

دراسة تقنيات التربة لموقع الابنية الجامعية في جامعة القادسية

(10)

2006

(10)

(0.90-0.65)	(23-5)	(SPT)	(N)
	(%30.1-%22.9)	(M.C)	.(N.G.S.)
	.(%31-%1)	(%46-%17)	(%78-%43)
Dynamic Static Method		.(28.4-%14.8)	(PI) (%56.1-%32.5) (LL.)
Dynamic method	.static method	(7-5) Φ_u 2 /	(6.0-4.0) (CU) Method
		. 2	² / (9.8-2.6)

Abstract

This research was conducted on the soil of the university buildings - based on the province of Qadissiyah investigations undertaken by the company for relying soil investigations of this site in 2006, and thus aims to search the calendar for this soil Jyotknique not have significance in the design construction. The research contained drilling (10) distributed on the test wells and the depth of the buildings (10) m. Reliance was placed in the calendar on the information obtained from field work and the results of laboratory testing of the models Almlkhalkhalp and loose soil from the study area. The search results showed that the soil mud slides containing low percentage of sand and mud to classify high and low plasticity with plastic Mtaatzbzbpb depth.

Ranged from the number of strikes (N) to examine the penetration index (SPT) between the (5-23) a, the level of underground water (0.65-0.90) m below the natural surface of the earth (NGS). The moisture content (MC) between (22.9% -30.1%) of the weight of models. The distribution granuloma ranged between the proportion of mud (43% -78%) and the proportion of silt (17% -46%) and the proportion m of sand (1% -31%). Limits ranged Atterbeyg reduce liquidity (LL.) between (32.5% -56.1%) and below the index (PI) between (14.8% -28.4).

Were calculated with soil collection of Static Method, Dynamic Method ranged (CU) between (4.0 - 6.0) ton / m², Φ_u between (5-7) in a way that static method. The calculated Dynamic method ranged between (2.6-9.8) t / m² and for different depths and under 2 m.

It appeared from the investigation and laboratory testing of soil that needs to be pre engineering installations for the purpose of engineering them.

Nomenclature

Specific gravity		G.S.
Liquid limit		L.L.
Plasticity limit		P.L.
Plasticity index		P.I.
Activity		A

Dry density		γ_d
Wet density		γ_t
Standard penetration test		SPT
N-vales		N
Water table		W.T.
Bore hole		BH
Unconfined compressive		σ_c
Cohesive		cu
Friction angle		ϕ_u
Initial void		e_o
Compress index		Cc
Swelling index		Cr
Over consolidation pressure		Pc
Water content		M.C.
Electrical conductivity		E.C.
pH		pH
Total Soluble salts		T.S.S.
Organic matter		O.M.

(Polyphasis)

(1998

) (Porosis)

(Dispersed)

. (2006)

-: (1998)

-

- ()

-

-

(consistency Index)

(Index properties)

(Toughness Index)

(liquidity Index)

(2006) .

(1990) .

(Supporting power)

(1991) .

.(Geology and Hydrology for study)

()

(1) . (3)

(0.9 – 0.65)

.(1)

.(Data)

.(1)

(10)

ASTM D-4767 , ASTM D- 2488 , ASTM D-4318 , ASTM)

(D- 422, ASTM D- 854 , ASTM D-2435

-:

(Grain size analysis)

-1

)

(Hydromekr analysis)

(4)

(sieve analysis) 200

(

(31 - 1)

.(78 - 43)

(46 - 17)

(Atterberg limits) -2

(LL.) (56.1 - 32.5) (pI)
(USCS) (4) . (28.4 – 17.6)
(CL) (CH)

.(Natural moisture content) -3

:(
(1990) (pore pressure)

. (2) (30.1 – 22.9)

(Soil Activity) -4

:((0.37 – 0.52)
BH.1=0.45, BH.2=0.38, BH.3=0.37, BH.4=0.35, BH.5=0.44, BH.6=0.52, BH.7=0.42,
BH.8=0.41, BH.9=0.53, BH.10=0.41.

.0.65

. (1997)

	(A)
(Non active)	0.75
Normally Active	1.25-0.7
Active	2.0 -1.25

(Bearing capacity) -5

(N) Dynamic Method
(23 – 5) (SPT)
Static Method . (3) (9.0 -1.50) ² / (9.8-2.6)
. (2) (7 -5) ϕ ² / (6.0 – 4.0) (CU)

.	-1
.	-2
.	-3
.	-4
.	-5
2006	-1
172	-2
(1989)	-3
352	-4
574	-5
(1991)	-6
(1998)	-7

(1)

The date of measurement	under ground water elevation (m)	BH.NO
2006-October	0.65	1
=	0.65	2
=	0.75	3
=	0.67	4
=	0.85	5
=	0.80	6
2006-October	0.85	7
=	0.90	8
=	0.80	9
=	0.83	10

(2)

BH.NO	Depth (m)	Undrained Cu T/m ²	Undrained ϕ_u
BH.1	2-2.5	2.7	5
=	4.5-5	2.8	6
=	7-7.5	3.3	5
BH.2	2-2.5	2.8	6
=	4.5-5	3.2	5
=	7-7.5	3.7	6
BH.3	2-2.5	2.4	5
=	4.5-5	2.9	7
=	7-7.5	3.8	6
BH.4	2-2.5	2.1	6
=	4.5-5	3.0	5
=	7-7.5	3.5	6
BH.5	2-2.5	2.3	6
=	4.5-5	3.5	6
=	7-7.5	4.1	5
BH.6	2-2.5	2.8	5
=	4.5-5	3.4	6
=	7-7.5	3.9	5
BH.7	2-2.5	2.1	6
=	4.5-5	2.9	5
=	7-7.5	3.8	5
BH.8	2-2.5	2.1	5
=	4.5-5	2.7	6
=	7-7.5	3.6	6
BH.9	2-2.5	2.5	5
=	4.5-5	3.2	6
=	7-7.5	4.0	5
BH.10	2-2.5	2.2	6
=	4.5-5	3.7	5
=	7-7.5	4.2	5

(3)

Depth (m)	BH.1 SPT Total for 300mm	B.C T/m ²	Depth (m)	BH.2 SPT Total for 300mm	B.C T/m ²	Depth (m)	BH.3SPT Total for 300mm	B.C T/m ²
1.5	6	3.0	1.5	6	3.0	1.5	8	4.0
3.5	11	5.7	3.5	8	4.0	3.5	-	-
6.0	16	8.0	6.0	14	7.0	6.0	15	7.8
9.0	19	8.8	9.0	20	9.0	9.0	21	9.4
Depth (m)	BH.4SPT Total for 300mm	B.C T/m ²	Depth (m)	BH.5 SPT Total for 300mm	B.C T/m ²	Depth (m)	BH.6SPT Total for 300mm	B.C T/m ²
1.5	7	3.6	1.5	5	2.6	1.5	6	3.0
3.5	14	7.0	3.5	7	3.6	3.5	11	5.7
6.0	17	8.3	6.0	14	7.0	6.0	18	8.5
9.0	21	9.4	9.0	19	8.8	9.0	23	9.8
Depth (m)	BH.7SPT Total for 300mm	B.C T/m ²	Depth (m)	BH.8 SPT Total for 300mm	B.C T/m ²	Depth (m)	BH.9SPT Total for 300mm	B.C T/m ²
1.5	8	4.0	1.5	10	5.0	1.5	5	2.6
3.5	13	6.8	3.5	13	6.8	3.5	11	5.7
6.0	17	8.3	6.0	22	9.6	6.0	16	8.0
9.0	-	-	9.0	-	-	9.0	22	9.6
Depth (m)		BH.10 SPT Total for 300mm	B.C T/m ²					
1.5		5	2.6					
3.5		9	4.7					
6.0		14	7.0					
9.0		19	8.8					

Table (4) Physical properties &field Tests for university building B.H.1

Type of sample	Depth (m)	System of classification				Properties index			Unit weight gm/cm ³		Layers – Description	Gs	SPT
		clay%	Silt %	Sand %	Grav.%	Mc %	LL %	Pi %	dry	wet			
DS	0-0.5	49	45	6	0	-	-	-	-	-	brown silty clay soil, soft consistency ,CL	-	-
DS	0.5-1	53	44	3	0	-	47.4	25.6	-	-	=	2.71	-
SS	1-1.5	55	43	2	0	-	-	-	-	-	=	-	6
US	2-2.5	63	37	0	0	25.9	-	-	1.47	1.85	=	-	-
SS	3-3.5	67	30	3	0	-	-	-	-	-	=	2.72	11
US	4.5-5	61	34	5	0	30.1	56.0	19.7	1.49	-	=	-	-
SS	5.5-6	52	42	6	0	-	-	-	-	-	brown silty clay soil, medium consistency ,CL	-	16
US	7-7.5	55	28	17	0	-	-	-	1.51	1.91	Gray sandy silty Clay soil, medium Consistency , CL	2.70	-
SS	8.5-9	45	29	26	0	-	41.0	27.0	-	-	=	-	19
US	9.5-10	48	30	22	0	24.9	-	-	-	-	=	-	-

Table (4) Physical properties &field Tests for university building B.H.2

Type of sample	Depth (m)	System of classification				Properties index			Unit weight gm/cm ³		Layers – Description	Gs	SPT
		clay%	Silt %	Sand %	Grav.%	Mc %	LL %	Pi %	dry	wet			
DS	0-0.5	48	47	5	0	-	-	-	-	-	brown silty clay soil, soft consistency ,CL	-	-
DS	0.5-1	-	-	-	-	-	-	-	-	-	=	2.71	-
SS	1-1.5	-	-	-	-	-	44.3	21.5	-	-	=	-	6
US	2-2.5	59	38	3	0	26.0	-	-	1.46	1.84	=	-	-
SS	3-3.5	-	-	-	-	-	-	-	-	-	=	2.73	8
US	4.5-5	60	30	5	0	-	-	-	-	-	=	-	-
SS	5.5-6	-	-	-	-	-	49.5	24.5	-	-	=	-	14
US	7-7.5	63	35	2	0	30.9	-	-	1.42	1.82	=	2.73	-
SS	8.5-9	-	-	-	-	-	-	-	-	-	=	-	20
US	9.5-10	59	35	6	0	-	-	--	-	-	=	-	-

Table (4) Physical properties &field Tests for university building B.H.3

Type of sample	Depth (m)	System of classification				Properties index			Unit weight gm/cm ³		Layers – Description	Gs	SPT
		clay%	Silt %	Sand %	Grav.%	Mc %	LL %	Pi %	dry	wet			
DS	0-0.5	-	-	-	-	-	-	-	-	-	brown silty clay soil, soft consistency ,CL	-	-
DS	0.5-1	52	43	5	0	25.3	-	-	1.43	1.79	=	2.71	-
SS	1-1.5	-	-	-	-	-	47.2	21.4	-	-	=	-	8
US	2-2.5	-	-	-	-	23.3	-	-	1.47	1.81	=	-	-
DS	3-3.5	-	-	-	-	-	43.2	19.5	-	-	=	-	-
US	4.5-5	60	36	4	0	-	-	-	-	-	=	2.73	-
SS	5.5-6	43	40	17	0	-	-	-	-	-	Gray sandy silty Clay soil, medium Consistency , CL	-	15
US	7-7.5	-	-	-	-	31.4	-	-	1.56	2.04	=	2.70	-
SS	8.5-9	-	-	-	-	-	32.5	25.8	-	-	=	-	21
US	9.5-10	68	28	4	0	27.1	-	-	1.53	1.94	brown silty clay soil, soft consistency ,CL	-	-

Table (4) Physical properties &field Tests for university building B.H.4

Type of sample	Depth (m)	System of classification				Properties index			Unit weight gm/cm ³		Layers – Description	Gs	SPT
		clay%	Silt %	Sand %	Grav.%	Mc %	LL %	Pi %	dry	wet			
DS	0-0.5	-	-	-	-	-	-	-	-	-	brown silty clay soil, soft consistency ,CL	-	-
DS	0.5-1	-	-	-	-	24.2	-	-	1.45	1.80	=	2.71	-
SS	1-1.5	-	-	-	-	-	38.6	17.5	-	-	=	2.72	7
US	2-2.5	59	37	4	0	29.6	-	-	1.48	1.92	=	-	-
SS	3-3.5	-	-	-	-	-	41.5	19.7	-	-	=	2.73	14
US	4.5-5	65	32	3	0	27.8	-	-	1.55	1.98	=	-	-
SS	5.5-6	-	-	-	-	-	-	-	-	-	=	2.73	17
US	7-7.5	70	29	1	0	-	-	-	-	-	=	-	-
SS	8.5-9	-	-	-	-	-	53.9	28.4	-	-	=	2.75	21
US	9.5-10	73	25	2	0	-	-	-	-	-	=	-	-

Table (4) Physical properties &field Tests for university building B.H.5

Type of sample	Depth (m)	System of classification				Properties index			Unit weight gm/cm ³		Layers – Description	Gs	SPT
		clay%	Silt %	Sand %	Grav.%	Mc %	LL %	Pi %	dry	wet			
DS	0-0.5	-	-	-	-	-	-	-	-	-	brown silty clay soil, soft consistency ,CL	-	-
DS	0.5-1	50	46	4	0	-	42.6	21.5	-	-	=	-	-
SS	1-1.5	-	-	-	-	-	-	-	-	-	=	2.72	5
US	2-2.5	57	38	5	0	27.3	-	-	1.45	1.85	=	-	-
SS	3-3.5	-	-	-	-	-	-	-	-	-	=	2.73	7
US	4.5-5	-	-	-	-	-	48.1	23.0	-	-	=	-	-
SS	5.5-6	48	21	31	0	-	-	-	-	-	Gray silty sandy Clay soil, medium Consistency , CL	2.70	14
US	7-7.5	56	21	23	0	28.1	-	-	1.57	2.01	=	-	-
SS	8.5-9	-	-	-	-	-	33.1	14.8	-	-	=	-	19
US	9.5-10	61	19	20	0	-	-	-	-	-	=	2.71	-

Table (4) Physical properties &field Tests for university building B.H.6

Type of sample	Depth (m)	System of classification				Properties index			Unit weight gm/cm ³		Layers – Description	Gs	SPT
		clay%	Silt %	Sand %	Grav.%	Mc %	LL %	Pi %	dry	wet			
DS	0-0.5	-	-	-	-	-	-	-	-	-	Gray silty clay soil, soft consistency ,CL	-	
DS	0.5-1	51	45	4	0	-	-	-	-	-	=	-	
SS	1-1.5	-	-	-	-	-	-	-	-	-	=	2.71	
US	2-2.5	-	-	-	-	28.0	-	-	1.46	1.86	=	-	
SS	3-3.5	-	-	-	-	-	49.5	17.6	-	-	=	2.73	
US	4.5-5	67	30	3	0	-	-	-	-	-	=	-	
SS	5.5-6	-	-	-	-	-	-	-	-	-	=	-	
US	7-7.5	71	25	4	0	23.9	-	-	1.54	1.91	=	-	
SS	8.5-9	-	-	-	-	-	47.3	28.7	-	-	brown silty clay soil, soft consistency ,CL	2.74	
US	9.5-10	56	36	8	0	-	-	-	-	-	=	-	

Table (4) Physical properties &field Tests for university building B.H.7

Type of sample	Depth (m)	System of classification				Properties index			Unit weight gm/cm ³		Layers – Description	Gs	SPT
		clay%	Silt %	Sand %	Grav.%	Mc %	LL %	Pi %	dry	wet			
DS	0-0.5	-	-	-	-	-	-	-	-	-	brown silty clay soil, soft consistency ,CL	2.7	-
DS	0.5-1	52	43	4	0	-	46.0	21.8	-	-	=	-	-
SS	1-1.5	-	-	-	-	29.1	-	-	1.42	1.83	=	-	8
US	2-2.5	-	-	-	-	-	49.3	22.7	-	-	=	2.7	-
SS	3-3.5	67	27	6	0	-	-	-	-	-	Gray silty clay soil, soft consistency ,CL	-	13
US	4.5-5	-	-	-	-	27.0	-	-	1.55	1.96	=	-	-
SS	5.5-6	-	-	-	-	-	-	-	-	-	brown silty clay soil, medium consistency ,CH	2.7	17
US	7-7.5	64	34	2	0	26.7	-	-	1.53	1.94	=	-	-
DS	8.5-9	-	-	-	-	-	51.6	24.9	-	-	=	2.7	-
US	9.5-10	78	19	3	0	23.2	-	-	1.58	1.95	=	2.7	-

Table (4) Physical properties &field Tests for university building B.H.8

Type of sample	Depth (m)	System of classification				Properties index			Unit weight gm/cm ³		Layers – Description	Gs	SPT
		clay%	Silt %	Sand %	Grav.%	Mc %	LL %	Pi %	dry	wet			
DS	0-0.5	-	-	-	-	-	-	-	-	-	brown silty clay soil, soft consistency ,CL	-	-
DS	0.5-1	51	44	5	0	-	-	-	-	-	=	2.7	-
SS	1-1.5	-	-	-	-	25	-	-	1.48	1.85	=	-	10
US	2-2.5	59	38	3	0	-	-	-	-	-	=	-	-
SS	3-3.5	-	-	-	-	-	43.8	20.5	-	-	=	2.7	13
US	4.5-5	-	-	-	-	27.5	-	-	1.52	1.93	Gray silty clay soil, medium consistency ,CH	-	-
SS	5.5-6	64	32	4	0	-	-	-	-	-	=	-	22
US	7-7.5	55	39	6	0	-	-	-	-	-	=	-	-
DS	8.5-9	-	-	-	-	-	52.1	21.8	-	-	=	2.7	-
US	9.5-10	54	31	15	0	28	-	-	1.50	1.92	Gray silty sandy Clay soil, medium Consistency , CL	-	-

Table (4) Physical properties &field Tests for university building B.H.9

Type of sample	Depth (m)	System of classification				Properties index			Unit weight gm/cm ³		Layers – Description	Gs	SPT
		clay%	Silt %	Sand %	Grav.%	Mc %	LL %	Pi %	dry	wet			
DS	0-0.5	-	-	-	-	-	-	-	-	-	Gray silty clay soil, soft consistency ,CL	-	-
DS	0.5-1	59	37	4	0	-	-	-	-	-	=	-	-
SS	1-1.5	-	-	-	-	-	46.0	23.1	-	-	=	-	5
US	2-2.5	58	36	5	0	26.0	-	-	1.46	1.84	=	-	-
SS	3-3.5	-	-	-	-	-	-	-	-	-	=	-	11
US	4.5-5	-	-	-	-	26.9	-	-	1.49	1.88	=	-	-
SS	5.5-6	-	-	-	-	-	53.0	26.0	-	-	brown silty clay soil, medium consistency ,CH	-	16
US	7-7.5	75	21	4	0	-	-	-	-	-	=	-	-
SS	8.5-9	-	-	-	-	-	-	-	-	-	=	2.73	22
US	9.5-10	77	17	6	0	22.9	-	-	1.62	1.95	Red silty clay soil, medium consistency ,CL	-	-

Table (4) Physical properties &field Tests for university building B.H.10

Type of sample	Depth (m)	System of classification				Properties index			Unit weight gm/cm ³		Layers – Description	Gs	SPT
		clay%	Silt %	Sand %	Grav.%	Mc %	LL %	Pi %	dry	wet			
DS	0-0.5	-	-	-	-	-	-	-	-	-	brown silty clay soil, soft consistency ,CL	-	-
DS	0.5-1	56	40	4	0	-	-	-	-	-	=	-	-
SS	1-1.5	-	-	-	-	-	-	-	-	-	=	2.72	5
US	2-2.5	64	33	3	0	27.2	-	-	1.42	1.80	Gray silty clay soil, soft consistency ,CL	-	-
SS	3-3.5	-	-	-	-	-	45.2	23.5	-	-	=	2.73	9
US	4.5-5	69	30	1	0	-	-	-	-	-	=	-	-
SS	5.5-6	-	-	-	-	-	-	-	-	-	brown silty clay soil, medium consistency ,CH	-	14
US	7-7.5	73	24	3	0	23.4	-	-	1.64	2.03	=	-	-

