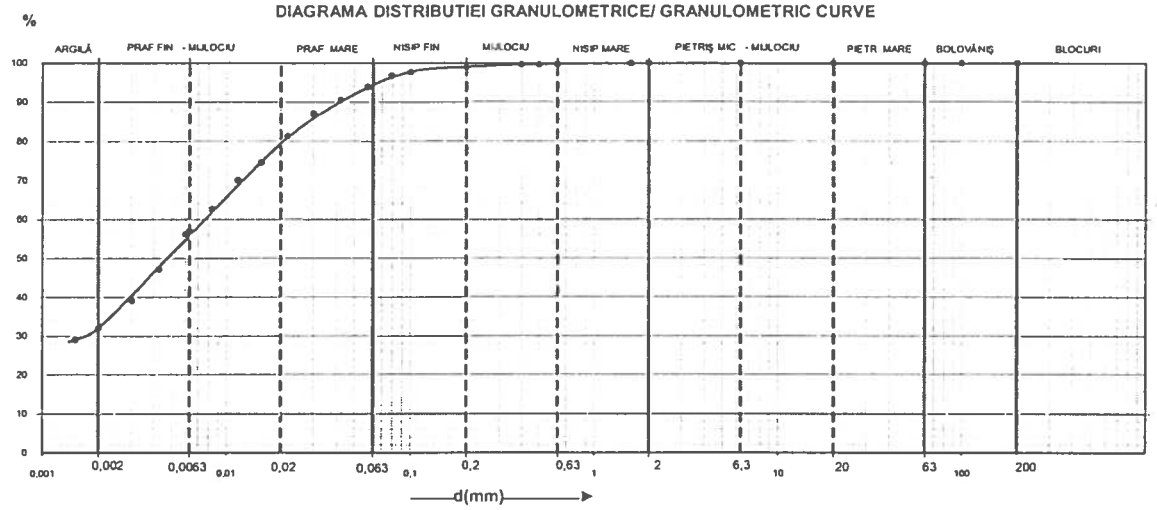
CONSOLIDARE DN1

## BULETIN DE ANALIZĂ nr./ ANALYSIS REPORT no. L.1209 .grP3 / 17.04.2015

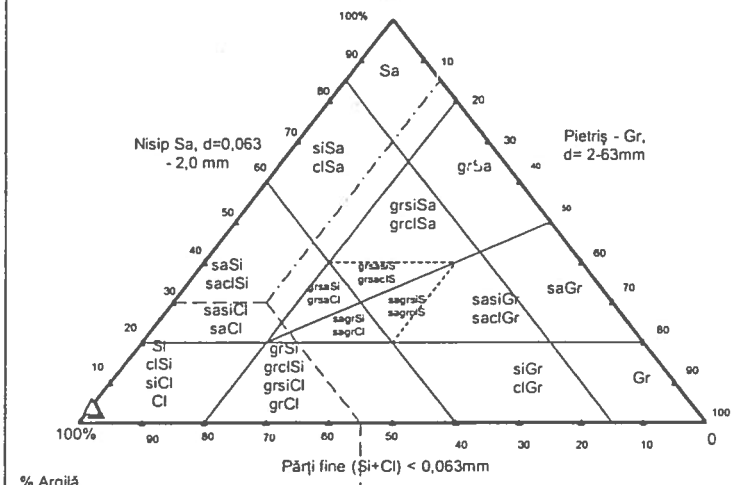
Determinarea granulozității prin metoda cernerii şi sedimentării conform STAS 1913/5-85 ;

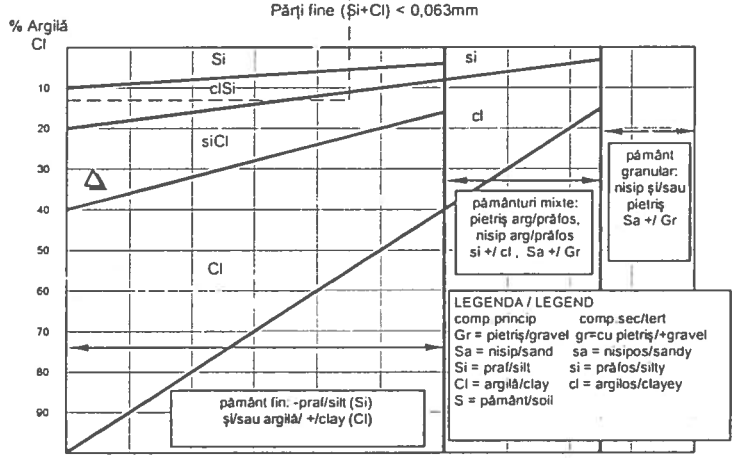
Particle size analysis of soil by sieving and sedimentation according to STAS 1913/5-85 ;

DIAGRAMA DISTRIBUTIEI GRANULOMETRICE/ GRANULOMETRIC CURVE




Clasificarea pământului (% Cl+Si, Sa, Gr)
SR EN ISO 14688-2:2005




Clasificarea pământului conform SR EN ISO 14688-2:2005

| d mm | tip păm./ soil's type/ % | | | % |
|---|---|---|---|---|
| d≤0,002 | argilă/ clay | | 32,0 | 32,0 |
| 0,002 < d < 0,0063 | praf / silt | fin/ fine | 25,1 | 64,0 |
| 0,0063< d < 0,02 | | mijlociu/ medium | 22.4 | |
| 0,02< d < 0,063 | | mare/ coarse | 16,3 | |
| 0,063< d < 0,2 | nisip/ sand | fin/ fine | 3,2 | 4,0 |
| 0,2 < d < 0,63 | | mijlociu/ medium | 0,8 | |
| 0,63< d < 2,0 | | mare/ coarse | 0,2 | |
| 2,0 < d <6,3 | pietriş/ gravel | mic/ small | 0,0 | 0,0 |
| 6,3 < d <20 | | mijlociu / | 0,0 | |
| 20< d <63,0 | | mare/ coarse | 0,0 | |
| 63,0 < d < 200,0 | bolovăniş/ cobbles | | 0,0 | 0,0 |
| d > 200,0 | blocuri/ boulder | | 0,0 | 0,0 |
| | | | total | 100,0 |

Descrierea probei / Sample description:
**Argilă prăfoasă cafenie, plastic vârtoasă-tare**

Întocmit:
ing.geol. Török Tiberiu

Acest buletin este înregistrat în registrul rezultate al laboratorului. Copia prezentului buletin este păstrată în arhiva S.C. Geo-Tech S.R.L.

LABORATORUL GEOTEHNIC

# ANALIZA GRANULOMETRICĂ

Consolidare DN1 – Vladeni

RAPORT NR.78.g/28.04.2015

foraj: FH
proba: 8
cota: – 8.00 m
data: 2015-27-4

CERNERE

| ϕ | m | % | %cuml |
|---|---|---|---|
| 20 | | 0.00 | 100.00 |
| 10 | | 0.00 | 100.00 |
| 5 | | 0.00 | 100.00 |
| 2 | | 0.00 | 100.00 |
| 1 | | 0.00 | 100.00 |
| 0.5 | 0.01 | 0.02 | 99.98 |
| 0.25 | 0.06 | 0.12 | 99.86 |
| 0.1 | 0.32 | 0.64 | 99.22 |
| 0.063 | 1.26 | 2.52 | 96.70 |
| rest | 0.01 | | |
| suma | 1.65 | | |
| pierderi | 48.34 | | |

SEDIMENTARE

| ora citirii | Timpul cuml. | Temperatura | Citirea pe areometru |
|---|---|---|---|
| | 30" | 20 | 28 |
| | 1' | | 27 |
| | 2' | | 25.75 |
| | 4' | | 24 |
| | 10' | | 22 |
| | 15' | | 20.25 |
| | 30' | | 17.5 |
| | 1h | | 15.25 |
| | 2h | | 12.5 |
| | 4h | | 10.25 |
| | 8h | | 8 |
| | 12h | | 7 |
| | 20h | | 6 |

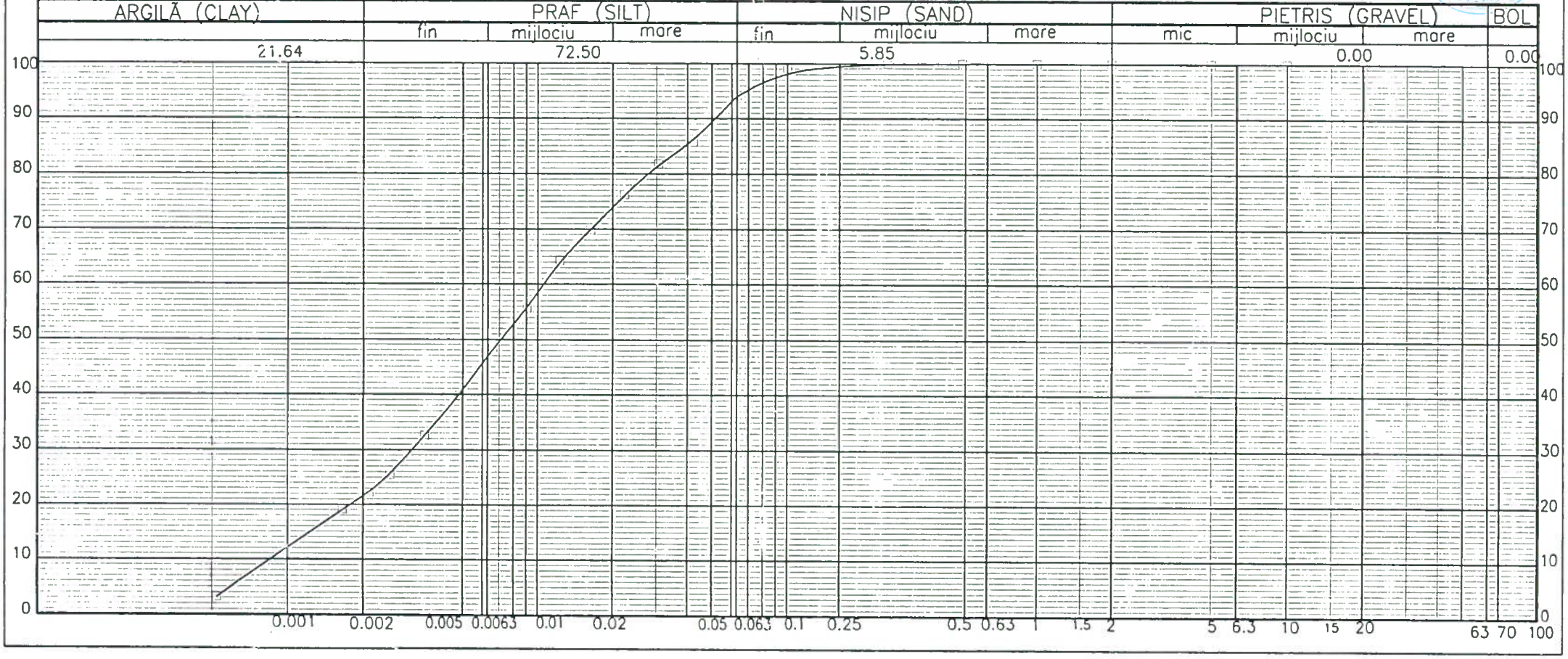
Greutatea probei : 50 g
nr.capsulă 8A

operator: ing. Lixandroiu C.

sef laborator: dr.ing. Marius Mantulescu

$U = \frac{d_{60}}{d_{10}} = 12.34$ $Cd = \frac{d_{75}}{d_{25}} = 8.54$

DENUMIREA MATERIALULUI praf argilos, cenusiu



LABORATORUL GEOTEHNIC

# ANALIZA GRANULOMETRICĂ

CERNERE

| ϕ | m | % | %cuml |
|---|---|---|---|
| 20 | | 0.00 | 100.00 |
| 10 | | 0.00 | 100.00 |
| 5 | | 0.00 | 100.00 |
| 2 | 0.14 | 0.28 | 99.72 |
| 1 | 0.15 | 0.30 | 99.42 |
| 0.5 | 0.24 | 0.48 | 98.94 |
| 0.25 | 0.34 | 0.68 | 98.26 |
| 0.1 | 0.90 | 1.80 | 96.46 |
| 0.063 | 1.68 | 3.36 | 93.10 |
| rest | 0.01 | | |
| suma | 3.45 | | |
| pierderi | 46.54 | | |

SEDIMENTARE

| ora citirii | Timpul cuml. | Temperatura | Citirea pe areometru |
|---|---|---|---|
| | 30'' | 20 | 28 |
| | 1' | | 27 |
| | 2' | | 26 |
| | 4' | | 24.5 |
| | 10' | | 23 |
| | 15' | | 21.5 |
| | 30' | | 20 |
| | 1h | | 18 |
| | 2h | | 16.5 |
| | 4h | | 15 |
| | 8h | | 13 |
| | 12h | | 12.25 |
| | 20h | | 11.5 |

Consolidare DN1 – Vladeni

RAPORT NR.80.g/28.04.2015

foraj: FI
proba: 2A
cota: – 1.90 m
data: 2015-27-4

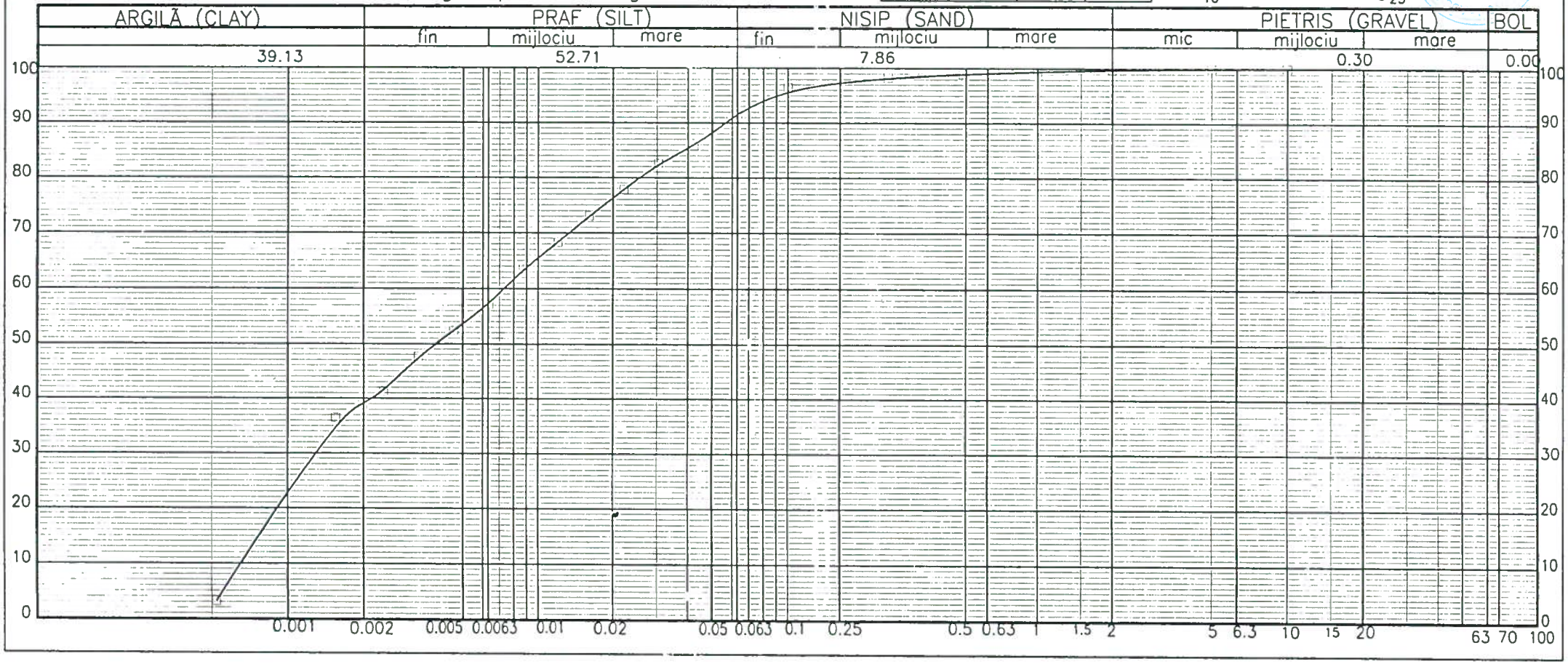
Greutatea probei : 50 g
nr.capsulă 9A

operator: ing. Lixandroiu C.

sef laborator: dr.ing. Marius Mantulescu

DENUMIREA MATERIALULUI argila prafoasa, galbuie

$U = \frac{d_{60}}{d_{10}} = 11.19$ $Cd = \frac{d_{75}}{d_{25}} = 16.90$



LABORATORUL GEOTEHNIC

# ANALIZA GRANULOMETRICĂ

Consolidare DN1 – Vladeni

RAPORT NR.79.g/28.04.2015

foraj: FI
proba: 2
cota: 2.00–2.30 m
data: 2015-27-4

CERNERE

| ϕ | m | % | %cuml |
|---|---|---|---|
| 20 | | 0.00 | 100.00 |
| 10 | | 0.00 | 100.00 |
| 5 | | 0.00 | 100.00 |
| 2 | | 0.00 | 100.00 |
| 1 | 0.12 | 0.24 | 99.76 |
| 0.5 | 0.21 | 0.42 | 99.34 |
| 0.25 | 0.32 | 0.64 | 98.70 |
| 0.1 | 0.65 | 1.30 | 97.40 |
| 0.063 | 0.80 | 1.60 | 95.80 |
| rest | 0.01 | | |
| suma | 2.10 | | |
| pierderi | 47.89 | | |

SEDIMENTARE

| ora citirii | Timpul cuml. | Temperatura | Citirea pe areometru |
|---|---|---|---|
| | 30'' | 20 | 30 |
| | 1' | | 29.5 |
| | 2' | | 28.5 |
| | 4' | | 27.5 |
| | 10' | | 25.5 |
| | 15' | | 24 |
| | 30' | | 23 |
| | 1h | | 21.5 |
| | 2h | | 19.25 |
| | 4h | | 17 |
| | 8h | | 15 |
| | 12h | | 13.5 |
| | 20h | | 12.5 |

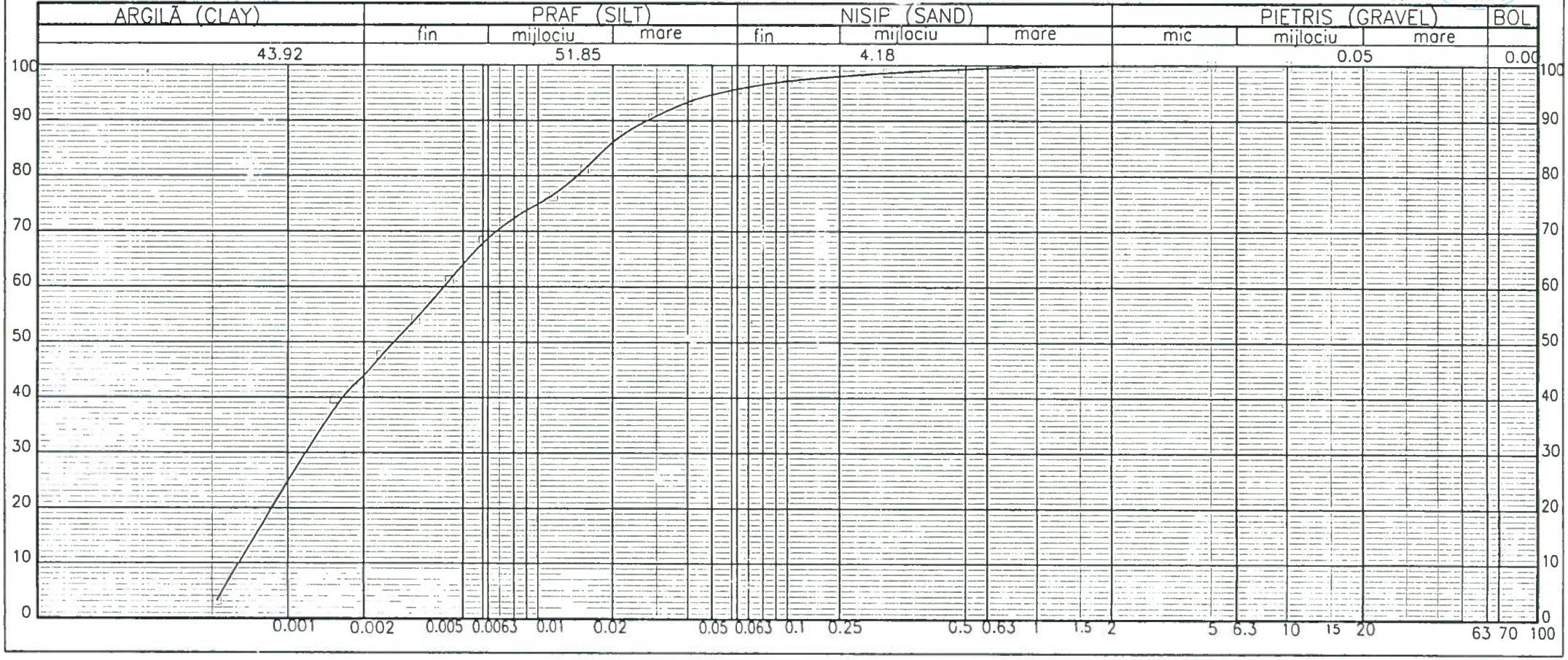
Greutatea probei : 50 g
nr.capsulă 11

operator: ing. Lixandroiu C.

sef laborator: dr.ing. Marius Mantulescu.

DENUMIREA MATERIALULUI argila prafoasa, galbui-cenusie

$U = \frac{d_{60}}{d_{10}} = 6.56$ $Cd = \frac{d_{75}}{d_{25}} = 10.04$



S.C. GEO-TECH SRL GHEORGHENI
LABORATOR GEOTEHNIC DE GRAD II
Autorizatie Nr. 2657 Data: 20.12.2012
Gheorgheni str.Carierei nr. 6 jud.Harghita-RO

Foraj nr./ Boring no: **F1**
Proba nr / Sample no.: **P4**
Adâncime/ Depth: **4.00-4.3** m

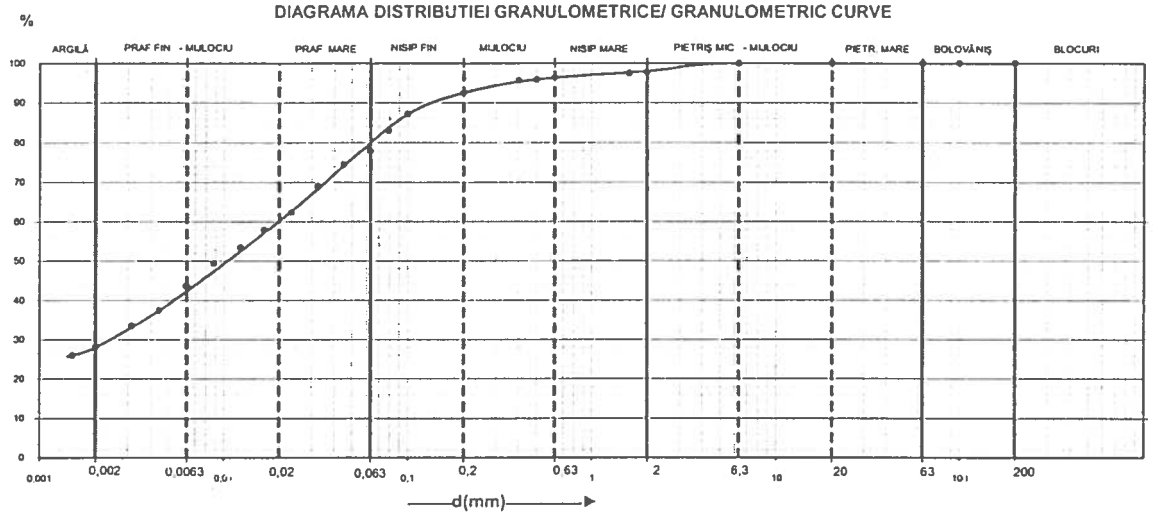
**CONSOLIDARE DN1**

## BULETIN DE ANALIZĂ nr./ ANALYSIS REPORT no. L.1209 .grP4 / 17.04.2015

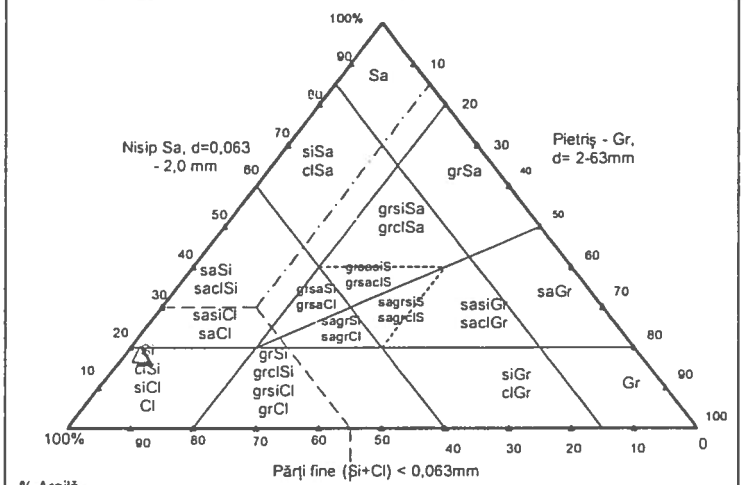
Determinarea granulozității prin metoda cernerii şi sedimentării conform STAS 1913/5-85 ;

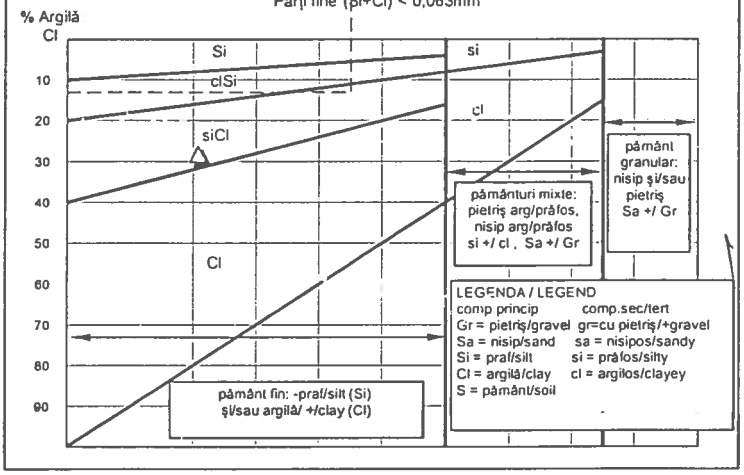
Particle size analysis of soil by sieving and sedimentation according to STAS 1913/5-85 ;

**DIAGRAMA DISTRIBUTIEI GRANULOMETRICE/ GRANULOMETRIC CURVE**




**Clasificarea pământului (% Cl+Si, Sa, Gr)**
SR EN ISO 14688-2:2005




Clasificarea pământului conform SR EN ISO 14688-2:2005

| d mm | tip păm./ soil's type/ % | | | % |
|---|---|---|---|---|
| d≤0,002 | argilă/ clay | | 28,1 | 28,0 |
| 0,002 < d < 0,0063 | praf / silt | fin/ fine | 15,7 | 52,0 |
| 0,0063< d < 0,02 | | mijlociu/ medium | 16,4 | |
| 0,02< d < 0,063 | | mare/ coarse | 19,0 | |
| 0,063< d < 0,2 | nisip/ sand | fin/ fine | 13,4 | 18,0 |
| 0,2 < d < 0,63 | | mijlociu/ medium | 3,9 | |
| 0,63< d < 2,0 | | mare/ coarse | 1,1 | |
| 2,0 < d <6,3 | pietriş/ gravel | mic/ small | 2,4 | 2,0 |
| 6,3 < d <20 | | mijlociu / | 0,0 | |
| 20< d <63,0 | | mare/ coarse | 0,0 | |
| 63,0 < d < 200,0 | bolovăniş/ cobbles | | 0,0 | 0,0 |
| d > 200,0 | blocuri/ boulder | | 0,0 | 0,0 |
| | | | total | 100,0 |

Descrierea probei / Sample description:
**Argilă prăfoasă gălbuie-cenuşie cu zone nisipoase, plastic vârtoasă**

Întocmit:
ing.geol. Török Tiberiu

Acest buletin este înregistrat în registrul rezultate al laboratorului. Copia prezentului buletin este păstrată în arhiva S.C. Geo-Tech S.R.L.

LABORATORUL GEOTEHNIC

# ANALIZA GRANULOMETRICĂ

Consolidare DN1 – Vladeni

RAPORT NR.81.g/28.04.2015

foraj: FI
proba: 8
cota: 7.70–8.00 m
data: 2015-27-4

CERNERE

| ϕ | m | % | %cuml |
|---|---|---|---|
| 20 | | 0.00 | 100.00 |
| 10 | | 0.00 | 100.00 |
| 5 | | 0.00 | 100.00 |
| 2 | | 0.00 | 100.00 |
| 1 | | 0.00 | 100.00 |
| 0.5 | 0.02 | 0.04 | 99.96 |
| 0.25 | 0.04 | 0.08 | 99.88 |
| 0.1 | 2.46 | 4.92 | 94.96 |
| 0.063 | 1.68 | 3.36 | 91.60 |
| rest | | | |
| suma | 4.20 | | |
| pierderi | 45.80 | | |

SEDIMENTARE

| ora citirii | Timpul cuml. | Temperatura | Citirea pe areometru |
|---|---|---|---|
| | 30'' | 20 | 29 |
| | 1' | | 28.25 |
| | 2' | | 27.5 |
| | 4' | | 25.25 |
| | 10' | | 22.5 |
| | 15' | | 20.5 |
| | 30' | | 19.5 |
| | 1h | | 17.25 |
| | 2h | | 15 |
| | 4h | | 12.75 |
| | 8h | | 11 |
| | 12h | | 10.25 |
| | 20h | | 9.5 |

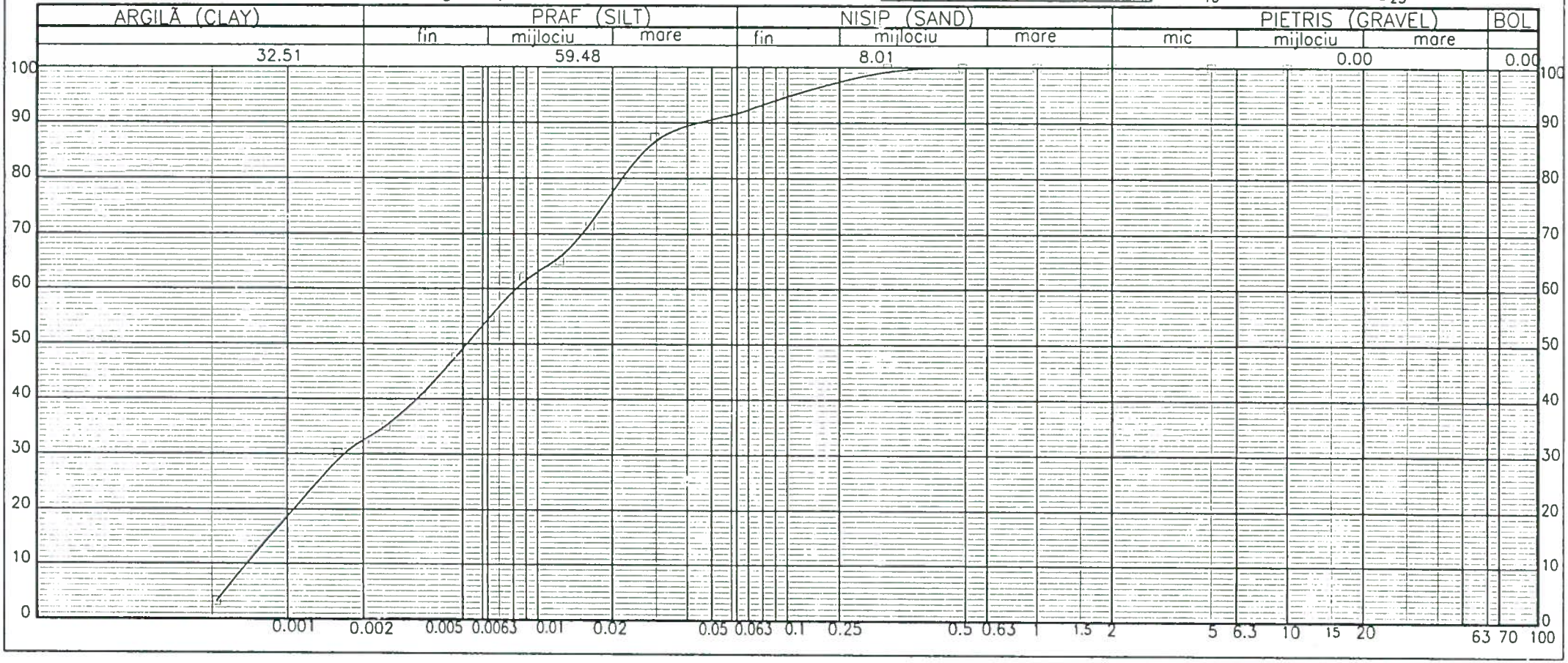
Greutatea probei : 50 g
nr.capsulă 12B

operator: ing. Lixandroiu C.

sef laborator: dr.ing. Marius Mantulescu

DENUMIREA MATERIALULUI argila prafoasa, cenusie

$U = \frac{d_{60}}{d_{10}} = 11.82$ $Cd = \frac{d_{75}}{d_{25}} = 13.80$



LABORATORUL GEOTEHNIC

# ANALIZA GRANULOMETRICĂ

CERNERE

| ϕ | m | % | %cuml |
|---|---|---|---|
| 20 | | 0.00 | 100.00 |
| 10 | | 0.00 | 100.00 |
| 5 | | 0.00 | 100.00 |
| 2 | | 0.00 | 100.00 |
| 1 | | 0.00 | 100.00 |
| 0.5 | 0.02 | 0.04 | 99.96 |
| 0.25 | 0.07 | 0.14 | 99.82 |
| 0.1 | 0.30 | 0.60 | 99.22 |
| 0.063 | 1.28 | 2.56 | 96.66 |
| rest | | | |
| suma | 1.67 | | |
| pierderi | 48.33 | | |

SEDIMENTARE

| ora citirii | Timpul cuml. | Temperatura | Citirea pe areometru |
|---|---|---|---|
| | 30" | 20 | 28 |
| | 1' | | 27 |
| | 2' | | 26 |
| | 4' | | 24.5 |
| | 10' | | 21 |
| | 15' | | 19.5 |
| | 30' | | 16.5 |
| | 1h | | 13.5 |
| | 2h | | 12 |
| | 4h | | 9.5 |
| | 8h | | 7.25 |
| | 12h | | 6 |
| | 20h | | 5 |

Consolidare DN1 – Vladeni

RAPORT NR.82.g/28.04.2015

foraj: F1
proba: 10
cota: – 10 m
data: 2015-27-4

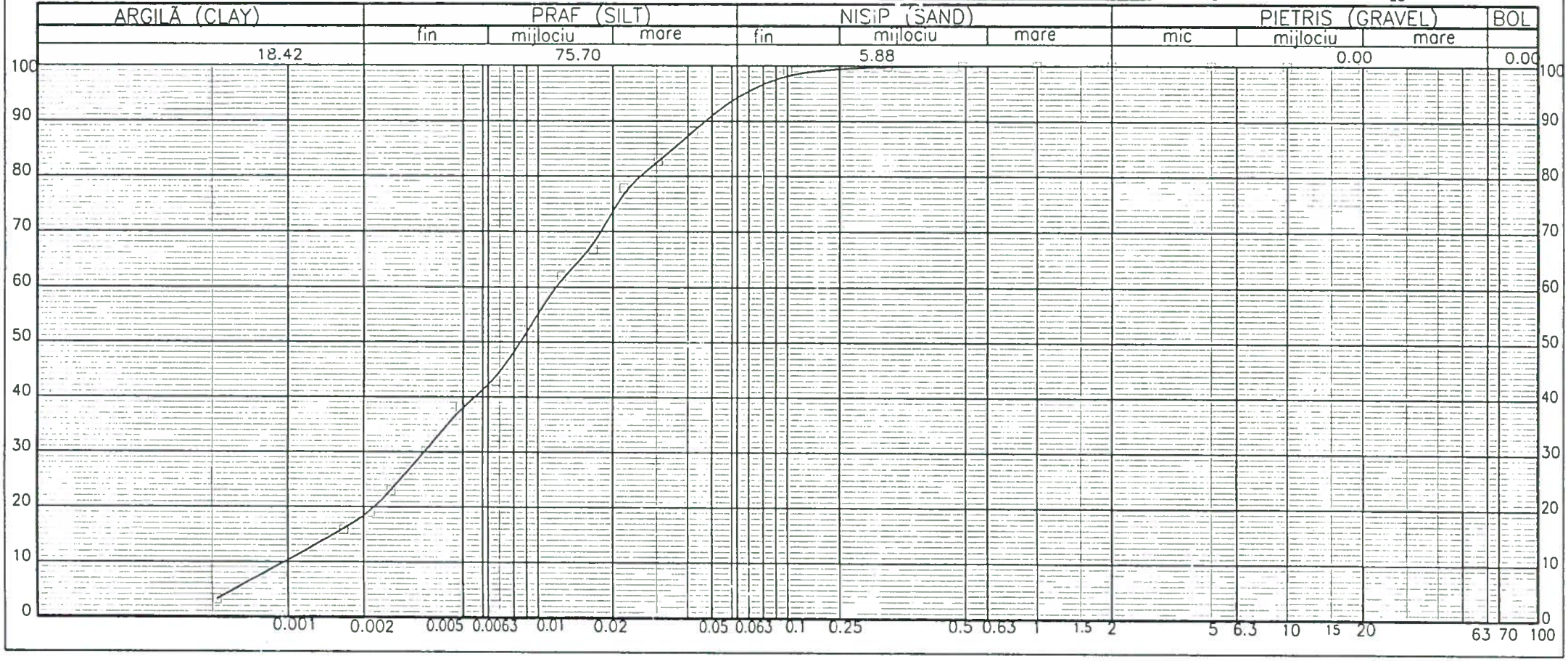
Greutatea probei : 50 g
nr.capsulă 5B

operator: ing. Lixandroiu C.

sef laborator: dr.ing. Marius Mantulescu

DENUMIREA MATERIALULUI praf argilos, cenusiu

$U = \frac{d_{60}}{d_{10}} = 12.20$ $C_d = \frac{d_{75}}{d_{25}} = 7.44$



Laboratorul geotehnic

Santierul: CONSOLIDARE DN 1 - VLADENI

Foraj, sant nr.: FE
Proba nr.: 2
Cota probei: 2.00 - 2.30 m

# Plasticitate-consistenta

## metoda cu cupa Casagrande si metoda cilindrilor de pamant

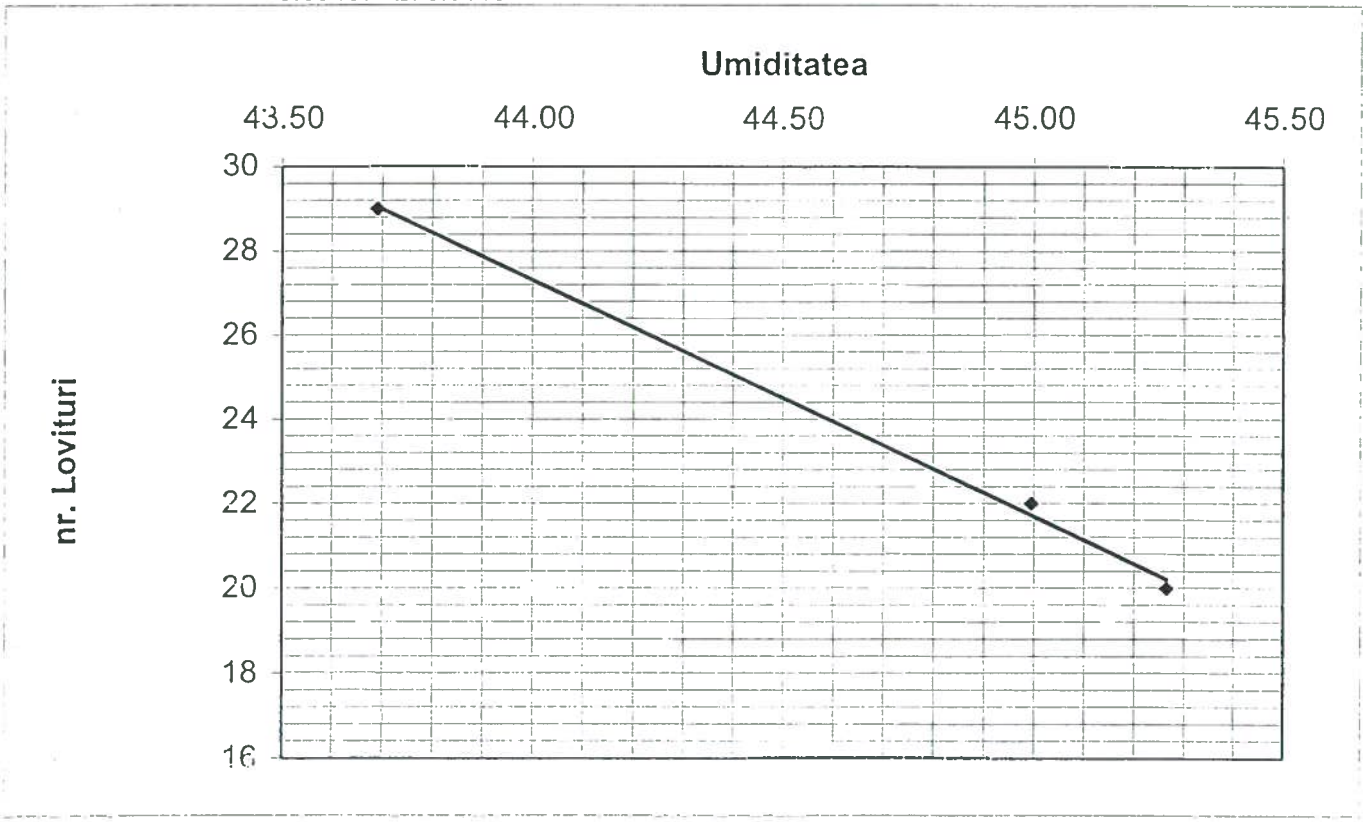
## Raport nr: 71. p /28.04.2015

Data apr.2015
Operator: ing.Lixandroiu C.

| | |
|---|---|
| Limita de curgere $W_L$: | 44.41 |
| Limita de framântare $W_P$: | 22.60 |
| Umiditarea naturala, W: | 30.19 |
| Indicele de plasticitate, $I_P$: | 21.81 |
| Indicele de consistenta, $I_C$: | 0.65 |

| Mersul determinarii | Umiditatea naturala W % | | Limita de curgere $W_L$: | | | | Limita de framântare $W_P$: | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 1 | 2 | 3 |
| Geamul nr: | 4 | 38 | | 113 | 81 | 224 | 7T | 4T | |
| nr. Lovituri | | | | 29 | 22 | 20 | | | |
| A gr | 239.43 | 251.94 | | 18.31 | 20.23 | 20.18 | 24.27 | 27.00 | |
| B gr. | 215.24 | 224.06 | | 14.64 | 15.96 | 15.83 | 22.17 | 24.41 | |
| C gr. | 135.02 | 131.79 | | 6.24 | 6.47 | 6.22 | 12.93 | 12.89 | |
| A-B | 24.19 | 27.88 | | 3.67 | 4.27 | 4.35 | 2.10 | 2.59 | |
| B-C | 80.22 | 92.27 | | 8.40 | 9.49 | 9.61 | 9.24 | 11.52 | |
| W | 30.15 | 30.22 | | 43.69 | 44.99 | 45.27 | 22.73 | 22.48 | |
| media | 30.19 | | | 44.65 | | | 22.60 | | |

5.60457 273.9119




Sef laborator,
dr. ing. Marius Mantulescu

Laboratorul geotehnic

Santierul: CONSOLIDARE DN 1 - VLADENI

Foraj, sant nr.: FE
Proba nr.: 8
Cota probei: 8.00 - 8.30 m

# Plasticitate-consistenta

## metoda cu cupa Casagrande si metoda cilindrilor de pamant

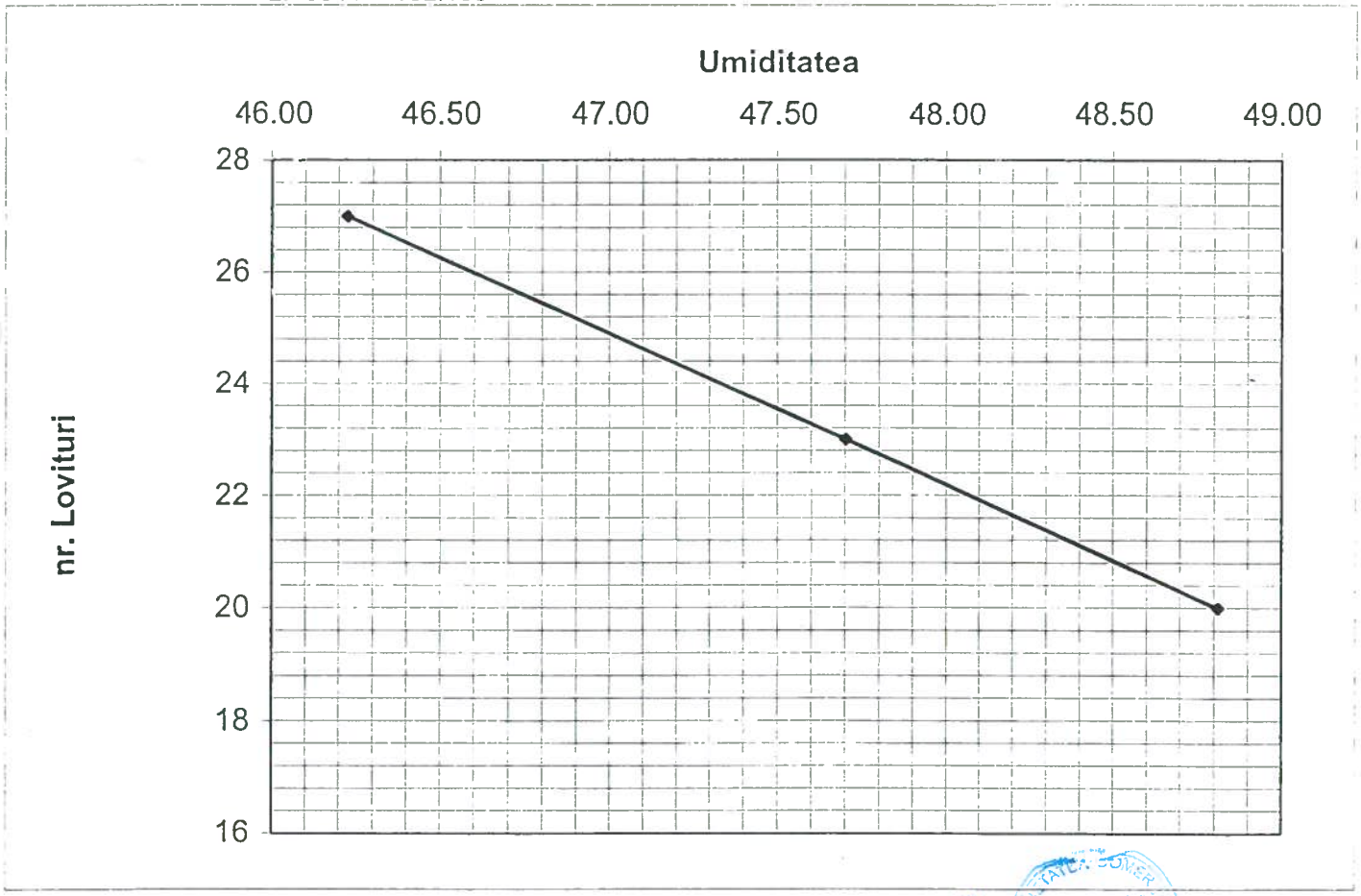
# Raport nr: 72.p/28.04.2015

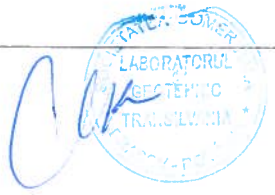
Data apr.2015
Operator: ing.Lixandroiu C.

Limita de curgere $W_L$: 46.96
Limita de framântare $W_P$: 25.10
Umiditarea naturala, W: 20.16
Indicele de plasticitate, $I_P$: 21.87
Indicele de consistenta, $I_C$: 1.23

| Mersul determinarii | Umiditatea naturala W % | | Limita de curgere $W_L$: | | | | Limita de framântare $W_P$: | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 1 | 2 | 3 |
| Geamul nr: | 38B | 17 | | 15 | 195 | 258 | 1T | 6T | |
| nr. Lovituri | | | | 27 | 23 | 20 | | | |
| A gr | 260.91 | 246.35 | | 18.64 | 18.25 | 21.92 | 27.15 | 24.93 | |
| B gr. | 238.04 | 226.51 | | 14.66 | 14.41 | 16.99 | 24.32 | 22.55 | |
| C gr. | 124.51 | 128.18 | | 6.05 | 6.36 | 6.89 | 12.93 | 13.16 | |
| A-B | 22.87 | 19.84 | | 3.98 | 3.84 | 4.93 | 2.83 | 2.38 | |
| B-C | 113.53 | 98.33 | | 8.61 | 8.05 | 10.10 | 11.39 | 9.39 | |
| W | 20.14 | 20.18 | | 46.23 | 47.70 | 48.81 | 24.85 | 25.35 | |
| media | 20.16 | | | 47.58 | | | 25.10 | | |

-2.70644 152.105



Laboratorul geotehnic

Santierul: CONSOLIDARE DN 1 - VLADENI

Foraj, sant nr.: FF
Proba nr.: 3
Cota probei: 2.00 - 2.30 m

# Plasticitate-consistenta

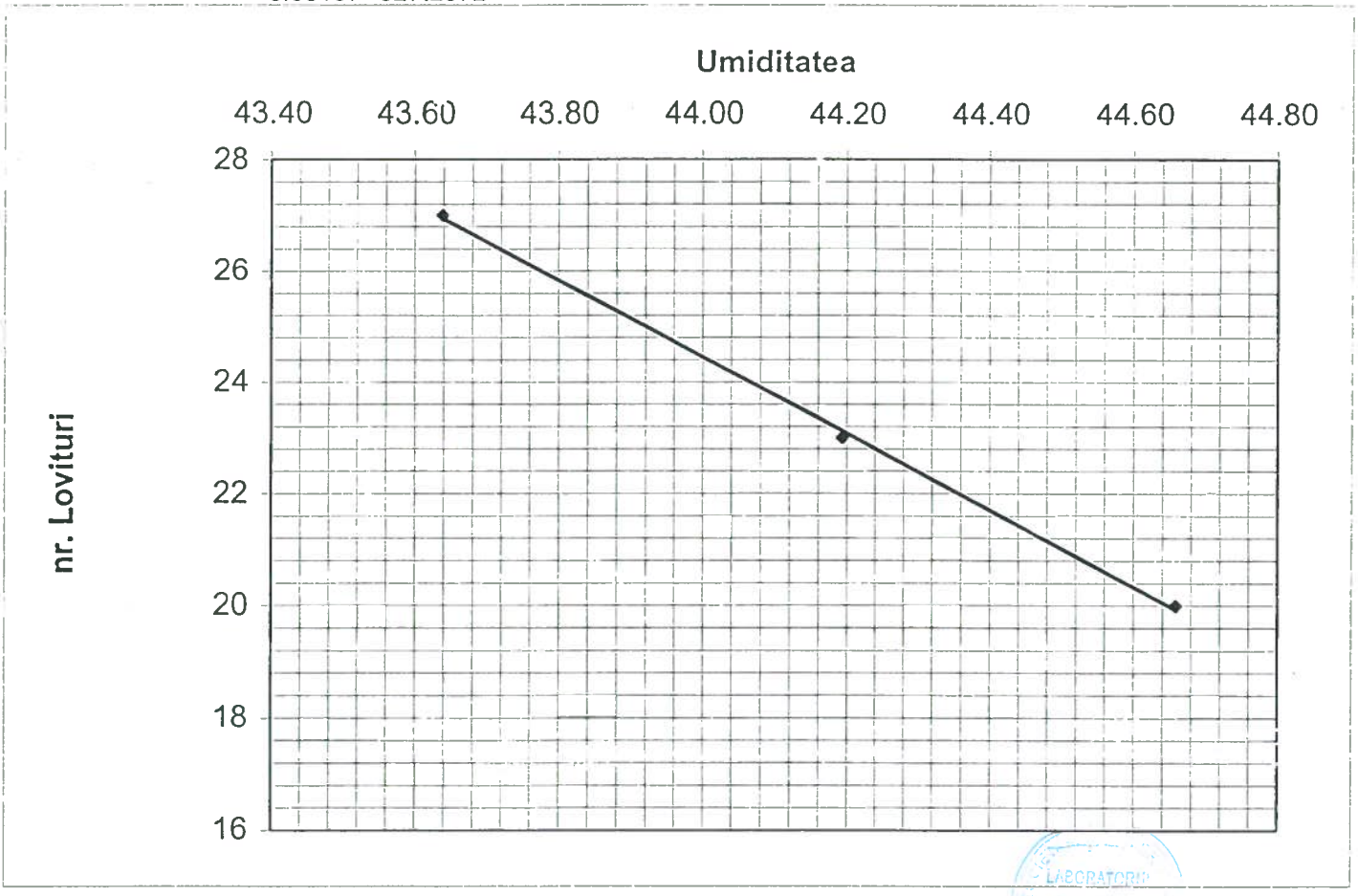
## metoda cu cupa Casagrande si metoda cilindrilor de pamant

Data apr.2015
Operator: ing.Lixandroiu C.

Limita de curgere $W_L$: 43.92
Limita de framântare $W_P$: 24.13
Umiditarea naturala, W: 21.87
Indicele de plasticitate, $I_P$: 19.79
Indicele de consistenta, $I_C$: 1.11

| Mersul determinarii | Umiditatea naturala W % | | Limita de curgere $W_L$: | | | | Limita de framântare $W_P$: | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 1 | 2 | 3 |
| Geamul nr: | 38 | 22 | | 154 | 138 | 243 | 3T | 4T | |
| nr. Lovituri | | | | 27 | 23 | 20 | | | |
| A gr | 326.47 | 226.91 | | 17.09 | 20.27 | 16.94 | 23.65 | 24.76 | |
| B gr. | 290.33 | 210.44 | | 13.66 | 16.16 | 13.68 | 21.59 | 22.45 | |
| C gr. | 124.51 | 135.42 | | 5.80 | 6.86 | 6.38 | 13.04 | 12.89 | |
| A-B | 36.14 | 16.47 | | 3.43 | 4.11 | 3.26 | 2.06 | 2.31 | |
| B-C | 165.82 | 75.02 | | 7.86 | 9.30 | 7.30 | 8.55 | 9.56 | |
| W | 21.79 | 21.95 | | 43.64 | 44.19 | 44.66 | 24.09 | 24.16 | |
| media | 21.87 | | | 44.16 | | | 24.13 | | |

-6.88137 327.2372



Laboratorul geotehnic

Santierul: CONSOLIDARE DN 1 - VLADENI

Foraj, sant nr.: FF
Proba nr.: 5
Cota probei: 4.00 - 4.30 m

# Plasticitate-consistenta

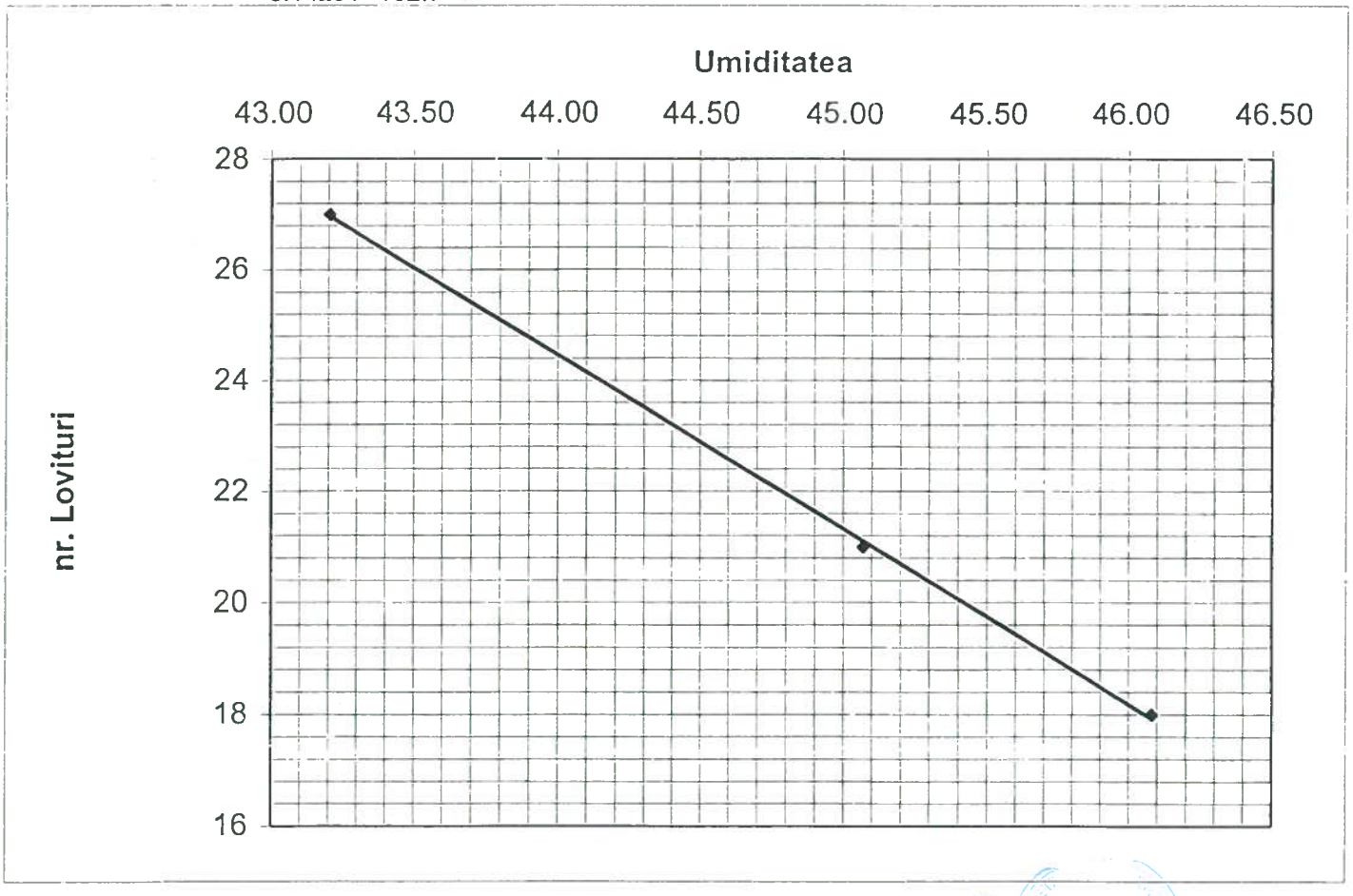
## metoda cu cupa Casagrande si metoda cilindrilor de pamant

Data apr.2015
Operator: ing.Lixandroiu C.

Limita de curgere $W_L$: 43.83
Limita de framântare $W_P$: 22.54
Umiditarea naturala, W: 12.32
Indicele de plasticitate, $I_P$: 21.29
Indicele de consistenta, $I_C$: 1.48

| Mersul determinarii | Umiditatea naturala W % | | Limita de curgere $W_L$: | | | | Limita de framântare $W_P$: | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 1 | 2 | 3 |
| Geamul nr: | 12A | 31 | | 91 | 69 | 195 | 1T | 7T | |
| nr. Lovituri | | | | 27 | 21 | 18 | | | |
| A gr | 252.46 | 239.22 | | 17.57 | 18.83 | 18.47 | 23.86 | 24.67 | |
| B gr. | 239.54 | 227.62 | | 14.20 | 14.90 | 14.65 | 21.88 | 22.48 | |
| C gr. | 133.8 | 134.18 | | 6.40 | 6.18 | 6.36 | 12.94 | 12.93 | |
| A-B | 12.92 | 11.6 | | 3.37 | 3.93 | 3.82 | 1.98 | 2.19 | |
| B-C | 105.74 | 93.44 | | 7.80 | 8.72 | 8.29 | 8.94 | 9.55 | |
| W | 12.22 | 12.41 | | 43.21 | 45.07 | 46.08 | 22.15 | 22.93 | |
| media | 12.32 | | | 44.78 | | | 22.54 | | |

-3.14201 162.7136



Laboratorul geotehnic

Santierul: CONSOLIDARE DN 1 - VLADENI

Foraj, sant nr.: FG
Proba nr.: 2
Cota probei: 2.00 - 2.30 m

# Plasticitate-consistenta

## metoda cu cupa Casagrande si metoda cilindrilor de pamant

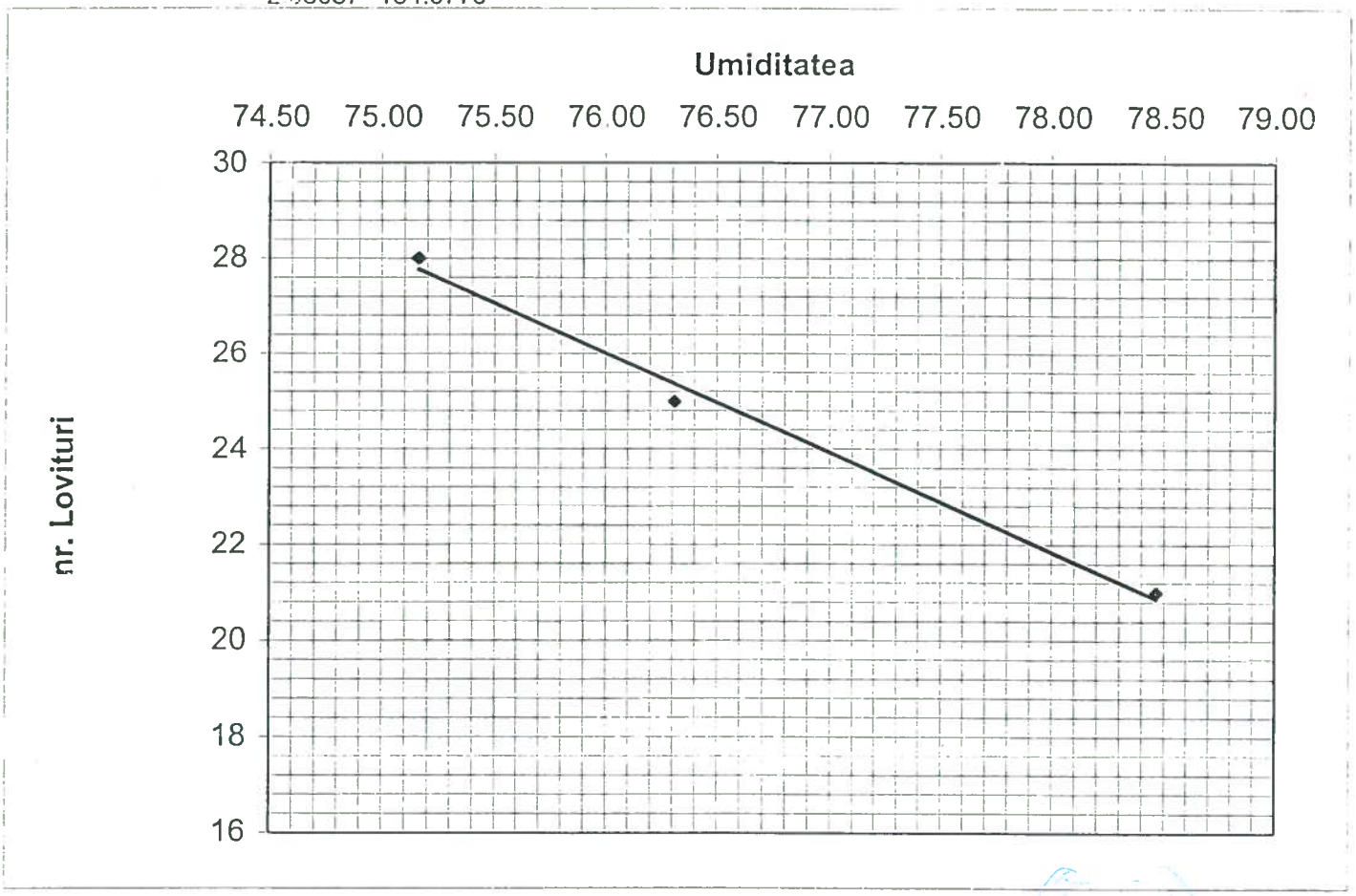
# Rapotr nr: 75.p / 28.04.2015

Data apr.2015
Operator: ing.Lixandroiu C.

Limita de curgere $W_L$: 76.49
Limita de framântare $W_P$: 27.45
Umiditarea naturala, W: 38.90
Indicele de plasticitate, $I_P$: 49.04
Indicele de consistenta, $I_C$: 0.77

| Mersul determinarii | Umiditatea naturala W % | | Limita de curgere $W_L$: | | | | Limita de framântare $W_P$: | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 1 | 2 | 3 |
| Geamul nr: | 14 | 3 | | 69 | 54 | 180 | 3T | 1L | |
| nr. Lovituri | | | | 28 | 25 | 21 | | | |
| A gr | 214.5 | 229.56 | | 17.08 | 17.87 | 19.61 | 22.07 | 22.94 | |
| B gr. | 190.01 | 200.02 | | 12.42 | 12.78 | 13.89 | 20.13 | 20.79 | |
| C gr. | 126.98 | 124.18 | | 6.22 | 6.11 | 6.60 | 13.04 | 12.98 | |
| A-B | 24.49 | 29.54 | | 4.66 | 5.09 | 5.72 | 1.94 | 2.15 | |
| B-C | 63.03 | 75.84 | | 6.20 | 6.67 | 7.29 | 7.09 | 7.81 | |
| W | 38.85 | 38.95 | | 75.16 | 76.31 | 78.46 | 27.36 | 27.53 | |
| media | 38.90 | | | 76.65 | | | 27.45 | | |

-2 08637 184.5778



Laboratorul geotehnic

Santierul: CONSOLIDARE DN 1 - VLADENI

Foraj, sant nr.: FG 3

Cota probei: 3.00 m

# Plasticitate-consistenta

## metoda cu cupa Casagrande si metoda cilindrilor de pamant

# Raport nr: 76.p / 28.04.2015

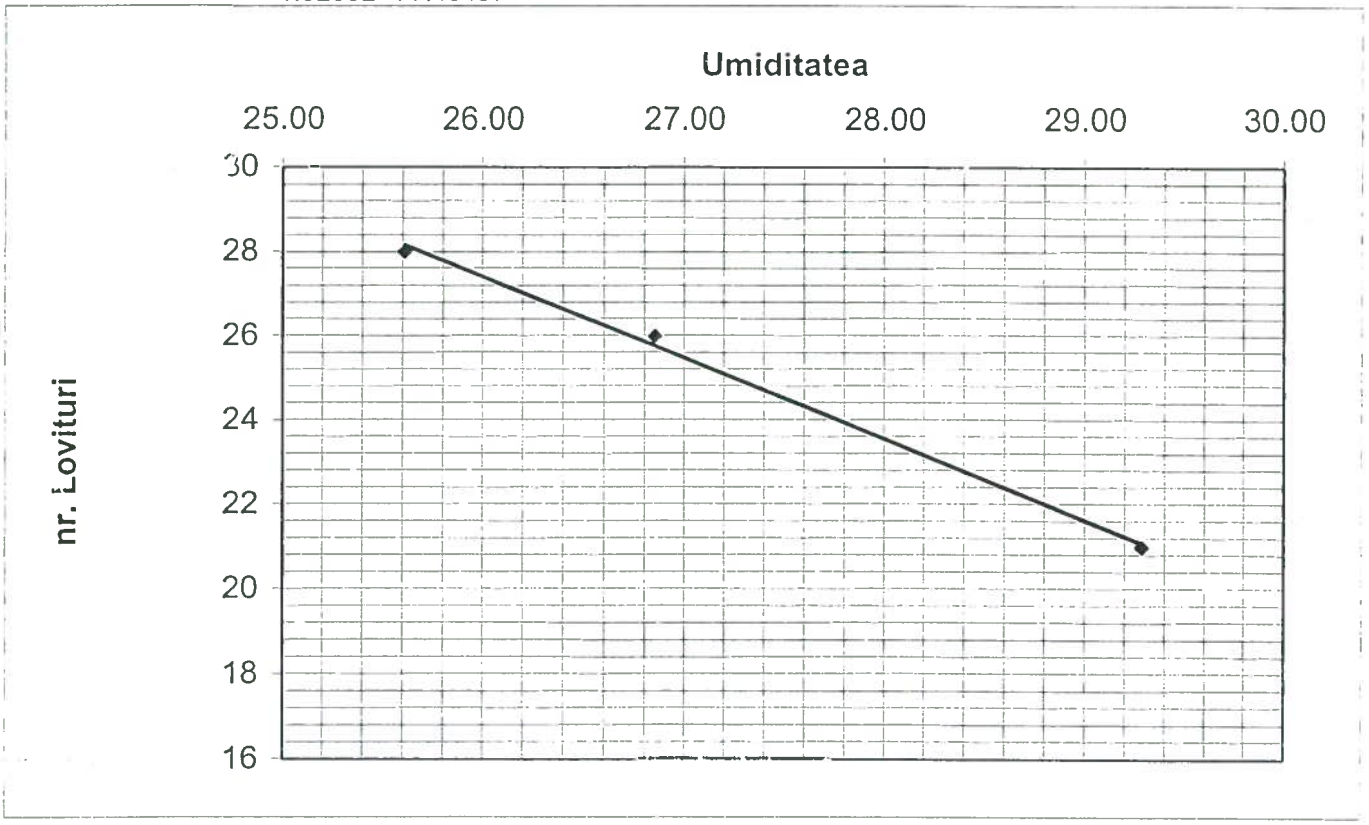
Data apr.2015

Operator: ing.Lixandroiu C.

| | |
|---|---|
| Limita de curgere $W_L$: | 27.25 |
| Limita de framântare $W_P$: | 13.41 |
| Umiditarea naturala, W: | 21.30 |
| Indicele de plasticitate, $I_P$: | 13.84 |
| Indicele de consistenta, $I_C$: | 0.43 |

| Mersul determinarii | Umiditatea naturala W % | | Limita de curgere $W_L$: | | | | Limita de framântare $W_P$: | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 1 | 2 | 3 |
| Geamul nr: | 8B | 24 | | 174 | 256 | 68 | 11X | 1S | |
| nr. Lovituri | | | | 28 | 26 | 21 | | | |
| A gr | 257 | 268.82 | | 19.08 | 20.34 | 19.35 | 17.11 | 28.34 | |
| B gr. | 235.74 | 245.36 | | 16.56 | 17.44 | 16.07 | 16.13 | 27.37 | |
| C gr. | 136.78 | 134.26 | | 6.72 | 6.64 | 4.87 | 8.88 | 20.08 | |
| A-B | 21.26 | 23.46 | | 2.52 | 2.90 | 3.28 | 0.98 | 0.97 | |
| B-C | 98.96 | 111.1 | | 9.84 | 10.80 | 11.20 | 7.25 | 7.29 | |
| W | 21.48 | 21.12 | | 25.61 | 26.85 | 29.29 | 13.52 | 13.31 | |
| media | 21.30 | | | 27.25 | | | 13.41 | | |

1.92502 77.45497




Sef laborator,
dr. ing. Marius Mantulescu

Laboratorul geotehnic

Santierul: CONSOLIDARE DN 1 - VLADENI

Foraj, sant nr.: FH
Proba nr.: 2
Cota probei: 2.00 - 2.30 m

# Plasticitate-consistenta

## metoda cu cupa Casagrande si metoda cilindrilor de pamant

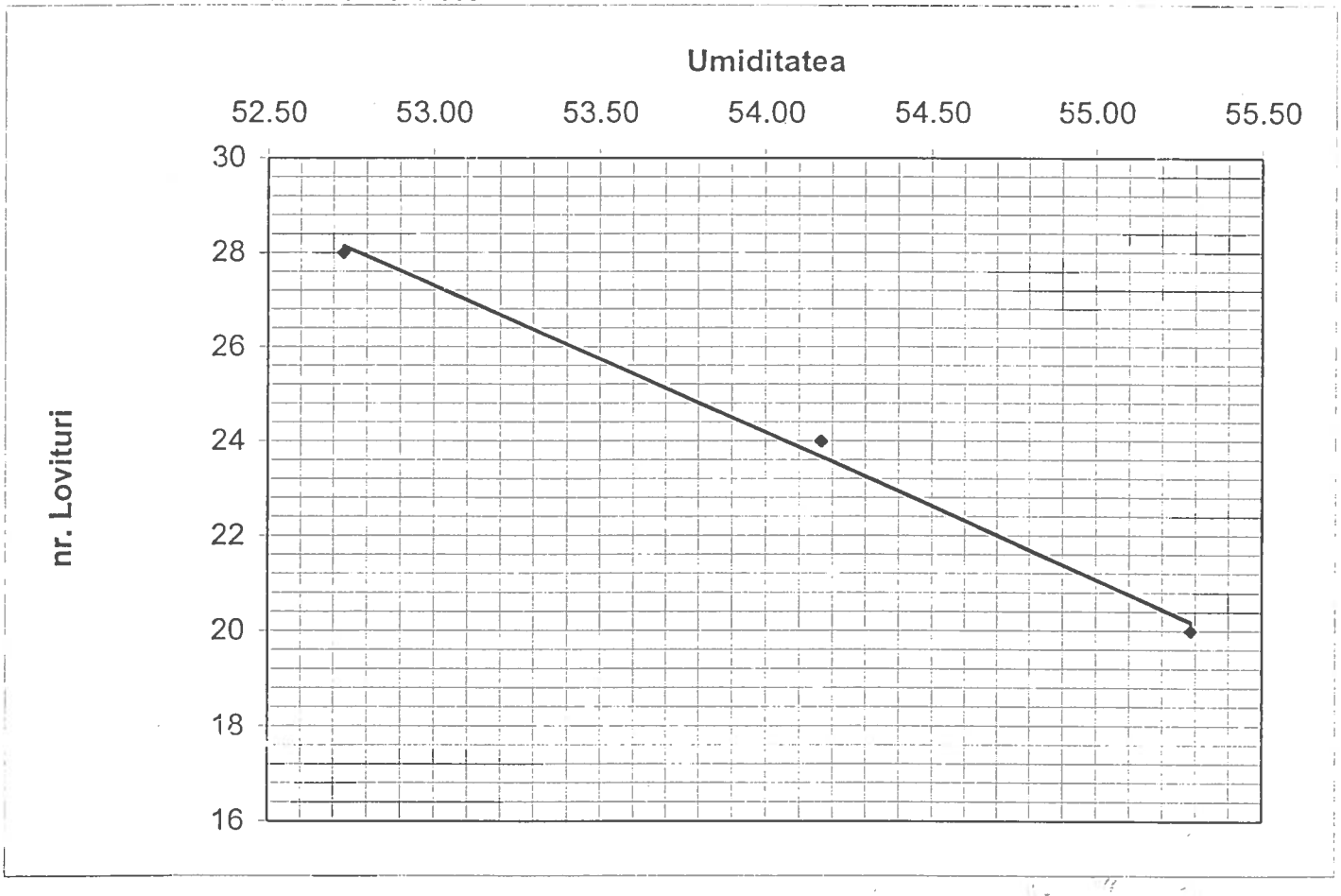
# Raport nr: 77.p/28.04.2015

Data apr.2015
Operator: ing.Lixandroiu C.

Limita de curgere $W_L$: 53.74
Limita de framântare $W_P$: 22.79
Umiditarea naturala, W: 28.52
Indicele de plasticitate, $I_P$: 30.95
Indicele de consistenta, $I_C$: 0.81

| Mersul determinarii | Umiditatea naturala W % | | Limita de curgere $W_L$: | | | | Limita de framântare $W_P$: | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 1 | 2 | 3 |
| Geamul nr: | 26A | 9 | | 245 | 53 | 51 | 4E | 5F | |
| nr. Lovituri | | | | 28 | 24 | 20 | | | |
| A gr | 229.25 | 238.94 | | 19.82 | 18.90 | 18.72 | 16.57 | 18.51 | |
| B gr. | 208.15 | 215.22 | | 15.38 | 14.48 | 14.17 | 15.19 | 16.78 | |
| C gr. | 134.03 | 132.22 | | 6.96 | 6.32 | 5.94 | 9.14 | 9.18 | |
| A-B | 21.1 | 23.72 | | 4.44 | 4.42 | 4.55 | 1.38 | 1.73 | |
| B-C | 74.12 | 83 | | 8.42 | 8.16 | 8.23 | 6.05 | 7.60 | |
| W | 28.47 | 28.58 | | 52.73 | 54.17 | 55.29 | 22.81 | 22.76 | |
| media | 28.52 | | | 54.06 | | | 22.79 | | |

-3.11648 192.4808



Laboratorul geotehnic

Santierul: CONSOLIDARE DN 1 - VLADENI

Foraj, sant nr.: FH 8

Cota probei: 8.00 m

# Plasticitate-consistenta

## metoda cu cupa Casagrande si metoda cilindrilor de pamant

# Raport nr:78.p / 28.04.2014

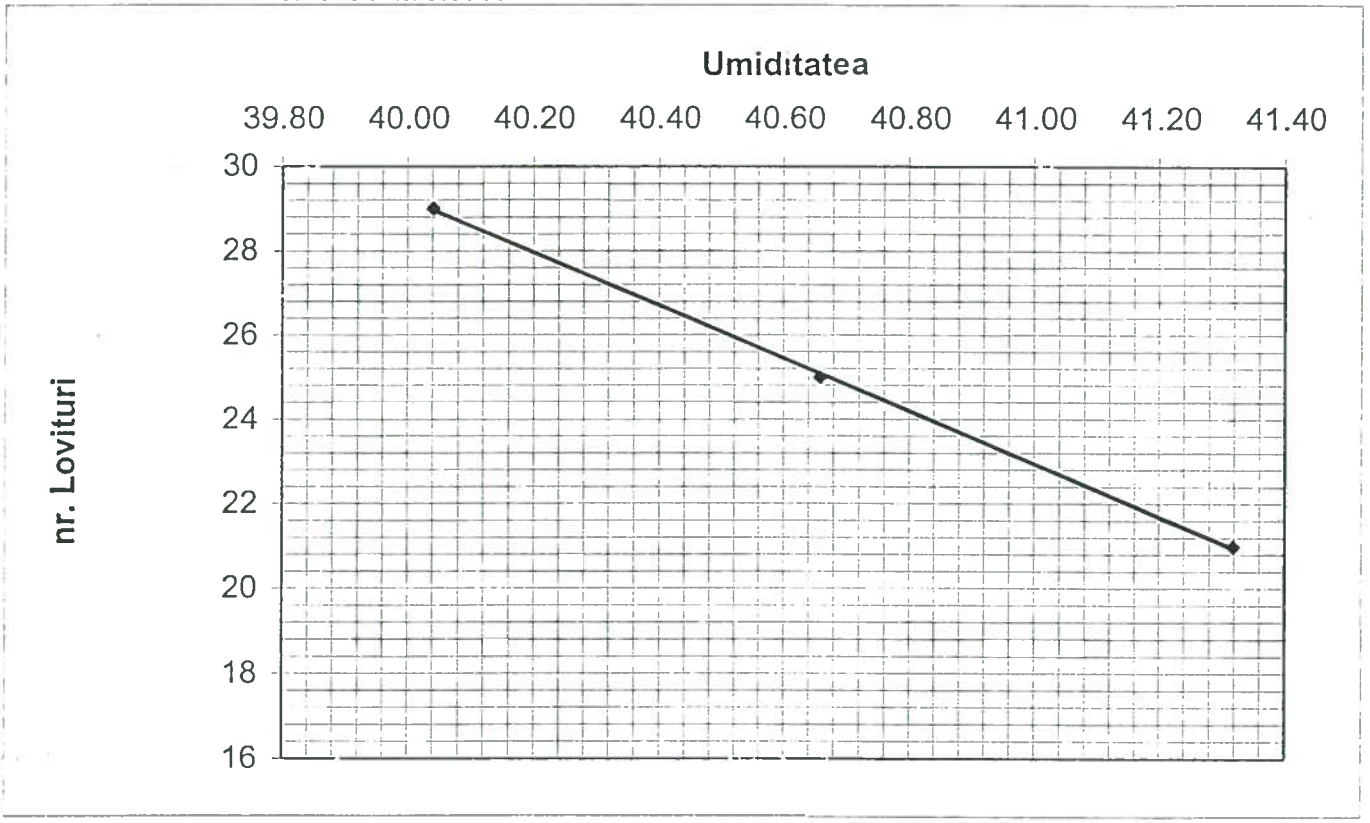
Data apr.2015

Operator: ing.Lixandroiu C.

| | |
|---|---|
| Limita de curgere $W_L$: | 40.67 |
| Limita de framântare $W_P$: | 22.20 |
| Umiditarea naturala, W: | 12.49 |
| Indicele de plasticitate, $I_P$: | 18.48 |
| Indicele de consistenta, $I_C$: | 1.53 |

| Mersul determinarii | Umiditatea naturala W % | | Limita de curgere $W_L$: | | | | Limita de framântare $W_P$: | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 1 | 2 | 3 |
| Geamul nr: | 9A | 16 | | 289 | 117 | 118 | 1T | 7T | |
| nr. Lovituri | | | | 29 | 25 | 21 | | | |
| A gr | 267.28 | 242.52 | | 20.11 | 24.08 | 19.84 | 22.34 | 22.56 | |
| B gr. | 252.39 | 229.94 | | 16.25 | 19.14 | 15.89 | 20.62 | 20.82 | |
| C gr. | 134.05 | 128.55 | | 6.61 | 6.99 | 6.33 | 12.93 | 12.92 | |
| A-B | 14.89 | 12.58 | | 3.86 | 4.94 | 3.95 | 1.72 | 1.74 | |
| B-C | 118.34 | 101.39 | | 9.64 | 12.15 | 9.56 | 7.69 | 7.90 | |
| W | 12.58 | 12.41 | | 40.04 | 40.66 | 41.32 | 22.37 | 22.03 | |
| media | 12.49 | | | 40.67 | | | 22.20 | | |

6.25482 279.8068




Sef laborator,
dr. ing. Marius Mantuleseu

LABORATORUL GEOTEHNIC TRANSILVANIA

Laboratorul geotehnic

Santierul: CONSOLIDARE DN 1 - VLADENI

Foraj, sant nr.: FI
Proba nr.: 2
Cota probei: 2.00 - 2.30 m

# Plasticitate-consistenta

## metoda cu cupa Casagrande si metoda cilindrilor de pamant

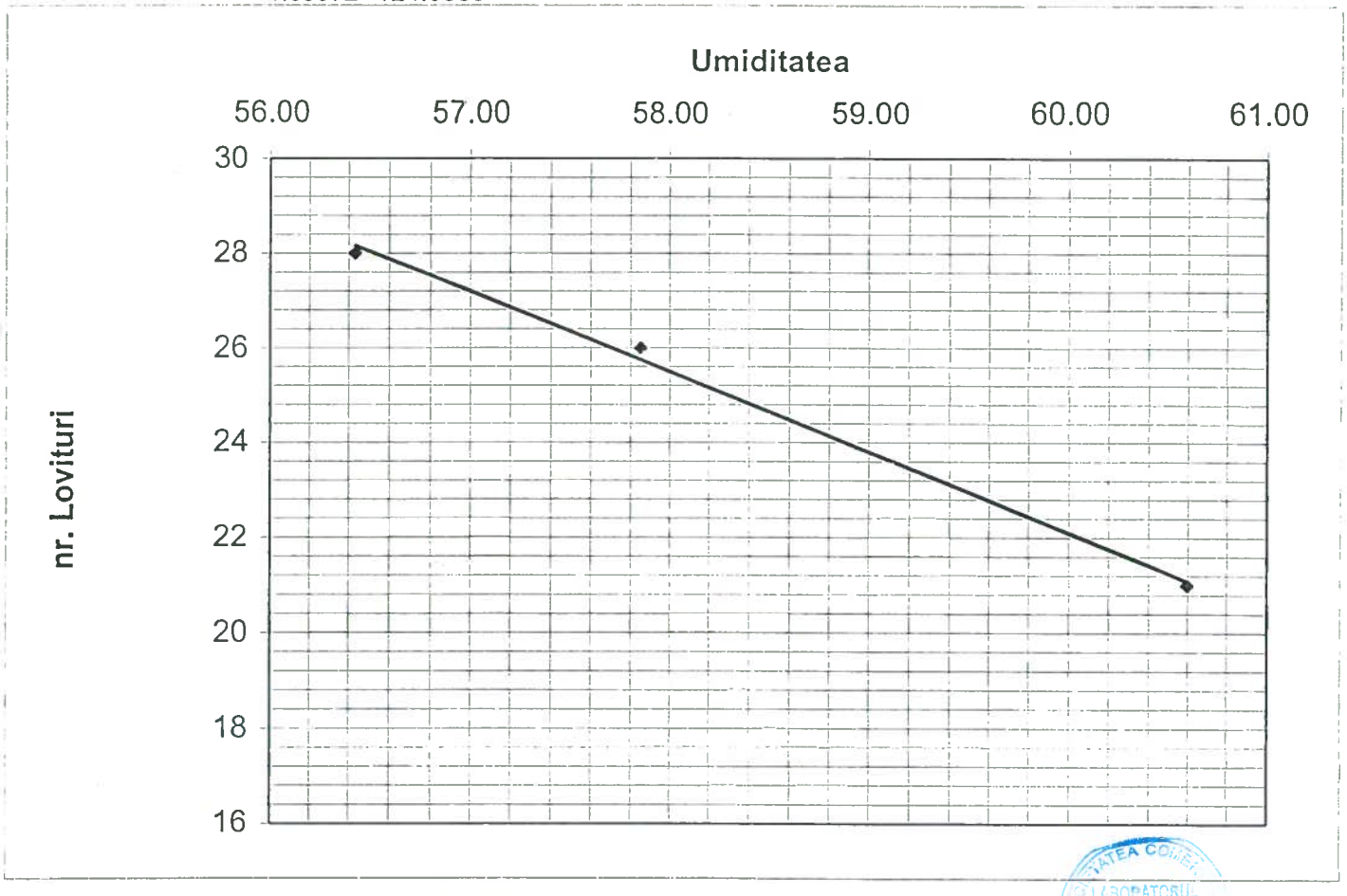
# Raport nr: 79.p / 28.04.2015

Data apr.2015
Operator: ing.Lixandroiu C.

Limita de curgere $W_L$: 58.29
Limita de framântare $W_P$: 23.18
Umiditarea naturala, W: 26.21
Indicele de plasticitate, $I_P$: 35.11
Indicele de consistenta, $I_C$: 0.91

| Mersul determinarii | Umiditatea naturala W % | | Limita de curgere $W_L$: | | | | Limita de framântare $W_P$: | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 1 | 2 | 3 |
| Geamul nr: | 11 | 5D | | 212 | 242 | 207 | 2T | 9T | |
| nr. Lovituri | | | | 28 | 26 | 21 | | | |
| A gr | 238.63 | 284.12 | | 20.89 | 16.20 | 17.81 | 34.90 | 30.42 | |
| B gr. | 215.22 | 252.14 | | 15.67 | 12.59 | 13.55 | 32.13 | 28.51 | |
| C gr. | 125.84 | 130.25 | | 6.42 | 6.35 | 6.52 | 20.21 | 20.25 | |
| A-B | 23.41 | 31.98 | | 5.22 | 3.61 | 4.26 | 2.77 | 1.91 | |
| B-C | 89.38 | 121.89 | | 9.25 | 6.24 | 7.03 | 11.92 | 8.26 | |
| W | 26.19 | 26.24 | | 56.43 | 57.85 | 60.60 | 23.24 | 23.12 | |
| media | 26.21 | | | 58.29 | | | 23.18 | | |

-1.69972 124.0836




LABORATORUL GEOTEHNIC TRANSILVANIA

Laboratorul geotehnic

Santierul: CONSOLIDARE DN 1 - VLADENI

Foraj, sant nr.: FI 2A

Cota probei: 1.90 m

# Plasticitate-consistenta

## metoda cu cupa Casagrande si metoda cilindrilor de pamant

# Raport nr: 80.p / 28.04.2015

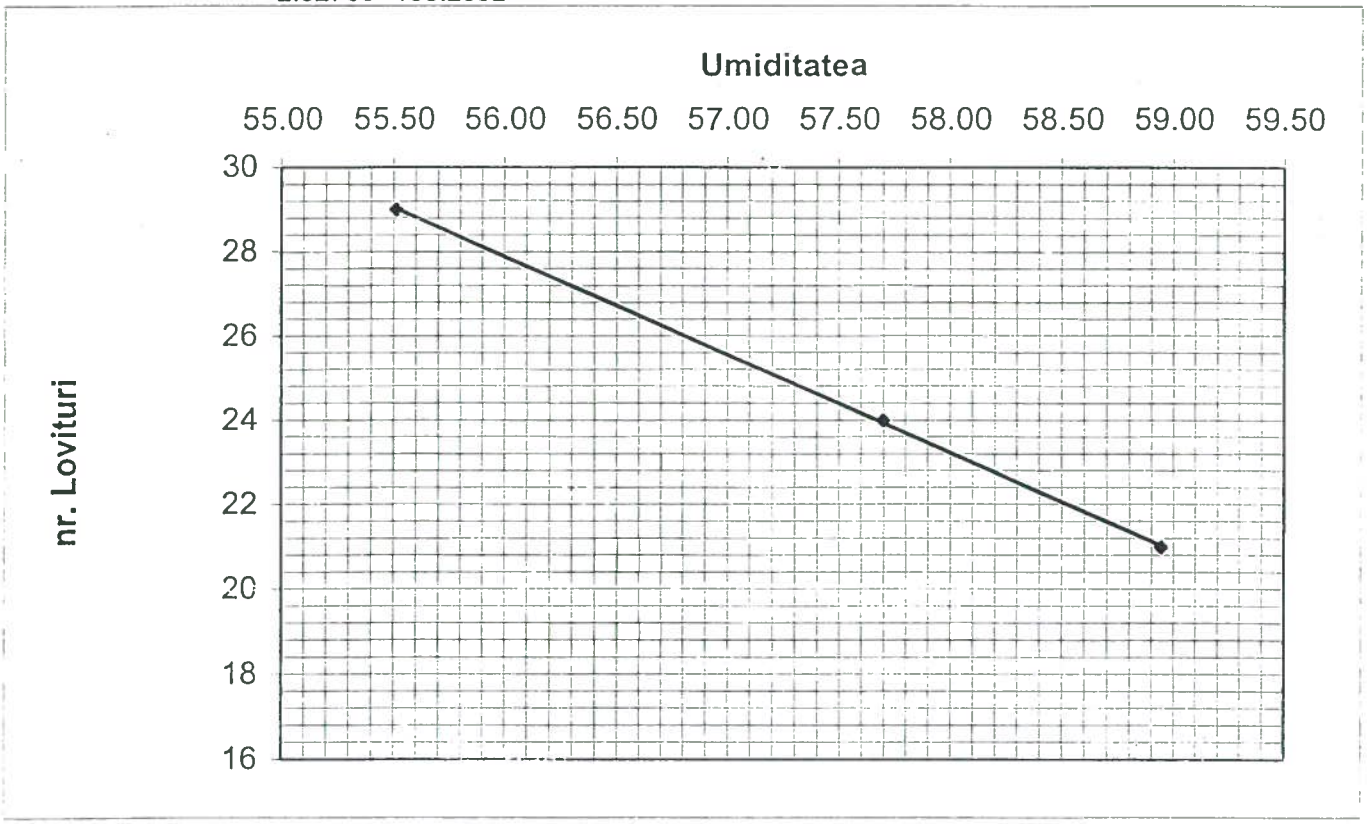
Data apr.2015

Operator: ing.Lixandroiu C.

| | |
|---|---|
| Limita de curgere $W_L$: | 57.24 |
| Limita de framântare $W_P$: | 22.27 |
| Umiditarea naturala, W: | 24.70 |
| Indicele de plasticitate, $I_P$: | 34.97 |
| Indicele de consistenta, $I_C$: | 0.93 |

| Mersul determinarii | Umiditatea naturala W % | | Limita de curgere $W_L$: | | | | Limita de framântare $W_P$: | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 1 | 2 | 3 |
| Geamul nr: | 8A | 11 | | 138 | 75 | 83 | 1E | 5G | |
| nr. Lovituri | | | | 29 | 24 | 21 | | | |
| A gr | 247.61 | 263.02 | | 19.36 | 17.74 | 19.73 | 16.89 | 16.29 | |
| B gr. | 225.16 | 236.91 | | 14.93 | 13.43 | 14.82 | 15.40 | 15.01 | |
| C gr. | 134 | 131.54 | | 6.95 | 5.96 | 6.49 | 8.76 | 9.22 | |
| A-B | 22.45 | 26.11 | | 4.43 | 4.31 | 4.91 | 1.49 | 1.28 | |
| B-C | 91.16 | 105.37 | | 7.98 | 7.47 | 8.33 | 6.64 | 5.79 | |
| W | 24.63 | 24.78 | | 55.51 | 57.70 | 58.94 | 22.44 | 22.11 | |
| media | 24.70 | | | 57.38 | | | 22.27 | | |

-2.32766 158.2392




Sef laborator,
dr. ing. Marius Mantulescu

Laboratorul geotehnic

Santierul: CONSOLIDARE DN 1 - VLADENI

Foraj, sant nr.: FI
Proba nr.: 8
Cota probei: 7.70 - 8.00 m

# Plasticitate-consistenta

## metoda cu cupa Casagrande si metoda cilindrilor de pamant

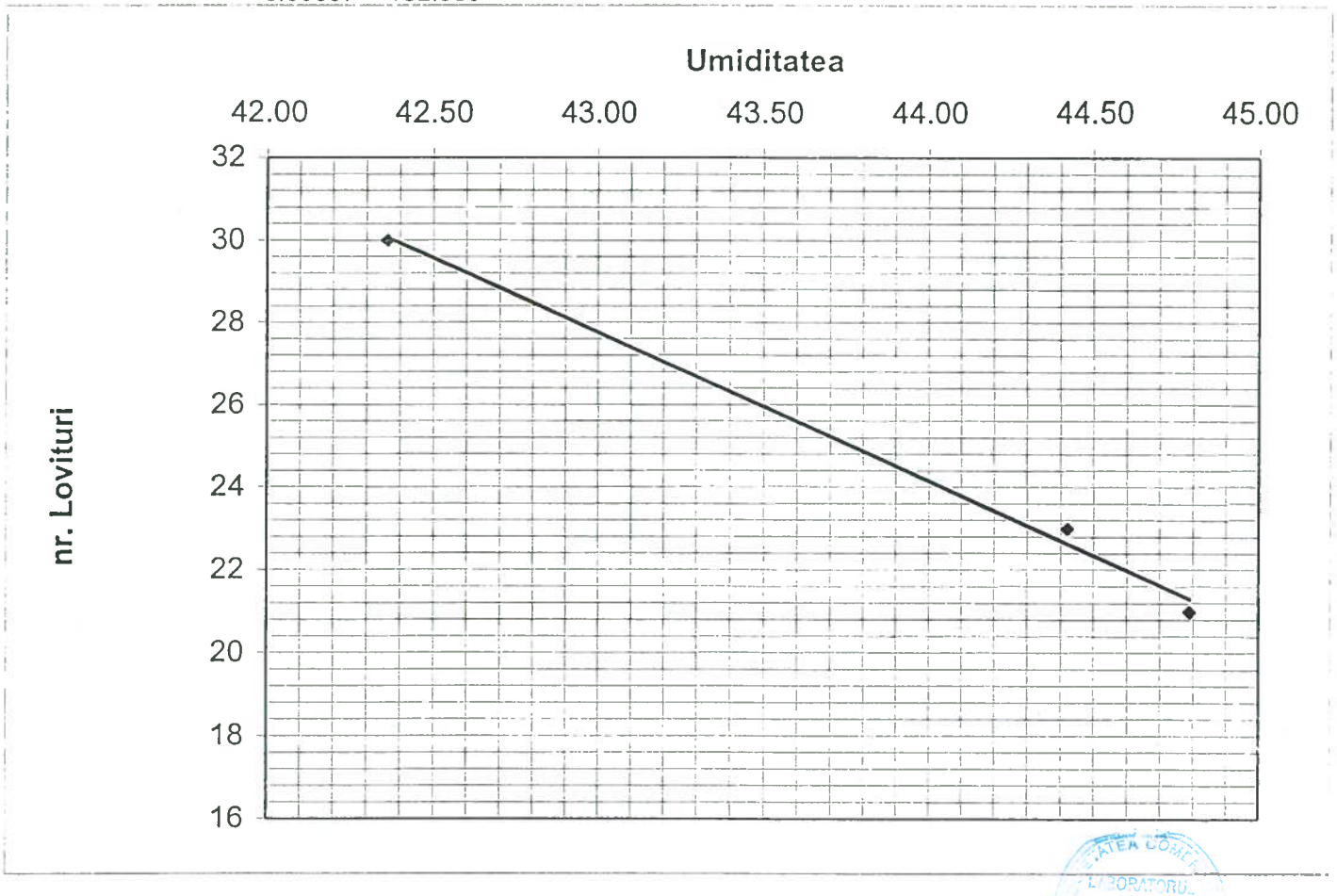
# Raport nr: 81.p / 28.04.2015

Data apr.2015
Operator: ing.Lixandroiu C.

Limita de curgere $W_L$: 43.77
Limita de framântare $W_P$: 20.10
Umiditarea naturala, W: 20.73
Indicele de plasticitate, $I_P$: 23.67
Indicele de consistenta, $I_C$: 0.97

| Mersul determinarii | Umiditatea naturala W % | | Limita de curgere $W_L$: | | | | Limita de framântare $W_P$: | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 1 | 2 | 3 |
| Geamul nr: | 12B | 3D | | 299 | 182 | 75 | 1L | 3T | |
| nr. Lovituri | | | | 30 | 23 | 21 | | | |
| A gr | 241.85 | 248.24 | | 17.21 | 19.77 | 20.35 | 24.95 | 22.60 | |
| B gr. | 223.38 | 229.12 | | 14.02 | 15.63 | 15.88 | 22.91 | 21.03 | |
| C gr. | 136.69 | 134.25 | | 6.49 | 6.31 | 5.90 | 12.98 | 13.04 | |
| A-B | 18.47 | 19.12 | | 3.19 | 4.14 | 4.47 | 2.04 | 1.57 | |
| B-C | 86.69 | 94.87 | | 7.53 | 9.32 | 9.98 | 9.93 | 7.99 | |
| W | 21.31 | 20.15 | | 42.36 | 44.42 | 44.79 | 20.54 | 19.65 | |
| media | 20.73 | | | 43.86 | | | 20.10 | | |

-3.60637 182.835



Laboratorul geotehnic

Santierul: CONSOLIDARE DN 1 - VLADENI

Foraj, sant nr.: FI 10

Cota probei: 10.00 m

# Plasticitate-consistenta

## metoda cu cupa Casagrande si metoda cilindrilor de pamant

# Raport nr: 82.p / 28.04.2015

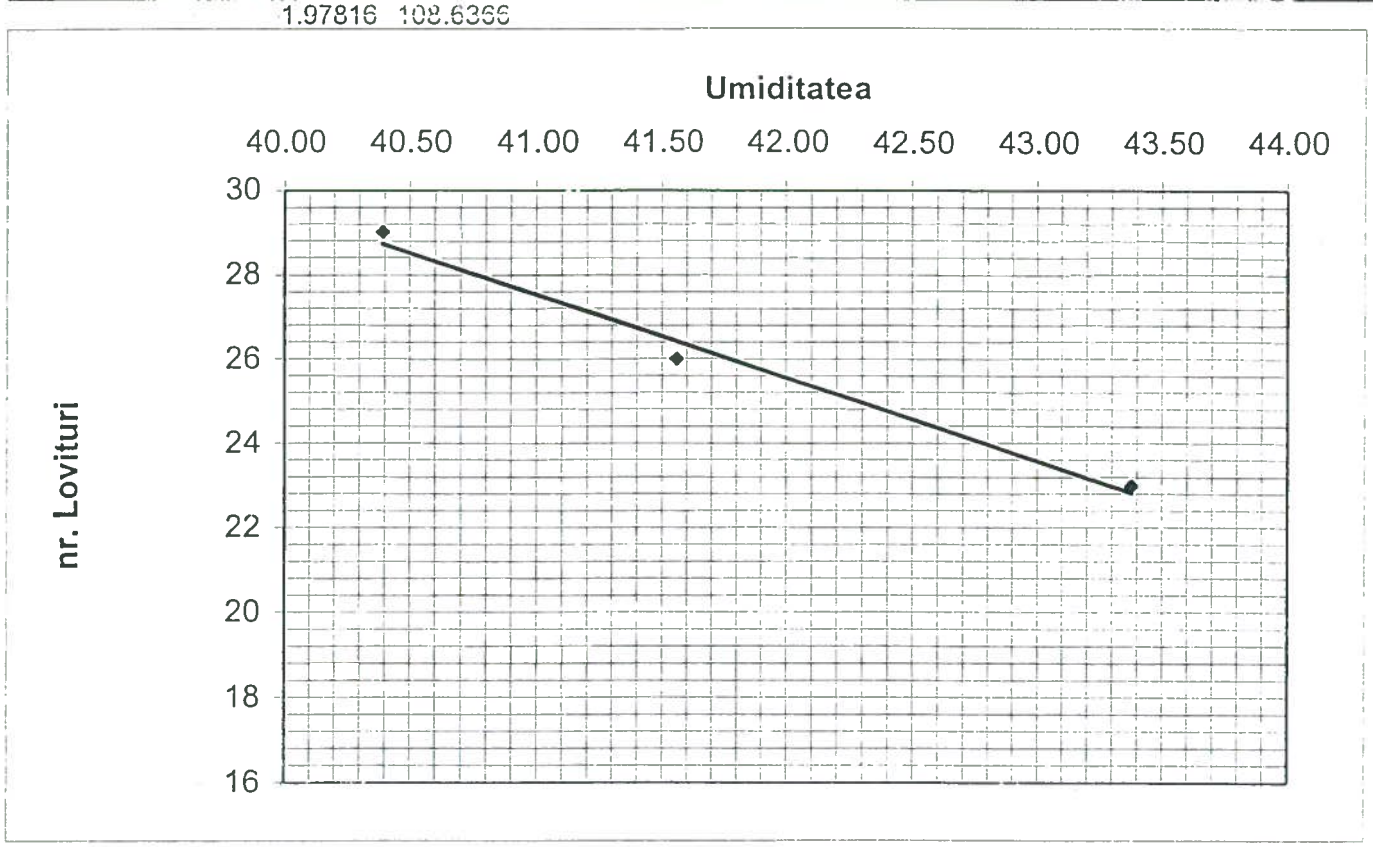
Data apr.2015

Operator: ing.Lixandroiu C.

| | |
|---|---|
| Limita de curgere $W_L$: | 42.28 |
| Limita de framântare $W_P$: | 20.61 |
| Umiditarea naturala, W: | 12.72 |
| Indicele de plasticitate, $I_P$: | 21.67 |
| Indicele de consistenta, $I_C$: | 1.36 |

| Mersul determinarii | Umiditatea naturala W % | | Limita de curgere $W_L$: | | | | Limita de framântare $W_P$: | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 1 | 2 | 3 |
| Geamul nr: | 5B | 14 | | 27 | 71 | 263 | 3Y | 7G | |
| nr. Lovituri | | | | 29 | 26 | 23 | | | |
| A gr | 283.14 | 274.25 | | 18.46 | 19.85 | 18.24 | 16.13 | 17.66 | |
| B gr. | 266.41 | 258.19 | | 14.95 | 15.79 | 14.54 | 15.02 | 16.17 | |
| C gr. | 133.9 | 132.77 | | 6.26 | 6.02 | 6.01 | 9.58 | 9.01 | |
| A-B | 16.73 | 16.06 | | 3.51 | 4.06 | 3.70 | 1.11 | 1.49 | |
| B-C | 132.51 | 125.42 | | 8.69 | 9.77 | 8.53 | 5.44 | 7.16 | |
| W | 12.63 | 12.80 | | 40.39 | 41.56 | 43.38 | 20.40 | 20.81 | |
| media | 12.72 | | | 41.77 | | | 20.61 | | |

1.97816 108.6366




Sef laborator,
dr. ing. Marius Mantulescu

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
SETUP DATA

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 - | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FE | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |
| Sample description | argila galbui - roscata, cu intruziuni cenusii | | |
| Particle density (Mg/m$^3$) | 2.72 | Assumed / Measured | Assumed |
| Dry or submerged | submerged | Box shape | ○ round ◉ square |

| SPECIMEN 1 | | | |
|---|---|---|---|
| Specimen depth (m) | 2.25 | Machine number | A |

| Initial measurements | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 60.1 | Specimen area (mm$^2$) | 3600.0 |
| Mass of specimen + cutter (g) | 193.9 | Mass of specimen (g) | 133.8 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| Trimmings moisture content | | Final moisture content | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 193.90 | Mass of wet soil + tin (g) | 194.38 |
| Mass of dry soil + tin (g) | 157.54 | Mass of dry soil + tin (g) | 157.54 |
| Mass of tin (g) | 60.09 | Mass of tin (g) | 60.09 |

| Applied stress | | | |
|---|---|---|---|
| Mass directly applied (kg) | 36.00 | Total mass on specimen (kg) | 36.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 98 |
| Load arm ratio (**:1) | 0.1 | | |

| Consolidation stage | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.000 |
| t100 (root mins) | | 2.80 |
| t100 (mins) | | 7.84 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 99.57 |
| Rate of displacement (mm/min) | Calculated | 0.100434 |
| | Actual | 0.100000 |

| Shear stage | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**SETUP DATA**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 - | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FE | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |
| Sample description | argila galbui - roscata, cu intruziuni cenusii | | |

| | | | |
|---|---|---|---|
| Particle density (Mg/m$^3$) | 2.72 | Assumed / Measured | Assumed |
| Dry or submerged | submerged | Box shape | ○ round ◉ square |

| SPECIMEN 2 | | | |
|---|---|---|---|
| Specimen depth (m) | 2.20 | Machine number | B |

| Initial measurements | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 61.2 | Specimen area (mm$^2$) | 3600.0 |
| Mass of specimen + cutter (g) | 196.4 | Mass of specimen (g) | 135.2 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| Trimmings moisture content | | Final moisture content | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 196.44 | Mass of wet soil + tin (g) | 195.94 |
| Mass of dry soil + tin (g) | 162.02 | Mass of dry soil + tin (g) | 162.02 |
| Mass of tin (g) | 61.22 | Mass of tin (g) | 61.22 |

| Applied stress | | | |
|---|---|---|---|
| Mass directly applied (kg) | 72.00 | Total mass on specimen (kg) | 72.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 196 |
| Load arm ratio (**:1) | 0.1 | | |

| Consolidation stage | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.200 |
| t100 (root mins) | | 2.80 |
| t100 (mins) | | 7.84 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 99.57 |
| Rate of displacement (mm/min) | Calculated | 0.100434 |
| | Actual | 0.100000 |

| Shear stage | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**SETUP DATA**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 - | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FE | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |
| Sample description | argila galbui - roscata, cu intruziuni cenusii | | |
| Particle density (Mg/m$^3$) | 2.72 | Assumed / Measured | Assumed |
| Dry or submerged | submerged | Box shape | ○ round ◉ square |

| | |
|---|---|
| **SPECIMEN 3** | |
| Specimen depth (m) | 2.10 |
| Machine number | A |

| **Initial measurements** | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 60.3 | Specimen area (mm$^2$) | 3600.0 |
| Mass of specimen + cutter (g) | 193.9 | Mass of specimen (g) | 133.7 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| **Trimmings moisture content** | | **Final moisture content** | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 193.90 | Mass of wet soil + tin (g) | 194.72 |
| Mass of dry soil + tin (g) | 158.79 | Mass of dry soil + tin (g) | 158.79 |
| Mass of tin (g) | 60.27 | Mass of tin (g) | 60.27 |

| **Applied stress** | | | |
|---|---|---|---|
| Mass directly applied (kg) | 108.00 | Total mass on specimen (kg) | 108.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 294 |
| Load arm ratio (**:1) | 0.1 | | |

| **Consolidation stage** | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.300 |
| t100 (root mins) | | 2.80 |
| t100 (mins) | | 7.84 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 99.57 |
| Rate of displacement (mm/min) | Calculated | 0.100434 |
| | Actual | 0.100000 |

| **Shear stage** | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)

**TEST REPORT - SUMMARY**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 - | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FE | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |
| Sample description | argila galbui - roscata, cu intruziuni cenusii | | |
| Particle density (Mg/m$^3$) | 2.72 (Assumed) | | Specimens tested submerged |

| INITIAL CONDITIONS | Specimen 1 | Specimen 2 | Specimen 3 |
|---|---|---|---|
| Specimen depth (m) | 2.25 | 2.20 | 2.10 |
| Specimen height (mm) | 20.0 | 20.0 | 20.0 |
| Length (mm) | 60.0 | 60.0 | 60.0 |
| Width (mm) | 60.0 | 60.0 | 60.0 |
| Area (mm$^2$) | 3600.0 | 3600.0 | 3600.0 |
| Moisture content (measured) (%) | 37 | 34 | 36 |
| Moisture content (trimmings) (%) | 37 | 34 | 36 |
| Bulk density (Mg/m$^3$) | 1.86 | 1.88 | 1.86 |
| Dry density (Mg/m$^3$) | 1.35 | 1.40 | 1.37 |
| Voids ratio | 1.010 | 0.943 | 0.988 |
| Degree of saturation (%) | 101 | 99 | 98 |

| | | | |
|---|---|---|---|
| Voids ratio at the end of consolidation | #VALUE! | #VALUE! | #VALUE! |

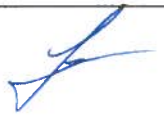
| SHEARING | | | |
|---|---|---|---|
| Rate of displacement (mm/min) | 0.100000 | 0.100000 | 0.100000 |
| **Conditions at peak shear stress** | | | |
| Normal stress (kPa) | 98 | 196 | 294 |
| Shear stress (kPa) | 69 | 109 | 124 |
| Horizontal displacement (mm) | 1.89 | 3.26 | 5.59 |
| Vertical deformation (mm) | -0.031 | -0.254 | -0.451 |

| | |
|---|---|
| Apparent cohesion (kPa) | 46.1 |
| Angle of shearing resistance (°) | 15.5 |

Comments / variations from procedures:

| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
|---|---|---|---|---|---|
| Date | 20.04.2015 | Date | 20.04.2015 | Date | 21.04.2015 |

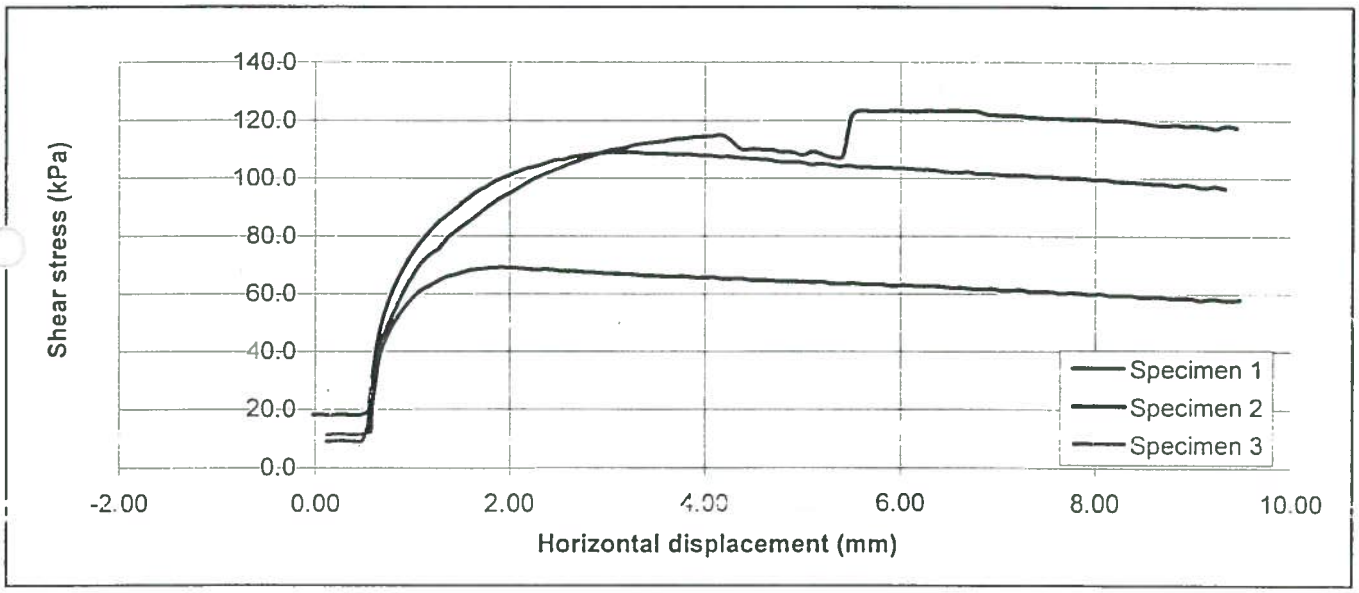


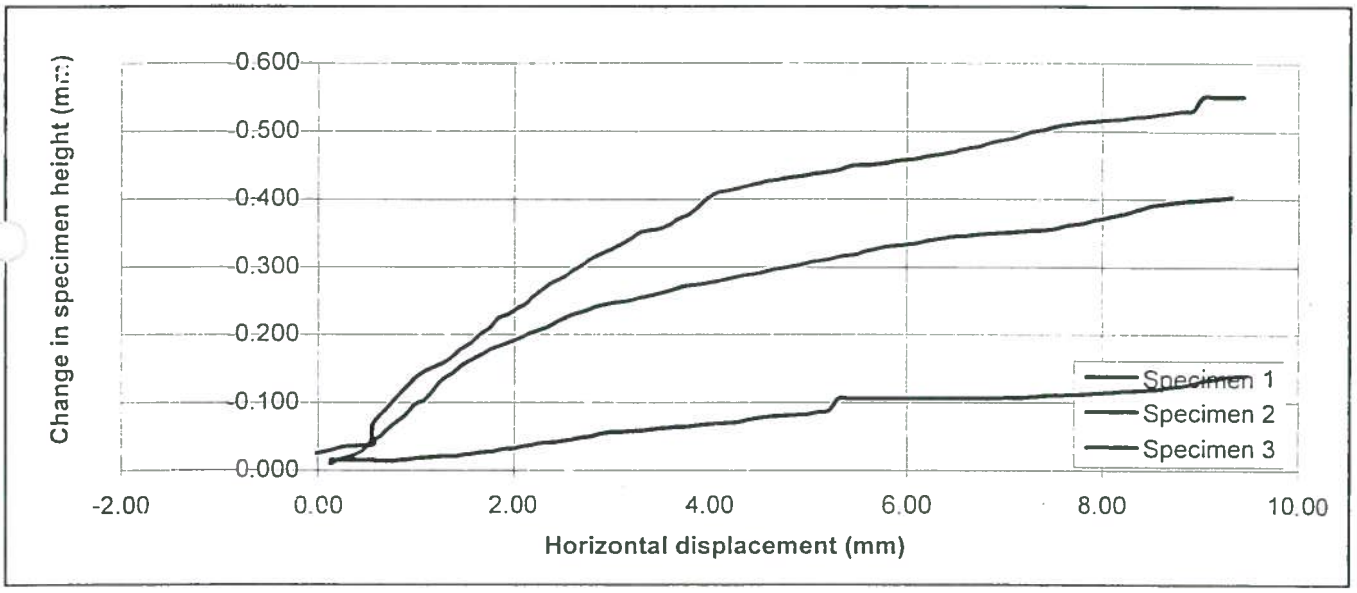




DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**TEST REPORT - SHEARING**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 - | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FE | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |



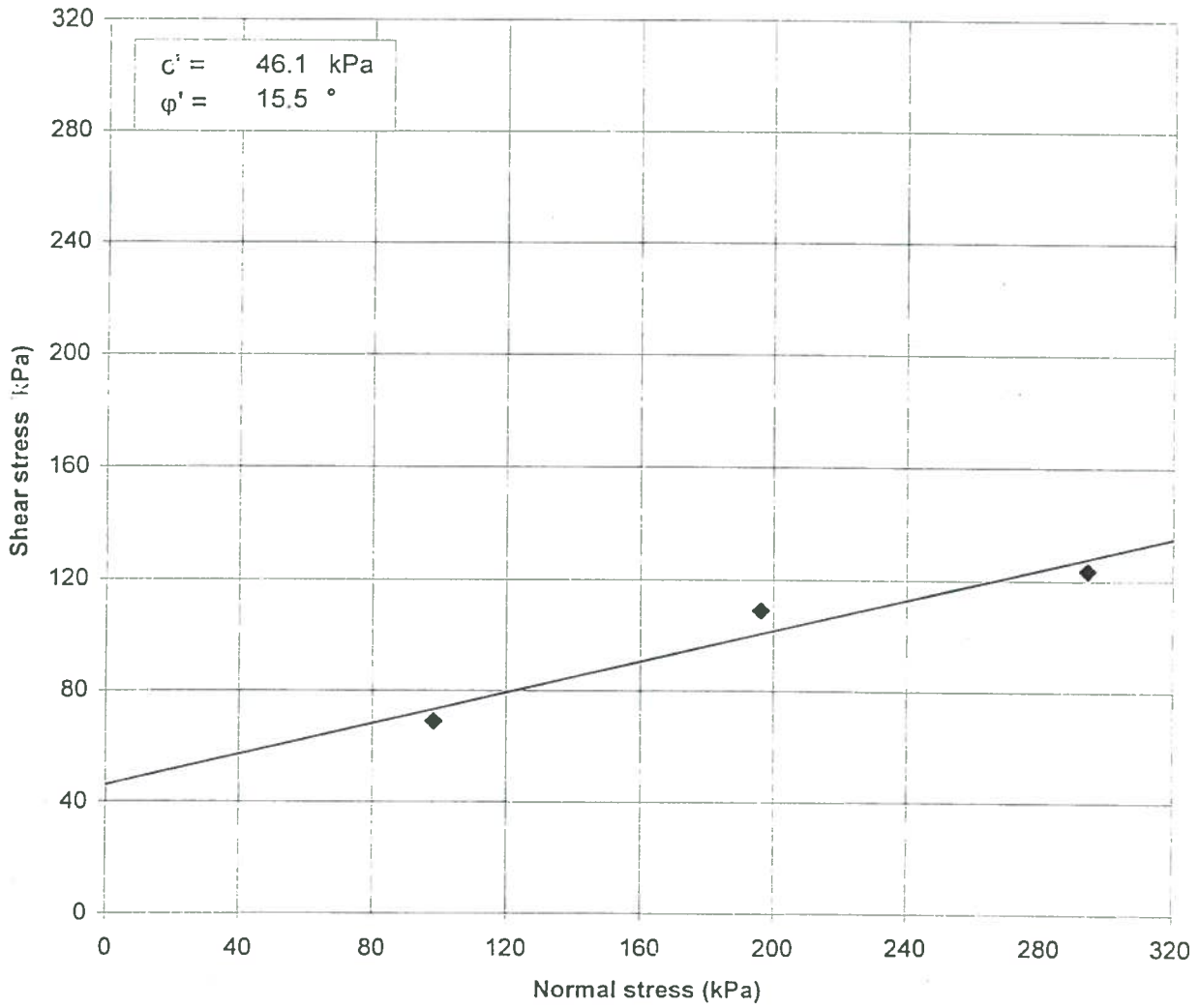




| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
| Date | 20.04.2015 | Date | 20.04.2015 | Date | 21.04.2015 |

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)

**TEST REPORT - SHEARING**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 - | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FE | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |




| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
| Date | 20.04.2015 | Date | 20.04.2015 | Date | 21.04.2015 |

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
SETUP DATA

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FF | Sample type | Undisturbed cohesive |
| Sample number | pr 3 | Specimen orientation | Vertical |
| Sample description | praf argilos | | |
| Particle density (Mg/m$^3$) | 2.67 | Assumed / Measured | Assumed |
| Dry or submerged | dry | Box shape | ○ round ◉ square |

| SPECIMEN 1 | | | |
|---|---|---|---|
| Specimen depth (m) | 2.25 | Machine number | A |

| Initial measurements | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 65.7 | Specimen area (mm$^2$) | 3600.0 |
| Mass of specimen + cutter (g) | 217.9 | Mass of specimen (g) | 152.2 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| Trimmings moisture content | | Final moisture content | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 217.88 | Mass of wet soil + tin (g) | 215.71 |
| Mass of dry soil + tin (g) | 195.74 | Mass of dry soil + tin (g) | 195.74 |
| Mass of tin (g) | 65.70 | Mass of tin (g) | 65.70 |

| Applied stress | | | |
|---|---|---|---|
| Mass directly applied (kg) | 36.00 | Total mass on specimen (kg) | 36.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 98 |
| Load arm ratio (**:1) | 0.1 | | |

| Consolidation stage | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.000 |
| t100 (root mins) | | 4.00 |
| t100 (mins) | | 16.00 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 203.20 |
| Rate of displacement (mm/min) | Calculated | 0.049213 |
| | Actual | 0.050000 |

| Shear stage | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**SETUP DATA**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FF | Sample type | Undisturbed cohesive |
| Sample number | pr 3 | Specimen orientation | Vertical |
| Sample description | praf argilos | | |

| | | | |
|---|---|---|---|
| Particle density (Mg/m$^3$) | 2.67 | Assumed / Measured | Assumed |
| Dry or submerged | dry | Box shape | ○ round ◉ square |

**SPECIMEN 2**

| | | | |
|---|---|---|---|
| ecimen depth (m) | 2.20 | Machine number | B |

**Initial measurements**

| | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 64.7 | Specimen area (mm$^2$) | 3600.0 |
| Mass of specimen + cutter (g) | 211.5 | Mass of specimen (g) | 146.8 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| Trimmings moisture content | | Final moisture content | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 211.48 | Mass of wet soil + tin (g) | 210.35 |
| Mass of dry soil + tin (g) | 188.72 | Mass of dry soil + tin (g) | 188.72 |
| Mass of tin (g) | 64.73 | Mass of tin (g) | 64.73 |

**Applied stress**

| | | | |
|---|---|---|---|
| Mass directly applied (kg) | 72.00 | Total mass on specimen (kg) | 72.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 196 |
| ad arm ratio (**:1) | 0.1 | | |

**Consolidation stage**

| | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.200 |
| t100 (root mins) | | 4.00 |
| t100 (mins) | | 16.00 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 203.20 |
| Rate of displacement (mm/min) | Calculated | 0.049213 |
| | Actual | 0.050000 |

**Shear stage**

| | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
SETUP DATA

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FF | Sample type | Undisturbed cohesive |
| Sample number | pr 3 | Specimen orientation | Vertical |
| Sample description | praf argilos | | |

| | | | |
|---|---|---|---|
| Particle density (Mg/m$^3$) | 2.67 | Assumed / Measured | Assumed |
| Dry or submerged | dry | Box shape | ○ round ◉ square |

| SPECIMEN 3 | | | |
|---|---|---|---|
| ecimen depth (m) | 2.10 | Machine number | A |

| Initial measurements | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 64.4 | Specimen area (mm$^2$) | 3600.0 |
| Mass of specimen + cutter (g) | 208.2 | Mass of specimen (g) | 143.9 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| Trimmings moisture content | | Final moisture content | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 208.24 | Mass of wet soil + tin (g) | 208.62 |
| Mass of dry soil + tin (g) | 186.23 | Mass of dry soil + tin (g) | 186.23 |
| Mass of tin (g) | 64.37 | Mass of tin (g) | 64.37 |

| Applied stress | | | |
|---|---|---|---|
| Mass directly applied (kg) | 108.00 | Total mass on specimen (kg) | 108.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 294 |
| ad arm ratio (**:1) | 0.1 | | |

| Consolidation stage | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.300 |
| t100 (root mins) | | 2.80 |
| t100 (mins) | | 7.84 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 99.57 |
| Rate of displacement (mm/min) | Calculated | 0.100434 |
| | Actual | 0.100000 |

| Shear stage | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**TEST REPORT - SUMMARY**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FF | Sample type | Undisturbed cohesive |
| Sample number | pr 3 | Specimen orientation | Vertical |
| Sample description | praf argilos | | |
| Particle density (Mg/m$^3$) | 2.67 (Assumed) | | Specimens tested dry |

| INITIAL CONDITIONS | Specimen 1 | Specimen 2 | Specimen 3 |
|---|---|---|---|
| Specimen depth (m) | 2.25 | 2.20 | 2.10 |
| Specimen height (mm) | 20.0 | 20.0 | 20.0 |
| Length (mm) | 60.0 | 60.0 | 60.0 |
| Width (mm) | 60.0 | 60.0 | 60.0 |
| Area (mm$^2$) | 3600.0 | 3600.0 | 3600.0 |
| Moisture content (measured) (%) | 17 | 18 | 18 |
| Moisture content (trimmings) (%) | 17 | 18 | 18 |
| Bulk density (Mg/m$^3$) | 2.11 | 2.04 | 2.00 |
| Dry density (Mg/m$^3$) | 1.81 | 1.72 | 1.69 |
| Voids ratio | 0.478 | 0.550 | 0.578 |
| Degree of saturation (%) | 95 | 89 | 83 |

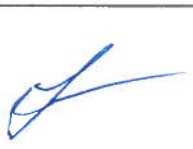
| | | | |
|---|---|---|---|
| Voids ratio at the end of consolidation | #VALUE! | #VALUE! | #VALUE! |

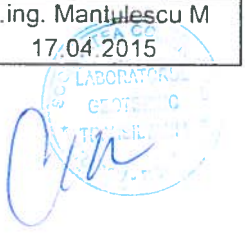
| SHEARING | | | |
|---|---|---|---|
| Rate of displacement (mm/min) | 0.050000 | 0.050000 | 0.100000 |
| **Conditions at peak shear stress** | | | |
| Normal stress (kPa) | 98 | 196 | 294 |
| Shear stress (kPa) | 178 | 198 | 279 |
| Horizontal displacement (mm) | 5.79 | 2.03 | 3.69 |
| Vertical deformation (mm) | -0.018 | -0.022 | -0.177 |

| | |
|---|---|
| Apparent cohesion (kPa) | 116.9 |
| Angle of shearing resistance (°) | 27.3 |

Comments / variations from procedures:

| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
|---|---|---|---|---|---|
| Date | 16.04.2015 | Date | 16.04.2015 | Date | 17.04.2015 |

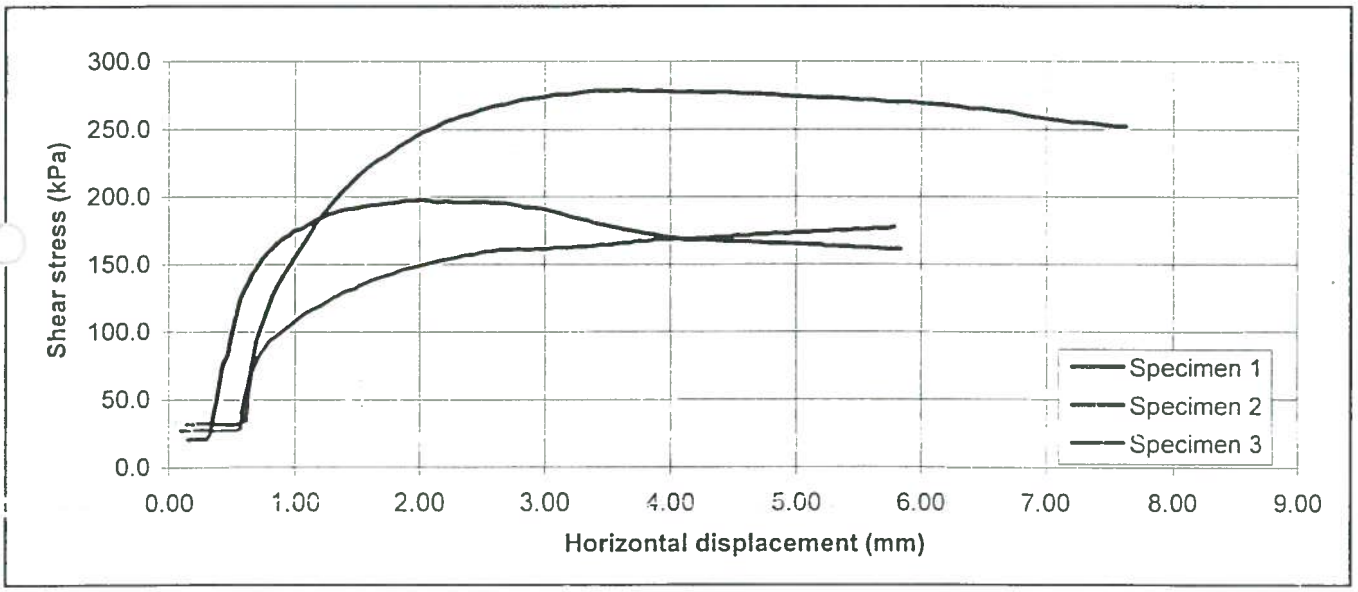


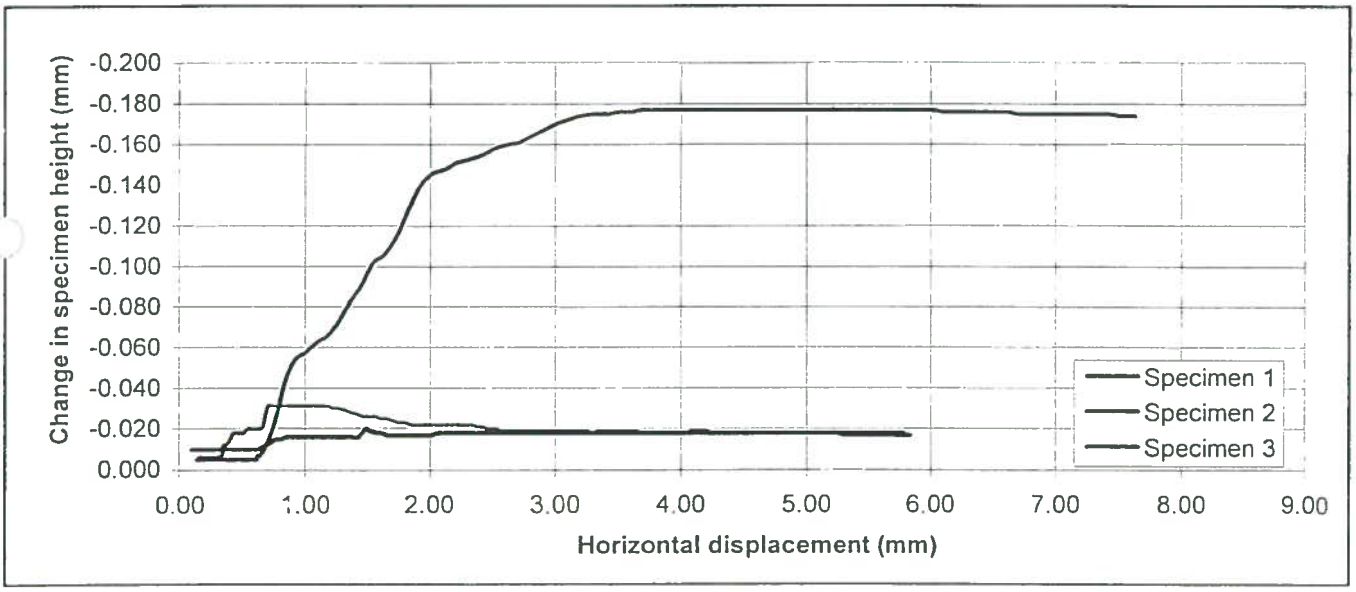


DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)

**TEST REPORT - SHEARING**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FF | Sample type | Undisturbed cohesive |
| Sample number | pr 3 | Specimen orientation | Vertical |



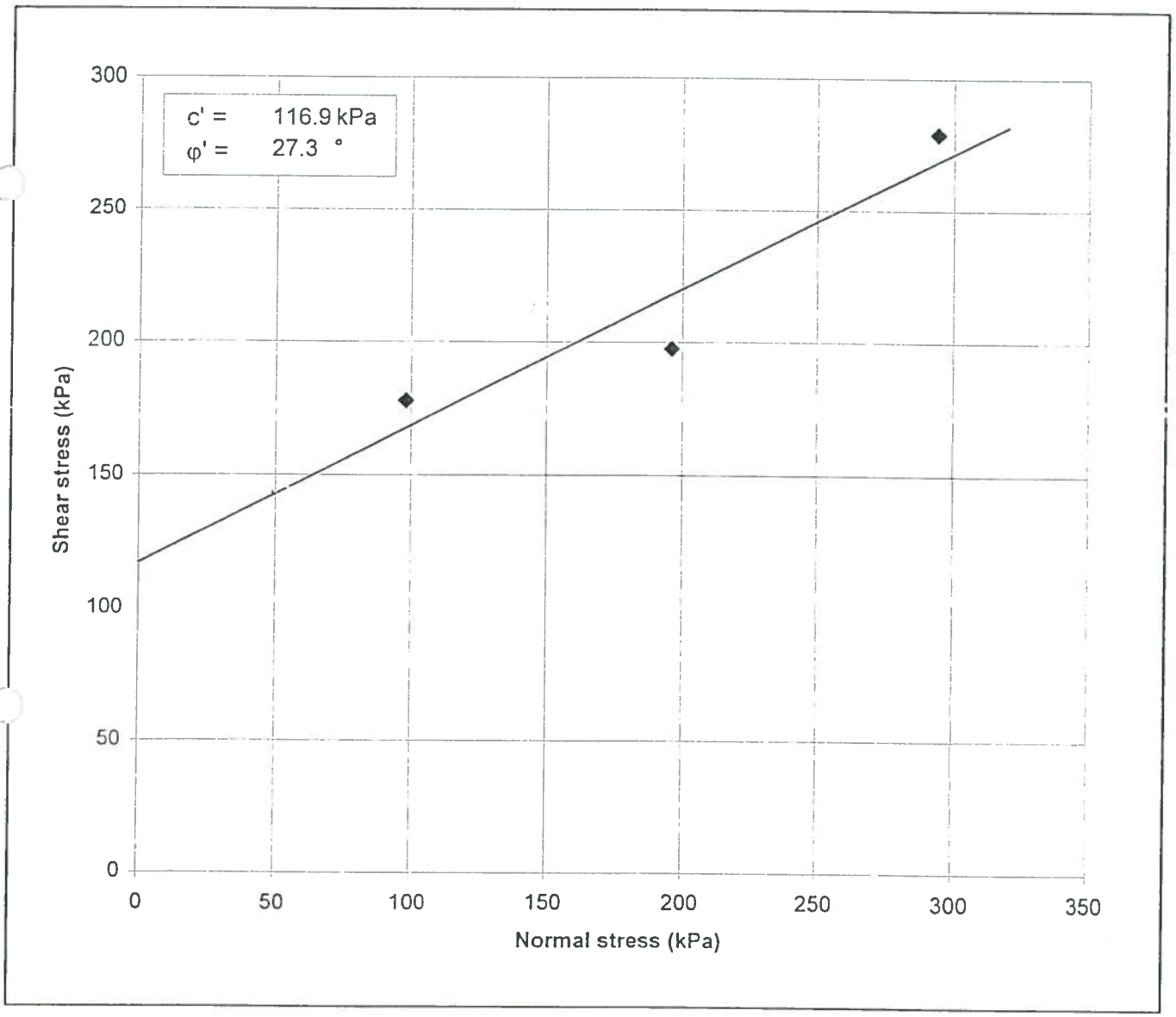




| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
| Date | 16.04.2015 | Date | 16.04.2015 | Date | 17.04.2015 |

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)

**TEST REPORT - SHEARING**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FF | Sample type | Undisturbed cohesive |
| Sample number | pr 3 | Specimen orientation | Vertical |




| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
|---|---|---|---|---|---|
| Date | 16.04.2015 | Date | 16.04.2015 | Date | 17.04.2015 |

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
SETUP DATA

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 4.0 - 4.3 |
| Borehole number | FF | Sample type | Undisturbed cohesive |
| Sample number | pr 5 | Specimen orientation | Vertical |
| Sample description* | argila canusie | | |

| | | | |
|---|---|---|---|
| Particle density (Mg/m$^3$) | 2.67 | Assumed / Measured | Assumed |
| Dry or submerged | submerged | Box shape | ○ round ◉ square |

| SPECIMEN 1 | | | |
|---|---|---|---|
| Specimen depth (m) | 4.25 | Machine number | A |

| Initial measurements | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 62.3 | Specimen area (mm$^2$) | 3600.0 |
| Mass of specimen + cutter (g) | 215.4 | Mass of specimen (g) | 153.2 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| Trimmings moisture content | | Final moisture content | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 215.44 | Mass of wet soil + tin (g) | 222.58 |
| Mass of dry soil + tin (g) | 194.97 | Mass of dry soil + tin (g) | 194.97 |
| Mass of tin (g) | 62.29 | Mass of tin (g) | 62.29 |

| Applied stress | | | |
|---|---|---|---|
| Mass directly applied (kg) | 36.00 | Total mass on specimen (kg) | 36.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 98 |
| Load arm ratio (**:1) | 0.1 | | |

| Consolidation stage | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.000 |
| t100 (root mins) | | 2.80 |
| t100 (mins) | | 7.84 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 99.57 |
| Rate of displacement (mm/min) | Calculated | 0.100434 |
| | Actual | 0.100000 |

| Shear stage | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**SETUP DATA**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 4.0 - 4.3 |
| Borehole number | FF | Sample type | Undisturbed cohesive |
| Sample number | pr 5 | Specimen orientation | Vertical |
| Sample description | argila canusie | | |

| | | | |
|---|---|---|---|
| Particle density (Mg/m$^3$) | 2.67 | Assumed / Measured | Assumed |
| Dry or submerged | submerged | Box shape | ○ round ◉ square |

| SPECIMEN 2 | | | |
|---|---|---|---|
| ecimen depth (m) | 4.20 | Machine number | B |

| Initial measurements | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 60.9 | Specimen area (mm$^2$) | 3600.0 |
| Mass of specimen + cutter (g) | 205.9 | Mass of specimen (g) | 145.0 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| Trimmings moisture content | | Final moisture content | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 205.88 | Mass of wet soil + tin (g) | 216.97 |
| Mass of dry soil + tin (g) | 185.72 | Mass of dry soil + tin (g) | 185.72 |
| Mass of tin (g) | 60.90 | Mass of tin (g) | 60.90 |

| Applied stress | | | |
|---|---|---|---|
| Mass directly applied (kg) | 72.00 | Total mass on specimen (kg) | 72.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 196 |
| ad arm ratio (**:1) | 0.1 | | |

| Consolidation stage | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.200 |
| t100 (root mins) | | 2.80 |
| t100 (mins) | | 7.84 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 99.57 |
| Rate of displacement (mm/min) | Calculated | 0.100434 |
| | Actual | 0.100000 |

| Shear stage | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**SETUP DATA**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 4.0 - 4.3 |
| Borehole number | FF | Sample type | Undisturbed cohesive |
| Sample number | pr 5 | Specimen orientation | Vertical |
| Sample description | argila canusie | | |

| | | | |
|---|---|---|---|
| Particle density (Mg/m$^3$) | 2.67 | Assumed / Measured | Assumed |
| Dry or submerged | submerged | Box shape | ○ round ◉ square |

**SPECIMEN 3**

| | | | |
|---|---|---|---|
| ecimen depth (m) | 4.10 | Machine number | A |

**Initial measurements**

| | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 63.7 | Specimen area (mm$^2$) | 3600.0 |
| Mass of specimen + cutter (g) | 200.2 | Mass of specimen (g) | 136.5 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| **Trimmings moisture content** | | **Final moisture content** | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 200.21 | Mass of wet soil + tin (g) | 211.27 |
| Mass of dry soil + tin (g) | 181.29 | Mass of dry soil + tin (g) | 181.29 |
| Mass of tin (g) | 63.67 | Mass of tin (g) | 63.67 |

**Applied stress**

| | | | |
|---|---|---|---|
| Mass directly applied (kg) | 108.00 | Total mass on specimen (kg) | 108.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 294 |
| ad arm ratio (**:1) | 0.1 | | |

**Consolidation stage**

| | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.300 |
| t100 (root mins) | | 2.80 |
| t100 (mins) | | 7.84 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 99.57 |
| Rate of displacement (mm/min) | Calculated | 0.100434 |
| | Actual | 0.100000 |

**Shear stage**

| | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)

**TEST REPORT - SUMMARY**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 4.0 - 4.3 |
| Borehole number | FF | Sample type | Undisturbed cohesive |
| Sample number | pr 5 | Specimen orientation | Vertical |
| Sample description | argila canusie | | |
| Particle density (Mg/m$^3$) | 2.67 (Assumed) | | Specimens tested submerged |

| INITIAL CONDITIONS | Specimen 1 | Specimen 2 | Specimen 3 |
|---|---|---|---|
| Specimen depth (m) | 4.25 | 4.20 | 4.10 |
| Specimen height (mm) | 20.0 | 20.0 | 20.0 |
| Length (mm) | 60.0 | 60.0 | 60.0 |
| Width (mm) | 60.0 | 60.0 | 60.0 |
| Area (mm$^2$) | 3600.0 | 3600.0 | 3600.0 |
| Moisture content (measured) (%) | 15 | 16 | 16 |
| Moisture content (trimmings) (%) | 15 | 16 | 16 |
| Bulk density (Mg/m$^3$) | 2.13 | 2.01 | 1.90 |
| Dry density (Mg/m$^3$) | 1.84 | 1.73 | 1.63 |
| Voids ratio | 0.449 | 0.540 | 0.634 |
| Degree of saturation (%) | 92 | 80 | 68 |

| | | | |
|---|---|---|---|
| Voids ratio at the end of consolidation | #VALUE! | #VALUE! | #VALUE! |

| SHEARING | | | |
|---|---|---|---|
| Rate of displacement (mm/min) | 0.100000 | 0.100000 | 0.100000 |
| **Conditions at peak shear stress** | | | |
| Normal stress (kPa) | 98 | 196 | 294 |
| Shear stress (kPa) | 144 | 149 | 166 |
| Horizontal displacement (mm) | 8.87 | 6.98 | 5.80 |
| Vertical deformation (mm) | 0.004 | -0.115 | -0.336 |

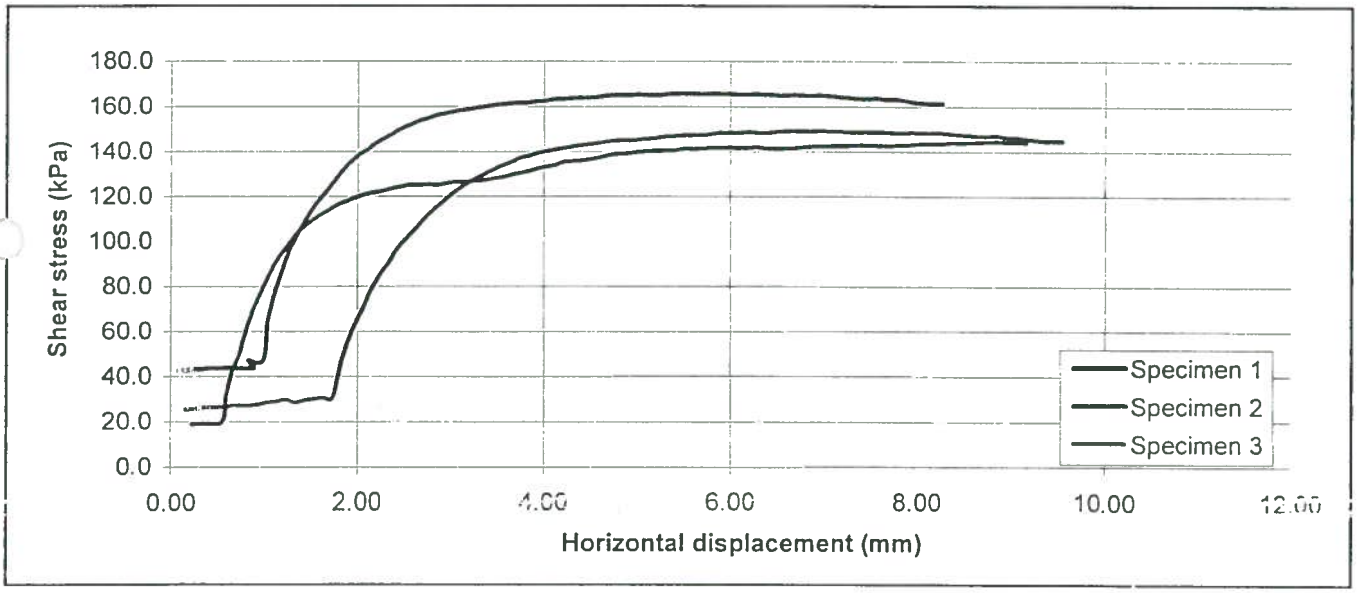
| | |
|---|---|
| Apparent cohesion (kPa) | 131.7 |
| Angle of shearing resistance (°) | 6.2 |

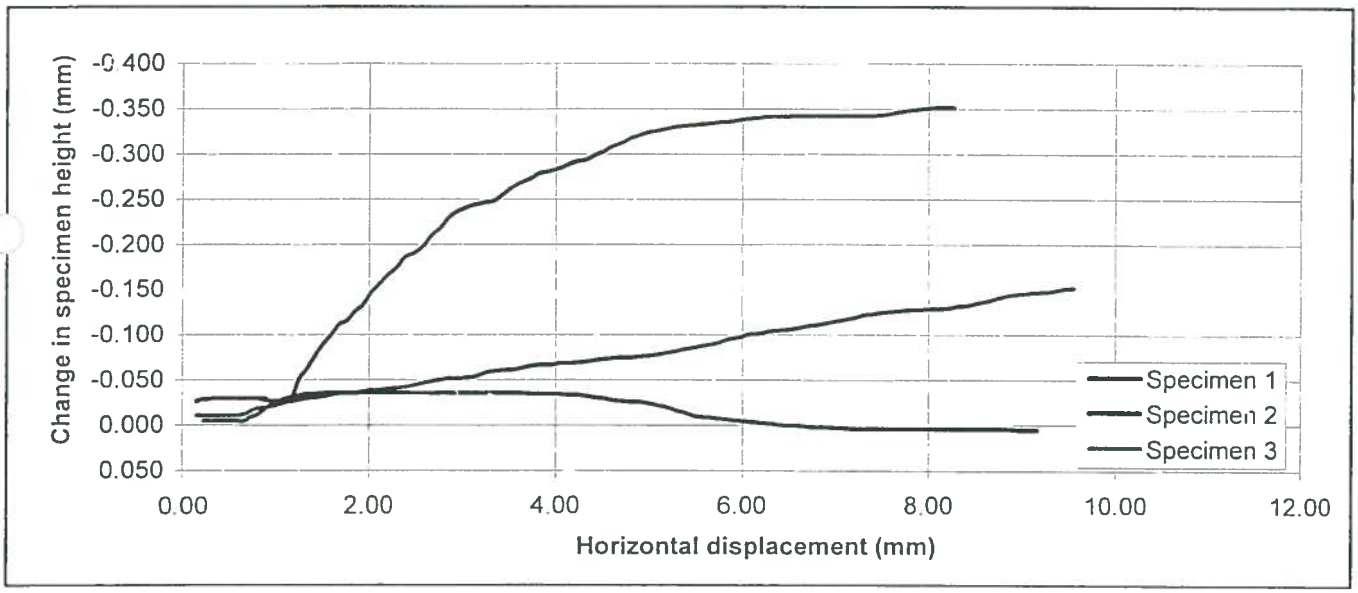
Comments / variations from procedures:

| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
| Date | 16.04.2015 | Date | 16.04.2015 | Date | 17.04.2015 |

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**TEST REPORT - SHEARING**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 4.0 - 4.3 |
| Borehole number | FF | Sample type | Undisturbed cohesive |
| Sample number | pr 5 | Specimen orientation | Vertical |



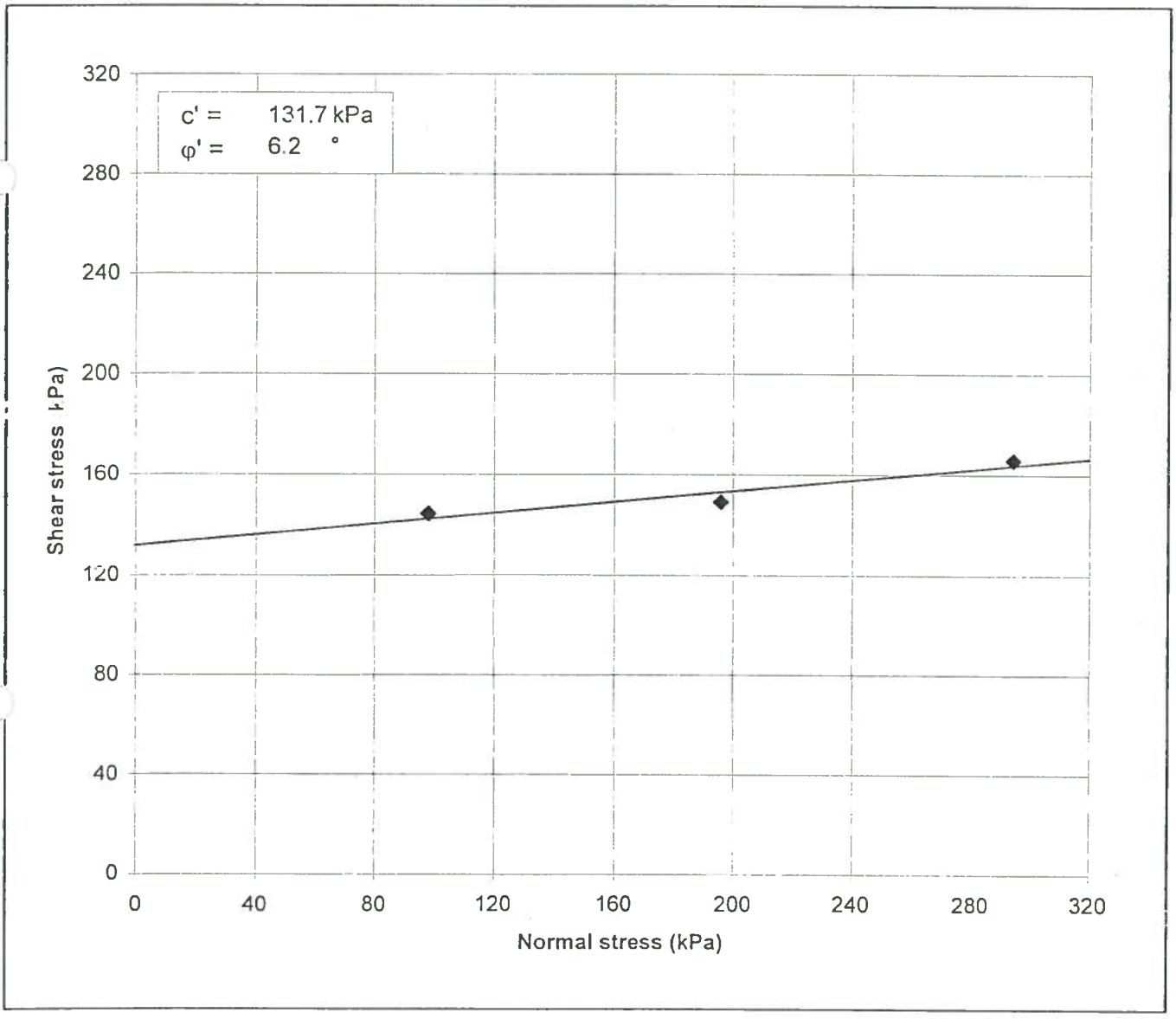




| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
| Date | 16.04.2015 | Date | 16.04.2015 | Date | 17.04.2015 |

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)

**TEST REPORT - SHEARING**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 4.0 - 4.3 |
| Borehole number | FF | Sample type | Undisturbed cohesive |
| Sample number | pr 5 | Specimen orientation | Vertical |




| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
| Date | 16.04.2015 | Date | 16.04.2015 | Date | 17.04.2015 |

S.C. GEO-TECH SRL GHEORGHENI
LABORATOR GEOTEHNIC DE GRAD II
Autorizatie Nr. 2657 Data: 20.12.2012
Gheorgheni str.Carierei nr. 6 jud.Harghita-RO

Nr.înreg. L.1209 .fP1
data: 17.04.2015

# Încercarea de forfecare directă
## STAS 8942/2-82

Obiectiv: CONSOLIDARE DN1

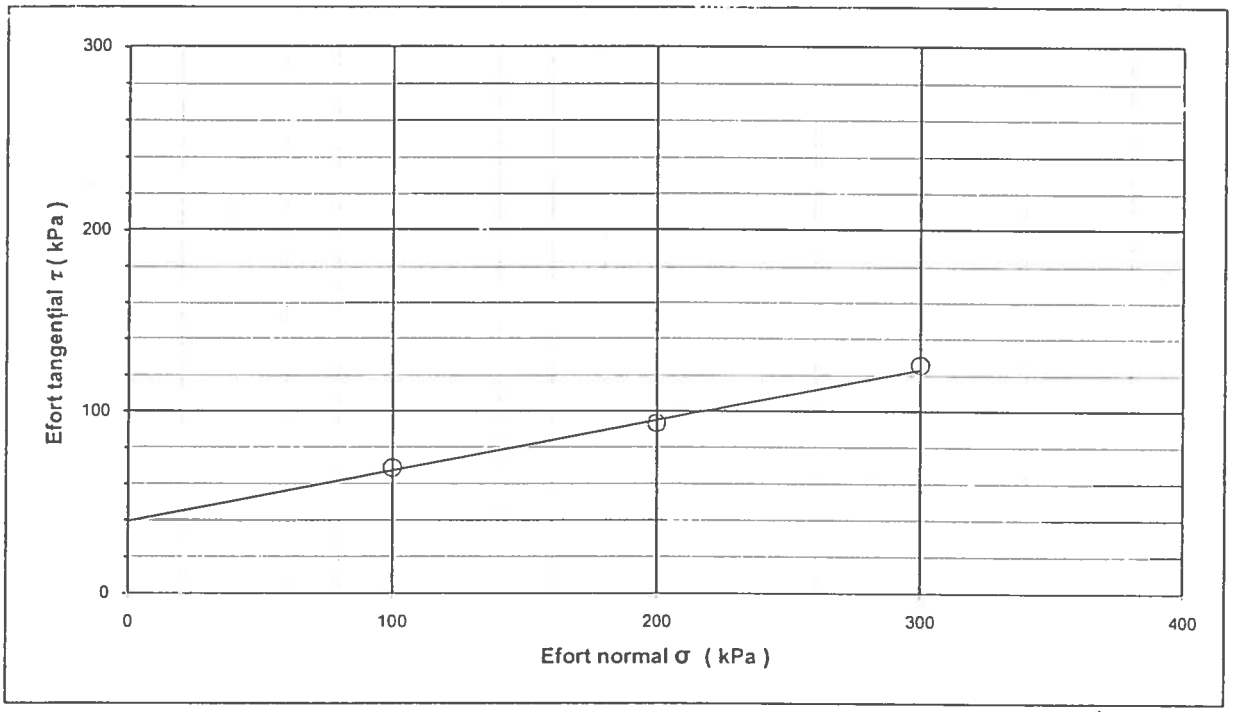
Foraj: FE  Proba: P1  Adâncime de prelevare (m): 4.00-4.30

metoda de încercare C.U. CONSOLIDAT NEDRENAT

| caseta nr / serie dinamometru | | Efort vertical ⊥ pe planul de forfecare σ (kPa) | Citire pe cadranul micrometrului (la momentul ruperii) P (1/100 mm) | Constanta inelului dinamometric C (N) | Solicitarea maximă de forfecare F=P*C (N) | Efortul de forfecare maxim $T_f$=F/A (kPa) | Viteza v mm/min |
|---|---|---|---|---|---|---|---|
| 1 | 39397-79 | 100 | 12,0 | 2,12 | 25,46 | 70,73 | 0,1 |
| 2 | 3808-80 | 200 | 15,0 | 2,12 | 31,84 | 88,43 | 0,1 |
| 3 | 12089-72 | 300 | 21,0 | 2,17 | 45,55 | 126,52 | 0,1 |

Coeziune $c_u^n$: 39,4 kPa  Unghi de frecare interna $\varphi_u^n$: 15,6 °

Descriere material:
Argilă cenușie-gălbuie cu intercalatii prăfoase-fin nisipoase, plastic vârtoasă




Întocmit:
ing.geol. Török Tiberiu

Acest buletin este înregistrat în registrul rezultate al laboratorului. Copia prezentului buletin este păstrată în arhiva S.C. Geo-Tech S.R.L.

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**SETUP DATA**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 8.0 - 8.3 |
| Borehole number | FE | Sample type | Undisturbed cohesive |
| Sample number | pr 8 | Specimen orientation | Vertical |
| Sample description | argila cenusiu deschis, cu intrcalatii feruginoase( posibil zona de trecere) | | |
| Particle density (Mg/m$^3$) | 2.72 | Assumed / Measured | Assumed |
| Dry or submerged | submerged | Box shape | ○ round ◉ square |

| SPECIMEN 1 | | | |
|---|---|---|---|
| Specimen depth (m) | 8.25 | Machine number | A |

| Initial measurements | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 63.6 | Specimen area (mm$^2$) | 3600.0 |
| Mass of specimen + cutter (g) | 214.4 | Mass of specimen (g) | 150.7 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| Trimmings moisture content | | Final moisture content | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 214.36 | Mass of wet soil + tin (g) | 219.20 |
| Mass of dry soil + tin (g) | 189.51 | Mass of dry soil + tin (g) | 189.51 |
| Mass of tin (g) | 63.64 | Mass of tin (g) | 63.64 |

| Applied stress | | | |
|---|---|---|---|
| Mass directly applied (kg) | 36.00 | Total mass on specimen (kg) | 36.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 98 |
| Load arm ratio (**:1) | 0.1 | | |

| Consolidation stage | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.000 |
| t100 (root mins) | | 4.00 |
| t100 (mins) | | 16.00 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 203.20 |
| Rate of displacement (mm/min) | Calculated | 0.049213 |
| | Actual | 0.050000 |

| Shear stage | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**SETUP DATA**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 8.0 - 8.3 |
| Borehole number | FE | Sample type | Undisturbed cohesive |
| Sample number | pr 8 | Specimen orientation | Vertical |
| Sample description | argila cenusiu deschis, cu intrcalatii feruginoase( posibil zona de trecere) | | |

| | | | |
|---|---|---|---|
| Particle density ($Mg/m^3$) | 2.72 | Assumed / Measured | Assumed |
| Dry or submerged | submerged | Box shape | ○ round ◉ square |

| SPECIMEN 2 | | | |
|---|---|---|---|
| Specimen depth (m) | 8.20 | Machine number | B |

| Initial measurements | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 61.6 | Specimen area ($mm^2$) | 3600.0 |
| Mass of specimen + cutter (g) | 210.6 | Mass of specimen (g) | 149.0 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| Trimmings moisture content | | Final moisture content | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 210.59 | Mass of wet soil + tin (g) | 215.16 |
| Mass of dry soil + tin (g) | 186.20 | Mass of dry soil + tin (g) | 186.20 |
| Mass of tin (g) | 61.56 | Mass of tin (g) | 61.56 |

| Applied stress | | | |
|---|---|---|---|
| Mass directly applied (kg) | 72.00 | Total mass on specimen (kg) | 72.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 196 |
| Load arm ratio (**:1) | 0.1 | | |

| Consolidation stage | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.200 |
| t100 (root mins) | | 4.00 |
| t100 (mins) | | 16.00 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 203.20 |
| Rate of displacement (mm/min) | Calculated | 0.049213 |
| | Actual | 0.050000 |

| Shear stage | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**SETUP DATA**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 8.0 - 8.3 |
| Borehole number | FE | Sample type | Undisturbed cohesive |
| Sample number | pr 8 | Specimen orientation | Vertical |
| Sample description | argila cenusiu deschis, cu intrcalatii feruginoase( posibil zona de trecere) | | |

| | | | |
|---|---|---|---|
| Particle density (Mg/m³) | 2.72 | Assumed / Measured | Assumed |
| Dry or submerged | submerged | Box shape | ○ round ◉ square |

| | | | |
|---|---|---|---|
| **SPECIMEN 3** | | | |
| Specimen depth (m) | 8.10 | Machine number | A |

| **Initial measurements** | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 60.1 | Specimen area (mm²) | 3600.0 |
| Mass of specimen + cutter (g) | 211.3 | Mass of specimen (g) | 151.2 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| **Trimmings moisture content** | | **Final moisture content** | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 211.32 | Mass of wet soil + tin (g) | 215.28 |
| Mass of dry soil + tin (g) | 184.62 | Mass of dry soil + tin (g) | 184.62 |
| Mass of tin (g) | 60.10 | Mass of tin (g) | 60.10 |

| **Applied stress** | | | |
|---|---|---|---|
| Mass directly applied (kg) | 108.00 | Total mass on specimen (kg) | 108.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 294 |
| Load arm ratio (**:1) | 0.1 | | |

| **Consolidation stage** | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.300 |
| t100 (root mins) | | 2.80 |
| t100 (mins) | | 7.84 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 99.57 |
| Rate of displacement (mm/min) | Calculated | 0.100434 |
| | Actual | 0.100000 |

| **Shear stage** | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**TEST REPORT - SUMMARY**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 8.0 - 8.3 |
| Borehole number | FE | Sample type | Undisturbed cohesive |
| Sample number | pr 8 | Specimen orientation | Vertical |
| Sample description | argila cenusiu deschis, cu intrcalatii feruginoase( posibil zona de trecere) | | |
| Particle density ($Mg/m^3$) | 2.72 (Assumed) | | Specimens tested submerged |

| INITIAL CONDITIONS | Specimen 1 | Specimen 2 | Specimen 3 |
|---|---|---|---|
| Specimen depth (m) | 8.25 | 8.20 | 8.10 |
| Specimen height (mm) | 20.0 | 20.0 | 20.0 |
| Length (mm) | 60.0 | 60.0 | 60.0 |
| Width (mm) | 60.0 | 60.0 | 60.0 |
| Area ($mm^2$) | 3600.0 | 3600.0 | 3600.0 |
| Moisture content (measured) (%) | 20 | 20 | 21 |
| Moisture content (trimmings) (%) | 20 | 20 | 21 |
| Bulk density ($Mg/m^3$) | 2.09 | 2.07 | 2.10 |
| Dry density ($Mg/m^3$) | 1.75 | 1.73 | 1.73 |
| Voids ratio | 0.556 | 0.571 | 0.573 |
| Degree of saturation (%) | 97 | 93 | 102 |

| | | | |
|---|---|---|---|
| Voids ratio at the end of consolidation | #VALUE! | #VALUE! | #VALUE! |

| SHEARING | | | |
|---|---|---|---|
| Rate of displacement (mm/min) | 0.050000 | 0.050000 | 0.100000 |
| **Conditions at peak shear stress** | | | |
| Normal stress (kPa) | 98 | 196 | 294 |
| Shear stress (kPa) | 102 | 121 | 156 |
| Horizontal displacement (mm) | 3.29 | 7.82 | 2.39 |
| Vertical deformation (mm) | -0.021 | -0.241 | -0.173 |

| | |
|---|---|
| Apparent cohesion (kPa) | 72.3 |
| Angle of shearing resistance (°) | 15.4 |

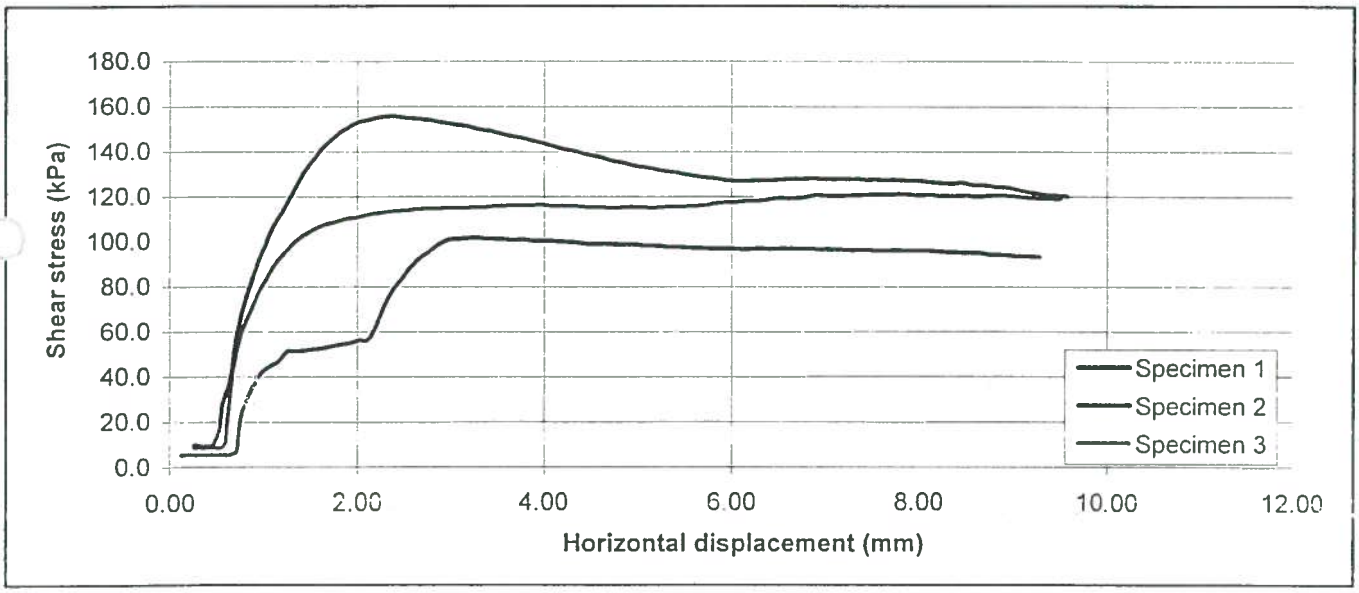
Comments / variations from procedures:

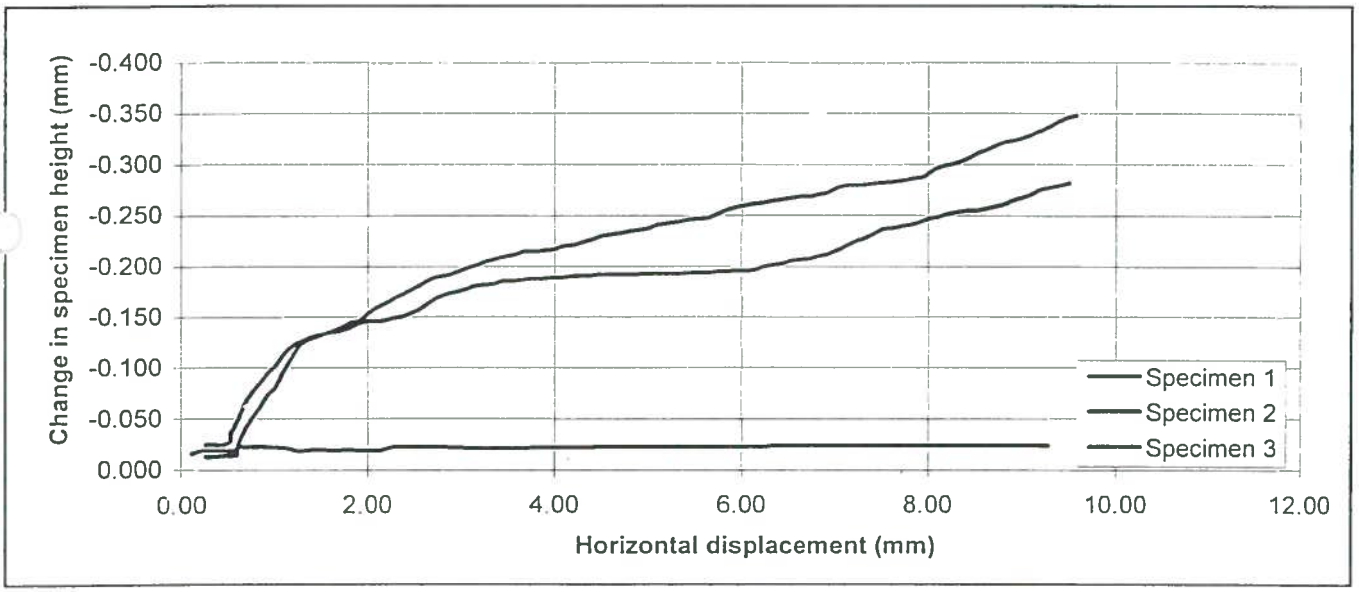
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
|---|---|---|---|---|---|
| Date | 21.04.2015 | Date | 21.04.2015 | Date | 22.04.2015 |

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)

**TEST REPORT - SHEARING**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 8.0 - 8.3 |
| Borehole number | FE | Sample type | Undisturbed cohesive |
| Sample number | pr 8 | Specimen orientation | Vertical |

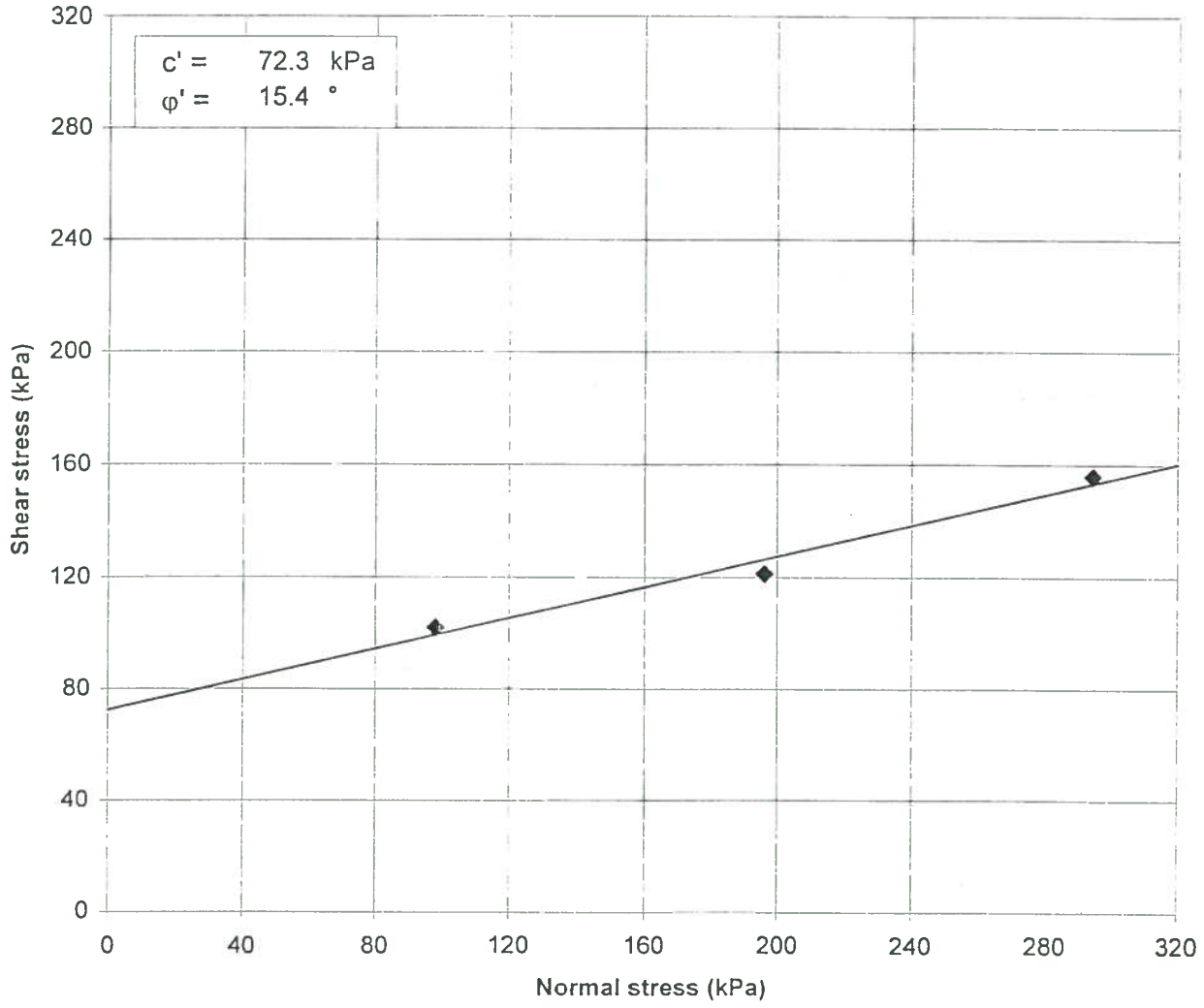



| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
| Date | 21.04.2015 | Date | 21.04.2015 | Date | 22.04.2015 |

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**TEST REPORT - SHEARING**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 8.0 - 8.3 |
| Borehole number | FE | Sample type | Undisturbed cohesive |
| Sample number | pr 8 | Specimen orientation | Vertical |




| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
| Date | 21.04.2015 | Date | 21.04.2015 | Date | 22.04.2015 |

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
SETUP DATA

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FG | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |
| Sample description | argila galbuie cu intrcalatii negricioase de sol vegetal | | |

| | | | |
|---|---|---|---|
| Particle density (Mg/m$^3$) | 2.72 | Assumed / Measured | Assumed |
| Dry or submerged | submerged | Box shape | ○ round ◉ square |

| SPECIMEN 1 | | | |
|---|---|---|---|
| Specimen depth (m) | 2.25 | Machine number | A |

| Initial measurements | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 61.0 | Specimen area (mm$^2$) | 3600.0 |
| Mass of specimen + cutter (g) | 202.7 | Mass of specimen (g) | 141.7 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| Trimmings moisture content | | Final moisture content | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 202.68 | Mass of wet soil + tin (g) | 203.62 |
| Mass of dry soil + tin (g) | 170.30 | Mass of dry soil + tin (g) | 170.30 |
| Mass of tin (g) | 61.03 | Mass of tin (g) | 61.03 |

| Applied stress | | | |
|---|---|---|---|
| Mass directly applied (kg) | 36.00 | Total mass on specimen (kg) | 36.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 98 |
| Load arm ratio (**:1) | 0.1 | | |

| Consolidation stage | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.000 |
| t100 (root mins) | | 4.00 |
| t100 (mins) | | 16.00 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 203.20 |
| Rate of displacement (mm/min) | Calculated | 0.049213 |
| | Actual | 0.050000 |

| Shear stage | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**SETUP DATA**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FG | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |
| Sample description | argila galbuie cu intrcalatii negricioase de sol vegetal | | |

| | | | |
|---|---|---|---|
| Particle density (Mg/m$^3$) | 2.72 | Assumed / Measured | Assumed |
| Dry or submerged | submerged | Box shape | ○ round ◉ square |

**SPECIMEN 2**

| | | | |
|---|---|---|---|
| Specimen depth (m) | 2.20 | Machine number | B |

**Initial measurements**

| | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 63.7 | Specimen area (mm$^2$) | 3600.0 |
| Mass of specimen + cutter (g) | 202.2 | Mass of specimen (g) | 138.4 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| **Trimmings moisture content** | | **Final moisture content** | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 202.15 | Mass of wet soil + tin (g) | 202.91 |
| Mass of dry soil + tin (g) | 169.70 | Mass of dry soil + tin (g) | 169.70 |
| Mass of tin (g) | 63.74 | Mass of tin (g) | 63.74 |

**Applied stress**

| | | | |
|---|---|---|---|
| Mass directly applied (kg) | 72.00 | Total mass on specimen (kg) | 72.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 196 |
| Load arm ratio (**:1) | 0.1 | | |

**Consolidation stage**

| | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.200 |
| t100 (root mins) | | 4.00 |
| t100 (mins) | | 16.00 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 203.20 |
| Rate of displacement (mm/min) | Calculated | 0.049213 |
| | Actual | 0.050000 |

**Shear stage**

| | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
SETUP DATA

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FG | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |
| Sample description | argila galbuie cu intrcalatii negricioase de sol vegetal | | |
| Particle density (Mg/m³) | 2.72 | Assumed / Measured | Assumed |
| Dry or submerged | submerged | Box shape | ○ round ◉ square |

| SPECIMEN 3 | | | |
|---|---|---|---|
| Specimen depth (m) | 2.10 | Machine number | A |

| Initial measurements | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 61.0 | Specimen area (mm²) | 3600.0 |
| Mass of specimen + cutter (g) | 202.3 | Mass of specimen (g) | 141.3 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| Trimmings moisture content | | Final moisture content | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 202.31 | Mass of wet soil + tin (g) | 202.29 |
| Mass of dry soil + tin (g) | 169.92 | Mass of dry soil + tin (g) | 169.92 |
| Mass of tin (g) | 61.02 | Mass of tin (g) | 61.02 |

| Applied stress | | | |
|---|---|---|---|
| Mass directly applied (kg) | 108.00 | Total mass on specimen (kg) | 108.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 294 |
| Load arm ratio (**:1) | 0.1 | | |

| Consolidation stage | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.300 |
| t100 (root mins) | | 2.80 |
| t100 (mins) | | 7.84 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 99.57 |
| Rate of displacement (mm/min) | Calculated | 0.100434 |
| | Actual | 0.100000 |

| Shear stage | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)

**TEST REPORT - SUMMARY**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FG | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |
| Sample description | argila galbuie cu intrcalatii negricioase de sol vegetal | | |
| Particle density ($Mg/m^3$) | 2.72 (Assumed) | | Specimens tested submerged |

| INITIAL CONDITIONS | Specimen 1 | Specimen 2 | Specimen 3 |
|---|---|---|---|
| Specimen depth (m) | 2.25 | 2.20 | 2.10 |
| Specimen height (mm) | 20.0 | 20.0 | 20.0 |
| Length (mm) | 60.0 | 60.0 | 60.0 |
| Width (mm) | 60.0 | 60.0 | 60.0 |
| Area ($mm^2$) | 3600.0 | 3600.0 | 3600.0 |
| Moisture content (measured) (%) | 30 | 31 | 30 |
| Moisture content (trimmings) (%) | 30 | 31 | 30 |
| Bulk density ($Mg/m^3$) | 1.97 | 1.92 | 1.96 |
| Dry density ($Mg/m^3$) | 1.52 | 1.47 | 1.51 |
| Voids ratio | 0.792 | 0.848 | 0.798 |
| Degree of saturation (%) | 102 | 98 | 101 |

| | | | |
|---|---|---|---|
| Voids ratio at the end of consolidation | #VALUE! | #VALUE! | #VALUE! |

| SHEARING | | | |
|---|---|---|---|
| Rate of displacement (mm/min) | 0.050000 | 0.050000 | 0.100000 |
| **Conditions at peak shear stress** | | | |
| Normal stress (kPa) | 98 | 196 | 294 |
| Shear stress (kPa) | 90 | 99 | 118 |
| Horizontal displacement (mm) | 2.71 | 3.75 | 3.12 |
| Vertical deformation (mm) | -0.001 | -0.198 | -0.251 |

| | |
|---|---|
| Apparent cohesion (kPa) | 74.9 |
| Angle of shearing resistance (°) | 8.0 |

Comments / variations from procedures:

| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
| Date | 22.04.2015 | Date | 22.04.2015 | Date | 23.04.2015 |

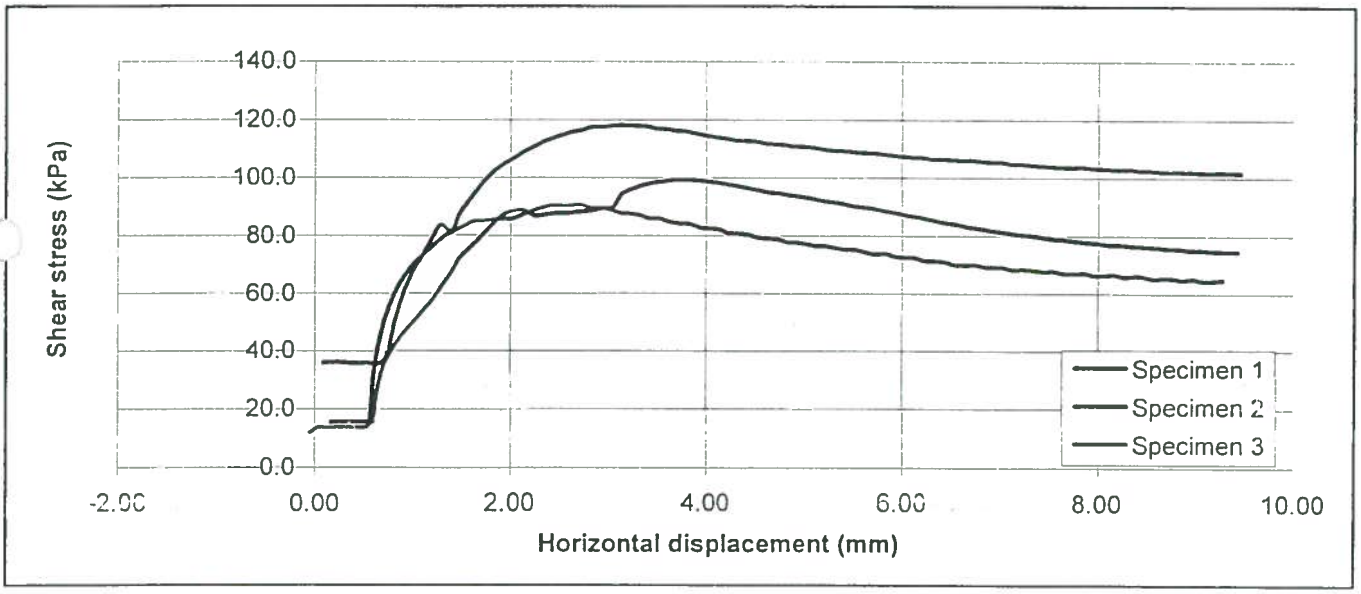


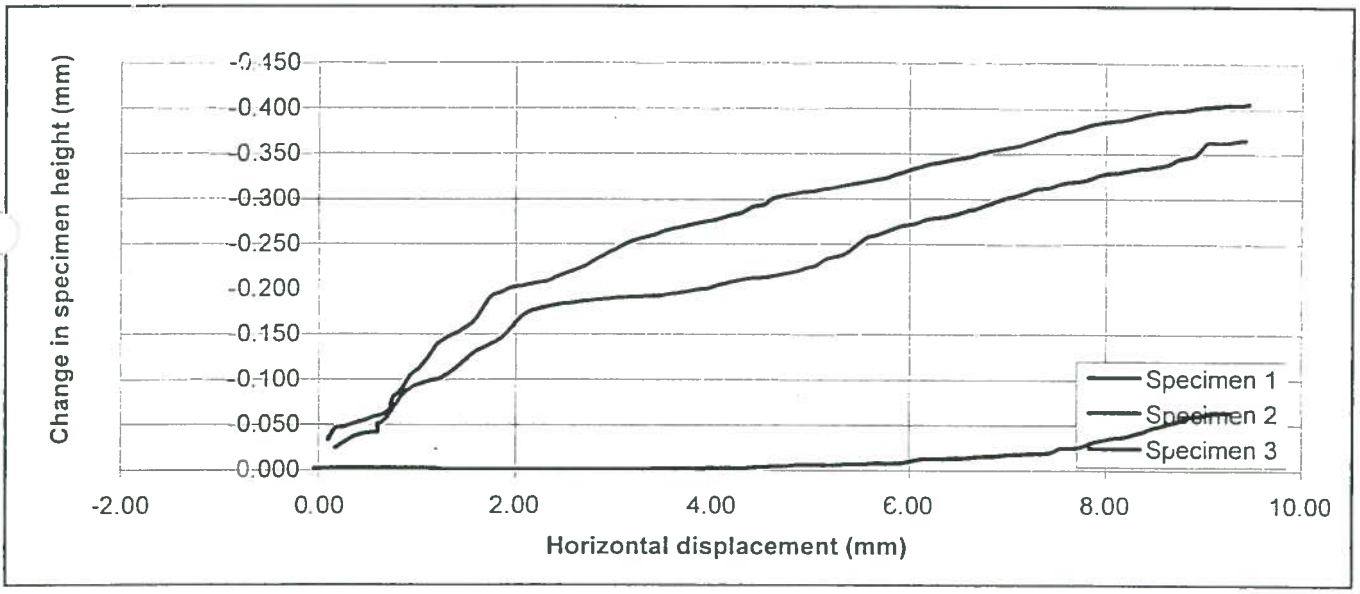




DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**TEST REPORT - SHEARING**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FG | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |

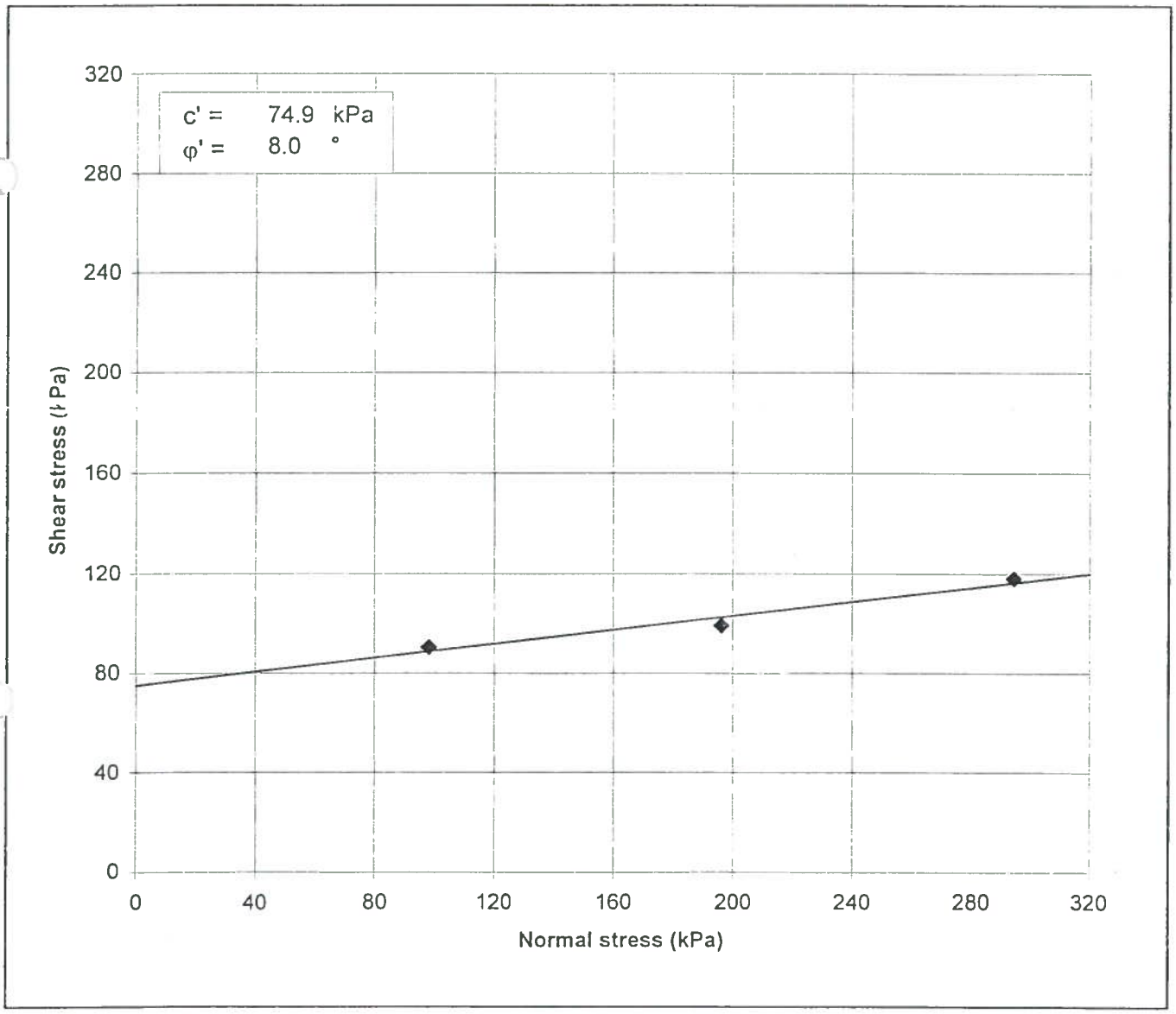



| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
| Date | 22.04.2015 | Date | 22.04.2015 | Date | 23.04.2015 |

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**TEST REPORT - SHEARING**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FG | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |




| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
| Date | 22.04.2015 | Date | 22.04.2015 | Date | 23.04.2015 |

S.C. GEO-TECH SRL GHEORGHENI
LABORATOR GEOTEHNIC DE GRAD II
Autorizatie Nr. 2657 Data: 20.12.2012
Gheorgheni str.Carierei nr. 6 jud.Harghita-RO

Nr.înreg. L.1209 .fP2
data: 17.04.2015

# Încercarea de forfecare directă

**STAS 8942/2-82**

Obiectiv: CONSOLIDARE DN1

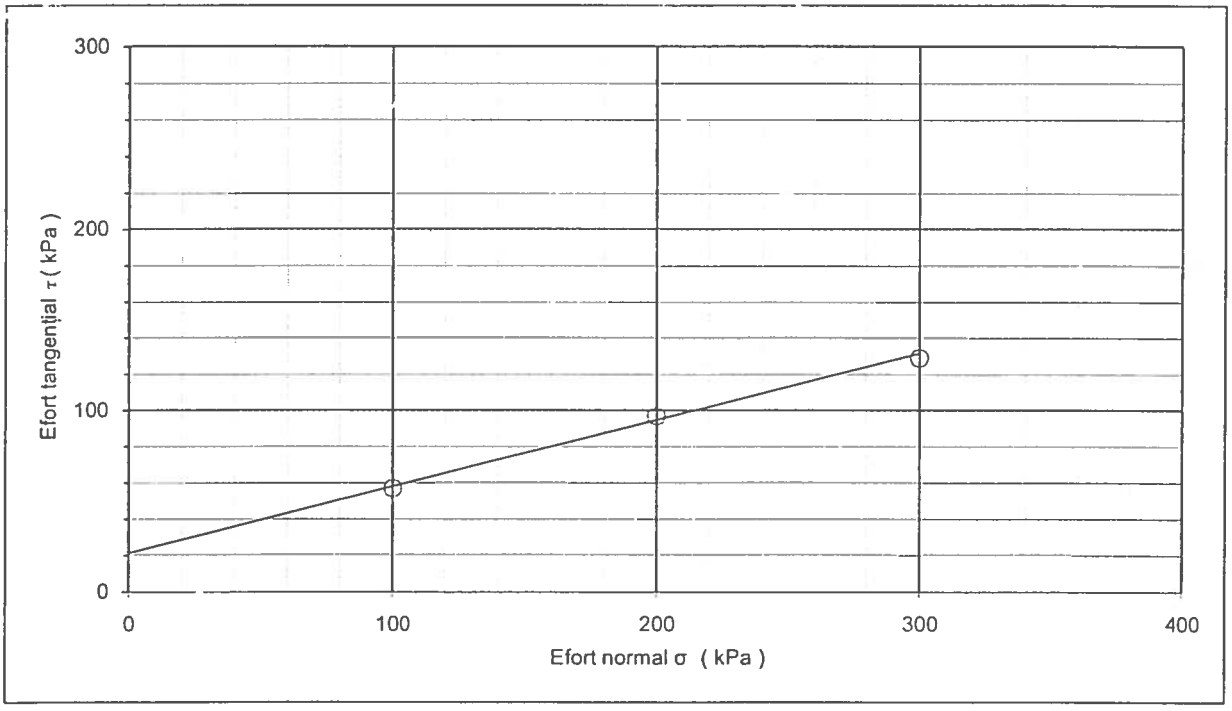
Foraj: FG  Proba: P2  Adâncime de prelevare (m): 4.00-4.30

metoda de încercare C.U. CONSOLIDAT NEDRENAT

| caseta nr / serie dinamometru | | Efort vertical ⊥ pe planul de forfecare σ (kPa) | Citire pe cadranul micrometrului (la momentul ruperii) P (1/100 mm) | Constanta inelului dinamometric C (N) | Solicitarea maximă de forfecare F=P*C (N) | Efortul de forfecare maxim $T_f$=F/A (kPa) | Viteza v mm/min |
|---|---|---|---|---|---|---|---|
| 1 | 39397-79 | 100 | 9,0 | 2,12 | 19,10 | 53,1 | 0,1 |
| 2 | 3808-80 | 200 | 17,8 | 2,12 | 37,78 | 104,9 | 0,1 |
| 3 | 12089-72 | 300 | 21,0 | 2,17 | 45,55 | 126,5 | 0,1 |

Coeziune $c_u^n$: 21,4 kPa  Unghi de frecare int. $\varphi_u^n$: 20,2 °

Descriere material:
Argilă prăfoasă cenușie cu zone nisipose gălbui-ruginii, plastic consistentă-vârtoasă




Întocmit:
ing.geol. Török Tiberiu

Acest buletin este înregistrat în registrul rezultate al laboratorului. Copia prezentului buletin este păstrată în arhiva S.C. Geo-Tech S.R.L.

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
SETUP DATA

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 - | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FH | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |
| Sample description | argila galbuie | | |

| | | | |
|---|---|---|---|
| Particle density (Mg/m³) | 2.67 | Assumed / Measured | Assumed |
| Dry or submerged | submerged | Box shape | ○ round ◉ square |

**SPECIMEN 1**

| | | | |
|---|---|---|---|
| Specimen depth (m) | 2.25 | Machine number | A |

**Initial measurements**

| | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 62.4 | Specimen area (mm²) | 3600.0 |
| Mass of specimen + cutter (g) | 202.9 | Mass of specimen (g) | 140.6 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| **Trimmings moisture content** | | **Final moisture content** | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 202.90 | Mass of wet soil + tin (g) | 204.57 |
| Mass of dry soil + tin (g) | 172.43 | Mass of dry soil + tin (g) | 172.43 |
| Mass of tin (g) | 62.35 | Mass of tin (g) | 62.35 |

**Applied stress**

| | | | |
|---|---|---|---|
| Mass directly applied (kg) | 36.00 | Total mass on specimen (kg) | 36.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 98 |
| Load arm ratio (**:1) | 0.1 | | |

**Consolidation stage**

| | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.000 |
| t100 (root mins) | | 2.80 |
| t100 (mins) | | 7.84 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 99.57 |
| Rate of displacement (mm/min) | Calculated | 0.100434 |
| | Actual | 0.100000 |

**Shear stage**

| | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**SETUP DATA**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference* | DN 1 - | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FH | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |
| Sample description | argila galbuie | | |

| | | | |
|---|---|---|---|
| Particle density (Mg/m$^3$) | 2.67 | Assumed / Measured | Assumed |
| Dry or submerged | submerged | Box shape | ○ round ◉ square |

| SPECIMEN 2 | | | |
|---|---|---|---|
| Specimen depth (m) | 2.20 | Machine number | B |

| Initial measurements | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 64.7 | Specimen area (mm$^2$) | 3600.0 |
| Mass of specimen + cutter (g) | 207.9 | Mass of specimen (g) | 143.2 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| Trimmings moisture content | | Final moisture content | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 207.89 | Mass of wet soil + tin (g) | 208.73 |
| Mass of dry soil + tin (g) | 177.74 | Mass of dry soil + tin (g) | 177.74 |
| Mass of tin (g) | 64.69 | Mass of tin (g) | 64.69 |

| Applied stress | | | |
|---|---|---|---|
| Mass directly applied (kg) | 72.00 | Total mass on specimen (kg) | 72.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 196 |
| Load arm ratio (**:1) | 0.1 | | |

| Consolidation stage | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.200 |
| t100 (root mins) | | 2.80 |
| t100 (mins) | | 7.84 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 99.57 |
| Rate of displacement (mm/min) | Calculated | 0.100434 |
| | Actual | 0.100000 |

| Shear stage | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**SETUP DATA**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 - | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FH | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |
| Sample description | argila galbuie | | |

| | | | |
|---|---|---|---|
| Particle density (Mg/m$^3$) | 2.67 | Assumed / Measured | Assumed |
| Dry or submerged | submerged | Box shape | ○ round ◉ square |

| SPECIMEN 3 | | | |
|---|---|---|---|
| ecimen depth (m) | 2.10 | Machine number | A |

| Initial measurements | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 60.3 | Specimen area (mm$^2$) | 3600.0 |
| Mass of specimen + cutter (g) | 207.8 | Mass of specimen (g) | 147.5 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| Trimmings moisture content | | Final moisture content | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 207.81 | Mass of wet soil + tin (g) | 206.57 |
| Mass of dry soil + tin (g) | 176.42 | Mass of dry soil + tin (g) | 176.42 |
| Mass of tin (g) | 60.27 | Mass of tin (g) | 60.27 |

| Applied stress | | | |
|---|---|---|---|
| Mass directly applied (kg) | 108.00 | Total mass on specimen (kg) | 108.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 294 |
| ad arm ratio (**:1) | 0.1 | | |

| Consolidation stage | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.300 |
| t100 (root mins) | | 2.80 |
| t100 (mins) | | 7.84 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 99.57 |
| Rate of displacement (mm/min) | Calculated | 0.100434 |
| | Actual | 0.100000 |

| Shear stage | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**TEST REPORT - SUMMARY**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 - | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FH | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |
| Sample description | argila galbuie | | |
| Particle density ($Mg/m^3$) | 2.67 (Assumed) | | Specimens tested submerged |

| INITIAL CONDITIONS | Specimen 1 | Specimen 2 | Specimen 3 |
|---|---|---|---|
| Specimen depth (m) | 2.25 | 2.20 | 2.10 |
| Specimen height (mm) | 20.0 | 20.0 | 20.0 |
| Length (mm) | 60.0 | 60.0 | 60.0 |
| Width (mm) | 60.0 | 60.0 | 60.0 |
| Area ($mm^2$) | 3600.0 | 3600.0 | 3600.0 |
| Moisture content (measured) (%) | 28 | 27 | 27 |
| Moisture content (trimmings) (%) | 28 | 27 | 27 |
| Bulk density ($Mg/m^3$) | 1.95 | 1.99 | 2.05 |
| Dry density ($Mg/m^3$) | 1.53 | 1.57 | 1.61 |
| Voids ratio | 0.746 | 0.700 | 0.655 |
| Degree of saturation (%) | 99 | 102 | 110 |

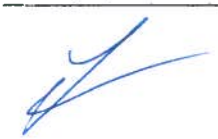
| | | | |
|---|---|---|---|
| Voids ratio at the end of consolidation | #VALUE! | #VALUE! | #VALUE! |

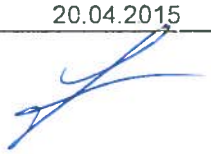
| SHEARING | | | |
|---|---|---|---|
| Rate of displacement (mm/min) | 0.100000 | 0.100000 | 0.100000 |
| **Conditions at peak shear stress** | | | |
| Normal stress (kPa) | 98 | 196 | 294 |
| Shear stress (kPa) | 85 | 126 | 170 |
| Horizontal displacement (mm) | 3.17 | 4.49 | 3.95 |
| Vertical deformation (mm) | -0.034 | -0.309 | -0.337 |

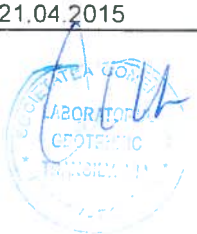
| | |
|---|---|
| Apparent cohesion (kPa) | 41.9 |
| Angle of shearing resistance (°) | 23.5 |

Comments / variations from procedures:

| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
|---|---|---|---|---|---|
| Date | 20.04.2015 | Date | 20.04.2015 | Date | 21.04.2015 |

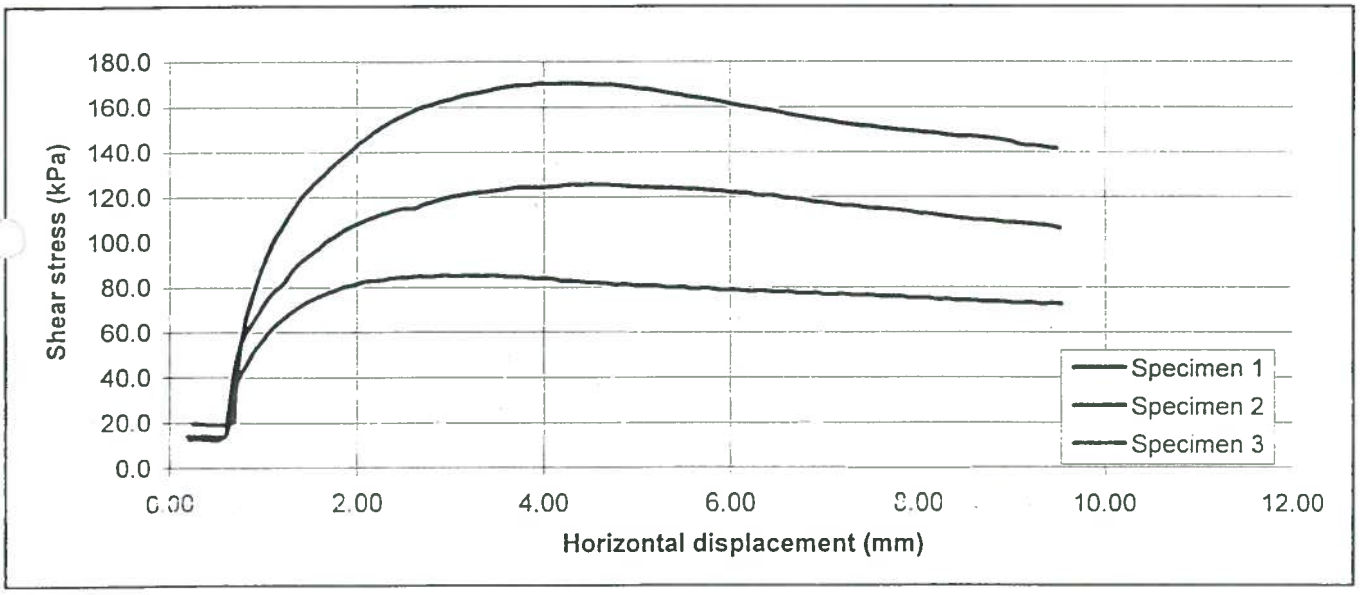


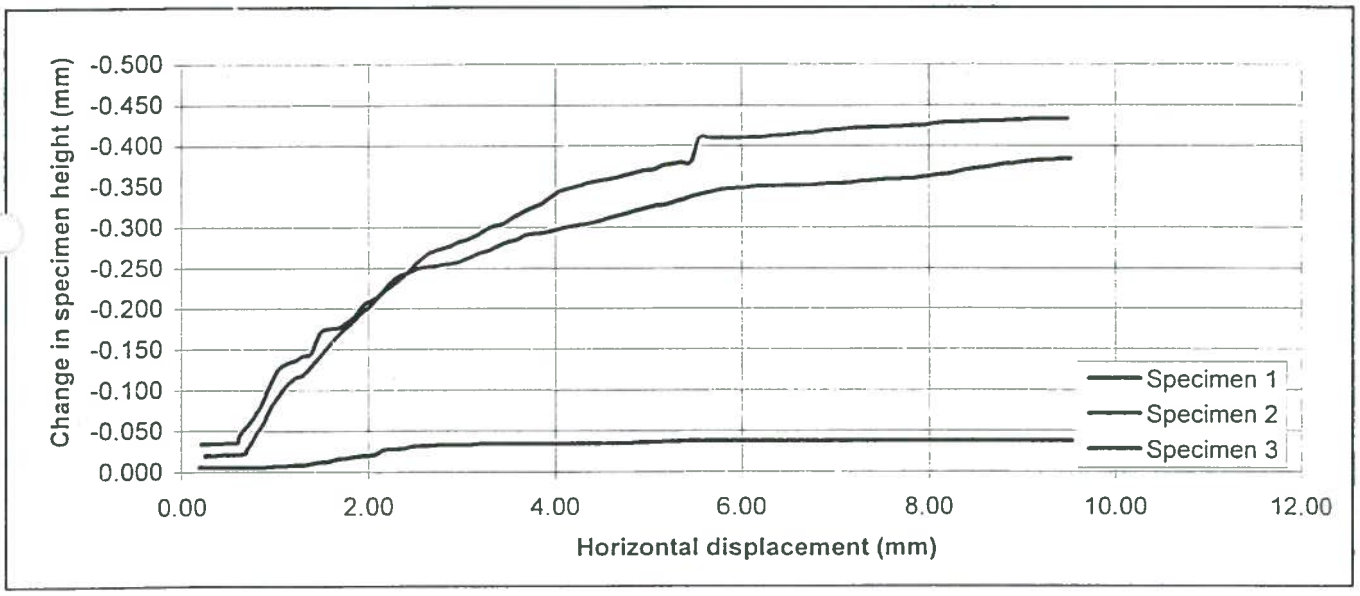




DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**TEST REPORT - SHEARING**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 - | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FH | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |



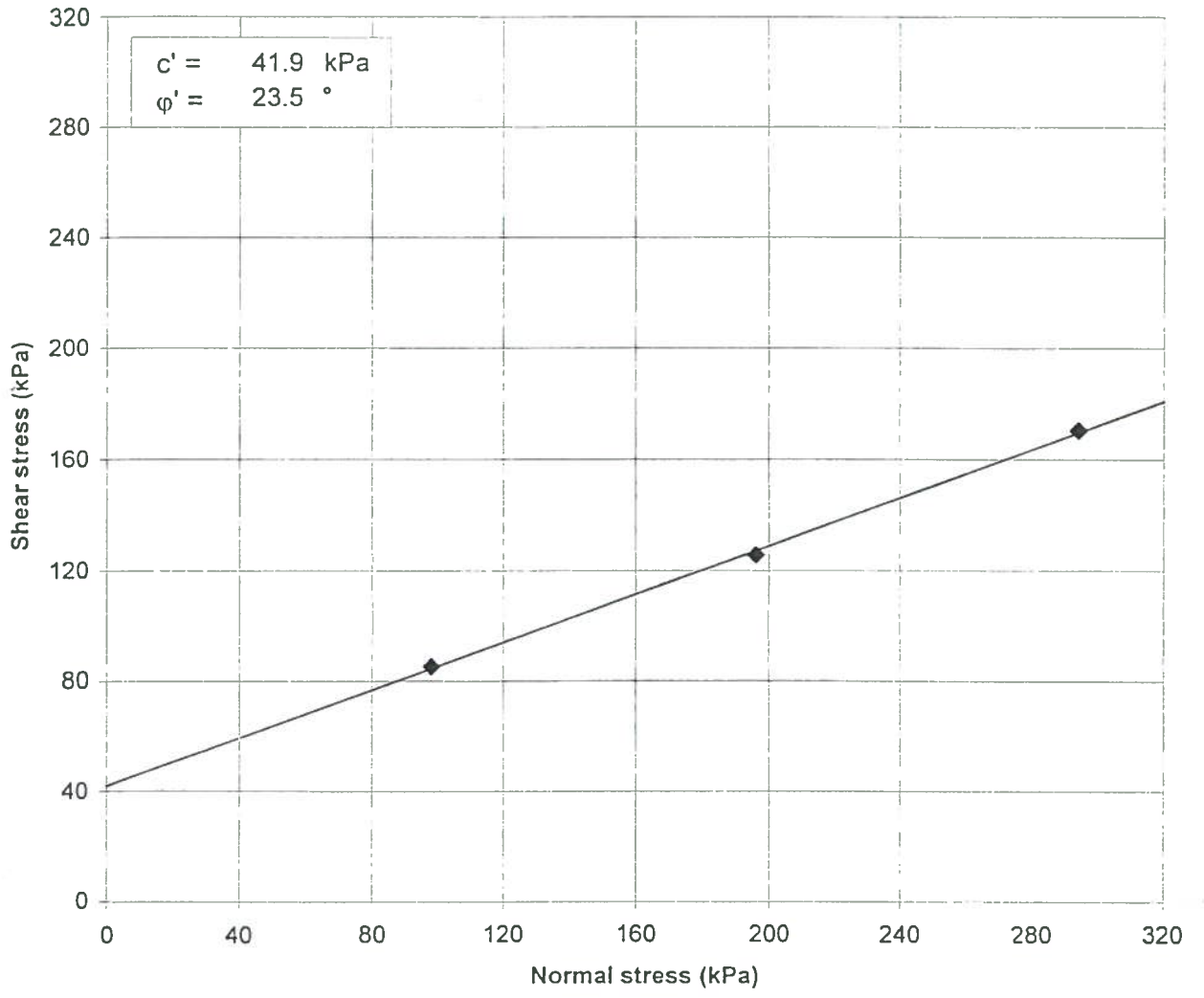




| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
| Date | 20.04.2015 | Date | 20.04.2015 | Date | 21.04.2015 |

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)

**TEST REPORT - SHEARING**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 - | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FH | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |




| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr ing. Mantulescu M |
| Date | 20.04.2015 | Date | 20.04.2015 | Date | 21.04.2015 |

S.C. GEO-TECH SRL GHEORGHENI
LABORATOR GEOTEHNIC DE GRAD II
Autorizatie Nr. 2657 Data: 20.12.2012
Gheorgheni str.Carierei nr. 6 jud.Harghita-RO

Nr.înreg. L.1209 .fP3
data: 17.04.2015

# Încercarea de forfecare directă

**STAS 8942/2-82**

**Obiectiv:** CONSOLIDARE DN1

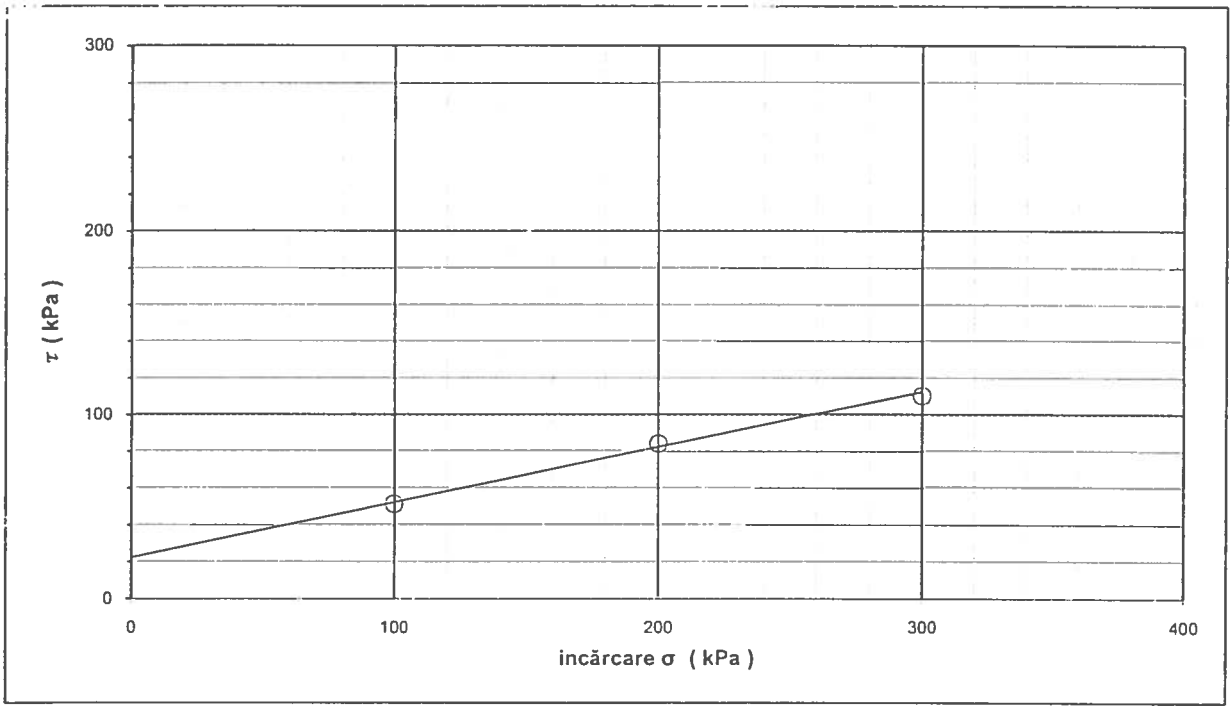
**Foraj:** FH **Proba:** P3 **Adâncime de prelevare (m):** 3.70-4.00

metoda de încercare C.U. CONSOLIDAT NEDRENAT

| caseta nr / serie dinamometru | | Efort vertical ⊥ pe planul de forfecare σ (kPa) | Citire pe cadranul micrometrului (la momentul ruperii) P (1/100 mm) | Constanta inelului dinamometric C (N) | Solicitarea maximă de forfecare F=P*C (N) | Efortul de forfecare maxim $T_f$=F/A (kPa) | Viteza v mm/min |
|---|---|---|---|---|---|---|---|
| 1 | 39397-79 | 100 | 8,0 | 2,12 | 16,98 | 47,2 | 0,1 |
| 2 | 3808-80 | 200 | 15,8 | 2,12 | 33,53 | 93,2 | 0,1 |
| 3 | 12089-72 | 300 | 17,8 | 2,17 | 38,61 | 107,2 | 0,1 |

| Coeziune $c_u^n$ | 22,4 kPa | Unghi de frecare int. $\varphi_u^n$: | 16,7 ° |
|---|---|---|---|

Descriere material:
Argilă prăfoasă cafenie, plastic vârtoasă-tare




Întocmit:
ing.geol. Török Tiberiu

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)

## SETUP DATA

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FI | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |
| Sample description | argila galbui - cenusie cu intrcalatii de resturi vegetale | | |

| | | | |
|---|---|---|---|
| Particle density (Mg/m$^3$) | 2.72 | Assumed / Measured | Assumed |
| Dry or submerged | dry | Box shape | ○ round ◉ square |

**SPECIMEN 1**

| | | | |
|---|---|---|---|
| Specimen depth (m) | 2.25 | Machine number | A |

**Initial measurements**

| | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 60.1 | Specimen area (mm$^2$) | 3600.0 |
| Mass of specimen + cutter (g) | 204.7 | Mass of specimen (g) | 144.6 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| Trimmings moisture content | | Final moisture content | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 204.69 | Mass of wet soil + tin (g) | 207.03 |
| Mass of dry soil + tin (g) | 174.60 | Mass of dry soil + tin (g) | 174.60 |
| Mass of tin (g) | 60.08 | Mass of tin (g) | 60.08 |

**Applied stress**

| | | | |
|---|---|---|---|
| Mass directly applied (kg) | 36.00 | Total mass on specimen (kg) | 36.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 98 |
| Load arm ratio (**:1) | 0.1 | | |

**Consolidation stage**

| | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.000 |
| t100 (root mins) | | 4.00 |
| t100 (mins) | | 16.00 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 203.20 |
| Rate of displacement (mm/min) | Calculated | 0.049213 |
| | Actual | 0.050000 |

**Shear stage**

| | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**SETUP DATA**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FI | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |
| Sample description | argila galbui - cenusie cu intrcalatii de resturi vegetale | | |

| | | | |
|---|---|---|---|
| Particle density (Mg/m$^3$) | 2.72 | Assumed / Measured | Assumed |
| Dry or submerged | dry | Box shape | ○ round ◉ square |

| SPECIMEN 2 | | | |
|---|---|---|---|
| ecimen depth (m) | 2.20 | Machine number | B |

| Initial measurements | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 61.9 | Specimen area (mm$^2$) | 3600.0 |
| Mass of specimen + cutter (g) | 205.8 | Mass of specimen (g) | 143.9 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| Trimmings moisture content | | Final moisture content | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 205.79 | Mass of wet soil + tin (g) | 207.45 |
| Mass of dry soil + tin (g) | 176.15 | Mass of dry soil + tin (g) | 176.15 |
| Mass of tin (g) | 61.87 | Mass of tin (g) | 61.87 |

| Applied stress | | | |
|---|---|---|---|
| Mass directly applied (kg) | 72.00 | Total mass on specimen (kg) | 72.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 196 |
| ad arm ratio (**:1) | 0.1 | | |

| Consolidation stage | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.200 |
| t100 (root mins) | | 4.00 |
| t100 (mins) | | 16.00 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 203.20 |
| Rate of displacement (mm/min) | Calculated | 0.049213 |
| | Actual | 0.050000 |

| Shear stage | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**SETUP DATA**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FI | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |
| Sample description | argila galbui - cenusie cu intrcalatii de resturi vegetale | | |

| | | | |
|---|---|---|---|
| Particle density (Mg/m$^3$) | 2.72 | Assumed / Measured | Assumed |
| Dry or submerged | dry | Box shape | ○ round ◉ square |

| SPECIMEN 3 | | | |
|---|---|---|---|
| Specimen depth (m) | 2.10 | Machine number | A |

| Initial measurements | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 62.9 | Specimen area (mm$^2$) | 3600.0 |
| Mass of specimen + cutter (g) | 208.3 | Mass of specimen (g) | 145.5 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| Trimmings moisture content | | Final moisture content | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 208.33 | Mass of wet soil + tin (g) | 209.33 |
| Mass of dry soil + tin (g) | 178.56 | Mass of dry soil + tin (g) | 178.56 |
| Mass of tin (g) | 62.87 | Mass of tin (g) | 62.87 |

| Applied stress | | | |
|---|---|---|---|
| Mass directly applied (kg) | 108.00 | Total mass on specimen (kg) | 108.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 294 |
| Load arm ratio (**:1) | 0.1 | | |

| Consolidation stage | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.300 |
| t100 (root mins) | | 2.80 |
| t100 (mins) | | 7.84 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 99.57 |
| Rate of displacement (mm/min) | Calculated | 0.100434 |
| | Actual | 0.100000 |

| Shear stage | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**TEST REPORT - SUMMARY**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FI | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |
| Sample description | argila galbui - cenusie cu intrcalatii de resturi vegetale | | |
| Particle density (Mg/m$^3$) | 2.72 (Assumed) | | Specimens tested dry |

| INITIAL CONDITIONS | Specimen 1 | Specimen 2 | Specimen 3 |
|---|---|---|---|
| Specimen depth (m) | 2.25 | 2.20 | 2.10 |
| Specimen height (mm) | 20.0 | 20.0 | 20.0 |
| Length (mm) | 60.0 | 60.0 | 60.0 |
| Width (mm) | 60.0 | 60.0 | 60.0 |
| Area (mm$^2$) | 3600.0 | 3600.0 | 3600.0 |
| Moisture content (measured) (%) | 26 | 26 | 26 |
| Moisture content (trimmings) (%) | 26 | 26 | 26 |
| Bulk density (Mg/m$^3$) | 2.01 | 2.00 | 2.02 |
| Dry density (Mg/m$^3$) | 1.59 | 1.59 | 1.61 |
| Voids ratio | 0.710 | 0.714 | 0.693 |
| Degree of saturation (%) | 101 | 99 | 101 |

| | | | |
|---|---|---|---|
| Voids ratio at the end of consolidation | #VALUE! | #VALUE! | #VALUE! |

| SHEARING | | | |
|---|---|---|---|
| Rate of displacement (mm/min) | 0.050000 | 0.050000 | 0.100000 |
| **Conditions at peak shear stress** | | | |
| Normal stress (kPa) | 98 | 196 | 294 |
| Shear stress (kPa) | 96 | 111 | 135 |
| Horizontal displacement (mm) | 4.60 | 2.79 | 2.60 |
| Vertical deformation (mm) | -0.014 | -0.158 | -0.200 |

| | |
|---|---|
| Apparent cohesion (kPa) | 75.8 |
| Angle of shearing resistance (°) | 11.1 |

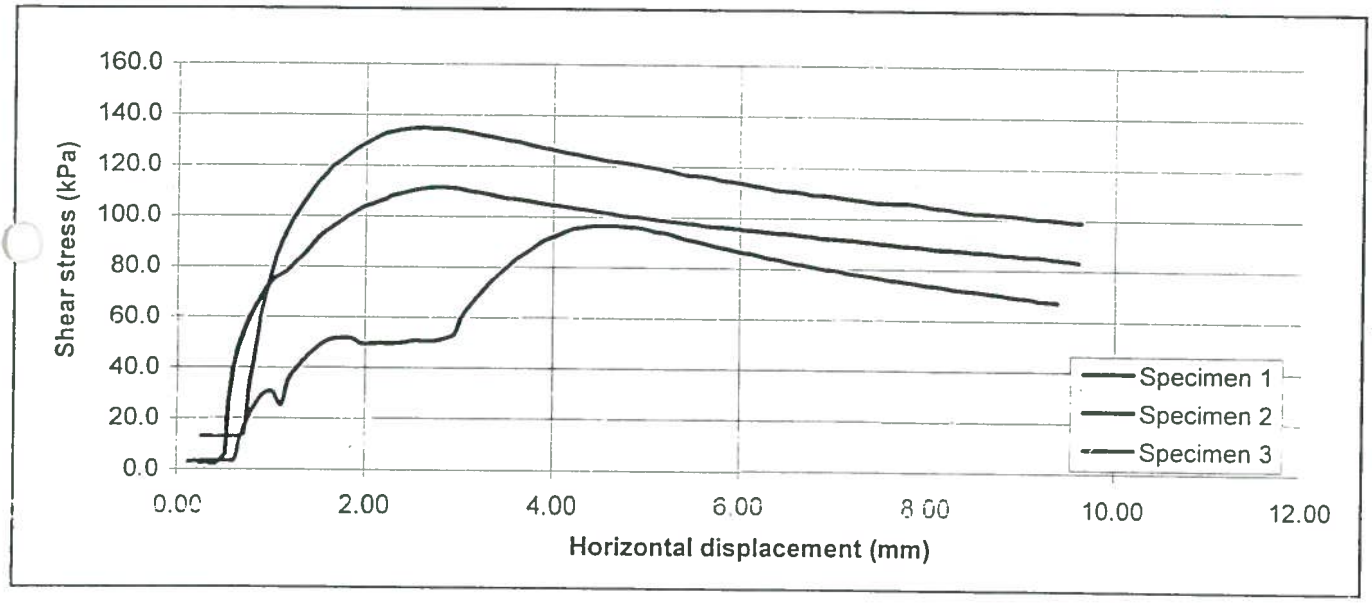
Comments / variations from procedures:

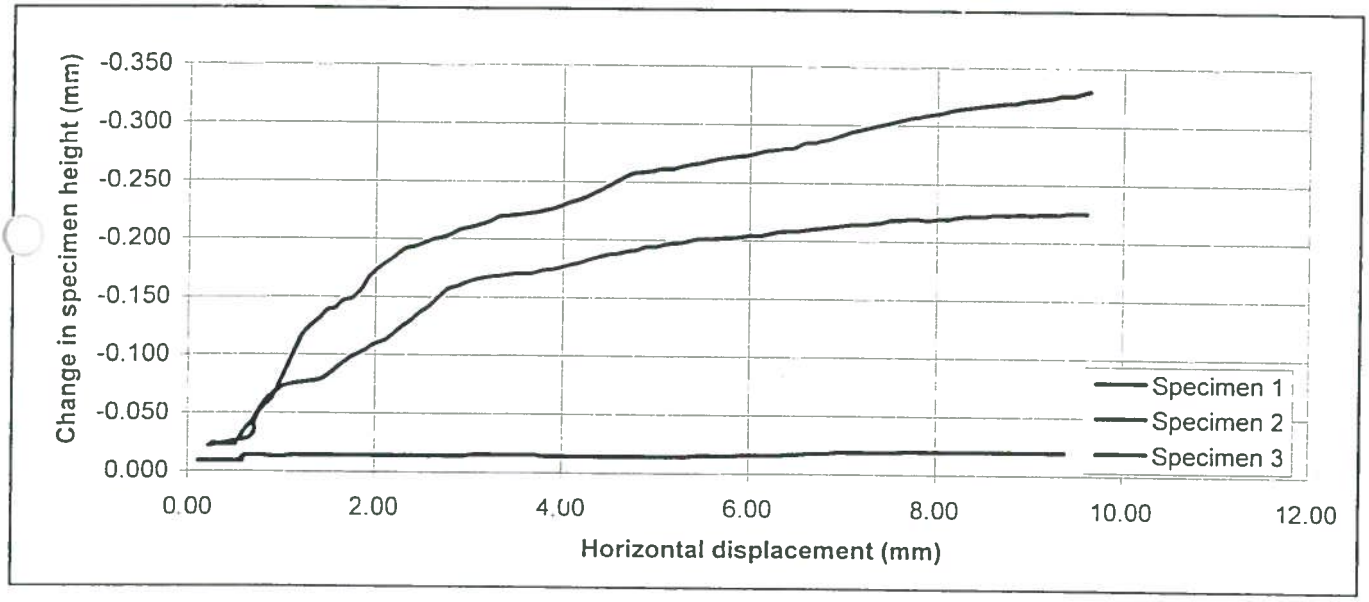
| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
| Date | 21.04.2015 | Date | 21.04.2015 | Date | 22.04.2015 |

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)

**TEST REPORT - SHEARING**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FI | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |

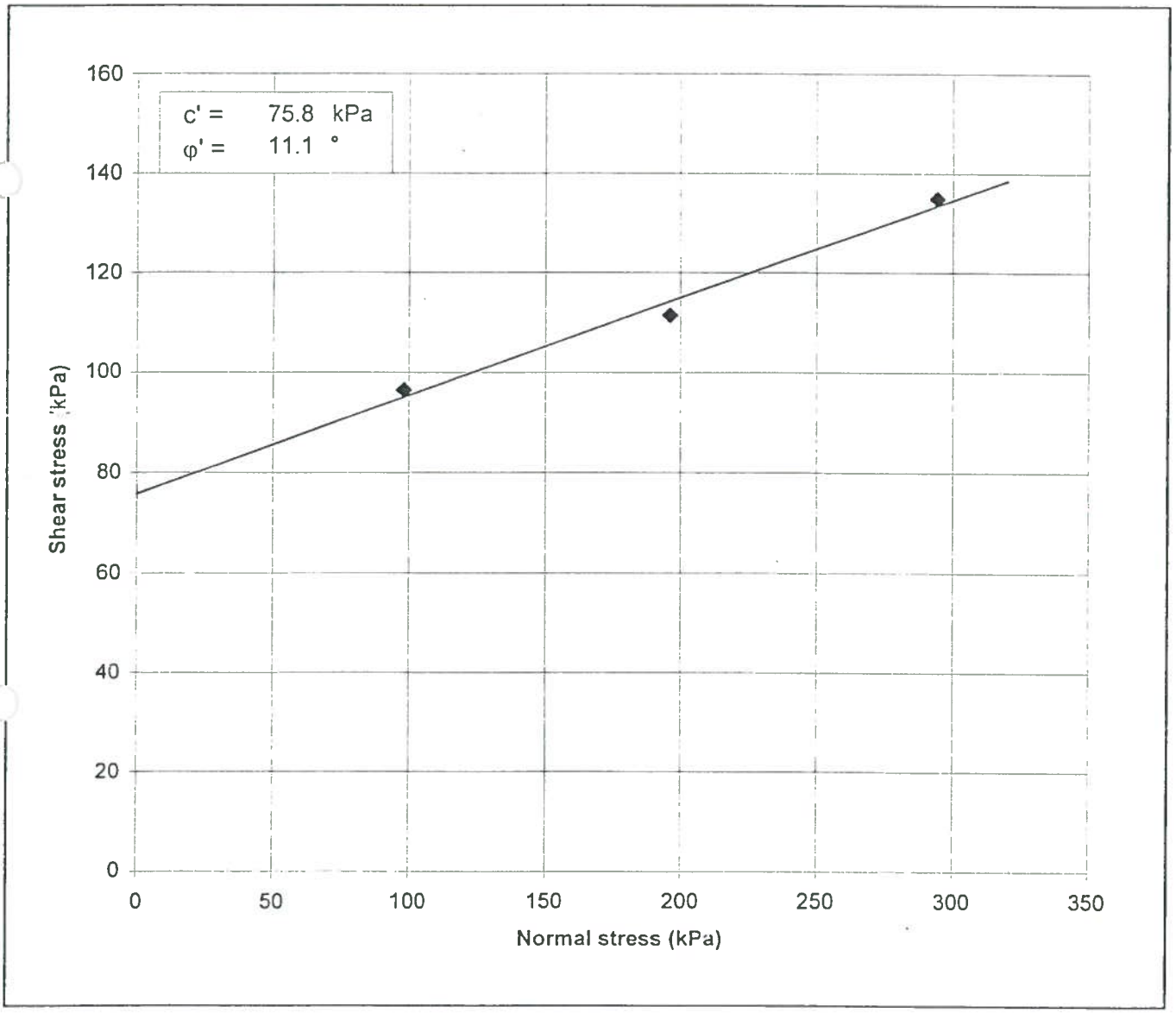



| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
| Date | 21.04.2015 | Date | 21.04.2015 | Date | 22.04.2015 |

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**TEST REPORT - SHEARING**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 2.0 - 2.3 |
| Borehole number | FI | Sample type | Undisturbed cohesive |
| Sample number | pr 2 | Specimen orientation | Vertical |




| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
| Date | 21.04.2015 | Date | 21.04.2015 | Date | 22.04.2015 |

S.C. GEO-TECH SRL GHEORGHENI
LABORATOR GEOTEHNIC DE GRAD II
Autorizatie Nr. 2657 Data: 20.12.2012
ISO 9001 ISO 14001
Gheorgheni str.Carierei nr. 6 jud.Harghita-RO

Nr.înreg. L.1209 .fP4
data: 17.04.2015

# Încercarea de forfecare directă

**STAS 8942/2-82**

**Obiectiv:** CONSOLIDARE DN1

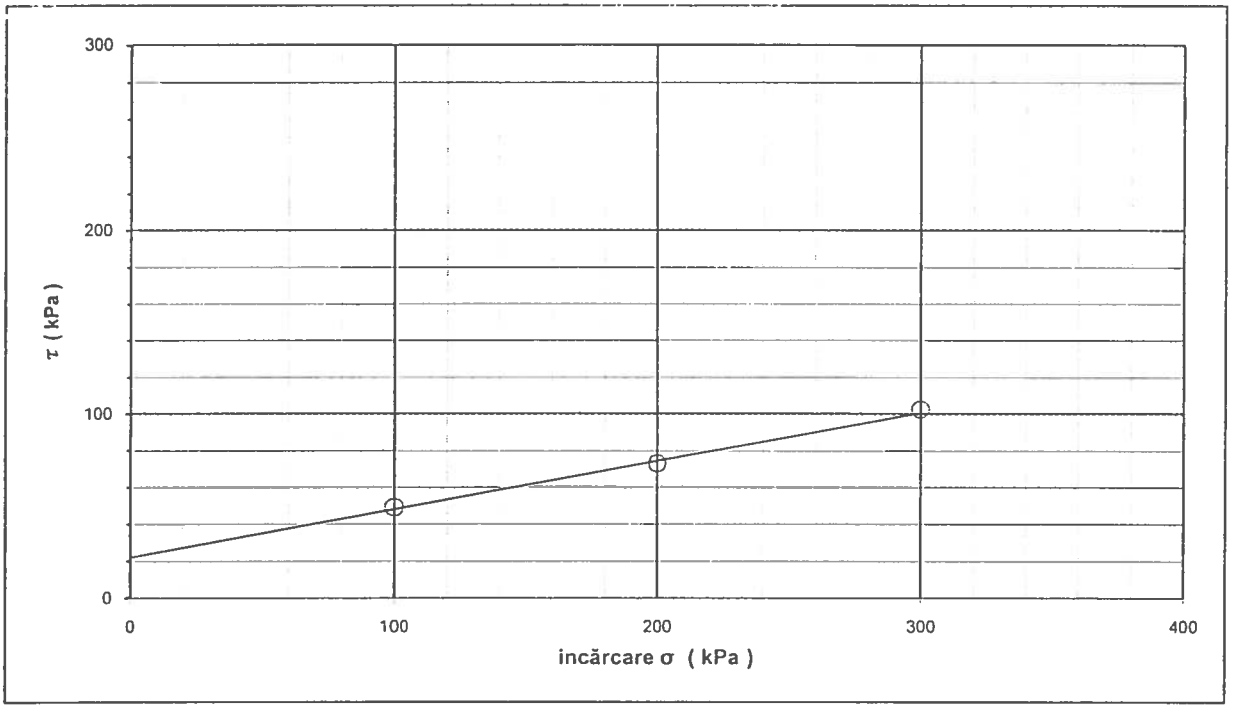
**Foraj:** FI **Proba:** P4 **Adâncime de prelevare (m):** 4.00-4.30

metoda de încercare C.U. CONSOLIDAT NEDRENAT

| caseta nr / serie dinamometru | | Efort vertical ⊥ pe planul de forfecare σ ( kPa) | Citire pe cadranul micrometrului (la momentul ruperii) P (1/100 mm) | Constanta inelului dinamometric C ( N) | Solicitarea maximă de forfecare F=P*C (N) | Efortul de forfecare maxim $T_f$=F/A (kPa) | Viteza v mm/min |
|---|---|---|---|---|---|---|---|
| 1 | 39397-79 | 100 | 9,0 | 2,12 | 19,10 | 53,1 | 0,1 |
| 2 | 3808-80 | 200 | 11,0 | 2,12 | 23,35 | 64,9 | 0,1 |
| 3 | 12089-72 | 300 | 17,5 | 2,17 | 37,96 | 105,4 | 0,1 |

| Coeziune $c_u^n$ | 22,1 kPa | Unghi de frecare int. $\varphi_u^n$: | 14,7 ° |
|---|---|---|---|

Descriere material:
Argilă prăfoasă gălbuie-cenușie cu zone nisipoase, plastic vârtoasă




Întocmit:
ing.geol. Török Tiberiu

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**SETUP DATA**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 7.70 - 8.00 |
| Borehole number | FI | Sample type | Undisturbed cohesive |
| Sample number | pr 8 | Specimen orientation | Vertical |
| Sample description | praf argilos cenusiu | | |

| | | | |
|---|---|---|---|
| Particle density (Mg/m$^3$) | 2.67 | Assumed / Measured | Assumed |
| Dry or submerged | submerged | Box shape | ○ round ◉ square |

**SPECIMEN 1**

| | | | |
|---|---|---|---|
| Specimen depth (m) | 7.90 | Machine number | A |

**Initial measurements**

| | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 61.9 | Specimen area (mm$^2$) | 3600.0 |
| Mass of specimen + cutter (g) | 209.6 | Mass of specimen (g) | 147.7 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| **Trimmings moisture content** | | **Final moisture content** | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 209.62 | Mass of wet soil + tin (g) | 212.30 |
| Mass of dry soil + tin (g) | 183.38 | Mass of dry soil + tin (g) | 183.38 |
| Mass of tin (g) | 61.91 | Mass of tin (g) | 61.91 |

**Applied stress**

| | | | |
|---|---|---|---|
| Mass directly applied (kg) | 36.00 | Total mass on specimen (kg) | 36.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 98 |
| Load arm ratio (**:1) | 0.1 | | |

**Consolidation stage**

| | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.000 |
| t100 (root mins) | | 2.80 |
| t100 (mins) | | 7.84 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 99.57 |
| Rate of displacement (mm/min) | Calculated | 0.100434 |
| | Actual | 0.100000 |

**Shear stage**

| | |
|---|---|
| Initial vertical displacement reading (mm)* | 0.000 |
| Initial horizontal displacement reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**SETUP DATA**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 7.70 - 8.00 |
| Borehole number | FI | Sample type | Undisturbed cohesive |
| Sample number | pr 8 | Specimen orientation | Vertical |
| Sample description | praf argilos cenusiu | | |

| | | | |
|---|---|---|---|
| Particle density (Mg/m$^3$) | 2.67 | Assumed / Measured | Assumed |
| Dry or submerged | submerged | Box shape | ○ round ◉ square |

| SPECIMEN 2 | | | |
|---|---|---|---|
| Specimen depth (m) | 7.85 | Machine number | B |

| Initial measurements | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 61.9 | Specimen area (mm$^2$) | 3600.0 |
| Mass of specimen + cutter (g) | 210.8 | Mass of specimen (g) | 148.9 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| Trimmings moisture content | | Final moisture content | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 210.81 | Mass of wet soil + tin (g) | 214.31 |
| Mass of dry soil + tin (g) | 182.52 | Mass of dry soil + tin (g) | 182.52 |
| Mass of tin (g) | 61.88 | Mass of tin (g) | 61.88 |

| Applied stress | | | |
|---|---|---|---|
| Mass directly applied (kg) | 72.00 | Total mass on specimen (kg) | 72.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 196 |
| Load arm ratio (**:1) | 0.1 | | |

| Consolidation stage | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.200 |
| t100 (root mins) | | 2.80 |
| t100 (mins) | | 7.84 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 99.57 |
| Rate of displacement (mm/min) | Calculated | 0.100434 |
| | Actual | 0.100000 |

| Shear stage | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**SETUP DATA**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 7.70 - 8.00 |
| Borehole number | FI | Sample type | Undisturbed cohesive |
| Sample number | pr 8 | Specimen orientation | Vertical |
| Sample description | praf argilos cenusiu | | |

| | | | |
|---|---|---|---|
| Particle density (Mg/m$^3$) | 2.67 | Assumed / Measured | Assumed |
| Dry or submerged | submerged | Box shape | ○ round ◉ square |

| SPECIMEN 3 | | | |
|---|---|---|---|
| ecimen depth (m) | 7.80 | Machine number | A |

| **Initial measurements** | | | |
|---|---|---|---|
| Depth from top of box to top of baseplate ($h_1$) (mm) | 20.0 | Length (mm) | 60.0 |
| Combined thickness of plates ($t_p$) (mm) | 20.0 | Width (mm) | 60.0 |
| Mass of cutter (g) | 64.9 | Specimen area (mm$^2$) | 3600.0 |
| Mass of specimen + cutter (g) | 210.9 | Mass of specimen (g) | 146.0 |
| Depth from top of box to top of porous plate ($h_2$) (mm) | -20.0 | | |

| **Trimmings moisture content** | | **Final moisture content** | |
|---|---|---|---|
| Mass of wet soil + tin (g) | 210.85 | Mass of wet soil + tin (g) | 216.09 |
| Mass of dry soil + tin (g) | 184.50 | Mass of dry soil + tin (g) | 184.50 |
| Mass of tin (g) | 64.88 | Mass of tin (g) | 64.88 |

| **Applied stress** | | | |
|---|---|---|---|
| Mass directly applied (kg) | 108.00 | Total mass on specimen (kg) | 108.00 |
| Mass indirectly applied (kg) | 0.00 | Normal stress (kPa) | 294 |
| ad arm ratio (**:1) | 0.1 | | |

| **Consolidation stage** | | |
|---|---|---|
| Initial vertical displacement reading (mm)* | | 0.300 |
| t100 (root mins) | | 2.80 |
| t100 (mins) | | 7.84 |
| Estimated horizontal displacement at failure (mm) | | 10.00 |
| Minimum time to failure ($t_f$) (mins) | | 99.57 |
| Rate of displacement (mm/min) | Calculated | 0.100434 |
| | Actual | 0.100000 |

| **Shear stage** | |
|---|---|
| Initial vertical displacment reading (mm)* | 0.000 |
| Initial horizontal displacment reading (mm)* | 0.00 |
| Initial horizontal force reading (N)* | 0.0 |

* If initial readings are not entered, values will be taken from the test data

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**TEST REPORT - SUMMARY**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 7.70 - 8.00 |
| Borehole number | FI | Sample type | Undisturbed cohesive |
| Sample number | pr 8 | Specimen orientation | Vertical |
| Sample description | praf argilos cenusiu | | |
| Particle density (Mg/m$^3$) | 2.67 (Assumed) | | Specimens tested submerged |

| INITIAL CONDITIONS | Specimen 1 | Specimen 2 | Specimen 3 |
|---|---|---|---|
| Specimen depth (m) | 7.90 | 7.85 | 7.80 |
| Specimen height (mm) | 20.0 | 20.0 | 20.0 |
| Length (mm) | 60.0 | 60.0 | 60.0 |
| Width (mm) | 60.0 | 60.0 | 60.0 |
| Area (mm$^2$) | 3600.0 | 3600.0 | 3600.0 |
| Moisture content (measured) (%) | 22 | 23 | 22 |
| Moisture content (trimmings) (%) | 22 | 23 | 22 |
| Bulk density (Mg/m$^3$) | 2.05 | 2.07 | 2.03 |
| Dry density (Mg/m$^3$) | 1.69 | 1.68 | 1.66 |
| Voids ratio | 0.583 | 0.594 | 0.607 |
| Degree of saturation (%) | 99 | 105 | 97 |

| | | | |
|---|---|---|---|
| Voids ratio at the end of consolidation | #VALUE! | #VALUE! | #VALUE! |

| SHEARING | | | |
|---|---|---|---|
| Rate of displacement (mm/min) | 0.100000 | 0.100000 | 0.100000 |
| **Conditions at peak shear stress** | | | |
| Normal stress (kPa) | 98 | 196 | 294 |
| Shear stress (kPa) | 132 | 143 | 164 |
| Horizontal displacement (mm) | 4.65 | 2.68 | 2.84 |
| Vertical deformation (mm) | -0.033 | 0.008 | -0.160 |

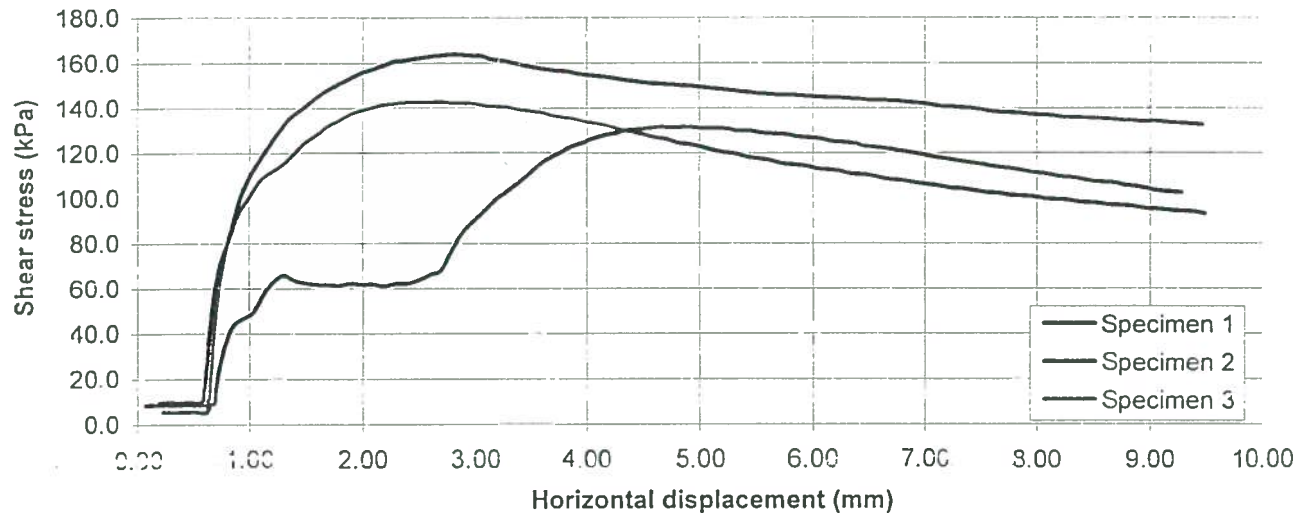
| | |
|---|---|
| Apparent cohesion (kPa) | 113.9 |
| Angle of shearing resistance (°) | 9.3 |

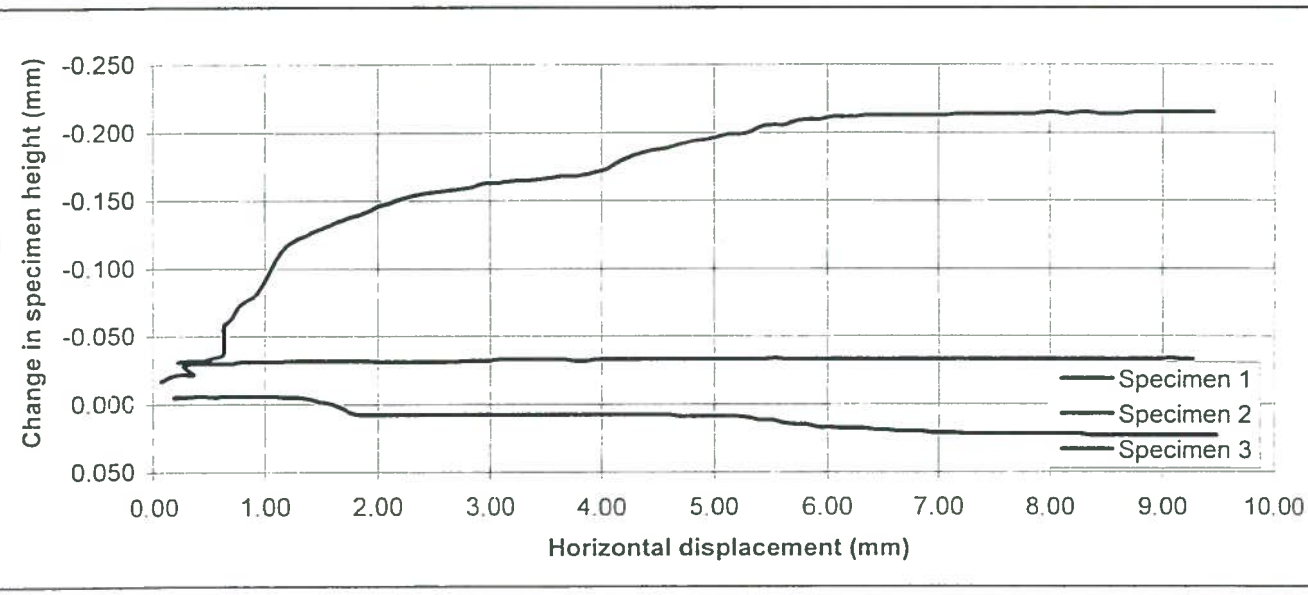
Comments / variations from procedures:

| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
|---|---|---|---|---|---|
| Date | 20.04.2015 | Date | 20.04.2015 | Date | 21.04.2015 |

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**TEST REPORT - SHEARING**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 7.70 - 8.00 |
| Borehole number | FI | Sample type | Undisturbed cohesive |
| Sample number | pr 8 | Specimen orientation | Vertical |

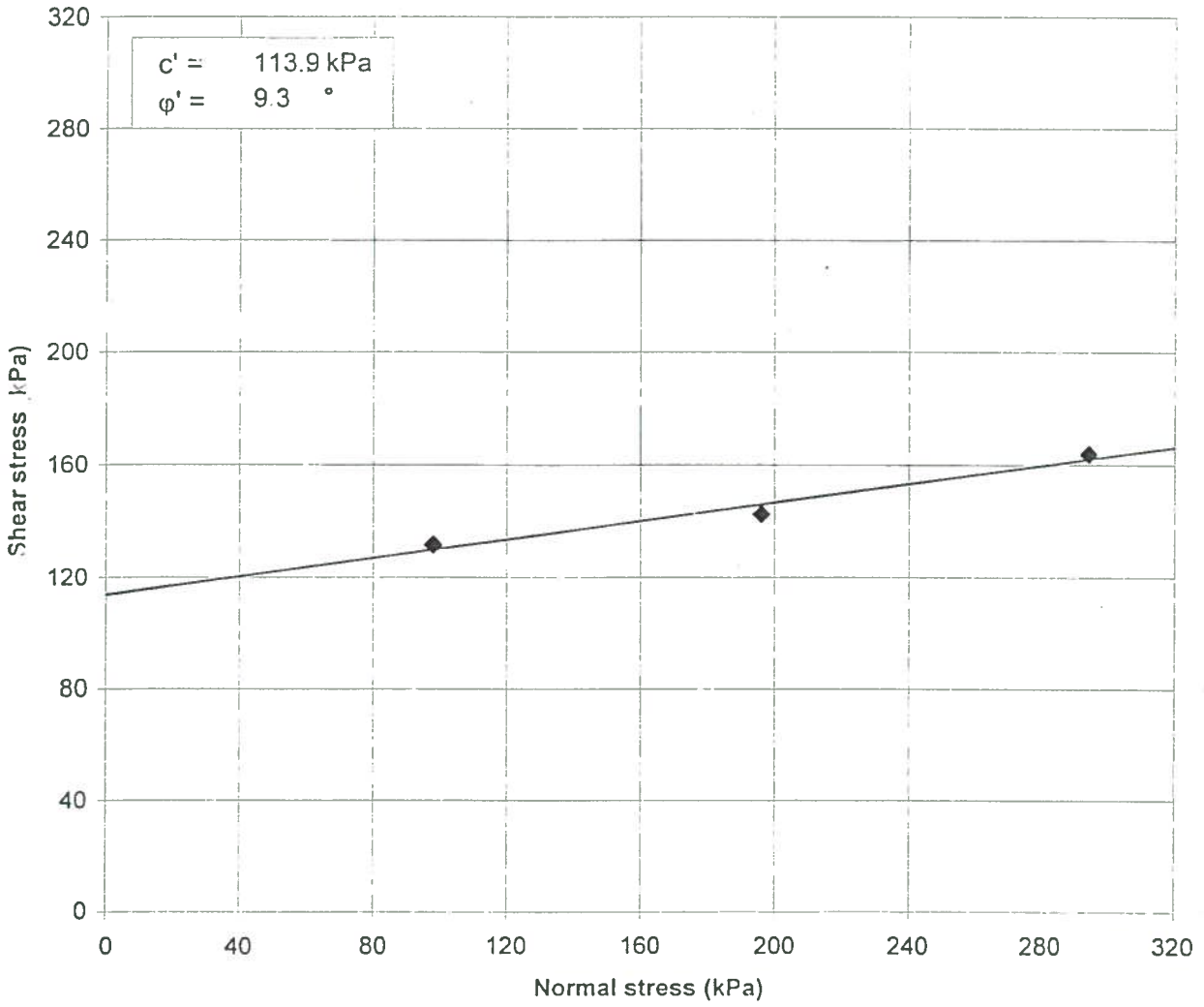



| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
| Date | 20.04.2015 | Date | 20.04.2015 | Date | 21.04.2015 |

DETERMINATION OF SHEAR STRENGTH BY DIRECT SHEAR (in the small shearbox apparatus)
Set of single stage tests - tested in accordance with BS 1377:1990:Part 7:Clause 4 (procedure 4.5.4)
**TEST REPORT - SHEARING**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | DN 1 | Sample depth (m) | 7.70 - 8.00 |
| Borehole number | FI | Sample type | Undisturbed cohesive |
| Sample number | pr 8 | Specimen orientation | Vertical |




| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr.ing. Mantulescu M |
| Date | 20.04.2015 | Date | 20.04.2015 | Date | 21.04.2015 |

S.C. GEO-TECH SRL GHEORGHENI
LABORATOR GEOTEHNIC DE GRAD II
Autorizatie Nr. 2657 Data: 20.12.2012
Gheorgheni str.Carierei nr. 6 jud.Harghita-RO

Foraj nr/ Boring no.: FE
adâncimea/ depth (m): 4.00-4.30
proba/ sample: P1

**CONSOLIDARE DN1**

## BULETIN DE ANALIZĂ nr. / ANALYSIS REPORT no. L.1209 .eP1 data: 17.04.2015

DETERMINAREA COMPRESIBILITĂȚII PĂMÂNTURILOR ÎN EDOMETRU / COMPRESSION TEST

Conform/ According to STAS 8942/1-89

| caracteristici epruveta | UM | initial | final |
|---|---|---|---|
| Inel edometru Nr. | - | 95 | |
| epruveta umeda+tara | g | 212,82 | 211,76 |
| epruveta uscata+tara | g | 181,12 | |
| tara | g | 58,36 | |
| apa continuta | g | 31,70 | 30,64 |
| masa umeda | g | 154,46 | 153,40 |
| masa uscata $m_s$ | g | 122,76 | |
| umiditate (w) | % | 25,82 | 24,96 |
| volumul probei | $cm^3$ | 76,96 | 74,07 |
| masa volumica nat. | $g/cm^3$ | 2,01 | 2,07 |
| masa volumica uscata | $g/cm^3$ | 1,60 | 1,66 |
| porozitate (n) | % | 41,35 | 39,07 |
| indicele porilor ($e_0$) | - | 0,705 | 0,64 |
| grad de umiditate | % | 0,996 | 1,06 |

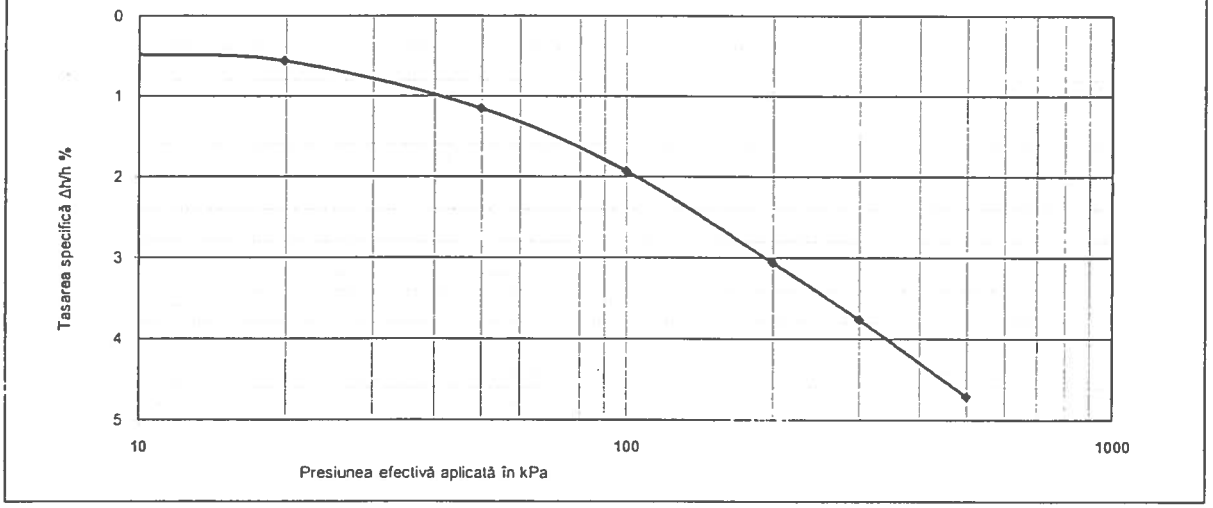
| | | |
|---|---|---|
| Aria epruvetei A | $cm^2$ | 38,48 |
| Inaltimea initiala $h_0$ | cm | 2,00 |
| masa scheletului mineral | $g/cm^3$ | 2,72 |
| greutate volumică naturală | $kN/m^3$ | 19,69 |
| greutate volumică uscată | $kN/m^3$ | 15,65 |

Descriere material:
Argilă cenușie-gălbuie cu intercalații prăfoase-fin nisipoase, plastic vârtoasă

| presiuni σ' kPa | ε% (Δh/h*100) | e | M kPa | $m_v$ 1/kPa | $a_v$ 1/kPa | $C_c$ % | $i_m$ % |
|---|---|---|---|---|---|---|---|
| 10 | 0,48 | 0,697 | - | - | - | - | - |
| 20 | 0,56 | 0,696 | 12420 | 8,05E-05 | 1,37E-04 | 0,005 | - |
| 50 | 1,15 | 0,686 | 5095 | 1,96E-04 | 3,35E-04 | 0,025 | - |
| 100 | 1,93 | 0,672 | 6402 | 1,56E-04 | 2,66E-04 | 0,044 | - |
| 200 | 3,06 | 0,653 | 8838 | 1,13E-04 | 1,93E-04 | 0,064 | - |
| 300 | 3,76 | 0,641 | 14267 | 7,01E-05 | 1,20E-04 | 0,068 | - |
| 300 | 3,76 | 0,641 | | | | | |
| 500 | 4,71 | | | | | | |

$M_{2-3}$ = 15200 [kPa]

CURBA DE COMPRESIUNE-TASARE / LOAD DEFORMATION CURVE




Întocmit:
ing.geol. Török Tiberiu

Acest buletin este înregistrat în registrul rezultate al laboratorului. Copia prezentului buletin este păstrată în arhiva S.C. Geo-Tech S.R.L.

# DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in accordance with BS 1377:1990:Part 5:Clause 3

## SETUP DATA

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | Consolidare DN 1 | Sample depth (m) | 2.00-2.30 |
| Borehole number | FF | Sample type | Undisturbed |
| Sample number | 3 | Specimen orientation | Vertical |
| | | Specimen depth (m) | 2.10 m |
| Sample description | praf argilos, galbui - cenusiu | | |
| Preparation method | Prepared from a sample tube in accordance with BS 1377:1990:Part 1:Clause 8.6 | | |
| Particle density (Mg/m³) | 2.67 | Assumed / Measured | Assumed |

| | | | |
|---|---|---|---|
| Ce[illegible]umber | CH 6 | Machine number | 2 |
| | | Ring number | 1 |

**Loading sequence information**

| Stage number | Pressure (kPa) | Mass (kg) |
|---|---|---|
| - | 0 | 0.00 |
| 1 | 13 | 5.10 |
| 2 | 26 | 10.20 |
| 3 | 52 | 20.40 |
| 4 | 104 | 40.80 |
| 5 | 234 | 91.80 |
| 6 | 494 | 193.80 |
| 7 | 13 | 5.10 |
| 8 | | |
| 9 | | |
| 10 | | |
| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |
| 16 | | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |
| 25 | | |

| **Initial measurements (ring)** | |
|---|---|
| Mass of ring (g) | 81.9 |
| Mass of tray (g) | 0.0 |
| Diameter of ring (mm) | 70.0 |
| Height of ring (mm) | 20.00 |
| Area of ring (mm²) | 3848.5 |
| Volume of ring (cc) | 76.97 |
| **Initial measurements (specimen)** | |
| Mass of specimen + ring + tray (g) | 244.5 |
| Height of specimen (mm) | 20.00 |
| Mass of specimen (g) | 162.6 |
| Equivalent height of solids (mm) | 13.10 |

| **Lever arm ratio (**:1)** |
|---|
| 1.0 |

| **Swelling pressure (kPa)** |
|---|
| |

| **Trimmings moisture content** | |
|---|---|
| Mass of wet soil + tin (g) | 244.45 |
| Mass of dry soil + tin (g) | 202.33 |
| Mass of tin (g) | 0.00 |

| **Final measurements** | |
|---|---|
| Mass of wet specimen + ring + tray (g) | 250.5 |
| Mass of dry specimen + ring + tray (g) | 202.3 |
| Mass of tray (g) | 81.9 |
| Mass of ring (g) | 81.86 |
| Mass of dry specimen (g) | 38.61 |

## DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in accordance with BS 1377:1990:Part 5:Clause 3

**TEST REPORT**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | Consolidare DN 1 | Sample depth (m) | 2.00-2.30 |
| Borehole number | FF | Sample type | Undisturbed |
| Sample number | 3 | Specimen orientation | Vertical |
| | | Specimen depth (m) | 2.10 m |
| Sample description | praf argilos, galbui - cenusiu | | |
| Preparation method | Prepared from a sample tube in accordance with BS 1377:1990:Part 1:Clause 8.6 | | |
| Particle density (Mg/m³) | 2.67 (Assumed) | Swelling pressure (kPa) | |

| INITIAL CONDITIONS | |
|---|---|
| Height (mm) | 20 |
| Diameter (mm) | 70 |
| Moisture content (trimmings) (%) | 21 |
| Bulk density (Mg/m³) | 2.11 |
| Dry density (Mg/m³) | 1.75 |
| Voids ratio | 0.527 |
| Degree of saturation (%) | 105 |

Comments / variations from procedures:

| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr. ing. Mantulescu M. |
| Date | 24.04.2015 | Date | 24.04.2015 | Date | 28.04.2015 |

# DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in accordance with BS 1377:1990:Part 5:Clause 3

**TEST REPORT**

| | | | |
|---|---|---|---|
| roject location | Vladeni | | |
| roject reference | Consolidare DN 1 | Sample depth (m) | 2.00-2.30 |
| orehole number | FF | Sample type | Undisturbed |
| ample number | 3 | Specimen orientation | Vertical |

verage laboratory temperature (°C) — Method of time fitting — Root time

| Pressure stage (kPa) | Coefficient of consolidation $c_v$ ($m^2$/year) | Coefficient of volume compressibility $m_v$ ($m^2$/MN) | Coefficient of secondary compression $c_{sec}$ (-) |
|---|---|---|---|
| 0 - 13 | - | #NUM! | - |
| 13 - 26 | - | 0.13 | - |
| 26 - 52 | - | 0.094 | - |
| 52 - 104 | - | 0.047 | - |
| 104 - 231 | - | 0.031 | - |
| 234 - 494 | - | 0.020 | - |
| 494 - 13 | - | - | - |

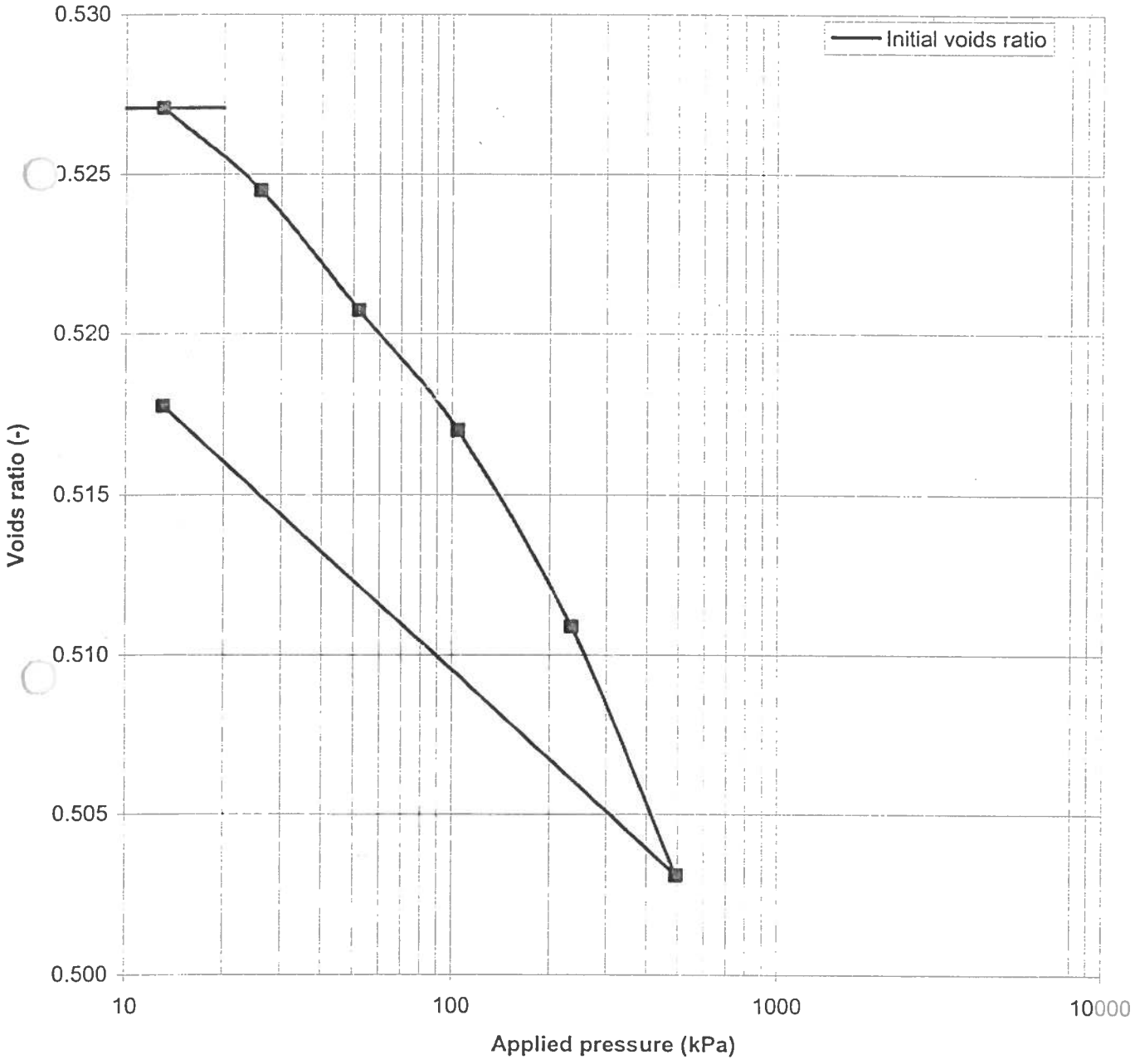
| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr. ing. Mantulescu M. |
| Date | 24.04.2015 | Date | 24.04.2015 | Date | 28.04.2015 |

## DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in accordance with BS 1377:1990:Part 5:Clause 3

**TEST REPORT**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | Consolidare DN 1 | Sample depth (m) | 2.00-2.30 |
| Borehole number | FF | Sample type | Undisturbed |
| Sample number | 3 | Specimen orientation | Vertical |



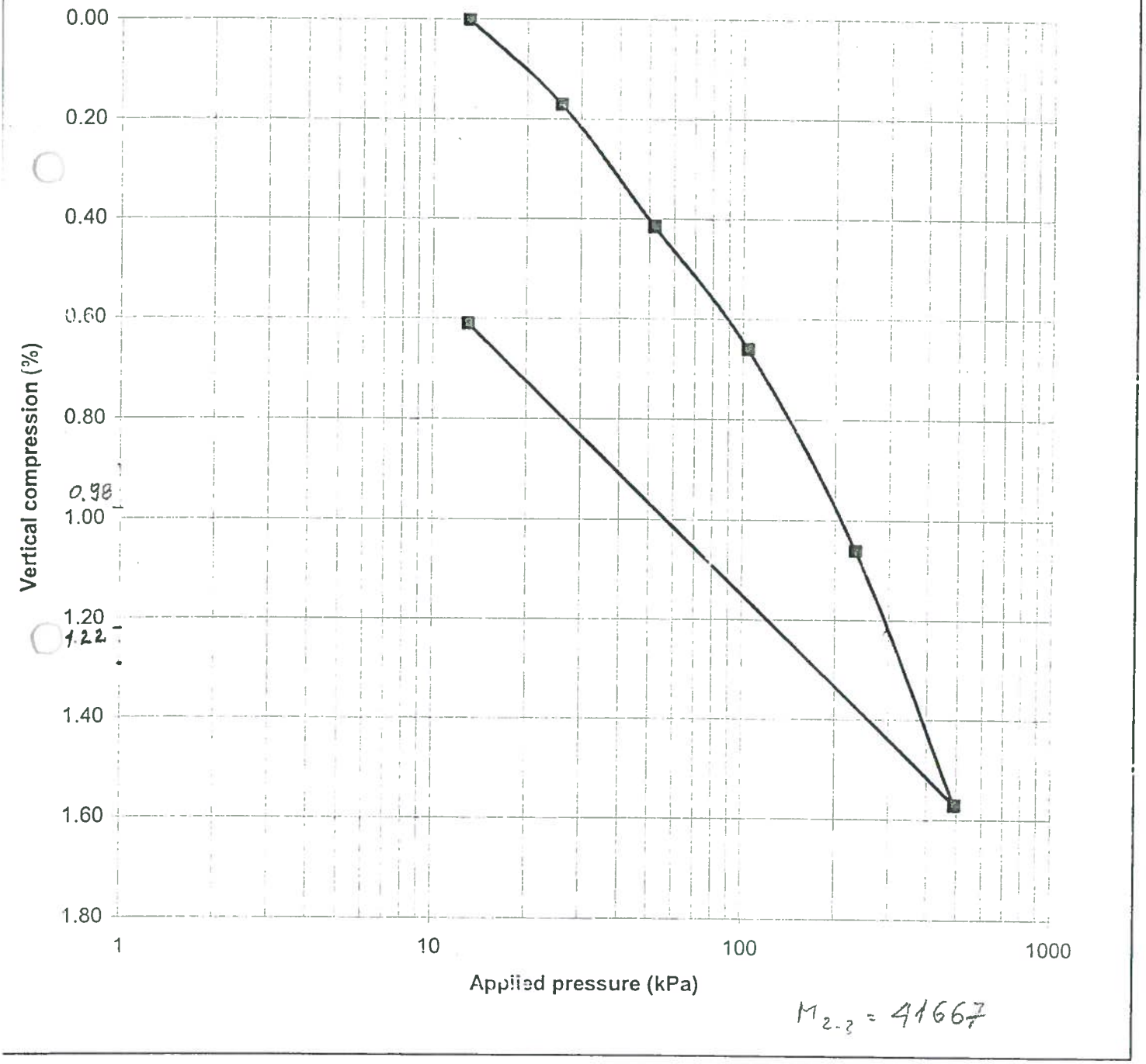

| | | | | | |
|---|---|---|---|---|---|
| Tested<br>Date | ing. Lixandroiu C.<br>24.04.2015 | Checked<br>Date | ing. Lixandroiu C.<br>24.04.2015 | Approved<br>Date | dr. ing. Mantulescu M.<br>28.04.2015 |

## DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in accordance with BS 1377:1990:Part 5:Clause 3

**TEST REPORT**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | Consolidare DN 1 | Sample depth (m) | 2.00-2.30 |
| Borehole number | FF | Sample type | Undisturbed |
| Sample number | 3 | Specimen orientation | Vertical |




| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr. ing. Mantulescu M. |
| Date | 24.04.2015 | Date | 24.04.2015 | Date | 28.04.2015 |

S.C. GEO-TECH SRL GHEORGHENI
LABORATOR GEOTEHNIC DE GRAD II
Autorizatie Nr. 2657 Data: 20.12.2012
Gheorgheni str.Carierei nr. 6 jud.Harghita-RO

Foraj nr/ Boring no.: FG
adâncimea/ depth (m): 4.00-4.30
proba/ sample: P2

**CONSOLIDARE DN1**

## BULETIN DE ANALIZĂ nr. / ANALYSIS REPORT no. L.1209 .eP2 data: 17.04.2015

DETERMINAREA COMPRESIBILITĂȚII PĂMÂNTURILOR ÎN EDOMETRU / COMPRESSION TEST

Conform/ According to STAS 8942/1-89

| caracteristici epruveta | UM | initial | final |
|---|---|---|---|
| Inel edometru Nr. | - | 93 | |
| epruveta umeda+tara | g | 215,31 | 214,23 |
| epruveta uscata+tara | g | 183,95 | |
| tara | g | 61,05 | |
| apa continuta | g | 31,36 | 30,28 |
| masa umeda | g | 154,26 | 153,18 |
| masa uscata $m_s$ | g | 122,90 | |
| umiditate (w) | % | 25,52 | 24,64 |
| volumul probei | $cm^3$ | 76,96 | 74,77 |
| masa volumica nat. | $g/cm^3$ | 2,00 | 2,05 |
| masa volumica uscata | $g/cm^3$ | 1,60 | 1,64 |
| porozitate (n) | % | 41,07 | 39,35 |
| indicele porilor ($e_0$) | - | 0,697 | 0,65 |
| grad de umiditate | % | 0,992 | 1,03 |

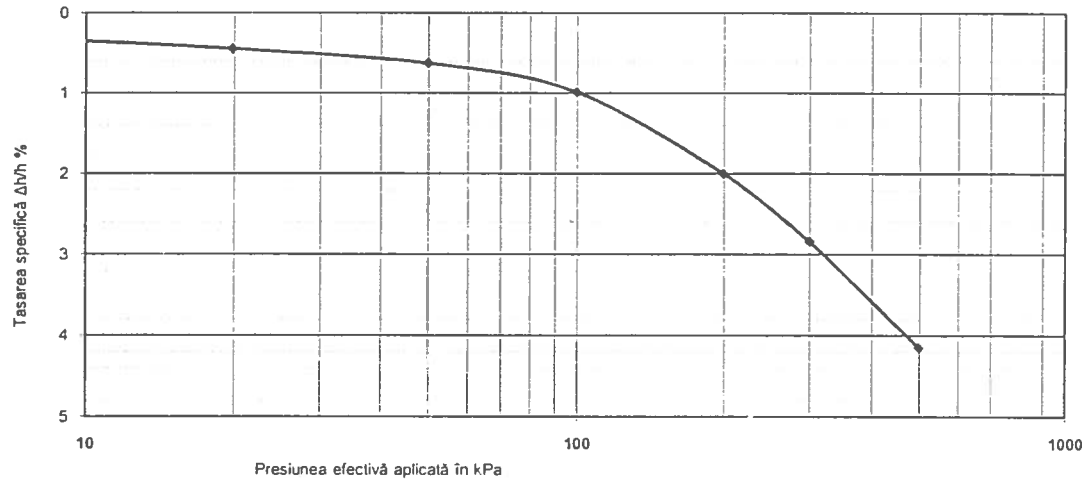
| Aria epruvetei A | $cm^2$ | 38,48 |
|---|---|---|
| Inaltimea initiala $h_0$ | cm | 2,00 |
| masa scheletului mineral | $g/cm^3$ | 2,71 |
| greutate volumică naturală | $kN/m^3$ | 19,66 |
| greutate volumică uscată | $kN/m^3$ | 15,67 |

Descriere material:
Argilă prăfoasă cenușie cu zone nisipose gălbui-ruginii, plastic consistentă-

| presiuni σ' kPa | ε% (Δh/h*100) | e | M kPa | $m_v$ 1/kPa | $a_v$ 1/kPa | $C_c$ % | $i_m$ % |
|---|---|---|---|---|---|---|---|
| 10 | 0,35 | 0,691 | - | - | - | - | - |
| 25 | 0,45 | 0,690 | 9937 | 1,01E-04 | 1,71E-04 | 0,006 | - |
| 50 | 0,63 | 0,687 | 16703 | 5,99E-05 | 1,02E-04 | 0,008 | - |
| 100 | 0,99 | 0,680 | 13872 | 7,21E-05 | 1,22E-04 | 0,020 | - |
| **200** | **2,00** | **0,663** | **9889** | **1,01E-04** | **1,72E-04** | **0,057** | - |
| **300** | **2,84** | **0,649** | **11890** | **8,41E-05** | **1,43E-04** | **0,081** | - |
| 300 | 2,84 | 0,649 | | | | | |
| 500 | 4,15 | | | | | | |

$M_{2-3}$ = 12600 [kPa]

CURBA DE COMPRESIUNE-TASARE / LOAD DEFORMATION CURVE




Întocmit:
ing.geol. Török Tiberiu

Acest buletin este înregistrat în registrul rezultate al laboratorului. Copia prezentului buletin este păstrată în arhiva S.C. Geo-Tech S.R.L.

# DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in accordance with BS 1377:1990:Part 5:Clause 3

## SETUP DATA

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | Consolidare DN 1 | Sample depth (m) | 2.00 - 2.30m |
| Borehole number | FH | Sample type | Undisturbed |
| Sample number | 2 | Specimen orientation | Vertical |
| | | Specimen depth (m) | 2.10 m |
| Sample description | argila prafoasaa, galbuie | | |
| Preparation method | Prepared from a sample tube in accordance with BS 1377:1990:Part 1:Clause 8.6 | | |
| Particle density (Mg/m³) | 2.72 | Assumed / Measured | Assumed |

| | | | |
|---|---|---|---|
| Cell number | CH5 | Machine number | 1 |
| | | Ring number | 1 |

**Loading sequence information**

| Stage number | Pressure (kPa) | Mass (kg) |
|---|---|---|
| - | 0 | 0.00 |
| 1 | 13 | 5.10 |
| 2 | 26 | 10.20 |
| 3 | 52 | 20.40 |
| 4 | 104 | 40.80 |
| 5 | 234 | 91.80 |
| 6 | 494 | 193.80 |
| 7 | 13 | 5.10 |
| 8 | | |
| 9 | | |
| 10 | | |
| 11 | | |
| 12 | | |
| 13 | | |
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| 18 | | |
| 19 | | |
| 20 | | |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |
| 25 | | |

| **Initial measurements (ring)** | |
|---|---|
| Mass of ring (g) | 81.9 |
| Mass of tray (g) | 0.0 |
| Diameter of ring (mm) | 70.0 |
| Height of ring (mm) | 20.00 |
| Area of ring (mm²) | 3848.5 |
| Volume of ring (cc) | 76.97 |
| **Initial measurements (specimen)** | |
| Mass of specimen + ring + tray (g) | 238.1 |
| Height of specimen (mm) | 20.00 |
| Mass of specimen (g) | 156.3 |
| Equivalent height of solids (mm) | 12.83 |

| **Lever arm ratio (**:1)** |
|---|
| 1.0 |

| **Swelling pressure (kPa)** |
|---|
| |

| **Trimmings moisture content** | |
|---|---|
| Mass of wet soil + tin (g) | 238.12 |
| Mass of dry soil + tin (g) | 204.61 |
| Mass of tin (g) | 0.00 |

| **Final measurements** | |
|---|---|
| Mass of wet specimen + ring + tray (g) | 322.2 |
| Mass of dry specimen + ring + tray (g) | 204.6 |
| Mass of tray (g) | 81.9 |
| Mass of ring (g) | 81.86 |
| Mass of dry specimen (g) | 40.89 |

DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in accordance with BS 1377:1990:Part 5:Clause 3

**TEST REPORT**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | Consolidare DN 1 | Sample depth (m) | 2.00 - 2.30m |
| Borehole number | FH | Sample type | Undisturbed |
| Sample number | 2 | Specimen orientation | Vertical |
| | | Specimen depth (m) | 2.10 m |
| Sample description | argila prafoasaa, galbuie | | |

Preparation method: Prepared from a sample tube in accordance with BS 1377:1990:Part 1:Clause 8.6

Particle density (Mg/m³): 2.72 (Assumed) Swelling pressure (kPa)

| INIT. CONDITIONS | |
|---|---|
| Height (mm) | 20 |
| Diameter (mm) | 70 |
| Moisture content (trimmings) (%) | 16 |
| Bulk density (Mg/m³) | 2.03 |
| Dry density (Mg/m³) | 1.74 |
| Voids ratio | 0.559 |
| Degree of saturation (%) | 80 |

Comments / variations from procedures:

| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr. ing. Mantulescu M. |
| Date | 20.04.2015 | Date | 20.04.2015 | Date | 21.04.2015 |

# DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in accordance with BS 1377:1990:Part 5:Clause 3

**TEST REPORT**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | Consolidare DN 1 | Sample depth (m) | 2.00 - 2.30m |
| Borehole number | FH | Sample type | Undisturbed |
| Sample number | 2 | Specimen orientation | Vertical |

Average laboratory temperature (°C) — Method of time fitting: Root time

| Pressure stage (kPa) | Coefficient of consolidation $c_v$ ($m^2$/year) | Coefficient of volume compressibility $m_v$ ($m^2$/MN) | Coefficient of secondary compression $c_{sec}$ (-) |
|---|---|---|---|
| 0 - 13 | - | #NUM! | - |
| 13 - 26 | - | 0.0038 | - |
| 26 - 52 | - | 0.067 | - |
| 52 - 104 | - | 0.052 | - |
| 104 - 234 | - | 0.068 | - |
| 234 - 494 | - | 0.063 | - |
| 494 - 13 | - | - | - |

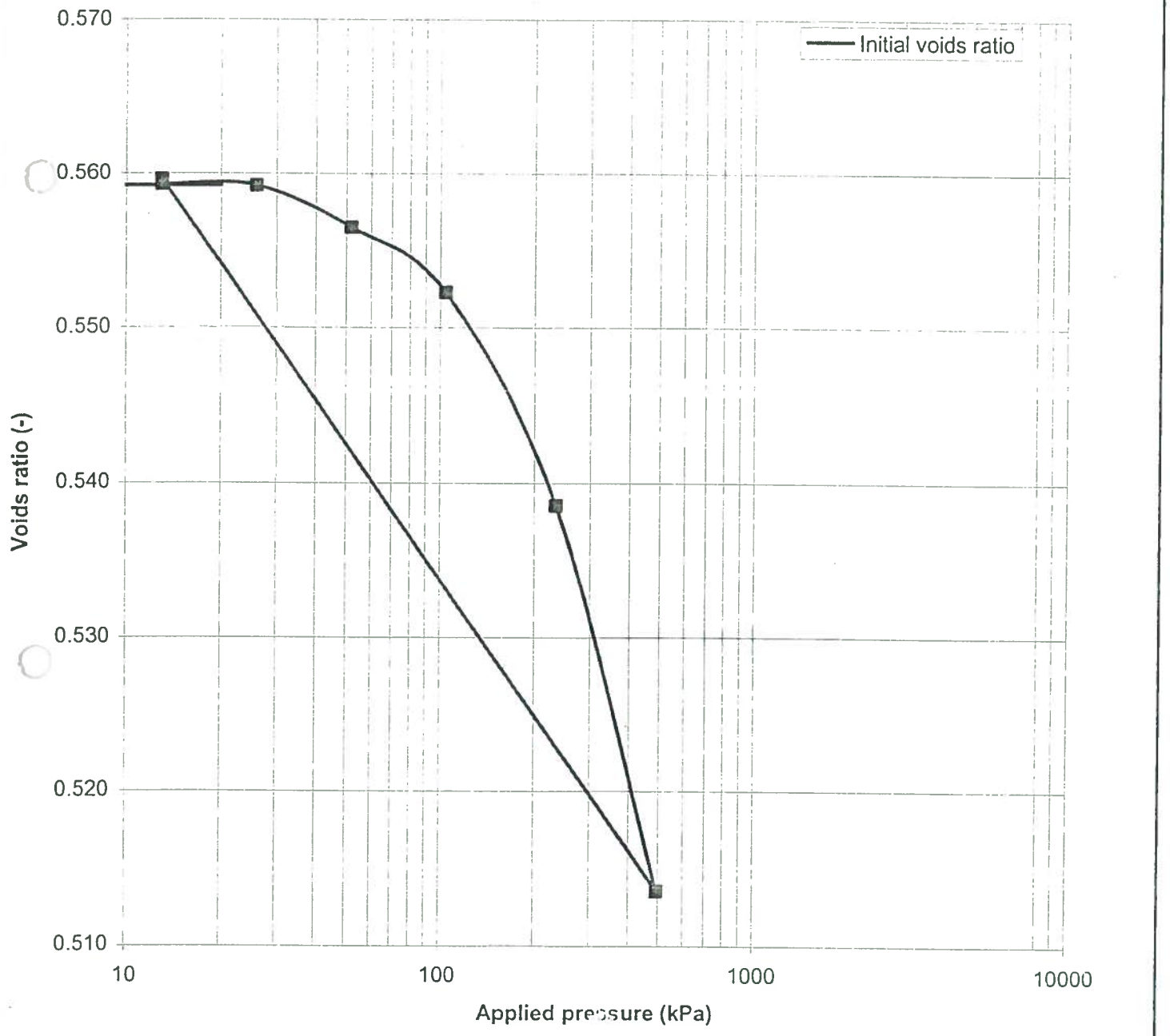
| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr. ing. Mantulescu M. |
| Date | 20.04.2015 | Date | 20.04.2015 | Date | 21.04.2015 |

## DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in accordance with BS 1377:1990:Part 5:Clause 3

**TEST REPORT**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | Consolidare DN 1 | Sample depth (m) | 2.00 - 2.30m |
| Borehole number | FH | Sample type | Undisturbed |
| Sample number | 2 | Specimen orientation | Vertical |



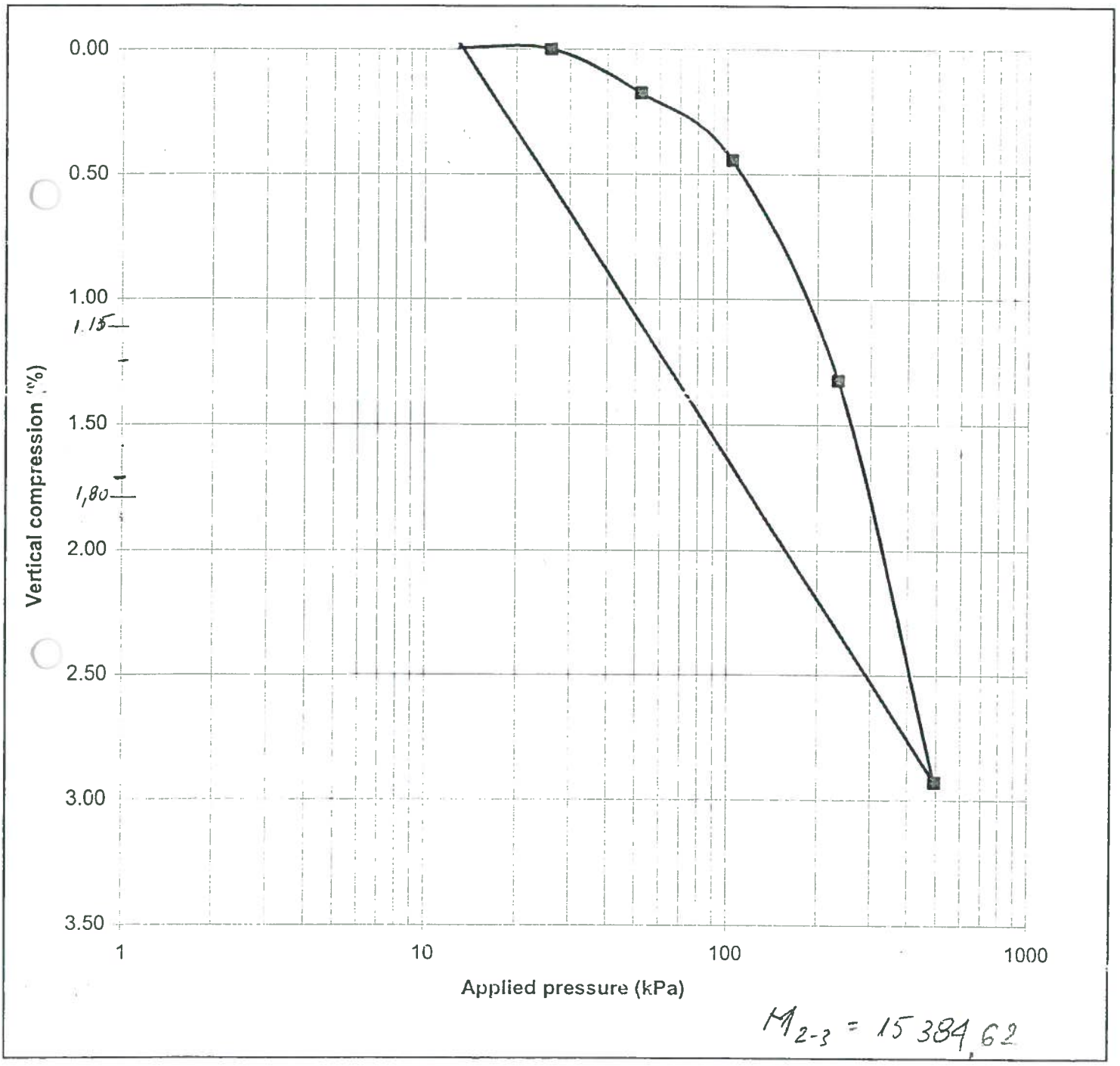

| | | | | | |
|---|---|---|---|---|---|
| Tested<br>Date | ing. Lixandroiu C.<br>20.04.2015 | Checked<br>Date | ing. Lixandroiu C.<br>20.04.2015 | Approved<br>Date | dr. ing. Mantulescu M.<br>21.04.2015 |

# DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in accordance with BS 1377:1990:Part 5:Clause 3

**TEST REPORT**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | Consolidare DN 1 | Sample depth (m) | 2.00 - 2.30m |
| Borehole number | FH | Sample type | Undisturbed |
| Sample number | 2 | Specimen orientation | Vertical |




| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr. ing. Mantulescu M. |
| Date | 20.04.2015 | Date | 20.04.2015 | Date | 21.04.2015 |

S.C. GEO-TECH SRL GHEORGHENI
LABORATOR GEOTEHNIC DE GRAD II
Autorizatie Nr. 2657 Data: 20.12.2012
Gheorgheni str.Carierei nr. 6 jud.Harghita-RO

Foraj nr/ Boring no.: FH
adâncimea/ depth (m): 3.70-4.00
proba/ sample: P3

**CONSOLIDARE DN1**

## BULETIN DE ANALIZĂ nr. / ANALYSIS REPORT no. L.1209 .eP3 data: 17.04.2015

DETERMINAREA COMPRESIBILITĂŢII PĂMÂNTURILOR ÎN EDOMETRU / COMPRESSION TEST

Conform/ According to STAS 8942/1-89

| caracteristici epruveta | UM | initial | final |
|---|---|---|---|
| Inel edometru Nr. | - | 98 | |
| epruveta umeda+tara | g | 216,20 | 215,12 |
| epruveta uscata+tara | g | 190,94 | |
| tara | g | 60,24 | |
| apa continuta | g | 25,26 | 24,18 |
| masa umeda | g | 155,96 | 154,88 |
| masa uscata $m_s$ | g | 130,70 | |
| umiditate (w) | % | 19,33 | 18,50 |
| volumul probei | $cm^3$ | 76,96 | 74,77 |
| masa volumica nat | $g/cm^3$ | 2,03 | 2,07 |
| masa volumica uscata | $g/cm^3$ | 1,70 | 1,75 |
| porozitate (n) | % | 37,10 | 35,26 |
| indicele porilor ($e_0$) | - | 0,590 | 0,55 |
| grad de umiditate | % | 0,885 | 0,92 |

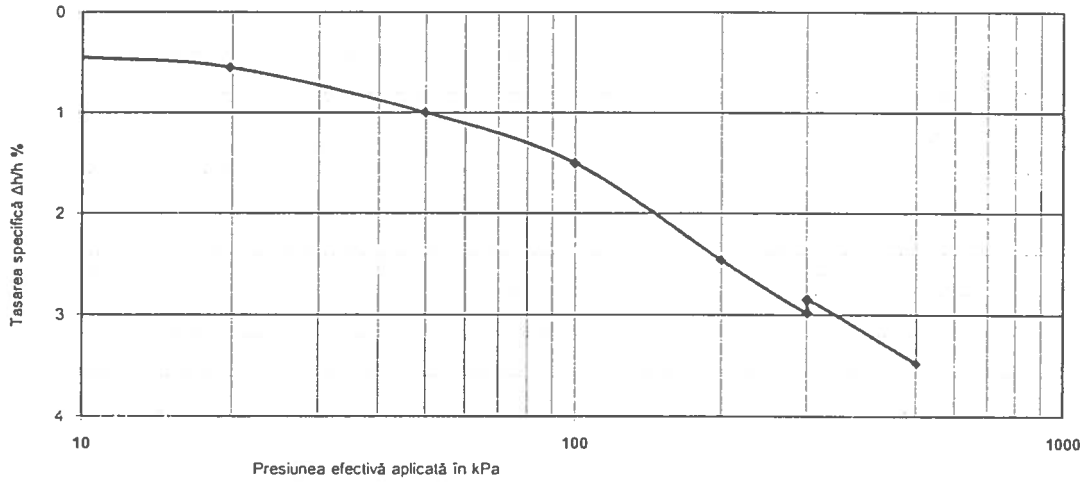
| Aria epruvetei A | $cm^2$ | 38,48 |
|---|---|---|
| Inaltimea initiala $h_0$ | cm | 2,00 |
| masa scheletului mineral | $g/cm^3$ | 2,70 |
| greutate volumică naturală | $kN/m^3$ | 19,88 |
| greutate volumică uscată | $kN/m^3$ | 16,66 |

Descriere material:
Argilă prăfoasă cafenie, plastic vârtoasă-tare

| | presiuni σ' kPa | ε% (Δh/h*100) | e | M kPa | $m_v$ 1/kPa | $a_v$ 1/kPa | $C_c$ % | $i_m$ % |
|---|---|---|---|---|---|---|---|---|
| | 10 | 0,45 | 0,583 | - | - | - | - | - |
| | 20 | 0,56 | 0,581 | 9938 | 1,01E-04 | 1,60E-04 | 0,005 | - |
| | 50 | 1,00 | 0,574 | 6682 | 1,50E-04 | 2,38E-04 | 0,018 | - |
| | 100 | 1,50 | 0,566 | 9989 | 1,00E-04 | 1,59E-04 | 0,026 | - |
| | 200 | 2,46 | 0,551 | 10405 | 9,61E-05 | 1,53E-04 | 0,051 | - |
| | 300 | 2,98 | 0,543 | 19209 | 5,21E-05 | 8,28E-05 | 0,047 | - |
| inundare | 300 | 2,85 | 0,545 | | | | | -0,13 |
| | 500 | 3,48 | | | | | | |

$M_{2-3}$ = 20500 [kPa]

CURBA DE COMPRESIUNE-TASARE / LOAD DEFORMATION CURVE




Întocmit:
ing.geol. Török Tiberiu

Acest buletin este înregistrat în registrul rezultate al laboratorului. Copia prezentului buletin este păstrată în arhiva S C. Geo-Tech S R L.

# DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in accordance with BS 1377:1990:Part 5:Clause 3

**SETUP DATA**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | Consolidare DN 1 | Sample depth (m) | 2.00 - 2.30m |
| Borehole number | FI | Sample type | Undisturbed |
| Sample number | 2 | Specimen orientation | Vertical |
| | | Specimen depth (m) | 2.10 m |
| Sample description | argila prafoasaa, galbui - cenusie | | |
| Preparation method | Prepared from a sample tube in accordance with BS 1377:1990:Part 1:Clause 8.6 | | |
| Particle density (Mg/m³) | 2.72 | Assumed / Measured | Assumed |

| | | | |
|---|---|---|---|
| Ce[illegible]umber | CH5 | Machine number | 1 |
| | | Ring number | 3 |

**Loading sequence information**

| Stage number | Pressure (kPa) | Mass (kg) |
|---|---|---|
| - | 0 | 0.00 |
| 1 | 13 | 5.10 |
| 2 | 26 | 10.20 |
| 3 | 52 | 20.40 |
| 4 | 104 | 40.80 |
| 5 | 234 | 91.80 |
| 6 | 494 | 193.80 |
| 7 | 13 | 5.10 |
| 8 | | |
| 9 | | |
| 10 | | |
| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |
| 16 | | |
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| 18 | | |
| 19 | | |
| 20 | | |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |
| 25 | | |

| **Initial measurements (ring)** | |
|---|---|
| Mass of ring (g) | 81.7 |
| Mass of tray (g) | 0.0 |
| Diameter of ring (mm) | 70.0 |
| Height of ring (mm) | 20.00 |
| Area of ring (mm²) | 3848.5 |
| Volume of ring (cc) | 76.97 |
| **Initial measurements (specimen)** | |
| Mass of specimen + ring + tray (g) | 233.4 |
| Height of specimen (mm) | 20.00 |
| Mass of specimen (g) | 151.7 |
| Equivalent height of solids (mm) | 11.50 |

| **Lever arm ratio (**:1)** |
|---|
| 1.0 |

| **Swelling pressure (kPa)** |
|---|
| |

| **Trimmings moisture content** | |
|---|---|
| Mass of wet soil + tin (g) | 233.40 |
| Mass of dry soil + tin (g) | 185.23 |
| Mass of tin (g) | 0.00 |

| **Final measurements** | |
|---|---|
| Mass of wet specimen + ring + tray (g) | 360.7 |
| Mass of dry specimen + ring + tray (g) | 185.2 |
| Mass of tray (g) | 81.7 |
| Mass of ring (g) | 81.7 |
| Mass of dry specimen (g) | 21.83 |

# DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in accordance with BS 1377:1990:Part 5:Clause 3

**TEST REPORT**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | Consolidare DN 1 | Sample depth (m) | 2.00 - 2.30m |
| Borehole number | FI | Sample type | Undisturbed |
| Sample number | 2 | Specimen orientation | Vertical |
| | | Specimen depth (m) | 2.10 m |
| Sample description | argila prafoasaa, galbui - cenusie | | |
| Preparation method | Prepared from a sample tube in accordance with BS 1377:1990:Part 1:Clause 8.6 | | |
| Particle density (Mg/m³) | 2.72 (Assumed) | Swelling pressure (kPa) | |

| INITIAL CONDITIONS | |
|---|---|
| Height (mm) | 20 |
| Diameter (mm) | 70 |
| Moisture content (trimmings) (%) | 26 |
| Bulk density (Mg/m³) | 1.97 |
| Dry density (Mg/m³) | 1.56 |
| Voids ratio | 0.739 |
| Degree of saturation (%) | 96 |

Comments / variations from procedures:

| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr. ing. Mantulescu M. |
| Date | 24.04.2015 | Date | 24.04.2015 | Date | 28.04.2015 |

# DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in accordance with BS 1377:1990:Part 5:Clause 3

**TEST REPORT**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | Consolidare DN 1 | Sample depth (m) | 2.00 - 2.30m |
| Borehole number | FI | Sample type | Undisturbed |
| Sample number | 2 | Specimen orientation | Vertical |

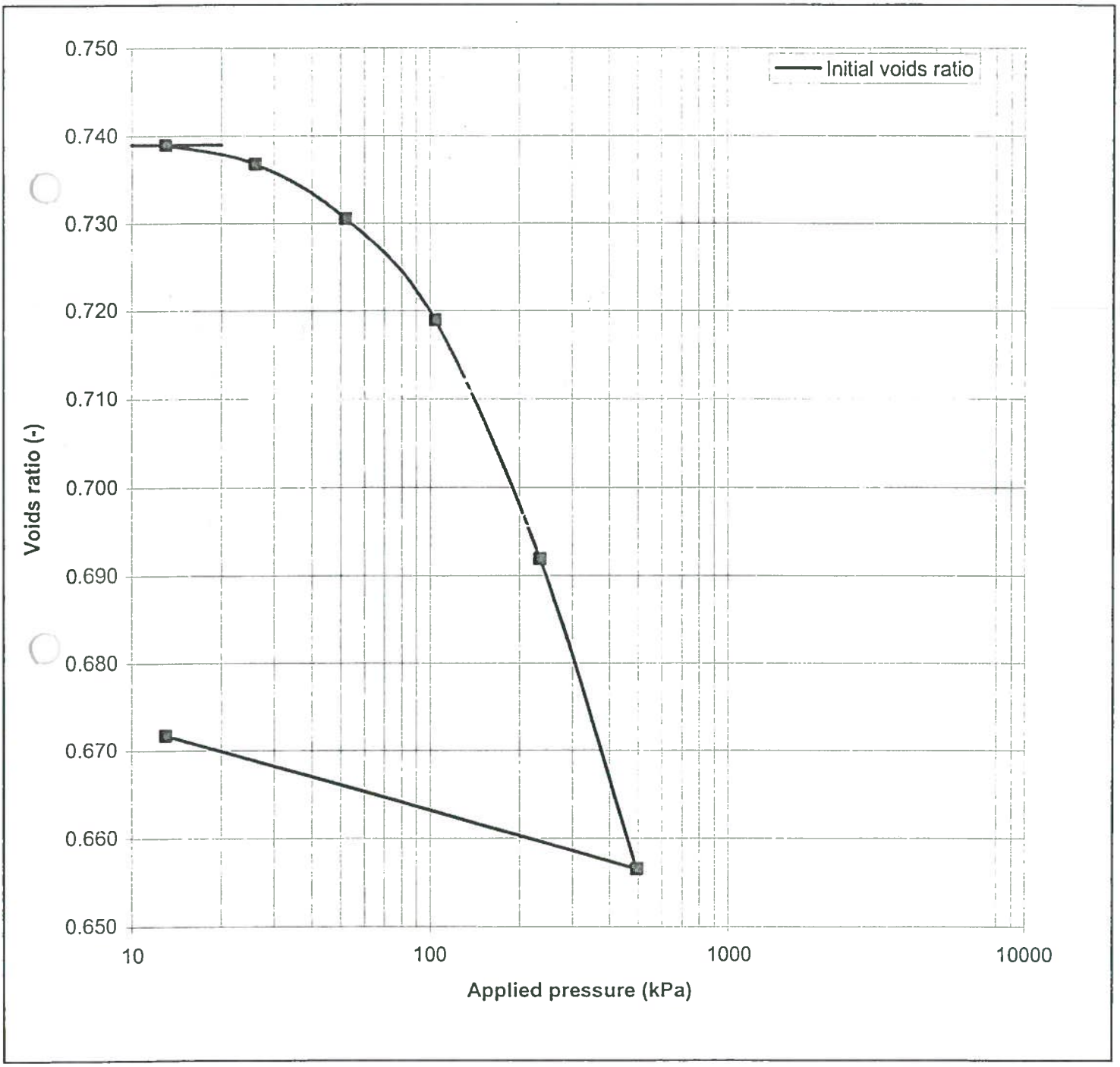
Average laboratory temperature (°C) — Method of time fitting — Root time

| Pressure stage (kPa) | Coefficient of consolidation $c_v$ ($m^2$/year) | Coefficient of volume compressibility $m_v$ ($m^2$/MN) | Coefficient of secondary compression $c_{sec}$ (-) |
|---|---|---|---|
| 0 - 13 | - | #NUM! | - |
| 13 - 26 | - | 0.096 | - |
| 26 - 52 | - | 0.14 | - |
| 52 - 104 | - | 0.13 | - |
| 104 - 234 | - | 0.12 | - |
| 234 - 494 | - | 0.080 | - |
| 494 - 13 | - | - | - |

| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr. ing. Mantulescu M. |
| Date | 24.04.2015 | Date | 24.04.2015 | Date | 28.04.2015 |

DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES
Tested in accordance with BS 1377:1990:Part 5:Clause 3
**TEST REPORT**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | Consolidare DN 1 | Sample depth (m) | 2.00 - 2.30m |
| Borehole number | FI | Sample type | Undisturbed |
| Sample number | 2 | Specimen orientation | Vertical |



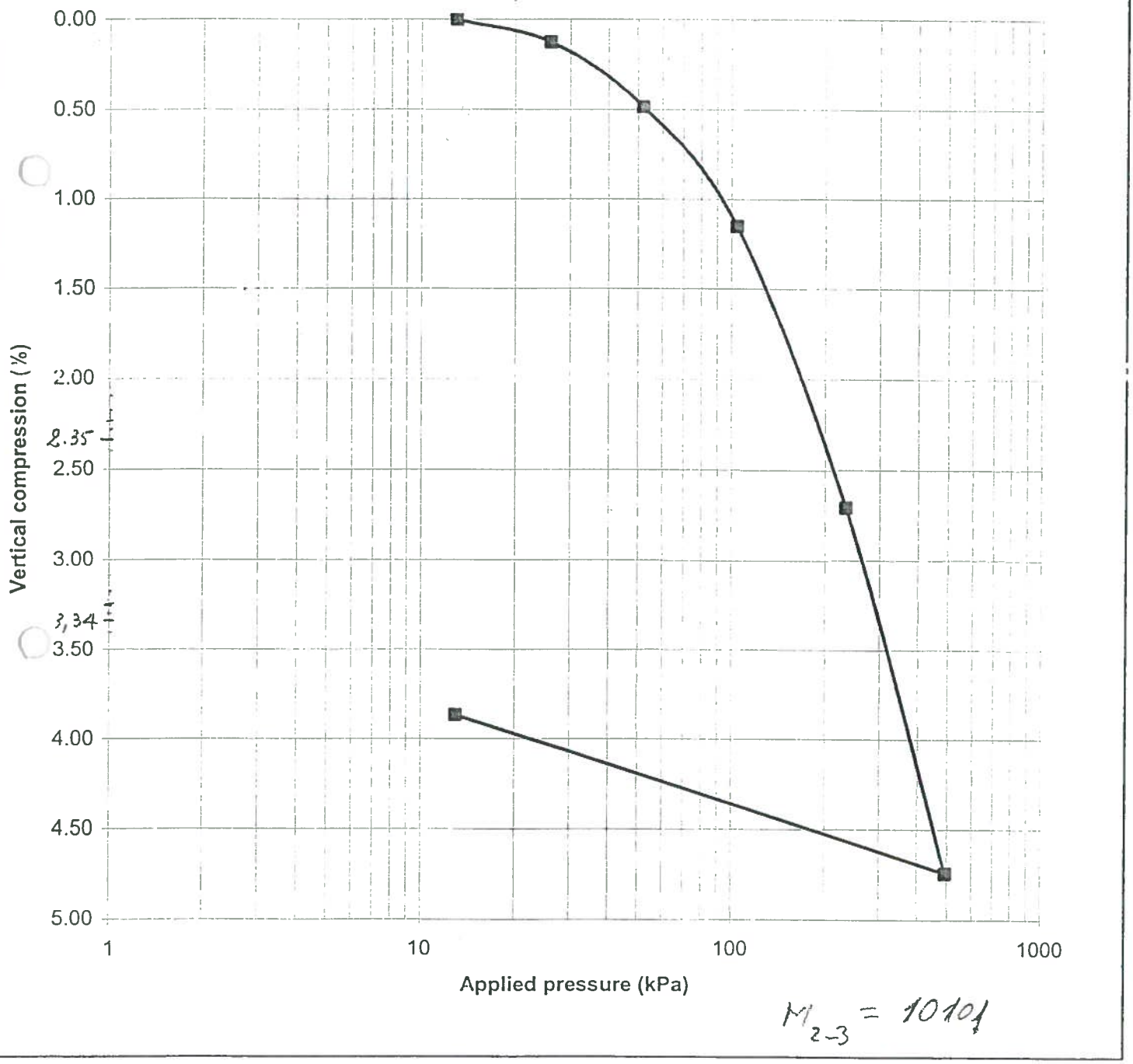

| | | | | | |
|---|---|---|---|---|---|
| Tested Date | ing. Lixandroiu C. 24.04.2015 | Checked Date | ing. Lixandroiu C. 24.04.2015 | Approved Date | dr. ing. Mantulescu M. 28.04.2015 |

# DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in accordance with BS 1377:1990:Part 5:Clause 3

**TEST REPORT**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | Consolidare DN 1 | Sample depth (m) | 2.00 - 2.30m |
| Borehole number | FI | Sample type | Undisturbed |
| Sample number | 2 | Specimen orientation | Vertical |




| | | | | | |
|---|---|---|---|---|---|
| Tested Date | ing. Lixandroiu C. 24.04.2015 | Checked Date | ing. Lixandroiu C. 24.04.2015 | Approved Date | dr. ing. Mantulescu M. 28.04.2015 |

S.C. GEO-TECH SRL GHEORGHENI
LABORATOR GEOTEHNIC DE GRAD II
Autorizatie Nr. 2657 Data: 20.12.2012
Gheorgheni str.Carierei nr. 6 jud.Harghita-RO

Foraj nr/ Boring no.: FI

adâncimea/ depth (m): 4.00-4.30

proba/ sample: P4

**CONSOLIDARE DN1**

## BULETIN DE ANALIZĂ nr. / ANALYSIS REPORT no. L.1209 .eP4 data: 17.04.2015

DETERMINAREA COMPRESIBILITĂŢII PĂMÂNTURILOR ÎN EDOMETRU / COMPRESSION TEST

Conform/ According to STAS 8942/1-89

| caracteristici epruveta | UM | initial | final |
|---|---|---|---|
| Inel edometru Nr. | - | 902 | |
| epruveta umeda+tara | g | 210,70 | 209,65 |
| epruveta uscata+tara | g | 182,66 | |
| tara | g | 54,43 | |
| apa continuta | g | 28,04 | 26,99 |
| masa umeda | g | 156,27 | 155,22 |
| masa uscata $m_s$ | g | 128,23 | |
| umiditate (w) | % | 21,87 | 21,05 |
| volumul probei | $cm^3$ | 76,97 | 74,19 |
| masa volumica nat. | $g/cm^3$ | 2,03 | 2,09 |
| masa volumica uscata | $g/cm^3$ | 1,67 | 1,73 |
| porozitate (n) | % | 38,30 | 35,99 |
| indicele porilor ($e_0$) | - | 0,621 | 0,56 |
| grad de umiditate | % | 0,951 | 1,01 |

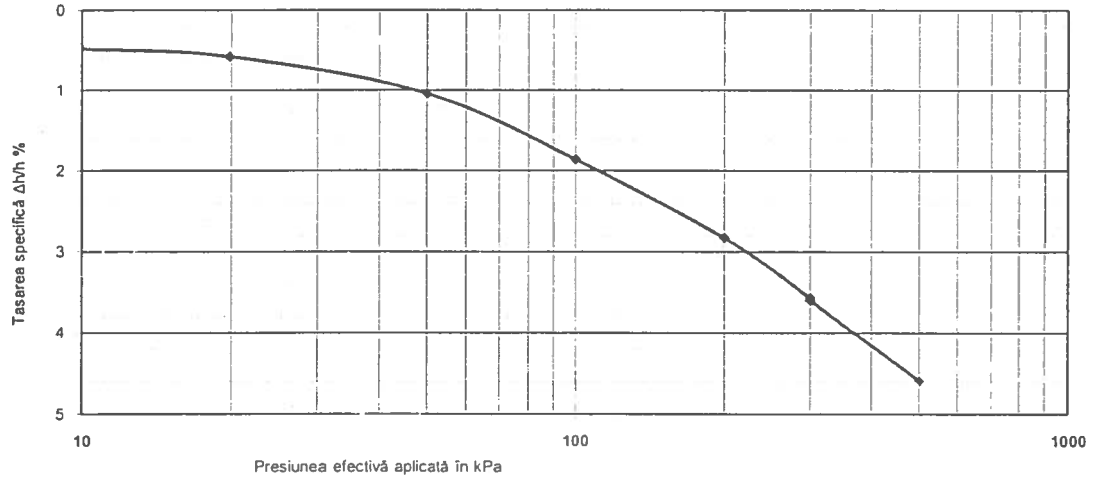
| Aria epruvetei A | $cm^2$ | 38,48 |
|---|---|---|
| Inaltimea initiala $h_0$ | cm | 2,00 |
| masa scheletului mineral | $g/cm^3$ | 2,70 |
| greutate volumică naturală | $kN/m^3$ | 19,92 |
| greutate volumică uscată | $kN/m^3$ | 16,34 |

Descriere material:
Argilă prăfoasă gălbuie-cenuşie cu zone nisipoase, plastic vârtoasă

| | presiuni σ' kPa | ε% (Δh/h*100) | e | M kPa | $m_v$ 1/kPa | $a_v$ 1/kPa | $C_c$ | $i_m$ |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | % | |
| | 10 | 0,48 | 0,613 | - | - | - | - | - |
| | 20 | 0,58 | 0,611 | 9940 | 1,01E-04 | 1,63E-04 | 0,005 | - |
| | 50 | 1,04 | 0,604 | 6538 | 1,53E-04 | 2,48E-04 | 0,019 | - |
| | 100 | 1,86 | 0,591 | 6092 | 1,64E-04 | 2,66E-04 | 0,044 | - |
| | 200 | 2,83 | 0,575 | 10300 | 9,71E-05 | 1,57E-04 | 0,052 | - |
| | 300 | 3,57 | 0,563 | 13501 | 7,41E-05 | 1,20E-04 | 0,068 | - |
| inundare | 300 | 3,60 | 0,562 | | | | | 0,03 |
| | 500 | 4,59 | | | | | | |

$M_{2-3}$ = 14200 [kPa]

CURBA DE COMPRESIUNE-TASARE / LOAD DEFORMATION CURVE




Întocmit:
ing.geol. Török Tiberiu

Acest buletin este înregistrat în registrul rezultate al laboratorului. Copia prezentului buletin este păstrată în arhiva S.C. Geo-Tech S.R.L.

# DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in accordance with BS 1377:1990:Part 5:Clause 3

**SETUP DATA**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | Consolidare DN 1 | Sample depth (m) | 7.70-8.00 |
| Borehole number | FI | Sample type | Undisturbed |
| Sample number | 8 | Specimen orientation | Vertical |
| | | Specimen depth (m) | 7.80 m |
| Sample description | praf argilos, cenusiu | | |
| Preparation method | Prepared from a sample tube in accordance with BS 1377:1990:Part 1:Clause 8.6 | | |
| Particle density (Mg/m³) | 2.67 | Assumed / Measured | Assumed |

| | | | |
|---|---|---|---|
| Ce umber | CH 6 | Machine number | 2 |
| | | Ring number | 2 |

**Loading sequence information**

| Stage number | Pressure (kPa) | Mass (kg) |
|---|---|---|
| - | 0 | 0.00 |
| 1 | 13 | 5.10 |
| 2 | 26 | 10.20 |
| 3 | 52 | 20.40 |
| 4 | 104 | 40.80 |
| 5 | 234 | 91.80 |
| 6 | 494 | 193.80 |
| 7 | 13 | 5.10 |
| 8 | | |
| 9 | | |
| 10 | | |
| 11 | | |
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |
| 16 | | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |
| 25 | | |

| **Initial measurements (ring)** | |
|---|---|
| Mass of ring (g) | 82.6 |
| Mass of tray (g) | 0.0 |
| Diameter of ring (mm) | 70.0 |
| Height of ring (mm) | 20.00 |
| Area of ring (mm²) | 3848.5 |
| Volume of ring (cc) | 76.97 |
| **Initial measurements (specimen)** | |
| Mass of specimen + ring + tray (g) | 246.3 |
| Height of specimen (mm) | 20.00 |
| Mass of specimen (g) | 163.8 |
| Equivalent height of solids (mm) | 14.26 |

| **Lever arm ratio (**:1)** |
|---|
| 1.0 |

| **Swelling pressure (kPa)** |
|---|
| |

| **Trimmings moisture content** | |
|---|---|
| Mass of wet soil + tin (g) | 246.34 |
| Mass of dry soil + tin (g) | 220.36 |
| Mass of tin (g) | 0.00 |

| **Final measurements** | |
|---|---|
| Mass of wet specimen + ring + tray (g) | 334.8 |
| Mass of dry specimen + ring + tray (g) | 220.4 |
| Mass of tray (g) | 82.6 |
| Mass of ring (g) | 82.56 |
| Mass of dry specimen (g) | 55.24 |

DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES
Tested in accordance with BS 1377:1990:Part 5:Clause 3
**TEST REPORT**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | Consolidare DN 1 | Sample depth (m) | 7.70-8.00 |
| Borehole number | FI | Sample type | Undisturbed |
| Sample number | 8 | Specimen orientation | Vertical |
| | | Specimen depth (m) | 7.80 m |
| Sample description | praf argilos, cenusiu | | |

Preparation method: Prepared from a sample tube in accordance with BS 1377:1990:Part 1:Clause 8.6

Particle density (Mg/m³): 2.67 (Assumed) Swelling pressure (kPa)

| INITIAL CONDITIONS | |
|---|---|
| Height (mm) | 20 |
| Diameter (mm) | 70 |
| Moisture content (trimmings) (%) | 12 |
| Bulk density (Mg/m³) | 2.13 |
| Dry density (Mg/m³) | 1.90 |
| Voids ratio | 0.403 |
| Degree of saturation (%) | 78 |

Comments / variations from procedures:

| | | | | | |
|---|---|---|---|---|---|
| Tested Date | ing. Lixandroiu C. 20.04.2015 | Checked Date | ing. Lixandroiu C. 20.04.2015 | Approved Date | dr. ing. Mantulescu M. 21.04.2015 |

# DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Tested in accordance with BS 1377:1990:Part 5:Clause 3

**TEST REPORT**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | Consolidare DN 1 | Sample depth (m) | 7.70-8.00 |
| Borehole number | FI | Sample type | Undisturbed |
| Sample number | 8 | Specimen orientation | Vertical |

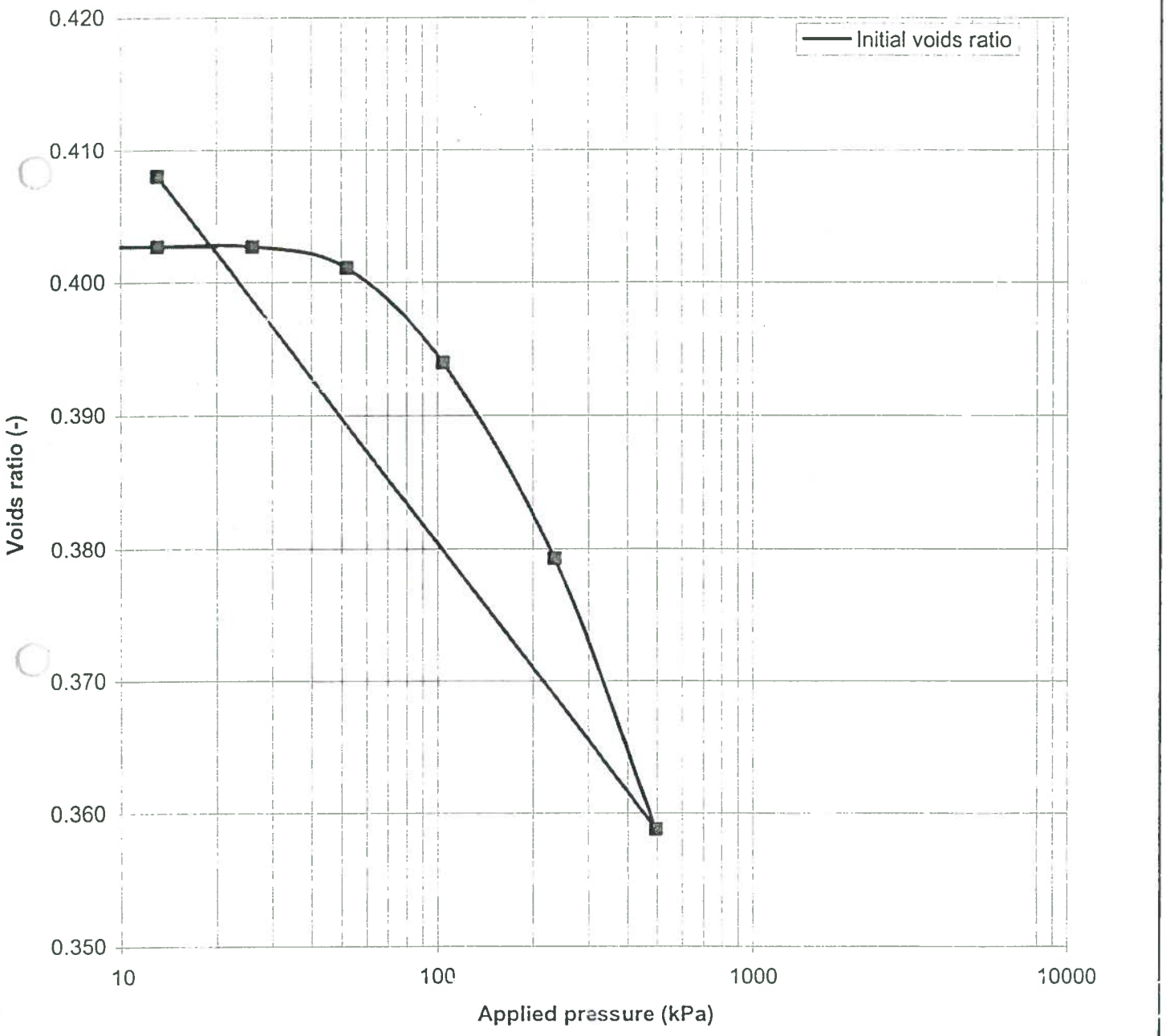
Average laboratory temperature (°C) — Method of time fitting: Root time

| Pressure stage (kPa) | Coefficient of consolidation $c_v$ ($m^2$/year) | Coefficient of volume compressibility $m_v$ ($m^2$/MN) | Coefficient of secondary compression $c_{sec}$ (-) |
|---|---|---|---|
| 0 - 13 | - | #NUM! | - |
| 13 - 26 | - | #NUM! | - |
| 26 - 52 | - | 0.044 | - |
| 52 - 104 | - | 0.098 | - |
| 104 - 234 | - | 0.081 | - |
| 234 - 494 | - | 0.057 | - |
| 494 - 13 | - | - | - |

| | | | | | |
|---|---|---|---|---|---|
| Tested<br>Date | ing. Lixandroiu C.<br>20.04.2015 | Checked<br>Date | ing. Lixandroiu C.<br>20.04.2015 | Approved<br>Date | dr. ing. Mantulescu M.<br>21.04.2015 |

DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES
Tested in accordance with BS 1377:1990:Part 5:Clause 3
**TEST REPORT**

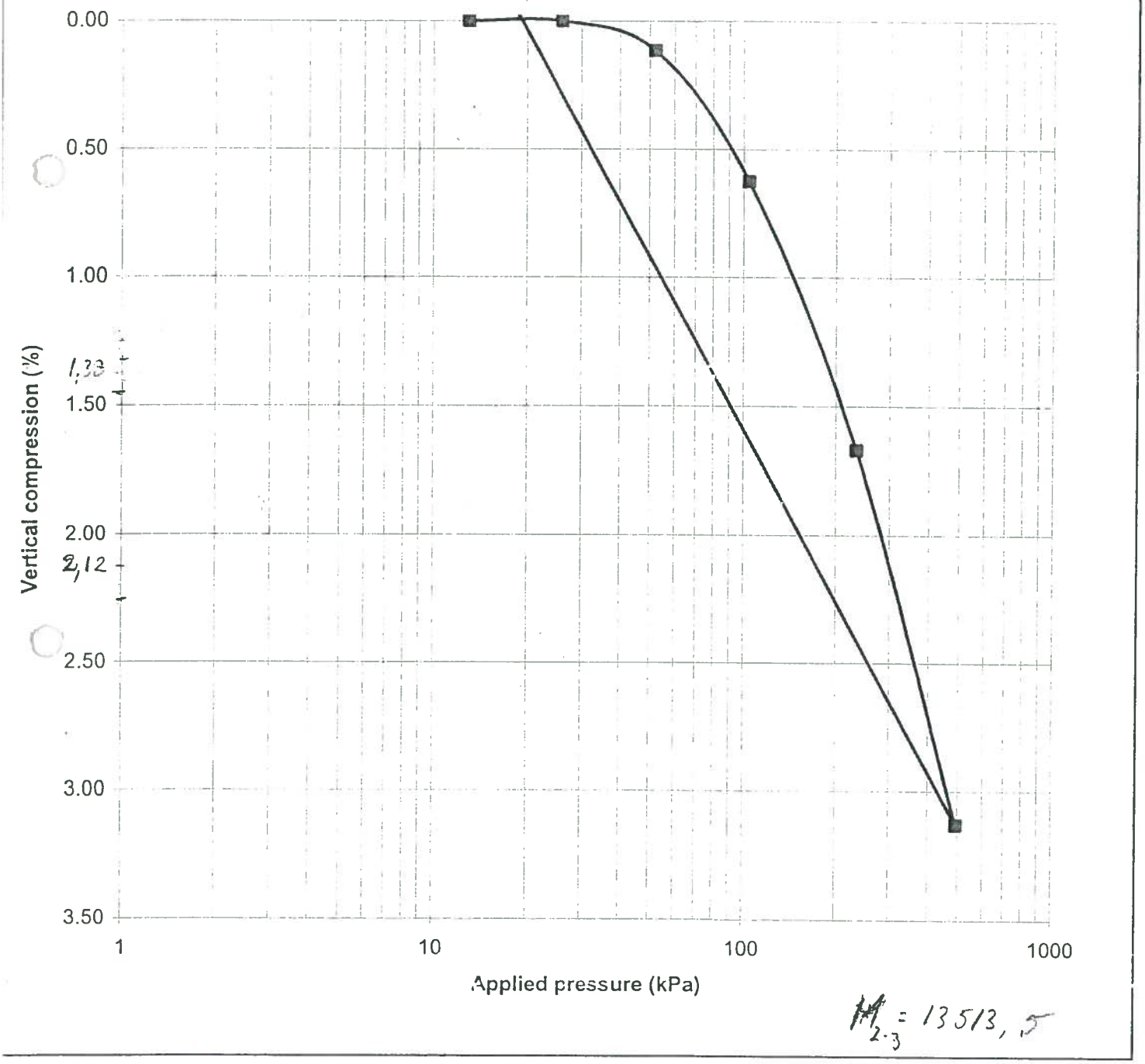
| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | Consolidare DN 1 | Sample depth (m) | 7.70-8.00 |
| Borehole number | FI | Sample type | Undisturbed |
| Sample number | 8 | Specimen orientation | Vertical |




| | | | | | |
|---|---|---|---|---|---|
| Tested | ing. Lixandroiu C. | Checked | ing. Lixandroiu C. | Approved | dr. ing. Mantulescu M. |
| Date | 20.04.2015 | Date | 20.04.2015 | Date | 21.04.2015 |

DETERMINATION OF ONE-DIMENSIONAL CONSOLIDATION PROPERTIES
Tested in accordance with BS 1377:1990:Part 5:Clause 3
**TEST REPORT**

| | | | |
|---|---|---|---|
| Project location | Vladeni | | |
| Project reference | Consolidare DN 1 | Sample depth (m) | 7.70-8.00 |
| Borehole number | FI | Sample type | Undisturbed |
| Sample number | 8 | Specimen orientation | Vertical |




| | | | | | |
|---|---|---|---|---|---|
| Tested<br>Date | ing. Lixandroiu C.<br>20.04.2015 | Checked<br>Date | ing. Lixandroiu C.<br>20.04.2015 | Approved<br>Date | dr. ing. Mantulescu M.<br>21.04.2015 |