TECHNICAL REPORT

RESULT SOIL TEST INVESTIGATION

Project: SAKATA FACTORY VIET NAM – BAC NINH BRANCH

Address: No3 – Road 11 – Phu Chan – VSIP Bac Ninh.

A. INTRODUCTION

To serve the investigation and construction Sakata factory Viet nam , SONG HONG CONSTRUCTION AND INVESTMENT CONSULTANT JOIN STOCK COMPANY has drilled in the construction site No3 – Road 11 – Phu Chan – VSIP Bac Ninh since 2 –April -2013.

The work was implemented in the Construction site with drilling equipment in rotary drilling method and take sample.

The result as follows:

No	Drilling symbol	Depth (m)	Number of SPT	Number of samples (Sample)	Execution date
1	BH1	30.00	7	6	3/04/2013
2	BH2	30.00	6	6	2/04/2013

TCVN 44195 – 1987, TCXD 160-1987 standard

Monitoring field by engineer DAO VAN LOI

Reported by engineer DAO VAN LOI

The original samples were preserved carefully and tested in the XD 1024 LAS. To identify the soil mechanics, the direct cut shear unconsolidated test and soil (undrained and unconsolidated specimen) and compression were used.

When we collected enough documents, the technical report is based on construction standards of Viet Nam: TCVN 44195 – 1987, TCXD 160-1987 standard

B. GEOLOGICAL CONDITION OF INVESTIGATION SITE

I. Location and characteristic of investigated site.

Investigation area located in No3 – Road 11 – Phu Chan – VSIP Bac Ninh .

Topography is plane.

Structure of geological soil and geological character of soil layers

7 soil layers were investigated from up to down as follows:

1. Layer 1: Made ground, fine sand with brownish. The thickness of layer is 1.30 m to 1.80m.

This layer cover whole is investigated which are fine sand with brownish. This layer is distributed over the drilling consequently meaningless for buildings.

2. Layer 2: Silty clay with greenish, brownish, mixed dust, firm.The thickness of layer is 8.00 m to 8.90m.

***Table 2: Muscle-physic indication of layers** 2*

No	Name of indication	Symbol	Unit	Mean- value
	Particle - analysis			
	10.0-5.0		%	**0.00**
	5.0 — 2.0		%	**0.00**
	2.0 — 1.0		%	**3.60**
	1.0 — 0.50		%	**5.50**
	0.5 — 0.25 mm		%	**7.60**
	0.25 —0.1 mm		%	**12.50**
1	0.1 — 0.05 mm		%	**14.20**
	0.05 — 0.01mm		%	**16.30**
	0.01 — 0.005 mm		%	**12.90**
	< 0.005 mm		%	**27.70**
2	Moisture content	W	%	**32.90**

3	Liquid limit	W_{ch}	%	**38.80**
4	Plastic limit	W_d	%	**25.10**
5	Plastic index	I_p		**13.70**
6	Liquidity Index	B		**0.57**
7	Wet Density	γ	g/cm^3	**1.78**
8	Dry Density	γ_c	g/cm^3	**1.34**
9	Specific Gravity	Δ	g/cm^3	**2.69**
10	Porosity	N	%	**50.30**
11	Void Ratio	e_0		**1.01**
12	Degree of saturation	G	%	**87.20**
13	Cohesion	C	kG/cm^2	**0.107**
14	Angle of interna friction	φ	Độ	**$10^0$34'**
15	Coef of compresion	a_{1-2}	Cm^2/kG	**0.033**

TCXD – 45 – 78 standard

Standard presure $R_0 =$ **0.79** (kG/cm^2)

Section module E_0 **= 99.74** (kG/cm^2)

SPT index = 7

3. Layer 3: Silty clay with blackish, brownish, mixed sand, firm.The thickness of layer is 2.50 m to 2.80m.

***Table 3: Muscle-physic indication of layers** 3*

No	Name of indication	Symbol	Unit	Mean- value
	Particle - analysis			
	10.0-5.0		%	**0.00**
	5.0 — 2.0		%	**0.00**
	2.0 — 1.0		%	**4.90**

	1.0 — 0.50		%	**7.70**
	0.5 — 0.25 mm		%	**12.00**
	0.25 —0.1 mm		%	**7.00**
1	0.1 — 0.05 mm		%	**11.10**
	0.05 — 0.01mm		%	**12.20**
	0.01 — 0.005 mm		%	**18.40**
	< 0.005 mm		%	**26.80**
2	Moisture content	W	%	**34.40**
3	Liquid limit	W_{ch}	%	**39.10**
4	Plastic limit	W_d	%	**26.20**
5	Plastic index	I_p		**13.00**
6	Liquidity Index	B		**0.63**
7	Wet Density	γ	g/cm^3	**1.80**
8	Dry Density	γ_c	g/cm^3	**1.34**
9	Specific Gravity	Δ	g/cm^3	**2.75**
10	Porosity	N	%	**51.30**
11	Void Ratio	e_0		**1.05**
12	Degree of saturation	G	%	**89.40**
13	Cohesion	C	kG/cm^2	**0.094**
14	Angle of interna friction	φ	Độ	**$12^0$57'**
15	Coef of compresion	a_{1-2}	Cm^2/kG	**0.032**

TCXD – 45 – 78 standard

Standard presure $R_0 =$ **0.90** (kG/cm^2)

Section module E_0 **= 104.80** (kG/cm^2)

SPT index = 6

4. Layer 4: Silty clay with brownish, mixed sand, stiff.The thickness of layer is 3.90 m to 4.00m.

***Table 4: Muscle-physic indication of layers** 4*

No	Name of indication	Symbol	Unit	Mean- value
	Particle - analysis			
	10.0-5.0		%	**0.00**
	5.0 — 2.0		%	**0.00**
	2.0 — 1.0		%	**4.50**
	1.0 — 0.50		%	**6.40**
	0.5 — 0.25 mm		%	**9.80**
	0.25 —0.1 mm		%	**6.70**
1	0.1 — 0.05 mm		%	**7.20**
	0.05 — 0.01mm		%	**16.10**
	0.01 — 0.005 mm		%	**20.30**
	< 0.005 mm		%	**29.30**
2	Moisture content	W	%	**31.20**
3	Liquid limit	W_{ch}	%	**39.50**
4	Plastic limit	W_d	%	**26.00**
5	Plastic index	I_p		**13.50**
6	Liquidity Index	B		**0.40**
7	Wet Density	γ	g/cm^3	**1.82**
8	Dry Density	γ_c	g/cm^3	**1.38**
9	Specific Gravity	Δ	g/cm^3	**2.70**
10	Porosity	N	%	**48.80**
11	Void Ratio	e_0		**0.952**
12	Degree of saturation	G	%	**88.50**
13	Cohesion	C	kG/cm^2	**0.130**

14	Angle of interna friction	φ	Độ	**$15^0$00'**
15	Coef of compresion	a_{1-2}	Cm^2/kG	**0.0273**

TCXD – 45 – 78 standard

Standard presure $R_0 =$ **1.11** (kG/cm^2)

Section module E_0 **= 130.56** (kG/cm^2)

SPT index = 10

5. Layer 5: Silty clay with brownish, very stiff.The thickness of layer is 2.30 m to 2.50m.

***Table 5: Muscle-physic indication of layers** 5*

No	Name of indication	Symbol	Unit	Mean- value
	Particle - analysis			
	10.0-5.0		%	**3.40**
	5.0 — 2.0		%	**4.60**
	2.0 — 1.0		%	**5.60**
	1.0 — 0.50		%	**6.80**
	0.5 — 0.25 mm		%	**9.00**
	0.25 —0.1 mm		%	**8.20**
1	0.1 — 0.05 mm		%	**11.00**
	0.05 — 0.01mm		%	**15.30**
	0.01 — 0.005 mm		%	**19.00**
	< 0.005 mm		%	**17.40**
2	Moisture content	W	%	**28.10**
3	Liquid limit	W_{ch}	%	**39.70**
4	Plastic limit	W_d	%	**26.10**
5	Plastic index	I_p		**13.60**
6	Liquidity Index	B		**0.14**

7	Wet Density	γ	g/cm^3	**1.94**
8	Dry Density	γ_c	g/cm^3	**1.51**
9	Specific Gravity	Δ	g/cm^3	**2.74**
10	Porosity	N	%	**44.80**
11	Void Ratio	e_0		**0.80**
12	Degree of saturation	G	%	**94.60**
13	Cohesion	C	kG/cm^2	**0.201**
14	Angle of interna friction	φ	Độ	**$19^0$27'**
15	Coef of compresion	a_{1-2}	Cm^2/kG	**0.0186**

TCXD – 45 – 78 standard

Standard presure $R_0 =$ **1.74** (kG/cm^2)

Section module E_0 **= 203.00** (kG/cm^2)

SPT index = 17

6. Layer 6: Silty clay with brightish, greenish, firm.The thickness of layer is 5.80 m to 6.00m.

***Table 6: Muscle-physic indication of layers** 6*

No	Particle - analysis	Symbol	Unit	Mean- value
	Particle - analysis			
	10.0-5.0		%	**0.00**
	5.0 — 2.0		%	**0.00**
	2.0 — 1.0		%	**4.50**
	1.0 — 0.50		%	**6.40**
	0.5 — 0.25 mm		%	**10.50**
	0.25 —0.1 mm		%	**7.40**
1	0.1 — 0.05 mm		%	**11.10**
	0.05 — 0.01mm		%	**13.80**

	0.01 — 0.005 mm		%	**18.90**
	< 0.005 mm		%	**27.50**
2	Moisture content	W	%	**35.10**
3	Liquid limit	W_{ch}	%	**39.30**
4	Plastic limit	W_d	%	**28.90**
5	Plastic index	I_p		**10.40**
6	Liquidity Index	B		**0.60**
7	Wet Density	γ	g/cm^3	**1.79**
8	Dry Density	γ_c	g/cm^3	**1.32**
9	Specific Gravity	Δ	g/cm^3	**2.74**
10	Porosity	N	%	**51.60**
11	Void Ratio	e_0		**1.06**
12	Degree of saturation	G	%	**90.10**
13	Cohesion	C	kG/cm^2	**0.11**
14	Angle of interna friction	φ	Độ	**$11^0$58'**
15	Coef of compresion	a_{1-2}	Cm^2/kG	**0.048**

TCXD – 45 – 78 standard

Standard presure $R_0 =$ **0.87** (kG/cm^2)

Section module E_0 **= 108.34** (kG/cm^2)

SPT index = 5

7. Layer 7: Fine sand with brightish, greenish, medium dense to dense. In extent depth borehole We has not drilled thickness finis in this layer.

***Table 7: Muscle-physic indication of layers** 7*

No	Name of indication	Symbol	Unit	Mean-value
	Particle - analysis			
	10 – 5.0		%	4.30
	5.0 – 2.0		%	8.60
	2.0 – 1.0		%	9.30
	1.0 – 0.50		%	10.40
	0.5 – 0.25 mm		%	14.30
	0.25 –0.1 mm		%	29.70
1	0.1 – 0.05 mm		%	22.30
	0.05 – 0.01mm		%	2.70
	0.01 – 0.005 mm		%	0.00
	< 0.005 mm		%	0.00
2	Void ration of sand	$\varepsilon_{\max}$		1.24
3	Void ration of sand	$\varepsilon_{\min}$		0.62
4	Angle of repose for sand	φ_{Dry}		$26^0$55’
5	Angle of repose for sand	φ_{Wet}		$32^0$31’

SPT index = 22 - 39

II. Conclusion

To sum up, the area is investigated which have good structure geological soil. The natural base has soil layers above-mentioned. The inventor should have suitable design plan for construction.

Layer 1: Made ground: Fine sand with brownish.

This layer cover whole is investigated which are Fine sand with brownish.

The thickness of layer is 1.30 m to 1.80m.

Layer 2: Silty clay with greenish, brownish, mixed dust, firm.The thickness of layer is 8.00 m to 8.90m. This layer can be not quite load-bearing.

Layer 3: Silty clay with blackish, brownish, mixed sand, firm.The thickness of layer is 2.50 m to 2.80m. This layer can be not quite load-bearing.

Layer 4: Silty clay with brownish, mixed sand, stiff.The thickness of layer is 3.90 m to 4.00m. This layer can be quite load-bearing.

Layer 5: Silty clay with brownish, very stiff.The thickness of layer is 2.30 m to 2.50m. This layer can be quite load-bearing.

Layer 6: Silty clay with brightish, greenish, firm.The thickness of layer is 5.80 m to 6.00m. This layer can be not quite load-bearing.

Layer 7: Fine sand with brightish, greenish, medium dense to dense. In extent depth borehole We has not drilled thickness finis in this layer. This layer can be quite load-bearing.