2024

Since 2001'

Specialist of Pile Test

Bi-Directional Pile Test

BACKYOUNG G&C

Specialist of Pile Test www. Bkgnc.com

Backyoung Geotechnical and Construction Engineering Co., Ltd.

C.E.O Massage

Backyoung Geotechnical & Construction Co., Ltd.(BK G&C) was established in the Korea in 1990 and currently has over 35 employees. In the late 1990's, BK G&C has emerged as one of the leading designers and manufacturers of a broad range of high quality geotechnical instrumentation in Korea. In particular, BK G&C, through innovation and experience, has developed a line of vibrating wire sensors as load cell, strain gage, piezometer etc. We were the first company in Korea for vibrating wire technology field.

Since the late 1990's, the company has expanded to provide pile load tests, instrumentation and monitoring, specialized engineering services and subsurface investigation. In particular, BK G&C, through innovation and experience in the electrical, mechanical and geotechnical field, has developed the method of load testing drilled shafts and piles as the premier method of static load testing. And deep foundation testing services also include lateral testing, cross hole sonic logging, dynamic pile load testing and sonic-based pile/shaft callipering, making BK G&C a full-service foundation testing company.

To further its aim of providing a quality service to its clients, BK G&C maintains an externally audited quality system to ISO 9001 for all its testing activities, including field work.

BK G&C, an ISO 9001 company is a registered consultancy organization and promises to provide customer’ s satisfaction and emotion through the endless endeavor and research for our parties concerned.

We sincerely hope to your attention and affection for BK G&C.

Thank you indeed.

BK G&C President/Ph.D. Bong-Geun, Park

INTRODUCTION

Since its inception in 2001

Backyoung G&C is a leading global engineering and construction company.

BKG&C has proven expertise for engineering and construction for 15 years.

We are committed to becoming the World Best contractor through the constant pursuit of growth

And through the quality of our leadership

GREEN

NEW

CHALLENGE

CHANGE

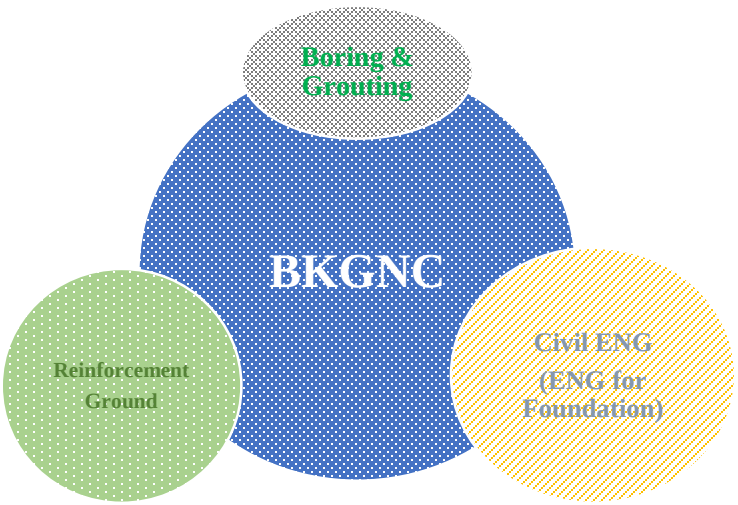
What we do

Civil ENG

- ✓ Pile Load Test
  - Bi-Directional Test
  - Pile Dynamic Test
  - Lateral Pile Test
  - Tensile Pile Test
  - Pile Integrity Test
  - Cross-hole Ultra Sonic Logging Test
- ✓ Soil Investigation

Boring & Grouting (Reinforcement Ground)

- ✓ HGG (Hi-FA Green Grouting)
- ✓ H-CIP(Hi-FA Cast In Place Pile)



www.bkgnc.com

Tel. +82-2-588-7188

Fax. +82-2-588-8184

E-mail: loadtest@naver.com

BACKYOUNG GEOTECHNICAL AND CONSTRUCTION ENGINEERING Co., Ltd

HISTORY

1990 [05] Backyoung Engineering founded in Seoul, Korea

1991 [07] Succeed in domestically producing complete Load Cell

1997 [06] Nominated for the grow-up company by korean economic daily

2001 [09] Company name changed to Backyoung G&C from Backyoung Engineering

2005 [03] Acquired domestic patent about BD-Cell assembles and test method

2006 [02] Laboratory founded affiliate with company

2006 [11] Attains the innobiz certificate

2007 [08] Attains ISO 9001:2008/KS Q ISO 9001:2009 certification in international quality management

2009 [07] Licensed by quality inspection for pile foundations.

2009 [11] Development HGG(Hi-FA Green Grouting) and Hi-FA(High performance & Multi-Functional Agent).

2010 [03] Licensed by Korean government for boring grouting.

2012 [04] Attains the NEP certificate by The ministry of knowledge economy.

2013 [09] Wins “Causeway Project in Kuwait(Main Link)-MPW”.

2014 [05] Wins “Causeway Project in Kuwait(Doha Link)-MPW”.

2015 [09] Wins “The 16th, Technological innovation of small businesses innovation” Award(presidential citation).

2016 [08] Wins “NRP #5 Project in Kuwait-KNPC”.

2018 [05] Wins “LNGI Project in Kuwait-KNPC”.

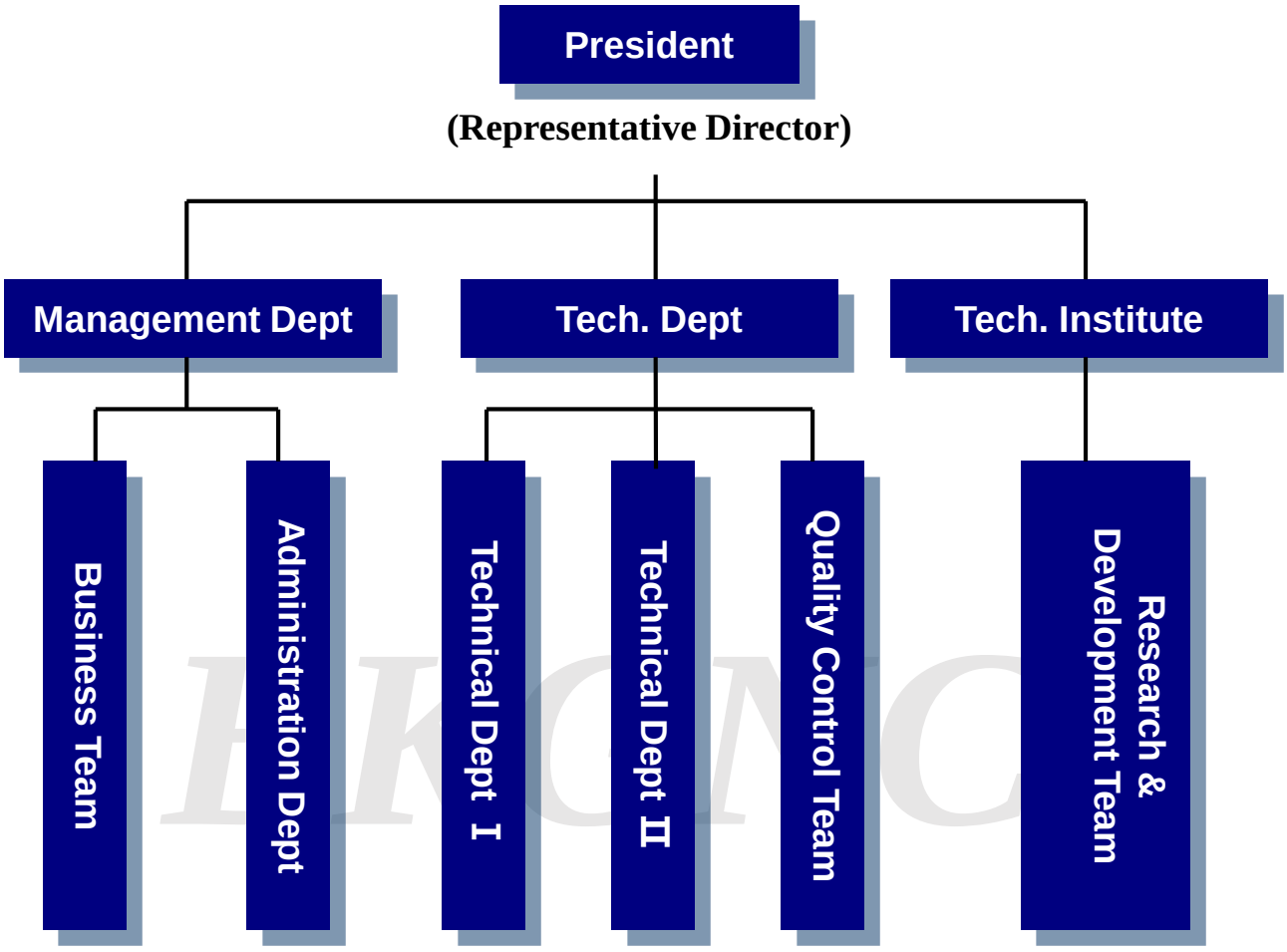
2018 [01] Wins “ CHACAO BRIDGE Project in Chile”.

2020 [01] Wins “ Metro 3 Line Project in Panama”.

2021 [01] Wins “ NSCR-EX CP N-01 Project in Philippines”.

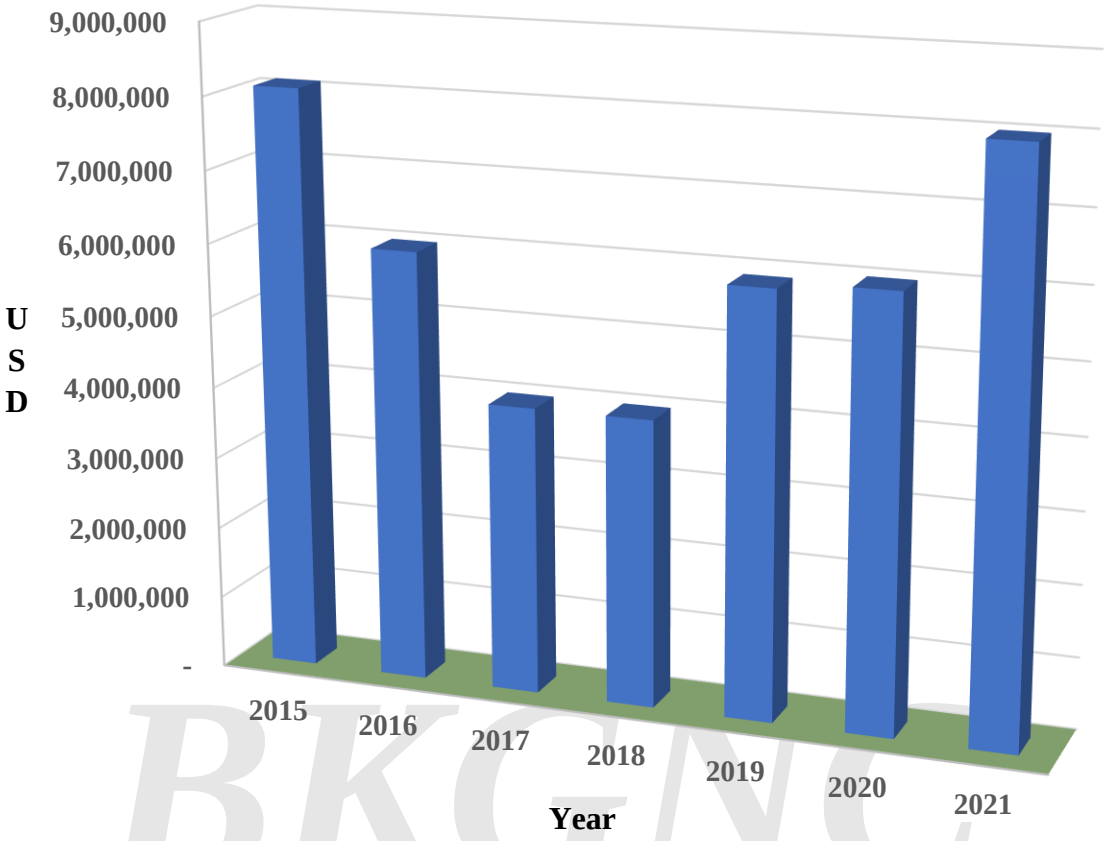
2023 [05] Wins “ NSCR-EX CP S-04,05,06 Project in Philippines”.

ORGANIZATION



Qualification	Persons	Remarks
Ph. D	2	
Ph. D, Candidate	1	
Master of ENG	1	
Engineer	12	

TURNOVER



❖ FIELD APPLICATION

Precast pile

- ✓ Conventional Load Test
  - Compression Test
  - Tension Test
  - Lateral Test
- ✓ Dynamic Pile Test(PDA)
- ✓ Pile Integrity Test(PIT)

Drilled Shaft pile

- ✓ Conventional Load Test
- ✓ Bi-directional Load Test
- ✓ Dynamic Pile Test(PDA)
- ✓ Cross-hole Ultra Sonic Logging Test(CSL)
- ✓ Pile Integrity Test(PIT)

LICENSE HOLDING

1) The Report on KENCA(Korea Engineering & Consulting Association) in 2001.

2) Registration on MOCT(Ministry of Construction & Transportation) for the Quality Test Laboratory & Institute in 2006.

3) Acquirement of ISO 9001 : 2000 by International Industrial Certification Co., Ltd. in 2006.

STANDARD MANAGEMENT CERTIFICATION
SMC

Standard Management Certification

BACKYOUNG GEOTECHNICAL AND CONSTRUCTION CO., LTD.

(BACKYOUNG G & C CO., LTD.)

2F, 160, Sadang-ro, Dongjak-gu, Seoul, Korea

This is to certify that the Quality Management System of the above mentioned company has been found to comply with

ISO 9001:2015

Scope

1. **Load Test(Static Axial Compressive Load, High Strain Dynamic Load, Lateral Load, Static Tensile Load, Horizontal Surface Static Load, Two-Way Load), Anchor Test, Integrity Test, Subsurface & Geological Survey, Measurement Control, Construction Material Test**
2. **Quality Service Direction of Construction On-Site**
3. **Technology Review and Research Service**

ANZSIC : 7829 , 7822 , 7823

Certificate Number:	**SKQ-10203**
Date of Initial Approval:	**08 August 2007**
Re-issued Date:	**24 February 2022**
Expiry Date:	**24 February 2025**

Approved by : Hyoung Jong Han

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT
IAF

This certificate is valid only if
Regulatory surveillance audit is conducted within the required time.
Standard Management System Co., Ltd.
(Baeksang Star Tower II, Gasan-dong) Rm 301, #165, Gasandigital 2-ro, Geumcheon-gu, Seoul, Korea T)+82-2-6111-6301 F)+82-2-6111-6309
Website : www.smcsmc.co.kr
JAS-ANZ : www.jas-anz.org/register

JAS-ANZ

1

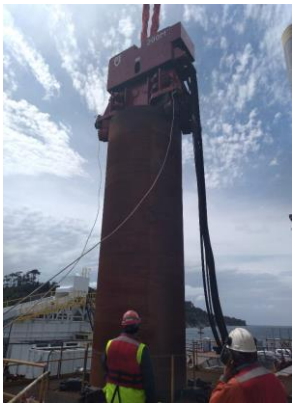
❖ MAJOR PERFORMANCE RECORDS OF OVERSEAS

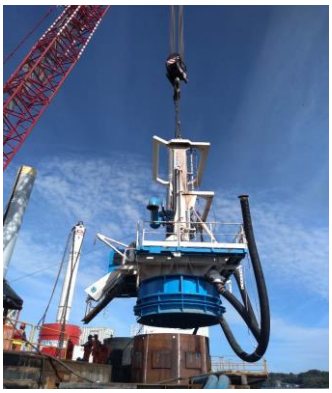
NO	Project	Country	Clint	Period	Work's	Condition
1	Philippines NSCR-EX CP S-04,05,06 Project	Philippines	HDEC	2023~	For Design, Pilot, Working Pile test	Onland
2	Philippines NSCR-EX CP N-01 Project	Philippines	HDEC	2021~	For Design, Pilot, Working Pile test	Onland
3	Panama Metro 3 Line Project	Panama	HDEC	2021	For Design, Test	Onland
4	Chacao Bridge Project	Chile	HDEC	2017~2019	For Design, Pilot, Working Pile test	Offshore
5	Al-Zour LNG Import Project	Kuwait	HDEC	2017~2018	For Design, Pilot, Working Pile test	Offshore /Onland
6	Al-Zour LNG Refinery Project	Kuwait	HDEC	2016~2018	For Design, Pilot, Working Pile test	Offshore /Onland
7	CAUSEWAY Project(Main Link)	Kuwait	HDEC	2013~2018	For Design, Pilot, Working Pile test	Offshore /Onland
8	CAUSEWAY Project(Doha Link)	Kuwait	GS E&C	2015~2018	For Design, Pilot, Working Pile test	Offshore /Onland
9	Az-Zour North Project	Kuwait	HHI	2013~2014	For Design, Pilot, Working Pile test	Onland
10	Rabic Ⅱ Project	Saudi	GS E&C	2014	For Design, Pilot, Working Pile test	Onland
11	Mubarak Al-kabeer Seaport Project	Kuwait	HDEC	2011~2013	For Design, Pilot, Working Pile test	Onland
12	Caimap international seaport project	Vietnam	POSCO E&C	2009~2011	For Design, Pilot, Working Pile test	Onland
13	Ghana Kumasi KRI Road project	Ghana	JUNGHEUNG	2009~2010	Working Pile Test	Onland
14	ISA Town Gate Interchange Project	Bahrain	SEUNG WON	2008	Working Pile Test	Onland
15	Chios Power Plant Extension Project	Greece	DOOSAN ENGINE	2006	Working Pile Test	Onland

REFERENCE LIST

Chacao Bridge Project 2017 ~ 2020

- **Client : MINISTERIO DE OBRAS PUBLICAS COBIERNA DE CHILE**
- **Construction : HYUNDAI E&C**
- **Purpose : Design, Build, Completion and Maintain**
- **Foundation type: Drilled Shaft pile (Dia. 2,500mm)**
- **Length of Bridge : 2.75 km**
- **Works : Test, Production Pile Test**



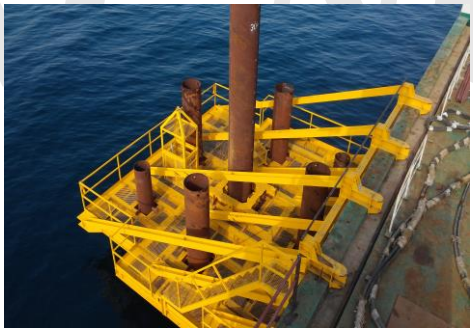


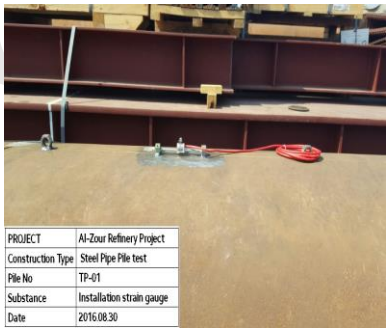
REFERENCE LIST

Al-Zour LNG Refinary & Import Project 2016 ~ 2018

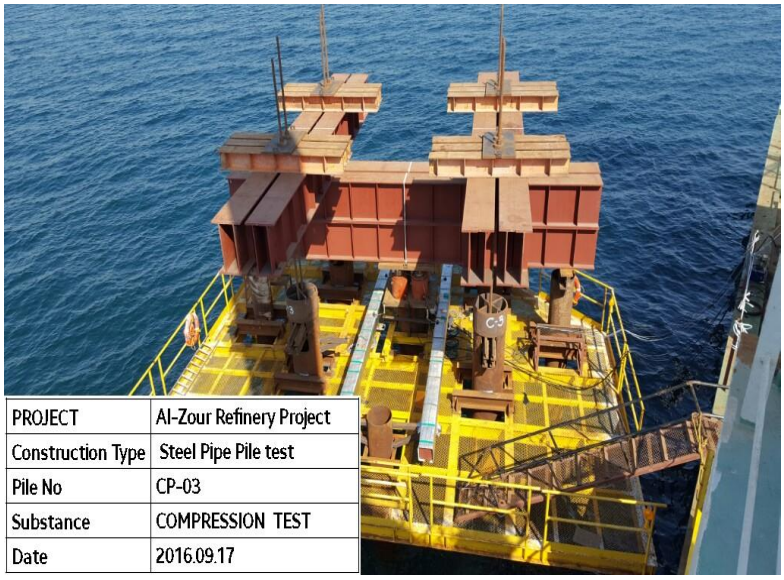
- Client : Kuwait National Petroleum Company
- Construction : HYUNDAI E&C
- Purpose : Engineering, Procurement, Construction
- Foundation type: Steel Pipe Pile (Dia. 813~914mm)
- Works : Test, Working Pile Test

PROJECT	Al-Zour Refinery Project
Construction Type	Steel Pipe Pile test
Pile No	TP-03
Substance	PDA(EOID)
Date	2016.08.29





PROJECT	Al-Zour Refinery Project
Construction Type	Steel Pipe Pile test
Pile No	TP-01
Substance	Installation strain gauge
Date	2016.08.30



PROJECT	Al-Zour Refinery Project
Construction Type	Steel Pipe Pile test
Pile No	CP-03
Substance	COMPRESSION TEST
Date	2016.09.17

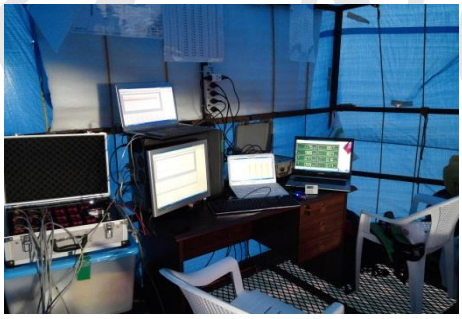
PROJECT	Al-Zour Refinery Project
Construction Type	Steel Pipe Pile test
Pile No	TP-03
Substance	Tension Test
Date	2016.09.15

REFERENCE LIST

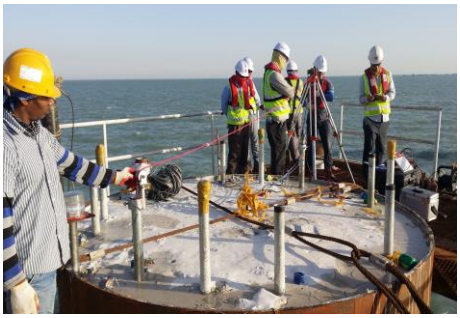
Sheikh Jaber Al-Ahmad Al-Sabah Causeway Project (MAIN LINK) 2013 ~ 2018

- Client : MINISTRY OF PUBLIC WORKS
- Construction : HYUNDAI E&C
- Purpose : Design, Build, Completion and Maintain
- Foundation type: Single Drilled Shaft pile (Dia. 2,500~3,000mm)
- Length of Bridge : 36.14 km
- Works : Pilot, Test, Production Pile Test



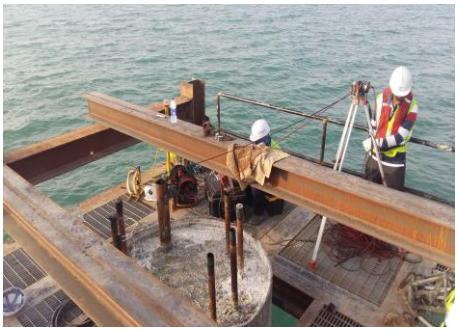


REFERENCE LIST

Sheikh Jaber Al-Ahmad Al-Sabah Causeway Project (DOHA LINK) 2015 ~ 2018

- **Client : MINISTRY OF PUBLIC WORKS**
- **Construction : GS E&C**
- **Purpose : Design, Build, Completion and Maintain**
- **Foundation type: Single Drilled Shaft pile (Dia. 2,500~3,000mm)**
- **Length of Bridge : 12.43 km**
- **Works : Pilot, Test, Production Pile Test**



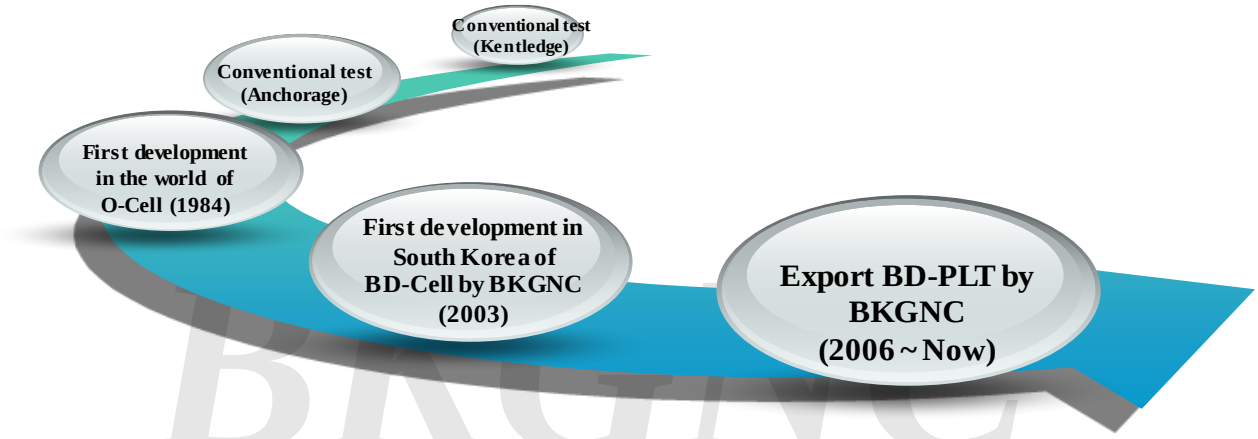
REFERENCE LIST

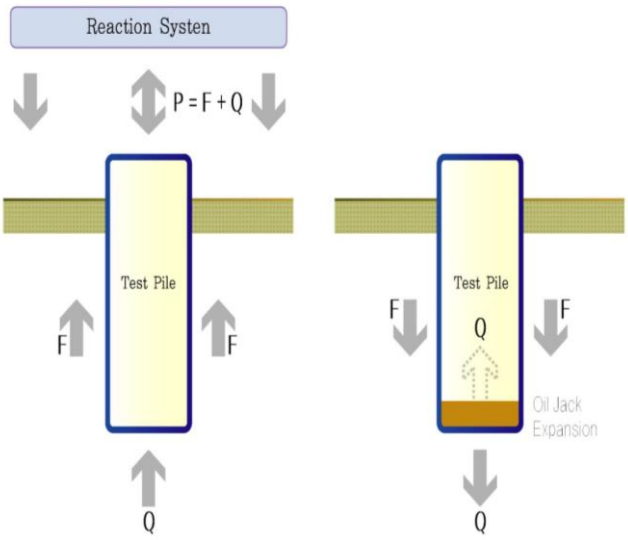
❖ MAJOR PERFORMANCE DOMASTIC RECORDS

NO	Project name	Client	Period	Work scope	Condition
1	Bosung-Insungli railway section 5 Project	KUMHO E&C	2019~	Bored Pile test	Onland
2	Ansung-guri highway section 10 Project	HANWHA E&C	2019~	Bored Pile test	Onland
3	Ansung-guri highway section 3 Project	DONGBU E&C	2019~	Bored Pile test	Onland
4	Hynix M16 Ph1 Project	SK E&C	2019~	PHC Pile Test	Onland
5	Luwon City SK Readers View	SK E&C	2019~	PHC Pile Test	Onland
6	Seamankum South-North connect way Project	SK E&C	2019~	PHC Pile Test	Onland
7	Dodam-Youngchun railway section 4 Project	HDC	2018~2019	Bored Pile test	Onland
8	Nampo-Jangjea way Project	Dong-A	2018~2019	Bored Pile test	Onland
9	East railway section 12 Project	HDEC	2016~2019	Bored Pile test	Onland
10	East railway section 13 Project	GS E&C	2017~2018	Bored Pile test	Onland
11	West railway section 3 Project	Hanlla	2016~2018	Bored Pile test	Onland
12	Amore Parcific Project	HDEC	2017	Bored Pile test	Onland
13	Jobal Grand Bridge (Hwayang-Juckum 3 site)	HDC	2014~2015	Marine Bored Pile test	Offshore
14	North Port Grand Bridge	HDC	2008~2012	Marine Bored Pile test	Offshore/ Onland
15	Geouguem Grand Bridge	HDEC	2004~2006	Marine Bored pile test	Offshore
16	Machang Grand Bridge	HDEC / Bouygues	2005~2006	Marine Bored pile test	Offshore
17	Myounggi Grand bridge	LOTTE E&C	2005~2007	Marine Bored pile test	Offshore
18	Inchon Bridge connection road	HDEC	2005	Pilot pile test	Onland
19	Extention work of Chubsung-Nulcha road	SAMSUNG C&T	2007	Marine Bored pile test	Offshore
20	Extention work of yabhee-yunam road	HDEC	2007	Marine Bored pile test	Offshore
21	North port Grand Bridge	HDC	2010~2012	Marine Bored pile test	Onland
22	Yeosu Grand Bridge	GS E&C	2010	Marine Bored pile test	Onland

❖ BI-DIRECTIONAL PILE LOAD TEST-FHWA NHI-10-016(2010)

- Dr. Jorj Osterberg, Professor Emeritus at Northwestern University, developed and patented the test which now carries his name. The device was first used in an experimental drilled shaft in 1984 and the first O-cell test on a driven pile occurred in 1987.
- In the early 2000 years, study of Bi-directional cell began to technical development by BKGNC in south Korea.
- And BKGNC acquired domestic patent about BD-Cell assembles and test method.





- BD-PLT automatically separates the toe and shaft resistance components. When one of the components fails BD-cell load, Q, the conventional pile head load, Q, required to fail both the shaft resistance and toe resistance would have to exceed 2Q. Thus, an BD-cell test load placed at the pile toe is always twice as effective as the same load placed at the pile head.

❖ STATIC PILE LOAD TEST-FHWA NHI-05-043(2006), ASTM D 1143

- Static load testing of piles is the most accurate method of determining load capacity. Depending upon the size of the project, static load tests may be performed either during the design stage or construction stage.
- Conventional load test types include the axial compression, axial tension and lateral load tests.




Kentledge type Reaction Pile & Anchor type

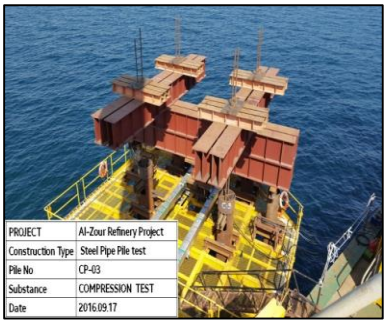
Conventional Pile Load Test for Drilled shaft pile **Test for precast pile**

- Reasons for load testing

- Load Tests are performed to develop information for use in the design and/or construction of a pile foundation.
- Load tests are performed to confirm the suitability of the pile-soil system to support the pile design load with an appropriate factor of safety.
- Implementation of new static or dynamic analysis methods or procedures.

Max. Compression Test Load
: 35,000kN

Max. Distance Between piles
: 16.5m



Max. Compression Test Load
: 15,000kN

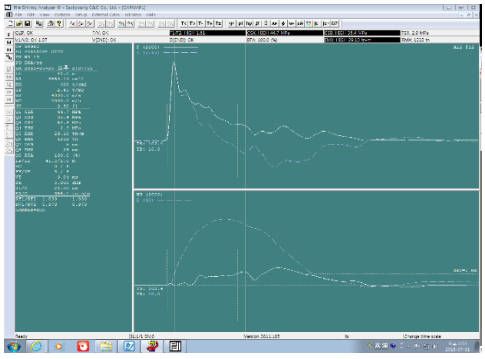
Max. Lateral Test Load
: 2,000kN

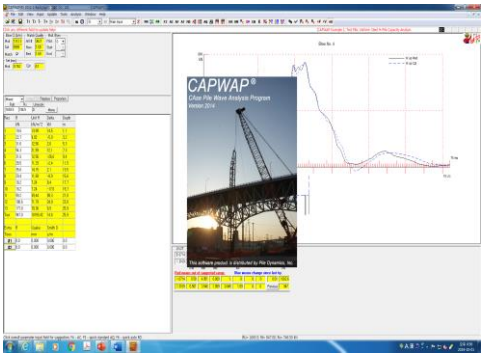
❖ DYNAMIC PILE LOAD TEST-FHWA NHI-05-043(2006), ASTM D 4945

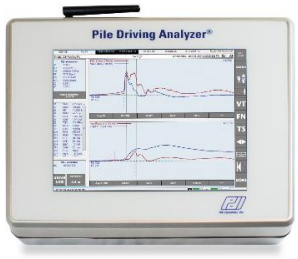
- Dynamic test methods use measurements of strain and acceleration taken near the pile head as a pile is driven or restrike with a pile driving hammer.
- These dynamic measurements can be used to evaluate the performance of the pile driving system, calculate pile installation stresses, determine pile integrity, and estimate static pile capacity.
- Dynamic test results can be further evaluated using signal matching techniques to determine the relative soil resistance distribution on the pile, as well as representative dynamic soil properties for use in wave equation analysis.
- E.O.I.D (End Of Initial Driving) test & Restrike test

PDA Test for precast pile : Vertical & Raked pile

PDA Test for Drilled Shaft pile : Drop ram weight (39.1ton)







CASE METHOD

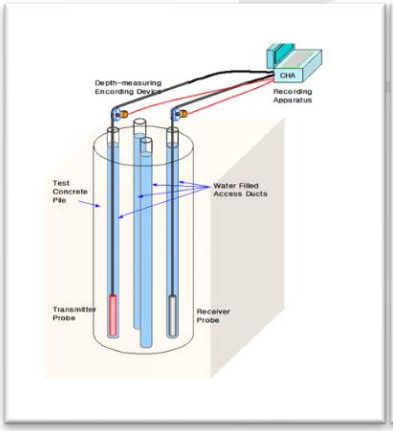
CAPWAP METHOD

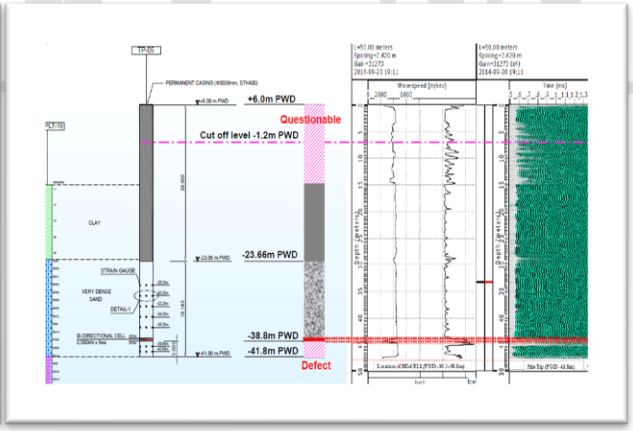
PDA-8G (3 set) for BKG&C

❖ CROSSHOLE ULTRA SONIC LOGGING TEST

- FHWA NHI-10-016(2010), ASTM D 6760

- The Crosshole Sonic Logging (CSL) method is currently the most widely used test for quality assurance of drilled shaft concrete.
- By sending ultrasonic pulses through concrete from one probe to another (probes located in parallel tubes), the CSL procedure inspects the drilled shaft structural integrity, and extent and location of defects, if any. At the receiver probe, pulse arrival time and signal strength are affected by the concrete. For equidistant tubes, uniform concrete yields consistent arrival times with reasonable pulse wave speed and signal strengths.
- Non uniformities such as contamination, soft concrete, honeycombing, voids, or inclusions exhibit delayed arrival times with reduced signal strength.





Velocity Reduction VR(%)	Signal Distortion/Strength	Concrete Rating	Indicated Conditions
0 – 10	none/normal energy reduction≤6dB	Good(G)	Acceptable quality concrete
10 – 20	minor/lower energy reduction6.1 to 9dB	Questionable(Q)	Minor contamination, intrusion, or qu estionable quality concrete
>20	severe/much lower energy reduction>9dB	Poor/defect (P/D)	Contamination, intrusion, and/or poor quality concrete
No signal	None	No. Signal (NS)	Intrusion or severe defect; could also be caused by tube debonding
≈60	severe/much lower energy reduction≥12dB	Water(W)	Water intrusion or water-filled gravel intrusion with few or no fines