

CV

of

AL-AHMED

For Engineering Consultants & Constructions Testing



Iraq – Baghdad – Alwaziriya – Q.301, St.13, Home No. 5/1

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2015



AL-AHMED

for Engineering Consultants & Constructions Testing

AL-AHMED Lab. (ECCT) was established by **Dr. Saheb A. Khidher** at (1998) recorded under number (556) in Iraqi Engineering Union.

AL-AHMED Lab. ready to present all the studies, consultants, designs and can make most of constructions testing for different civil engineering projects.

List of Tests:

1-Soils:

- A- Physical tests include sieve analysis, Atterberg limits, specific gravity and Compaction test.
- B- Chemical tests include Ph value, Sulphate, carbonate, gypsum, total soluble salts and organic matter.
- C- Shear strength characteristics: (Unconfined compression test, Triaxial test and Direct shear test).
- D- Consolidation and swelling tests.
- E- Field density.
- F- Lab. Permeability tests.

2-Rocks:

- A- Petrological and Mineralogical of Rock.
- B- Specific gravity.
- C- Density and Absorption.
- D- Abrasion test.
- E- Point Load Test.
- F- Unconfined Test.
- G- Triaxial Test.
- H- Direct Shear Test.
- I- Pulse Velocity of the Waves.

3- Cement and Concrete:

3-1 Fresh Concrete:

- A- Setting Time.
- B- Fineness of Cement.
- C- Consistency of Cement.

- D- Slump Test for Fresh Concrete.
- E- Air-Entraining for Concrete.
- F- Compaction Factor for Concrete.
- G- Design of Mixing Jobs.

3-2 Hardened Concrete:

3-2-a Destructive Tests

- 1- Compressive Strength.
- 2- Core of Hardened Concrete

3-2-b Non-Destructive Tests:

- 1- Ultrasonic Pulse Velocity Apparatus.
- 2- Schmidt Hammer.

4- Base and Sub-Base:

- A- Standard and Modified Proctor.
- B- Gradation of base and sub-base.
- C- CBR Test.
- D- SO₃ and Gypsum Content.

5- Asphalt Tests:

- A- Penetration Test for Asphalt.
- B- Percent of air voids.
- C- Marshall Test.
- D- Extraction Test.
- E- Core Test of Asphalt.

The *above mentioned tests* are done according to the *Standard Specifications of BS, ASTM, AASHTO, and IQS Standards.*

Today, We are looking forward to get the international accreditation during this year which is awarded according to satisfy the requirements of ISO/IEC 17025 : 2005 and under the supervision of United Nations Industrial Development Organization (UNIDO) and in cooperation with Central Organization of Standardization and Quality Control (C.O.S.Q.C) in Iraq and Swedish International Development Agency (Sida)

Concerning Projects, Also, the bureau since its establishments till now, a lot of works were done; some of these works are listed below:

- A-** Bridge of Al-Kut Dam from 1991 until 1992.
- B-** Al-Abbasiyat Bridge 1992.
- C-** The two layers Bridge (Al-Dorah Side) 1993 until 1994.
- D-** Implementing the project of Al-Aziziya Company for Agricultural and Animal production at 1995 until 1996.
- E-** As Consultant Engineer for a number of private and public Projects as a quality control Engineer especially for field of using Chemical Admixtures for Concrete from 1996 until 1998 (and as Expert in this field in Hot Weather).
- F-** More than 50 consultations were submitted for a number of different Projects and revaluating Buildings.
- G-** Designed more than 150 mixing Jobs of Concrete with and without Chemical Admixtures for Different Projects (2005).
- H-** Fulfilled more than 600 Reports in Testing of different Material for many Projects.
- I-** Fulfilled Studies and tests for big Dams Project like (TAQ-TAQ Dams, Drash Dam and Bassara Dam) (2006-2007).
- J-** Field density tests of soil and sub base of different projects such (WWTP, F1, F2, T0-South, T0-North, Area A, St. Al-Nuaimiyia-HT, Al-Falahat Water Treatment Plant\Al-Bu Hassan, Al-Jaghaify School,....etc),2006
- K-** Expert in Non-Destructive Test by Using Ultrasonic Pulse Hammer, for Evaluating the Buildings, Velocity and Schmidt.
- L-** Evaluation of Ministry of telecommunication using non destructive tests, 2007.
- M-** Soil investigation of Al-Yasmine Garden/Kut, 2009.
- N-** Evaluation of Kadhim Mufty Building/Baghdad, 2009.
- O-** Geotechnical Report for the Subsoil Investigation for Al-Dewaniah EOD project, June, 2010.
- P-** Hamrin oil field projects (Site Investigations, Field tests and Electrical Resistivity tests, September, 2010.
- Q-** Evaluation of Building no.1701 in Tikrit, March 2011.
- R-** Evaluation of Al-Ibda'a Building in Baghdad, March 2011.
- S-** Pavement and Road tests of Iraqi Border Road, June, 2011.
- T-** Soil classification of Suba and Luhais Oil Field Project in Basrah, April, 2011.



- U-** Soil Investigation of Al-Nahrain University Extension and Refurbishment Project, July, 2011.
- V-** Concrete core tests of Al-Kut Dam, July, 2011.
- W-** Soil Investigation of Karbala'a Gas Power Plant Project, June, 2011.
- X-** Soil Investigation of Building Directorate for the Protection of Vital Installations in Kirkuk, September, 2011.
- Y-** Soil Investigation of Samawa Al-Soub Al-Saghair Sewerage and Storm Drainage System Project, September, 2011.
- Z-** Soil Investigation of Basrah Water Supply Improvement, December, 2011.
- AA-** Geotechnical Report for the Subsoil Investigation for Akaz 2X125 MW 9E Gas Power Plant at Al-Anbar Province, Iraq.
- BB-** Fallujah Sewer Plant, December, 2011.
- CC-** Amarah Station for Power Plant Transfer Project, December, 2011.
- DD-** Al-Jehad Switchboard Phones Tower Project, Baghdad, January, 2012.
- EE-** Geotechnical Report for the Subsoil Investigation for Directorate of Distribution of Maissan Electricity Al-Neda'a & Al-Araidat Stations, Amarah-Iraq, January, 2012.
- FF-** Baghdad Flowers Residential Building Project, Baghdad, March, 2012.
- GG-** Soil Investigation of Basrah Water Supply Improvement near Airport, 2012.
- HH-** Geotechnical Report for the Subsoil Investigation for Kids Cultural City Project Baghdad, Iraq, May, 2012
- II-** Geotechnical Report for the Subsoil Investigation for Safwan sewerage Project Al Basra-Iraq, May, 2012.
- JJ-** Geotechnical Report for the Subsoil Investigation for Shat Al-Arab sewerage Project Al Basra-Iraq, May, 2012.
- KK-** Geotechnical Report for the Subsoil Investigation for Umm Qasr sewerage Project Al Basra-Iraq, May, 2012.
- LL-** Geotechnical Report for the Subsoil Investigation for Medical Al-Rahma Complex, Baghdad-Iraq, June, 2012.
- MM-** Geotechnical Report for the Subsoil Investigation for Fallujah Sewer Project Al-Anbar-Iraq, July, 2012.
- NN-** Geotechnical Report for the Subsoil Investigation for Halfayah Oil Project Maissan-Iraq, July, 2012.



- OO-** Geotechnical Report of Subsoil Investigation for Iraqi University proposed B+G+4 Building at Al-Bakreya Zone, Baghdad-Iraq, August, 2012.
- PP-** Geotechnical Report of Subsoil Investigation for Iraqi University in Al-Tarmeya Zone, Baghdad-Iraq, August, 2012.
- QQ-** Geotechnical Report for the Subsoil Investigation for AKKAS Gas Field, KOGAS Company, Al-Anbar Governorate, Iraq, September, 2012.
- RR-** Geotechnical Report for the Subsoil Investigation for BISMAYAH New City Project, HANWAH Company, Baghdad, Iraq, June, 2013.
- SS-** Geotechnical Report for the Subsoil Investigation for AKKAS PJ., DAWEOO Company, Al-Anbar Governorate, Iraq, February, 2014.
- TT-** Geotechnical Report for the Subsoil Investigation for AKKAS EPP, STX Company, Al-Anbar Governorate, Iraq, March & June 2014.
- UU-** Geotechnical Report for the Subsoil Investigation for Health Center in Baladroz District, , Diyala Governorate, Iraq, January 2015.
- VV-** Geotechnical Report for the Subsoil Investigation for Al-Mdaina Hospital Project, Basrah Governorate, Iraq, January 2015.
- WW-**Geotechnical Report for the Subsoil Investigation for Al-Zubair Water Treatment Plant Project, Basrah Governorate, Iraq, June 2015.

And you can visit our website (www.alahmed.iq) to have a look at our activities and our abilities for doing most of the tests in lab. or in site.



جمهورية العراق

Republic Of Iraq

نقابة المهندسين العراقية

Iraqi Engineers Union

إجازة مختبر
للأحمد للإستشارات والفحوصات الإنشائية
Engineering laboratory license

الأحمد للإستشارات والفحوصات الإنشائية

اسم المختبر :

Registered Name : *Al-Ahmed for Consultation & Constructional Testing*

Registration No. : 556

Registered Location : *Baghdad*

استنادا لقرار مجلس النقابة المرقم ٨٨ والمؤرخ في ٢٢ / ٢ / ١٩٩٨ وبناء على توفر الشروط القانونية
تقرر منح المهندس / **د. صاحب أحمد خضر**

إجازة مختبر لغرض الخدمات الهندسية الإستشارية في الإختصاصات والمرتبة التالية

In Reference to the Iraqi Engineers Union Board decision No. (88) dated 22/02/1998 , and as the applicant fully comply with the Engineering office

License Legal requirements , Engineer / **Dr. Saheb Ahmed Khider**

are granted the Engineering Laboratory License to perform their capacity in the following fields of activities and rank

Fields of Activities : *Civil.*

Rank : *Consultant*

License validity till **31/12/2015**

الإختصاصات : **مدني**

المرتبة : **إستشاري**

الإجازة نافذة لغاية **٢٠١٥/١٢/٣١**



Herein, Miscellaneous samples of selected reports of some recently executive projects done by our bureau:

**MINISTRY OF HIGHER EDUCATION
AND SCIENTIFIC RESEARCH
BAGHDAD-IRAQ**



**MIMAR EMIRATES ENG. CONSULTANTS
P.O.BOX.29354, Sharjah, UAE.**



**PRIME CONTRACTOR:
CONSULTANT ENGINEER
ABDUL KAREIM HARBY T.
CONSULTANT ENGINEERING
BAGHDAD-IRAQ**



**SECONDARY CONTRACTOR
AL-AHMED BUREAU FOR ENGINEERING CONSULTANTS
AND CONSTRUCTION MATERIAL
Baghdad - Al-Waziriyah, near Al-Shabab Theatre
Mobile: 07906317904-07700714644
Phone: 4225038-7183749**



**SOIL INVESTIGATION
OF
AL-NAHRAIN UNIVERSITY
EXTENSION AND REFURBISHMENT
PROJECT**

Revised Edition, July, 2011

Baghdad-IRAQ

Geotechnical Report for the Subsoil
Investigation
for
Al-Nahrain University
Extension and Refurbishment
Project
Baghdad-Iraq
Revised Edition, July, 2011

By
Al-Ahmed Bureau
for
Engineering Consultants & Construction Testing

Contents:

1. Introduction
2. Authorization
3. Site Location and Description
4. Site Exploration
 - 4.1 Drilling and sampling
 - 4.2 Number of boreholes
 - 4.3 In-Situ Testing (Standard Penetration Test)
 - 4.4 Laboratory Works
5. Results and Discussions of tests results
 - 5.1 Field Tests (Standard Penetration Test)
 - 5.2 Laboratory Tests
 - 5.2.1 Subsurface stratification
 - 5.2.2 Underground Water Table
 - 5.2.3 Atterberg Limits
 - 5.2.4 Soil Compressibility and Swelling Characteristics
 - 5.2.5 Permeability Measurement
 - 5.2.6 Shear Strength Parameter
 - 5.2.7 Chemical tests results
6. Conclusions and Recommendations
 - 6.1 Conclusions
 - 6.2 Design Data
 - 6.3 Recommendations
7. References

APPENDIX-A- Site plan and Boreholes locations

APPENDIX-B-Bore hole logs, Soil Profile and Corrected SPT N-values.

APPENDIX-C-Physical tests results

APPENDIX-D- Chemical tests results

APPENDIX-E- Sieve and hydrometer graphs

APPENDIX-F- Compressibility graphs

APPENDIX-G- Shear strength graphs

Abbreviations:

ASTM American Society for Testing and Materials

BS British Standards

CaSO₄.2H₂O Gypsum content, %

c Cohesion, kPa

C_c Compression index

C_r Recompression or rebound index

D.S. Disturbed Samples

e Void ratio

G_s Specific gravity

k Permeability coefficient, m/s

L.L. Liquid limit, %

N No. of blows of SPT

N.G.L Natural ground level

P Vertical pressure, kPa

P.I. Plasticity index, %

P.L. Plastic limit, %

P_c	Pre consolidation pressure, kPa
P_o	Overburden pressure, kPa
S.S.	The Split Spoon Samples
SO_3	Sulphate content, %
SPT	Standard penetration test
T.S.S.	Total Soluble Salts, %
U.S.	Undisturbed Samples
ϕ	Angle of shearing resistance, degree

Geotechnical Report for the Subsoil Investigation

for

Building Directorate for the Protection of Vital Installations in Kirkuk Kirkuk-Iraq

September, 2011

By

Al-Ahmed Bureau

for

Engineering Consultants & Construction Testing

**REPUBLIC OF IRAQ
MINISTRY OF ELECTRICITY
DIRECTORATE GENERAL FOR ENERGY PRODUCTION
PROJECTS
BAGHDAD-IRAQ**



MAIN CONTRACTOR:
INTERNATIONAL FREE COMPANY
SHAMARA GROUP
KARRADA-NEAR AL-MASBAH INTERSECTION
BAGHDAD-IRAQ



INTERNATIONAL FREE COMPANY

SHAMARA GROUP

SUB CONTRACTOR:
AL-AHMED BUREAU FOR ENGINEERING CONSUTANTS
AND CONSTRUCTION MATERIAL
Baghdad - Al-Waziriyah, near Al-Shabab Threatre
Mobile: 07906317904-07700714644
Phone: 4225038-7183749



**SOIL INVESTIGATION
OF
Karbala'a Gas Power Plant
PROJECT**

June, 2011

Baghdad-IRAQ

Geotechnical Report for the Subsoil
Investigation

for

Karbala'a Gas Power Plant
Project

Karbala'a-Iraq

June, 2011

By

Al-Ahmed Bureau

for

Engineering Consultants & Construction Testing

Geotechnical Report for the Subsoil Investigation

for

Basrah Water Supply

Improvement

Project

Al-Hartha WTP

BASRAH-IRAQ

DECEMBER, 2011

By

Al-Ahmed Bureau for Engineering Consultants& Construction

Testing

Geotechnical Report for the Subsoil Investigation

for

***Akaz 2X125 MW 9E Gas Power Plant At
Al-Anbar Province, Iraq***

January, 2012

By

Al-Ahmed Bureau
for
Engineering Consultants & Construction Testing

Geotechnical Report for the Subsoil Investigation
for
Directorate of Distribution of Maissan
Electricity
Al-Neda'a & Al-Araidat
Stations
AMARAH-IRAQ

January, 2012

By

Al-Ahmed Bureau

for

Engineering Consultants & Construction Testing

Geotechnical Report for the Subsoil
Investigation

for

**Kids Cultural City
Project**

Baghdad-Iraq

May, 2012

By

Al-Ahmed Bureau

for

Engineering Consultants & Construction Testing

Geotechnical Report for the Subsoil
Investigation

for

Safwan sewerage
Project

Al Basra-Iraq

First Edition, May, 2012

By

Al-Ahmed Bureau

for

Engineering Consultants & Construction Testing

Geotechnical Report for the Subsoil
Investigation

for

Shat Alarab sewerage
Project

Al Basra-Iraq

May, 2012

By

Al-Ahmed Bureau

for

Engineering Consultants & Construction Testing

Geotechnical Report for the Subsoil
Investigation

for

Umm-Qasr sewerage
Project

Al Basra-Iraq

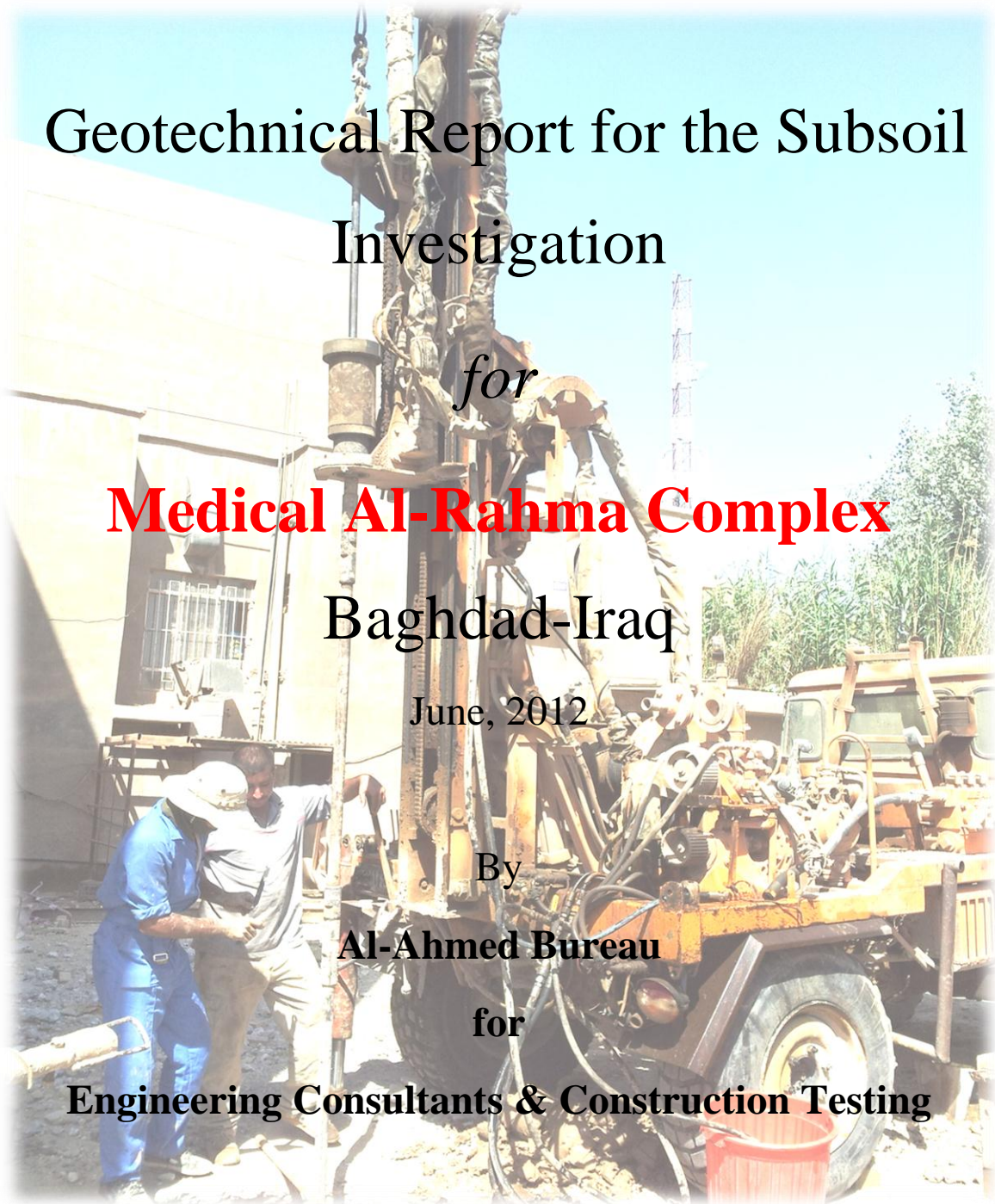
First Edition, May, 2012

By

Al-Ahmed Bureau

for

Engineering Consultants & Construction Testing



Geotechnical Report for the Subsoil
Investigation

for

Medical Al-Rahma Complex

Baghdad-Iraq

June, 2012

By

Al-Ahmed Bureau

for

Engineering Consultants & Construction Testing

FALLUJAH SEWER PROJECT

LABORATORY SOIL TESTING RESULTS

**AL-AHMED BUREAU FOR
ENGINEERING
CONSULTANTS &
CONSTRUCTION TESTING**

7/13/2012

HALFAYAH OIL PROJECT

LABORATORY SOIL TESTING RESULTS

**AL-AHMED BUREAU FOR
ENGINEERING
CONSULTANTS &
CONSTRUCTION TESTING**

7/26/2012

Geotechnical Report of
Subsoil Investigation

for

Iraqi University

**PROPOSED B+G+4 BUILDING
AT AL-BAKREYA ZONE**

Baghdad-Iraq

August, 2012

By

Al-Ahmed Bureau

for

Engineering Consultants & Construction Testing



Geotechnical Report of
Subsoil Investigation

for

**Iraqi University
in Al-Tarmeya Zone**

Baghdad-Iraq

August, 2012

by

Al-Ahmed Bureau

for

Engineering Consultants & Construction Testing

Geotechnical Report for the Subsoil Investigation

for
AKKAS GAS FIELD
Al-Anbar Governorate, Iraq

September, 2012

by
Al-Ahmed Bureau
for
Engineering Consultants & Construction Testing



AL-AALY

For Engineering Consultancy



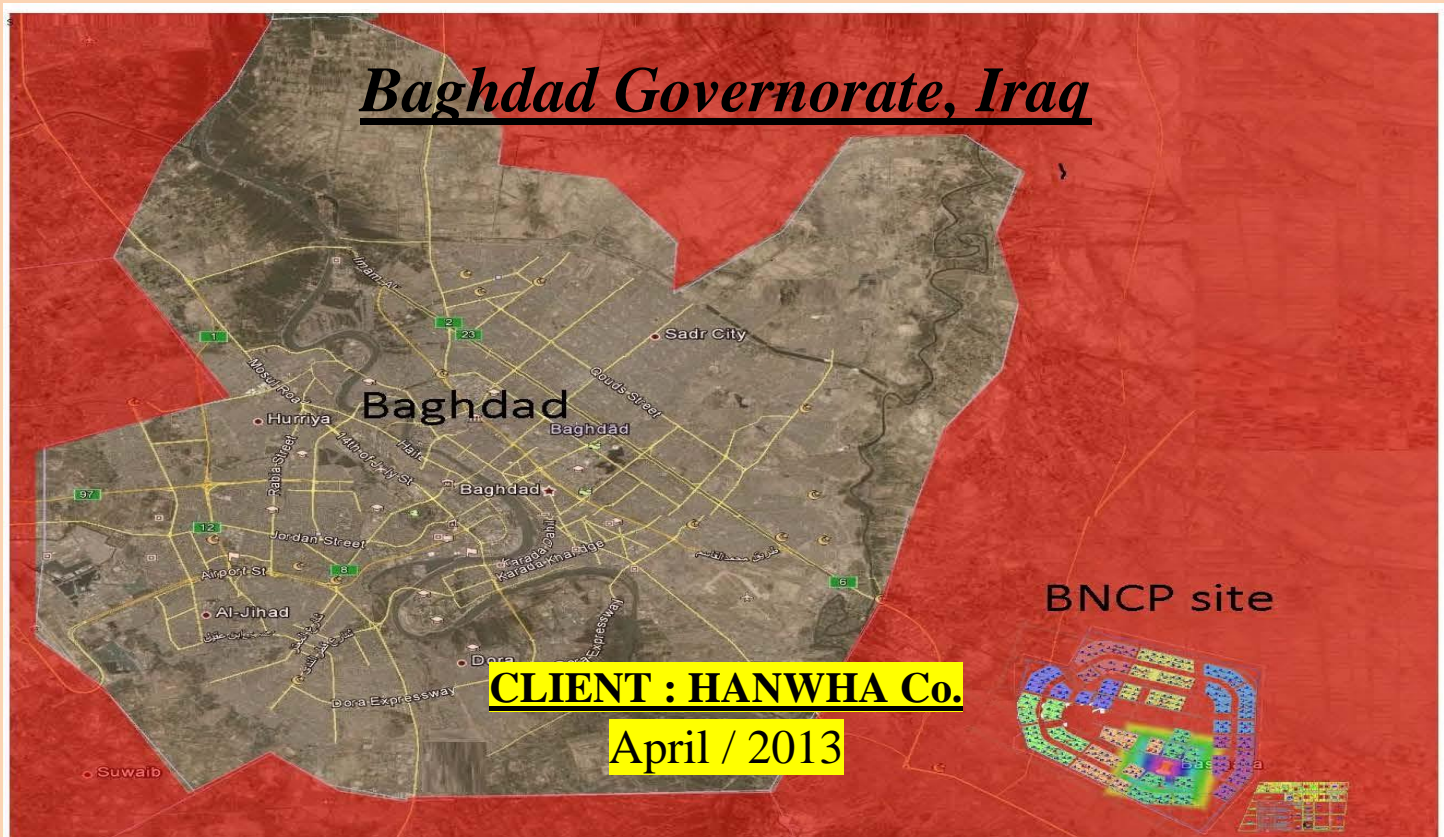
AL-AHMED

For Engineering Consultancy

2013

BISMAYA NEW CITY PROJECT
Geotechnical Investigation Report Of

APT SITE



By

AL-AALY CO. FOR ENGINEERING CONSULTANCY
AL-AHMED FOR CONSULTANCY & LABORATORY TESTS

Geotechnical Investigation Report for APT Site

**THE FINAL REPORT OF SUBSOIL INVESTIGATION
AKKAS PROJECT
AKKAS GAS FIELD – ALANBAR GOVERNORATE,
REPUBLIC OF IRAQ**



February
2014

The Final Report of Subsoil Investigation

for

***AKKAS PJ
Al-Anbar Governorate, Iraq***



DAEWOO E&C

By

AL-AHMED LABORATORY



for

Engineering Consultants & Construction Testing

The Final Report of Subsoil Investigation

for

***AKKAS EP PROJECT
Phase (1)
Al-Anbar Governorate, Iraq***



By

AL-AHMED LABORATORY



for

Engineering Consultants & Construction Testing



AL-AHMED

Engineering Consultants & Construction Testing

Jan.

2015

Supplementary Investigation Report for

**Al-Mdaina Hospital Site
Additional BH6, BH7, BH8**

Basrah Governorate, Iraq



Al-Mdaina Site

Website : alahmed.iq

E-mail : info@alahmed.iq

Geotechnical Investigation Report

HEALTH CENTER

IN BALADROZ DISTRICT

Diyala Governorate, Iraq



Final Soil Investigations Report for

AL ZUBAIR WATER

TREATMENT PLANT

AL - GELIDHA SITE

AL-BASRAH GOVERNORATE, IRAQ



REPORT No. 138/15

Website : alahmed.iq

E-mail : info@alahmed.iq

Boring and Excavation



Plate Load Test and Field Density Test



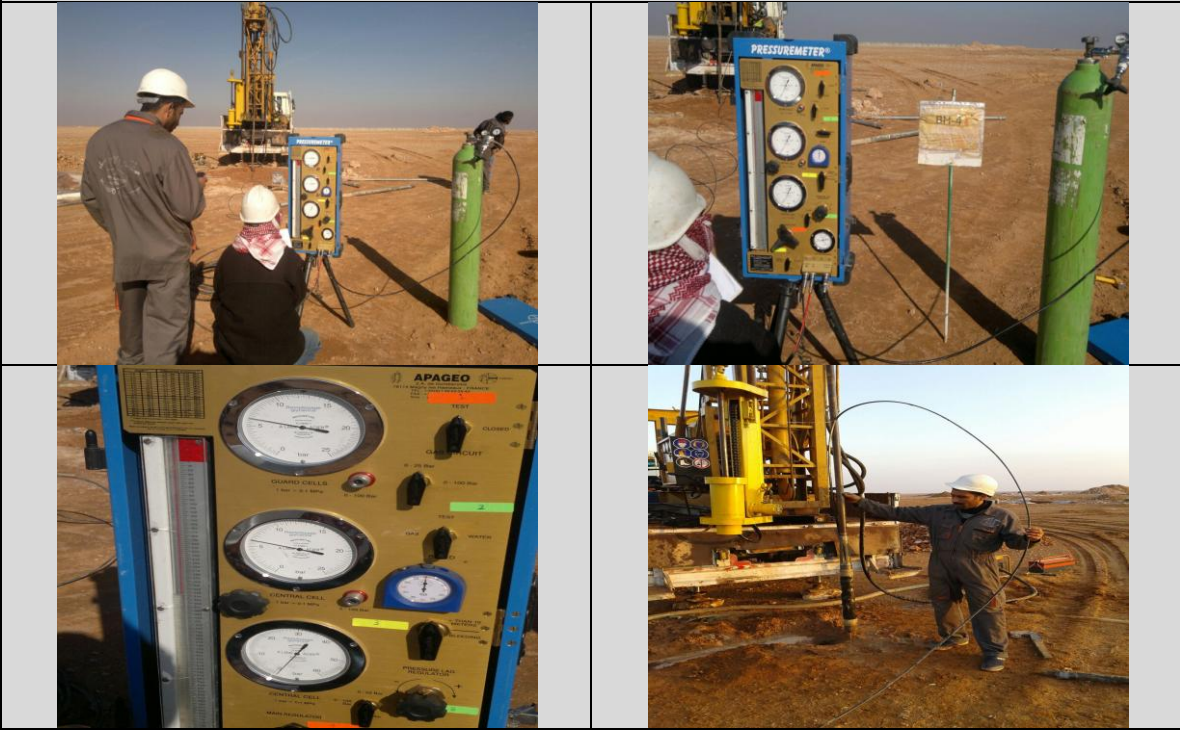
Electrical Resistivity Test and Thermal Conductivity Test



Field Permeability Test



Pressuremeter Test



Down Hole Test



Laboratory Tests





SPT



CPT



Sieve Analysis



Hydraulic Conductivity



Tri-axial Test (CU)



Tri-axial Test (UU)



Unconfined Compression Test



Standard Consolidation Test



Soil Chemical Test



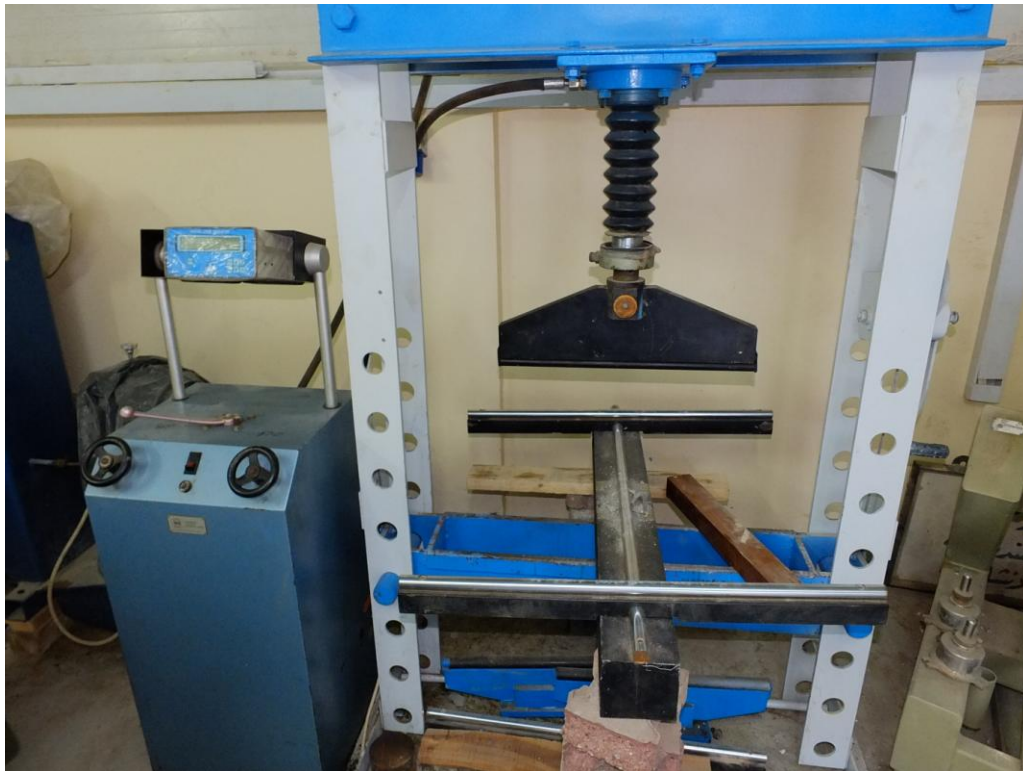
Ground water Chemical Test

SOIL LABORATORY



CEMENT AND CONCRETE LABORATORY





STEEL LABORATORY



ASPHALT LABORATORY

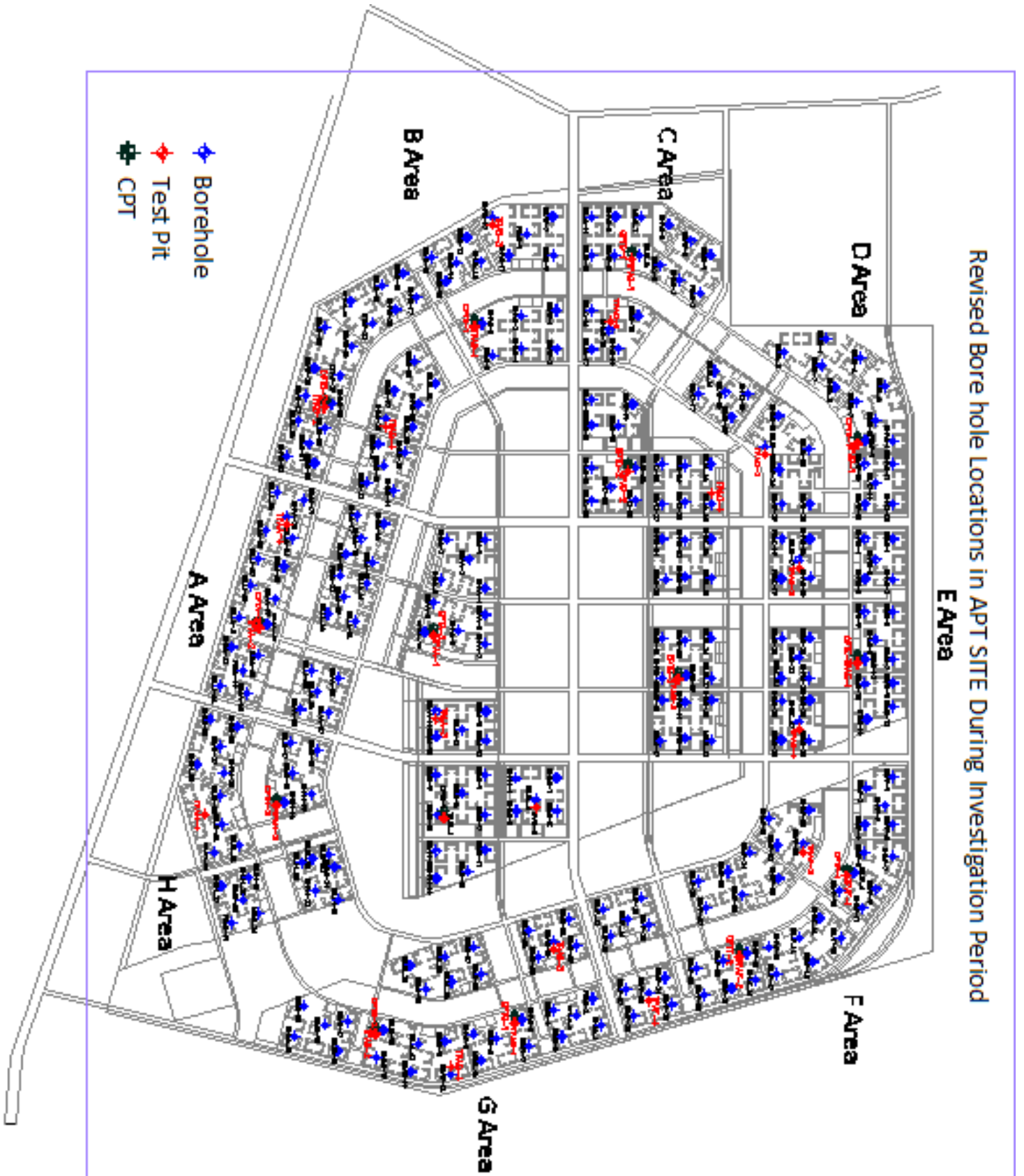




Appendix-A-
Revised Bore hole
Locations

Revised Borehole Locations in APT Site

During Investigation Period



Appendix - B - Borehole Logs

BOREHOLE LOG

Project: BNCP

Borehole No: BHP1-10	Coordinates : N= 3669931.53 E= 467620.625 Elv= 28.515
Borehole Diameter: 100 mm	Date of Drilling: 7/1/2013
Depth of Borehole: 30m	Method of Drilling: Flight Auger

Depth (m)	Sample Type	S.P.T			Corrected SPT Blows N ₁ (60)	Description of Soil and Symbol
		15cm	15cm	15cm		
0.0-1.0	DS					Brown Clay
1.0-1.5	US					Ditto
1.5-2	SS	5	8	12	11	Ditto
2-3.5	DS					Ditto
3.5-4.0	SS	11	14	16	17	Ditto
4.0-5.0	DS					Ditto
5.0-5.5	US					Ditto
5.5-6.0	SS	18	20	27	26	Ditto
6.0-7.5	DS					Ditto
7.5-8.0	SS	15	20	24	25	Black Sand
8.0-9.5	DS					Ditto
9.5-10.0	SS	10	12	15	15	Ditto
10.0-11.5	DS					Ditto
11.5-12.0	SS	8	14	26	30	Ditto
12.0-13.5	DS					Ditto
13.5-14.0	SS	13	14	23	28	Ditto
14.0-15.5	DS					Ditto
15.5-16.0	SS	10	19	25	33	Ditto
16.0-17.5	DS					Ditto
17.5-18.0	SS	16	17	28	34	Ditto
18.0-19.5	DS					Ditto
19.5-20	SS	17	20	29	37	Ditto

Initial Water Table Level in m (1.8)	SS: Split Spoon Sample	D.S: Disturbed Sample	U.S: Shelby Tube
Final Water Table Level in m (0.92)			

BOREHOLE LOG

Project: BNCP

Borehole No: **BHP1-10**

Coordinates : N= **3669931.53** E= **467620.625** Elv= **28.515**

Borehole Diameter: 100 mm

Date of Drilling: 7/1/2013


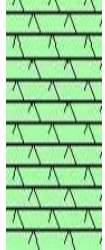
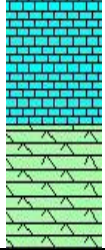
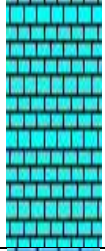
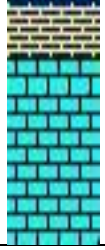
Depth of Borehole: 30m

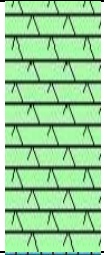
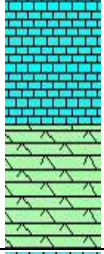
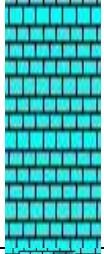

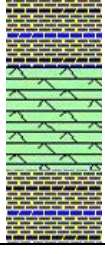
Method of Drilling: Flight Auger

Depth (m)	Sample Type	S.P.T			Corrected SPT Blows N _i (60)	Description of Soil and Symbol
		15cm	15cm	15cm		
20.0-23.5	DS					Sand
23.5-24.0	SS	19	22	33	41	Ditto
24.0-25.5	DS					Ditto
25.5-26.0	SS	21	21	34	41	Ditto
26.0-27.5	DS					Ditto
27.5-28.0	SS	20	24	34	44	Ditto
28.0-29.5	DS					Ditto
29.5-30.0	SS	23	25	37	47	Ditto
Initial Water Table Level in m (1.8)		SS: Split Spoon Sample			D.S: Disturbed Sample	U.S: Shelby Tube
Final Water Table Level in m (0.92)						

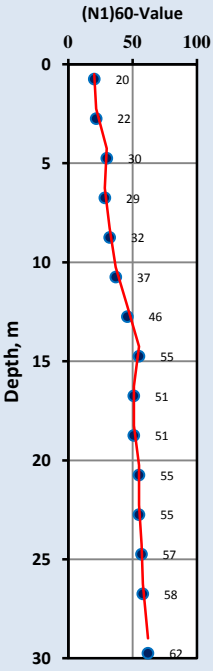
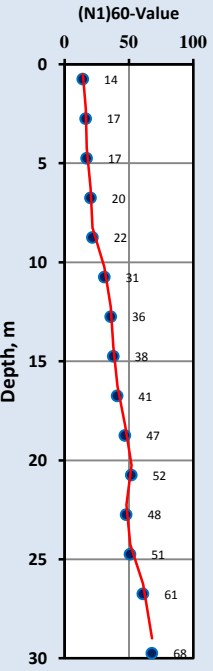
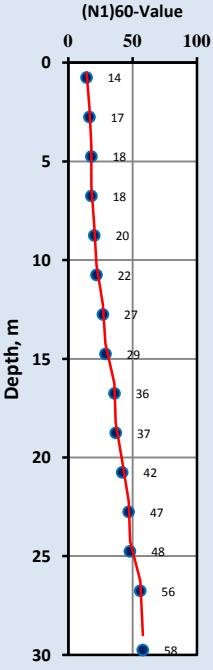
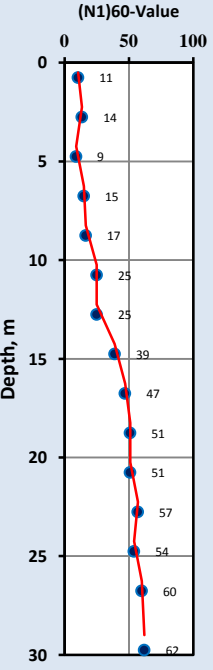


LOG OF BORING NO : *BH-1*

PROJECT: AKKAS PJ.		Coordinates		NORTH (m) : 3,771,843.88		
DATE : 19-11-2013				EAST (m) : 684,681.95		
METHOD DETAILS: Core boring water				WATER Table (m) : Not encountered		
SAMPLE DEPTH (m)	Sample Type	Lithology	Total Recovery %	RQD %	DESCRIPTION	Remark
0.0-0.5	DS				Top – soil (Rock fragment) Silt & Shale – Light to Dark Brown	
0.5-1.0	SPT 36/15 50/6				Limestone , color off White to light Gray High hardness	
1.0-2.5	DS				Limestone , color off White to light Gray High hardness Marly lime ,Color – light Red, Low- hardness	
2.5-3.0	SPT 50/8				Marly lime ,Color – light Red to off white Low- hardness	
3.0-4.5	Core		50	0.0	Dolomite, light Gary, high Hardness Limestone , color off White to light Gray High hardness Contains Fossils	Losing of Water in the depth (3.0 – 4.5)M

SAMPLE DEPTH (m)	Sample Type	Lithology	Total Recovery %	RQD %	DESCRIPTION	Remark
4.5-5.0	SPT 50/7				Marly lime ,Color – Off White to Light Red Low- hardness	
5.0-6.5	Core		66.5	0.0	Limestone – light Gray to off White Thick – 60 cm ,Contains Fossils High hardness Marly lime ,Color – light Red to off white Low- hardness	
6.5-7.0	SPT 12/15 50/8				Limestone – light Red to off White High hardness	
7.0-8.5	Core		73.1	0.0	Limestone , color – off White to light Red Thick 60cm, High-hardness Contains shale in the Limestone Beds Dolomite, light Gary, Thick 50cm high Hardness	
8.5-10.0	Core		46	0.0	Dolomite, light Gary, high Hardness Thick 35Cm, Marly lime ,Color – Off White to light Pink Thick 30 Cm, Low- hardness Dolomite, light Gary, high Hardness	

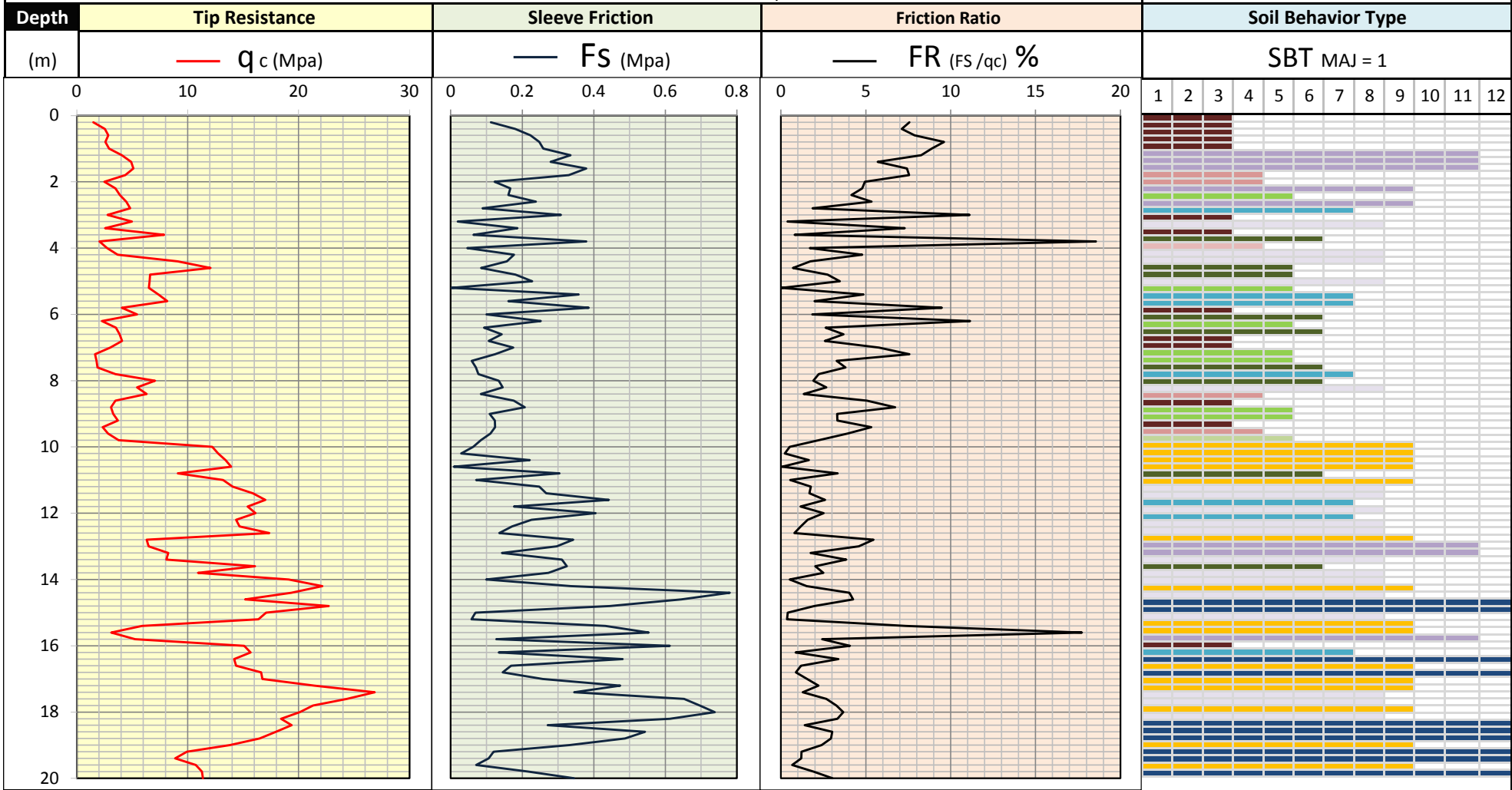
**Appendix - C -
Corrected Standard
Penetration Test Blows
(N60)**

BHAG-19	Variations of factors	BHAG-20	Variations of factors																																																																																																																																				
 <table border="1" data-bbox="203 289 414 955"> <caption>(N1)60-Value vs Depth (m) for BHAG-19</caption> <tr><th>Depth (m)</th><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td></tr> <tr><th>(N1)60-Value</th><td>20</td><td>22</td><td>30</td><td>29</td><td>32</td><td>37</td><td>46</td><td>55</td><td>51</td><td>51</td><td>55</td><td>55</td><td>57</td><td>58</td><td>62</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>	Depth (m)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	(N1)60-Value	20	22	30	29	32	37	46	55	51	51	55	55	57	58	62																			$\eta_H=60$ $\eta_B=1$ $\eta_S=1$ $\eta_R=0.75$	 <table border="1" data-bbox="883 289 1094 955"> <caption>(N1)60-Value vs Depth (m) for BHAG-20</caption> <tr><th>Depth (m)</th><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td></tr> <tr><th>(N1)60-Value</th><td>14</td><td>17</td><td>17</td><td>20</td><td>22</td><td>31</td><td>36</td><td>38</td><td>41</td><td>47</td><td>52</td><td>48</td><td>51</td><td>61</td><td>68</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>	Depth (m)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	(N1)60-Value	14	17	17	20	22	31	36	38	41	47	52	48	51	61	68																			$\eta_H=60$ $\eta_B=1$ $\eta_S=1$ $\eta_R=0.75$
Depth (m)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30																																																																																																								
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BHAG-21	Variations of factors	BHAG-32	Variations of factors																																																																																																																																				
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Depth (m)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30																																																																																																								
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Appendix -D-
Cone Penetration Test Results
(CPT)

CONE PENETRATION TEST RESULTS

<i>CPTCA-1</i>	PROJECT TITLE : Bismayah New City Project		
LOCATION : <i>iraq- Baghdad province .</i>	STA. : FLAT AREA	DATE : 19-Dec.2012	
TESTED BY : FIRAS & SAMEAR	TEST NO.6	TOTAL DEPTH OF BORE HOLE : 20.0 M	
EQUIPMENTS : MAX.LOAD . 10 TON , CONE DIA : 35.7 mm , SLEEVE DIA : 35.7 mm , tip area = 10 cm ² , sleeve area = 150 cm ²			standard : ASTM D 3441



	1 Sensitive Fine Grained	4 Silty Clay To Clay	7 silty sand to sandy silt	10 Gravelly Sand To Sand
	2 Organic Material	5 clayey silt to silty clay	8 sand to silty sand	11 Very Stiff Fine Grained
	3 Clay	6 sandy silt to clayey silt	9 sand	12 Sand To Clayey Sand

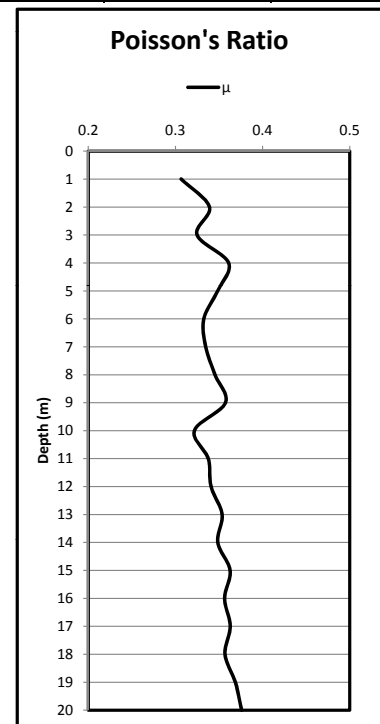
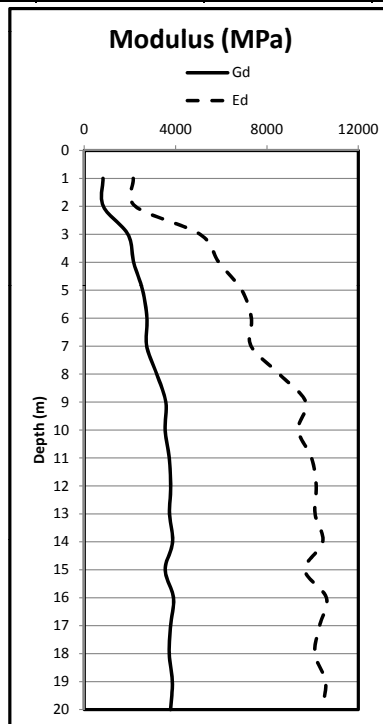
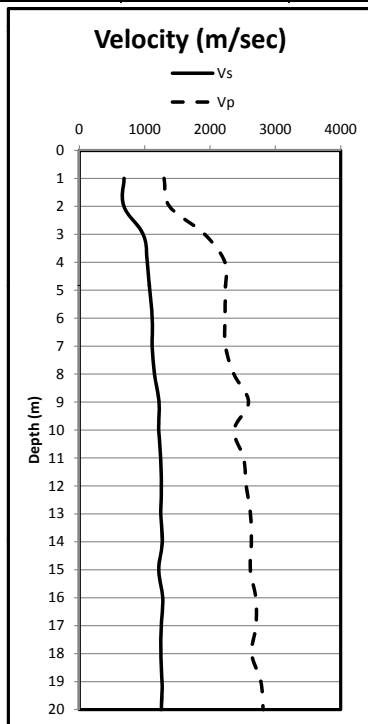
**Appendix - E -
Down Hole Test
Results**



Downhole Seismic Testing According to ASTM D-7400

Project Name : AKKAS PJ
Site Location : AKKAS Gas Field-Alanbar Governorate-Republic of Iraq
Borhole No. : DHT-1
Total Depth (m) : 20

Date of test :		Weather :		Source :		Borehole information :	
19-Jan-14		Cloudy, 20°C		10 kg Hammer		Grouted Cased Borehole	
Depth (m)	Vp (m/sec)	Vs (m/sec)	Density, ρ (kg/m ³)	Poisson's Ratio, μ	Shear Modulus, Gd (Mpa)	Young's Modulus, Ed (Mpa)	Bulk Modulus, Bd (Mpa)
1	1297	685	1750	0.31	821.14	2145.78	1849.01
2	1380	681	1800	0.34	834.77	2235.59	2314.89
3	1920	978	2000	0.32	1912.97	5068.66	4822.18
4	2230	1040	2000	0.36	2163.20	5888.33	7061.53
5	2235	1078	2200	0.35	2556.58	6894.68	7580.72
6	2230	1117	2200	0.33	2744.92	7315.39	7280.49
7	2237	1115	2200	0.33	2735.10	7301.17	7362.38
8	2366	1150	2400	0.35	3174.00	8540.21	9203.09
9	2590	1220	2400	0.36	3572.16	9697.88	11336.56
10	2370	1215	2400	0.32	3542.94	9365.70	8756.64
11	2515	1245	2400	0.34	3720.06	9952.65	10220.46
12	2556	1256	2400	0.34	3786.09	10153.02	10631.41
13	2620	1247	2400	0.35	3732.02	10103.03	11498.53
14	2634	1270	2400	0.35	3870.96	10440.41	11489.81
15	2618	1215	2400	0.36	3542.94	9656.25	11725.50
16	2701	1276	2400	0.36	3907.62	10600.22	12298.80
17	2705	1255	2400	0.36	3780.06	10303.31	12520.78
18	2639	1245	2400	0.36	3720.06	10095.19	11754.29
19	2780	1268	2400	0.37	3858.78	10562.66	13403.12
20	2815	1255	2400	0.38	3780.06	10402.47	13978.06



Vs: The propagation velocity of the shear waves
Vp: The propagation velocity of the compressional waves

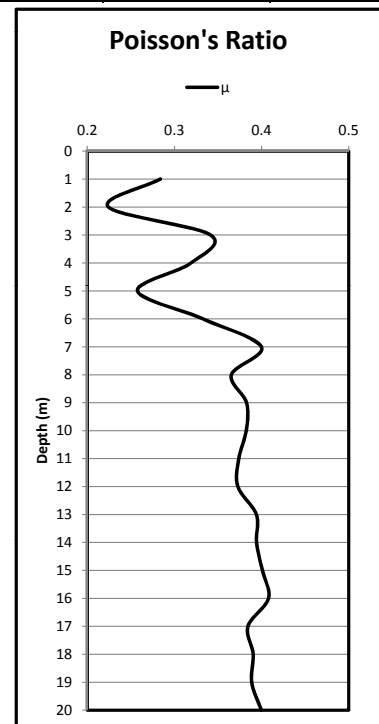
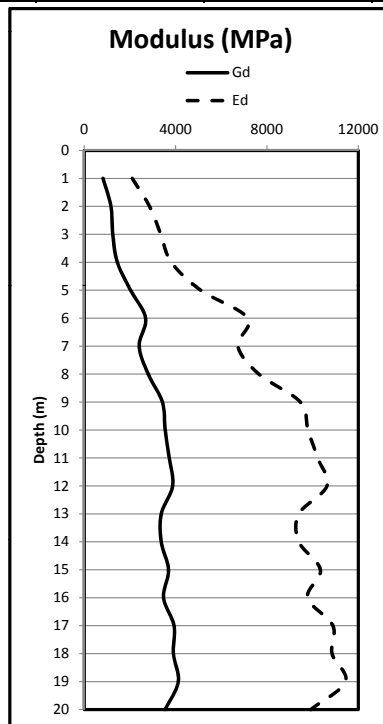
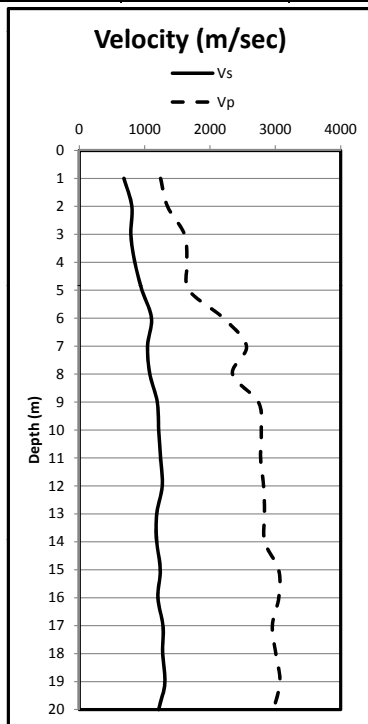
Ed, Gd, Bd and μ : Dynamic elastic soil properties



Downhole Seismic Testing According to ASTM D-7400

Project Name : AKKAS PJ
Site Location : AKKAS Gas Field-Alanbar Governorate-Republic of Iraq
Borhole No. : DHT-2
Total Depth (m) : 20

Date of test :		Weather :		Source :		Borehole information :	
19-Jan-14		Cloudy, 20°C		10 kg Hammer		Grouted Cased Borehole	
Depth (m)	Vp (m/sec)	Vs (m/sec)	Density, ρ (kg/m ³)	Poisson's Ratio, μ	Shear Modulus, Gd (Mpa)	Young's Modulus, Ed (Mpa)	Bulk Modulus, Bd (Mpa)
1	1245	684	1750	0.28	818.75	2102.27	1620.88
2	1350	805	1800	0.22	1166.45	2855.74	1725.24
3	1610	790	2000	0.34	1248.20	3348.77	3519.93
4	1650	850	2000	0.32	1445.00	3812.99	3518.33
5	1680	960	2200	0.26	2027.52	5099.52	3505.92
6	2206	1105	2200	0.33	2686.26	7159.01	7124.49
7	2558	1045	2200	0.40	2402.46	6726.10	11192.13
8	2345	1080	2400	0.37	2799.36	7644.46	9465.18
9	2740	1194	2400	0.38	3421.53	9462.56	13456.20
10	2785	1215	2400	0.38	3542.94	9795.99	13891.02
11	2774	1245	2400	0.37	3720.06	10221.83	13508.10
12	2820	1270	2400	0.37	3870.96	10628.03	13924.48
13	2835	1185	2400	0.39	3370.14	9396.95	14795.82
14	2837	1185	2400	0.39	3370.14	9398.17	14823.05
15	3050	1240	2400	0.40	3690.24	10339.98	17405.68
16	3052	1203	2400	0.41	3473.30	9781.00	17724.22
17	2954	1280	2400	0.38	3932.16	10887.52	15699.80
18	3007	1275	2400	0.39	3901.50	10849.32	16498.92
19	3070	1310	2400	0.39	4118.64	11439.05	17128.24
20	2974	1215	2400	0.40	3542.94	9919.01	16503.30



Vs : The propagation velocity of the shear waves

Vp : The propagation velocity of the compressional waves

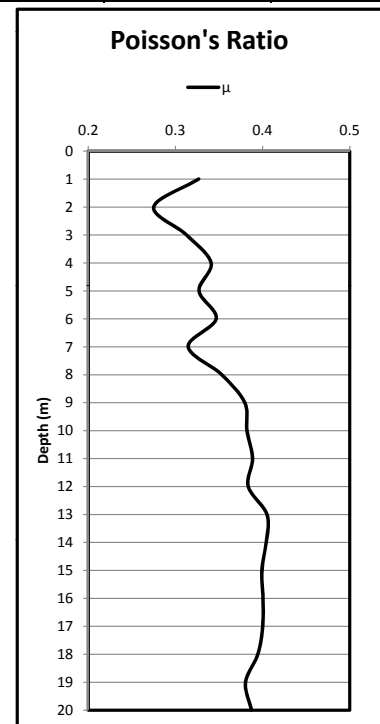
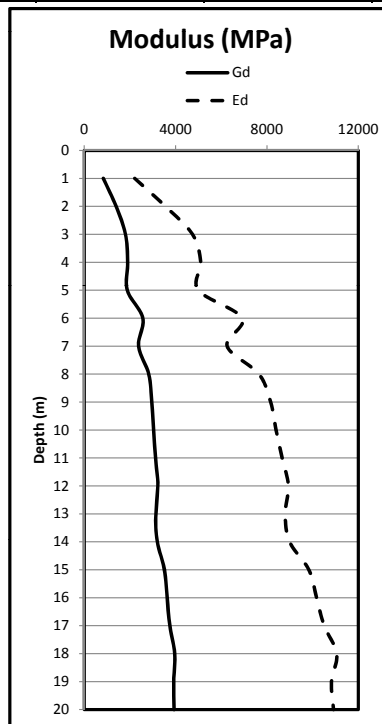
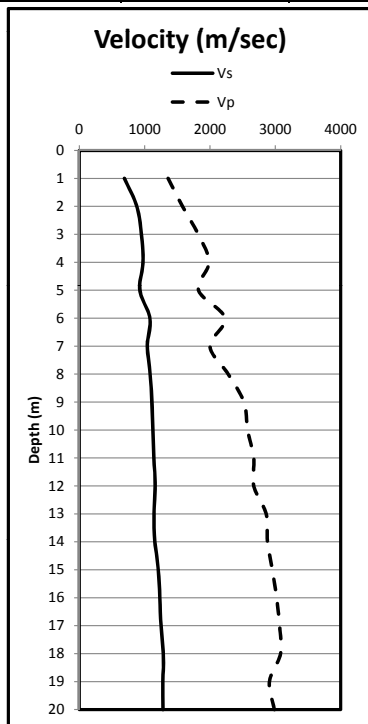
Ed, Gd, Bd and μ : Dynamic elastic soil properties



Downhole Seismic Testing According to ASTM D-7400

Project Name : AKKAS PJ
Site Location : AKKAS Gas Field-Alanbar Governorate-Republic of Iraq
Borhole No. : DHT-3
Total Depth (m) : 20

Date of test :		Weather :		Source :		Borehole information :	
20-Jan-14		Sunny, 12°C		10 kg Hammer		Grouted Cased Borehole	
Depth (m)	Vp (m/sec)	Vs (m/sec)	Density, ρ (kg/m ³)	Poisson's Ratio, μ	Shear Modulus, Gd (Mpa)	Young's Modulus, Ed (Mpa)	Bulk Modulus, Bd (Mpa)
1	1360	690	1750	0.33	833.18	2210.72	2125.90
2	1580	880	1800	0.28	1393.92	3554.90	2634.96
3	1820	950	2000	0.31	1805.00	4739.03	4218.13
4	1985	975	2000	0.34	1901.25	5099.20	5345.45
5	1825	925	2200	0.33	1882.38	4996.37	4817.54
6	2230	1080	2200	0.35	2566.08	6911.93	7518.94
7	2000	1040	2200	0.31	2379.52	6256.68	5627.31
8	2278	1085	2400	0.35	2825.34	7647.00	8687.16
9	2520	1110	2400	0.38	2957.04	8159.29	11298.24
10	2576	1125	2400	0.38	3037.50	8396.63	11875.86
11	2670	1140	2400	0.39	3119.04	8661.75	12950.64
12	2670	1160	2400	0.38	3229.44	8936.93	12803.44
13	2860	1142	2400	0.41	3129.99	8796.27	15457.72
14	2880	1155	2400	0.40	3201.66	8991.35	15637.68
15	2954	1210	2400	0.40	3513.84	9833.09	16257.56
16	3020	1230	2400	0.40	3630.96	10170.79	17047.68
17	3065	1250	2400	0.40	3750.00	10501.84	17546.14
18	3080	1285	2400	0.39	3962.94	11053.65	17483.44
19	2910	1278	2400	0.38	3919.88	10822.93	15096.93
20	2985	1280	2400	0.39	3932.16	10910.53	16141.66



Vs : The propagation velocity of the shear waves

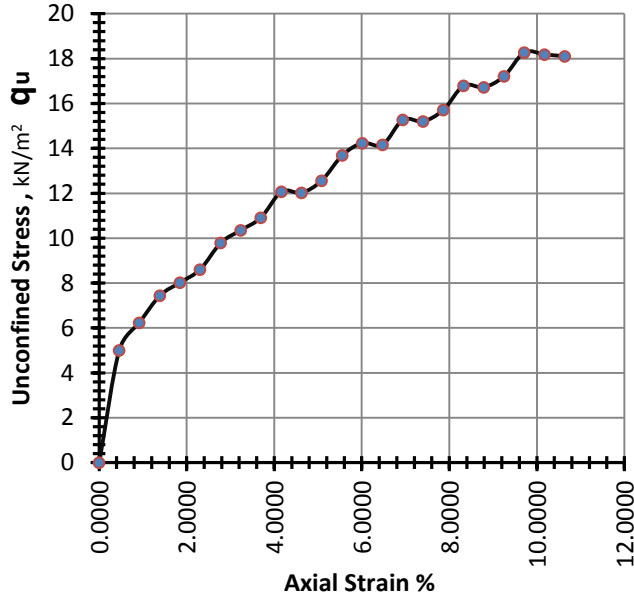
Vp : The propagation velocity of the compressional waves

Ed, Gd, Bd and μ : Dynamic elastic soil properties

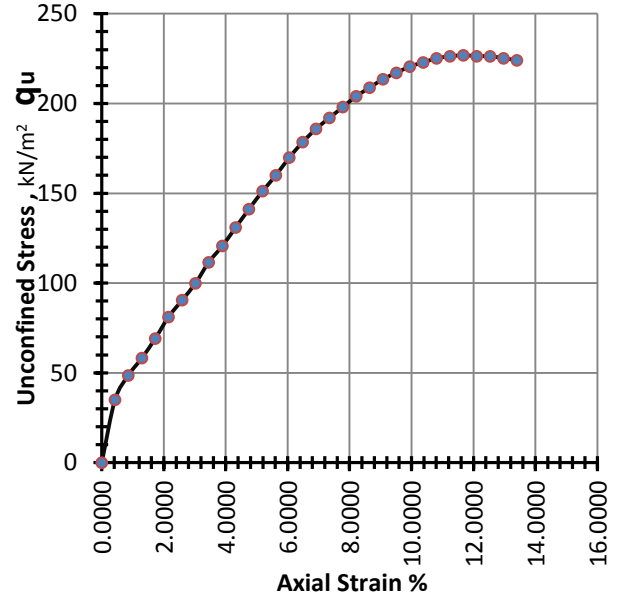
**Appendix - F -
Unconfined Compression
, Tri axial (UU , CU) &
Consolidation Test
Results**

Unconfined Test

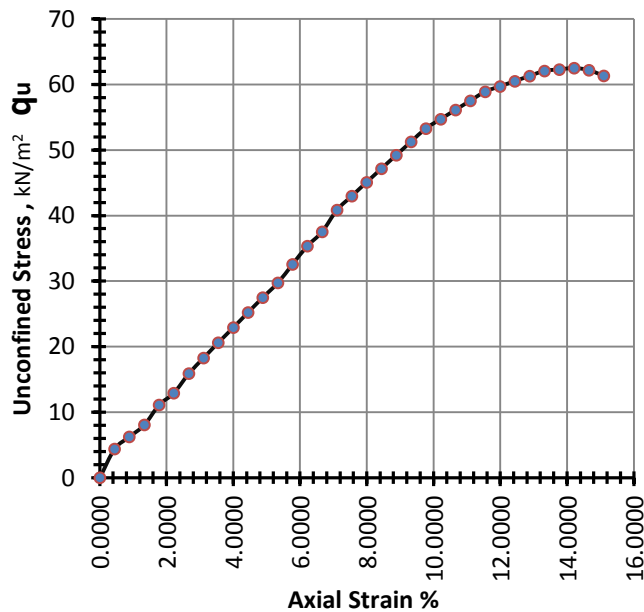
BH AA-10



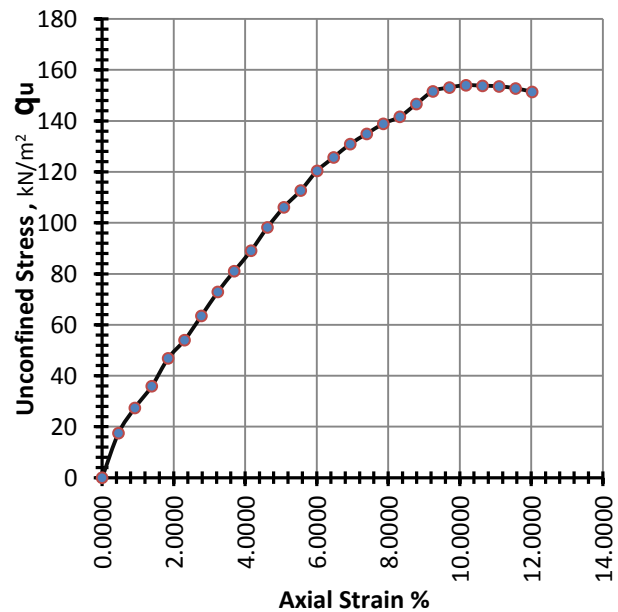
Depth (m) : 1-1.5 , Max. stress (Kn/m²) =18.27



Depth (m) : 3-3.5 , Max. stress (Kn/m²) =226.87

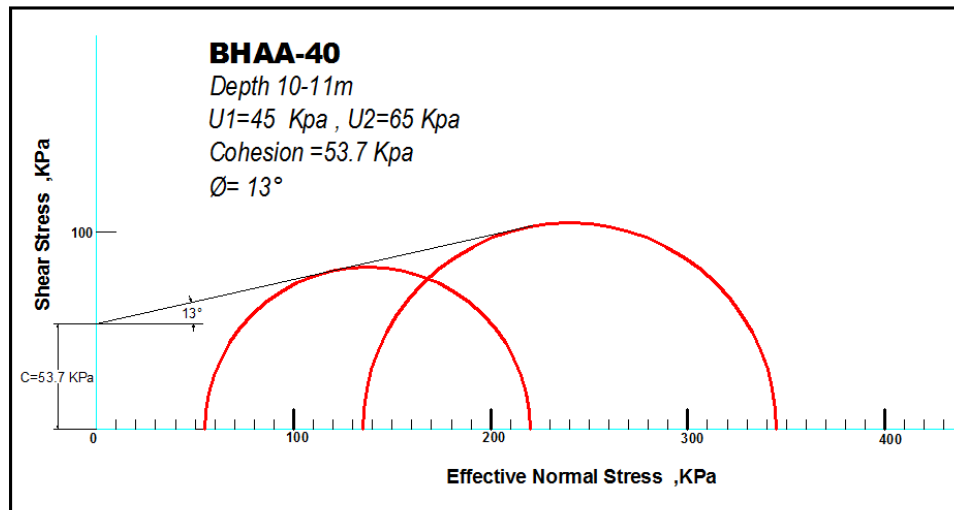
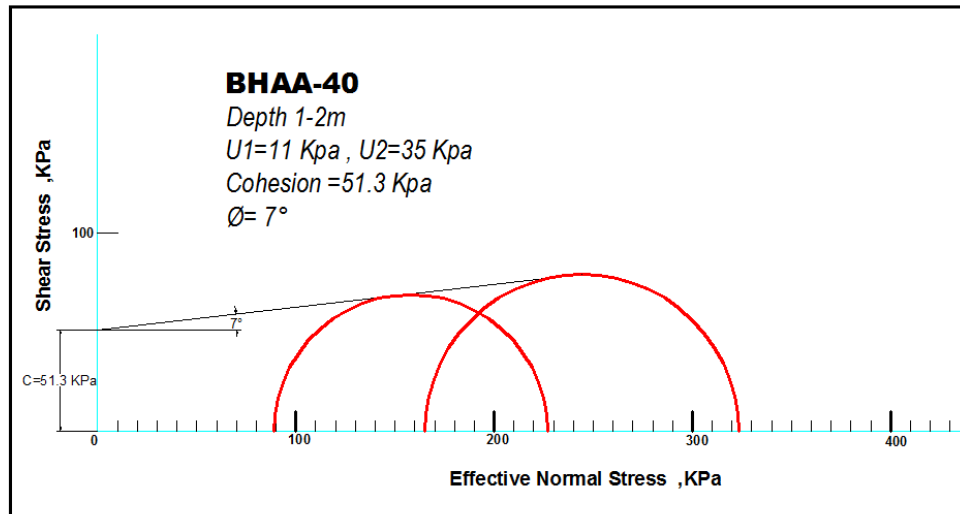


Depth (m) : 5-5.5 , Max. stress (Kn/m²) =62.5

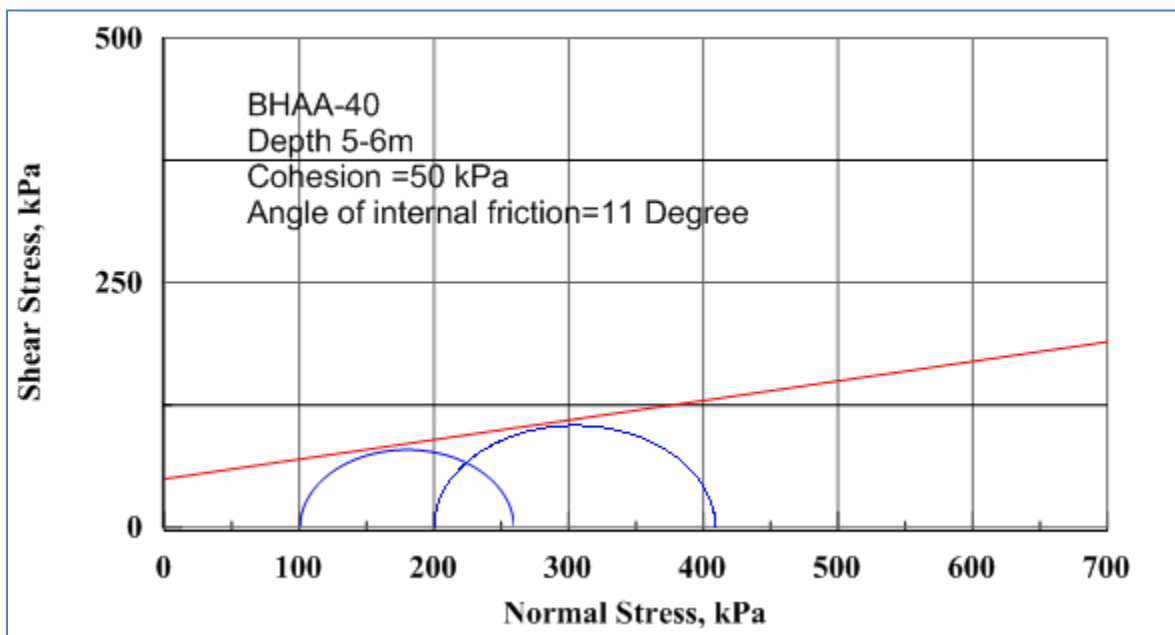
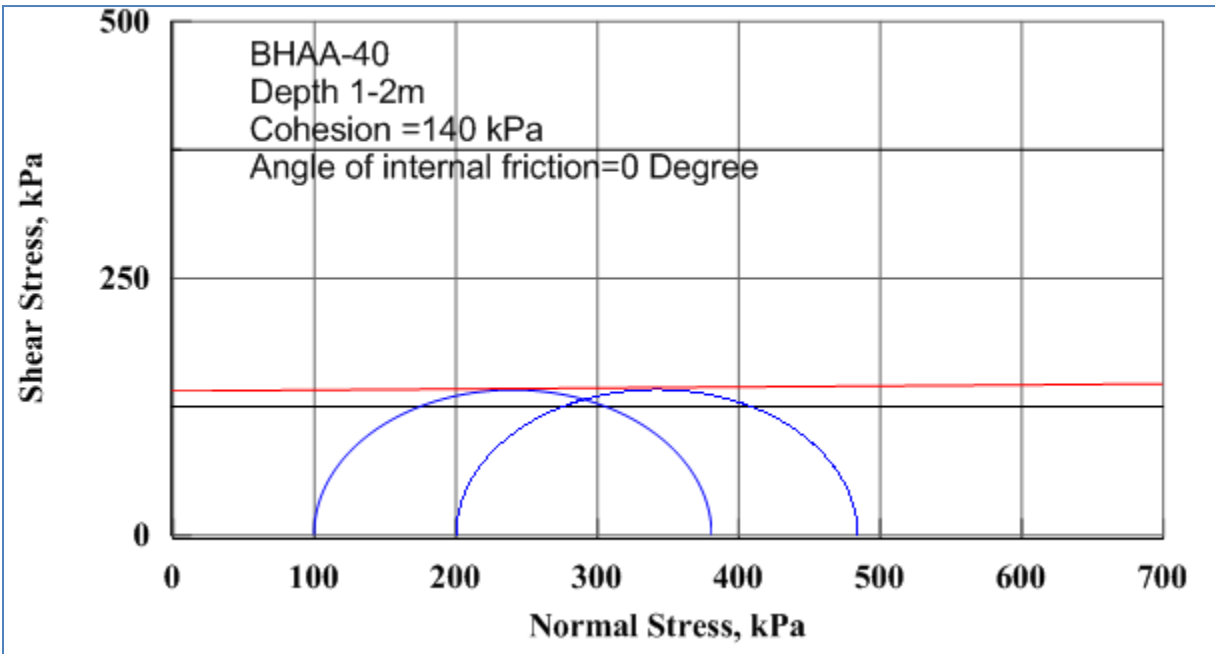


Depth (m) : 7-7.5 , Max. stress (Kn/m²) =154.0

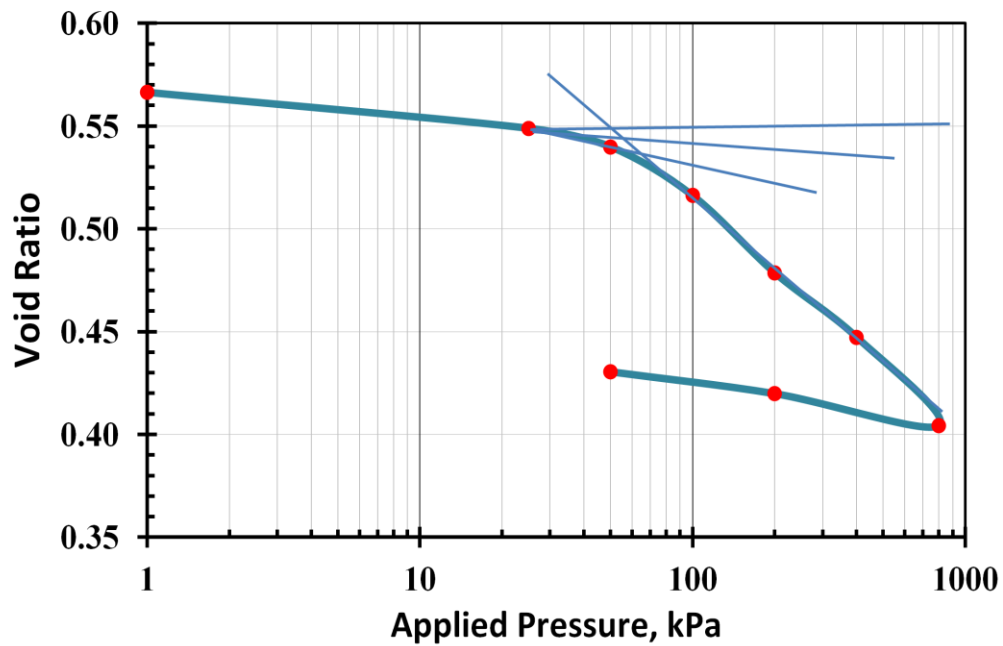
Triaxial (CU) Test



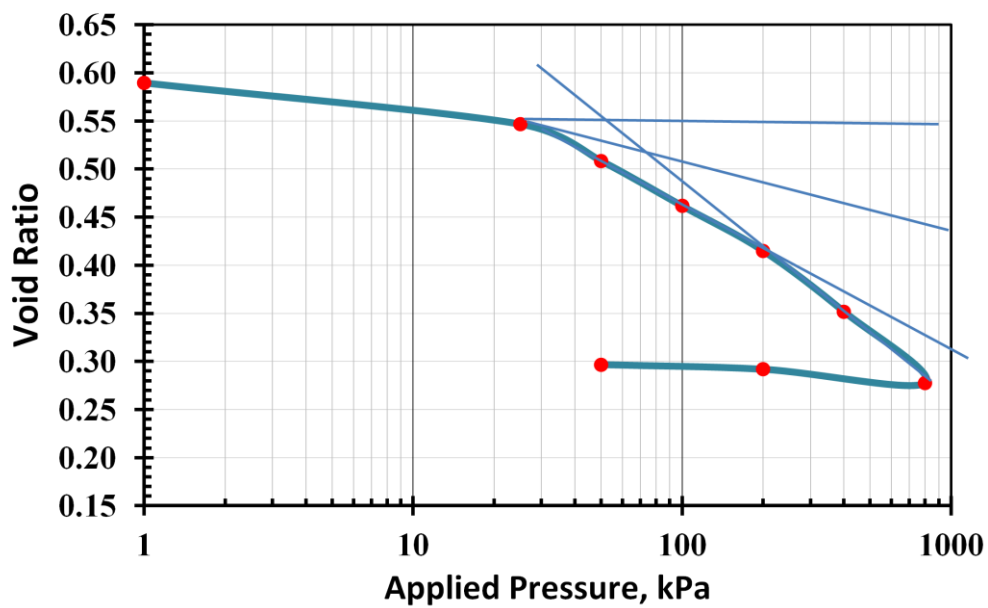
Triaxial (UU) Test



Consolidation Test Results



BHAA-40 Depth (1-2m)



BHAA-40 Depth (5-6m)

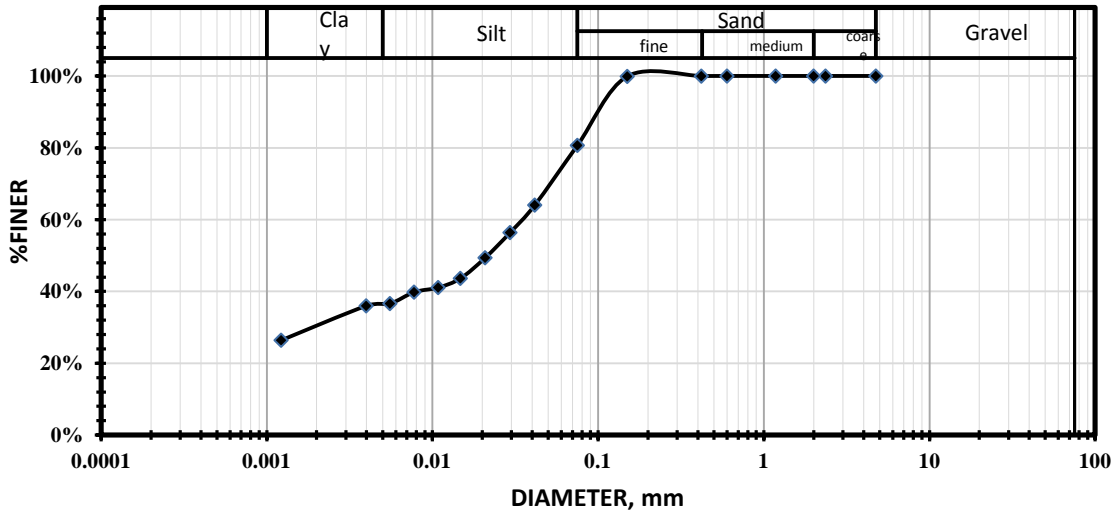
**Appendix - G -
Soil Physical & Chemical
Test Results**

Borehole No.	Depth (m)	Moisture Content %	Specific Gravity
BH AA-40	1.0-2.0	25.69	2.78
	5.0-6.0	19.94	2.73
	10.0-11.0	29.33	2.74
	15.0-16.0	19.14	2.71
	20.0-20.5	27.23	2.69
	44.5-46.0	25.04	2.68
BH AB-5	1.0-2.0	21.03	2.76
	4.0-5.0	17.20	2.77
	7.0-8.0	30.17	2.75
	10.0-11.0	21.65	2.72
	18.0-18.5	26.29	2.69
	40.0-40.5	22.74	2.67
BH AC-28	1.0-2.0	22.31	2.74
	5.0-6.0	20.24	2.75
	10.0-11.0	19.87	2.73
	17.0-17.5	20.95	2.71
	27.0-27.5	20.33	2.67
	45.0-45.5	22.33	2.68
BH AD-9	1.0-1.5	18.54	2.77
	3.0-3.5	21.24	2.76
	5.0-5.5	21.87	2.73
	7.0-7.5	22.56	2.71
	9-9.5	24.13	2.69
	25.5-26	21.76	2.66
BH AE-10	1.0-1.5	16.49	2.74
	5.5-6.0	26.97	2.78
	10.0-10.5	30.20	2.76
	12.5-13.0	23.34	2.71
	16.5-17.0	32.27	2.68
	26.0-26.5	21.21	2.66
BH AG-15	1.0-2.0	29.36	2.70
	5.0-6.0	24.56	2.68
	10-10.5	20.63	2.68
	22-22.5	20.87	2.66
	30-30.5	21.55	2.66
	44-44.5	23.67	2.64

Borehole No.	Depth (m)	L.L %	P.L %	P.I %
BH AA-40	1.0-2.0	61	45	16
	5.0-6.0	38	24	14
	10.0-11.0	44	26	18
	15.0-16.0	46	26	18
	20.0-20.5	----	N.P	----
	44.5-46.0	----	N.P	----
BH AB-5	1.0-2.0	34	21	13
	4.0-5.0	NP		
	7.0-8.0	38	23	15
	10.0-11.0	46	23	23
	18.0-18.5	----	N.P	----
	40.0-40.5	----	N.P	----
BH AC-28	1.0-2.02	47	29	18
	5.0-6.0	45	25	20
	10.0-11.0	42	25	17
	17.0-17.5	----	N.P	----
	45.0-45.5	----	N.P	----
	62.0-63.5	----	N.P	----
BH AD-9	1.0-1.5	39	28	11
	3.0-3.5	36	24	12
	5.0-5.5	39	28	11
	7.0-7.5	44	28	16
	9-9.5	60	25	35
	25.5-26	----	N.P	----
BH AE-10	1.0-1.5	41	27	14
	5.5-6.0	45	29	16
	10.0-10.5	46	26	20
	12.5-13.0	43	26	17
	16.5-17.0	35	24	11
	26.0-26.5	----	N.P	----
BH AG-15	1.0-2.0	29	19	10
	5.0-6.0	34	21	13
	10-10.5	----	N.P	----
	22-22.5	----	N.P	----
	30-30.5	----	N.P	----
	44-44.5	----	N.P	----

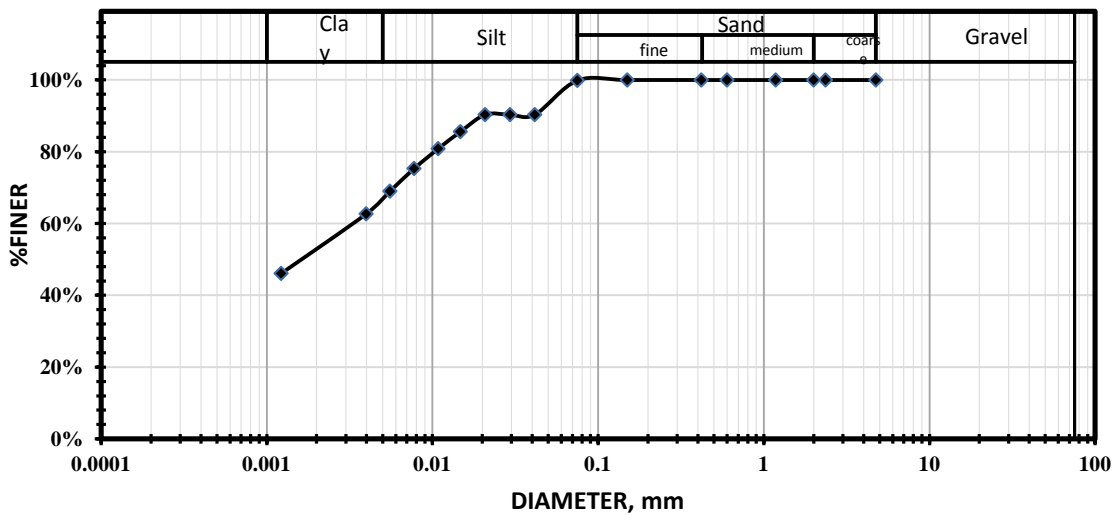
BHAA-40						
Soil Chemical Test					Ground Water Chemical Test	
<i>Depth (m)</i>	<i>SO₃ %</i>	<i>Cl⁻ %</i>	<i>Organic %</i>	<i>pH</i>	<i>SO₄⁻² (mg/L)</i>	
1-2	4.17	0.089	2.819	8.4		1420
5-6	0.64	0.032	2.257	8.3	<i>Free Cl⁻ (mg/L)</i>	0.18
10-11	0.76	0.039	1.520	8.2	<i>Hardness (CaCO₃+ Mg(OH)₂+ CaSO₃) (mg/L)</i>	535
15-16	0.45	0.053	1.906	8.3	<i>pH</i>	7.7
20-20.5	0.21	0.032	0.420	8.4		
BHAB-5						
Soil Chemical Test					Ground Water Chemical Test	
<i>Depth (m)</i>	<i>SO₃ %</i>	<i>Cl⁻ %</i>	<i>Organic %</i>	<i>pH</i>	<i>SO₄⁻² (mg/L)</i>	
1-2	0.27	0.036	2.494	8.4		855
4-5	0.91	0.053	3.528	8.4	<i>Free Cl⁻ (mg/L)</i>	0.35
7-8	0.33	0.053	3.345	8.5	<i>Hardness (CaCO₃+ Mg(OH)₂+ CaSO₃) (mg/L)</i>	530
10-11	0.52	0.032	3.065	8.4	<i>pH</i>	7.8
40-40.5	0.92	0.057	0.829	8.3		
BHAE-10						
Soil Chemical Test					Ground Water Chemical Test	
<i>Depth (m)</i>	<i>SO₃ %</i>	<i>Cl⁻ %</i>	<i>Organic %</i>	<i>pH</i>	<i>SO₄⁻² (mg/L)</i>	
1-1.5	1.52	0.053	4.284	8.9		1770
5.5-6	1.94	0.053	3.855	8.5	<i>Free Cl⁻ (mg/L)</i>	0.16
10-10.5	2.16	0.050	4.022	8.5	<i>Hardness (CaCO₃+ Mg(OH)₂+ CaSO₃) (mg/L)</i>	530
12.5-13	2.28	0.036	4.356	8.5	<i>pH</i>	7.8
26-26.5	0.35	0.028	0.479	8.3		
BHAG-15						
Soil Chemical Test					Ground Water Chemical Test	
<i>Depth (m)</i>	<i>SO₃ %</i>	<i>Cl⁻ %</i>	<i>Organic %</i>	<i>pH</i>	<i>SO₄⁻² (mg/L)</i>	
1.0-2.0	0.87	0.107	1.707	8.6		1240
5.0-6.0	0.66	0.156	2.020	8.6	<i>Free Cl⁻ (mg/L)</i>	0.23
10-10.5	0.38	0.050	1.049	8.4	<i>Hardness (CaCO₃+ Mg(OH)₂+ CaSO₃) (mg/L)</i>	530
22-22.5	0.25	0.039	0.210	8.5	<i>pH</i>	7.4
30-30.5	0.21	0.032	0.420	8.4		

**Grain Size Analysis
TPAG-3 (1.0-2.0 m)**



Clay	Silt	Sand
36	45	19

**Grain Size Analysis
TPAH-3 (1.0-2.0 m)**



Clay	Silt	Sand
67	33	0

Appendix-H-
Hydraulic Conductivity
Test Results
(Field & Lab. Tests)

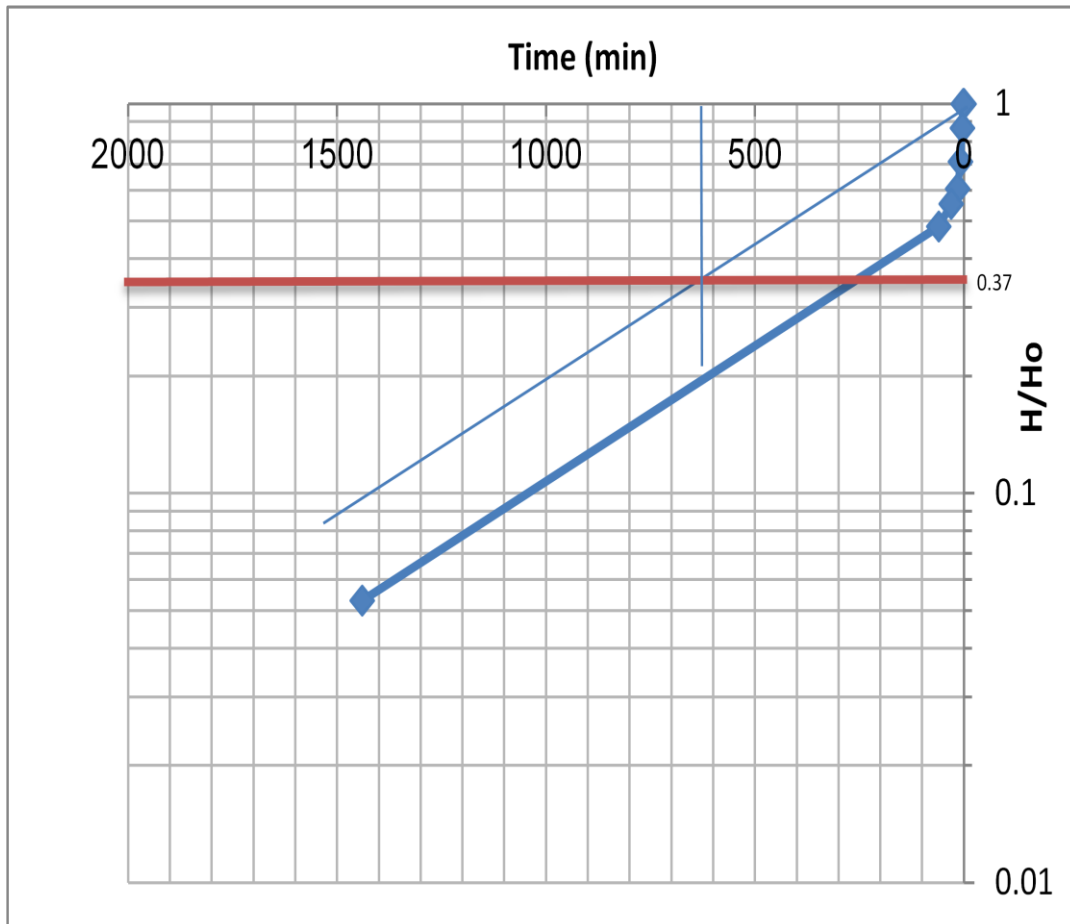
PROJECT : -----BNCP APT Site-----

B.H.NO : BHAA-40	
W.T : 2.1 m	Depth : 5.0 - 6.0m
Diameter of borehole= 10 cm	L= 1 m
A: Cross sectional area of the standpipe	Date :
T :Basic Time log	T= 620 min

Time T(min)	Water level Reading H (cm)	Active Head H (cm)	Head Ratio H/H₀
0.0	500	Ho: 190	1.00
1	500	190	1.00
2	500	190	1.00
4	475	165	0.868
8	445	135	0.710
15	425	115	0.605
30	415	105	0.553
60	402	92	0.484
1440	320	10	0.053

$$F = \frac{2\pi L}{\ln\left(\frac{L}{D} + \sqrt{1 + \left(\frac{L}{D}\right)^2}\right)} = 209.46$$

$$K = \frac{A}{F * T} = 10.07 * 10^{-6} \text{ cm/sec}$$



Appendix -AA-
Test Pit Logs

LOG OF TEST PIT

Project Name: BNCP APT 1st stage

Test pit no.: TPAA1	Date: 16/12/2012	Ground Elevation (m): 29.53	N: 3,672,184.01
		Ground Water Level: Not Appear	E: 464,564.72

Depth (m)	classification	Soil Description
- 0.0	CL	Brown lean silty sandy clay (Crust Layer)
- 0.5		Ditto
- 1.0		Ditto
- 1.5		Brownish gray lean silty Clay
- 2.0		Ditto
- 2.5		Ditto

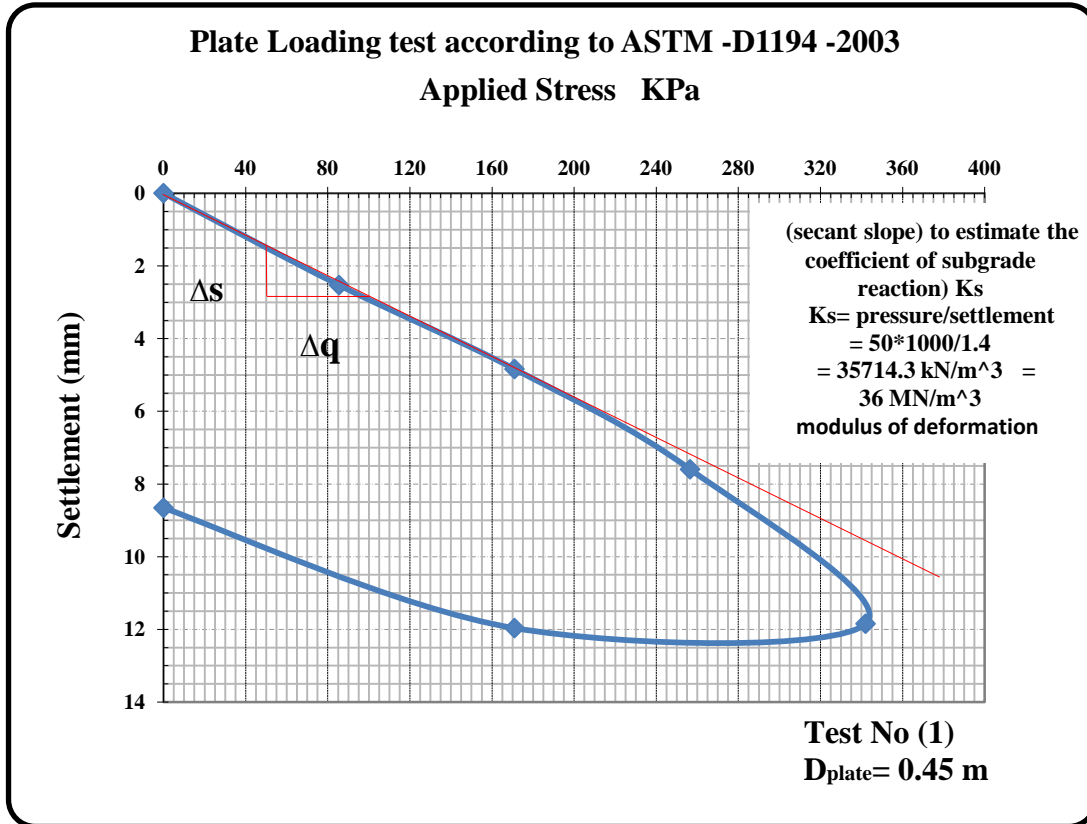


Appendix - AC - Soil Density

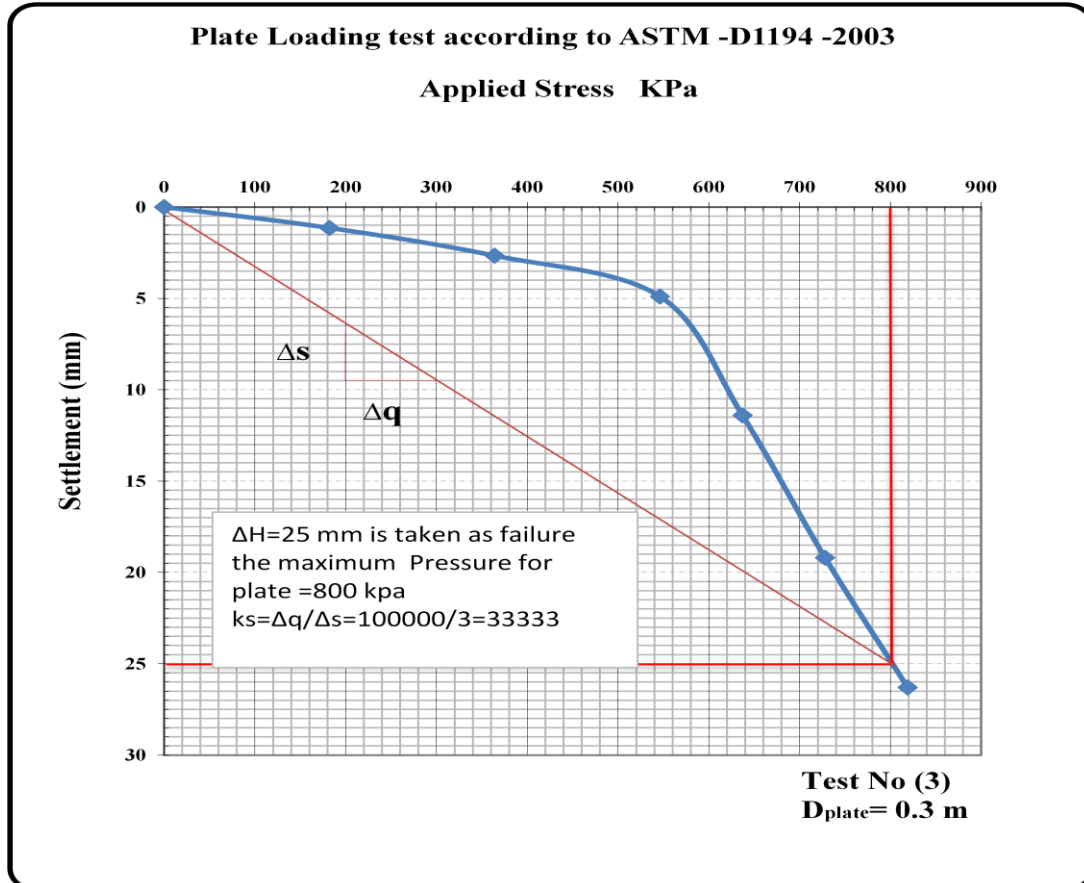
Pit No.	Depth (m)	Density (g/cm³)
TPAA-1	0-0.5	1.96
TPAA-2	1.0-2.0	2.03
TPAB-1	0-0.5	1.87
TPAB-2	1.0-2.0	1.97
TPAC-1	0-0.5	1.98
TPAC-2	0-0.5	2.11
TPAD-1	1.0-2.0	1.99
TPAE-1	0-0.5	1.78
TPAE-2	1.0-2.0	1.83
TPAG-2	0-0.5	1.77
TPAH-1	0-0.5	2.01
TPAH-2	0-0.5	2.08

Appendix - AD - Plate Bearing Test

PBT Results				
16/12/2012		Pit No. : TPAA 1		
		at depth 0.5m		
Pressure		Settlement (mm)		
Ton/m ²	KPa	δ1	δ2	δavg.
0	0	0	0	0
8.5	85	1.4	3.65	2.53
17	170	3.09	6.59	4.84
25.5	255	6.40	8.80	7.60
34	340	8.52	15.19	11.85
17	170	8.86	15.09	11.97
0	0	5.97	11.40	8.66



PBT Results				
18/12/2012		Pit No. : TPAC 1		
		at depth 0.5m		
Pressure		Settelment (mm)		
Ton/m ²	KPa	δ1	δ2	δavg.
0	0	0	0	0
18.2	182	1.64	0.64	2.84
36.4	364	3.65	1.66	5.7
54.6	546	5.79	3.98	8.5
63.7	637	12.60	10.20	11.4
72.8	728	20.85	17.55	19.2
8.19	819	27.75	24.85	26.3



**Appendix - AE -
Compaction Test
Results**

<i>Pit No.</i>	<i>Depth (m)</i>	<i>Type of Compaction</i>	<i>Max Ydry (g/cm³)</i>	<i>Optimum W.C %</i>
<i>TPAA1</i>	<i>0-0.5</i>	<i>Standard</i>	<i>1.58</i>	<i>21</i>
<i>TPAA1</i>	<i>1-2</i>	<i>Standard</i>	<i>1.74</i>	<i>16</i>
<i>TPAC1</i>	<i>0-0.5</i>	<i>Standard</i>	<i>1.62</i>	<i>20</i>
<i>TPAC1</i>	<i>1-2</i>	<i>Standard</i>	<i>1.66</i>	<i>17</i>
<i>TPAD1</i>	<i>0-0.5</i>	<i>Modified</i>	<i>1.82</i>	<i>15.7</i>
<i>TPAD1</i>	<i>1-2</i>	<i>Modified</i>	<i>1.58</i>	<i>19.5</i>
<i>TPAH1</i>	<i>0-0.5</i>	<i>Modified</i>	<i>1.84</i>	<i>15</i>
<i>TPAH1</i>	<i>1-2</i>	<i>Modified</i>	<i>1.58</i>	<i>22</i>
<i>TPAB1</i>	<i>0-0.5</i>	<i>Modified</i>	<i>1.71</i>	<i>20.5</i>
<i>TPAB1</i>	<i>1-2</i>	<i>Modified</i>	<i>1.74</i>	<i>20</i>
<i>TPAE1</i>	<i>0-0.5</i>	<i>Standard</i>	<i>1.6</i>	<i>22</i>
<i>TPAE1</i>	<i>1-2</i>	<i>Standard</i>	<i>1.61</i>	<i>24</i>

Summary of Test Results

