



S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 062  
Cota/Depth: -1,90 m

**BULETIN DE ANALIZĂ nr. / ANALYSIS REPORT no. 11823 / 19 12 2008**

**DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS**

Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

1. Conținutul de particule fine / Percentages of fine particles ( $d < 0,002$  mm)
2. Indicele de activitate / Activity Index
3. Criteriul de plasticitate / Plasticity Criteria
4. Contractia volumică / Volumic Contraction
5. Umflare liberă / Swelling
6. Limita de contracție / Contraction Limit
7. Indicele de contracție-umflare / Contraction-Swelling Index
8. Indicele de plasticitate/Plasticity index

$A_2 = -$   
 $I_A = -$   
 $C_P = 36,14 \%$   
 $C_V = 90,20 \%$   
 $U_L = 80,00 \%$   
 $w_s = 16,82 \%$

$I_{cu} = -$   
 $I_P = 44,70 \%$

$$I_A = \frac{I_P}{A_2}$$

$$C_V = \frac{V_i - V_r}{V_r} * 100$$

$$w_s = w_L - \frac{V_i - V_r}{m_s} * \rho_w * 100$$

$$C_P = 0,73 * (w_L - 20)$$

$$U_L = 10 * (V_i - 10)$$

$$I_{cu} = \frac{W_{sat} - W}{W_{sat} - W_s}$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PUTIN ACTIVE / LESS ACTIVE
$A_2$	> 30%	18...35%	15...25%
$I_P$	> 35%	25...35%	20...30%
$I_A$	> 1,25	1,00...1,25	0,75...1,0
$C_P$	$I_P > C_P$	$I_P > C_P$	$I_P > C_P$
$C_V$	> 100%	75...100%	55...75%
$U_L$	> 140%	100...140%	55...100%
$w_s$	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN

Șef laborator: Dr. ing. Ion BOGDAN





S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 066  
Cota/Depth: -2,00 m

## BULETIN DE ANALIZĂ nr. / ANALYSIS REPORT no. 11914 / 19.11.2004

DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS  
Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

- Conținutul de particule fine / Percentages of fine particles ( $d < 0,002 \text{ mm}$ )
- Indicele de activitate / Activity Index
  - Criteriul de plasticitate / Plasticity Criteria
  - Contrația volumică / Volumic Contraction
  - Umflarea liberă / Swelling
  - Limita de contracție / Contraction Limit
  - Indicele de contracție-umflare / Contraction-Swelling Index
  - Indicele de plasticitate/Plasticity index

$A_2 = -$   
 $I_A = -$   
 $C_P = 18,62 \%$   
 $C_V = 56,56 \%$   
 $U_L = 65,00 \%$   
 $w_s = 14,22 \%$

$I_{cu} = -$   
 $I_p = 25,50 \%$

$$I_A = \frac{I_p}{A_2}$$

$$w_s = w_L - \frac{V_L - V_t}{m_s} \cdot \rho_w \cdot 100$$

$$U_L = 10 \cdot (V_t - 10)$$

$$C_V = \frac{V_L - V_t}{V_t} \cdot 100$$

$$C_P = 0,73 \cdot (w_L - 20)$$

$$I_{cu} = \frac{w_{sat} - w}{w_{sat} - w_s}$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PUTIN ACTIVE / LESS ACTIVE
$A_2$	> 30%	18...35%	15...25%
$I_p$	> 35%	25...35%	20...30%
$I_A$	> 1,25	1,00...1,25	0,75...1,0
$C_P$	$I_p > C_P$	$I_p > C_P$	$I_p > C_P$
$C_V$	> 100%	75...100%	55...75%
$U_L$	> 140%	100...140%	55...100%
$w_s$	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN

Șef laborator: Dr. ing. Ion BOGDAN

PO-101-01.09/16/17

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S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 072  
Cota/Depth: -2,10 m

## BULETIN DE ANALIZĂ nr. / ANALYSIS REPORT no. 11825 / 19.12.2004

DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS  
Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

- Conținutul de particule fine / Percentages of fine particles ( $d < 0,002$  mm)
- Indicele de activitate / Activity Index
  - Criteriul de plasticitate / Plasticity Criteria
  - Contrația volumică / Volumic Contraction
  - Umflare liberă / Swelling
  - Limita de contracție / Contraction Limit
  - Indicele de contracție-umflare / Contraction-Swelling Index
  - Indicele de plasticitate/Plasticity index

$A_2 = -$   
 $I_A = -$   
 $C_P = 44,75 \%$   
 $C_V = 47,60 \%$   
 $U_L = 110,00 \%$   
 $w_s = 56,38 \%$

$I_{cu} = -$   
 $I_p = 54,50 \%$

$$I_A = \frac{I_P}{A_2}$$

$$w_s = w_L - \frac{V_i - V_f}{m_s} * \rho_w * 100$$

$$U_L = 10 * (V_f - 10)$$

$$C_V = \frac{V_i - V_f}{V_f} * 100$$

$$C_P = 0,73 * (w_L - 20)$$

$$I_{cu} = \frac{w_{sat} - w}{w_{sat} - w_s}$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PUTIN ACTIVE / LESS ACTIVE
$A_2$	> 30%	18...35%	15...25%
$I_P$	> 35%	25...35%	20...30%
$I_A$	> 1,25	1,00...1,25	0,75...1,0
$C_P$	$I_P > C_P$	$I_P > C_P$	$I_P > C_P$
$C_V$	> 100%	75...100%	55...75%
$U_L$	> 140%	100...140%	55...100%
$w_s$	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN

Șef laborator: Dr. ing. Ion BOGDAN

PO-101-01.09/16/17



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S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 090  
Cota/Depth: -2,00 m

## BULETIN DE ANALIZĂ nr. / ANALYSIS REPORT no. 11824.....1.19.12.2008.....

DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS

Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

1. Conținutul de particule fine / Percentages of fine particles (d < 0,002 mm)  $A_2 = -$
2. Indicele de activitate / Activity Index  $I_A = -$
3. Criteriul de plasticitate / Plasticity Criteria  $C_P = 33,58 \%$
4. Con tracția volumică / Volumic Contraction  $C_V = 73,92 \%$
5. Umflare liberă / Swelling  $U_L = 70,00 \%$
6. Limita de contracție / Contraction Limit  $w_s = 25,77 \%$
7. Indicele de umflare / Swelling Index  $I_{cu} = -$
8. Indicele de plasticitate/Plasticity index  $I_P = 41,20 \%$

$$I_A = \frac{I_P}{A_2}$$

$$w_s = w_L - \frac{V_L - V_f}{m_s} \cdot \rho_w \cdot 100$$

$$U_L = 10 \cdot (V_f - 10)$$

$$C_V = \frac{V_L - V_f}{V_f} \cdot 100$$

$$C_P = 0,73 \cdot (w_L - 20)$$

$$I_{cu} = \frac{w_{sat} - w}{w_{sat} - w_s}$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PUȚIN ACTIVE / LESS ACTIVE
$A_2$	> 30%	18...35%	15...25%
$I_P$	> 35%	25...35%	20...30%
$I_A$	> 1,25	1,00...1,25	0,75...1,0
$C_P$	$I_P > C_P$	$I_P > C_P$	$I_P > C_P$
$C_V$	> 100%	75...100%	55...75%
$U_L$	> 140%	100...140%	55...100%
$w_s$	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN  
Șef laborator: Dr. ing. Ion BOGDAN





S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 096  
Cota/Depth: -2,00 m

**BULETIN DE ANALIZĂ nr. / ANALYSIS REPORT no. 11824 / 19.12.2008**

DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS  
Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

1. Conținutul de particule fine / Percentages of fine particles (d < 0,002 mm)
2. Indicele de activitate / Activity Index
3. Criteriul de plasticitate / Plasticity Criteria
4. Con tracția volumică / Volumic Contraction
5. Umflare liberă / Swelling
6. Limita de contracție / Contraction Limit
7. Indicele de contracție-umflare / Contraction-Swelling Index
8. Indicele de plasticitate/Plasticity index

A<sub>2</sub> = -  
I<sub>A</sub> = -  
C<sub>P</sub> = 22,56 %  
C<sub>V</sub> = 21,94 %  
U<sub>L</sub> = 60,00 %  
w<sub>s</sub> = 38,17 %

I<sub>cu</sub> = -  
I<sub>P</sub> = 27,70 %

$$I_A = \frac{I_P}{A_2}$$

$$w_s = w_L - \frac{V_i - V_f}{m_s} \cdot \rho_w \cdot 100$$

$$U_L = 10 \cdot (V_f - 10)$$

$$C_V = \frac{V_i - V_f}{V_f} \cdot 100$$

$$C_P = 0,73 \cdot (w_L - 20)$$

$$I_{cu} = \frac{w_{sat} - w}{w_{sat} - w_s}$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PUTIN ACTIVE / LESS ACTIVE
A <sub>2</sub>	> 30%	18...35%	15...25%
I <sub>P</sub>	> 35%	25...35%	20...30%
I <sub>A</sub>	> 1,25	1,00...1,25	0,75...1,0
C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>
C <sub>V</sub>	> 100%	75...100%	55...75%
U <sub>L</sub>	> 140%	100...140%	55...100%
w <sub>s</sub>	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN  
Șef laborator: Dr. ing. Ion BOGDAN





S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 102  
Cota/Depth: -2,00 m

**BULETIN DE ANALIZĂ nr. / ANALYSIS REPORT no. 11888 / 19.12.2008**

DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS  
Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

1. Conținutul de particule fine / Percentages of fine particles (d < 0,002 mm)
2. Indicele de activitate / Activity Index
3. Criteriul de plasticitate / Plasticity Criteria
4. Contractia volumică / Volumic Contraction
5. Umflare liberă / Swelling
6. Limita de contracție / Contraction Limit
7. Indicele de contracție-umflare / Contraction-Swelling Index
8. Indicele de plasticitate/Plasticity index

$A_2 = -$   
 $I_A = -$   
 $C_p = 29,93 \%$   
 $C_v = 24,95 \%$   
 $U_L = 90,00 \%$   
 $w_s = 46,16 \%$

$I_{cu} = -$   
 $I_p = 35,40 \%$

$$C_v = \frac{V_i - V_r}{V_r} * 100$$

$$C_p = 0,73 * (w_L - 20)$$

$$I_{cu} = \frac{W_{sat} - W}{W_{sat} - W_s}$$

$$I_A = \frac{I_p}{A_2}$$

$$w_s = w_L - \frac{V_i - V_r}{m_s} * \rho_w * 100$$

$$U_L = 10 * (V_r - 10)$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PŪȚIN ACTIVE / LESS ACTIVE
A <sub>2</sub>	> 30%	18...35%	15...25%
I <sub>p</sub>	> 35%	25...35%	20...30%
I <sub>A</sub>	> 1,25	1,00...1,25	0,75...1,0
C <sub>p</sub>	I <sub>p</sub> > C <sub>p</sub>	I <sub>p</sub> > C <sub>p</sub>	I <sub>p</sub> > C <sub>p</sub>
C <sub>v</sub>	> 100%	75...100%	55...75%
U <sub>L</sub>	> 140%	100...140%	55...100%
w <sub>s</sub>	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN  
Șef laborator: Dr. ing. Ion BOGDAN





S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘDARA

Autostrada - Task III  
Sondaj nr.: C / 114  
Cota/Depth: -0,70 m

## BULETIN DE ANALIZĂ nr. 11829 / ANALYSIS REPORT no. 11829

DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS

Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

1. Conținutul de particule fine / Percentages of fine particles (d < 0,002 mm)
2. Indicele de activitate / Activity Index
3. Criteriul de plasticitate / Plasticity Criteria
4. Con tracția volumică / Volumic Contraction
5. Umflarea liberă / Swelling
6. Limita de contracție / Contraction Limit
7. Indicele de contracție-umflare / Contraction-Swelling Index
8. Indicele de plasticitate/Plasticity index

$A_2 = -$   
 $I_A = -$   
 $C_P = 41,25 \%$   
 $C_V = 102,05 \%$   
 $U_L = 120,00 \%$   
 $w_s = 17,73 \%$

$I_{cu} = -$   
 $I_P = 53,60 \%$

$$I_A = \frac{I_P}{A_2}$$

$$w_s = w_L - \frac{V_1 - V_f}{m_s} \cdot \rho_w \cdot 100$$

$$U_L = 10 \cdot (V_f - 10)$$

$$C_V = \frac{V_1 - V_f}{V_f} \cdot 100$$

$$C_P = 0,73 \cdot (w_L - 20)$$

$$I_{cu} = \frac{W_{sat} - W}{W_{sat} - W_s}$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PUȚIN ACTIVE / LESS ACTIVE
A <sub>2</sub>	> 30%	18...35%	15...25%
I <sub>P</sub>	> 35%	25...35%	20...30%
I <sub>A</sub>	> 1,25	1,00...1,25	0,75...1,0
C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>
C <sub>V</sub>	> 100%	75...100%	55...75%
U <sub>L</sub>	> 140%	100...140%	55...100%
w <sub>s</sub>	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN

Șef laborator: Dr. ing. Ion BOGDAN

PO-101-01.09/16/17





S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 115  
Cota/Depth: -2,00 m

## BULETIN DE ANALIZĂ nr. / ANALYSIS REPORT no. 11830 / 19.12.2004

DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS  
Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

1. Conținutul de particule fine / Percentages of fine particles ( $d < 0,002$  mm)
2. Indicele de activitate / Activity Index
3. Criteriul de plasticitate / Plasticity Criteria
4. Contractia volumică / Volumic Contraction
5. Umflare liberă / Swelling
6. Limita de contracție / Contraction Limit
7. Indicele de contracție-umflare / Contraction-Swelling Index
8. Indicele de plasticitate/Plasticity index

$A_2 = -$   
 $I_A = -$   
 $C_P = 37,96 \%$   
 $C_V = 129,31 \%$   
 $U_L = 100,00 \%$   
 $w_s = 18,42 \%$

$I_{cu} = -$   
 $I_P = 52,60 \%$

$$I_A = \frac{I_P}{A_2}$$

$$C_V = \frac{V_i - V_f}{V_f} * 100$$

$$w_s = w_L - \frac{V_i - V_f}{m_s} * \rho_w * 100$$

$$C_P = 0,73 * (w_L - 20)$$

$$U_L = 10 * (V_f - 10)$$

$$I_{cu} = \frac{W_{sat} - W}{W_{sat} - W_s}$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PUTIN ACTIVE / LESS ACTIVE
$A_2$	> 30%	18...35%	15...25%
$I_P$	> 35%	25...35%	20...30%
$I_A$	> 1,25	1,00...1,25	0,75...1,0
$C_P$	$I_P > C_P$	$I_P > C_P$	$I_P > C_P$
$C_V$	> 100%	75...100%	55...75%
$U_L$	> 140%	100...140%	55...100%
$w_s$	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN

Șef laborator: Dr. ing. Ion BOGDAN







S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 117  
Cota/Depth: -0,40 - 1,00 m

## BULETIN DE ANALIZĂ nr. 11831 / ANALYSIS REPORT no. 19.12.2004

DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS

Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

- Conținutul de particule fine / Percentages of fine particles (d < 0,002 mm)
1. fine particles (d < 0,002 mm)
  2. Indicele de activitate / Activity Index
  3. Criteriul de plasticitate / Plasticity Criteria
  4. Con tracția volumică / Volumic Contraction
  5. Umflarea liberă / Swelling
  6. Limita de contracție / Contraction Limit
  7. Indicele de contracție-umflare / Contraction-Swelling Index
  8. Indicele de plasticitate/Plasticity index

$A_2 = -$   
 $I_A = -$   
 $C_P = 52,20 \%$   
 $C_V = 129,45 \%$   
 $U_L = 105,00 \%$   
 $w_s = 18,69 \%$

$I_{cu} = -$   
 $I_P = 67,10 \%$

$$I_A = \frac{I_P}{A_2}$$

$$C_V = \frac{V_i - V_f}{V_i} * 100$$

$$w_s = w_L - \frac{V_i - V_f}{m_s} * \rho_w * 100$$

$$C_P = 0,73 * (w_L - 20)$$

$$U_L = 10 * (V_f - 10)$$

$$I_{cu} = \frac{W_{sat} - W}{W_{sat} - W_s}$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PŪȚIN ACTIVE / LESS ACTIVE
A <sub>2</sub>	> 30%	18...35%	15...25%
I <sub>P</sub>	> 35%	25...35%	20...30%
I <sub>A</sub>	> 1,25	1,00...1,25	0,75...1,0
C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>
C <sub>V</sub>	> 100%	75...100%	55...75%
U <sub>L</sub>	> 140%	100...140%	55...100%
w <sub>s</sub>	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN

Șef laborator: Dr. ing. Ion BOGDAN





S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 123  
Cota/Depth: -0,50 - 1,20 m

## BULETIN DE ANALIZĂ nr. / ANALYSIS REPORT no. 11832.1.19.12.2008

DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS  
Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

1. Conținutul de particule fine / Percentages of fine particles (d < 0,002 mm)
2. Indicele de activitate / Activity Index
3. Criteriul de plasticitate / Plasticity Criteria
4. Con tracția volumică / Volumic Contraction
5. Umflarea liberă / Swelling
6. Limita de contracție / Contraction Limit
7. Indicele de contracție-umflare / Contraction-Swelling Index
8. Indicele de plasticitate/Plasticity index

A<sub>2</sub> = -  
I<sub>A</sub> = -  
C<sub>P</sub> = 40,52 %  
C<sub>V</sub> = 56,25 %  
U<sub>L</sub> = 120,00 %  
w<sub>s</sub> = 31,88 %

I<sub>cu</sub> = -  
I<sub>P</sub> = 51,30 %

$$I_A = \frac{I_P}{A_2}$$

$$w_s = w_L - \frac{V_L - V_I}{m_s} \cdot \rho_w \cdot 100$$

$$U_L = 10 \cdot (V_I - 10)$$

$$C_V = \frac{V_I - V_I}{V_I} \cdot 100$$

$$C_P = 0,73 \cdot (w_L - 20)$$

$$I_{cu} = \frac{w_{sat} - w}{w_{sat} - w_s}$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PUTIN ACTIVE / LESS ACTIVE
A <sub>2</sub>	> 30%	18...35%	15...25%
I <sub>P</sub>	> 35%	25...35%	20...30%
I <sub>A</sub>	> 1,25	1,00...1,25	0,75...1,0
C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>
C <sub>V</sub>	> 100%	75...100%	55...75%
U <sub>L</sub>	> 140%	100...140%	55...100%
w <sub>s</sub>	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN  
Șef laborator: Dr. ing. Ion BOGDAN





S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 128  
Cota/Depth: -1,30 - 2,00 m

**BULETIN DE ANALIZĂ nr. / ANALYSIS REPORT no. 11833 / 19.12.2008.**

**DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS**

Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

- |  |                           |
|--|---------------------------|
| 1. Conținutul de particule fine / Percentages of fine particles (d < 0,002 mm) | A <sub>2</sub> = -        |
| 2. Indicele de activitate / Activity Index                                     | I <sub>A</sub> = -        |
| 3. Criteriul de plasticitate / Plasticity Criteria                             | C <sub>P</sub> = 60,74 %  |
| 4. Con tracția volumică / Volumic Contraction                                  | C <sub>V</sub> = 139,40 % |
| 5. Umflarea liberă / Swelling  | U <sub>L</sub> = 115,00 % |
| 6. Limita de contracție / Contraction Limit                                    | w <sub>s</sub> = 20,18 %  |

- |  |                          |
|--|--------------------------|
| 7. Indicele de umflare / Contraction- Swelling Index | I <sub>cu</sub> = -      |
| 8. Indicele de plasticitate/Plasticity index         | I <sub>P</sub> = 72,10 % |

$$I_A = \frac{I_P}{A_2}$$

$$w_s = w_L - \frac{V_L - V_f}{m_s} \cdot \rho_w \cdot 100$$

$$U_L = 10 \cdot (V_f - 10)$$

$$C_V = \frac{V_L - V_f}{V_f} \cdot 100$$

$$C_P \geq 0,73 \cdot (w_L - 20)$$

$$I_{cu} = \frac{W_{sat} - W}{W_{sat} - W_s}$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PŪȚIN ACTIVE / LESS ACTIVE
A <sub>2</sub>	> 30%	18...35%	15...25%
I <sub>P</sub>	> 35%	25...35%	20...30%
I <sub>A</sub>	> 1,25	1,00...1,25	0,75...1,0
C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>
C <sub>V</sub>	> 100%	75...100%	55...75%
U <sub>L</sub>	> 140%	100...140%	55...100%
w <sub>s</sub>	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN

Șef laborator: Dr. ing. Ion BOGDAN





S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 133  
Cota/Depth: -1,30 - 2,00 m

## BULETIN DE ANALIZĂ nr. 1834 / ANALYSIS REPORT no. 1834

DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS

Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

1. Conținutul de particule fine / Percentages of fine particles (d < 0,002 mm)
2. Indicele de activitate / Activity Index
3. Criteriul de plasticitate / Plasticity Criteria
4. Con tracția volumică / Volumic Contraction
5. Umflarea liberă / Swelling
6. Limita de contracție / Contraction Limit
7. Indicele de contracție-umflare / Contraction-Swelling Index
8. Indicele de plasticitate/Plasticity index

$A_2 = -$   
 $I_A = -$   
 $C_p = 34,68 \%$   
 $C_v = 99,66 \%$   
 $U_L = 95,00 \%$   
 $w_s = 13,07 \%$

$I_{cu} = -$   
 $I_p = 43,80 \%$

$$I_A = \frac{I_p}{A_2}$$

$$w_s = w_L - \frac{V_i - V_f}{m_s} \cdot \rho_w \cdot 100$$

$$U_L = 10 \cdot (V_f - 10)$$

$$C_v = \frac{V_i - V_f}{V_f} \cdot 100$$

$$C_p = 0,73 \cdot (w_L - 20)$$

$$I_{cu} = \frac{w_{sat} - w}{w_{sat} - w_s}$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PŪȚIN ACTIVE / LESS ACTIVE
$A_2$	> 30%	18...35%	15...25%
$I_p$	> 35%	25...35%	20...30%
$I_A$	> 1,25	1,00...1,25	0,75...1,0
$C_p$	$I_p > C_p$	$I_p > C_p$	$I_p > C_p$
$C_v$	> 100%	75...100%	55...75%
$U_L$	> 140%	100...140%	55...100%
$w_s$	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN

Șef laborator: Dr. ing. Ion BOGDAN





S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 138  
Cota/Depth: -0,50 - 1,10 m

## BULETIN DE ANALIZĂ nr. / ANALYSIS REPORT no. 11835 / 19.12.2008

DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS

Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

1. Conținutul de particule fine / Percentages of fine particles (d < 0,002 mm)
2. Indicele de activitate / Activity Index
3. Criteriul de plasticitate / Plasticity Criteria
4. Contractia volumică / Volumic Contraction
5. Umflare liberă / Swelling
6. Limita de contracție / Contraction Limit
7. Indicele de contracție-umflare / Contraction-Swelling Index
8. Indicele de plasticitate/Plasticity index

$A_2 = -$   
 $I_A = -$   
 $C_P = 30,88 \%$   
 $C_V = 70,84 \%$   
 $U_L = 95,00 \%$   
 $w_s = 25,28 \%$   
 $I_{cu} = -$   
 $I_P = 42,30 \%$

$$I_A = \frac{I_P}{A_2}$$

$$w_s = w_L - \frac{V_i - V_r}{m_s} \cdot \rho_w \cdot 100$$

$$U_L = 10 \cdot (V_r - 10)$$

$$C_V = \frac{V_i - V_r}{V_r} \cdot 100$$

$$C_P = 0,73 \cdot (w_L - 20)$$

$$I_{cu} = \frac{w_{sat} - w}{w_{sat} - w_s}$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PŪȚIN ACTIVE / LESS ACTIVE
A <sub>2</sub>	> 30%	18...35%	15...25%
I <sub>P</sub>	> 35%	25...35%	20...30%
I <sub>A</sub>	> 1,25	1,00...1,25	0,75...1,0
C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>
C <sub>V</sub>	> 100%	75...100%	55...75%
U <sub>L</sub>	> 140%	100...140%	55...100%
w <sub>s</sub>	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN

Șef laborator: Dr. ing. Ion BOGDAN

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PO-101-01.09/16/17



S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘDARA

Autostrada - Task III  
Sondaj nr.: C / 145  
Cota/Depth: -1,10 - 2,00 m

## BULETIN DE ANALIZĂ nr. / ANALYSIS REPORT no. 11836 / 19.12.2008

DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS

Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

1. Conținutul de particule fine / Percentages of fine particles (d < 0,002 mm)
2. Indicele de activitate / Activity Index
3. Criteriul de plasticitate / Plasticity Criteria
4. Contractia volumică / Volumic Contraction
5. Umflare liberă / Swelling
6. Limita de contracție / Contraction Limit
7. Indicele de contracție-umflare / Contraction-Swelling Index
8. Indicele de plasticitate/Plasticity index

$A_2 = -$   
 $I_A = -$   
 $C_P = 32,70 \%$   
 $C_V = 72,83 \%$   
 $U_L = 90,00 \%$   
 $w_s = 27,66 \%$

$I_{cu} = -$   
 $I_P = 43,10 \%$

$$I_A = \frac{I_P}{A_2}$$

$$w_s = w_L - \frac{V_L - V_f}{m_s} \cdot \rho_w \cdot 100$$

$$U_L = 10 \cdot (V_f - 10)$$

$$C_V = \frac{V_L - V_f}{V_f} \cdot 100$$

$$C_P = 0,73 \cdot (w_L - 20)$$

$$I_{cu} = \frac{W_{sat} - W}{W_{sat} - W_s}$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PUTIN ACTIVE / LESS ACTIVE
A <sub>2</sub>	> 30%	18...35%	15...25%
I <sub>P</sub>	> 35%	25...35%	20...30%
I <sub>A</sub>	> 1,25	1,00...1,25	0,75...1,0
C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>
C <sub>V</sub>	> 100%	75...100%	55...75%
U <sub>L</sub>	> 140%	100...140%	55...100%
w <sub>s</sub>	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN

Șef laborator: Dr. ing. Ion BOGDAN

PO-101-01.09/16/17

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S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 149  
Cota/Depth: -1,40 - 2,00 m

**BULETIN DE ANALIZĂ nr. / ANALYSIS REPORT no. ....11837 / 19.12.2008**

DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS  
Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

- |  |                          |
|--|--------------------------|
| 1. Conținutul de particule fine / Percentages of fine particles (d < 0,002 mm) | A <sub>2</sub> = -       |
| 2. Indicele de activitate / Activity Index                                     | I <sub>A</sub> = -       |
| 3. Criteriul de plasticitate / Plasticity Criteria                             | C <sub>P</sub> = 13,29 % |
| 4. Con tracția volumică / Volumic Contraction                                  | C <sub>V</sub> = 18,15 % |
| 5. Umflare liberă / Swelling   | U <sub>L</sub> = 60,00 % |
| 6. Limita de contracție / Contraction Limit                                    | w <sub>s</sub> = 26,69 % |
| 7. Indicele de umflare / Swelling Index  | I <sub>cu</sub> = -      |
| 8. Indicele de plasticitate/Plasticity index                                   | I <sub>P</sub> = 16,60 % |

$$C_V = \frac{V_i - V_f}{V_f} * 100$$

$$C_P = 0,73 * (w_L - 20)$$

$$I_{cu} = \frac{W_{sat} - W}{W_{sat} - W_s}$$

$$I_A = \frac{I_P}{A_2}$$

$$w_s = w_L - \frac{V_i - V_f}{m_s} * \rho_w * 100$$

$$U_L = 10 * (V_f - 10)$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PUTIN ACTIVE / LESS ACTIVE
A <sub>2</sub>	> 30%	18...35%	15...25%
I <sub>P</sub>	> 35%	25...35%	20...30%
I <sub>A</sub>	> 1,25	1,00...1,25	0,75...1,0
C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>
C <sub>V</sub>	> 100%	75...100%	55...75%
U <sub>L</sub>	> 140%	100...140%	55...100%
w <sub>s</sub>	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN  
Șef laborator: Dr. ing. Ion BOGDAN





S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 154  
Cotar/Depth: -0,70 - 1,20 m

## BULETIN DE ANALIZĂ nr. 11838 / 19.12.2004

### DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS

Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

1. Conținutul de particule fine / Percentages of fine particles (d < 0,002 mm)
2. Indicele de activitate / Activity Index
3. Criteriul de plasticitate / Plasticity Criteria
4. Contractia volumică / Volumic Contraction
5. Umflarea liberă / Swelling
6. Limita de contracție / Contraction Limit
7. Indicele de contracție-umflare / Contraction-Swelling Index
8. Indicele de plasticitate/Plasticity index

$A_2 = -$   
 $I_A = -$   
 $C_P = 18,76 \%$   
 $C_V = 47,45 \%$   
 $U_L = 80,00 \%$   
 $w_s = 17,08 \%$

$I_{cu} = -$   
 $I_P = 20,40 \%$

$$I_A = \frac{I_P}{A_2}$$

$$w_s = w_L - \frac{V_i - V_r}{m_s} \cdot \rho_w \cdot 100$$

$$U_L = 10 \cdot (V_r - 10)$$

$$C_V = \frac{V_i - V_r}{V_r} \cdot 100$$

$$C_P = 0,73 \cdot (w_L - 20)$$

$$I_{cu} = \frac{W_{sat} - W}{W_{sat} - W_s}$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PUTIN ACTIVE / LESS ACTIVE
A <sub>2</sub>	> 30%	18...35%	15...25%
I <sub>P</sub>	> 35%	25...35%	20...30%
I <sub>A</sub>	> 1,25	1,00...1,25	0,75...1,0
C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>
C <sub>V</sub>	> 100%	75...100%	55...75%
U <sub>L</sub>	> 140%	100...140%	55...100%
w <sub>s</sub>	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN

Șef laborator: Dr. ing. Ion BOGDAN







S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 161  
Cota/Depth: -1,00 - 2,00 m

## BULETIN DE ANALIZĂ nr. / ANALYSIS REPORT no. 11839 / 19.12.2004

DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS  
Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

1. Conținutul de particule fine / Percentages of fine particles (d < 0,002 mm)
2. Indicele de activitate / Activity Index
3. Criteriul de plasticitate / Plasticity Criteria
4. Contractia volumică / Volumic Contraction
5. Umflare liberă / Swelling
6. Limita de contracție / Contraction Limit
7. Indicele de contracție-umflare / Contraction-Swelling Index
8. Indicele de plasticitate/Plasticity index

$A_2 = -$   
 $I_A = -$   
 $C_p = 64,24 \%$   
 $C_v = 33,93 \%$   
 $U_L = 190,00 \%$   
 $w_s = 75,58 \%$

$I_{cu} = -$   
 $I_p = 67,80 \%$

$$I_A = \frac{I_p}{A_2}$$

$$w_s = w_L - \frac{V_i - V_r}{m_s} \cdot \rho_w \cdot 100$$

$$U_L = 10 \cdot (V_r - 10)$$

$$C_v = \frac{V_i - V_r}{V_r} \cdot 100$$

$$C_p = 0,73 \cdot (w_L - 20)$$

$$I_{cu} = \frac{w_{sat} - w}{w_{sat} - w_s}$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PŪȚIN ACTIVE / LESS ACTIVE
$A_2$	> 30%	18...35%	15...25%
$I_p$	> 35%	25...35%	20...30%
$I_A$	> 1,25	1,00...1,25	0,75...1,0
$C_p$	$I_p > C_p$	$I_p > C_p$	$I_p > C_p$
$C_v$	> 100%	75...100%	55...75%
$U_L$	> 140%	100...140%	55...100%
$w_s$	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN

Șef laborator: Dr. ing. Ion BOGDAN





S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 174  
Cota/Depth: -0,80 m

## BULETIN DE ANALIZĂ nr. 11840 / ANALYSIS REPORT no. 19/2.2008

DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS  
Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

1. Conținutul de particule fine / Percentages of fine particles ( $d < 0,002$  mm)
2. Indicele de activitate / Activity Index
3. Criteriul de plasticitate / Plasticity Criteria
4. Contractia volumică / Volumic Contraction
5. Umflare liberă / Swelling
6. Limita de contracție / Contraction Limit
7. Indicele de contracție-umflare / Contraction-Swelling Index
8. Indicele de plasticitate/Plasticity index

$A_2 = -$   
 $I_A = -$   
 $C_P = 14,75 \%$   
 $C_V = 29,64 \%$   
 $U_L = 70,00 \%$   
 $w_s = 23,20 \%$

$I_{cu} = -$   
 $I_P = 16,10 \%$

$$I_A = \frac{I_P}{A_2}$$

$$w_s = w_L - \frac{V_L - V_f}{m_s} \cdot \rho_w \cdot 100$$

$$U_L = 10 \cdot (V_f - 10)$$

$$C_V = \frac{V_L - V_f}{V_f} \cdot 100$$

$$C_P = 0,73 \cdot (w_L - 20)$$

$$I_{cu} = \frac{w_{sat} - w}{w_{sat} - w_s}$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PŪȚIN ACTIVE / LESS ACTIVE
$A_2$	> 30%	18...35%	15...25%
$I_P$	> 35%	25...35%	20...30%
$I_A$	> 1,25	1,00...1,25	0,75...1,0
$C_P$	$I_P > C_P$	$I_P > C_P$	$I_P > C_P$
$C_V$	> 100%	75...100%	55...75%
$U_L$	> 140%	100...140%	55...100%
$w_s$	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN

Șef laborator: Dr. ing. Ion BOGDAN

PO-101-01.09/16/17

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S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 189  
Cota/Depth: -0,80 m

## BULETIN DE ANALIZĂ nr. / ANALYSIS REPORT no. 1184/1.19.12.2008

DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS  
Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

1. Conținutul de particule fine / Percentages of fine particles ( $d < 0,002$  mm)
2. Indicele de activitate / Activity Index
3. Criteriul de plasticitate / Plasticity Criteria
4. Contractia volumică / Volumic Contraction
5. Umflare liberă / Swelling
6. Limita de contracție / Contraction Limit
7. Indicele de contracție-umflare / Contraction-Swelling Index
8. Indicele de plasticitate/Plasticity index

$A_2 = -$   
 $I_A = -$   
 $C_p = 34,31 \%$   
 $C_v = 109,26 \%$   
 $U_L = 130,00 \%$   
 $w_s = 2,65 \%$

$I_{cu} = -$   
 $I_p = 35,60 \%$

$$C_v = \frac{V_i - V_r}{V_r} * 100$$

$$C_p = 0,73 * (w_L - 20)$$

$$I_{cu} = \frac{w_{sat} - w}{w_{sat} - w_s}$$

$$I_A = \frac{I_p}{A_2}$$

$$w_s = w_L - \frac{V_i - V_r}{m_s} * \rho_w * 100$$

$$U_L = 10 * (V_r - 10)$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PŪȚIN ACTIVE / LESS ACTIVE
$A_2$	> 30%	18...35%	15...25%
$I_p$	> 35%	25...35%	20...30%
$I_A$	> 1,25	1,00...1,25	0,75...1,0
$C_p$	$I_p > C_p$	$I_p > C_p$	$I_p > C_p$
$C_v$	> 100%	75...100%	55...75%
$U_L$	> 140%	100...140%	55...100%
$w_s$	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN

Șef laborator: Dr. ing. Ion BOGDAN





S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 194  
Cota/Depth: -0,80 m

## BULETIN DE ANALIZĂ nr. 11842 / ANALYSIS REPORT no. 11842

DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS

Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

1. Conținutul de particule fine / Percentages of fine particles (d < 0,002 mm)
2. Indicele de activitate / Activity Index
3. Criteriul de plasticitate / Plasticity Criteria
4. Con tracția volumică / Volumic Contraction
5. Umflarea liberă / Swelling
6. Limita de contracție / Contraction Limit
7. Indicele de contracție-umflare / Contraction-Swelling Index
8. Indicele de plasticitate/Plasticity index

$A_2 = -$   
 $I_A = -$   
 $C_P = 34,38 \%$   
 $C_V = 92,11 \%$   
 $U_L = 90,00 \%$   
 $w_s = 15,17 \%$

$I_{cu} = -$   
 $I_P = 44,50 \%$

$$I_A = \frac{I_P}{A_2}$$

$$w_s = w_L - \frac{V_L - V_f}{m_s} \cdot \rho_w \cdot 100$$

$$U_L = 10 \cdot (V_f - 10)$$

$$C_V = \frac{V_L - V_f}{V_f} \cdot 100$$

$$C_P = 0,73 \cdot (w_L - 20)$$

$$I_{cu} = \frac{w_{sat} - w}{w_{sat} - w_s}$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PŪȚIN ACTIVE / LESS ACTIVE
$A_2$	> 30%	18...35%	15...25%
$I_P$	> 35%	25...35%	20...30%
$I_A$	> 1,25	1,00...1,25	0,75...1,0
$C_P$	$I_P > C_P$	$I_P > C_P$	$I_P > C_P$
$C_V$	> 100%	75...100%	55...75%
$U_L$	> 140%	100...140%	55...100%
$w_s$	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN

Șef laborator: Dr. ing. Ion BOGDAN





S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 200  
Cota/Depth: -0,70 m

## BULETIN DE ANALIZĂ nr. / ANALYSIS REPORT no. 11843 / 19.12.2004

DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS  
Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

1. Conținutul de particule fine / Percentages of fine particles (d < 0,002 mm)
2. Indicele de activitate / Activity Index
3. Criteriul de plasticitate / Plasticity Criteria
4. Con tracția volumică / Volumic Contraction
5. Umflarea liberă / Swelling
6. Limita de contracție / Contraction Limit
7. Indicele de contracție-umflare / Contraction-Swelling Index
8. Indicele de plasticitate/Plasticity index

$A_2 = -$   
 $I_A = -$   
 $C_P = 47,01 \%$   
 $C_V = 95,73 \%$   
 $U_L = 130,00 \%$   
 $w_s = 27,50 \%$

$I_{cu} = -$   
 $I_P = 54,40 \%$

$$I_A = \frac{I_P}{A_2}$$

$$C_V = \frac{V_i - V_r}{V_r} * 100$$

$$w_s = w_L - \frac{V_i - V_r}{m_s} * \rho_w * 100$$

$$C_P = 0,73 * (w_L - 20)$$

$$U_L = 10 * (V_r - 10)$$

$$I_{cu} = \frac{W_{sat} - W}{W_{sat} - W_s}$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PUȚIN ACTIVE / LESS ACTIVE
$A_2$	> 30%	18...35%	15...25%
$I_P$	> 35%	25...35%	20...30%
$I_A$	> 1,25	1,00...1,25	0,75...1,0
$C_P$	$I_P > C_P$	$I_P > C_P$	$I_P > C_P$
$C_V$	> 100%	75...100%	55...75%
$U_L$	> 140%	100...140%	55...100%
$w_s$	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN  
Șef laborator: Dr. ing. Ion BOGDAN





S.D. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 205  
Cota/Depth: -0,80 m

**BULETIN DE ANALIZĂ nr. / ANALYSIS REPORT no. 11844 / 19.12.2008**

DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS

Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

1. Conținutul de particule fine / Percentages of fine particles (d < 0,002 mm)
2. Indicele de activitate / Activity Index
3. Criteriul de plasticitate / Plasticity Criteria
4. Contractia volumică / Volumic Contraction
5. Umflare liberă / Swelling
6. Limita de contracție / Contraction Limit
7. Indicele de contracție-umflare / Contraction-Swelling Index
8. Indicele de plasticitate/Plasticity index

$A_2 = -$   
 $I_A = -$   
 $C_P = 40,88 \%$   
 $C_V = 71,44 \%$   
 $U_L = 130,00 \%$   
 $w_s = 37,45 \%$

$I_{cu} = -$   
 $I_P = 53,00 \%$

$$C_V = \frac{V_i - V_f}{V_f} * 100$$

$$C_P = 0,73 * (w_L - 20)$$

$$I_{cu} = \frac{W_{sat} - W}{W_{sat} - W_s}$$

$$I_A = \frac{I_P}{A_2}$$

$$w_s = w_L - \frac{V_i - V_f}{m_s} * \rho_w * 100$$

$$U_L = 10 * (V_f - 10)$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PŪȚIN ACTIVE / LESS ACTIVE
A <sub>2</sub>	> 30%	18...35%	15...25%
I <sub>p</sub>	> 35%	25...35%	20...30%
I <sub>A</sub>	> 1,25	1,00...1,25	0,75...1,0
C <sub>P</sub>	I <sub>p</sub> > C <sub>P</sub>	I <sub>p</sub> > C <sub>P</sub>	I <sub>p</sub> > C <sub>P</sub>
C <sub>V</sub>	> 100%	75...100%	55...75%
U <sub>L</sub>	> 140%	100...140%	55...100%
w <sub>s</sub>	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN

Șef laborator: Dr. ing. Ion BOGDAN





S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 211  
Cota/Depth: -0,80 m

**BULETIN DE ANALIZĂ nr. / ANALYSIS REPORT no. 11845 / 19/2.2008.**

**DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS**

Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

1. Conținutul de particule fine / Percentages of fine particles ( $d < 0,002$  mm)
2. Indicele de activitate / Activity Index
3. Criteriul de plasticitate / Plasticity Criteria
4. Contractia volumică / Volumic Contraction
5. Umflarea liberă / Swelling
6. Limita de contractie / Contraction Limit
7. Indicele de contractie-umflare / Contraction-Swelling Index
8. Indicele de plasticitate/Plasticity index

$$A_2 = -$$

$$I_A = -$$

$$C_P = 40,30 \%$$

$$C_V = 97,20 \%$$

$$U_L = 70,00 \%$$

$$w_s = 24,41 \%$$

$$I_{cu} = -$$

$$I_P = 49,50 \%$$

$$I_A = \frac{I_P}{A_2}$$

$$w_s = w_L - \frac{V_i - V_f}{m_s} \cdot \rho_w \cdot 100$$

$$U_L = 10 \cdot (V_f - 10)$$

$$C_V = \frac{V_i - V_f}{V_f} \cdot 100$$

$$C_P = 0,73 \cdot (w_L - 20)$$

$$I_{cu} = \frac{W_{sat} - W}{W_{sat} - W_s}$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PŪȚIN ACTIVE / LESS ACTIVE
A <sub>2</sub>	> 30%	18...35%	15...25%
I <sub>P</sub>	> 35%	25...35%	20...30%
I <sub>A</sub>	> 1,25	1,00...1,25	0,75...1,0
C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>	I <sub>P</sub> > C <sub>P</sub>
C <sub>V</sub>	> 100%	75...100%	55...75%
U <sub>L</sub>	> 140%	100...140%	55...100%
w <sub>s</sub>	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN

Șef laborator: Dr. ing. Ion BOGDAN

PO-101-01.09/16/17

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S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 222  
Cota/Depth: -0,60 - 0,70 m

## BULETIN DE ANALIZĂ nr. 11846 / ANALYSIS REPORT no. 11846 / 18.11.2008

DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS  
Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

1. Conținutul de particule fine / Percentages of fine particles (d < 0,002 mm)
2. Indicele de activitate / Activity Index
3. Criteriul de plasticitate / Plasticity Criteria
4. Contractia volumică / Volumic Contraction
5. Umflare liberă / Swelling
6. Limita de contracție / Contraction Limit
7. Indicele de contracție-umflare / Contraction-Swelling Index
8. Indicele de plasticitate/Plasticity index

$A_2 = -$   
 $I_A = -$   
 $C_P = 36,94 \%$   
 $C_V = 72,36 \%$   
 $U_L = 90,00 \%$   
 $w_s = 26,23 \%$

$I_{cu} = -$   
 $I_p = 43,20 \%$

$$I_A = \frac{I_P}{A_2}$$

$$C_V = \frac{V_1 - V_r}{V_r} * 100$$

$$w_s = w_L - \frac{V_1 - V_r}{m_s} * \rho_w * 100$$

$$C_P = 0,73 * (w_L - 20)$$

$$U_L = 10 * (V_r - 10)$$

$$I_{cu} = \frac{W_{sat} - W}{W_{sat} - W_s}$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PUTIN ACTIVE / LESS ACTIVE
A <sub>2</sub>	> 30%	18...35%	15...25%
I <sub>p</sub>	> 35%	25...35%	20...30%
I <sub>A</sub>	> 1,25	1,00...1,25	0,75...1,0
C <sub>P</sub>	I <sub>p</sub> > C <sub>P</sub>	I <sub>p</sub> > C <sub>P</sub>	I <sub>p</sub> > C <sub>P</sub>
C <sub>V</sub>	> 100%	75...100%	55...75%
U <sub>L</sub>	> 140%	100...140%	55...100%
w <sub>s</sub>	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN

Șef laborator: Dr. ing. Ion BOGDAN

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PO-101-01.09/16/17





S.C. CARA SRL  
STR. FILARET BARBU NR. 2  
300193 TIMIȘOARA

Autostrada - Task III  
Sondaj nr.: C / 227  
Cota/Depth: -1,20 m

## BULETIN DE ANALIZĂ nr. 11844 / ANALYSIS REPORT no. 11844 / 19.12.2004

DETERMINAREA CARACTERISTICILOR PĂMÂNTURILOR CONTRACTILE PUCM / DETERMINATION OF THE EXPANSIVE SOILS CHARACTERISTICS

Conform/According to STAS 1913/12 - 88 - Laborator autorizat/Authorized laboratory - Aut. nr./Aut. no. 624/ISC-30.11.2004

- Conținutul de particule fine / Percentages of fine particles ( $d < 0,002$  mm)
- Indicele de activitate / Activity Index
  - Criteriul de plasticitate / Plasticity Criteria
  - Contrația volumică / Volumic Contraction
  - Umflarea liberă / Swelling
  - Limita de contracție / Contraction Limit
  - Indicele de contracție-umflare / Contraction-Swelling Index
  - Indicele de plasticitate/Plasticity index

$A_2 = -$   
 $I_A = -$   
 $C_p = 14,16 \%$   
 $C_v = 28,95 \%$   
 $U_L = 70,00 \%$   
 $w_s = 23,04 \%$

$I_{cu} = -$   
 $I_p = 17,40 \%$

$$I_A = \frac{I_p}{A_2}$$

$$w_s = w_L - \frac{V_i - V_f}{m_s} \cdot \rho_w \cdot 100$$

$$C_p = 0,73 \cdot (w_L - 20)$$

$$I_{cu} = \frac{w_{sat} - w}{w_{sat} - w_s}$$

$$U_L = 10 \cdot (V_f - 10)$$

CATEGORIA PĂMÂNTULUI / SOIL CATEGORY	FOARTE ACTIVE / VERY ACTIVE	ACTIVE/ACTIVE	PŪȚIN ACTIVE / LESS ACTIVE
$A_2$	> 30%	18...35%	15...25%
$I_p$	> 35%	25...35%	20...30%
$I_A$	> 1,25	1,00...1,25	0,75...1,0
$C_p$	$I_p > C_p$	$I_p > C_p$	$I_p > C_p$
$C_v$	> 100%	75...100%	55...75%
$U_L$	> 140%	100...140%	55...100%
$w_s$	< 10%	14...10%	16...14%

Șef profil: Dr. ing. Ioan Petru BOLDUREAN

Șef laborator: Dr. ing. Ion BOGDAN

PO-101-01.09/16/17

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