

# GRAIN SIZE ANALYSIS

ASTM - D 422 - 63

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
TA TIU BRIDGE

Borehole : P01  
Sample No : D10  
Depth (m): 26.6 + 26.8

Tets No : 638  
Date : 10/7/2006

## SIZE ANALYSIS

Weight of dry soil (g): 847.0

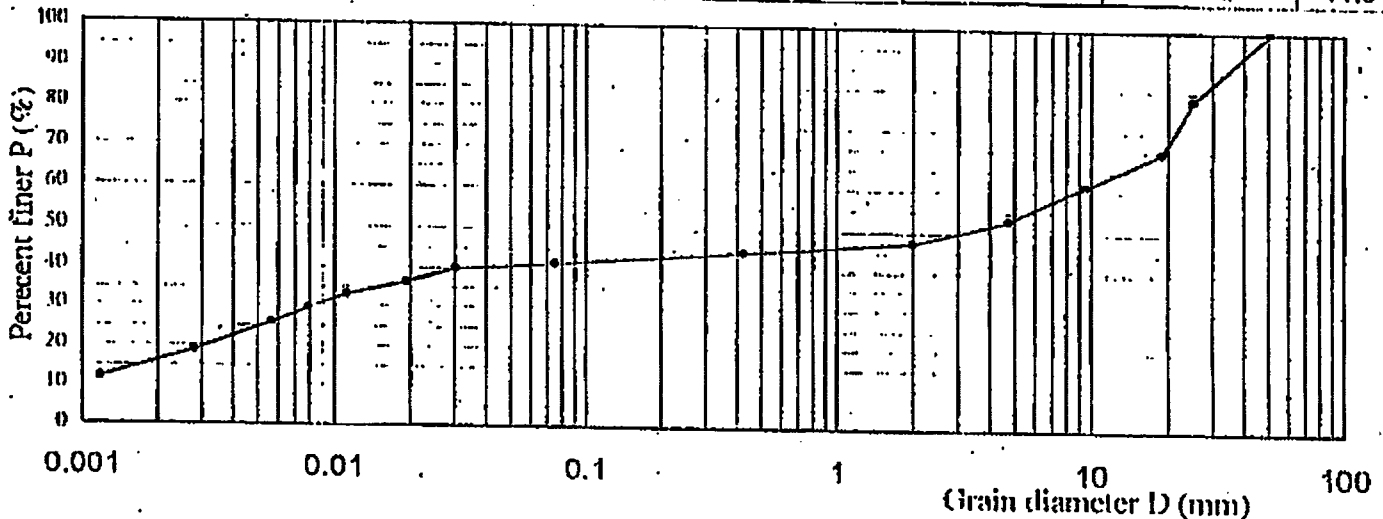
Grain diameter (mm)	50.8	25.4	19.0	9.5	4.75	2.00	0.425	0.075	Khối lượng riêng ( $\rho/cm^3$ ) 2.690
Weight soil retained (g)	0.00	146.80	112.54	67.30	72.40	48.18	24.58	1.38	
Percent retained (%)	0.0	17.3	13.3	7.9	8.5	5.7	2.9	3.1	
Percent finer (%)	100.0	82.7	69.4	61.4	52.9	47.2	44.3	41.2	

## HYDROMETER ANALYSIS

Weight of dry soil (g): 20.00

Temperature in ( $^{\circ}C$ ) 30.0

Elapsed time (min)	Actual Hydrometer Reading	Correction			Effective depth L (cm)	Diameter D (mm)	Percent passing P (%)
		Temperature	Zero	Hyd. Reagin			
2	8.0	2.3	1.0	11.3	12.71	0.0303	39.8
5	7.0	2.3	1.0	10.3	12.86	0.0193	36.3
15	6.0	2.3	1.0	9.3	13.01	0.0112	32.8
30	5.0	2.3	1.0	8.3	13.16	0.0060	29.3
60	4.0	2.3	1.0	7.3	13.31	0.0057	25.7
250	2.0	2.3	1.0	5.3	13.61	0.0028	18.7
1440	0.0	2.3	1.0	3.3	13.91	0.0012	11.6



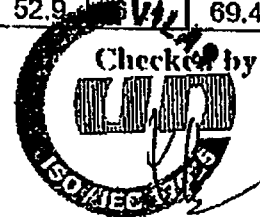
## RESULT

Size (mm)	< 0.002	0.002	0.005	0.0075	0.015	0.03	0.06	0.12	0.25	0.5	1.0	2.0	4.0	8.0	15.0	30.0
Percent (%)	15.8	9.0	15.7	0.7	3.1	2.9	5.7	8.5	7.9	13.3	17.3	0.0				
Percent finer (%)		15.8	24.8	40.5	41.2	44.3	47.2	52.9	69.4	82.7	100.0					

Tested by

*Nguyễn Thị Hồng*

Nguyễn Thị Hồng



VIIAM 1201 Toan

# GRAIN SIZE ANALYSIS

ASTM - D 422 - 63

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
TA TIU BRIDGE

Borehole : P02  
Sample No : D1  
Depth (m) : 2.8 - 3.0

Tests No : 639  
Date : 11/7/2006

SIZE ANALYSIS

Weight of dry soil (g): 1217.8

Size (mm)	50.8	25.4	19.0	9.5	4.75	2.00	0.425	0.075	< 0.075
Weight soil (g)	358	593.00	76.10	57.20	39.00	27.00	31.10	23.50	12.90
Percent retained (%)	29.4	48.7	6.2	4.7	3.2	2.2	2.6	1.9	1.1
Percent finer (%)	70.6	21.9	15.7	11.0	7.8	5.5	3.0	1.1	

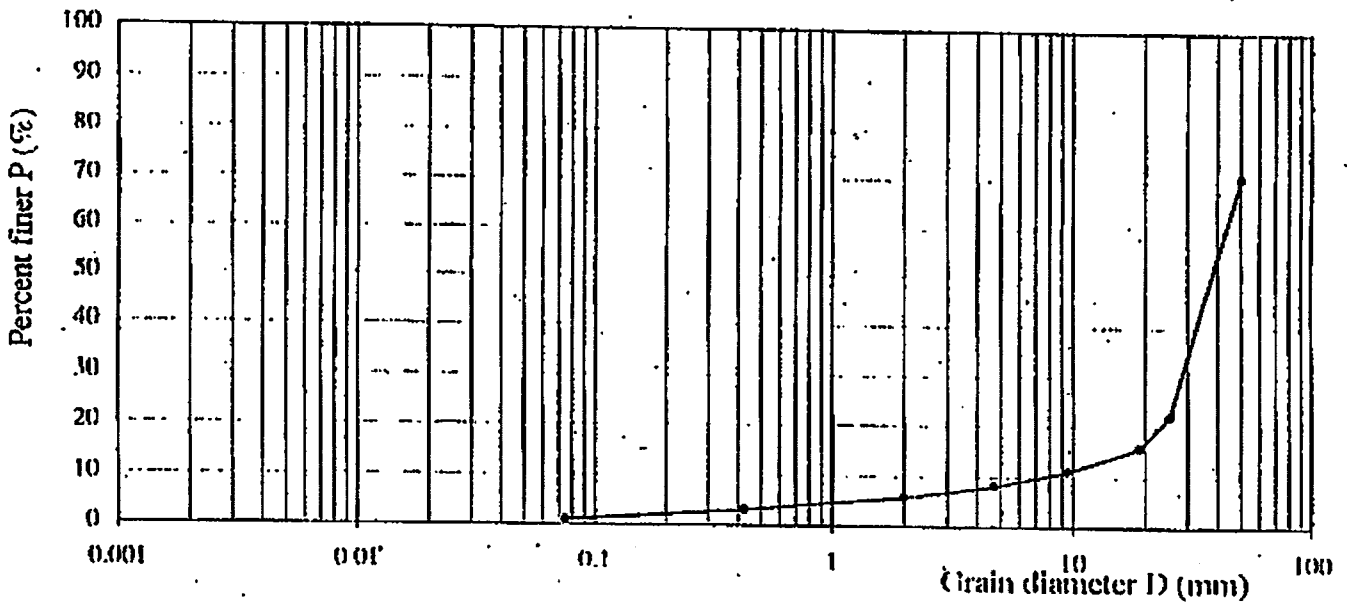
RESULT

$D_{60} = 42.0$        $C_u = 5.3$   
 $D_{30} = 29.0$        $C_c = 2.5$   
 $D_{10} = 8.0$

Soil classification (ASTM - D 2487)

Group symbol : GW  
Group name : Good aggregate grit

Size (mm)	50.8	25.4	19	9.5	4.75	2	0.425	0.075	< 0.075
Percent retained (%)	29.4	48.7	6.2	4.7	3.2	2.2	2.6	1.9	1.1



Tested by

*Handwritten signature*



Nguyen Thi Hong

VILAS 129 am Toan

# GRAIN SIZE ANALYSIS

ASTM - D 422 - 63

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
TA TIU BRIDGE

Borehole : P02  
Sample No : D2  
Depth (m): 5.8 + 6.0

Tets No : 640  
Date : 11/7/2006

**SIZE ANALYSIS**

Weight of dry soil (g): 1239.4

Size (mm)	50.8	25.4	19.0	9.5	4.75	2.00	0.425	0.075	< 0.075
Weight soil (g)	0.0	768.00	86.00	111.50	81.50	88.50	70.50	21.60	11.80
Percent retained (%)	0.0	62.0	6.9	9.0	6.6	7.1	5.7	1.7	1.0
Percent finer (%)	100.0	38.0	31.1	22.1	15.5	8.4	2.7	1.0	

**RESULT**

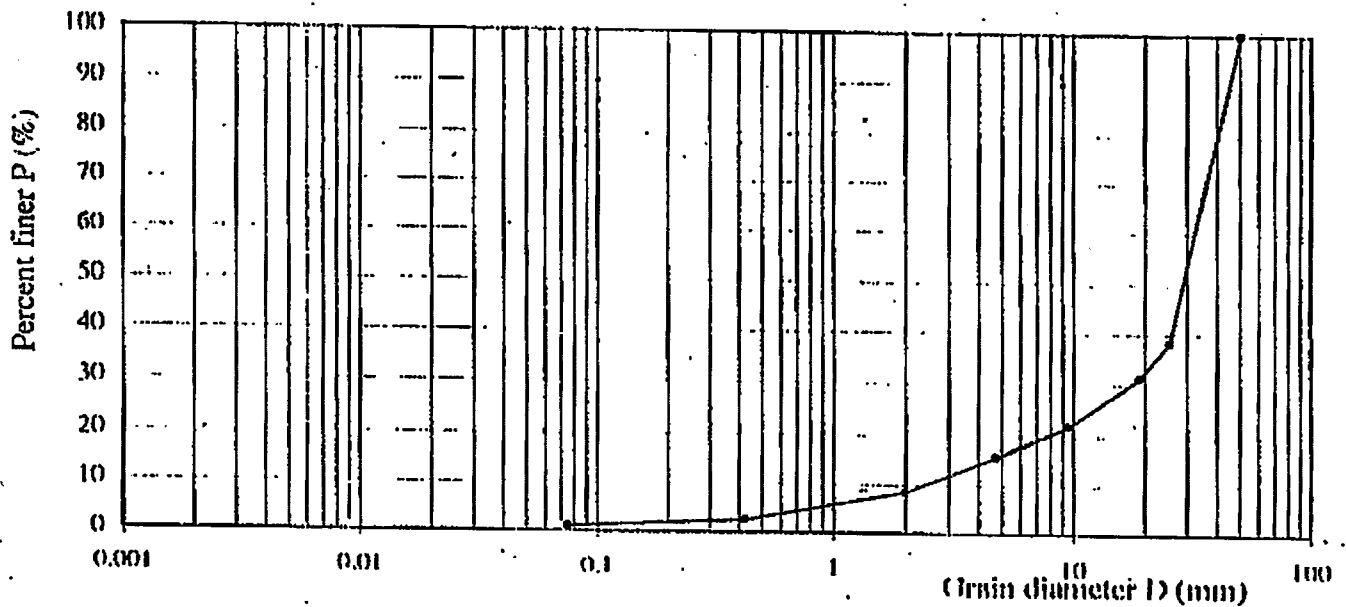
$D_{60} = 32.0$        $C_u = 13.9$   
 $D_{30} = 17.0$        $C_c = 3.9$   
 $D_{10} = 2.3$

Soil classification (ASTM - D 2487)

Group symbol : GP

Group name : Bad aggregate grit

Size (mm)	50.8	25.4	19	9.5	4.75	2	0.425	0.075	< 0.075
Percent retained (%)	0.0	62.0	6.9	9.0	6.6	7.1	5.7	1.7	1.0



Tested by

*Handwritten signature*

Nguyen Thi Hong

Checked by



VILAS 129an Toan

# GRAIN SIZE ANALYSIS

ASTM - D 422 - 63

**THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
TA TIU BRIDGE**

**Borehole :** P02  
**Sample No :** D3  
**Depth (m):** 8.8 ; 9.0

**Tests No :** 641  
**Date :** 11/7/2006

**SIZE ANALYSIS**

Weight of dry soil (g): 1349.9

Size (mm)	50.8	25.4	19.0	9.5	4.75	2.00	0.425	0.075	< 0.075
Weight soil (g)	0.0	988.80	73.70	49.40	54.50	54.90	66.50	31.80	27.30
Percent retained (%)	0.0	73.2	5.5	3.7	4.0	4.1	4.9	2.6	2.0
Percent finer (%)	100.0	26.8	21.3	17.6	13.6	9.5	4.6	2.0	

**RESULT**

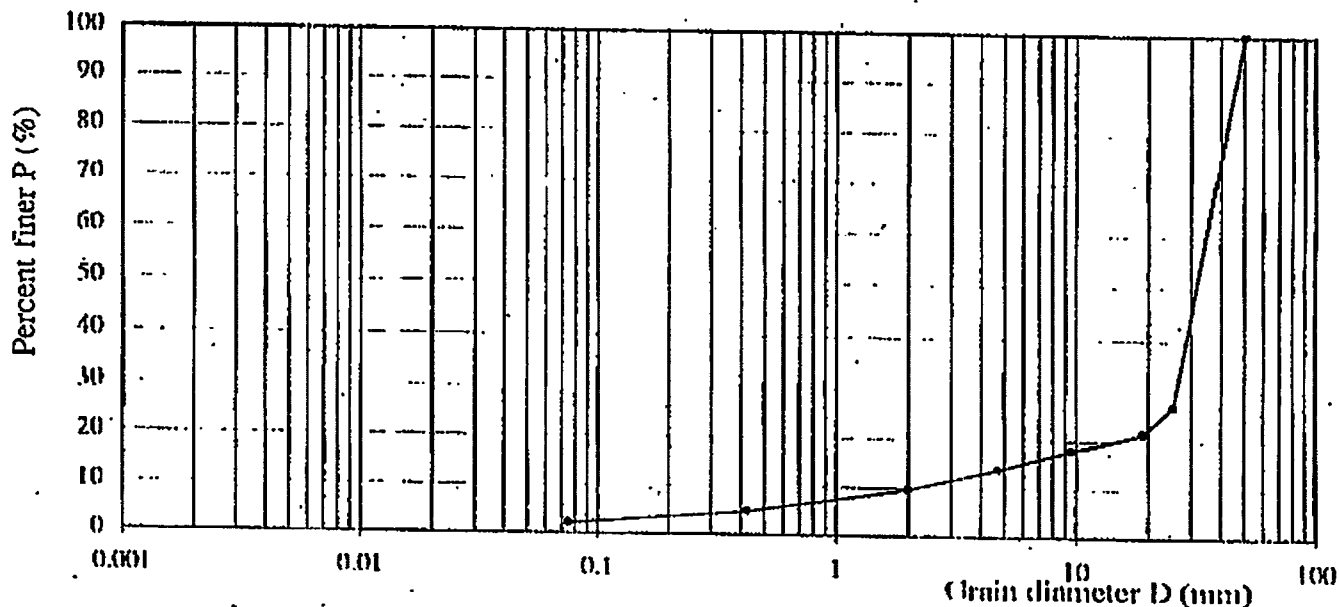
$D_{60} = 35.0$                        $C_u = 16.7$   
 $D_{30} = 17.0$                        $C_c = 3.9$   
 $D_{10} = 2.1$

Soil classification ( ASTM - D 2487 )

**Group symbol :** GP

**Group name :** Bad aggregate grit

Size (mm)	50.8	25.4	19	9.5	4.75	2	0.425	0.075	< 0.075
Percent retained (%)	0.0	73.2	5.5	3.7	4.0	4.1	4.9	2.6	2.0



Tested by

*Handwritten signature*

Nguyen Thi Hong



VILAS 129

Tran Van Toan

# GRAIN SIZE ANALYSIS

ASTM - D 422 - 63

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
TA TIU BRIDGE

Borehole : P02  
 Sample No : D4  
 Depth (m): 11.8 : 12.0

Tets No : G42  
 Date : 11/7/2006

**SIZE ANALYSIS**

Weight of dry soil (g): 1199.3

Size (mm)	50.8	25.4	19.0	9.5	4.75	2.00	0.425	0.075	< 0.075
Weight soil (g)	403.0	554.00	64.10	67.00	20.60	39.60	23.40	12.60	19.30
Percent retained (%)	33.6	46.2	5.3	4.8	2.2	3.3	2.0	1.0	1.6
Percent finer (%)	66.4	20.2	14.9	10.1	7.9	4.6	2.7	1.6	

**RESULT**

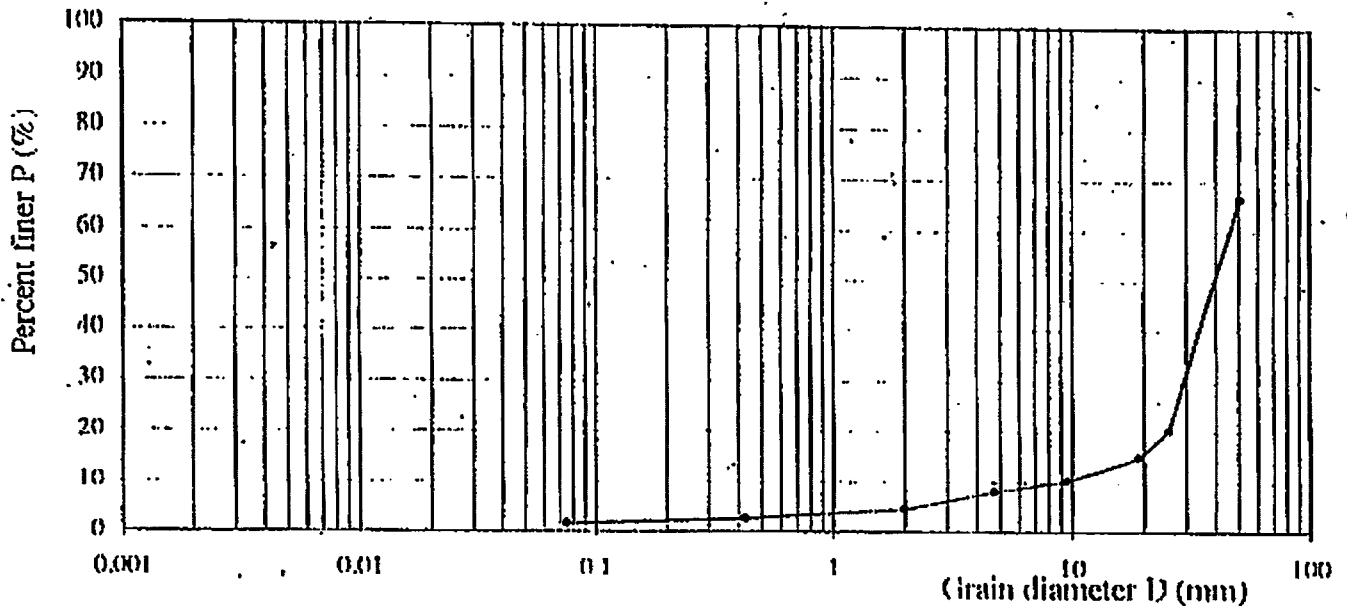
$D_{60} = 46.0$                        $C_u = 5.1$   
 $D_{30} = 30.0$                        $C_c = 2.2$   
 $D_{10} = 9.0$

Soil classification ( ASTM - D 2487 )

Group symbol : GW

Group name : Good aggregate grit

Size (mm)	50.8	25.4	19	9.5	4.75	2	0.425	0.075	< 0.075
Percent retained (%)	33.6	46.2	5.3	4.8	2.2	3.3	2.0	1.0	1.6



Tested by

*Thi Hong*

Nguyen Thi Hong

Checked by



VILAS 129

Tran Van Toan

# GRAIN SIZE ANALYSIS

ASTM - D 422 - 63

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
TA TIU BRIDGE

Borehole : P02  
Sample No : D5  
Depth (m) : 14.8 + 15.0

Tets No : 643  
Date : 11/7/2006

**SIZE ANALYSIS**

Weight of dry soil (g): 1263.0

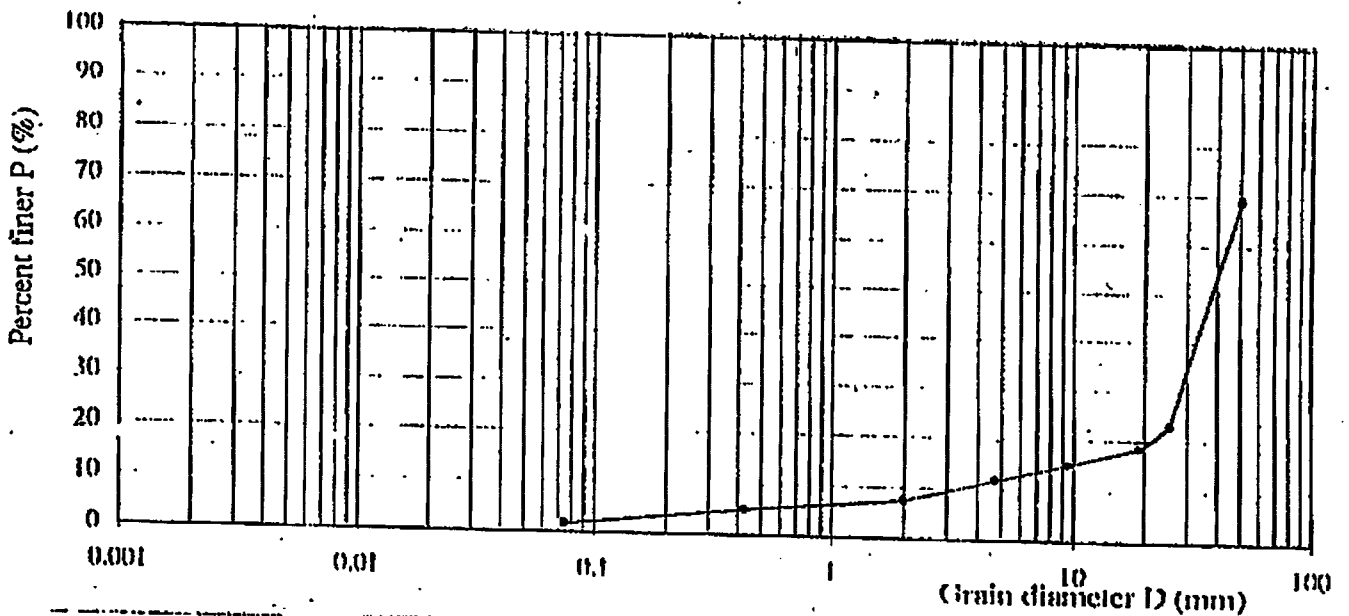
Size (mm)	50.8	25.4	19.0	9.5	4.75	2.00	0.425	0.075	< 0.075
Weight soil (g)	394.00	582.40	57.30	45.80	39.20	51.40	31.80	40.20	20.90
Percent retained (%)	31.2	46.1	4.5	3.6	3.1	4.1	2.5	3.2	1.7
Percent finer (%)	68.8	22.7	18.2	14.5	11.4	7.4	4.8	1.7	

**RESULT**

$D_{60} = 44.0$        $C_u = 13.3$   
 $D_{30} = 28.0$        $C_c = 5.4$   
 $D_{10} = 3.3$

Soil classification ( ASTM - D 2487 )  
Group symbol : GP  
Group name : Bad aggregate grit

Size (mm)	50.8	25.4	19	9.5	4.75	2	0.425	0.075	< 0.075
Percent retained (%)	31.2	46.1	4.5	3.6	3.1	4.1	2.5	3.2	1.7



Tested by

*Signature*

Nguyen Thi Hong



VILAS 129  
Tran Van Toan

# GRAIN SIZE ANALYSIS

ASTM - D 422 - 63

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
TA TIU BRIDGE

Borehole : P02  
Sample No : D6  
Depth (m): 17.8 + 18.0

Tets No : 644  
Date : 11/7/2006

SIZE ANALYSIS

Weight of dry soil (g): 1649.2

Size (mm)	50.8	25.4	19.0	9.5	4.75	2.00	0.425	0.075	< 0.075
Weight soil (g)	246.0	703.50	11.40	38.80	247.80	265.00	58.10	55.20	23.40
Percent retained (%)	14.9	42.7	0.7	2.4	15.0	16.1	3.5	3.3	1.4
Percent finer (%)	85.1	42.4	41.7	39.4	24.4	8.3	4.8	1.4	

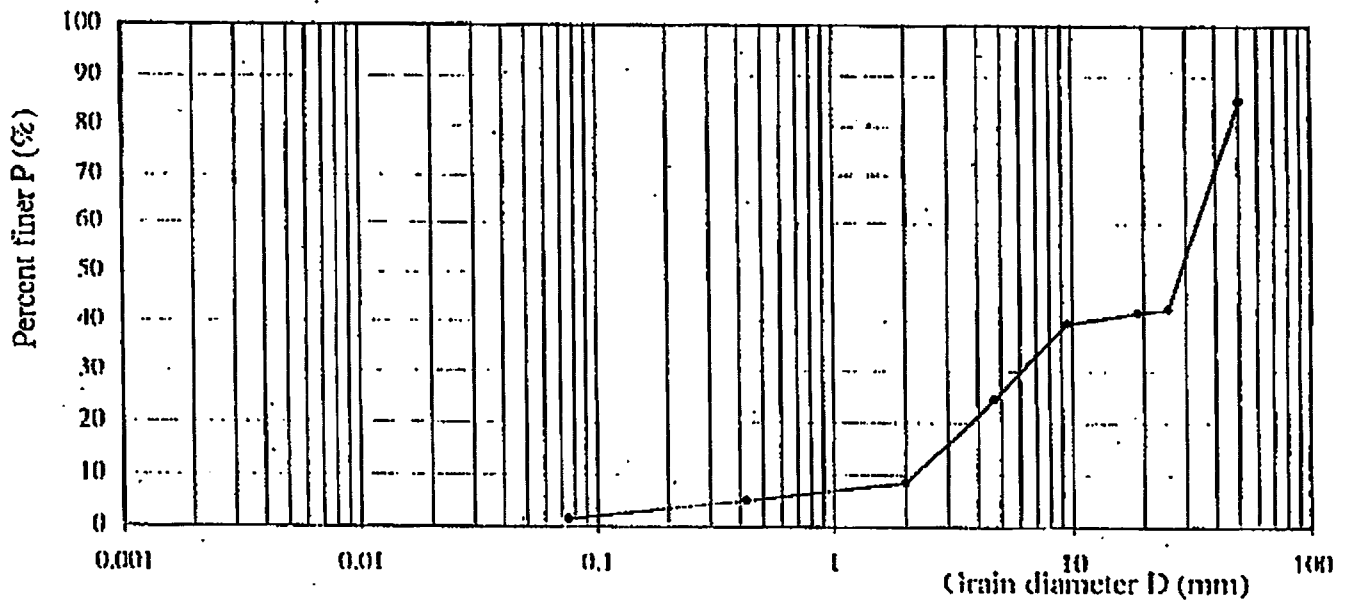
RESULT

$D_{60} = 33.0$        $C_u = 15.7$   
 $D_{30} = 6.1$        $C_c = 0.5$   
 $D_{10} = 2.1$

Soil classification (ASTM - D 2487)

Group symbol : GP  
Group name : Bad aggregate grit

Size (mm)	50.8	25.4	19	9.5	4.75	2	0.425	0.075	< 0.075
Percent retained (%)	14.9	42.7	0.7	2.4	15.0	16.1	3.5	3.3	1.4



Tested by

*Handwritten signature*

Nguyen Thi Hong



VILAS 1109 Van Toan

# GRAIN SIZE ANALYSIS

ASTM - D 422 - 63

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
TA TIU BRIDGE

Borehole : P02  
Sample No : D7  
Depth (m): 20.8 - 21.0

Tets No : 645  
Date : 11/7/2006

**SIZE ANALYSIS**

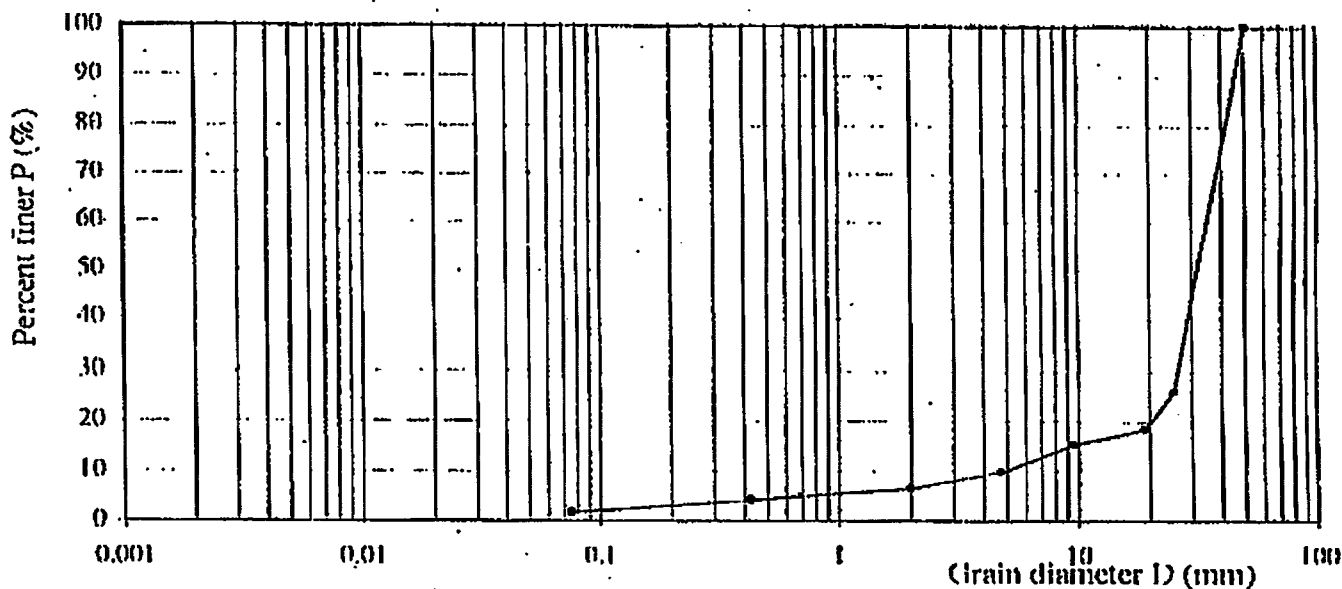
Weight of dry soil (g): 694.7

Size (mm)	50.0	25.4	19.0	9.5	4.75	2.00	0.425	0.075	< 0.075
Weight soil (g)	0.0	516.40	51.00	22.40	37.50	24.00	15.40	16.50	11.50
Percent retained (%)	0.0	74.3	7.3	3.2	5.4	3.5	2.2	2.4	1.7
Percent finer (%)	100.0	25.7	18.3	15.1	9.7	6.2	4.0	1.7	

**RESULT**

D <sub>80</sub> = 35.0	C <sub>u</sub> = 7.0	Soil classification (ASTM - D 2487)
D <sub>30</sub> = 27.0	C <sub>c</sub> = 4.2	Group symbol : GP
D <sub>10</sub> = 5.0		Group name : Bad aggregate grit

Size (mm)	50.8	25.4	19	9.5	4.75	2	0.425	0.075	< 0.075
Percent retained (%)	0.0	74.3	7.3	3.2	5.4	3.5	2.2	2.4	1.7



Tested by

*Handwritten signature*

Nguyen Thi Hong



VILAS 129  
Tran Van Toan



# GRAIN SIZE ANALYSIS

ASTM - D 422 - 63

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
TA TIU BRIDGE

Borehole : P02  
Sample No : D8  
Depth (m): 24.6 - 24.8

Tests No : 646  
Date : 11/7/2006

**SIZE ANALYSIS**

Weight of dry soil (g): 754.5

Size (mm)	50.8	25.4	19.0	9.5	4.75	2.00	0.425	0.075	< 0.075
Weight soil (g)	0.0	655.00	58.00	51.50	20.40	21.50	14.00	12.40	11.10
Percent retained (%)	0.0	73.6	7.7	8.2	2.7	2.8	1.9	1.6	1.5
Percent finer (%)	100.0	26.4	18.8	10.8	7.9	5.0	3.1	1.5	

**RESULT**

$D_{60} = 35.0$

$C_u = 4.4$

Soil classification (ASTM - D 2487)

$D_{30} = 27.0$

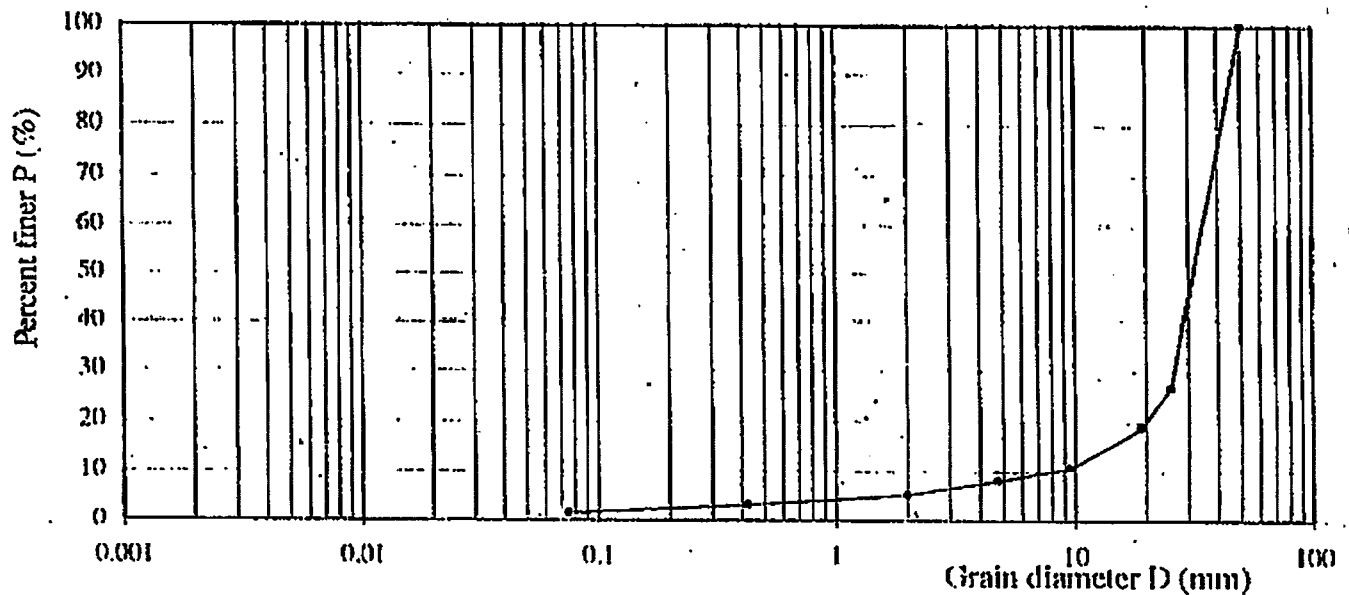
$C_c = 2.6$

Group symbol : GP

$D_{10} = 8.0$

Group name : Bad aggregate grit

Size (mm)	50.8	25.4	19	9.5	4.75	2	0.425	0.075	< 0.075
Percent retained (%)	0.0	73.6	7.7	8.2	2.7	2.8	1.9	1.6	1.5



Tested by

*Handwritten signature*

Nguyen Thi Hong

Checked by



VILAS 129  
Phu Van Toan

# ATTERBERG LIMITS

ASTM - D 4318 - 84

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
TA TIU BRIDGE

Borehole : P01

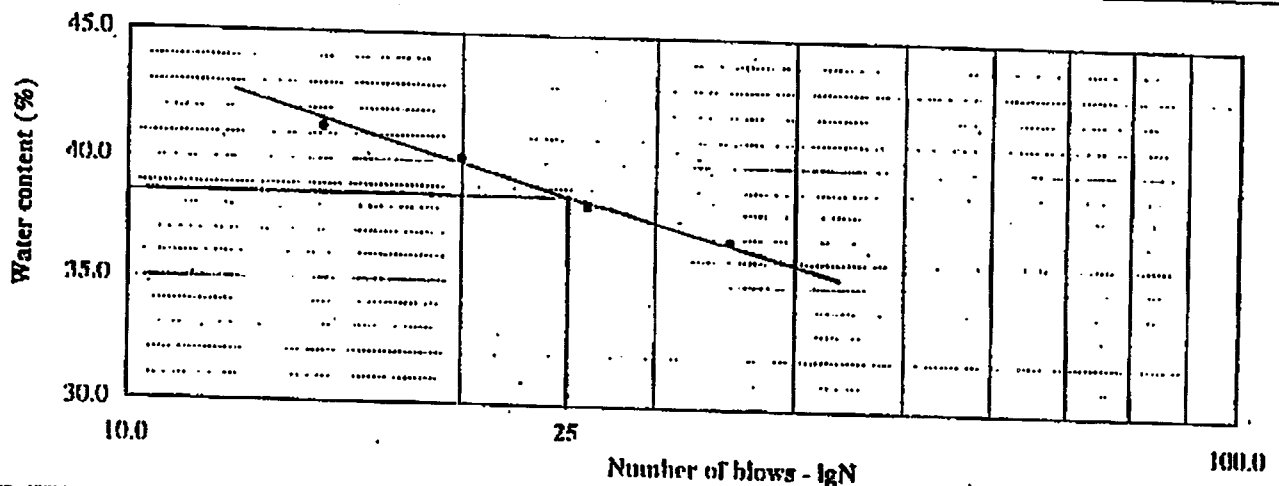
Sample No : D8

Depth (m): 21.0 + 22.0

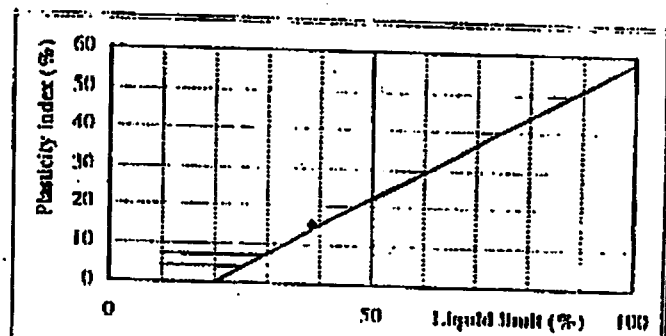
Tests No : 638

Date : 12/7/2006

Container number	LIQUID LIMIT ( $W_L$ )				PLATIC LIMIT ( $W_P$ )	
	IN31	HN08	HN07	HN37	HN19	HN03
Weight of wet (g)	86.34	43.10	44.63	39.29	42.58	38.67
Weight of dry (g)	80.06	37.57	38.84	34.76	38.86	35.46
Weight of container (g)	64.85	23.79	23.67	22.46	23.21	22.22
Water content (%)	41.3	40.1	38.2	36.8	23.8	24.2
Average water content (%)					24.0	
Number of blows ( N )	15	20	26	35		



**RESULT:**  
 Liquid limit :  $W_L = 38.6$  %  
 Plastic limit :  $W_P = 24.0$  %  
 Plasticity index :  $I_P = 14.6$  %



Tested by

*Thai Thi Lien*

Thai Thi Lien



VILAS 129  
Tran Van Toan

# ATTERBERG LIMITS

ASTM - D 4318 - 84

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
TA TIU BRIDGE

Borehole : P01

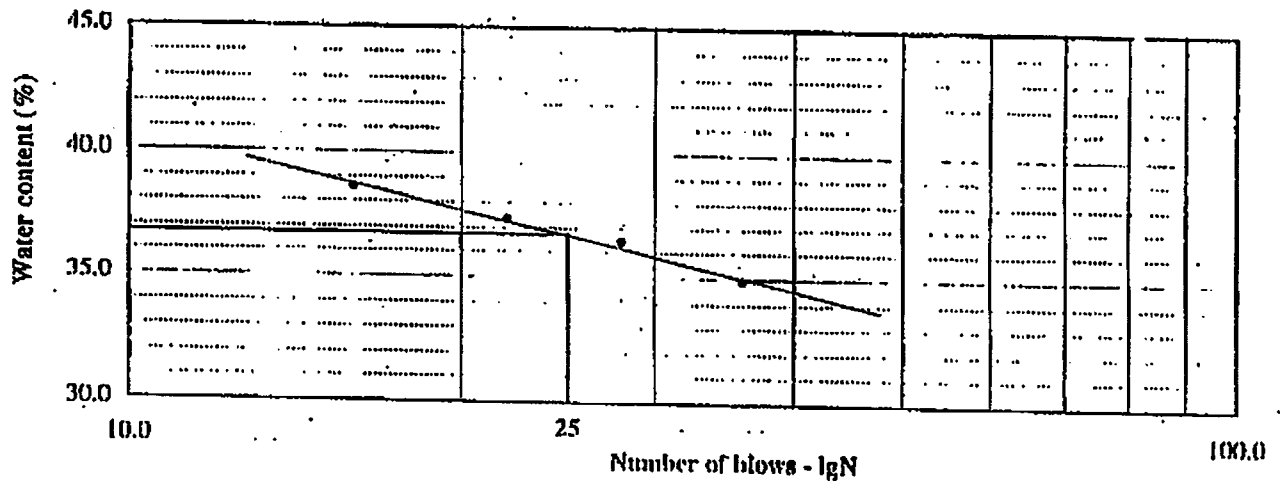
Sample No : D9

Depth (m): 24.8 + 25.0

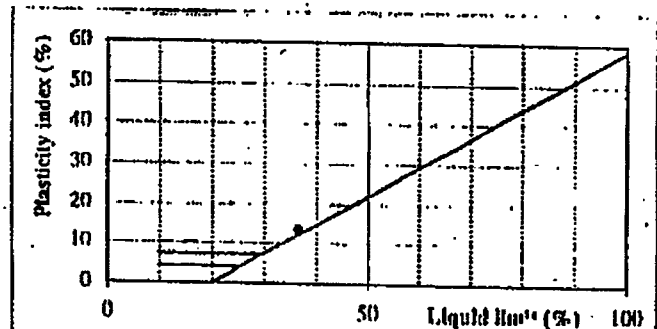
Tests No : 637

Date : 12/7/2006

Container number	LIQUID LIMIT ( $W_L$ )				PLATIC LIMIT ( $W_P$ )		
	IN23	HN31	IN11	IN09	HN49	HN98	
Weight of wet (g)	83.32	41.60	88.42	85.32	43.03	52.18	
Weight of dry (g)	78.49	36.57	82.18	80.10	39.30	48.00	
Weight of container (g)	65.96	23.09	65.04	65.13	23.38	30.16	
Water content (%)	38.5	37.3	36.4	34.9	23.4	23.4	
Average water content (%)						23.4	
Number of blows ( N )	16	22	28	36			



**RESULT:**  
 Liquid limit :  $W_L = 36.7$  %  
 Plastic limit :  $W_P = 23.4$  %  
 Plasticity index :  $I_P = 13.3$  %



Tested by

*Thai Thi Lien*

Thai Thi Lien



VILAS 129

Tran Van Toan

# ATTERBERG LIMITS

ASTM - D 4318 - 84

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
TA TIU BRIDGE

Borehole : P01

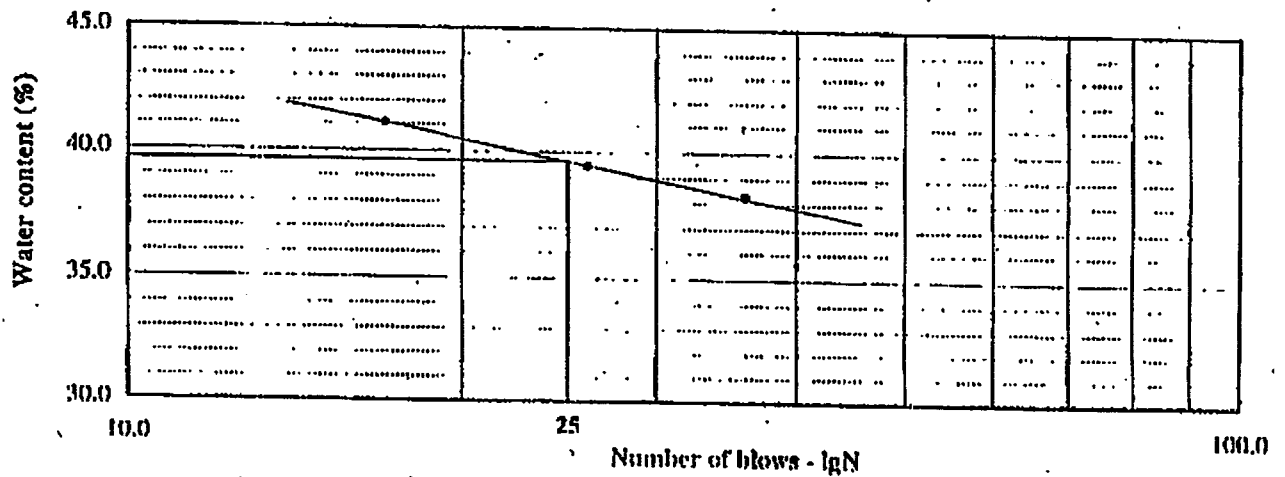
Sample No : D10

Depth (m) : 26.8 + 26.8

Tests No : 638

Date : 12/7/2006

Container number	LIQUID LIMIT ( $W_L$ )			PLATIC LIMIT ( $W_P$ )	
	IN12	IN16	IN22	IN50	IN28
Weight of wet (g)	86.74	84.67	83.70	39.76	43.58
Weight of dry (g)	80.53	79.12	78.54	36.34	39.35
Weight of container (g)	65.39	65.03	65.05	22.25	21.77
Water content (%)	41.0	39.4	38.3	24.3	24.1
Average water content (%)				24.2	
Number of blows ( N )	17	26	36		

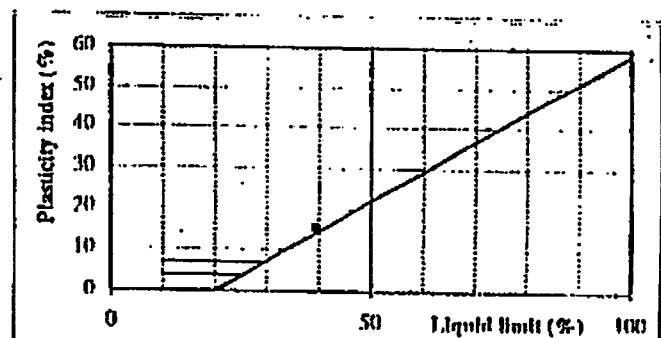


**RESULT:**

Liquid limit :  $W_L = 39.6$  %

Platic limit :  $W_P = 24.2$  %

Plasticity index :  $I_p = 15.4$  %



Tested by

*Glina*

Nguyen Thi Lien



VILAS 129  
Tran Van Toan

BORING LOG

BORING		THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES TECHNICAL DESIGN PHASE				BRIDGES OF YEN BAI PROVINCE BEN CAO BRIDGE												
No		LKT1		Co-ord. X=      Y=		Station: Km6+993												
+88.50		Elev. of underwater level: +0.00		Drilling date:		13/06/2006 - 14/06/2006												
No		Nguyen Cong Sinh		Checker:		Tran Viet Han												
Elev. (m)	Depth (m)	Thickness (m)	PROFILE Scale 1/100	DESCRIPTION	STANDARD PENETRATION TEST (SPT)						Sampling depth for test (m)							
					Depth (m)	Blow No./15cm			N <sub>60</sub> /cm	Chart								
						N1	N2	N3			0	10	20	30	40	50	N	
89.00	0.60	0.60		Dusty sand is in blackish grey mixed with organic, very soft.	SPT1 1.00-1.45	5	7	9	10									
					SPT2 2.00-2.45	6	8	10	18									N01 1.80-2.00
		6.90		Completely weathered granite becomes grit-sand in brown, yellowish grey and white spotted colour mixes with plaster. Structure is medium to very closed.	SPT3 3.00-3.45	10	15	18	33									N02 3.80-4.00
					SPT4 4.00-4.45	11	17	24	41									N03 5.80-6.00
					SPT5 5.00-5.45	12	17	22	39									
					SPT6 6.00-6.45	19	30/10	>50	>50									
81.50	7.00	1.80		Granite is in green, white spotted, cracked.														U4 7.70-8.00
79.70	8.80																	U5 8.00-8.30
		4.70		Granite is in green, white spotted, blockish. Hardness is in level 7-8.														U6 11.0-11.30
75.00	13.50																	U7 13.20-13.50

BORING LOG

ENGINEERING		THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES TECHNICAL DESIGN PHASE				BRIDGES OF YEN BAI PROVINCE										
Bore hole		LKT2	Co-ord. X=		Y=	Sta/Bon: Km7+020										
Elev.: +91.44		Elev. of underwater level: +0.00			Drilling date:		12/06/2006 - 13/08/2006									
Corrector:		Nguyen Cong Sinh			Checker:		Tran Viet Han									
Layer	Elev. (m)	Depth (m)	Thickness (m)	PROFILE Scale 1/100	DESCRIPTION	STANDARD PENETRATION TEST (SPT)					Sampling depth for test (m)					
						Depth (m)	Blow No./15cm			N30cm		Chart				
N1	N2	N3	N	0	10		20	30	40		50	N				
1	90.24	1.20	1.20		Dusty sand is in blackish grey mixed with organic, very soft.											
2	88.94	2.50	1.30		Sand is mixed with cobble, gravel, grit in whitish grey, very loose structure.	SPT1 1.50-1.95	2	4	5	9						
3	83.94	7.50	5.00		Completely weathered granite becomes grit-sand in brown, yellowish grey and white spotted colour mixes with plaster. Structure is medium closed.	SPT2 2.40-2.85	10	18	24	39						
						SPT3 3.0-3.45	9	16	26	40						
						SPT4 4.20-4.65	12	18	24	42						
						SPT5 5.00-5.45	12	13	28	41						
						SPT6 6.00-6.45	13	17	24	41						
4	81.14	10.30	2.80		Completely weathered granite becomes grit sand in greenish grey. Structure is very closed.	SPT7 7.00-7.45	10	16	24	40						
						SPT8 8.20-8.65	12	15	28	43						
						SPT9 9.10-9.55	16	21	29	50						
5	79.64	11.80	1.50		Granite is green, cracked.											
6	78.44	16.00	3.20		Granite is in green, white spotted blockish. Hardness is in level 7-8.											

No: 290606.01.9/CLB

**SUMMARY OF TEST RESULTS**

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES


BEN CAO BRIDGE

Borehole :		T2			T1	
Sample No :		XD1	ND2	ND3	ND1	ND2
Depth (m):		1.0 : 2.4	4.0 : 4.2	6.0 : 6.2	1.8 : 2.0	3.8 : 4.0
Test No.		680	681	682	685	686
Grain size analysis						
Percent finer (%)	50.8 (mm)	89.3				100.0
	25.4 (mm)	75.1				55.2
	19 (mm)	67.6				45.6
	9.5 (mm)	63.8	100.0	100.0	100.0	36.8
	4.75 (mm)	61.4	99.4	88.6	89.3	31.8
	2.00 (mm)	52.4	96.1	79.7	72.1	22.3
	0.425 (mm)	24.4	82.2	66.0	55.7	9.0
	0.075 (mm)	6.5	56.0	50.8	37.1	0.8
	0.050 (mm)		49.0	45.0	32.5	
	0.005 (mm)		15.0	16.0	16.0	
0.002 (mm)		12.0	11.0	9.5		
Natural water content	W %		31.0	21.6	21.6	
Natural unit weight	$\gamma_w$ g/cm <sup>3</sup>		1.920	2.060	1.927	
Dry unit weight	$\gamma_k$ g/cm <sup>3</sup>		1.486	1.694	1.585	
Specific gravity	$\rho_s$ g/cm <sup>3</sup>		2.690	2.690	2.690	
Coefficient of uniformity	$C_u$	38.2				60.0
Coefficient of gradation	$C_c$	0.8				1.3
In Dry condision	$\alpha_k$					
In Saturation condision	$\alpha_w$					
Void Ratio	$e_0$		0.835	0.588	0.697	
Porosity	n %		45.5	37.0	41.1	
Degree of Saturation	S %		99.8	98.8	83.3	
Liquid Limits	W <sub>L</sub> %		36.6	34.2	33.8	
Plastic Limits	W <sub>p</sub> %		26.2	24.6	25.2	
Plasticity Index	I <sub>p</sub> %		10.4	9.6	8.6	
Internal friction angle	$\varphi^0$		14°41'	17°20'	20°54'	
Cohesion	C KG/cm <sup>2</sup>		0.068	0.063	0.047	
Compressibility Index	$a_{1,2}$ cm <sup>2</sup> /KG		0.038	0.031	0.021	
Soil classification ASTM - D 2487		Bad aggregate sand - SP	Silty soils - ML	Silty soils - ML	Silty soils - ML	Good aggregate grt - GW

COLECTED BY

*NCHP*

Eng. Nguyen Thi Khanh Ha

DATE: 07/06  
 LABORATORY CENTER  
  
 YILAS 129  
 Eng. Tran Van Toan

# GRAIN SIZE ANALYSIS

ASTM - D 422 - 63

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
BEN CAO BRIDGE

Borehole : T2  
Sample No : XD1  
Depth (m): 1.8 - 2.0

Tests No : 680  
Date : 11/7/2016

SIZE ANALYSIS

Weight of dry soil (g): 1630.0

Size (mm)	50.8	25.4	19.0	9.5	4.75	2.00	0.425	0.075	< 0.075
Weight soil (g)	175.10	230.03	123.00	61.80	40.00	145.30	457.50	291.70	105.57
Percent retained (%)	10.7	14.1	7.5	3.8	2.5	8.9	28.1	17.9	6.5
Percent finer (%)	89.3	75.1	67.6	63.8	61.4	52.4	24.4	6.5	

RESULT

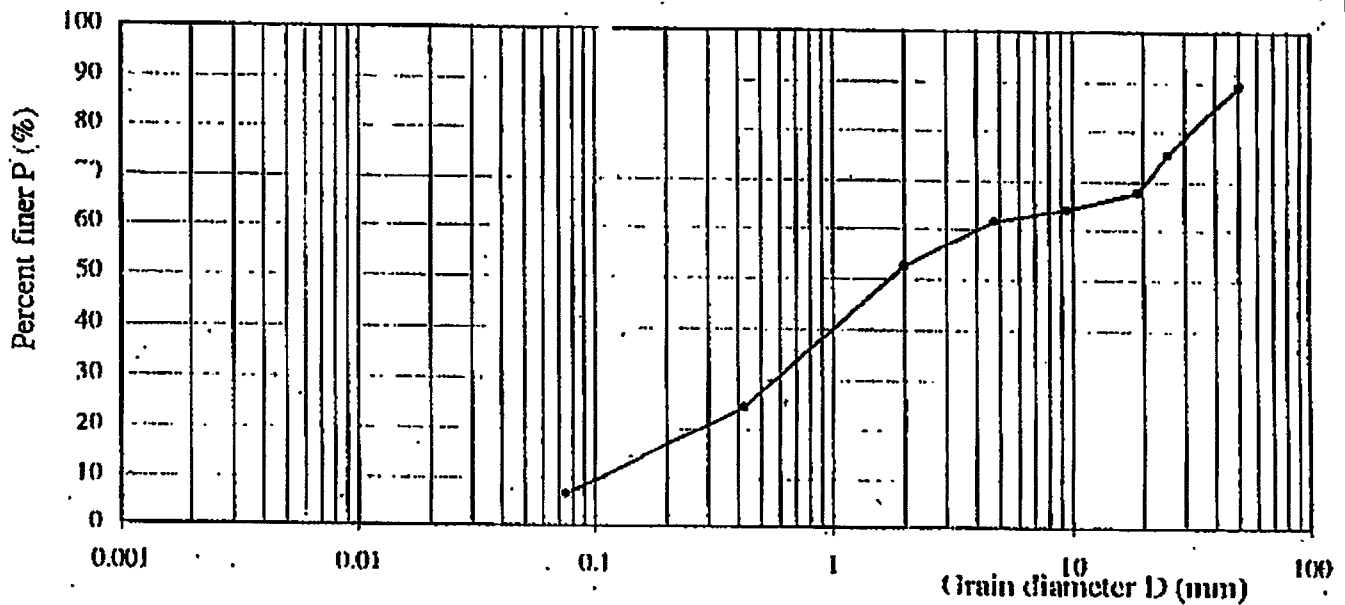
$D_{60} = 4.2$        $C_u = 38.2$   
 $D_{30} = 0.59$      $C_c = 0.8$   
 $D_{10} = 0.11$

Soil classification (ASTM - D 2487)

Group symbol : SP

Group name : Bad aggregate sand

Size (mm)	50.8	25.4	19	9.5	4.75	2	0.425	0.075	< 0.075
Percent retained (%)	10.7	14.1	7.5	3.8	2.5	8.9	28.1	17.9	6.5



Tested by

*Handwritten signature*

Nguyen Thi Hong



VILAS 129  
Tran Van Toan



# GRAIN SIZE ANALYSIS

ASTM - D 422 - 63

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
BEN CAO BRIDGE

Borehole : T2  
Sample No : ND2  
Depth (m): 4.0 + 4.2

Tests No : 681  
Date : 13/7/2006

## SIZE ANALYSIS

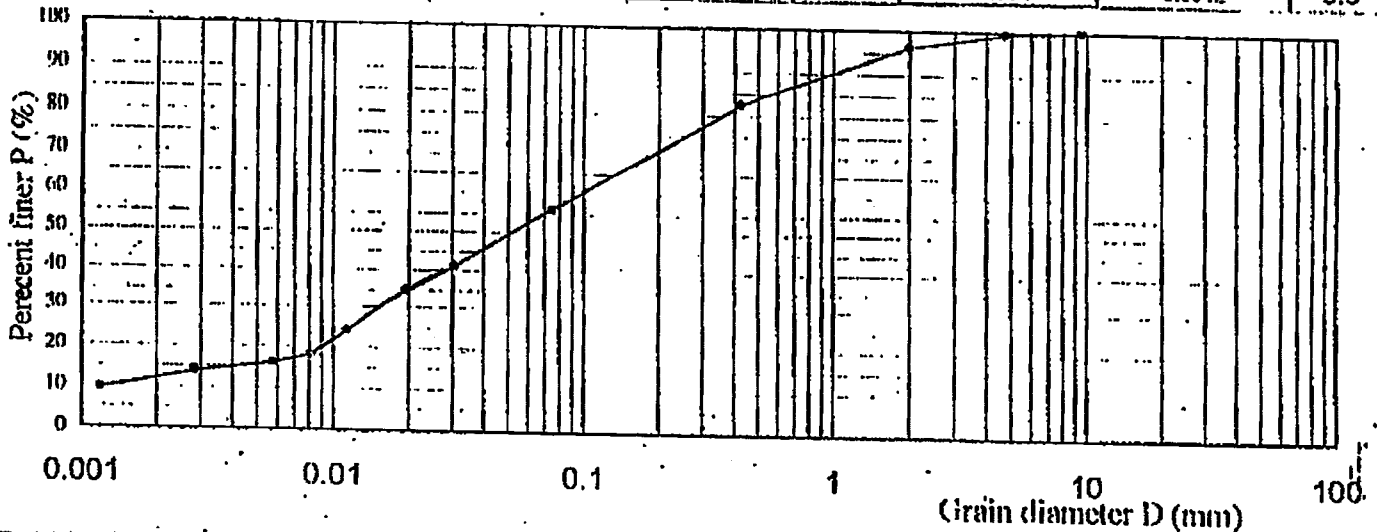
Grain diameter (mm)	50.8	25.4	19.0	9.5	4.75	2.00	0.425	0.075	Khối lượng riêng (g/cm <sup>3</sup> ) 2.600
Weight soil retained (g)	0.00	0.00	0.00	0.00	0.22	1.25	5.31	10.00	
Percent retained (%)	0.0	0.0	0.0	0.0	0.8	3.3	13.9	26.2	
Percent finer (%)	100.0	100.0	100.0	100.0	99.4	96.1	82.2	56.0	

Weight of dry soil (g):

## HYDROMETER ANALYSIS

Weight of dry soil (g): 38.17  
Temperature in (°C) 30.0

Elapsed time (min)	Actual hydrometer Reading	Correction			Effective depth L (cm)	Diameter D (mm)	Percent passing P (%)
		Temperature	Zero	Hyd. Reagin			
2	6.5	2.3	1.0	9.8	12.93	0.0306	40.9
5	5.0	2.3	1.0	8.3	13.16	0.0195	34.8
15	2.5	2.3	1.0	5.8	13.53	0.0114	24.2
30	1.0	2.3	1.0	4.3	13.76	0.0082	17.9
60	0.5	2.3	1.0	3.8	13.83	0.0058	15.8
250	0.0	2.3	1.0	3.3	13.91	0.0028	13.8
1440	1.0	2.3	1.0	2.3	14.06	0.0012	9.6

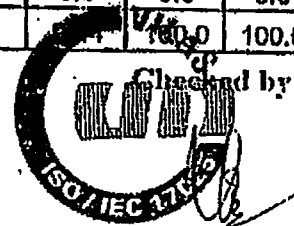


## RESULT

Size (mm)	<0.002	0.002	0.005	0.05	0.075	0.425	2.00	4.75	9.5	19.0	25.4	50.8
Percent (%)	12.0	3.0	34.0	7.0	26.2	13.9	3.3	0.6	0.0	0.0	0.0	0.0
Percent finer (%)		12.0	15.0	49.0	56.0	82.2	96.1	100.0	100.0	100.0	100.0	100.0

Tested by

*Nguyễn Thị Hồng*



Checked by

Nguyễn Thị Hồng

VILAS 129  
Trần Văn Toàn

# GRAIN SIZE ANALYSIS

Bridge No.23

ASTM - D 422 - 63

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
BEN CAO BRIDGE

Borehole : T2  
Sample No : ND3  
Depth (m): 6.0 + 6.2

Tets No : 682  
Date : 13/7/2016

**SIZE ANALYSIS**

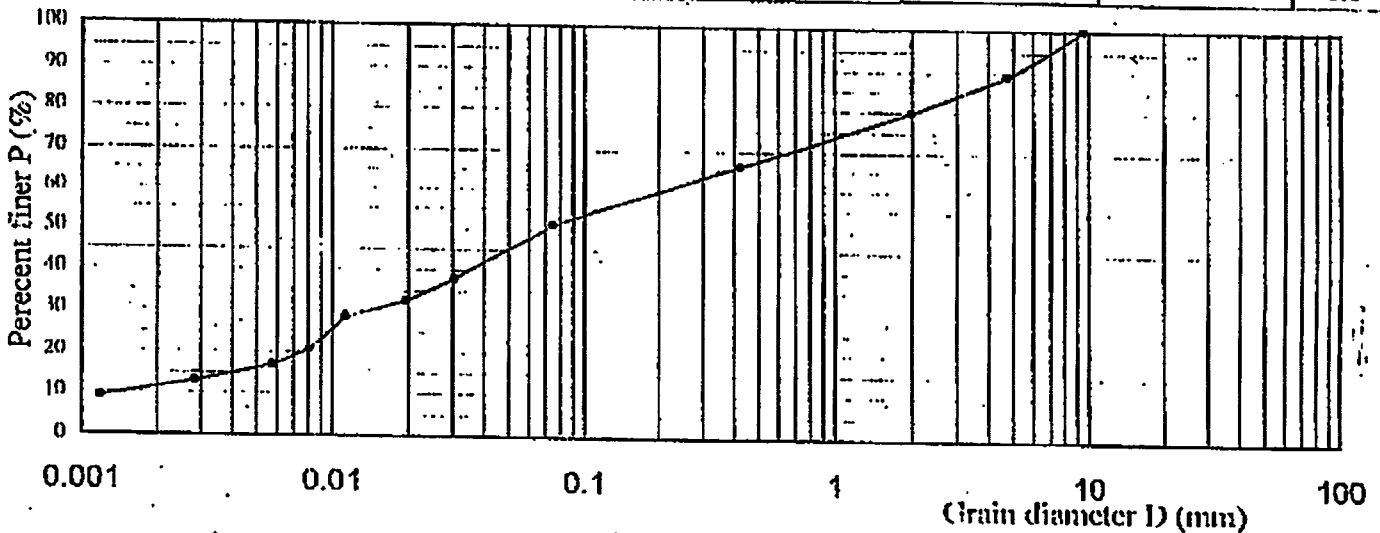
Weight of dry soil (g):

Grain diameter (mm)	50.8	25.4	19.0	9.5	4.75	2.00	0.425	0.075	Khối lượng riêng (g/cm <sup>3</sup> )  2.690
Weight soil retained (g)	0.00	0.00	0.00	0.00	4.89	3.66	5.62	6.24	
Percent retained (%)	0.0	0.0	0.0	0.0	11.4	8.9	13.7	15.2	
Percent finer (%)	100.0	100.0	100.0	100.0	88.6	79.7	66.0	50.8	

**HYDROMETER ANALYSIS**

Weight of dry soil (g): 41.12  
Temperature in (°C) 30.0

Elapsed time (min)	Actual Hydrometer Reading	Correction			Effective depth l (cm)	Diameter D (mm)	Percent passing P (%)
		Temperature	Zero	Hyd. Reagin			
2	6.5	2.3	1.0	9.8	12.93	0.0306	37.9
5	5.0	2.3	1.0	8.3	13.16	0.0195	32.1
15	4.0	2.3	1.0	7.3	13.31	0.0113	28.3
30	2.0	2.3	1.0	5.3	13.61	0.0081	20.5
60	1.0	2.3	1.0	4.3	13.76	0.0058	16.6
250	0.0	2.3	1.0	3.3	13.91	0.0028	12.8
1440	-1.0	2.3	1.0	2.3	14.06	0.0012	8.9



**RESULT**

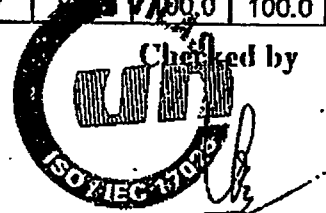
Size (mm)	<0.002	0.002	0.003	0.05	0.075	0.425	2.00	4.75	9.5	19.0	25.4	50.8
Percent (%)	11.0	5.0	29.0	5.8	15.2	13.7	8.9	11.4	0.0	0.0	0.0	0.0
Percent finer (%)		11.0	16.0	45.0	50.8	66.0	79.7	88.6	100.0	100.0	100.0	100.0

Tested by

*Signature of Nguyen Thi Hong*

Nguyen Thi Hong

Checked by



VILAS 129  
Tran Van Toan

# GRAIN SIZE ANALYSIS

Bridge No.23

ASTM : D 422 - 63

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
BEN CAO BRIDGE

Borehole : T1  
Sample No : ND1  
Depth (m) : 1.8 ± 2.0

Tets No : 685  
Date : 13/7/2006

### SIZE ANALYSIS

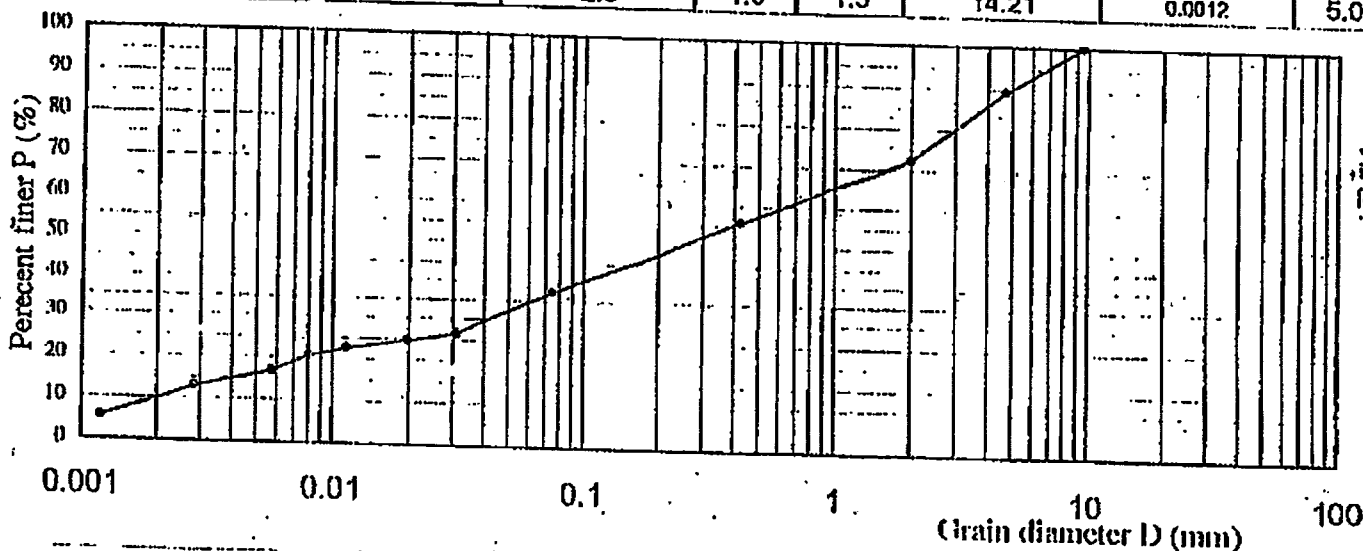
Grain diameter (mm)	50.8	25.4	19.0	9.5	4.75	2.00	0.425	0.075	Khối lượng riêng (g/cm <sup>3</sup> ) 2.000
Weight soil retained (g)	0.00	0.00	0.00	0.00	4.42	7.05	8.75	7.00	
Percent retained (%)	0.0	0.0	0.0	0.0	10.7	17.1	16.4	18.6	
Percent finer (%)	100.0	100.0	100.0	100.0	89.3	72.1	55.7	37.1	

Weight of dry soil (g):

### HYDROMETER ANALYSIS

Weight of dry soil (g): 41.12  
Temperature in (°C) 30.0

Elapsed time (min)	Actual Hydrometer Reading	Correction			Effective depth l (cm)	Diameter D (mm)	Percent passing P (%)
		Temperature	Zero	Hyd. Reagin			
2	3.5	2.3	1.0	6.8	13.30	0.0311	26.3
5	3.0	2.3	1.0	6.3	13.46	0.0197	24.4
15	2.5	2.3	1.0	5.8	13.53	0.0114	22.5
30	2.0	2.3	1.0	5.3	13.61	0.0081	20.5
60	1.0	2.3	1.0	4.3	13.76	0.0050	16.6
250	0.0	2.3	1.0	3.3	13.91	0.0020	12.8
1440	-2.0	2.3	1.0	1.3	14.21	0.0012	5.0



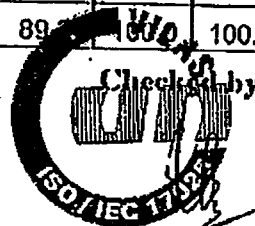
### RESULT

Size (mm)	< 0.002	0.002	0.005	0.05	0.075	0.425	2.00	4.75	9.5	19.0	25.4	50.0
Percent (%)	9.5	6.5	16.5	4.6	18.6	16.4	17.1	10.7	0.0	0.0	0.0	0.0
Percent finer (%)		9.5	16.0	32.5	37.1	55.7	72.1	89.3	100.0	100.0	100.0	100.0

Tested by

*Nguyễn Thị Hồng*

Nguyễn Thị Hồng



VIETAS 100  
Trần Văn Loan

# GRAIN SIZE ANALYSIS

ASTM - D 422 - 63

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
BEN CAO BRIDGE

Borehole : T2  
Sample No : ND2  
Depth (m) : 3.8 + 4.0

Tets No : 686  
Date : 11/7/2006

**SIZE ANALYSIS**

Weight of dry soil (g): 940.0

Size (mm)	50.8	25.4	19.0	9.5	4.75	2.00	0.425	0.075	< 0.075
Weight soil (g)	0.00	421.30	90.00	82.80	47.00	89.00	125.40	76.80	7.70
Percent retained (%)	0.0	44.8	9.6	8.8	5.0	9.5	13.3	8.2	0.8
Percent finer (%)	100.0	55.2	45.6	36.8	31.8	22.3	9.0	0.8	

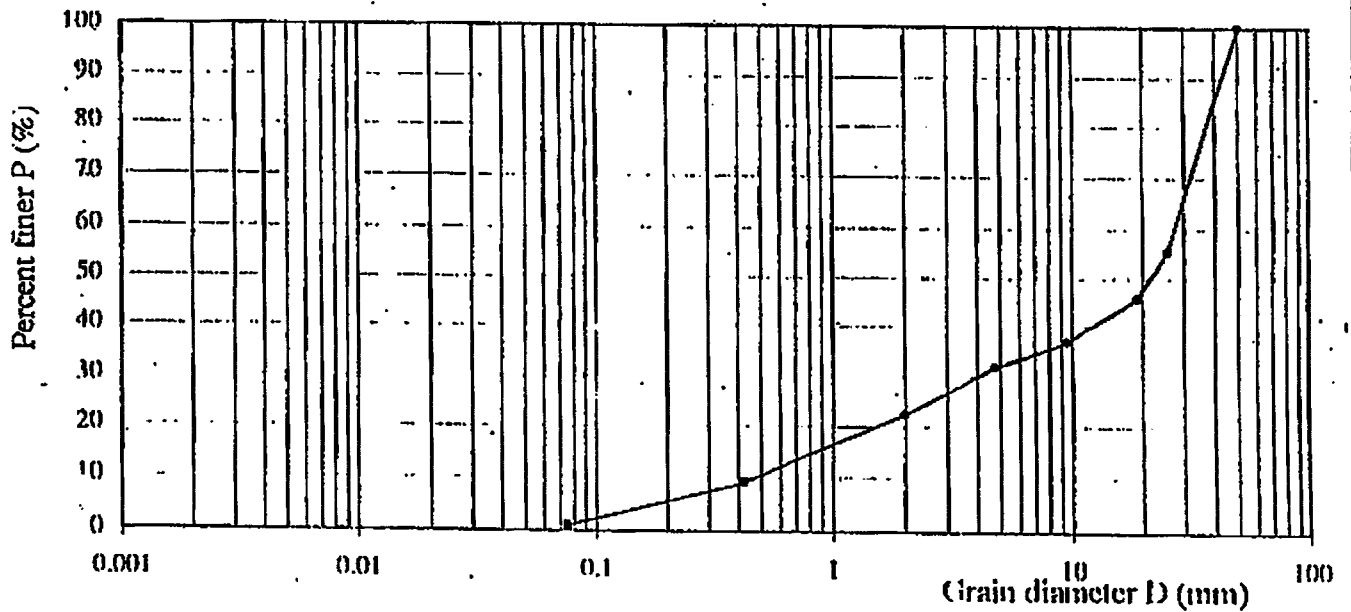
**RESULT**

$D_{60} = 27.0$        $C_u = 60.0$   
 $D_{30} = 4.00$        $C_c = 1.3$   
 $D_{10} = 0.45$

Soil classification ( ASTM - D 2487 )

Group symbol : GW  
Group name : Good aggregate grit

Size (mm)	50.8	25.4	19	9.5	4.75	2	0.425	0.075	< 0.075
Percent retained (%)	0.0	44.8	9.6	8.8	5.0	9.5	13.3	8.2	0.8



Tested by

*Handwritten signature*

Nguyen Thi Hong.

Checked by



VILAS 120  
Tran Van Toan

# ATTERBERG LIMITS

ASTM - D 4318 - 84

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
BEN CAO BRIDGE

Borehole : T2

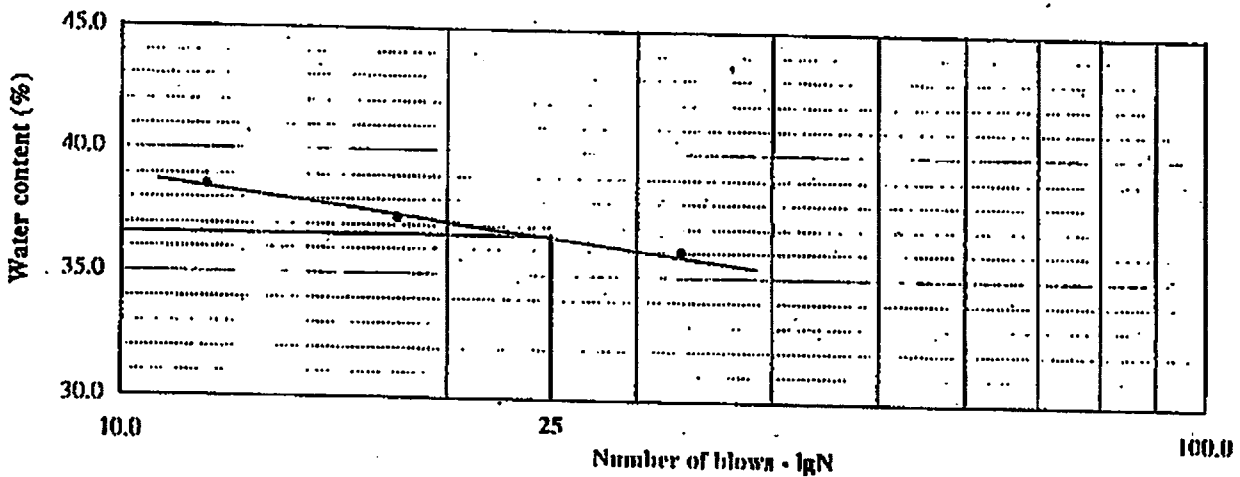
Sample No : ND2

Depth (m): 4.0 + 4.2

Tests No : 681

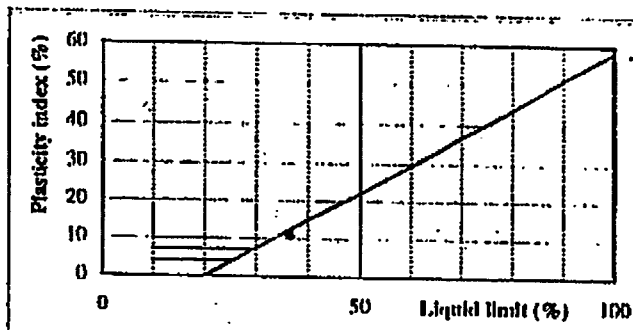
Date : 11/7/2006

Container number	LIQUID LIMIT ( $W_L$ )			PLATIC LIMIT ( $W_P$ )	
	HN08	HN07	C7	HN26	C17
Weight of wet (g)	44.39	47.36	58.23	41.94	52.08
Weight of dry (g)	38.66	40.93	52.75	37.73	49.08
Weight of container (g)	23.79	23.67	37.52	21.77	37.55
Water content (%)	38.6	37.3	36.0	28.4	28.0
Average water content (%)					26.2
Number of blows ( N )	12	18	33		



**RESULT:**

Liquid limit :  $W_L = 36.6$  %  
 Platic limit :  $W_P = 26.2$  %  
 Plasticity index :  $I_P = 10.4$  %



Tested by

*Nguyen Thi Lien*  
 Nguyen Thi Lien

Checked by

**VILAS**  
 ISO 9001:2008  
 VILAS 129  
 Tran Van Loan

# ATTERBERG LIMITS

ASTM - D 4318 - 84

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
BEN CAO BRIDGE

Borehole : T2

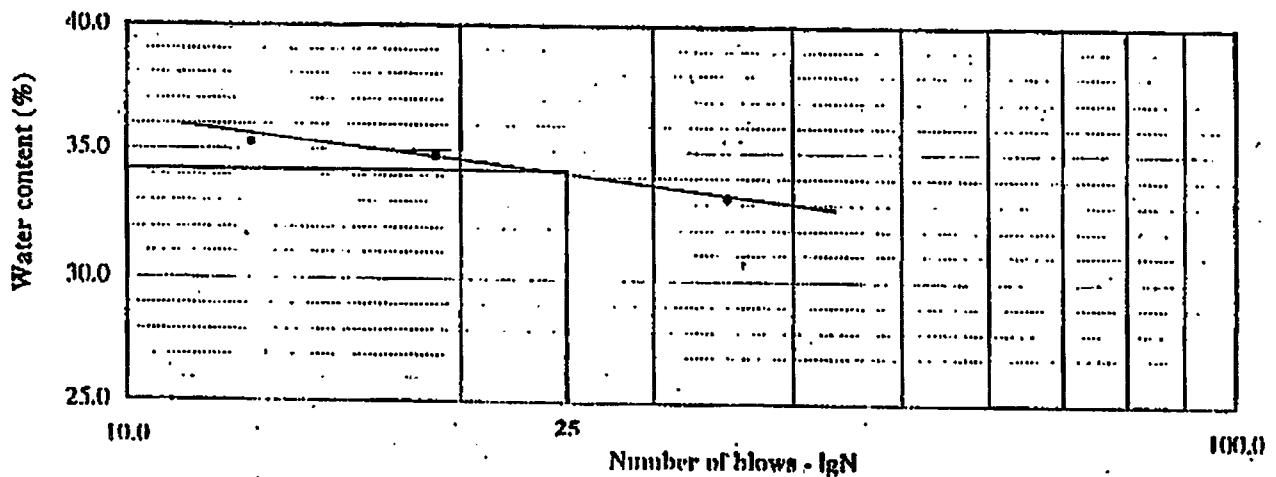
Sample No : ND3

Tets No : 682

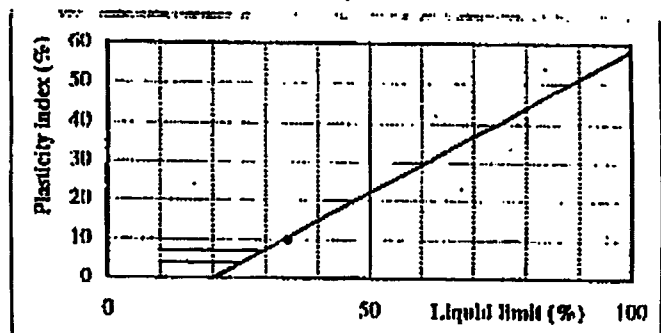
Depth (m): 6.0 + 6.2

Date : 11/7/2008

Container number	LIQUID LIMIT (W <sub>L</sub> )			PLATIC LIMIT (W <sub>P</sub> )	
	HN98	HN39	C2	HN36	C16
Weight of wet (g)	53.83	44.12	56.09	41.00	50.61
Weight of dry (g)	47.66	38.78	51.54	37.59	48.08
Weight of container (g)	30.16	23.41	37.84	23.64	37.84
Water content (%)	35.3	34.7	33.2	24.4	24.7
Average water content (%)	24.6				
Number of blows (N)	13	19	35		



**RESULT:**  
 Liquid limit : W<sub>L</sub> = 34.2 %  
 Platic limit : W<sub>P</sub> = 24.6 %  
 Plasticity index : I<sub>P</sub> = 9.6 %



Tested by

*Nguyen Thi Lien*

Nguyen Thi Lien



VILAS 129  
Tran Van Toan

# ATTERBERG LIMITS

ASTM - D 4318 - 84

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
**BEN CAO BRIDGE**

Borehole : T1

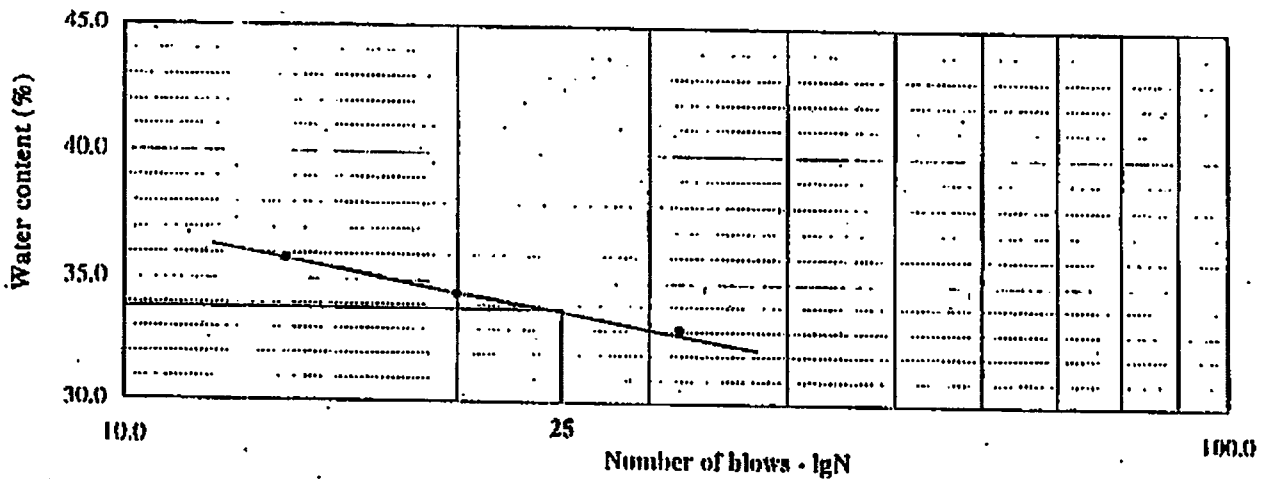
Sample No : ND1

Depth (m): 1.8 + 2.0

Tets No : 885

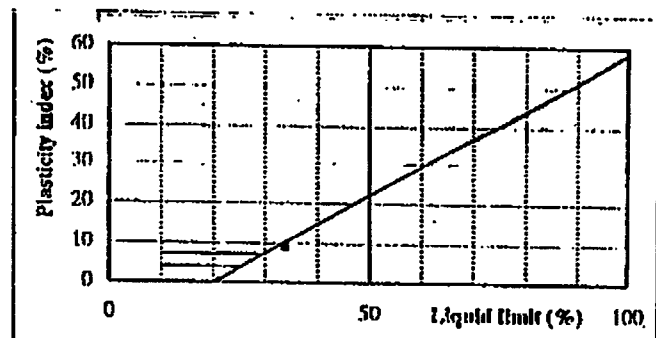
Date : 11/7/2006

Container number	LIQUID LIMIT (W <sub>L</sub> )			PLATIC LIMIT (W <sub>p</sub> )	
	HN40	C18	C8	HN31	C12
Weight of wet (g)	45.68	56.18	53.91	40.81	50.61
Weight of dry (g)	39.69	51.28	49.79	37.22	48.07
Weight of container (g)	22.95	37.05	37.32	23.09	37.90
Water content (%)	35.8	34.4	33.0	25.4	25.0
Average water content (%)	25.2				
Number of blows (N)	14	20	32		



**RESULT:**

Liquid limit :  $W_L = 33.8$  %  
 Platic limit :  $W_p = 25.2$  %  
 Plasticity index :  $I_p = 8.6$  %



Tested by

*Nguyen Thi Lien*  
 Nguyen Thi Lien



VILAS 128  
 Tran Phu Toan

# DIRECT SHEAR TEST

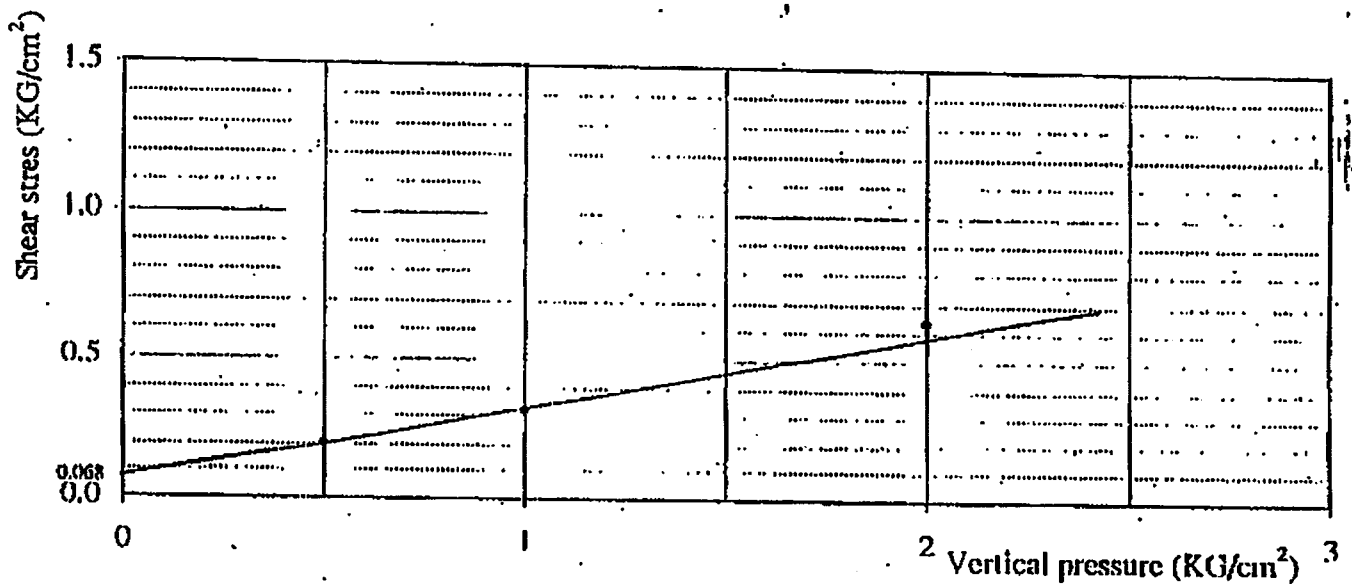
TCVN 4199 - 95

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES

BEN CAO BRIDGE

Borehole :	M2	Tests No :	681
Sample No :	ND2	Date :	03/7/2006
Depth (m) :	4.0 - 4.2	Method :	Unconsolidated - Undrained

Vertical pressure (kG/cm <sup>2</sup> )	0.5	1.0	2.0	CALCULATE
Max reading	10.0	16.0	32.0	$\lg \phi = \frac{0.460 - 0.199}{1.5 - 0.5} = 0.262$
Composite Correction Shear stress $\tau$ (kG/cm <sup>2</sup> )	0.01985 0.199	0.01985 0.318	0.01985 0.635	<p style="text-align: center;">RESULT</p> Internal friction angle $\phi$ (°) = 14°41' Cohesion C (kG/cm <sup>2</sup> ) = 0.068



Tested by  
  
 Nguyen Thi Lien

Checked by  
  
 Tran Xuan Loan  
 VIAS 122



# DIRECT SHEAR TEST

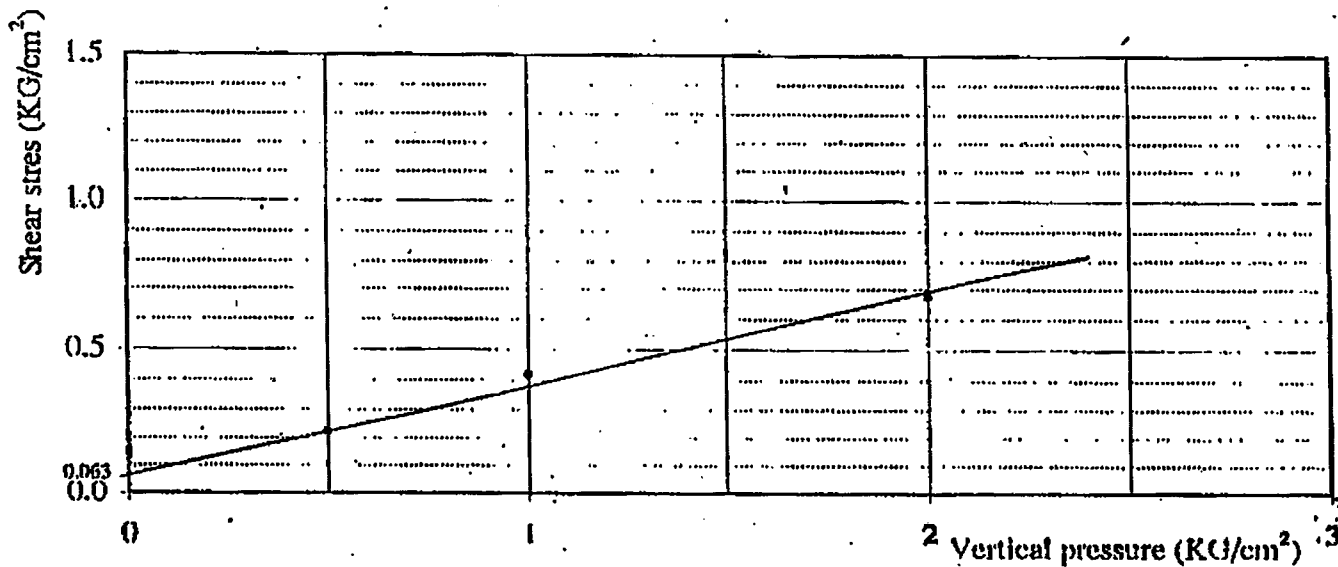
TCVN 4199 - 95

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES

BEN CAO BRIDGE

Borehole :	M2	Tests No :	682
Sample No :	ND3	Date :	03/7/2008
Depth (m) :	6.0 + 6.2	Method :	Unconsolidated - Undrained

Vertical pressure (kG/cm <sup>2</sup> )	0.5	1.0	2.0	CALCULATE
Max reading	11.0	21.0	34.0	$\lg \varphi = \frac{0.530 - 0.218}{1.5 - 0.5} = 0.312$
Composite Correction Shear stress $\tau$ (kG/cm <sup>2</sup> )	0.01985 0.218	0.01985 0.417	0.01985 0.675	<b>RESULT</b> Internal friction angle $\varphi$ (°) = 17°20' Cohesion C (kG/cm <sup>2</sup> ) = 0.063



Tested by

*Nguyen Thi Lien*

Nguyen Thi Lien



VILAS 120  
Tran Van Toan

# DIRECT SHEAR TEST

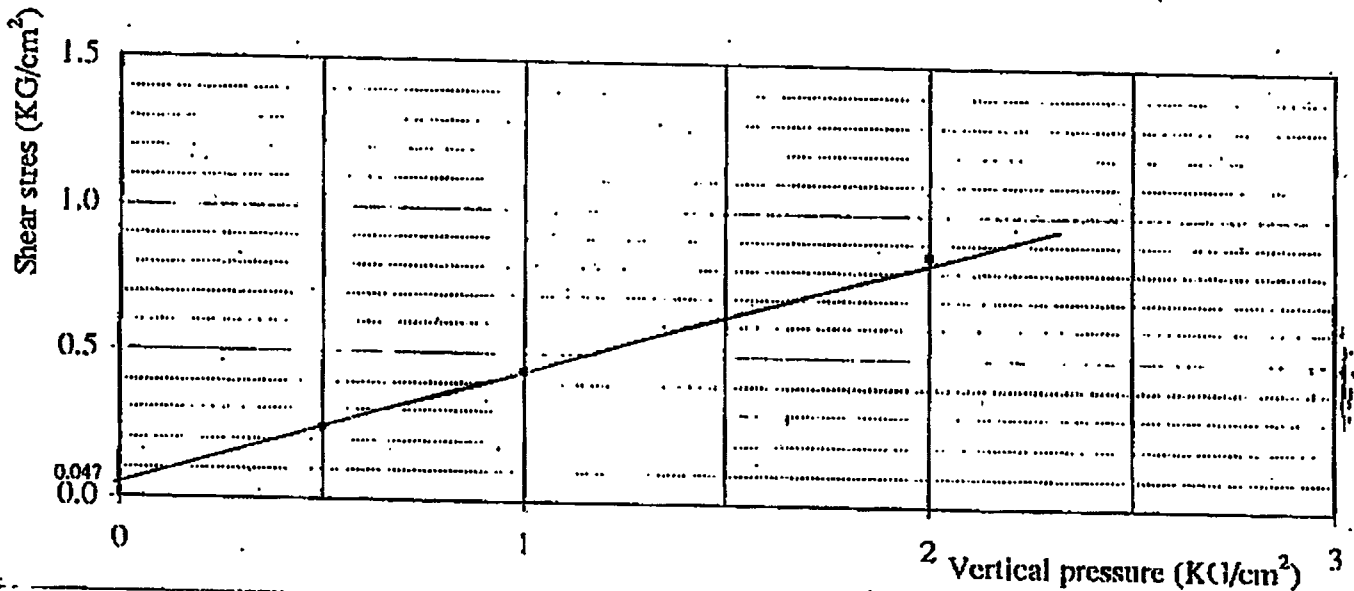
TCVN 4199 - 95

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES

BEN CAO BRIDGE

Borehole :	T1	Tests No :	685
Sample No :	ND2	Date :	03/7/2006
Depth (m) :	3.8 + 4.0	Method :	Unconsolidated - Undrained

Vertical pressure (kG/cm <sup>2</sup> )	0.5	1.0	2.0	CALCULATE
Max reading	12.0	22.0	43.0	$\lg \varphi = \frac{0.620 - 0.238}{1.5 - 0.5} = 0.382$
Composite Correction Shear stress $\tau$ (kG/cm <sup>2</sup> )	0.01985 0.238	0.01985 0.437	0.01985 0.854	<b>RESULT</b> Internal friction angle $\varphi$ (°) = 20°54' Cohesion C (kG/cm <sup>2</sup> ) = 0.047



Tested by

*Nguyen Thi Lien*

Nguyen Thi Lien



VILAS 120 Tran

# OEDOMETER COMPRESSION TEST

TCVN 4200 - 95

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
BEN CAO BRIDGE

Borehole : T2

Sample No : ND2

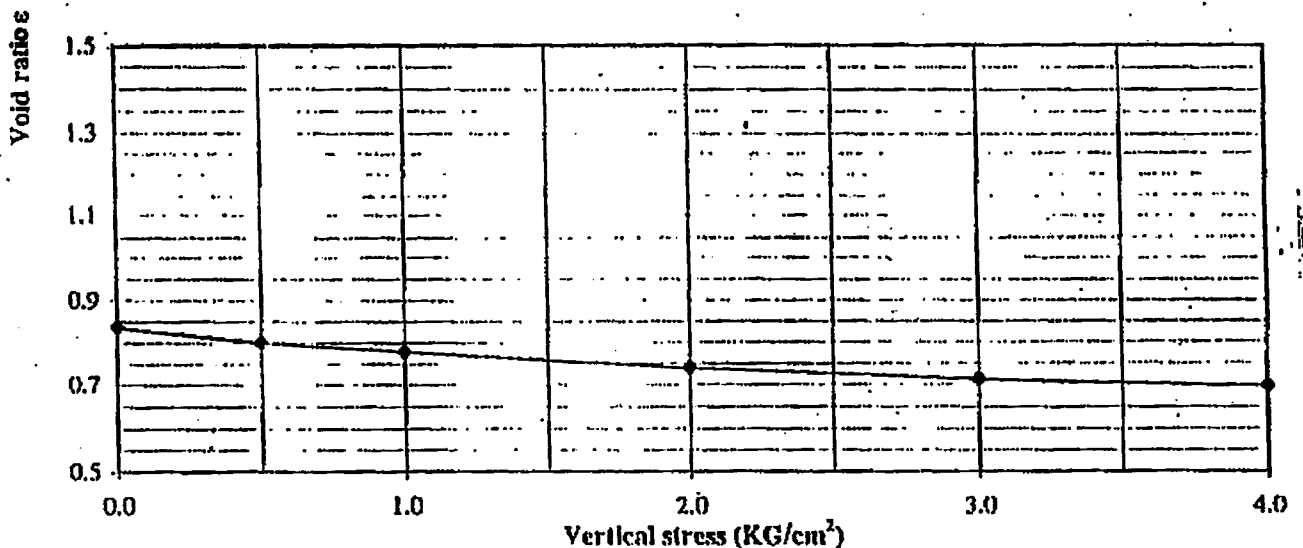
Depth (m) : 4.0 + 4.2

Tets No : 681

Date : 05/7/2006

W (%)	$\gamma_w$ (g/cm <sup>3</sup> )	$\gamma_d$ (g/cm <sup>3</sup> )	$\rho$ (g/cm <sup>3</sup> )	S (%)	n (%)	$\epsilon_o$	H (cm)	$N_o$
31.0	1.920	1.465	2.690	99.9	45.5	0.836	2.00	10

Vertical stress (kg/cm <sup>2</sup> )	0.0	0.5	1.0	2.0	3.0	4.0
Dial reading (0.01mm)						
2 h		42.0	70.0	113.5	144.0	166.0
24 h						169.0
Final reading (0.01mm)		42.8	71.3	115.6	146.6	169.0
Deformation of compr. (0.01mm)		2.0	6.0	9.0	11.0	16.0
Deformation of sample $\Delta H$ (0.01mm)		40.8	65.3	106.6	135.6	153.0
Change of void ratio $\Delta e$		0.037	0.060	0.098	0.124	0.140
Void ratio $e_p$	0.876	0.798	0.776	0.738	0.711	0.695
Index of compression $a$ (cm <sup>2</sup> /KG)		0.075	0.045	0.038	0.027	0.016



Tested by

*Handwritten signature*

Nguyen Thi Hong



VILAS 129  
Tran Van Toan

# OEDOMETER COMPRESSION TEST

TCVN 4200 - 95

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
BEN CAO BRIDGE

Borehole : T2

Sample No : ND3

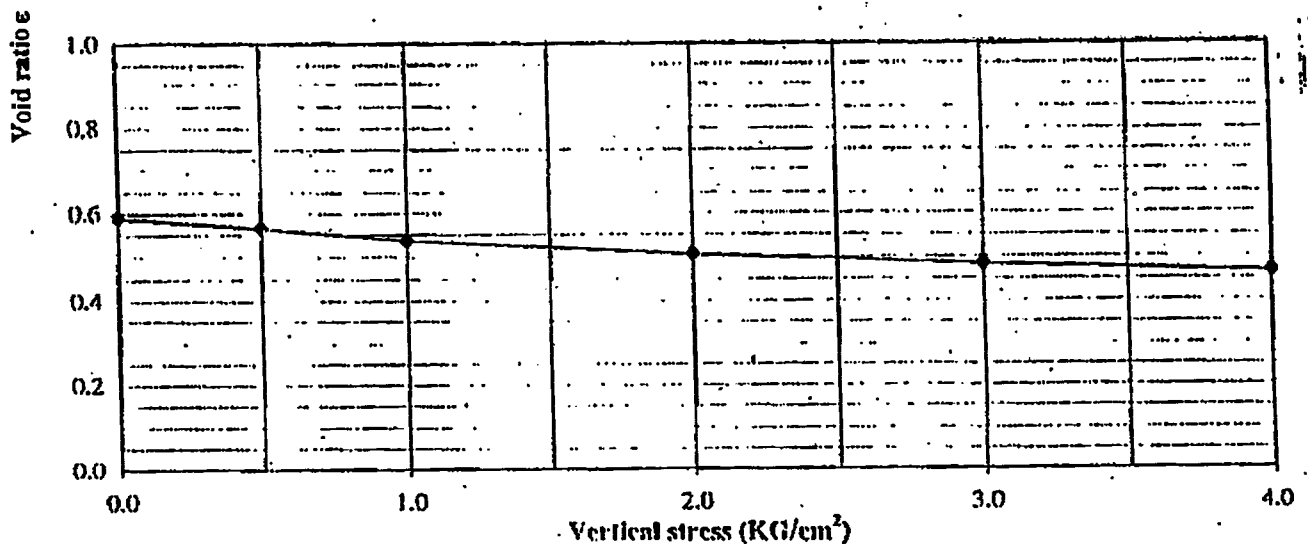
Depth (m) : 6.0 + 6.2

Tets No : 682

Date : 05/7/2006

W (%)	$\gamma_w$ (g/cm <sup>3</sup> )	$\gamma_d$ (g/cm <sup>3</sup> )	$\rho$ (g/cm <sup>3</sup> )	S (%)	n (%)	$\epsilon_0$	H (cm)	$N_0$
21.0	2.000	1.084	2.090	98.9	37.0	0.588	2.00	11

Vertical stress (kg/cm <sup>2</sup> )	0.0	0.5	1.0	2.0	3.0	4.0
Dial reading (0.01mm)						
2 h		33.0	73.0	116.0	146.0	169.0
24 h						171.0
Final reading (0.01mm)		33.4	73.9	117.4	147.7	171.0
Deformation of compr. (0.01mm)		2.0	6.0	10.0	13.0	16.5
Deformation of sample $\Delta H$ (0.01mm)		31.4	67.9	107.4	134.7	154.5
Change of void ratio $\Delta e$		0.025	0.054	0.085	0.107	0.123
Void ratio $e_p$	0.588	0.563	0.534	0.503	0.481	0.466
Index of compression $a$ (cm <sup>2</sup> /KG)		0.050	0.058	0.031	0.022	0.016



Tested by

*Handwritten signature*

Nguyen Thi Hong



VILAS 129  
Tran Van Toan

# OEDOMETER COMPRESSION TEST

TCVN 4200 - 95

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
BEN CAO BRIDGE

Borehole : T1

Sample No : ND1

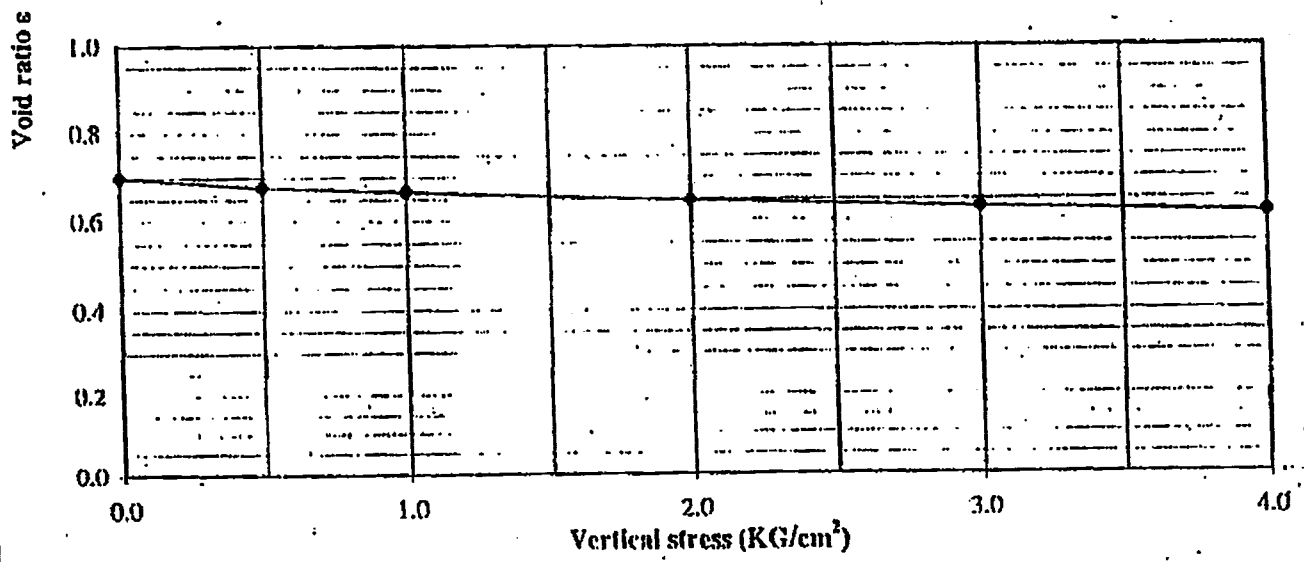
Depth (m) : 1.8 + 2.0

Tets No : 685

Date : 05/7/2006

W (%)	$\gamma_w$ (g/cm <sup>3</sup> )	$\gamma_d$ (g/cm <sup>3</sup> )	$\rho$ (g/cm <sup>3</sup> )	S (%)	n (%)	$\epsilon_o$	H (cm)	N <sub>o</sub>
21.8	1.927	1.585	2.690	83.2	41.1	0.698	2.00	12

Vertical stress (kg/cm <sup>2</sup> )	0.0	0.5	1.0	2.0	3.0	4.0
Initial reading (0.01mm)						
2 h		28.0	43.5	72.0	94.0	113.0
24 h						115.0
Final reading (0.01mm)		28.5	44.3	73.3	95.7	115.0
Deformation of compr. (0.01mm)		3.0	7.0	11.0	14.0	16.0
Deformation of sample $\Delta H$ (0.01mm)		25.5	37.3	62.3	81.7	99.0
Change of void ratio $\Delta e$		0.022	0.032	0.053	0.069	0.084
Void ratio $e_p$	0.698	0.676	0.666	0.645	0.628	0.614
Index of compression $a$ (cm <sup>2</sup> /KG)		0.043	0.020	0.021	0.016	0.015



Tested by

*Handwritten signature*

Nguyen Thi Hong

Checked by



VILAS 129  
Thị Văn Toàn

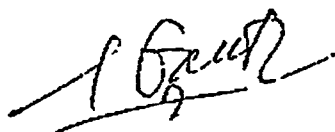
TEST FOR UNCONFINED COMPRESSIVE STRENGTH OF ROCK  
(22 TCN 57 - 84)

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES

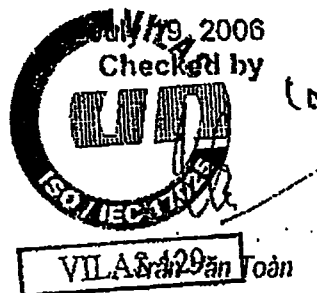
BEN CAO BRIDGE

	T2	T2	T2
Bore hole			
Sample No.	U6	U7	U8
Depth (m)	11,0-11,1	13,0-13,15	14,8-15,0
<b>Test Items</b>			
Dry unconfined compressive strength $\sigma_n$ (kG/cm <sup>2</sup> )	550,0	565,0	578,0
Saturated unconfined compressive strength $\sigma_{bh}$ (kG/cm <sup>2</sup> )	395,0	390,0	405,0
Index of softening k	0,72	0,69	0,70
Natural unit weight $\gamma_w$ (g/cm <sup>3</sup> )	2,381	2,385	2,379
Specific gravity $\Delta$ (g/cm <sup>3</sup> )	2,695	2,691	2,700

Tested by



Nguyễn Văn Hạnh



**TEST FOR UNCONFINED COMPRESSIVE STRENGTH OF ROCK**

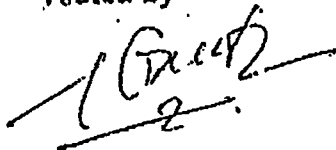
(22 TCN 57 - 84)

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES

**BEN CAO BRIDGE**

Bore hole	T1	T1	T1
Sample No.	U4	U5	U6
Depth (m)	7,7-8,0	9,0-9,3	11,0-11,15
<b>Test Items</b>			
Dry unconfined compressive strength $\sigma_u$ (kG/cm <sup>2</sup> )	505,0	515,0	537,0
Saturated unconfined compressive strength $\sigma_{bh}$ (kG/cm <sup>2</sup> )	355,0	358,0	379,0
Index of softening k	0,70	0,70	0,71
Natural unit weight $\gamma_w$ (g/cm <sup>3</sup> )	2,395	2,390	2,394
Specific gravity $\Delta$ (g/cm <sup>3</sup> )	2,700	2,698	2,695

Tested by



Nguyễn Văn Hạnh

July 19, 2006

Checked by



VILAS 129

BORING LOG

ENGINEERING		THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES TECHNICAL DESIGN PHASE				BRIDGES OF LAO CAI PROVINCE THANH PHU BRIDGE																		
Bore hole		LK P2		Co-or. X= Y=		Station: km24+018.40																		
Elev.: +78.50		Elev. of underwater level: +0.00		Drilling date:		26/08/2008 - 28/08/2008																		
Contractor:		Nguyen Cong Sinh		Checker:		Tran Viet Han																		
Layer	Elev. (m)	Depth (m)	Thickness (m)	PROFILE Scale 1/100.	DESCRIPTION	STANDARD PENETRATION TEST (SPT)						Sampling depth for test (m)												
						Depth (m)	Blow No./15cm			N <sub>30cm</sub>	Chart													
N1	N2	N3	N <sub>30cm</sub>	0	10		20	30	40		50	N												
1	71.30	7.20	7.20		It is mixture of cobble, gravel, grit, sand (with big diameter of cobble) mixed with rolling boulder. It is in blackish grey, yellowish-whitish grey colour, saturate state and closed structure (Positions for SPT N1 >50 to blow into rolling boulder).	1.00-1.45	>50																	
						2.30-2.76	12	18	30	48														
						3.00-3.45	13	18	29	46														
						4.20-4.65	15	23	27	50														
						5.00-5.45	19	25	>50	>50														
						6.00-6.45	20	24	>50	>50														
2	68.30	12.20	5.00		Granite is in leaden-grey, whitish grey with black spotted colour. Hardness is in level VII-VIII.																			



BORING LOG

ENGINEERING		THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES TECHNICAL DESIGN PHASE				BRIDGES OF LAO CAI PROVINCE																	
Bore hole		LK_P1		Co-ord. X= Y=		Station: km23+983.40																	
Elev.: +82.00		Elev. of underwater level: +0.00		Drilling date:		28/06/2006 - 30/06/2006																	
Contractor:		Nguyễn Công Sinh		Checker:		Trần Việt Mạnh																	
Layer	Elev. (m)	Depth (m)	Thickness (m)	PROFILE Scale 1/100	DESCRIPTION	STANDARD PENETRATION TEST (SPT)						Sampling depth for test (m)											
						Depth (m)	Blow No./15cm			N <sub>60cm</sub>	Chart												
							N1	N2	N3			0	10	20	30	40	50	N					
1	75.10	6.90	6.90		It is mixture of cobble, gravel, grit, sand (with big diameter of cobble) mixed with rolling boulder. It is in blackish grey, yellowish-whitish grey colour, saturate state and closed structure (Positions for SPT N1 >50 to blow into rolling boulder).	1.00-1.45	>50																
						2.00-2.45	13	20	25	45													
						3.00-3.45	14	21	24	45													
						4.00-4.45	14	23	23	46													
						5.00-5.45	16	22	25	47													
2	70.10	11.90	5.00		Granite is in leaden-grey, whitish grey with black spotted colour. Hardness is in level VII-VIII.	6.00-6.45	20	24	>50	>50													

# TEST FOR UNCONFINED COMPRESSIVE STRENGTH OF ROCK

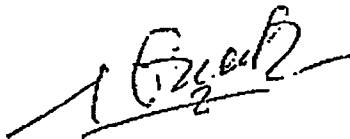
(22 TCN 57 - 84)

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES

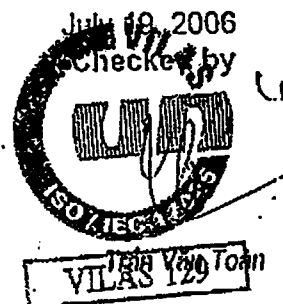
## THANH PU BRIDGE

Bore hole		PO1	PO1	PO1
Sample No.		U2	U3	U4
Depth (m)		4,0-4,25	8,1-8,35	11,0-11,25
<b>Test items</b>				
Dry unconfined compressive strength	$\sigma_n$ (kG/cm <sup>2</sup> )	805,0	810,0	817,0
Saturated unconfined compressive strength	$\sigma_{bh}$ (kG/cm <sup>2</sup> )	642,0	650,0	660,0
Index of softening	k	0,80	0,80	0,81
Natural unit weight	$\gamma_w$ (g/cm <sup>3</sup> )	2,410	2,400	2,410
Specific gravity	$\Delta$ (g/cm <sup>3</sup> )	2,720	2,718	2,718

Tested by



Nguyễn Văn Hạnh



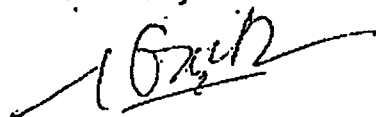
**TEST FOR UNCONFINED COMPRESSIVE STRENGTH OF ROCK**  
(22 TCN 57 - 84)

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES

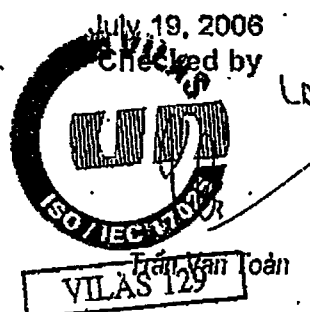
**THANH PU BRIDGE**

Bore hole	PO2	PO2	MO2
Sample No	U3	U4	U4
Depth (m)	9,0-9,35	11,0-11,25	13-13,25
<b>Test Items</b>			
Dry unconfined compressive strength $\sigma_n$ (kG/cm <sup>2</sup> )	770,0	764,0	780,0
Saturated unconfined compressive strength $\sigma_{bh}$ (kG/cm <sup>2</sup> )	625,0	612,0	630,0
Index of softening k	0,81	0,80	0,81
Natural unit weight $\gamma_w$ (g/cm <sup>3</sup> )	2,390	2,390	2,391
Specific gravity $\Delta$ (g/cm <sup>3</sup> )	2,718	2,720	2,720

Tested by



Nguyễn Văn Hạnh



No: 100706.04.1/CLB

**SUMMARY OF TEST RESULTS**

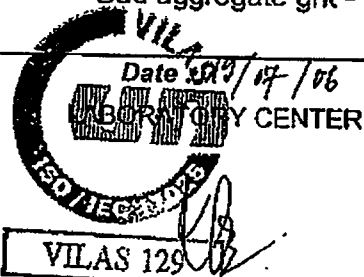
THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
**THANH PHU BRIDGE**

Borehole :		P02	
Sample No :		PH1	PH2
Depth (m): m		2.30 + 2.55	4.20 + 4.45
Test No.		757	758
Grain size analysis	P %		
Percent finer (%)	50.8 (mm)	100.0	100.0
	25.4 (mm)	51.2	60.1
	19.0 (mm)	40.3	50.8
	9.5 (mm)	21.3	38.2
	4.75 (mm)	10.5	21.0
	2.00 (mm)	5.2	8.9
	0.425 (mm)	0.5	0.6
	0.075 (mm)	0.3	0.3
	0.050 (mm)		
	0.005 (mm)		
0.002 (mm)			
Natural water content	W %		
Natural unit weight	$\gamma_w$ g/cm <sup>3</sup>		
Dry unit weight	$\gamma_k$ g/cm <sup>3</sup>		
Specific gravity	$\rho$ g/cm <sup>3</sup>	2.670	2.670
Coefficient of uniformity	$C_u$	6.90	11.5
Coefficient of gradation	$C_g$	1.40	0.90
In Dry condision	$\alpha_k$		
In Saturation condision	$\alpha_w$		
Void Ratio	$e_0$		
Porosity	n %		
Degree of Saturation	S %		
Liquid Limits	Wl %		
Plastic Limits	Wp %		
Plasticity Index	Ip %		
Internal friction angle	$\varphi^\circ$		
Cohesion	C KG/cm <sup>2</sup>		
Compressibility Index	$a_{1-2}$ cm <sup>2</sup> /KG		
Soil classification ASTM - D 2487	Good aggregate grit - GW	Bad aggregate grit - GP	

COLECTED BY

*Handwritten signature*

Eng. Nguyen Thi Khanh Ha



# GRAIN SIZE ANALYSIS

ASTM - D 422 - 63

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
THANH PHU BRIDGE

Borehole : P02  
Sample No : PH1  
Depth (m): 2.3 + 2.56

Tets No : 757  
Date : 13/7/2006

SIZE ANALYSIS

Weight of dry soil (g): 2130.0

Size (mm)	50.8	25.4	19.0	9.5	4.75	2.00	0.425	0.075	< 0.075
Wt. Soil retained (g)	0.0	1040.0	230.6	405.3	230.1	114.3	100.0	3.2	6.5
Percent retained (%)	0.0	48.8	10.8	19.0	10.8	5.4	4.7	0.2	0.3
Percent finer (%)	100.0	51.2	40.3	21.3	10.5	5.2	0.5	0.3	

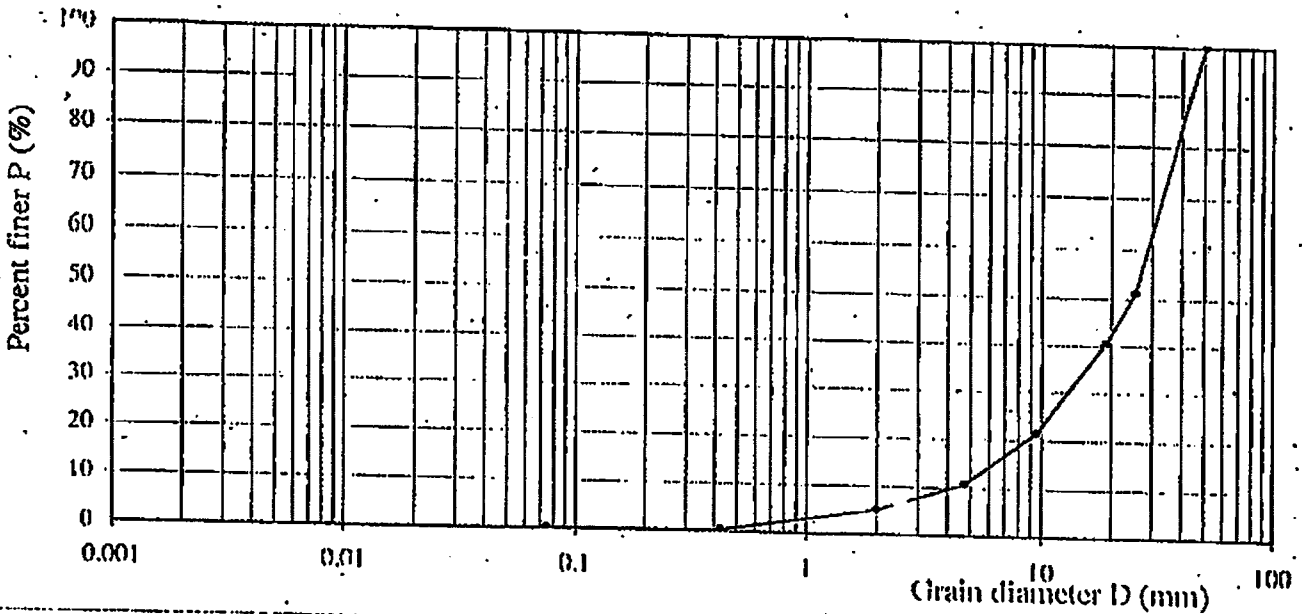
RESULT

$D_{60} = 29.0$        $C_u = 6.9$   
 $D_{30} = 13.0$        $C_c = 1.4$   
 $D_{10} = 4.2$

Soil classification (ASTM - D 2487)

Group symbol : GW  
Group name : Good aggregate-grit

Size (mm)	50.8	25.4	19.0	9.5	4.75	2.0	0.425	0.075	< 0.075
Percent retained (%)	0.0	48.8	10.8	19.0	10.8	5.4	4.7	0.2	0.3



Tested by

*Handwritten signature*

Nguyen Thi Hong



VILAS 129  
Tran Van Toan

# GRAIN SIZE ANALYSIS

ANIM - D 422 - 63

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
THANH PHU BRIDGE

Borehole : M01  
Sample No : PH2  
Depth (m) : 4.0 ± 4.45

Tests No : 758  
Date : 13/7/2006

**SIZE ANALYSIS**

Weight of dry soil (g): 2154.0

Size (mm)	50.8	25.4	19.0	9.5	4.75	2.00	0.425	0.075	< 0.075
Wt. Soil retained (g)	0.00	860.20	200.40	270.80	370.10	260.00	180.30	5.20	7.00
Percent retained (%)	0.0	39.9	9.3	12.6	17.2	12.1	8.4	0.2	0.3
Percent finer (%)	100.0	60.1	50.8	38.2	21.0	8.0	0.6	-0.3	

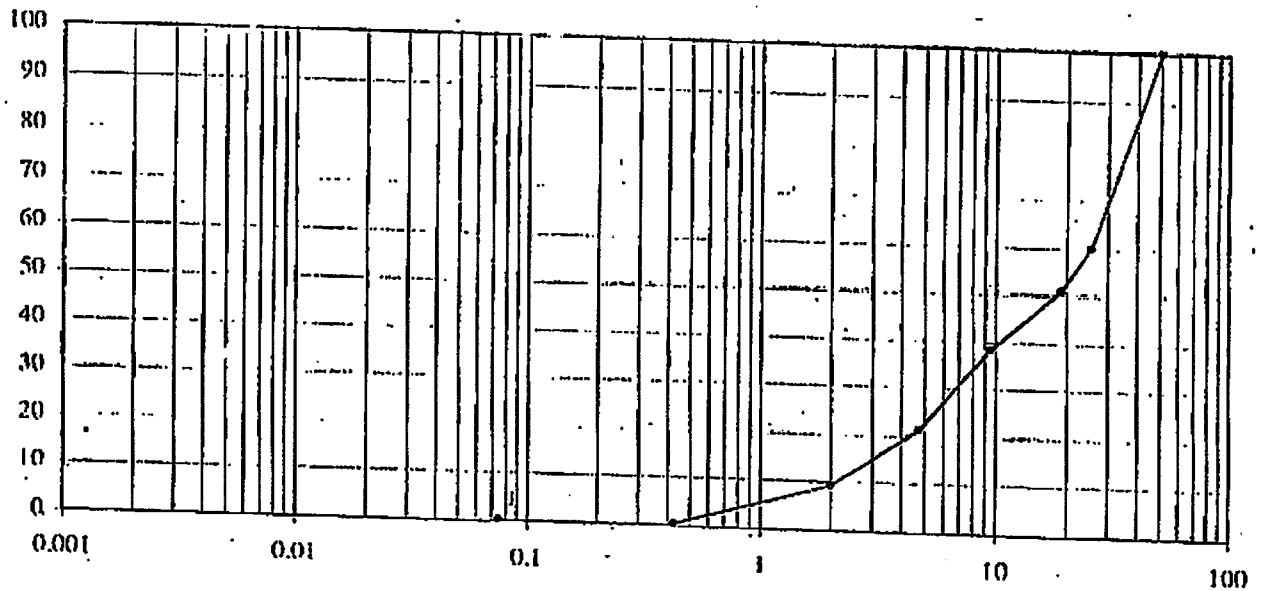
**RESULT**

$D_{60} = 25.40$        $C_u = 11.5$   
 $D_{30} = 7.00$        $C_c = 0.9$   
 $D_{10} = 2.20$

Soil classification (ASTM - D 2487)

Group symbol : GP  
Group name : Bad aggregate grit

Size (mm)	50.8	25.4	19.0	9.5	4.75	2.0	0.425	0.075	< 0.075
Percent retained (%)	0.0	39.9	9.3	12.6	17.2	12.1	8.4	0.2	0.3



Tested by

*Handwritten signature*

Nguyen Thi Hong



VILAS 129  
Tran Van Toan

BORING LOG

ENGINEERING		THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES TECHNICAL DESIGN PHASE				BRIDGES OF LAO CAI PROVINCE																		
Bore hole		LK P01		Co-or. X= Y=		Station: Km 15+986.18																		
Elev.: +44.36		Elev. of underwater level: +0.00		Drilling date:		16/06/2008 - 19/06/2008																		
Corrector:		Nguyen Cong Sinh		Checker:		Tran Viet Han																		
Layer	Elev. (m)	Depth (m)	Thickness (m)	PROFILE Scale 1/100	DESCRIPTION	STANDARD PENETRATION TEST (SPT)							Sampling depth for test (m)											
						Depth (m)	Blow No./15cm			N30cm	Chart													
							N1	N2	N3			0	10	20	30	40	50	N						
1	42.46	1.90	1.90		Sandy clay is blackish gray mixed with grit, slightly stiff.	1.10-1.55	1	2	2	4														
2	34.16	10.20	8.30		It is mixture of rolling boulder, cobble, grit mixed with clay-sand in blackish gray colour, medium closed structure. Locations for SPT >50 to blow into rolling boulders	2.40-2.85	2	2	>80	>50									PH1 2.20-2.40					
						3.40-3.85	4	5	6	11											PH2 4.30-4.60			
						4.50-4.95	4	7	>50	>50													PH3 6.30-6.50	
						5.50-5.95	5	6	4	10														
						6.50-6.95	4	5	>50	>50														
						7.50-7.95	>50																	
4	29.36	15.00	4.80		Sandstone is blackish grey, weathered, cracked and crushed. Hardness is in level V.	8.50-8.95	8	8	8	14									U4 12.00-12.25					
						9.50-9.95	8	>50														U5 14.00-14.25		

BORING LOG

ENGINEERING		THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES TECHNICAL DESIGN PHASE				BRIDGES OF LAO CAI PROVINCE						
Bore hole		LK_P02		Co-ord. X= Y=		Station: Km 18+018.18						
Elev.: +42.75		Elev. of underwater level: +0.00		Drilling date:		03/07/2006 - 04/07/2006						
Corrector:		Nguyen Cong Sinh		Checker:		Tran Viet Han						
Layer	Elev. (m)	Depth (m)	Thickness (m)	PROFILE Scale 1/100	DESCRIPTION	STANDARD PENETRATION TEST (SPT)					Sampling depth for test (m)	
						Depth (m)	Blow No./15cm			N <sub>60</sub> cm		Chart
							N1	N2	N3			0 10 20 30 40 50 N
1	41.26	1.80	1.80		Sandy clay is blackish grey mixed with grit, slightly stiff.	1.60-1.45	2	2	2	4		
3	37.25	5.50	4.00		Grit mixes with clay-sand in blackish grey, yellowish grey, closed structure.	2.00-2.45	10	15	18	33		PH1 2.00-2.45
						3.00-3.45	12	18	17	35		
						4.00-4.45	15	20	25	45		
						5.00-5.45	17	22	27	49		
4	32.23	10.50	5.00		Sandstone is blackish grey, weathered, cracked and crushed. Hardness is in level V.						U2 12.00-12.25	



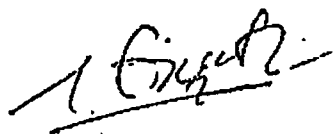
**TEST FOR UNCONFINED COMPRESSIVE STRENGTH OF ROCK**  
(22 TCN 57 - 84)

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES

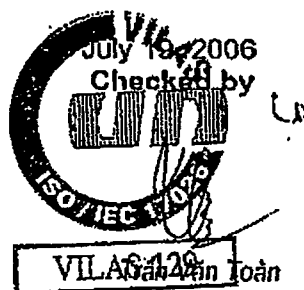
**BAN XEO BRIDGE**

Bore hole		P01	P01	P02
Sample No.		U1	U5	U2
Depth (m)		12-12,25	14-14,25	7,25-7,5
<b>Test items:</b>				
Dry unconfined compressive strength	$\sigma_{11}$ (kG/cm <sup>2</sup> )	121,0	125,0	115,0
Saturated unconfined compressive strength	$\sigma_{bh}$ (kG/cm <sup>2</sup> )	75,0	80,0	79,0
Index of softening	k	0,62	0,64	0,69
Natural unit weight	$\gamma_w$ (g/cm <sup>3</sup> )	2,350	2,351	2,371
Specific gravity	$\Delta$ (g/cm <sup>3</sup> )	2,685	2,688	2,680

Tested by



Nguyễn Văn Hạnh



No: 260606.01.1/CLD

**SUMMARY OF TEST RESULTS**

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES

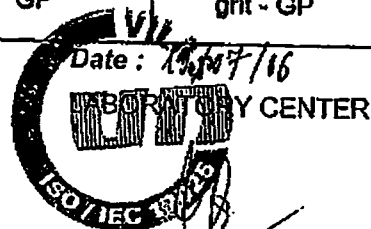
BAN XEO BRIDGE

Borehole :		P01.			P02
Sample No :		PH1	PH2	PH3	PH1
Depth (m):	m	2.00 + 2.25	4.30 + 4.55	6.30 + 6.55	2.20 + 2.45
Test No.		616	617	618	767
Grain size analysis		P %			
Percent finer (%)	50.8 (mm)	100.0	100.0	100	59.8
	25.4 (mm)	41.8	38.2	42.9	54.4
	19.0 (mm)	7.4	6.1	1.8	53.8
	9.5 (mm)	5.4	4.3	1.1	51.3
	4.75 (mm)	4.4	3.5	0.7	47.5
	2.00 (mm)	2.7	3.0	0.5	44.1
	0.425 (mm)	1.5	2.1	0.1	36.0
	0.075 (mm)	0.1	0.1		26.5
	0.050 (mm)				
	0.005 (mm)				
0.002 (mm)					
Natural water content	W %				
Natural unit weight	$\gamma_w$ g/cm <sup>3</sup>				
Dry unit weight	$\gamma_k$ g/cm <sup>3</sup>				
Specific gravity	$\rho$ g/cm <sup>3</sup>	2 670	2.670	2.67	2.71
Coefficient of uniformity	$C_u$	1.6	1.6	1.6	
Coefficient of gradation	$C_c$	0.8	0.8	0.9	
In Dry condision	$\alpha_k$				
In Saturation condision	$\alpha_w$				
Void Ratio	$e_0$				
Porosity	n %				
Degree of Saturation	S %				
Liquid Limits	Wl %				
Plastic Limits	Wp %				
Plasticity Index	Ip %				
Internal friction angle	$\psi^\circ$				
Cohesion	C KG/cm <sup>2</sup>				
Compressibility Index	$a_{1-2}$ cm <sup>2</sup> /KG				
Soil classification ASTM - D 2487		Bad aggregate grit - GP	Bad aggregate grit - GP	Bad aggregate grit - GP	Clay grit - GC

COLECTED BY

*NCH*

Eng. Nguyen Thi Khanh Ha



VILAS 129

Eng. Tran Van Toan

# GRAIN SIZE ANALYSIS

ASTM - D 422 - 63.

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
BAN XEO BRIDGE

Borehole : P01

Sample No : PH1

Depth (m): 2.00 + 2.25

Tets No : 616

Date : 30/6/2006

SIZE ANALYSIS

Weight of dry soil (g): 2074.0

Size (mm)	50.8	25.4	19.0	9.5	4.75	2.00	0.425	0.075	< 0.075
Weight soil (g)	0.00	1207.00	733.67	42.61	20.64	34.18	24.81	28.64	2.45
Percent retained (%)	0.0	58.2	34.4	2.1	1.0	1.6	1.2	1.4	0.1
Percent finer (%)	100.0	41.8	7.4	5.3	4.3	2.7	1.5	0.1	

RESULT

$D_{60} = 31.0$

$C_u = 1.6$

Soil classification (ASTM - D 2487)

$D_{30} = 22.0$

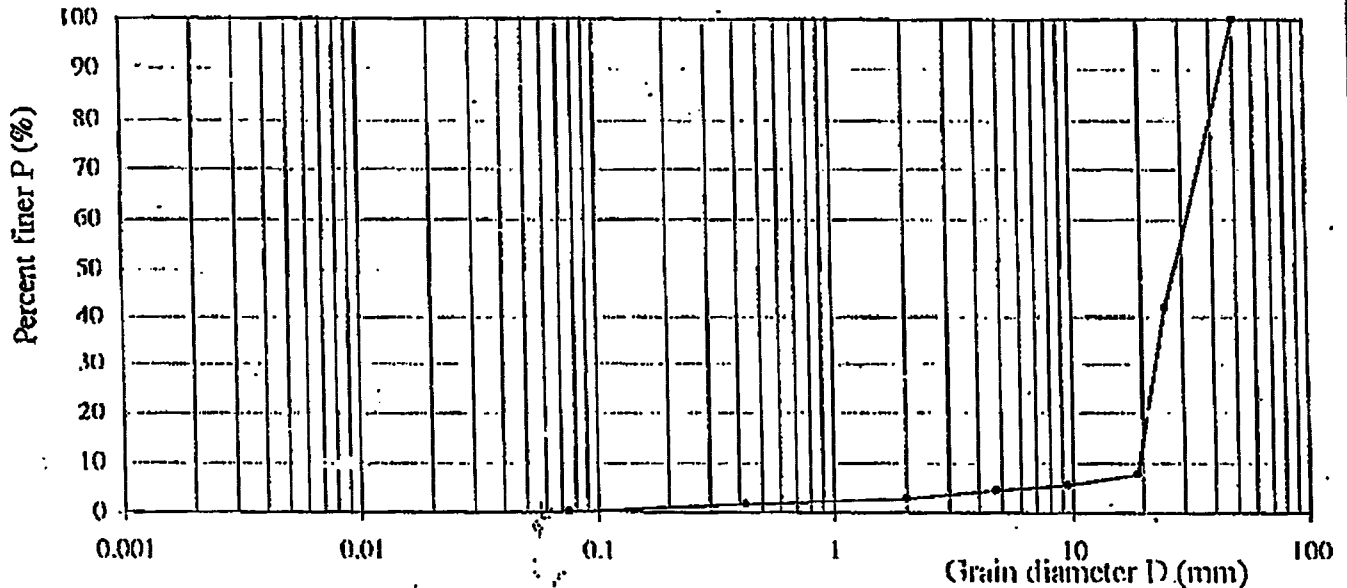
$C_c = 0.8$

Group symbol : GP

$D_{10} = 20.0$

Group name : Bad aggregate grit

Size (mm)	50.8	25.4	19	9.5	4.75	2	0.425	0.075	< 0.075
Percent retained (%)	0.0	58.2	34.4	2.1	1.0	1.6	1.2	1.4	0.1



Tested by

*Nguyen Thi Hong*

Nguyen Thi Hong

Checked by



VILAS 129

Tran Van Toan

# GRAIN SIZE ANALYSIS

ASTM - D 422 - 63

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
BAN XEO BRIDGE

Borehole : P01  
Sample No : PH2  
Depth (m): 4.30 + 4.55

Tets No : 617  
Date : 30/6/2006

**SIZE ANALYSIS**

Weight of dry soil (g): 2269.0

Size (mm)	50.8	25.4	19.0	9.5	4.75	2.00	0.425	0.075	< 0.075
Weight soil (g)	0.00	1403.00	727.00	40.41	20.23	10.16	20.60	45.13	2.47
Percent retained (%)	0.0	61.8	32.0	1.8	0.9	0.4	0.9	2.0	0.1
Percent finer (%)	100.0	38.2	6.1	4.3	3.5	3.0	2.1	0.1	

**RESULT**

$D_{60} = 32.0$

$C_u = 1.6$

Soil classification (ASTM - D 2487)

$D_{30} = 23.0$

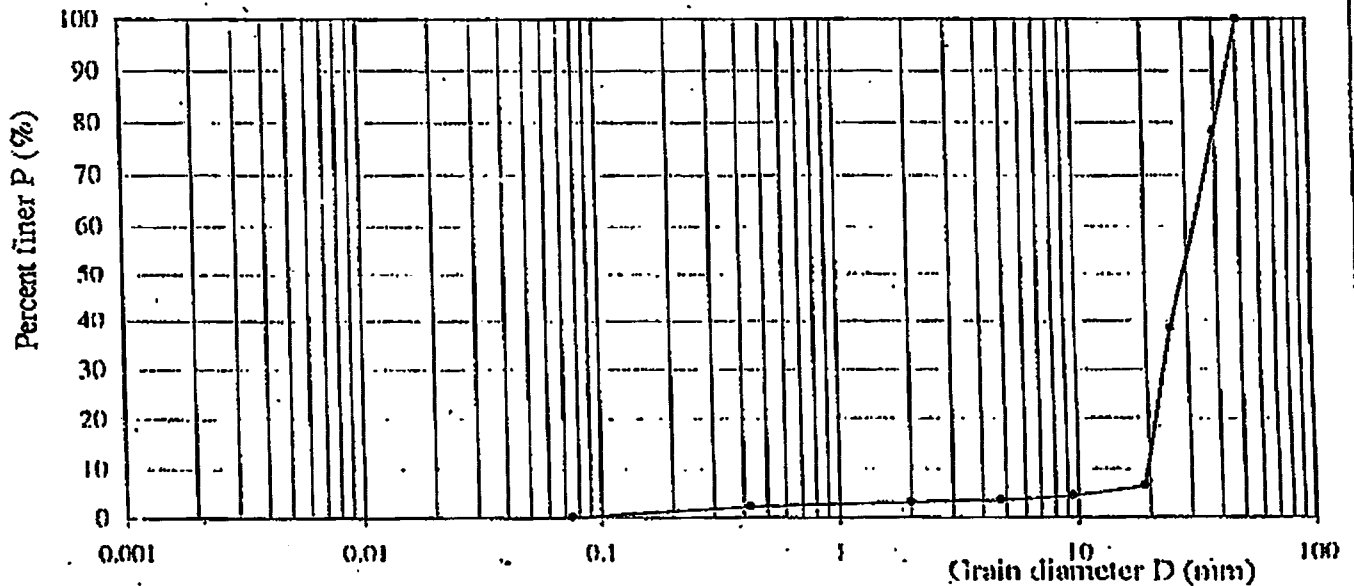
$C_c = 0.8$

Group symbol : GP

$D_{10} = 20.0$

Group name : Bad aggregate grit

Size (mm)	50.8	25.4	19	9.5	4.75	2	0.425	0.075	< 0.075
Percent retained (%)	0.0	61.8	32.0	1.8	0.9	0.4	0.9	2.0	0.1

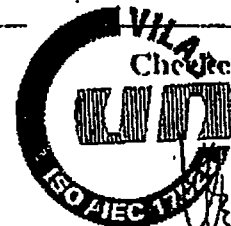


Tested by

*Handwritten signature*

Nguyen Thi Hong

Checked by



VILAS 129

Tran Van Toan

# GRAIN SIZE ANALYSIS

ASTM - D 422 - 63

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
BAN XEO BRIDGE

Borehole : P01  
Sample No : P143  
Depth (m) : 6.30 + 6.55

Tets No : 618  
Date : 30/6/2006

**SIZE ANALYSIS**

Weight of dry soil (g): 3219,4

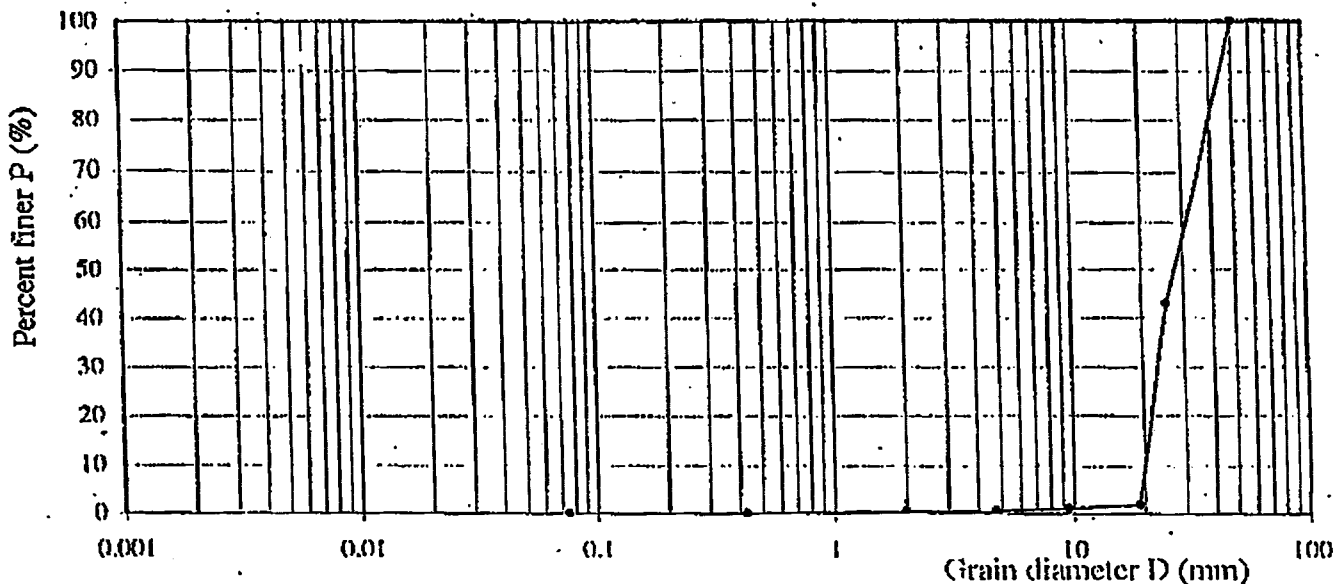
Size (mm)	50.8	25.4	19.0	9.5	4.75	2.00	0.425	0.075	< 0.075
Weight soil (g)	0.00	1839.30	1321.51	21.83	14.51	6.39	14.24	1.62	0.00
Percent retained (%)	0.0	57.1	41.0	0.7	0.5	0.2	0.4	0.1	0.0
Percent finer (%)	100.0	42.9	1.8	1.1	0.7	0.5	0.1	0.0	

**RESULT**

$D_{60} = 31.0$        $C_u = 1.6$   
 $D_{30} = 23.0$        $C_o = 0.9$   
 $D_{10} = 20.0$

Soil classification ( ASTM - D 2487 )  
Group symbol : GP  
Group name : Bad aggregate grit

Size (mm)	50.8	25.4	19	9.5	4.75	2	0.425	0.075	< 0.075
Percent retained (%)	0.0	57.1	41.0	0.7	0.5	0.2	0.4	0.1	0.0



Tested by

*Handwritten signature*

Nguyen Thi Hong



VILAS 120 Van Toan

# GRAIN SIZE ANALYSIS

ASTM - D 422 - 63

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES  
BAN XEO BRIDGE

Borehole : T2  
Sample No : PH1  
Depth (m) : 2.20 : 2.45

Tests No : 767  
Date : 13/7/2006

**S.IZE ANALYSIS**

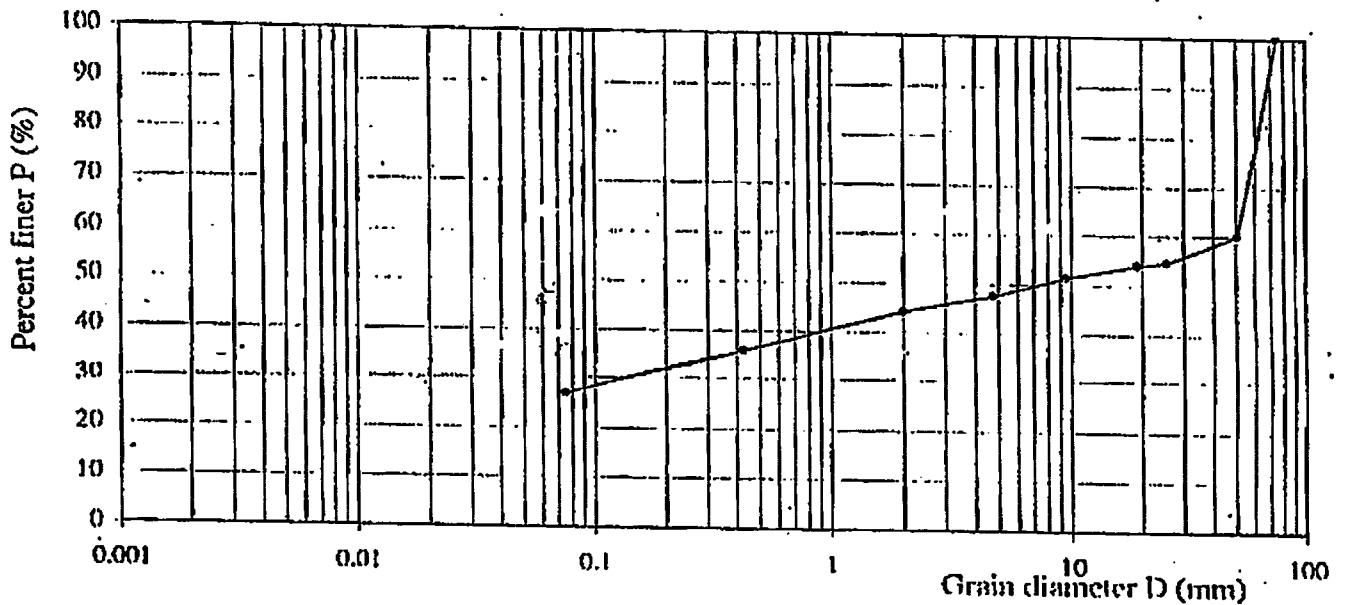
Weight of dry soil (g): 1780.0

Size (mm)	50.8	25.4	19.0	9.5	4.75	2.00	0.425	0.075	< 0.075
Weight soil (g)	715.60	95.30	10.90	45.80	66.60	60.10	144.80	169.90	471.00
Percent retained (%)	40.2	5.4	0.6	2.6	3.7	3.4	8.1	9.5	26.5
Percent finer (%)	59.8	94.6	99.4	97.4	96.3	96.6	91.9	90.5	73.5

**RESULT**

D <sub>60</sub> =	C <sub>u</sub> =	Soil classification (ASTM - D 2487)
D <sub>30</sub> =	C <sub>c</sub> =	Group symbol : GC
D <sub>10</sub> =		Group name : Clay grit

Size (mm)	50.8	25.4	19	9.5	4.75	2	0.425	0.075	< 0.075
Percent retained (%)	40.2	5.4	0.6	2.6	3.7	3.4	8.1	9.5	26.5



Tested by

*Signature of Nguyen Thi Hong*

Nguyen Thi Hong

Checked by



Tran Van Toan

VILAS 129

# ATTERBERG LIMITS

ASTM - D 4318 - 84

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES

BAN XEO BRIDGE

Borehole : T2

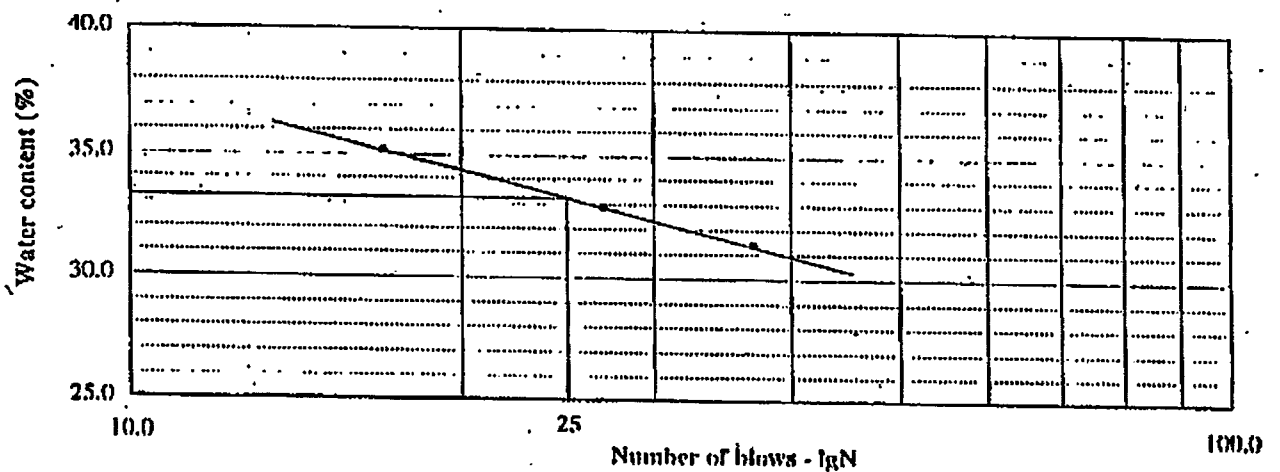
Sample No : PH1

Depth (m): 2.2 + 2.45

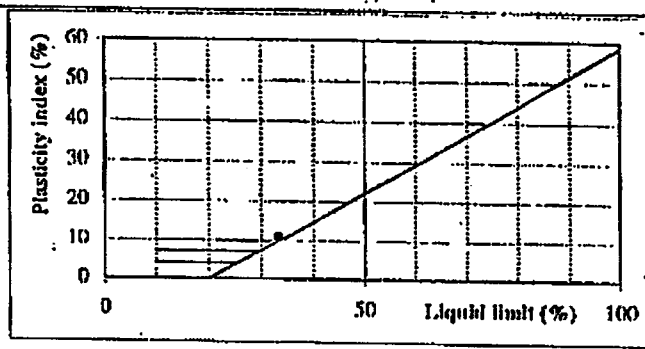
Tests No : 787

Date : 14/7/2008

Container number	LIQUID LIMIT ( $W_L$ )			PLATIC LIMIT ( $W_P$ )	
	IN12	IN16	IN22	HN50	HN26
Weight of wet (g)	85.57	84.16	84.06	39.47	42.68
Weight of dry (g)	80.32	79.43	79.52	36.34	38.84
Weight of container (g)	65.39	65.03	65.05	22.25	21.77
Water content (%)	35.2	32.8	31.4	22.2	22.5
Average water content (%)					22.4
Number of blows ( N )	17	27	37		



**RESULT:**  
 Liquid limit :  $W_L = 33.2$  %  
 Platic limit :  $W_P = 22.4$  %  
 Plasticity index :  $I_P = 10.8$  %



Tested by

*Tran Thi My Dung*

Tran Thi My Dung



VILAS 129  
Tran Van Toan

BORING LOG

ENGINEERING		THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES TECHNICAL DESIGN PHASE				BRIDGES OF LAO CAI PROVINCE MUONG HUM BRIDGE NO.2						
Bore hole		LK_P1		Co-or. X= Y=		Station: km24+011.88						
Elev.: +189.63		Elev. of underwater level: +0.00		Drilling date:		11/08/2006 - 14/08/2006						
Corrector:		Nguyen Cong Sinh		Checker:		Tran Viet Han						
Layer	Elev. (m)	Depth (m)	Thickness (m)	PROFILE Scale 1/100	DESCRIPTION	STANDARD PENETRATION TEST (SPT)					Sampling depth for test (m)	
						Depth (m)	Blow No./15cm			N <sub>60cm</sub>		Chart 0 10 20 30 40 50 N
					N1		N2	N3				
1	183.23	6.40	6.40		It is mixture of cobble, gravel, grit and sand (Cobble diameter is big) in blackish grey, yellowish grey, saturate, closed structure.	1.00-1.45	15	18	10	84		PH1 2.00-2.45
						2.00-2.45	15	18	18	36		
						3.00-3.45	18	20	25	45		
						4.00-4.45	15	20	23	43		
						5.00-5.45	16	21	24	45		
6.00-6.45	18	22	>50	>50								
2	178.28	11.35	4.95		Sandstone is blackish grey, weathered, little cracked. Hardness is in level VI-VII.						U3 7.30-7.55	
											U4 9.90-10.16	



BORING LOG

ENGINEERING		THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES TECHNICAL DESIGN PHASE				BRIDGES OF LAO CAI PROVINCE										
Bore hole		LK_P2	Co-ord. X=		Y=	Station: km23+987.98										
Elev.: +189.43		Elev. of underground level: +0.00		Drilling date:		14/06/2006 - 16/06/2006										
Corrector:		Nguyen Cong Sinh			Checker:		Tran Viet Han									
Layer	Elev. (m)	Depth (m)	PROFILE Scale 1/100	DESCRIPTION	STANDARD PENETRATION TEST (SPT)							Sampling depth for test (m)				
					Depth (m)	Blow No./15cm			N <sub>60</sub> cm	Chart						
						N1	N2	N3			0	10	20	30	40	50
1	179.23	10.20		It is mixture of cobble, gravel, grit and sand (Cobble diameter is big) in blackish grey, yellowish grey, saturate, closed structure.	1.00-1.45	10	20	25	45							
					2.00-2.45	12	21	23	44						PH1 2.00-2.45	
					3.00-3.45	15	21	28	47							
					4.00-4.45	14	22	24	48						PH2 4.00-4.45	
					5.00-5.45	16	23	24	47							
					6.00-6.45	18	22	23	45						PH3 6.00-6.45	
					7.00-7.45	20	25	24	49							
					8.00-8.45	20	24	25	49						PH4 8.00-8.45	
					9.00-9.45	18	20	24	44							
					10.00-10.45	20	24	>50	>50							
2	174.23	15.20		Sandstone is blackish grey, weathered, little cracked. Hardness is in level VI-VII.											U5 12.10-12.35	
															U6 14.30-14.55	

## TEST FOR UNCONFINED COMPRESSIVE STRENGTH OF ROCK

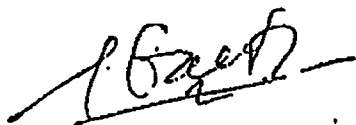
(22 TCN 57 - 84)

THE PROJECT FOR IMPROVEMENT OF RURAL BRIDGES IN NORTHERN MOUNTAINOUS PROVINCES

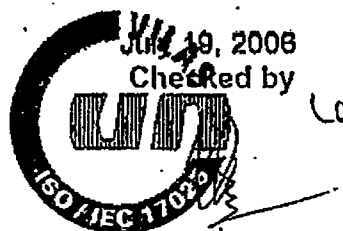
## MUONG HUM 2.BRIDGE

Bore hole		P1	P2
Sample No.		U5	U3
Depth (m)		12,10-12,35	7,30-7,55
<b>Test Items</b>			
Dry unconfined compressive strength	$\sigma_n$ (kG/cm <sup>2</sup> )	350,0	365,0
Saturated unconfined compressive strength	$\sigma_{bh}$ (kG/cm <sup>2</sup> )	225,0	237,0
Index of softening	k	64,00	0,65
Natural unit weight	$\gamma_w$ (g/cm <sup>3</sup> )	2,395	2,387
Specific gravity	$\Delta$ (g/cm <sup>3</sup> )	2,700	2,695

Tested by



Nguyễn Văn Hạnh


 VILAS 129  
 Trần Văn Toàn