

Best Solution &
Best Partner



Best Solution & Best Partner

Expertise
Underground
Since 1983

Expertise Underground **PUMYANG E&C**

PUMYANG E&C

Contents

Company Profile

Endless Satisfaction

Making the world you have craved.

Customer Satisfaction

Our efforts are endless in any places within sight or out of sight in order for making the customers dream come true.

Quality Satisfaction

We realize endless satisfaction for our customers with the top-quality construction and the best know-hows.

Ceo's Message **04**

Company History **06**

Organization **10**

Korean-French Machinery Manufacturing Co., Ltd **11**

Machine Equipments **12**

Intellectual Property **14**

CEO's Message

Pumyang and Soletanche Bachy originated from the 1983 Korean-French joint-venture company Soletanche Pumyang. After 24 years, this cooperative relationship ended when the joint venture stocks were transferred from Soletanche Bachy to Pumyang. At the same time, the old name of the company was changed to Pumyang E&C. Through the years, Pumyang E&C has devoted its efforts to introducing new construction technologies and methods in the market, and it has greatly contributed to the development of Korea construction industry.

Pumyang E&C has accumulated various techniques through its successful soil improvement work (e.g., the use of a stone column in Yeosu GS CALTEX Refinery Plant, the application of vibro compaction in Busan new port), architectural construction works (e.g., diaphragm wall construction in the Seoul and Busan subways, National Assembly Hall, Jamsil Lotte World, Dongdaemun Doosan Tower, the building of National Tax Service, the MBC broadcasting center in Ilsan, and Good Morning City), and civil construction works (e.g., Cutoff Wall in Nanji-do, foundation works in Asan COREX, tunnel work for the multiwater supply line in the metropolitan area, and the construction of the structural part of Maehyun Bridge at the Jungbu internal highway).

Based on its accumulated know-how and experiences, we execute successfully in oversea construction works (e.g., Intake & Outfall and diaphragm wall in Algeria Oman Fertilizer Project, Algeria/Cutoff Wall in Mangla Dam, Pakistan/Bored Pile-PRD, Hyatte Regency Hotel in Ulaanbaatar, Mongolia) All of PUMYANG E&C employees concentrate on oversea with Singapore Branch in the lead.

Based on the accumulating experience and know-how such as these, in the overseas market, as our first step, we had performed Intake & Outfall Structure constructions in the Algeria Oman fertilizer project successfully with diaphragm wall and PPS construction method, which is our company's patent technology.

We, all staff and employees, are working very hard in order to expand overseas markets, including Newbong Escape Hydropower complex project of Pakistan, Sea Vibro Compaction constructions in Djen Djen Port of Algeria, Zwitina Power Plant of Libya, MAK Hyatt Regency Hotel Ulaanbaatar of Mongolia, Ukhaa khudag to Gashuun Sukahait (UKGS) Railway Project, etc.

Pumyang E&C constantly explores new civil engineering technologies and provides services that exceed its customer's expectations.

We at Pumyang E&C will do our best to become "The Best Solution and Partner." from design to construction. Thanks for your encouragement and support.

CEO **JungWoo Lee**

Best Solution & Best Partner

Pumyang E&C is a major Korean construction company that specializes in the general civil and architectural civil fields, such as in retaining walls and foundation works, earthworks, soil, improvement works, and concreteworks. Pumyang E&C's customers from all over the world can expect high-quality construction and engineering services from it.



History

Within view or out of view, our **efforts** in order to achieve
the customer's **dream** is to go infinite
“**CUSTOMER SATISFACTION!**”

1978

Aug.
Obtained a special-construction-company license in the geological field (S.N. Earthwork, 78-02-103, S.N. Boring and Grouting Works, Seoul 14-30)

1983

Oct.
Introduced construction technology in a special underground structure between Pumyang and Soletanche Bachy, and established the joint-venture company Soletanche Pumyang

1990

Aug.
Its equipment and maintenance parts manufacture become independent, under Korean-French Machinery Manufacturing Co., Ltd.

1992

July.
Pumyang KFMM and moved to its site in Cheonan, Chungcheongnam-do

1994

July.
Registered as a foreign construction business (S.N. Earthworks-5, S.N. Boring and Grouting Works-2)
Oct.
The main office was moved to its present location (PUMYANG B/D, Seoul)

1995

Jun.
The Pumyang branch became independent (Pumyang Soletanche)

1997

Oct.
Obtained ISO9001 (No. QSC70819)
Dec.
Obtained a license to undertake reinforced concrete works (S.N. Yongsan 97-10-3)

2010

Jan.
Registered as a foreign construction business (S.N. Scaffolding Works-No.157, S.N. Water Supply & Sewerage Works-No.224, S.N. Reinforced Concrete Works-No.415, S.N. Paving Works-No.109)

2009

Aug.
Obtained a license to undertake Water Supply & Sewerage works (S.N. Yong San 09-11-01)
Aug.
Obtained a license to undertake Paving works (S.N. Yong San 09-14-02)

2008

Feb.
Patent registration of The bottom structure of a storm storage tank (Registration No. 10-081691)
Aug.
Opened Singapore Branch (No: F07251W)

2007

Sep.
Ended its partnership with Soletanche Bachy and changed its name to PUMYANG E&C Co., Ltd.
Nov.
Patent registration of underground wall earth retaining structure by prestressed steel pipe and excavation construction method of having used this (Registration No. 10-0776964)

2006

July.
Changed certificate authority ISO9001 (No. AJA06/10639)

2004

Feb.
Pumyang Soletanche was merged into Soletanche-Pumyang
Mar.
Obtained a license to undertake scaffolding works (S.N. Busan DongRae 2003-07-02)

2000

Apr.
Obtained an engineering license (No. 10-938)

2011

Aug.
Obtained a license to undertake Construction Business in Singapore Building and Construction Authority
Unique Entity Number/ACRA Registration Number: T08FC7251B

2012

Jan.
PUMYANG MONGOL LLC. established in MONGOLIA
National Registration Number: 9019064081
Corporation Registration Number: 5559618
Jul.
Obtained a license to undertake plastering work, masonry work, waterproof work (S.N. Yongsan 2012-03-01)

2014

Apr.
Patent registration of the direction controlling implement with the vibration cut of in the charge hole to obstruct propagation of blasting vibration, and the blasting method using that implement (Registration No. 10-1392158)

2015

Jun.
Founded PUMYANG MYANMAR E&C Co., Ltd.
Registration No. 225FC of 2015 - 2016 (YGN)
Dec.
Founded PUMYANG SINGAPORE E&C Pte. Ltd.
(UEN 201542674G)

2016

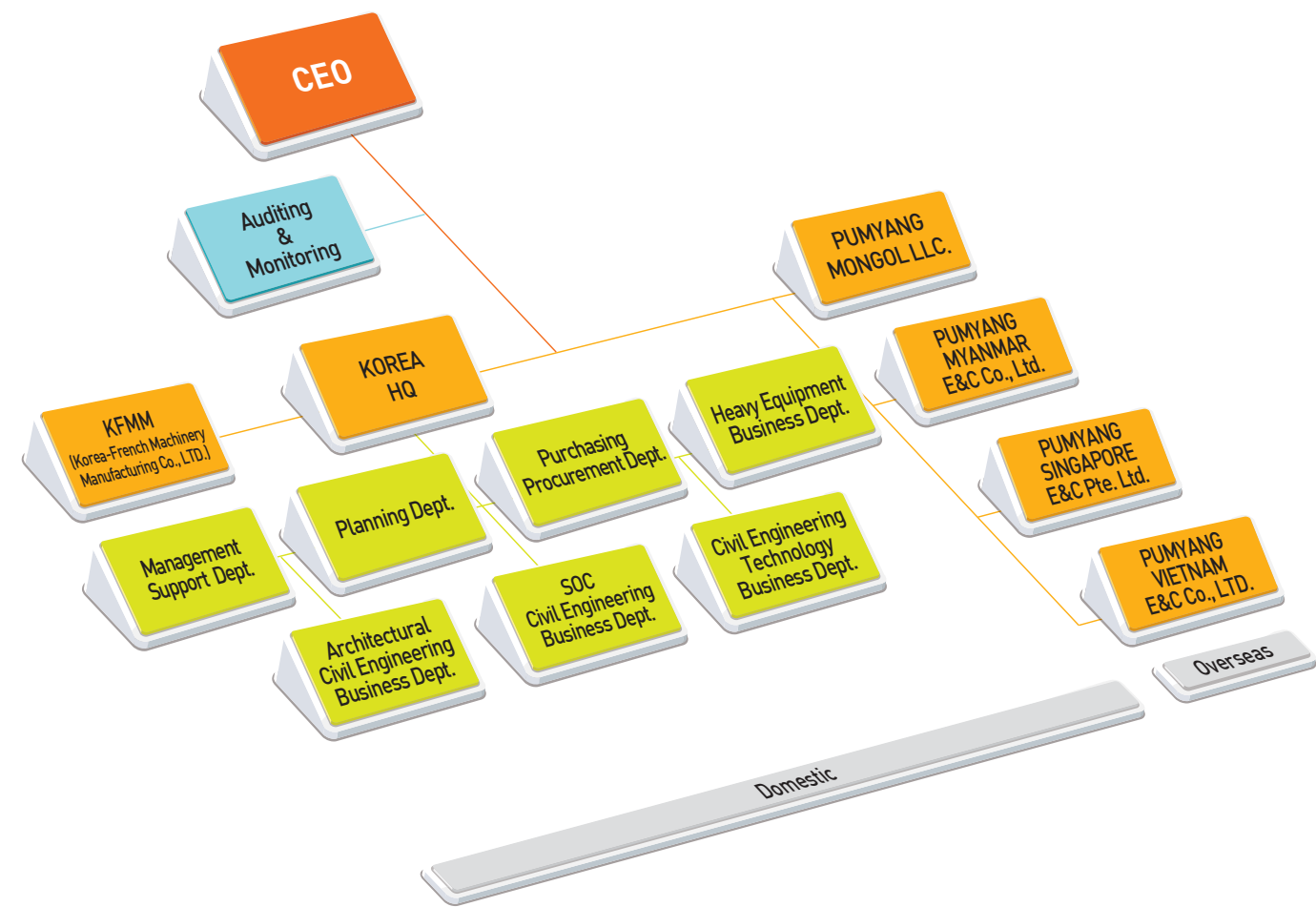
July.
Registration of Export & Import Business as a Primary Foreign Company in Myanmar
Oct.
Acquired Specialist Builder (Piling Work) License in Singapore Construction Industry
Nov.
Patent Registration of Pre-stressing Apparatus for Pipe Strut (Registration No. 10 - 1674663)

2017

Feb.
International Patent Appearance of Pre-stressing Apparatus for Pipe Strut (Singapore, Malaysia, Indonesia, Vietnam)
May.
Registration ISO9001 / OHSAS18001 in Singapore

Organization

With the geotechnical know-how it gained through its completion of thousands of contracts, Pumyang E&C consistently delivers the essentials for success : a firm price, a reliable schedule, predictable construction, and a commitment to excellence in both construction and engineering service.



Korean-French Machinery Manufacturing Co., Ltd.

We can manufacture construction machines by ourselves as we have a machine manufacturing subsidiary company. The machines of Pumyang E&C have been proven to have superior efficiency and excellent quality, having been used in many sites for several decades.

KFMM is a subsidiary of Pumyang E&C. The company has a manpower that consist of engineers who majored in electrical, electronic, and mechanical engineering, and of technicians with many years of experiences in the fields. When a need for them arises, the best suited machines are made by KFMM.

- **Foundation**
Aug. 1990
- **Location**
321 Backjari, Susin-myeon, Cheonan-si, Chungcheongnam-do
- **Factory Scale**
Ground area-13,653m² / Architectural area- 3,306m²

- Business field**
- **Diaphragm Wall Machines**
Hydro-fraise, Hang Grab, Hydro-Grab, etc.
 - **Grouting Machines**
Sinnus, Auto-Mixing Plant, Desander, etc.
 - **Drilling Machines**
Termite, Enpasol, etc.
 - **Accessory Machines**



Machine Equipments

Main Equipments owned by PUMYANG

DIAPHRAGM WALL			
Model	Standard	Quantity	Unit
HAYDRO FRAISE	2800, 2400	9	Set
HYDRAULIC GRAB EXCAVATOR	2800, 2400	1	Set
HANG GRAB(GRAB BODY)	2800, 2400	11	Set
SILO	45m³	122	Set
SILO	70m³	30	Set
BIG SILO	70m³	2	Set
DESANDER	500m³/HRS	7	Set
AUTO MIXING PLANT		4	Set



VIBRO			
Model	Standard	Quantity	Unit
DEEP VIBRO	TR75	2	Set
QUALITY CONTROL RECORDER	B-tronic System	2	Set
FOLLOW-UP TUBE		2	Ea
POWER PACK	HD 460	2	Ea

CRANE			
Model	Standard	Quantity	Unit
CRANE LS 128	70 ton	1	Set
CRANE LS 458	80 ton	2	Set
CRANE KH 500	100 ton	2	Set
CRANE CX 1200HD-2	120 ton	3	Set

BORED PILE			
Model	Standard	Quantity	Unit
R.C.D	Ø1,500/2,000	2	Set
OSCILLATOR	Ø1,500/2,000	1	Set
HAMMER GRAB	Ø1,500/2,000	2	Set



Machine Equipments

Main Equipments owned by PUMYANG

Diaphragm Wall

01 TRENCH CUTTER

Features

- Capability to construct extra deep foundations up to 80m below the ground level.
- Its minimal vibrations and low noise levels make it suitable for use in highly durable walls with zero water permeability.
- Prevents slack soil and subsidence by providing highly durable walls with zero water permeability.
- Adaptable in dynamic and complicate soil conditions and various sections applicable depending on site conditions.
- Excellent verticality allows it to be the foundation of permanent underground walls and structures.

Standard/ Model	Quantity	Manufacture
H/F 4,000	2 set	KOREAN FRENCH MACHINERY MANUFACTURING Co.,Ltd(KOREA)
H/F 12,000	3 set	KOREAN FRENCH MACHINERY MANUFACTURING Co.,Ltd(KOREA)
H/F 10,000	5 set	KOREAN FRENCH MACHINERY MANUFACTURING Co.,Ltd(KOREA)

Main Specification

Model		H/F - 4,000	H/F - 12,000	H/F - 10,000
BODY	DEPTH(M)	44	70	80
	LENGTH(mm)	2,790	2,790	2,790
	WIDTH(mm)	650 ~ 1,200	800 ~ 1,200	800 ~ 1,800
GEAR BOX	TORQUE(KNM)	39	118	108
	ROTATION	0 ~ 28	0 ~ 20	0 ~ 25
POWER PACK	MODEL	HP-1200	HP-1200/2	HP-1200/2
	ENGINE	CAT3408DITA	CAT3412DITA0	C32
	OUTPUT(KW)	377	562	709
BASE CRANE	MODEL	LS458	KH500-3	SCX1200HD-2
	WEIGHT(TON)	80	100	120
	ENGINE	8DC9C	6RBIT	MITSUMISHI 6M70-TL
	OUTPUT(KW)	273 (204 KW)	280 (210KW)	370 (277KW)

02 DESANDER

Features

- The desanding equipment is used for underground diaphragm wall constructions.
- It is commonly used in conjunction with the HF Hydro fraise cutter.
- Excavation equipment being used with Bentonite Slurry to protect excavated surfaces.

Standard / Model	Quantity
280m³	2
500m³	3

Main Specification

Model	SBD-500	KFD-500
Capacity	500m³	500m³
Frame Size (mm)	15,000 X 2,250 X 7,025(mm)	12,000 X 2,400 X 5,380(mm)
Electricity	300KW	250KW
Weight (Ton)	22	30

Machine Photograph

• TRENCH CUTTER



H/F 4,000



H/F 12,000



H/F 10,000

• DESANDER



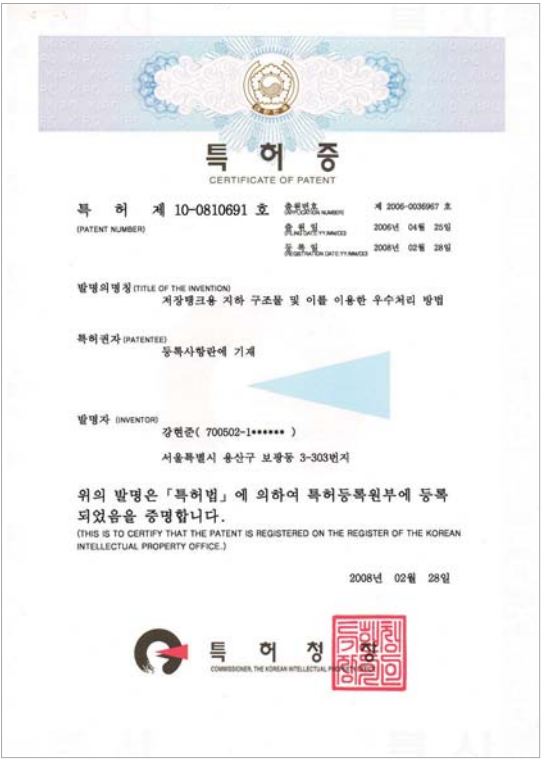
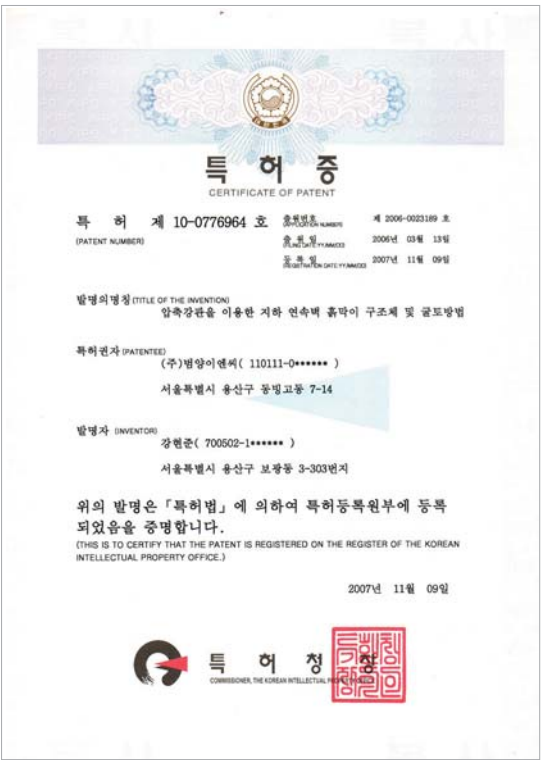
SBD - 500



Auto mixing plant

Intellectual Property

Main Patents owned by PUMYANG



Intellectual Property List

- 1

2007. 11. 09.
Patent registration of underground wall earth retaining structure by prestressed steel pipe and excavation construction method of having used this (Registration No. 10-0776964)
- 2

2008. 02. 28.
Patent registration of The bottom structure of a storm storage tank (Registration No. 10-081691)
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2014. 04. 29.
Patent registration of the direction controlling implement with the vibration cut of in the charge hole to obstruct propagation of blasting vibration, and the blasting method using that implement (Registration No. 10-1392158)
- 4

2016. 11. 03.
Patent Registration of Pre-stressing Apparatus for Pipe Strut (Registration No. 10-1674663)

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Architectural Civil Engineering Business Sector **18**

SOC Civil Engineering Business Sector **24**

Civil Engineering Technology Business Sector **28**

Overseas Business Sector **32**

Environment Business Sector **36**

Engineering Business Sector **40**

Civil Engineering Work Business Sector

The best construction; the most stable and delicate...

Using “Top-Down” and “Open-Cut” method, we are continuing the development of Pumyang E&C’s own technology on Underground Engineering from the design and the proposal of construction method to its construction, for various kinds of basement structures of the buildings, including offices, officetels, mixed-use residential buildings, department stores, and public institution buildings.

- **Earth Retaining and Waterproof Wall**
Diaphragm Wall(slurry Wall) , CIP(Cast In Place Pile), SCW
- **Pile Supported Foundation**
Barrette Pile, RCD, PRD
- **Timbering**
Strut, Earth Anchor, Soil Nailing, Top-down, Open-cut
- **Complex Civil**
Site Preparation, Subsidiary Civil Engineering

Gangreung Gangmundong Hotel ▶



Magok Office Bldg., Seoul



National Assembly Member's Office Bldg., Seoul



Garak Market facilities modernization service, Seoul





▲ Haeundae Dongwon vista

▲ Ulsan, Loyal palace Tier 1



▲ Heaundae LCT



▲ Misa E-Pyeonhangesang APT

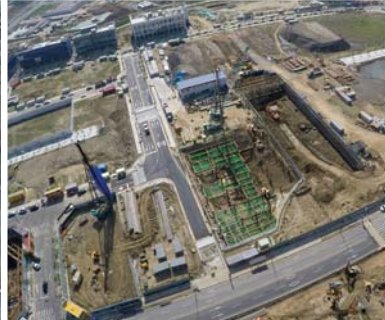
▲ Busan Samhan Goldenview Central Tower



Wirye E-mart Town



▲ Hanam Hillstate office



▲ SBS, Media Center, Seoul



▲ Mokdong Central Purugio, Seoul



▲ Kimpo Marinabay Hotel

Dain Royal Palace New Harbor 1, 2 New Construction

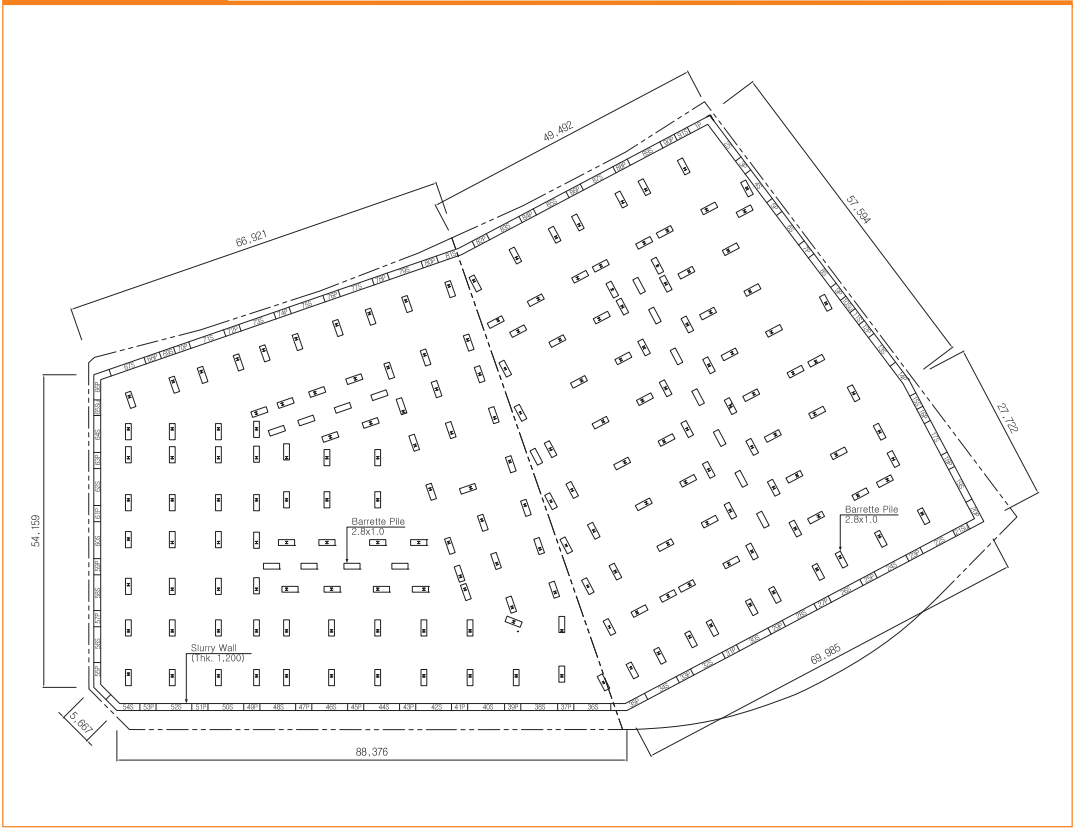
Summary of Construction Site

- **Name of Construction Site** : Dain Royal Palace New Harbor 1, 2 New Construction
- **Order Organization** : Dain Construction
- **1st Contractor** : YL Holdings
- **2nd Contractor** : Durew Holdings
- **Construction Period** : 2016. 12. 23 ~ 2018. 04. 22
- **Applied Construction Method** : D/wall(Thk1200) + B/T(2.8x1000)

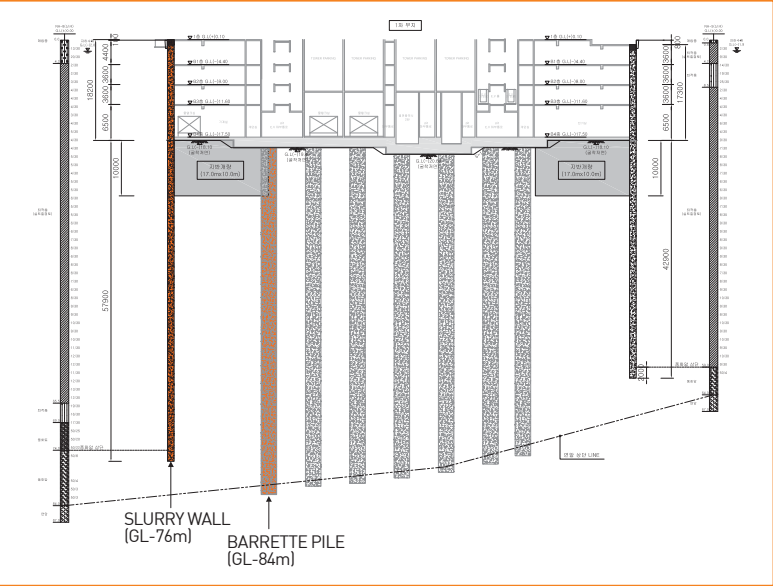
Excavation Depth

- **Diaphragm Wall excavation maximum depth** : GL-76m
- **Barrette excavation maximum depth** : GL-84m

Plan



Sectional View



Infrastructure Civil Work Business Sector

Many years of work experience, and responsible construction practices

Pumyang E&C has taken a role in enhancing national competitiveness. With many years of work experience and know-how, we have placed the first priority on responsible construction practices in roads, bridges, tunnels, housing site developments and the like.

- **Road, Railway**
Processing of roadbed
- **Bridge**
Foundation for civil engineering structures
- **Tunnel**
Tunnel by New Australian Tunneling Method (NATM)
- **Housing Site Development**

The construction works of the Highway of Guri-Pocheon (Section No. 3), Namyangju ▶



Jungbu Naeryuk Expressway, Mehyun bridge work, Chungju



Korea High speed Rail, Phase 9-1, Joseom Tunnel Kimcheon



Metropolitan Double Line Construction for Tap Water, Seoul





The construction works of the Railway of Wonju-Gangreung (Section No. 2.), Uigwan Tunnel, Wonju



▲ The construction works of the Highway of Guri-Pocheon (Section No. 3), Namyangju

▲ The construction works of the Highway of Guri-Pocheon (Section No. 3), Namyangju

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▲ The construction works of the Highway of Guri-Pocheon (Section No. 3), Namyangju



▲ The construction works of the Highway of Guri-Pocheon (Section No. 3), Namyangju



▲ The construction works of the Metropolitan Express Railway of Suseo-Pyeongtak (Section No. 1-2), Seoul



▲ The construction works of the Metropolitan Express Railway of Suseo-Pyeongtak (Section No. 1-2), Seoul



▲ The construction works of the Metropolitan Express Railway of Suseo-Pyeongtak (Section No. 1-2), Seoul

Civil Engineering Technology Business Sector

Construction methods to suit various needs of consumers...

Starting from participation in Busan Subway line No. 1, we contribute to the development of technologies of civil engineering with the designs and constructions where advanced methods, which had been validated in soft foundation improvement, were applied to civil engineering structures including Foundation Structure, LPG storage facility, Refined oil storage facility, and Dry Dock, etc., also to the Sewage Treatment Plant, Factory Site, Harbor, and the likes.

- **Earth Retaining and Waterproof Wall**
PPS(Prestressed Pipe Strut) method
- **Subway, Power pit**
Civil engineering structure having historical value, Vertical pit
- **Port, Shore**
Dry Dock, Vertical type quay wall
- **Ground Improvement, Ground Reinforcement**
Vibro Compaction, Stone Columns, Sinnus Grouting, Micro Pile



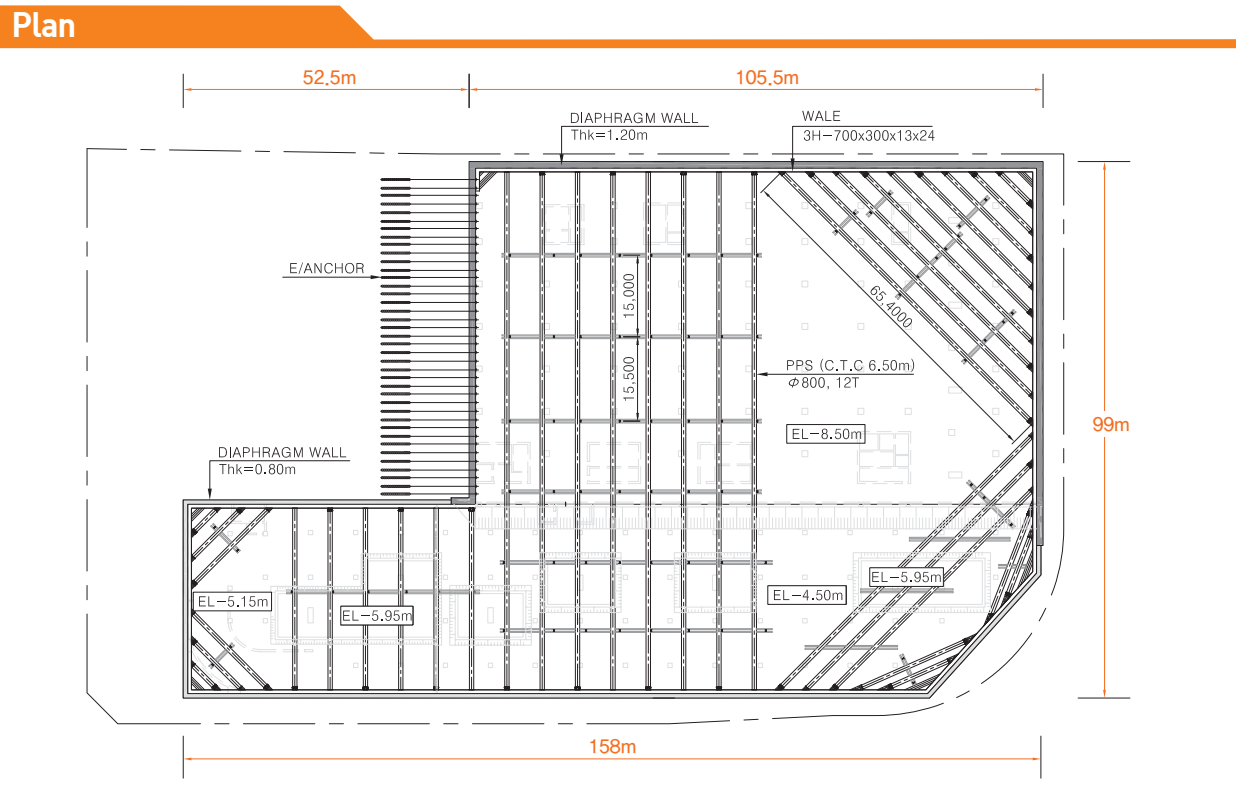
▲ Magok Kolon the Future technology center



Umyeon Samsung R&D Center, Seoul



Chungdam Jinheung Villa Reconstruction, Seoul





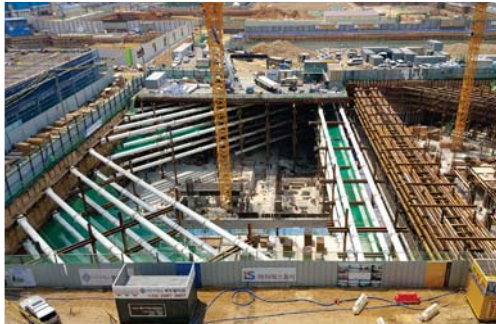
- ▲ Incheon Airport Second Passenger Terminal, Incheon
- ▲ EBS Digital Integration Company office Building, Ilsan
- ▲ Maporo 1 district, 54 area urban environmental renewal project, Seoul



Songpa Judicial Town Prugio City (Section No. 1-2), Seoul



▲ Gwangsan Mansion Reconstruction Project, Busan



▲ Wirye Central Tower



▲ Pyungchon Highfield Knowledge Industry Center



▲ Youngjong Megastar, Incheon

Overseas Business Sector

Construction capability that stunned the world, we're shedding our precious beads of sweat even today for the best of the world.

Pumyang E&C is actively developing new markets, and practicing successful constructions in all around the world with over 30 years know-how accumulated in domestic fields.

- **Rail, Subway**
Bored Pile, Diaphragm Wall
- **Plant, Building**
Retaining wall, Pile, Strut
- **Habor, Dam**
Quay Wall, Vibro Compaction, Drydock, Stone Column, Grouting
- **Ground Improvement, Ground Reinforcement**
Vibro Compaction, Stone Columns, Sinnus Grouting, Micro Pile

MONGOL
MONGOL, Ulaanbaatar
Certificate of Incorporation, Mongolia
Construction License
PUMYANG MONGOL LLC.

MONGOL, Gobi Desert

PAKISTAN, Islamabad

KOREA

NORTH PACIFIC OCEAN

VIETNAM
VIETNAM, Hanoi
PUMYANG VIETNAM E&C Co., Ltd.

MYANMAR
MYANMAR, Yangon
PUMYANG MYANMAR E&C Co., Ltd.

SINGAPORE
SINGAPORE, Singapore City
PUMYANG SINGAPORE E&C Pte. Ltd.

Algeria, Arzew

Algeria, Djen Djen Port

LIBYA, Tripoli

LIBYA, Zwitina

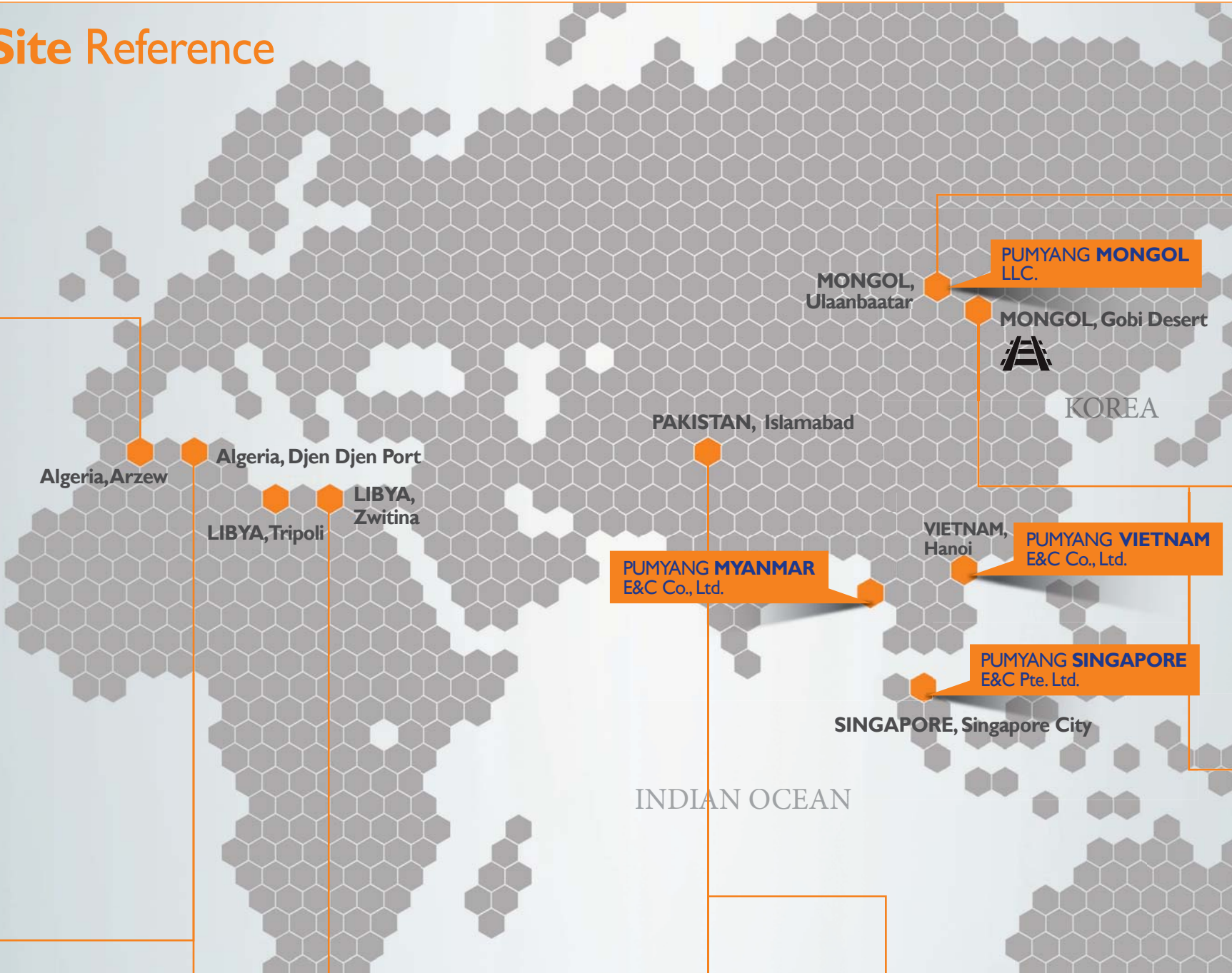
Certificate of Exporter - Importer

Certificate of Incorporation, Myanmar

Certificate of Incorporation, Singapore

Construction License

Site Reference



- ▲ Algeria Oman Fertilizer Plant (ALGERIA)
- ▲ Algeria Oman Fertilizer Plant (ALGERIA)
- ▲ Algeria Djen Djen Port , harbor structure extension work (ALGERIA)



▲ Algeria Djen Djen Port, harbor structure extension work (ALGERIA)



▲ Zwitina power station, Intake temporary facilities works, Libya



▲ New Bong Escape Hydroelectric Power Complex (PAKISTAN)



▲ New Bong Escape Hydroelectric Power Complex (PAKISTAN)

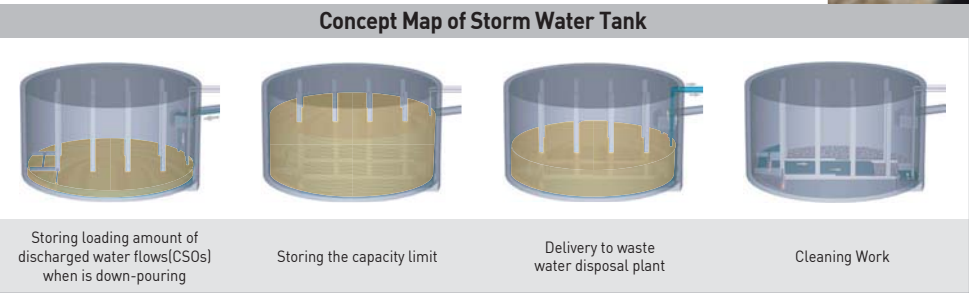
- ▲ Mak, Hyatt Regency Hotel (Mongolia)
- ▲ UKHAA KHUDAG to GASHUUN SUKHAIT Railway Project Mongolia
- ▲ UKHAA KHUDAG to GASHUUN SUKHAIT Railway Project Mongolia

Environment Business Sector

For well-balanced and harmonized life
between humankind and nature...

Subsurface dam in order for scarce water resources management, and shielding wall construction to prevent contamination of environment due to waste leachate occurred at human lives; we are trying to apply rainwater / discharge water management system in many ways, which is the new concept, to prepare for a natural disaster according to climate change and likes due to global warming, and to prevent the environment where mankind and nature are able to live together in harmony.

- **Rock-fill Dam**
Leachate shielding wall, Subsurface dam
- **Rainwater/Discharge Water Management System**
Storm Water Tank



Nanjido Cut-off Wall, Seoul



Water Intake Station, Sokcho

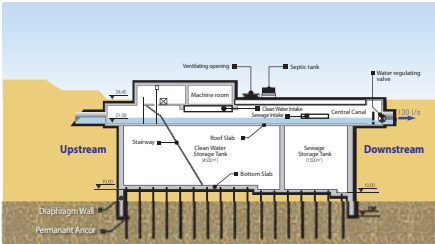


CB-Wall Excavation

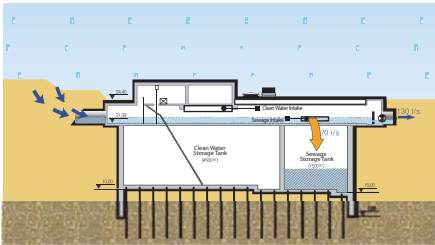


• Rain Water, Waste Water Treatment Process of Storm Water Tank

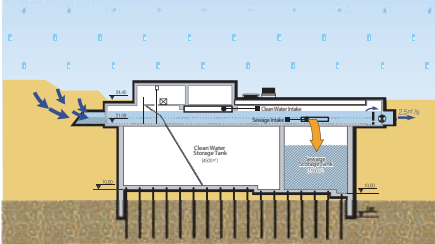
1. Influent Treatment during Dry Period (normal day)



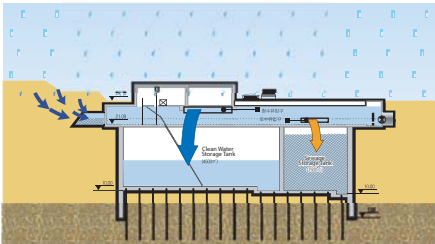
2. A small amount of rainfall (at the time of initial rainfall)



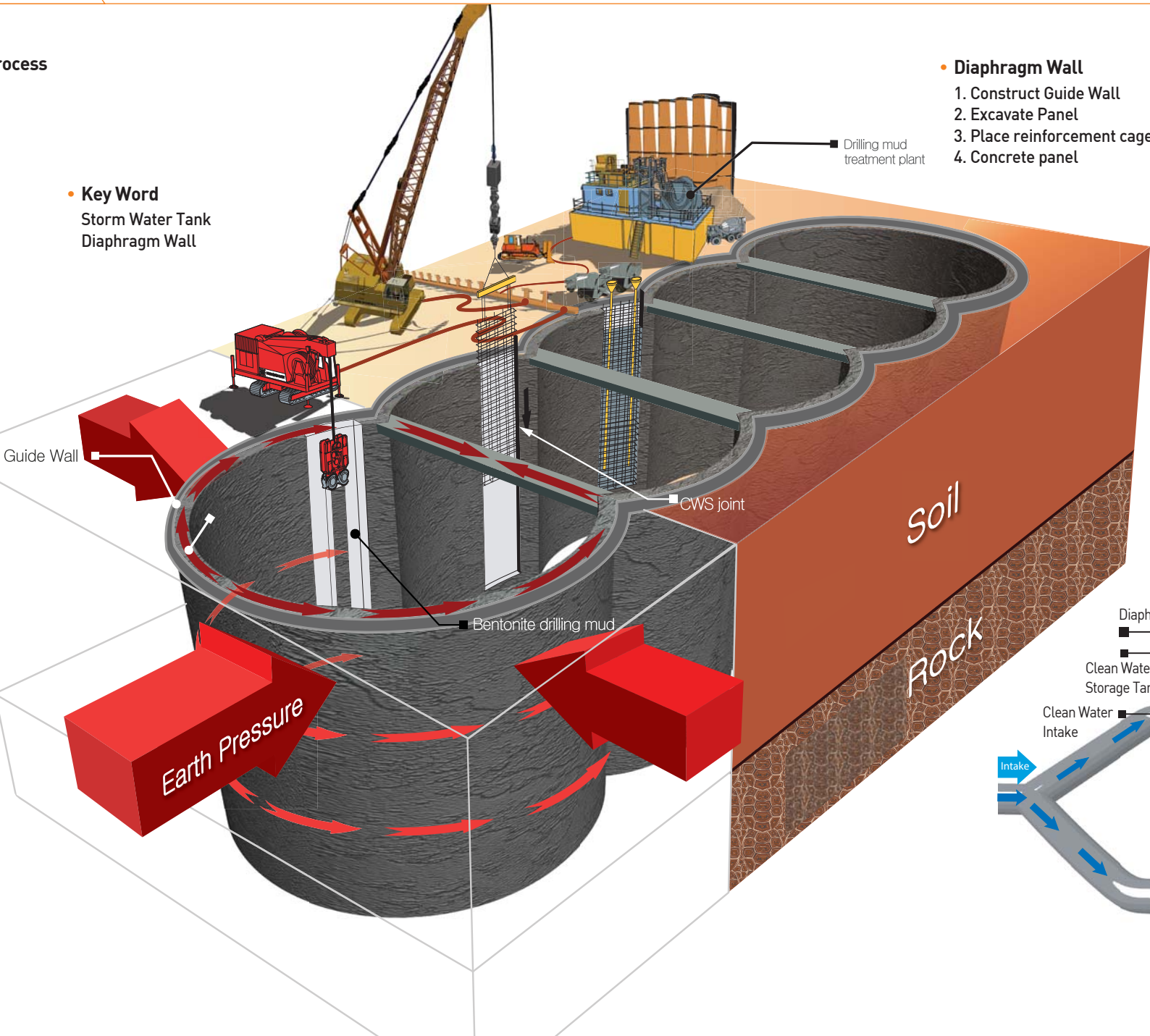
3. When down-pouring



4. When flooding

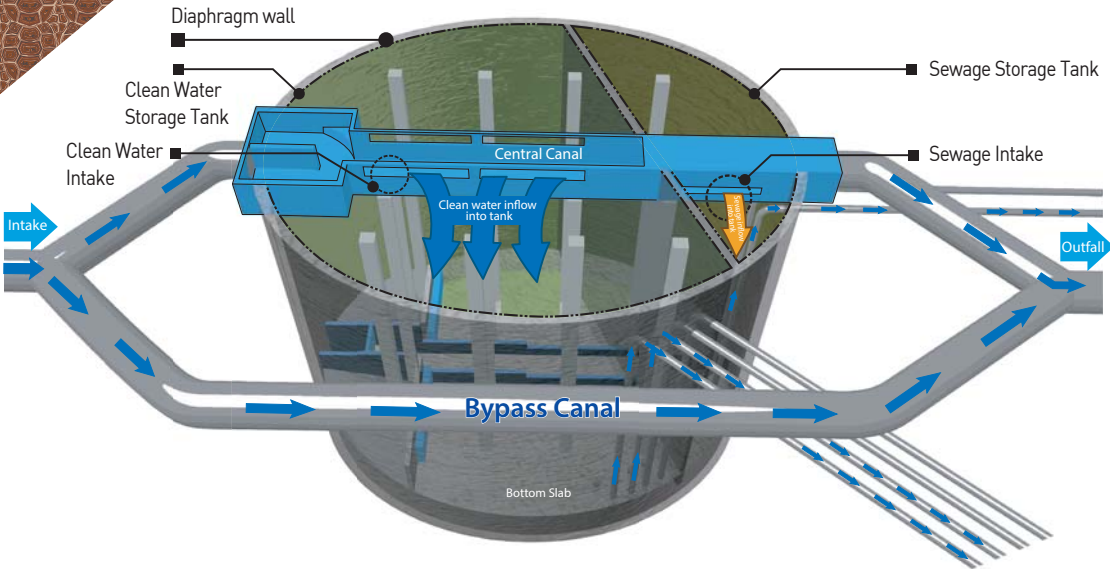


• Key Word
Storm Water Tank
Diaphragm Wall



- Diaphragm Wall
- 1. Construct Guide Wall
- 2. Excavate Panel
- 3. Place reinforcement cage
- 4. Concrete panel

- Design of Storm Water Tank
- » Geometric shape of water tank is to be used Diaphragm Wall Method in the style of circle or oval which is favorable in either structural aspect or economic aspect owing to good self-reliant with minimized supports (crossbeam, slab, etc.) of structure.
- » Construction joint part between panels of diaphragm wall is to prevent pollution of the groundwater around due to waste water being stored having planned the wall which is a high water tightness using CWS joint, and when necessary, interior surface of wall is to be treated with coating by a waterproof membrane or resin.
- » Considering frequency of downpour and follow-up downpour, planning of quick drain of rainwater and waste water stored inside of storage tank, also planning of extra pumping equipment in preparation for failure of the pump.
- » Using separate screen filtering equipment, processing suspended solids that flowed in (manual, automatic, and suction tube type, etc.)
- » Planning of water tank floor cleaning equipment (High Pressure Injection Type, Filth Tray Type, etc.)
- » Noise Blocking Equipment – Covering the top, and a slope way for inflow water.
- » Planning of upper part of tank, which is friendly with surrounding environment.



• Rainwater / Discharge Water Management System

Main Contents

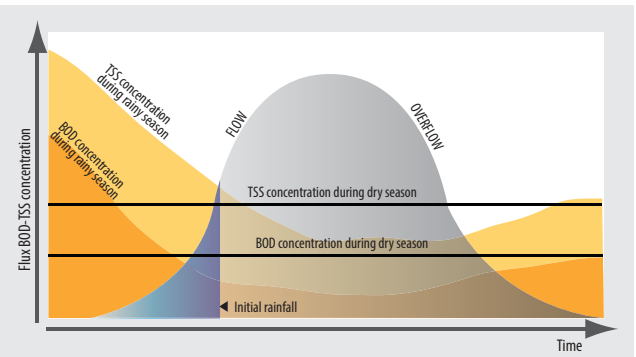
- » Highly polluted waste water occurred during initial rain is separated from rainwater of which pollution level is comparatively low. It is detention, storage technology thereof in Storm Water Tank.
- » After completion of rain fall, waste water that detained-stored in Storm Water Tank shall be delivered to the waste water disposal plant aligned with the operating rate of the waste water disposal plant, which is relatively the slow during a day. It reduces overloading of the waste water disposal plant due to the rain fall.
- » Considering rainwater regulatory ability according to the degree of rain fall, it is the role to prevent damages due to heavy rainfall, including the origin of sewage network, a flooded downtown area the likes, by applying appropriate scale of detention storage for Storm Water Tank.

- » Storm Water Tank is to be allowed a permanent safety in a shape of Non Supporting using Diaphragm Wall Method which is cast-in-place rein force concrete structure.
- » Storm Water Tank is to be used as an eco-friendly structure at the downtown area having installed a separate noise prevention facility, odor removing facility and self-cleaning facility.

Maintenance

- » Having planned a passageway that is accessible to inside through the cover slab of tank structure, all of the facilities inside are to be maintained and repaired.
- » To install retractable step for better accessibility and easy maintenance
- » Having installed Gantry Crane in the machine room, heavy equipment (pump, etc.) are maintained and repaired.

• Water quality characteristic of initial rainfall



» As shown in reference picture, pollution load of sewer overflows occurred in the terminal of sewage pipe during the initial stage of rain fall due to First Flush, the impact

to discharge zone due to fairly high pollutant concentration (maximum more than 10 times) compare to the continuous rainfall period after initial rainfall or sewage during dry season.

- » Since the concentration of pollutant is different from the degree of development for target area, condition of soil usage, state of cleanliness of city, rainfall intensity and rainfall duration time, etc., data for target area which were monitored beforehand, and sewer overflows treatment (separate storage and discharge facility) having considered with multiple factors of existing waste water disposal plant and water quality characteristic of initial rainfall, these are more effective method of rain water, waste water treatment on the improvement of water quality of river or lake.

Key Concepts of Design

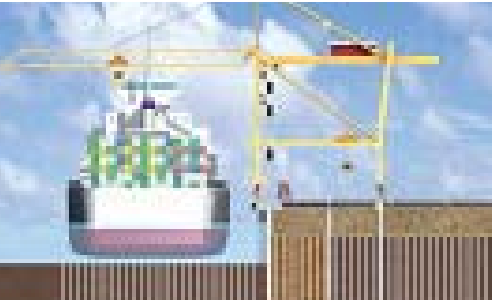
- » With regard to rainfall and downpour, it is to establish standard design values according to each period of time for rainfall intensity during the year.
- » It is to set up marginal conditions of superb discharge in order not to exceed the standard of pollution level environmentally.

Engineering Business Sector

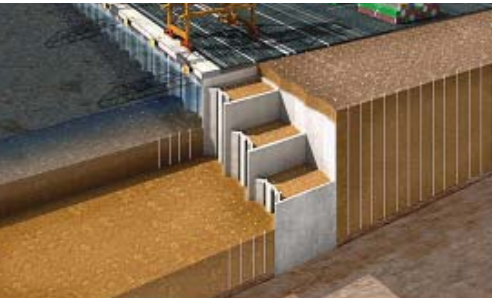
Superlative technical support to fit the order of customer

Design practice on earth retaining and excavating method, timbering, and basic method of construction, etc., and proposal activity for VE(Value Engineering), etc. in relation to the fields of quay wall, Dry Dock, soft foundation improvement and reinforcement, etc., Pumyang E&C's effort for customer satisfaction is continuing.

- **Engineering & Consulting**
 - Earth Retaining and Excavating Method
 - Special Timbering
 - Pile Supported Foundation
 - Slurry Wall Quay and Dry Dock
 - Soft Foundation Improvement
 - System Grouting
- **VE (Value Engineering)**
 - **Research & Development**
 - **Construction Plan Review**



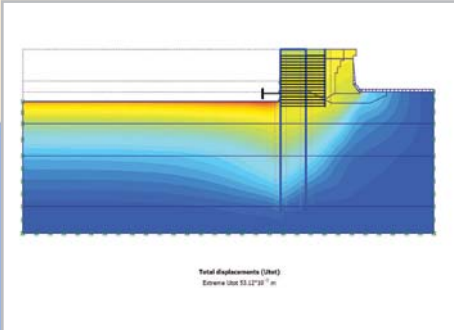
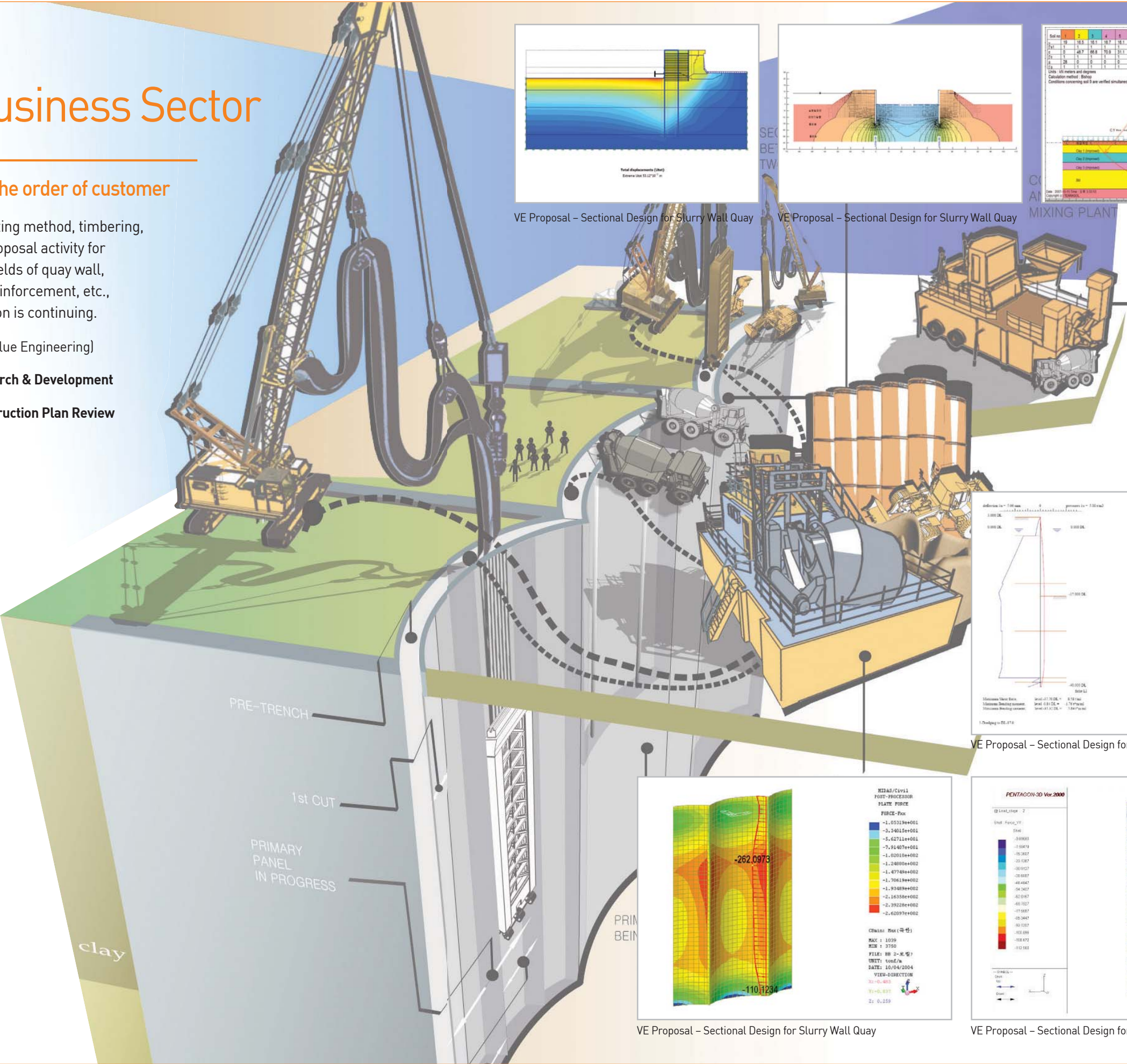
VE Proposal – Sectional Design for Slurry Wall Quay



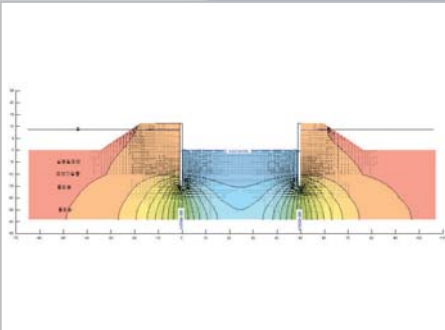
VE Proposal – Construction Plan for Slurry Wall Quay



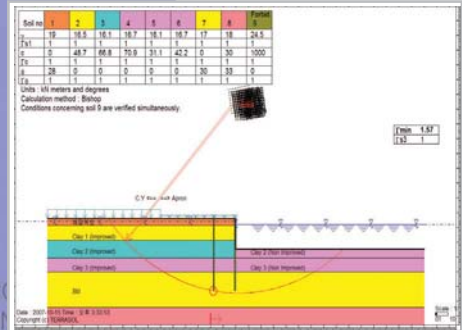
VE Proposal – Rear End Ground Improvement for Slurry Wall Quay



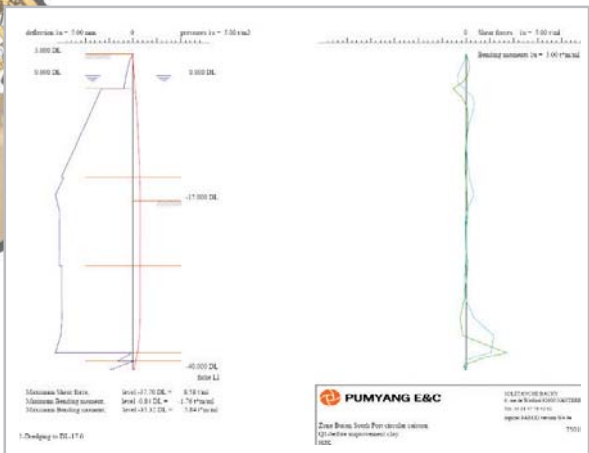
VE Proposal – Sectional Design for Slurry Wall Quay



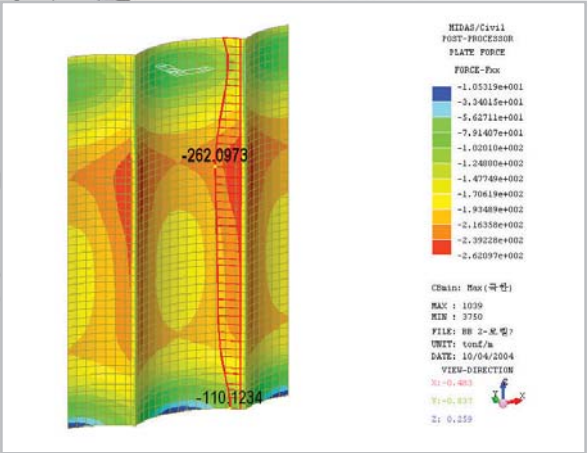
VE Proposal – Sectional Design for Slurry Wall Quay



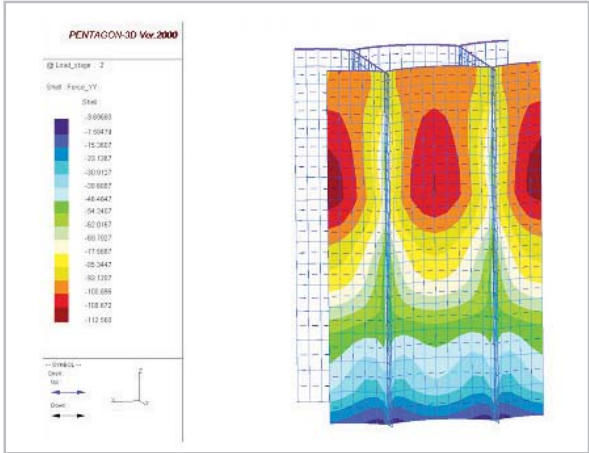
VE Proposal – Sectional Design for Slurry Wall Quay



VE Proposal – Sectional Design for Slurry Wall Quay



VE Proposal – Sectional Design for Slurry Wall Quay



VE Proposal – Sectional Design for Slurry Wall Quay

Contents

Method Introduction

Endless Satisfaction

Making the world you have craved.

Customer Satisfaction

Our efforts are endless in any places within sight or out of sight in order for making the customers dream come true.

Quality Satisfaction

We realize endless satisfaction for our customers with the top-quality construction and the best know-hows.

Diaphragm Wall_ Slurry Wall **44**

Diaphragm Wall_ Hydrofraise **46**

Pile Foundation - Barrette / RCD Pile **48**

Direction Control Explosion Method **50**

PPS (Prestressed Pipe Strut) Excavation Method **52**

Vibro Compaction **58**

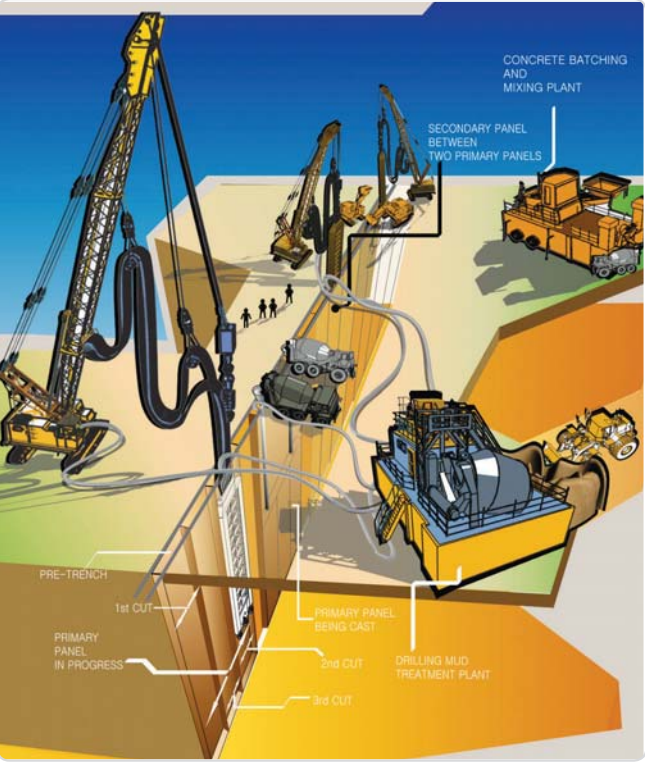
Stone Columns Method **60**

Diaphragm Wall

Method Introduction

- A method on site concreting of Diaphragm Wall is used to build reinforced concrete wall sequentially while excavating the ground using underground excavation equipment, a rotary excavator, and filling the Bentonite stabilizer liquid to prevent the hollow wall collapse.
- This method started to be applied to dam construction site in Europe in 1950s. In Korea, It was introduced into construction of Yeouido Lucky GumSung office building in the early 1980s.
- In the early stage of introduction Clamshell excavation method which is impact technique using Hang Grab was used. However, after development of Hydrofraise, rotating Hydraulic excavation equipment, it turns non-impact excavation technique, thus it is possible to construct the wall the deep depth as it minimizes impact of the vibration on the field, develops straightness, and improves the quality of the joint between the panel by cutting the construction wall.

Slurry Wall Construction View

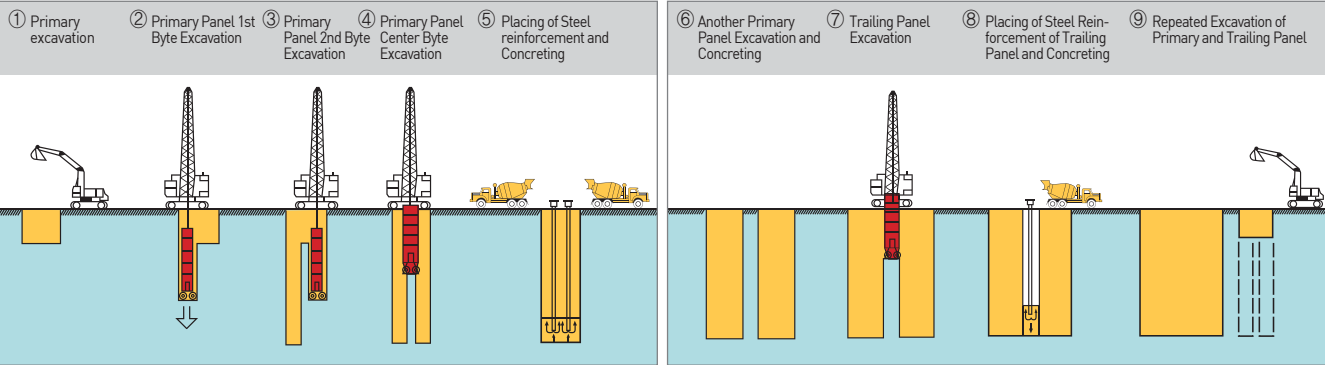


• Application of construction method

Diaphragm Wall is used as earth retaining wall or waterproof wall, thus it is diversely applied to underground structures, subsurface dams, subways, underground roads, underground storage, construction wall, Barrette pile, Dam base, and foundation of bridge structure.



Method Introduction



Slurry Wall

Diaphragm Wall Construction

• Working Platform

The working site in order to construct Slurry Wall should be high over ground water level more than 1.5m, and should also be sturdy.

• Guide Wall

Guide Wall shall induce excavating, and it makes easy to establish the reference point of excavating, like the depth and length of panel. Also it has a function as of support beam for construction of hopper for concreting or steel reinforcement. Guide Wall is to be installed at the 1.0m~1.5m of the upper part of slurry wall higher than the planned height, and it is normally constructed as with reinforced concrete.



• Slurry Wall Excavation

Excavation thickness is generally set up at 0.65m, 08m, and 1.0m according to geological condition or site condition, and in particular cases, it's possible to construct as with 1.2m, and 1.5m. The depth of excavation, owing to development of rotating excavating equipment, is enabled 60m under normal condition. In case of hydrofraise, it is possible to 150m. Excavation shall be performed by setting the leading panel and trailing panel in the order of construction, and the length of each panel shall be decided within 6m~7m generally.



• Placing of Steel Reinforcement

Steel Reinforcement that is placed should be done with smooth concrete casting by assembled it at interval of 15cm ~ 25cm. The width of steel reinforcement is smaller than the thickness of wall by 20cm, and it shall be needed a separate hook for placement. Having attached spacer, it should maintain cover thickness.



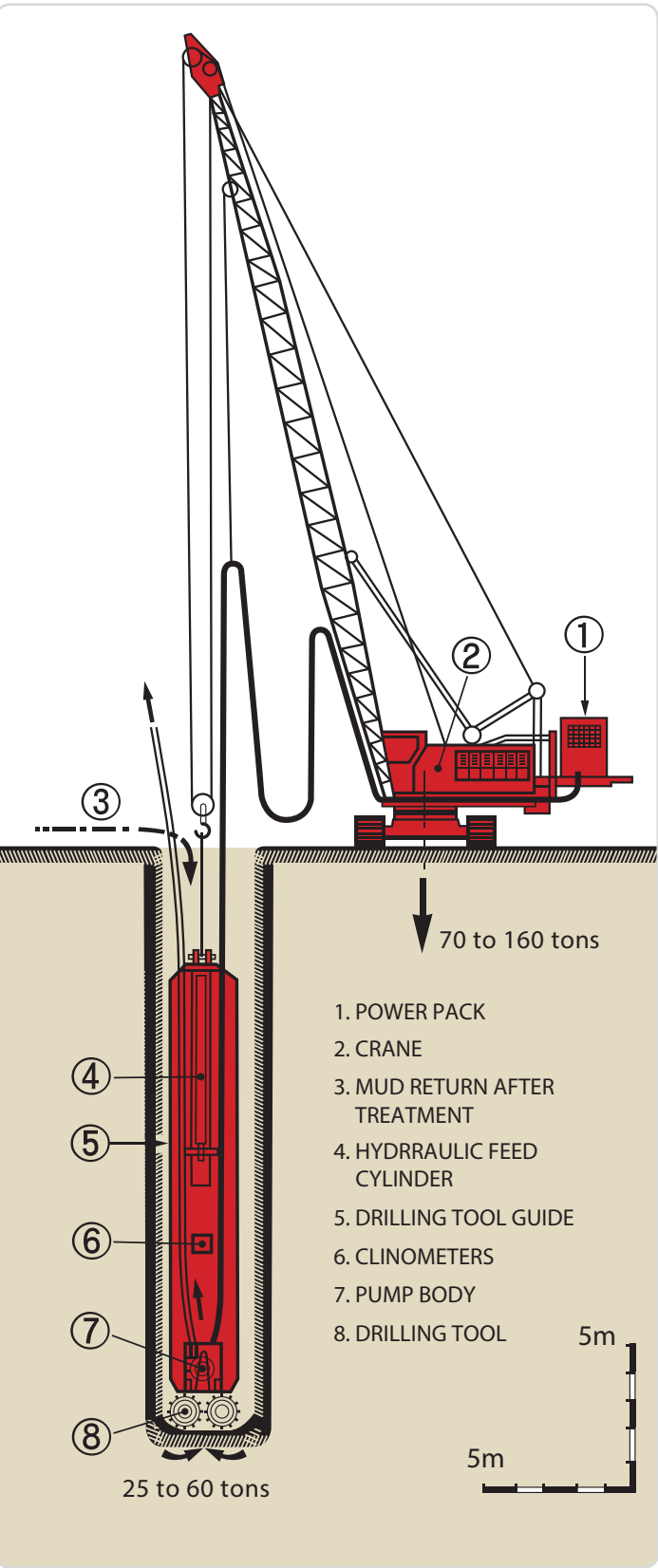
Placing of Steel Reinforcement

• Concreting

Concrete shall be casting from the lower part through Tremie Pipe, and it doesn't need a separate vibrator. Concreting must be done without interruption, and during concreting, there are some cases to add up admixture including retarder, etc..Tremie Pipe should install 2~3 sets according to the length of panel, and should be concreting simultaneously.



Diaphragm Wall



Principle of Operation

Hydrofraise will be equipped with Heavy Duty Crane, and two Cutter Drums in the lower part of body attached with TIP made of Tungsten Carbide material spin counter of each other by means of hydraulics, and keep excavating. Power Pack equipped with Crane provide hydraulics to Motor that drives Drum inside of Hydrofraise, and to Bentonite Slurry, as well as to Motor that drives high-performance pump which pull out and lift the excavated earth and sand, and smashed rock. Steel Frame of the Body induces vertical excavation, and it consists of Body Frame and Guide Frame that are designed to maintain a constant speed for Drum rotation and excavation according to Hydraulic Feed Cylinder.

Standard excavation depth	60m
Maximum excavation depth	150m
Cutter rotation speed	9-25rpm
Cutter diameter	1200-1400mm
Maximum cutter torque at 300 bars	4000-12000m.kg
Rotation motors power output	110-330HP
Circulation pump flowrate	450m3/h
Maximum outlet pressure	4.5bars
Cutting tool total operating weight	25-60tons
Power-pack output at 1800rpm	475-750HP

Mechanical Characteristics

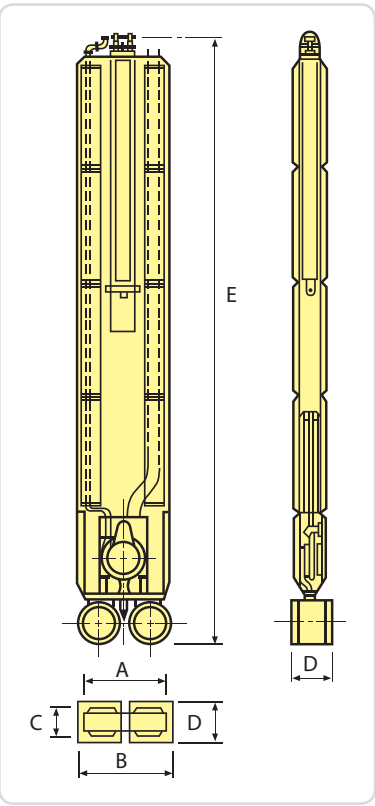
Cutter of HYDROFRAISE shapes the joint while cutting the joint region of leading type panel already casted concrete less than 10cm, so it does not need joint mechanics separately. Whole process is continued having circulated Bentonite liquid and the excavated earth and sand together, so that it has advantage in that it is possible for concreting right after excavation.



Detail View of Joint

Hydrofraise

Excavation by HYDROFRAISE can be widely practiced in the variety of soil condition (clay, sand, gravel stratum, underlying rock formation), and excavation speed is in inverse proportion to the degree of soil's firmness. (Crushing Strength - 500~1000kg/cm2) There is no vibration during excavating, thus it is very suitable excavator to be used for construction within the downtown area. Having equipped with precise Inclinometer that measures precise straightness, it has very small margin of error. (less than 0.2%) The depth of excavation, generally, is 60 meters, and it is possible to excavate the depth of maximum 150 meters. So it has a constructability being able to use, under any circumstances, as of exterior walls of the underground structures.



A	2.36/2.76	2.36/2.76	2.36/2.76	2.36/2.76	2.36/2.76
B	2.4/2.80	2.40/2.80	2.40/2.80	2.40/2.80	2.40/2.80
C	0.59	0.76	0.96	1.16	1.46
D	0.65	0.80	1.00	1.20	1.50
E	15.00	15.00	15.00	15.00	15.00

Standard Equipment Sizes



HYDROFRAISE



HYDROFRAISE CUTTING MOTOR



HYDROFRAISE 12000, Algeria Omen Fertilizer Project

Pile Foundation

Barrette / RCD Pile

» BARRETTE PILE

Method Introduction

- Barrette Pile is, different from RCD Pile that is constructed as in circular section, and also is foundation pile supporting the structures on land, a kind of concrete pile on site concreting that is able to construct in various types of section which is necessary for secure the soil or ground bearing power.
- Construction method will, as in construction of slurry wall with rotating excavator like HYDROFRAISE, excavate to the designed depth maintaining a hollow wall having used Bentonite stabilizer liquid, and after installation of steel members, it will be concreting till completion of the construction job.
- Barrette Pile's cross section can be expanded over 7m² in order to resist horizontal and vertical loads, and depending on geological condition, it can construct deeply under the ground, depth over 60m in case the stratum where brittle terrain had been developed, and it is also possible to construct up to the soft rock layer.



Installation of Barrette Steel Frame

Application Example of Design Load per Specification

Cross-Section Size	Line Cross-Section	Near Barrette Pile Filled	Design Load of the Main Hall (TON)	
m	m ²	m	Allowable Bearing Capacity on Ground (50kg/cm ²)	Allowable Bearing Capacity on Ground (50kg/cm ²)
2.4x0.65	1.56	6.10	780	1248
2.4x0.80	1.92	6.40	960	1536
2.4x1.00	2.4	6.80	1200	1920
2.8x0.80	2.24	7.20	1120	1792
2.8x1.00	2.8	7.60	1400	2240
2.8x1.20	3.36	8.00	1680	2688

Distinctive Features of Construction Method

- It is able to construct deeply under the ground, and it is also possible to excavate up to the soft-rock layer.
- It is possible to construct the size of section that is wanted - rectangular shape, cross-shaped, and H-shaped.
- This is a construction method of low noise and non-vibration.
- It's easy to manage straightness comparing with RCD pile construction.
- Since it is excavated and constructed under Bentonite stabilizer, there is no need of separate Casing to be accompanied with the construction of either RCD or PRD.

Application of Construction Method

- Barrette foundation is diversely applied to the basis of building, foundation of dam, and foundation of bridge structure, etc.



Barrette Pile Construction Scene at Byeoksan Mixed-use Apartment in Hangang-ro



Barrette Pile Construction Scene at National Assembly Member's Office Bldg. in Yeouido



Barrette Pile Construction Scene at Upsquare in Ulsan

» RCD (REVERSE CIRCULATION DRILL)

Method Introduction

- RCD (Reverse Circulation Drill) method is to install Stand Pipe from the surface of the earth to the upper region of weathered rock. It prevents collapse of hollow wall, and it excavates with Hammer Grab. It is the construction method that excavates rock formation below to the design depth by rotating special Bit having maintained hollow wall with hydrostatic pressure more than 0.2kg/cm² using either clear water or stabilizer.
- Excavate material generated during the excavation discharges above the ground together with circulation water through Drill Rod Pipe making use of compressed air from the lower part, and after settling the excavation material at the settling reservoir, it supplies settled excavation material again. By means of this method, it is called reverse circulation excavation method. terrain had been developed, and it is also possible to construct up to the soft rock layer.



Distinctive Features of Construction Method

- It is able to construct to the soft rock layer or hard rock layer.
- In the On Site Concreting Pile Methods, it's the most large-diameter drilled shaft.
- This is a construction method that uses water, so it's possible to construct on the water.
- There is a difficulty in management of straightness.
- Constructions have difficulty in terrain conditions which cannot be maintained water level.

Application of Construction Method

- Generally, RCD foundation is possible to excavate with the large-diameter drilled shaft from 1500mm to 3000mm. It's the basic pile that support structures on the ground, thus it apply to the foundation of building or pier foundation of bridges.



RCD construction scene at Poonglim Exllu Tower in Incheon



RCD construction at Hanil Residential Complex Building in Mangwoo-dong



RCD construction scene at Good Morning City



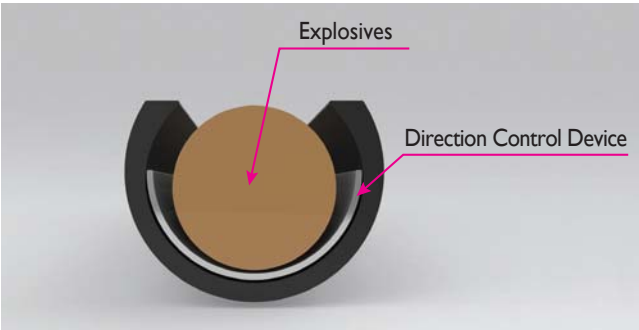
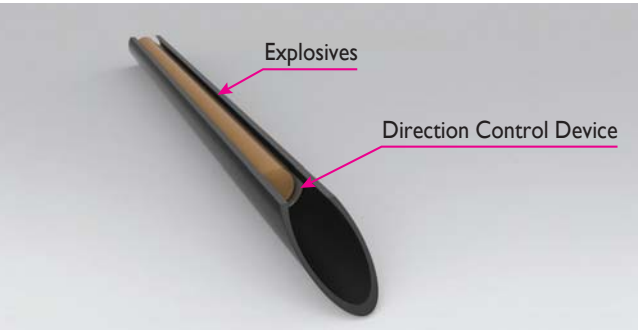
Christian Church Mokchang RCD construction site at Seoul Sungrak Church

Direction Control Explosion Method

» DIRECTION CONTROL EXPLOSION METHOD [Patent Registration No.10-1392158]

Method Introduction

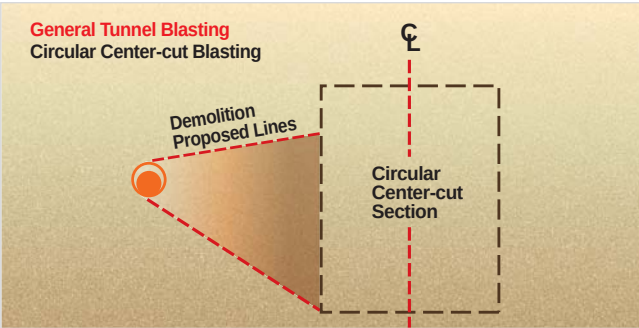
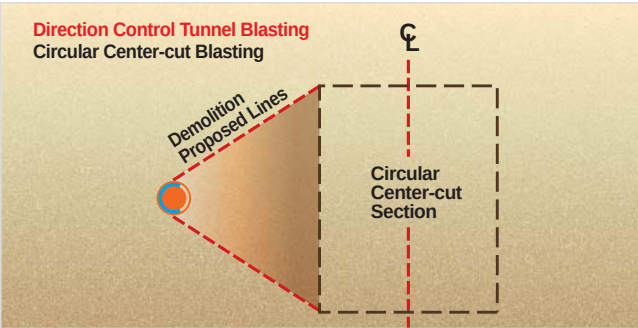
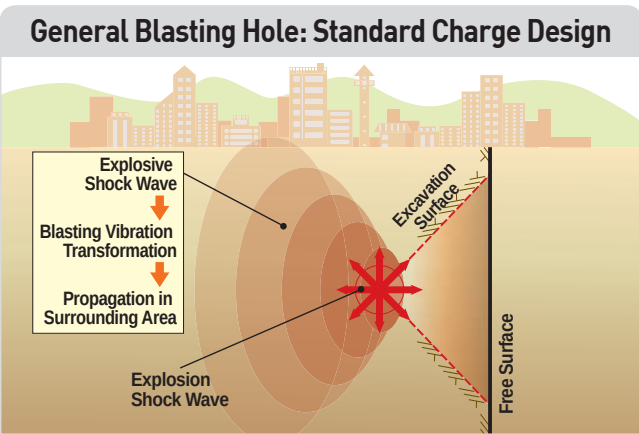
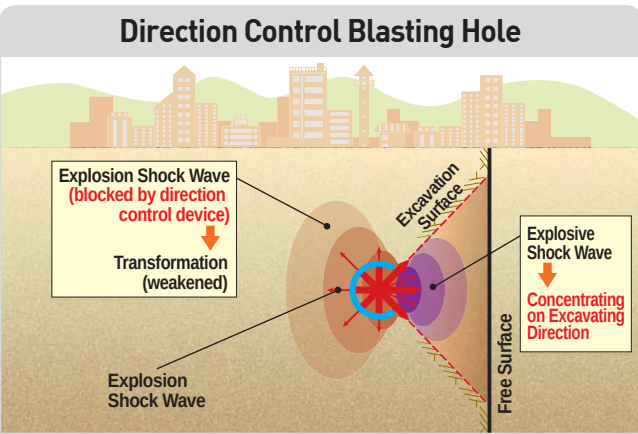
- Direct control Explosion Method suppresses the vibration at blast while insulating auxiliary material which controls the vibration. As this method lets explosion in the perforation on the bedrock, the shock waves occurred at the explosion concentrate at the planned area of excavation in order to destroy the bedrock. To prevent shock waves for unnecessary area of excavation the stronger blocking material which stainless or carbon fiber is insulated is used.
- This method lets shock waves at the explosion in the certain direction to excavate the planned area only. Therefore, the shock wave is blocked in the unplanned direction by the Direction Control Device, so it prevents propagating the blasting vibration. It is known as non-vibration explosion method.



Comparison Table of Construction Method

Classification	Summary of Construction Method	Unit Price
Vibration Control Blasting	At center-cut section, 2~3 pre large holes (D=362mm) are to be bored. This is a construction method to decrease vibration having reduced the excavated length by 1.0m making use of pre large holes as in a free surface.	55,000 won/m³
Electronic Blasting	This is a construction method to decrease vibration having minimized the charge per delay making use of advantages of electronic detonator that can freely use the initiation time of detonator.	190,000 won/m³
NRC Vapor Pressor Crushing (Nonex)	Having produced vapor pressure with generating high-temperature heat by external stimulation making use of demolition agent which is composed of non-explosives, and by using this vapor pressure, this method excavates rock mass.	-
SUPER WEDGE (non-vibration excavation)	It's a construction method that uses mechanical hydraulic crusher. After boring the rock mass, wedges and blades are inserted into the holes. With this method, it excavates rock mass using wedge force.	240,000 won/m³
Direction Control Explosion	Using direction control device that is open in one-side direction, the explosive power shall be focused toward Pre Large Hole. This is a construction method that blocks propagation of vibration toward the opposite direction.	130,000 won/m³

Principle of Direction Control Explosion and its Efficiency



Construction Flow Chart



PPS (Prestressed Pipe Strut) Excavation Method

» PPS (Prestressed Pipe Strut) EXCAVATION METHOD [Patent Registration No.1-0776964]

Method Introduction

- Among excavation works of underground structures, Strut Method, Underground Anchor Method, and Structural Slab Support Method, etc. are mostly utilized for Propped Retaining Wall Method. In particular, Strut Method is much applied as the universal method of Propped Retaining Wall owing to its easier installation method and smoother supply of structural steel comparing to other methods, however, narrow-spaced members, and Post Piles that support these members, etc. are restricting working space for excavation equipment, thus this reduces efficiency of earthworks, also when constructing main structure, this results in much of decline of efficiency in construction process due to interference between Strut and Post Pile.
- **PPS Method**, different from common Strut Method, deals with pre-compressive force using pre-compression load jack making use of circular steel pipe of which resistance limits in relation to the allowable compressive force and buckling are relatively larger, and that it minimizes the retaining wall horizontal displacement and its surrounding ground sinking. Thus it will enable to plan efficient excavating works making use of broad working space. Also space between PPS placement is wide in both vertical and horizontal direction, and there are no POST Piles, so this construction method is much more advantageous comparing with Strut Method in terms of constructability of structures and quality management.

Main Specification

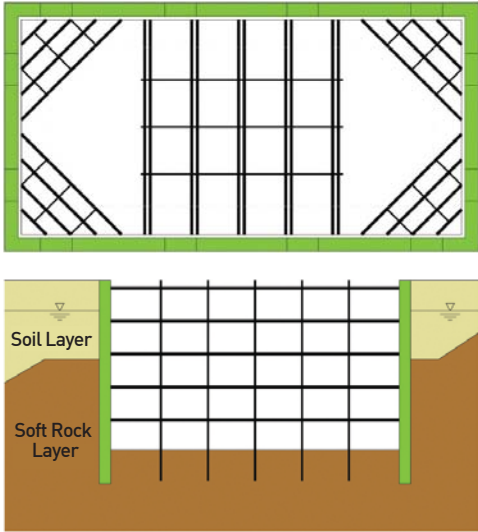
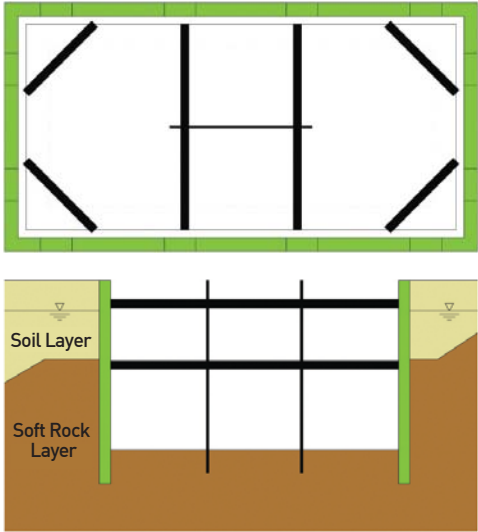
- Maximization of installed supporting steel beam is possible using section properties of large steel pipe (Ø800~1200mm).
- Post Pile for prevention of buckling is no need.
- With prestress using hydraulic Jack, it minimizes surrounding ground sinking and retaining wall displacement.
- In time of constructing main structure, working space is so wide that it's significantly more favorable to the constructability and quality management.
- Reduction of construction period and costs comparing with existing Strut Method (about 20~30%)
- Reduction of building frame construction period (reduction of 7~10 days per one basement floor)

PPS Main Features and Performance Comparison according to Slenderness Ratio

Classification	Steel Grade	Cross-sectional Area	Unit Weight	Cross-section Secondary Moment	Section Coefficient	Slenderness Ratio	Installed Support Steel Beam	Allowable Bearing Power of Main Hall
		cm²	kg/m	cm⁴	cm³	L/r	m	tonf
H-300 X 300 X 10 X 15	SM275	119.8	94	204x10²	136x10	60	4.5	176
ø800mm, t=12mm	STKT590	297.1	233	231x10³	577x10	60	16.5	566.7
ø800mm, t=16mm	STKT590	394.1	309	303x10³	757x10	60	16.5	781.9
ø1000mm, t=14mm	STKT590	433.7	340	527x10³	105x10²	60	20.5	844.1

PPS (Prestressed Pipe Strut) Excavation Method

Comparison Table of Construction Method

Classification	Common STRUT Method	PPS Method
Plane · Cross Section		
Characteristic	• Classification of Strong Axis / Weak Axis • Directing of weak axis is disadvantageous for buckling • Disadvantageous for torsion • Limited spacing of spread beam • Required horizontal / vertical Stiffener (Post Pile spacing within about 5.0m, Brace)	• No classification for strong axis / weak axis • Advantageous for buckling and torsion • Able to maximize vertical spacing of spread beam • The weight of required structural steel is small quantity comparing to STRUT method • Minimize horizontal / vertical stiffener (Post Pile spacing within about 20m)
Constructability	• Detailed technologies of constructability, including connecting and dismantling, etc. are generalized • Generation of additional construction process for installation / dismantling of stiffener • Risk factors are available on the spread veam accoring to generation of working process • Many obstacles have arisen when constructing in up this structure. (Close placement of supports in up down left right side, and post pile) • Construction Period is disadvantageous relatively	• Flange type joint has become generalized • No additional process in relation to stiffener • It's safe in construction because PPS steel pipe installation process is simple • Relatively possible to reduce the construction period • Quality control and constructability are satisfactory because there is no construction interference with PPS structure steel when constructing this structure
Construction	• General	• Construction period saving effect is 15days per one basement floor
Economy	• Relatively High Construction cost • Advantageous for Small construction site	• Save less than a 10% of construction cost comparing to H-shape steel type • Applied to regardless the size of construction site (holds a record of construction, excavation width more than 100m)
Safety	• Inappropriate to apply it to a large size construction site for long term period	• Increase resistance of changes in earth pressure during construction according to apply to high-strength-large-section spread beam method • Diminishing displacement of abnormality of retaining wall through prestress load • Minimize subsidence of neighboring ground through prestress load (Increase safety of adjacent building and the buried utility assets)

PPS (Prestressed Pipe Strut) Excavation Method

» Manufacture of PPS



▲ Material inspection of steel coil



▲ Cube Steel Production of Steel Pipe and Cutting



▲ Installation of PLATE of the end Part of Steel Pipe



▲ Sanding and Painting

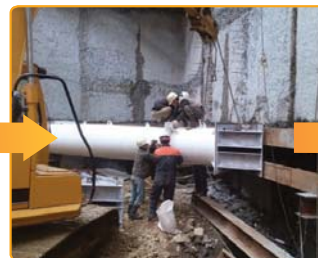
» Installation of PPS



▲ Earth Retaining Wall Construction



▲ Installation of Wale and Backfill



▲ PPS Installation (Positioning of PPS and Connection)



▲ Prestress Loading

» PPS Disassembling



▲ Construction of Building SLAB in the Basement



▲ Removal of Pressure from Prestressed Load Jack

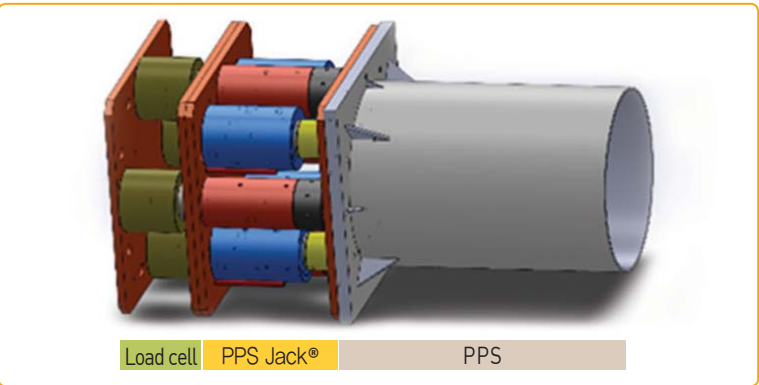


▲ PPS

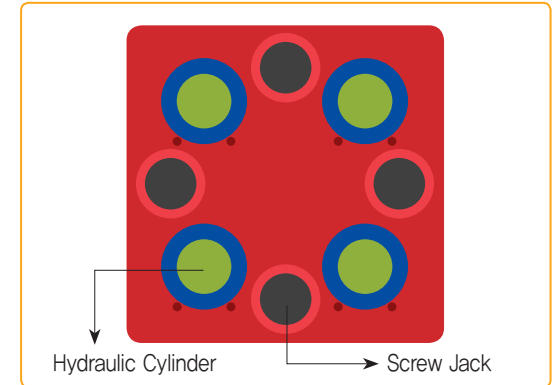


▲ PPS (Transportation and Salvage)

» PPS Connection Detail



▲ PPS JACK® Connection Detail



▲ PPS JACK® Section

PPS (Prestressed Pipe Strut) Excavation Method

» Prestress Load Control

Minimum Prestress Load for Control of Bending Compressive Stress generated according to Self-Load Steel Pipe

Classification	A cm ²	W kg/m	Z cm ³	Effective Length m												
				10	12	14	16	18	20	22	24	26	28	30		
ø 800 12t	297.1	233	5770	Moment Occurred tonf	3	4	6	7	9	12	14	17	20	23	26	
				Minimal Prestress Load tonf	15	22	29	38	49	60	73	86	101	118	135	
ø 800 16t	394.1	309	7570	Moment Occurred tonf	4	6	8	10	13	15	19	22	26	30	35	
				Minimal Prestress Load tonf	20	29	39	51	65	80	97	116	136	158	181	
ø 1000 14t	433.7	340	10500	Moment Occurred tonf	4	6	8	11	14	17	21	24	29	33	38	
				Minimal Prestress Load tonf	18	25	34	45	57	70	85	101	119	138	158	

* The above Prestress load should be applied to fit into the field situation with minimal applied pressure in order not to generate the bending tensile force according to self-load at the beginning of installation.



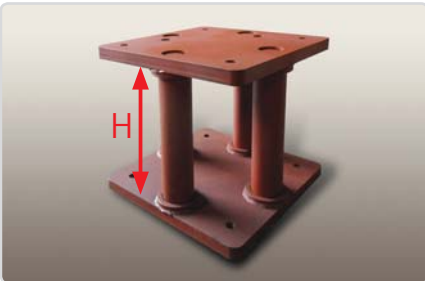
▲ Prestress Load Control Pump

PW-75 Hydraulic Pump				
Maximum Pump Pressure (kgf/cm ²)	Weight (kg)	Number of Cylinder (ea)	Cross-section Area (cm ²)	Tensile Load (tonf)
1000	300	4	188.5	500
			268.6	750
			362.8	1000



▲ Prestressed Load Jack (PPS Jack®)

PPS JACK®					
Classification	Dimension of Outward Form (mm)			Hydraulic Jack (ea)	Allowable Bearing Capacity (tonf)
	Width (Horizontal Length)	Height	Length		
PPS - PRJ	1000	1000	500-750	4	1000



▲ Adjustable Jack of Length of the End Part

Adjustable Jack of the End Part				
H (mm)	Under Loading Test		Number of Installation (ea)	Allowable Bearing Capacity (tonf)
	Loading	Test Results		
30	245	All serene	4	980
180			6	1470
330				

PPS (Prestressed Pipe Strut) Excavation Method

» Site reference



EBS Digital Integration Company office Building, Ilsan
· Excavation depth : 13~16m
· PPS installation layer & length : 2 layer / 2,356m
· PPS diameter : Ø 800mm



Magok Kolon the Future technology center
· Excavation depth : 13.9~17.9m
· PPS installation layer & length : 2 layer / 3,260m
· PPS diameter : Ø 800mm



Umyeon Samsung R&D Center, Seoul
· Excavation depth : 15.5~20.9m
· PPS installation layer & length : 3~4 layer / 5,656m
· PPS diameter : Ø 800mm



Incheon Airport Second Passenger Terminal, Incheon
· Excavation depth : 21.0~25.0m
· PPS installation layer & length : 2~3 layer / 6,000m
· PPS diameter : Ø 800mm



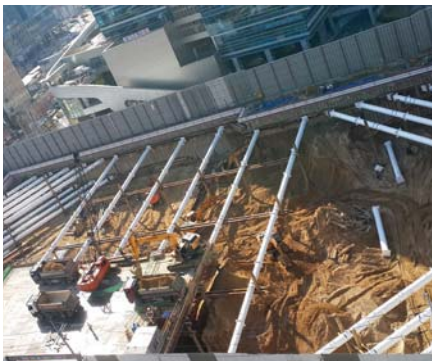
Kwangyang E-Pyeonhansesang APT
· Excavation depth : 15.5~20.9m
· PPS installation layer & length : 3 layer / 2,320m
· PPS diameter : Ø 800mm



Sungsu Wooribank Call center
· Excavation depth : 17.5~21.0m
· PPS installation layer & length : 2~3 layer / 1,400m
· PPS diameter : Ø 800mm



Jamsil I-Park Officetel, Seoul
· Excavation depth : 18.8~23.7m
· PPS installation layer & length : 3 layer / 1,000m
· PPS diameter : Ø 800mm



Yeongdeungpo officetel, Seoul
· Excavation depth : 14.1~17.9m
· PPS installation layer & length : 3~4 layer / 2,720m
· PPS diameter : Ø 800mm



Pyungchon IS BIZ tower, Anyang
· Excavation depth : 16.3~19.3m
· PPS installation layer & length : 3 layer / 2,707m
· PPS diameter : Ø 800mm

PPS (Prestressed Pipe Strut) Excavation Method



Bulgwangsa, Seoul
· Excavation depth : 20.5~22.9m
· PPS installation layer & length : 3 layer / 711m
· PPS diameter : Ø 800mm



Sangam Doosan Weve Centium, Seoul
· Excavation depth : 19.0~23.0m
· PPS installation layer & length : 3~4 layer / 840m
· PPS diameter : Ø 800~1,000mm



Yonghoman Complex Facility, Busan
· Excavation depth : 21.5m
· PPS installation layer & length : 4 layer / 1,850m
· PPS diameter : Ø 800mm



International Temple stay
· Excavation depth : 14~20m
· PPS installation layer & length : 2 layer / 630m
· PPS diameter : Ø 800mm



Wirye New City IS Central Tower
· Excavation depth : 14.0~18.5m
· PPS installation layer & length : 3~4 layer / 1,740m
· PPS diameter : Ø 800mm



North Port Bridge Marine Special Foundation, Busan
· PPS installation layer & length : 1 layer / 250m
· PPS diameter : Ø 1,200mm



Algeria Oman Fertilizer Plant Intake (ALGERIA)
· Excavation depth : 10m
· PPS diameter : Ø 800mm / Ø 1,000mm



Algeria Oman Fertilizer Plant Outfall (ALGERIA)
· Excavation depth : 11.9m
· PPS diameter : Ø 800mm / Ø 1,000mm



LNG Tank Terminal, Pyeongtaek
· Excavation depth : 15.5~20.9m
· PPS installation layer & length : 3~4 layer / 840m
· PPS diameter : Ø 800mm

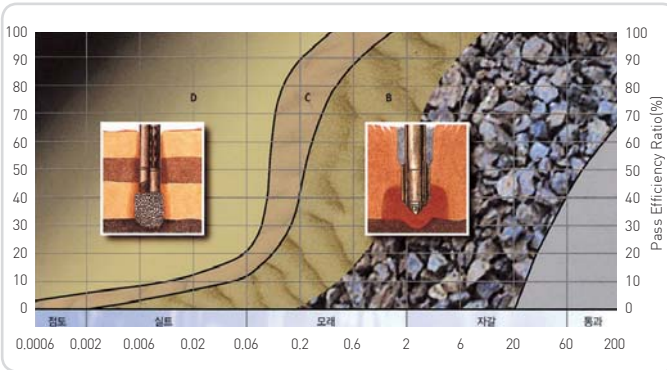
Vibro Compaction



Category A : Compactness is excellent in this category of earth. The right-hand side boundary line of graph shows amount of gravel and boulder stone empirically, and that it is hard for Vibroprobe to reach the depth of compact.

Category B : This category of earth is suitable for vibro compaction. Granular content is less than 12%. In case of the ground in category A, when compacting, the original ground flows in the direction of vibroprobe. If the ground sinking occurred during that time is allowable, it shall not do the Backfill from the above additionally. According to the initial density and required density, the damages due to vibro compaction will be arisen in the range of 2~10% of thickness of reformed stratum.

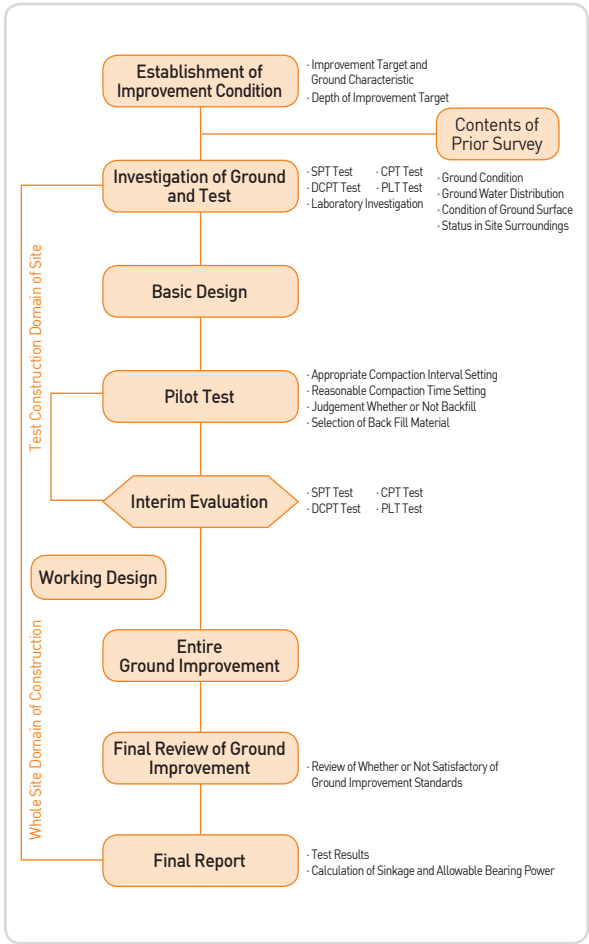
Category C : Although Category C is able to do Vibro Compaction, the time required for compaction is to be greatly increased comparing with Category C, this is because soil pore water does not drain quickly. Since the original ground does not flow in the direction of Vibroprobe, it is possible to compact through supply of additional earth and sand from the surface.



Vibro Compaction

- This applies to the case for improvement of the ground with more densely compactness having increased relative density for coarse ground, like the sand or gravel layer on a classification of soil. (A, B, C category) Vibro Compaction Method is to compact and improve loose sandy ground using vibration of the probe after interpenetrating the probe into the targeted ground for improvement, and it will compact the ground in a dense state up to 50~90% of relative density at an interval of 2~5m of compact hole.
- After interpenetrating the probe into the ground by vibration power having injected high-pressure water and air, it is to be drawn at regular interval through maintenance period, and, at this time, the earth and sand that flowed in the bottom surface and original ground is going to be compacted.

Construction Method Flow



Probe Penetration stage within the ground



Drawing and compaction steps



After Completion Vibro Compaction

Effect of Compacting

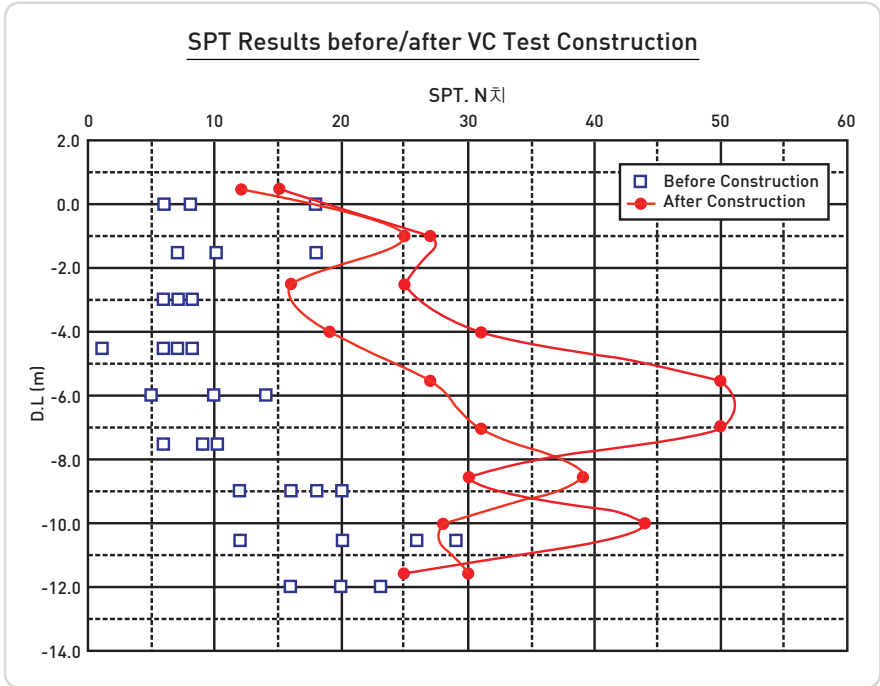
- Increase of bearing power and prevention of sinking
- Increase of ground hardness
- Control of water permeability to ground (decrease of permeability coefficient)
- Prevention of liquefaction

Quality Management

- Pilot Test
- Ground Resistance Ratio during Vibro Compaction management
- Confirmatory Test (CPT, SPT Plate Load Test)
- In some sandy area, excessive dense compaction may have lower compactness rather than the compaction with a wide interval. (Three vulnerable spots between the location of compaction)
- Accurate amount, time, and location of water being used during compaction are very important. As shown in the Proctor compaction, optimum moisture content plays a very important role.
- It has a different compactness according to the kind of equipment for Vibro probe.
- Accordingly, for placement interval of Vibro Compaction, it should be decided for the most efficient construction plan to suit ground condition through Pilot Test (field test execution).



Busan Newport Phase 1-2, Vibro compaction site view



Site Confirmatory Test, Busan Newport Phase 1-2

Stone Columns Method

Stone Columns

- In order for the purposes, including increase of bearing power and reduction of ground sinking, residual settlement control, and prevention of liquefaction, etc., targeting Fine-Grained Soil ground which is composed of viscous soil and silt, this is a construction method to improve soft ground by adding up a fixed vibration energy to the ground forming gravel compaction pile. According to the frequency of re-interpenetration of Vibro Probe, there are formed the stone columns about 800 ~ 1500 in diameter.



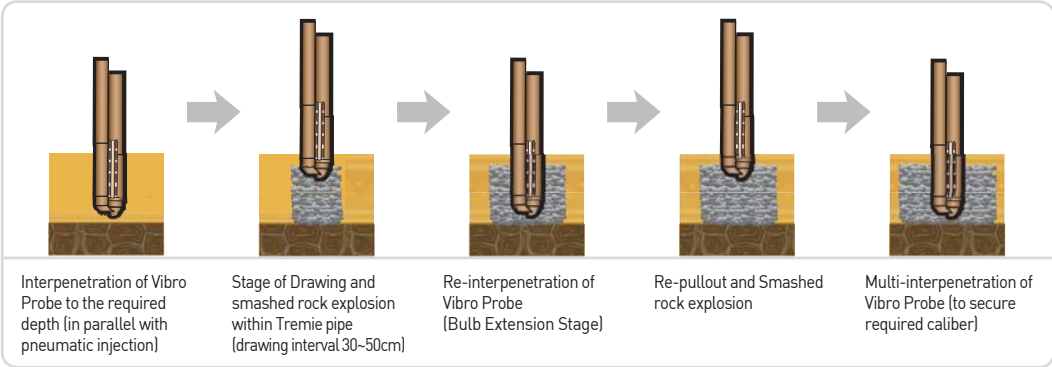
Development Works of Masan Port (1-1 Phase)



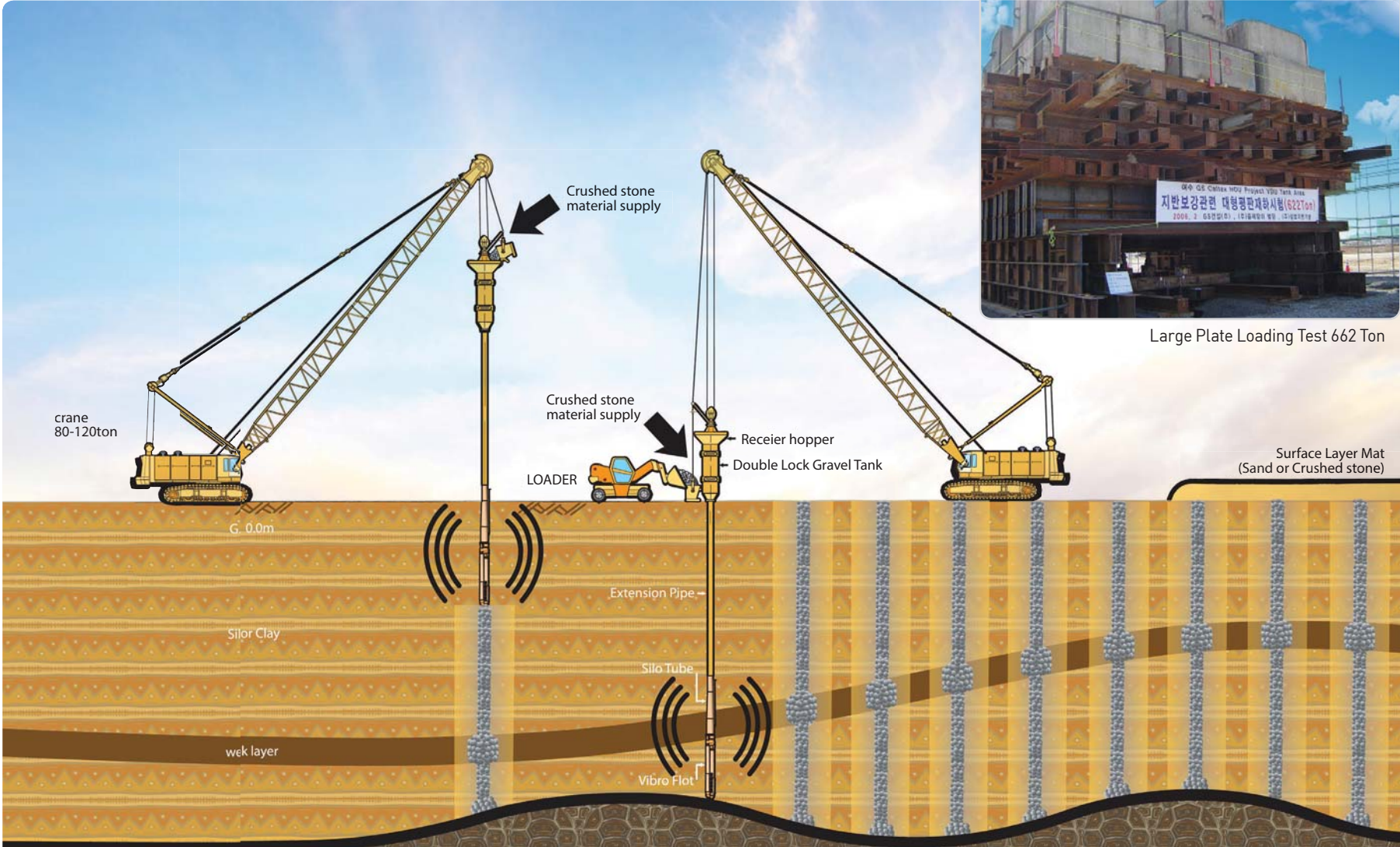
HOU No.2, VDU Tank Area GS CALTEX, Yeosu



Algeria Djen Djen Port , harbor structure extension work (ALGERIA)



Construction of Stone Column for Substructure of Dock at Gunsan Shipbuilding Yard



Large Plate Loading Test 662 Ton

Contents

Track Record

Endless Satisfaction

Making the world you have craved.

Customer Satisfaction

Our efforts are endless in any places within sight or out of sight in order for making the customers dream come true.

Quality Satisfaction

We realize endless satisfaction for our customers with the top-quality construction and the best know-hows.

Architectural Civil Engineering Business Sector **64**

SOC Civil Engineering Business Sector **74**

Civil Engineering Technology & Overseas Business Sector **78**

Architectural Civil Engineering Business Sector Record

Client Satisfaction & Reliable Engineering

Experience is the key to consistent, high-quality performance. Pumyang E&C have been applying our technological capability to excellence performance of project in many sites for the last many year. The below table present to you for significant projects except general earth work. We are ready and eager to assist you.



2017

- | | | |
|---|--|--------------|
| • Chungju AdministrationTown Koaroo Hutis | · Diaphragm Wall : 9,574m ² | · PRD : 89ea |
| • Seosomun Office | · CIP : 11,552m | · PRD : 20ea |

2016

- | | | |
|---------------------------------------|---|----------------------------------|
| • Loyal palace Busan Newport Tier 1,2 | · Diaphragm Wall : 26,031m ² | · DCM : 248,920m |
| • Sangam DMC Parking Complex Building | · Diaphragm Wall : 4,206m ² | · H-PILE : 1,509m |
| • Cheongna Diostel | · Diaphragm Wall : 4,670m ² | · PRD : 28ea |
| • MisaStation, Herington Tower | · Diaphragm Wall : 3,726m ² | · PRD : 38ea |
| • Guro knowledge industry center | · CIP : 7,338m | · SGR : 10,824m |
| • Kimpo Marinabay Hotel | · Diaphragm Wall : 8,175m ² | · Barrette : 7,950m ² |
| • Kimpo Pungmu 2 zone E-mart | · Diaphragm Wall : 10,799m ² | · PRD : 105ea |
| • Wirye E-mart Town | · Diaphragm Wall : 13,901m ² | · Underpinning : 3,562m |
| • Haeundae Dongwong vista | · Diaphragm Wall : 8,000m ² | · PRD : 107ea |
| • Misa E-Pyeonhansesang APT | · Diaphragm Wall : 6,921m ² | · PRD : 67ea |
| • Ulsan, Loyal palce Tier 1 | · Diaphragm Wall : 11,241m ² | · Barrette : 7,134m ² |

2015

- | | | |
|---|---|----------------------------------|
| • Hanam Hillstate office | · Diaphragm Wall : 6,292m ² | · PRD : 80ea |
| • Gangnam Severance hospital, Seoul | · Diaphragm Wall : 2,743m ² | · Guide wall : 159m |
| • Heaundae U-dong Business Hotel | · CIP : 7,689m | · PRD : 28ea |
| • Yangsan Samjung Greencore the city | · Diaphragm Wall : 9,000m ² | · Barrette : 7,750m ² |
| • Yeouido Jamsa hall Business facility | · Diaphragm Wall : 6,861m ² | · PRD : 34ea |
| • Busan Samhan Goldenview Central Tower | · Diaphragm Wall : 7,875m ² | · CIP : 12,973m |
| • Gangreung Gangmundong Hotel | · Diaphragm Wall : 10,050m ² | · PRD : 75ea |
| • Bangi-dong Officetel | · CIP : 6,557m | · JSP : 3,213m |

- | | | |
|---------------------------------------|--|--------------|
| • Chorang Intergation Building, Busan | · Diaphragm Wall : 5,277m ² | |
| • Sungsu Youngchang Digitaltower | · Diaphragm Wall : 5,400m ² | · PRD : 51ea |

2014

- | | | |
|--|--|--------------------------|
| • Hyundai Investment H-tower, Seoul | · Earthwork : 37,345m ³ | |
| • Sungsu-dong BY center, Seoul | · Earthwork : 39,216m ³ | |
| • KT&G Namdaemun Hotel | · Diaphragm Wall : 5,606m ² | |
| • Heaundae LCT | · Diaphragm Wall : 7,670m ² | · Earth Anchor : 31,248m |
| • Seosomun ENA Hotel, Seoul | · Earthwork : 21,467m ³ | |
| • Seoulsup Station, Knowledge Industry Center, Seoul | · Diaphragm Wall : 7,669m ² | |
| • Yongdap-dong Officetel, Seoul | · Earthwork : 37,345m ³ | |
| • Life, Ilwon-dong Company office building, Seoul | · Earthwork : 165,037m ³ | |
| • Gangnam Daesung Institute | · Bored Pile(CIP) : 2,705m | |
| • Mullae-dong Knowledge Industry Center, Seoul | · Diaphragm Wall : 6,771m ² | |
| • Sangam Dreamtower | · Diaphragm Wall : 5,793m ² | |

2013

- | | | |
|---|---|---|
| • Noryangin Fishery products wholesale market, modernizing Project, Seoul | | · Diaphragm Wall : 12,427m ² |
| • Suwon station Extension Work, Suwon | · SCW : 6,317m | · Bored Pile (CIP) : 6,155m |
| • Susong Tower, Susongdong, Seoul | · Earthwork : 65,635m ³ | |
| • Gunpo KEFICO Electron Management R&D Center | · Diaphragm Wall : 7,380m ² | |
| • Mokdong Central Purugio, Seoul | · Diaphragm Wall : 3,022m ² | · Bored Pile (PRD) : 3,206m |
| • Baeksuk Y-City Newly-built 2nd Level, Ilsan | · Diaphragm Wall : 13,905m ² | |
| • Ulsan, Dal-dong Business Hotel, Ulsan | · Diaphragm Wall : 1,993m ² | |
| • Samyang Pangyo R&D Center | · Earthwork : 129,776m ³ | |
| • Janggyo district-4, Urban Environment Improvement Project | · Earthwork : 57,322m ³ | |
| • Seongsu-dong Knowledge Industry Center | · Diaphragm Wall : 4,630m ² | |

2012

- | | | |
|--|---|--------------|
| • Korea Engineering Consultants Corp.,Seoul | · Diaphragm Wall : 78,869m ² | |
| • Yulchon, Combined cycle power plant | · Diaphragm Wall : 1,449m ² | |
| • Baesuk Y-City, Ilsan | · Diaphragm Wall : 12,705m ² | |
| • Sangsu District 1, Newly-Built APT | · Earthwork : 188,156m ³ | |
| • Gasan-dong Mario 1 Hall, Extension, Seoul | · Earthwork : 68,179m ³ | |
| • 11-2 Housing Facility newly-built project | · Earthwork : 48,553m ³ | |
| • Cheongjin District 2,3 Urban Envionnment Improvement Project | · Bored Pile (PRD) : 76ea | |
| • Western YeoUido Business Hotel, Seoul | · Diaphragm Wall : 6,379m ² | |
| • Busan UNIV. hospital Pulmonolgy center | · Diaphragm Wall : 2,711m ² | · PRD : 23ea |

2011

• National Assembly Member’s Office Bldg., Seoul	· Earthwork : 8,823m ²	
• Dangsang Station Desianluv Office Bldg., Seoul	· Diaphragm Wall : 6,412m ²	· Barrette : 3,581m ²
• Mapo 2-10 District office Bldg.	· Bored Pile (CIP) : 8,133m	
• Upsquare, Ulsan	· Barrette : 9,508m ²	
• Digital broadcast center	· Diaphragm Wall : 11,916m ²	
• Seoulsup IT Valley, Seoul	· Diaphragm Wall : 8,934m ²	· Bored Pile (PRD) : 919m
• Gunpo IT Valley, Gunpo	· Bored Pile (CIP) : 5,403m	· Bored Pile (PRD) : 919m
• Irwondong Samsung Life Insurance, Seoul	· Diaphragm Wall : 6,868m ²	
• Jeju City Hotel, Jeju	· Bored Pile (PRD) : 1,463m ²	
• Sambo sales support facility, Seoul	· Diaphragm Wall : 8,170m ²	
• Garak Market facilities modernization service, Seoul	· Diaphragm Wall : 20,173m ²	· Bored Pile (PRD) : 288ea
• Japanese compulsory mobilization history memorial hall, Busan	· Reinforced Retaining Wall : 1,661m	
• Busan national University Hospital, Busan	· Diaphragm Wall : 4,286m ²	· Bored Pile (PRD)

2010

• Woori Bank Call Center, Seongsu-dong, Seoul	· Diaphragm Wall : 4,986m ²	· PPS : 1,485m
• Hyundai Marine & Fire insurance Bupyeong office, Bupyeong	· Diaphragm Wall : 6,132m ²	
• SBS, Media Center, Seoul	· Diaphragm Wall : 6,950m ²	· Bored Pile (PRD) : 26ea
• Nonhyeondong SB Tower, Seoul	· Diaphragm Wall : 4,902m ²	· Bored Pile (PRD) : 1,424m
• Sungrak Church, Seoul	· Diaphragm Wall : 10,094m ²	· Bored Pile (RCD) : 2,161m
• Seo-Myeon, Samhan goldenview, Busan	· Diaphragm Wall : 3,423m ²	· PPS Method : 1,875.536m
• MBC, New Company Building, Seoul	· Diaphragm Wall : 12,708m ²	· Bored Pile (PRD) : 82ea
• TS office Bldg., Seoul	· Diaphragm Wall : 4,310m ²	· Earth Anchor : 8,218m
• Korea Express Busan Branch, Busan	· Diaphragm Wall : 3,740m ²	· Bored Pile (PRD) : 630m
• Central Purgio City Officetel		
• Sieunso Church, Suwon	· Diaphragm Wall : 3,552m ²	· Earth Anchor : 3,818m
• Induk UNIV. complex center, Seoul	· Excavation & Reaining Wall (L.S)	
• NC Soft Pangyo R&D center, Suwon	· H-Pile : 6,603m	· Earthwork : 111,555m ³

2009

• Meritz Fire, Busan branch, Busan	· Diaphragm Wall : 6,293m ²	· Bored Pile (RCD) : 911m
• National Assembly Member’s Office Bldg., Seoul	· Earth Work : 251,301m ³	· Diaphragm Wall : 18,656m ²
• Busan Centum Class One, Busan	· Diaphragm Wall : 7,392m ²	· Barrette : 6,127m ²
• Busan Lotte town, Rock mass measurement		
• Chungjin 5 district, Seoul	· Diaphragm Wall : 5,227m ²	· Bored Pile (PRD) : 539m
• Gangseo Jungang Market, Seoul	· Diaphragm Wall : 5,334m ²	· Barrette Pile : 67ea
• LIG insurance Busan Branch company Bldg., Busan	· Diaphragm Wall : 4,205m ²	· Bored Pile (PRD) : 775m

2008

• Junghak 2 zone 2-1 district, urban environment refurbishment project, Seoul		· Diaphragm Wall : 2,840m ²
• Seocho Business Facility, Seoul	· Retaining Wall (L.S)	· Soilnail : 204m
• Incheon Nonhyeon Sang10-1 Office Bldg., Seoul	· Diaphragm Wall : 6,947m ²	· Bored Pile (PRD) : 1,175m
• The Police Mutual Aid Association, Mapo Bldg., Seoul	· Diaphragm Wall : 6,777m ²	· Earth Work : 58,481m ³
• International Temple Stay, Seoul	· Diaphragm Wall : 4,646m ²	· PPS Method
• China Culture Town (DragonPlaza), Goyang	· Diaphragm Wall : 10,225m ²	
• Hansup E-Pyeonghansesang	· Diaphragm Wall : 12,011m ²	· Underpinning : 3,553m
• National Asia Culture Hall, Gwangju	· Diaphragm Wall : 31,966m ²	
• Ferrum Tower, Seoul	· Diaphragm Wall : 6,387m ²	· RCD : 24ea

2007

• Myoungdong Artnouveau B/D, Seoul	· Diaphragm Wall : 3,937m ²	· PRD : 30ea
• Amore Pacific B/D, Busan	· Diaphragm Wall : 2,675m ²	· Beam Strut : 406ton
• Hagik Exllutower, Incheon	· Bored Pile (RCD) : 4,472m	
• Jamsil Siyoung APT, Seoul	· Diaphragm Wall : 7,252m ²	
• Guro Digital Valley 7 B/D	· Diaphragm Wall : 4,715m ²	· Bored Pile (PRD) : 970m
• Hanam Doosan Wevepark	· Diaphragm Wall : 11,038m ²	
• Dongyang Medical Center, Pohang	· Barrette : 6,130m ³	· Earth Work : 4,290m ³
• Cheonggye Squire Garden, Seoul	· Diaphragm Wall : 69,112m ²	· Bored Pile (RCD) : 3,751m
• Busan Haeundae Airforce Resort		
• Yeouido Y22 Project	· Diaphragm Wall : 13,507m ²	· Underpinning : 2,760m
• Cinema & Fashion Complex B/D, Gangreung	· Diaphragm Wall : 10,599m ²	· Barrette : 5,831m ³

2006

• Hwangseyoung Hospital, Seoul	· CIP : 6,430m	· Earth Work : 17,167m ³
• KT Mokdong IDC	· Diaphragm Wall : 8,428m ²	
• Ukang Koaru APT-4 district, Pohang	· Barrette : 15,527m ³	
• Ukang Koaru APT-3 district, Pohang		
• Songpa Artnouveau B/D, Seoul	· Diaphragm Wall : 3,790m ²	· PHC PILE : 9,000m
• TESCO Homeplus Mokpo branch, Mokpo	· CIP : 2,420m ²	· Earth Work : 57,244m
• Jamsil-1 Redevelopment APT, Seoul	· Diaphragm Wall : 8,386m ²	
• Costco Ilsan branch, Ilsan	· Diaphragm Wall : 10,303m ²	· Earth Work : 126,741m ³
• Dongil Sweet Complex B/D, Jinju	· SCW : 7,751m ²	· Earth Work : 137,883m ³
• Deachi-dong Business Facility	· Bored Pile (PRD) : 498m	
• Gyeongsan Sa-dong 2 district Deadong dasup APT	· Earth Work : 416,140m ³	

2005

• Mangwoodong Complex B/D, Seoul	· Diaphragm Wall : 5,477m ²	· Bored Pile (R.C.D) : 1,233m
• Pantech R&D Center, Seoul	· Diaphragm Wall : 6,436m ²	· Bored Pile (P.R.D) : 1,793m
• Bupyeong Postoffice	· Diaphragm Wall : 3,173m ²	· PRD : 491m

• Seocho Business Facility		
• Pohang Ukang Land Compartmentalization rearrangement		
• Mokdong Trapalace, Seoul	· Diaphragm Wall : 12,472m ²	· Shotcrete : 1,547m ²
• Sangam IT Tower	· Diaphragm Wall : 6,561m ²	· Barrette : 1,424m
• Seocho Project-C, Seoul	· Bored Pile (R.C.D) : 14ea	
• Good Morning City Shopping Mall, Seoul	· Diaphragm Wall : 11,149m ²	· Earthwork : 296,321m ³
• Best Western Hotel, Seoul	· Diaphragm Wall : 3,832m ²	· Bored Pile (R.C.D) : 20ea
• Starpicasso Complex B/D, Seoul	· Diaphragm Wall : 4,628m ²	· Bored Pile (C.I.P) : 475m
• Samsungdong Dongil Sweet, Seoul	· Bored Pile (C.I.P) : 3,846m	· H/Pile : 1,375m

2004

• Yongsan Office B/D, Seoul	· Diaphragm Wall : 3,749m ²	· Soil Nailing : 444m
• Taeyoung B/D, Seoul	· Diaphragm Wall : 7,880m ²	· Bored Pile (R.C.D) : 2,145m
• Piccadilly Plus, Seoul	· L.W : 1,142m	· Sheet Pile : 468m
• Ildong Miraju B/D, Seoul	· Bored Pile (P.R.D) : 1,406m	· Earthwork : 51,315m ³
• Chorang Harborvill, Busan	· Diaphragm Wall : 5,536m ²	· Barrette : 3,716m ²
• Tesco Homeplus Sosa branch, Bucheon	· Diaphragm Wall : 5,657m ²	· Bored Pile (R.C.D) : 1,469m
• Samsungfire B/D, Ilsan	· Diaphragm Wall : 4,253m ²	· Bored Pile (P.R.D) : 433m
• MBC Dream Center, Ilsan	· Diaphragm Wall : 13,365m ²	· Barrette : 253ea
• Lemeilleur Jongrotown-I, Seoul	· Diaphragm Wall : 9,151m ²	· Grouting : 1,624m ²
• Mecave Shopping Mall, Incheon	· Diaphragm Wall : 5,822m ²	· Earthwork : 58,755m ³

2003

• Anmindong Hansvill, Changwon	· PHC : 6,098m	· Earthwork : 77,414m ³
• Gwonseondong Office B/D, Suwon	· Bored Pile (C.I.P) : 8,570m	· L.W : 3,817m
• Paradisevill, Seoul	· Diaphragm Wall : 3,854m ²	· Bored Pile (PRD) : 770m
• Esher Shopping Mall, Seoul	· Diaphragm Wall : 6,488m ²	· Bored Pile (R.C.D) : 22ea
• Ildong Jienin, Busan	· Bored Pile (P.R.D) : 1,030m	· Jet Grouting : 4,066m
• Suyoodong Office B/D, Seoul	· Diaphragm Wall : 4,321m ²	· Beam Strut : 1,024ton
• Dongdaemun Complex B/D, Seoul	· Diaphragm Wall : 5,795m ²	· L.W. : 3,210m
• Rosanview Complex B/D, Seoul	· Diaphragm Wall : 4,744m ²	· Beam Strut : 807ton
• Masan Dongsong-dong, Saerom APT		
• Samhwan Complex B/D, Busan	· Diaphragm Wall : 4,946m ²	· Beam Strut : 1,244ton
• Sejong World Plaza, Busan	· Bored Pile (C.I.P) : 1,458m	· Jet Grouting : 5,262m
• Seungjae Highview, Bucheon	· Diaphragm Wall : 4,547m ²	
• SK HUB Olive, Busan	· Bored Pile (P.R.D) : 551m	· Jet Grouting : 2,373m
• Lotte Department Store Haeundae branch, Busan	· Diaphragm Wall : 12,930m ²	
• Seomyeon E-Pyeonhan Sesang, Busan	· Diaphragm Wall : 10,213m ²	· Bored Pile (R.C.D) : 1,051m
• Pohang ROKMC recruit training center		
• Winers Technotower, Seoul	· Diaphragm Wall : 4,354m ²	

2002

• Daechidong Hotel, Seoul	· Diaphragm Wall : 4,700m ²	· Bored Pile (R.C.D) : 19ea
• Yeouido Center B/D, Seoul	· Diaphragm Wall : 3,165m ²	· Earthwork : 18,656m ³
• Bulkwang pamsquare, Seoul	· Diaphragm Wall : 7,029m ²	· Bored Pile (R.C.D) : 69ea
• Piccadilly Plus, Seoul	· Diaphragm Wall : 8,791m ²	· Bored Pile (R.C.D) : 38ea
• Metrocan B/D, Pyeongchon	· Diaphragm Wall : 6,951m ²	· Underpinning : 3,473m
• Hangangro Megatrium, Seoul	· Diaphragm Wall : 7,432m ²	· Bored Pile (R.C.D) : 148ea
• Doryeam-19 Office B/D, Seoul	· Diaphragm Wall : 4,529m ²	· Bored Pile (P.R.D) : 19ea
• Banghwadong Complex B/D, Seoul	· Diaphragm Wall : 3,570m ²	· Beam Strut : 580ton
• Doosan Wevecentium, Busan	· Soil Cement Wall : 4,611m ²	· Earthwork : 35,015m ³
• Dongdo Centurium, Seoul	· Diaphragm Wall : 3,530m ²	· Earthwork : 28,767m ³
• Junggu Sports & Culture Center, Seoul	· Diaphragm Wall : 6,365m ²	· Earthwork : 5,809m ³
• Samsung Michelan 147, Seoul	· Bored Pile (C.I.P) : 6,022m	· L.W. : 4,244m
• Susongdong Complex B/D, Seoul	· Diaphragm Wall : 5,662m ²	· Bored Pile (R.C.D) : 62ea

2001

• Janan-dong VentureVill, Seoul		
• Walmart Supercenter, Masan	· Diaphragm Wall : 9,402m ²	· Beam Strut : 288ton
• Tesco Homeplus Ulsan branch, Ulsan	· Earth Anchor : 422ea	· L.W : 4,002m
• Tesco Homeplus Chilgok branch, Daegu	· Soil Cement Wall : 2,795m ²	· Earth Anchor : 874m
• Sinwaldong Redevelopment, Seoul	· MicroPile : 72ea	· Soil Nailinging : 8,900m
• Magnet Dobong branch, Seoul	· Diaphragm Wall : 4,615m ²	
• Dongdaemun APM Shopping Mall, Seoul	· Diaphragm Wall : 5,566m ²	· Bored Pile (R.C.D) : 691m
• Uljiro SK B/D, Seoul	· Diaphragm Wall : 7,032m ²	

2000

• Deachi-dong Business Hotel		
• Gireum section no.1 redevelopment apt, Seoul		
• Sibum Woiki Apt the rear side work, Seoul		
• Busan distribution center, Busan		
• Jihaksa distribution center, Ilsan		
• Seocho Samsung APT., Seoul	· Bored Pile (P.R.D) : 55ea	· Jet Grouting : 2,866m
• Homeplus, Kimhae branch, Kimhae	· PHC : 69,000m	· Earthwork : 29,400m ³
• SGI Temple Hall HQ, Seoul	· Diaphragm Wall : 5,169m ²	· Beam Strut : 1,509ton
• Hanaro Information Center, Ilsan	· Diaphragm Wall : 4,867m ²	· Earth Anchor : 851m
• National Tax Service Office, Seoul	· Diaphragm Wall : 4,963m ²	· Bored Pile (R.C.D) : 77ea
• Baeraesuite, Suwon	· Diaphragm Wall : 3,084m ²	· Bored Pile (R.C.D) : 47ea

1999

• Yangpyeongdong Sindongbang B/D, Seoul	· Diaphragm Wall : 5,274m ²	· Barrette : 40ea
• Myongji Foundation B/D, Seoul	· Diaphragm Wall : 5,767m ²	· Bored Pile (R.C.D) : 24ea
• Doosan tower connection passageway installation work, Seoul		
• Samsung union APT, Anyang		

1998

• Midas B/D, Busan		
• Midas B/D, Ilsan	· Diaphragm Wall : 3,809m ²	· Beam Strut : 868ton
• Dongdeasandong APT, Busan		

1997

• Hyundai, Worldtower II, Seoul	· Diaphragm Wall : 5,994m ²	
• Hyundai Cityworld, Seoul	· Diaphragm Wall : 13,466m ²	· Earth Anchor : 2,463ea
• Hanjin Group Office B/D, Busan	· Diaphragm Wall : 4,632m ²	· Bored Pile (R.C.D) : 34ea
• Seocho Office B/D, Seoul	· Bored Pile (C.I.P) : 2,500m	· Post/Pile : 1,208m
• Posteel B/D, Seoul	· Diaphragm Wall : 1,741m ²	
• Jinheung Tenement House, Seoul	· Diaphragm Wall : 3,687m ²	· Earth Anchor : 32ea
• Seohyun Car Park B/D, Bundang	· Bored Pile (C.I.P) : 4,880m	· Earth Anchor : 19,882m
• Samsung life insurance Office B/D, Kimhae	· Diaphragm Wall : 4,788m ²	· Earthwork : 22,481m ³
• Yangpyeongdong Sindongbang B/D, Seoul	· Diaphragm Wall : 5,274m ²	· Barrette : 19.3m
• Price Club, Daejeon	· Diaphragm Wall : 6,055m ²	· Earth Anchor : 436ea
• Oksu-dong adjacency building reinforcement work, Seoul		
• Inchang B/D, Guri	· Diaphragm Wall : 6,555m ²	· Earthwork : 83,378m ³
• Financial B/D, Ulsan	· Diaphragm Wall : 4,277m ²	· Beam Strut : 490ton
• Sewon Mart, Ulsan	· Diaphragm Wall : 9,133m ²	· Bored Pile (P.R.D) : 57ea

1996

• Daewoo Stock, Ulsan	· Diaphragm Wall : 8,008m ²	· Barrette : 26m
• Hwani department store, Gwangju	· Micro-Pile : 600m	
• SEC B/D, Busan	· Diaphragm Wall : 4,860m ²	· Bored Pile (R.C.D) : 23ea
• Soonhwa-9 Development, Seoul	· Diaphragm Wall : 2,446m ²	· Bored Pile (R.C.D) : 18ea
• Suandong Service, Busan	· Diaphragm Wall : 3,186m ²	· Tube Column : 362m
• Yongsung Highplaza, Seoul	· Diaphragm Wall : 2,193m ²	· Beam Strut : 654ton
• Doosan Tower, Seoul	· Diaphragm Wall : 3,322m ²	· Earthwork : 278,062m ³
• Kyobo B/D, Gangreung	· Diaphragm Wall : 2,971m ²	· Earthwork : 15,073m ³
• Nara Financial B/D, Seoul	· Diaphragm Wall : 3,720m ²	· Earth Anchor : 78ea
• Ducksoo B/D, Seoul	· Diaphragm Wall : 5,312m ²	· Underpinning : 118ea
• Daesung Plaza, Busan	· Diaphragm Wall : 5,195m ²	· Earthwork : 14,754m ³

- Neospo, Busan
- Mokdong Nasan Sweet, Seoul
- Yeouido KIA B/D, Seoul
- Songpa Complex B/D, Seoul

· Diaphragm Wall : 11,174m ²	· Earth Anchor : 284ea
· Diaphragm Wall : 8,268m ²	· Earthwork : 119,081m ³
· Diaphragm Wall : 6,207m ²	
· Diaphragm Wall : 4,236m ²	

1995

• Juriwon Department Store, Ulsan	· Diaphragm Wall : 12,403m ²	· Earthwork : 154,278m ³
• Pyeonghwa Shopping Center, Busan	· Diaphragm Wall : 4,851m ²	· Underpinning : 103ea
• Samsung SDI Dormitory, Busan	· Earth Anchor : 39ea	· Beam Strut : 382ton
• Sungsu Automatic Factory, Seoul	· Diaphragm Wall : 7,336m ²	· Bored Pile (R.C.D) : 32ea
• Central City, Seoul	· Bored Pile (R.C.D) : 34ea	
• Technocity, Busan	· Barrette : 242ea	
• Lotte Department Store, Daejeon	· Diaphragm Wall : 5,005m ²	

1994

• Guro Complex B/D, Seoul	· Diaphragm Wall: 4,555m ²	· Earth Anchor : 144ea
• Hyundai Depatment Store, Busan	· Diaphragm Wall : 8,715m ²	· Barrette : 69ea
• Sinjin Tenement House, Seoul	· Diaphragm Wall : 3,096m ²	· Beam Strut : 1,149ton
• Joongang Industry B/D, Seoul	· Diaphragm Wall : 6,318m ²	· Earth Anchor : 30ea
• Samsung Life Insurance Office B/D, Busan	· Diaphragm Wall : 7,992m ²	· Earth Anchor : 341ea
• Jamsil Hanbit Plaza, Seoul	· Diaphragm Wall : 5,223m ²	· Earth Anchor : 92ea
• Samwoo TEX Plaza, Seoul	· Diaphragm Wall : 6,035m ²	· Barrette : 60ea
• Lotte L-green B/D, Seoul	· Diaphragm Wall : 8,892m ²	· Earth Anchor : 10,353m
• LG Department Store, Bucheon	· Diaphragm Wall : 12,090m ²	
• Keumsung IT B/D, Seoul	· Diaphragm Wall : 3,581m ²	· Earth Anchor : 144ea
• KCB Annex B/D, Seoul	· Diaphragm Wall : 6,907m ²	· Barrette : 20ea
• Jeongwoo B/D, Changwon	· Diaphragm Wall : 10,079m ²	· Beam Strut : 1,586ton
• Munhyun Tower, Busan	· Diaphragm Wall : 4,100m ²	· Earth Anchor : 178ea
• Suseo Nasan Office B/D, Seoul	· Diaphragm Wall : 5,108m ²	· Bored Pile (R.C.D) : 33ea
• Guro KIA B/D, Seoul	· Diaphragm Wall : 6,730m ²	· Earth Anchor : 1,217m

1993

• Sincheondong Complex B/D, Seoul	· Diaphragm Wall : 13,984m ²	· Bored Pile (R.C.D) : 18ea
• KTP B/D, Busan	· Diaphragm Wall : 5,933m ²	· Earth Anchor : 427ea
• Lotte World, Busan	· Diaphragm Wall : 8,892m ²	
• Yuseong Sapphire Office B/D, Daejeon	· Diaphragm Wall : 6,303m ²	· Barrette : 35ea
• World Tower Office B/D, Seoul	· Diaphragm Wall : 5,213m ²	· Beam Strut : 1,696ton
• Stock Exchange Computation Center, Seoul	· Diaphragm Wall : 13,984m ²	· Barrette : 127ea

1992

• Hyundai Town B/D, Seoul	· Diaphragm Wall : 4,238m ²	· Barrette : 32ea
• Heungin-dong Complex B/D (Sport center), Seoul	· Soil Cement Wall : 2,007m ²	· Earth Anchor : 6,447m
• Heungin-dong Complex B/D (Office Part), Seoul	· Diaphragm Wall : 6,390m ²	· Earth Anchor : 13,475m
• Bogang Glass Tower B/D, Seoul	· Diaphragm Wall : 7,180m ²	· Bored Pile (R.C.D) : 60ea
• Hankuk Industry Lease B/D, Seoul	· Diaphragm Wall : 3,160m ²	· Beam Strut : 400ton

1991

• Kumkang B/D, Seoul	· Diaphragm Wall : 5,670m ²	· Beam Strut : 1,500ton
• Guro Aekyung Distribution Center, Seoul	· Diaphragm Wall : 13,038m ²	· Earth Anchor : 43,484m
• Midopa Department Store Transfer Center, Seoul	· Barrette : 61ea	
• Seungsan Shopping Mall, Busan	· Diaphragm Wall : 3,960m ²	· Earth Anchor : 7,000m
• Sinsong B/D, Seoul	· Diaphragm Wall : 5,030m ²	· Bored Pile (R.C.D) : 17ea
• Dongwoo International B/D, Seoul	· Diaphragm Wall : 3,160m ²	· Beam Strut : 480ton
• Garak Office B/D, Seoul	· Diaphragm Wall : 1,712m ²	· Underpinning : 41ea

1990

• Dongkuk Textile Co. B/D, Seoul	· Diaphragm Wall : 5,120m ²	· Beam Strut : 641ton
• Daeil Office B/D, Sokcho	· Diaphragm Wall : 3,400m ²	
• Korea Machine Promotion Hall, Seoul	· Diaphragm Wall : 5,659m ²	· Beam Strut : 120ton
• Regent Office B/D, Seoul	· Diaphragm Wall : 5,000m ²	· Barrette : 20ea
• KEPCO, Seoul	· Diaphragm Wall : 890m ²	· Beam Strut : 170ton
• Daelim B/D, Busan	· Diaphragm Wall : 4,130m ²	· Earthwork : 9,167m ³
• Jeil Mutual Saving Bank B/D, Seoul	· Diaphragm Wall : 4,380m ²	· Earth Anchor : 4,460m

1989

• Crystal Beach Office B/D, Busan	· Diaphragm Wall : 1,560m ²	· Underpinning : 370m ²
• Korea Office B/D, Seoul	· Diaphragm Wall : 3,200m ²	· Underpinning : 1,800m ²
• KAL Computation Center, Gimpo	· Diaphragm Wall : 2,880m ²	· Earthwork : 1,022m ³
• Haksan Tower Office B/D, Pohang	· Diaphragm Wall : 4,950m ²	· Barrette : 20ea
• Kookmin Invest B/D	· Diaphragm Wall : 2,016m ²	· Earthwork : 9,900m ³
• Daewoo Stock B/D, Busan	· Diaphragm Wall : 2,911m ²	
• Riverpark Office B/D, Seoul	· Diaphragm Wall : 4,120m ²	· Beam Strut : 580ton
• Hangang Electronics Office B/D, Seoul	· Diaphragm Wall : 5,650m ²	· Tie Back : 200ea
• Lucky Stock B/D, Seoul	· Diaphragm Wall : 1,322m ²	· Grouting : 133ea
• Joongam B/D, Busan	· Diaphragm Wall : 2,066m ²	

1988

• Hyundai Stock B/D, Seoul	· Diaphragm Wall : 5,124m ²	
• Koryeo Industry B/D, Busan	· Diaphragm Wall : 3,600m ²	· Steel Pile : 35ea
• U.S Army Billet (drangon hill), Seoul	· Barrette : 81ea	· Bored Pile (R.C.D) : 200ea
• Masan ITM B/D, Masan	· Diaphragm Wall : 2,948m ²	· Earthwork : 9,167m ³
• Olympic Youth Hall, Seoul	· Barrette : 42ea	
• Apartment Type Factory, Incheon	· Diaphragm Wall : 4,900m ²	

1987

• Banpo Leisure town, Seoul	· Diaphragm Wall : 5,200m ²
• KITM Seomyeon branch, Busan	· Diaphragm Wall : 1,300m ²
• Samhyup B/D, Busan	· Diaphragm Wall : 2,000m ²
• Yeongdeungpo Station, Seoul	· Diaphragm Wall : 10,000m ²

1986

• Hanil Bank Bujeondong Branch, Busan	· Diaphragm Wall : 2,418m ²	· Barrette : 858m ²
• KAL Seoul B/D, Seoul	· Diaphragm Wall : 7,053m ²	· Earthwork : 106,766m ³
• KITM Busan branch, Busan	· Diaphragm Wall : 1,280m ²	· Steel Pile : 13ea
• Lotte Hotel, Seoul	· Diaphragm Wall : 9,377m ²	· Tie Back : 597ea

1985

• Sindonga Jagalchi Store, Busan	· Diaphragm Wall : 5,700m ²	· Earthwork : 37,000m ³
• Keukdong Broadcasting B/D, Seoul	· Diaphragm Wall : 1,320m ²	· Micro-Pile : 16ea

1984

• Korea Housing Bank B/D, Busan	· Diaphragm Wall : 2,094m ²
• Korea Traditional Association B/D, Busan	· Diaphragm Wall : 3,100m ²

1983

• Yeouido LG twin B/D	· Diaphragm Wall : 16,000m ²	· Tie Back : 587ea
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SOC Civill Engineering Business Sector Record

Client Satisfaction & Reliable Engineering

Experience is the key to consistent, high-quality performance. Pumyang E&C have been applying our technological capability to excellence performance of project in many sites for the last many year. The below table present to you for significant projects except general earth work. We are ready and eager to assist you.



2017

- Deagok-Sosa Double track subway, (Section no.5)

2016

- Seoul Metropolitan Rapid Transit 7-line Seoknam extension (Section No.1), Bupyeng

2015

- Jungang-line , Dodam-Youngcheon 1-zone, double track subway roadbed project, Danyang · Tunnel (NATM) : 2,080m

2014

- The construction works of the Highway of Guri-Pocheon (Section No. 3), Namyangju · Tunnel (NATM) : 2,470m

2013

- The construction works of the Railway of Wonju-Gangreung (Section No. 2), Uigwan Tunnel, Wonju · Tunnel (NATM) : 1,550m

2012

- The construction works of the Metropolitan Express Railway of Suseo-Pyeongtaek (Section No. 1-2), Seoul
 - Tunnel (NATM) : 2,360m
 - Box Structure : 387m
- Jeonju National highway alternative bypass (Yongjeon-Yongjin), Jeonju · Earth worker
- The Second outer circular Highway Incheon-Kimpo (Section No.2) Vertical Tunnel, Incheon
 - Diaphragm Wall : 2,935m²

2010

- Gwanggyo District, Residential Land Development Project, Suwon · Earth worker

2009

- Han River the lower class, water supply facility building service, Seoul · D/Wall 24 PNL : 24m²

2006

- Steel transmission tower, Yongmun-mountain · Earth worker · Construction of structure
- Kyodong City planing road, Yangsan · Earth worker

2004

- MBC -Sindon Set, Yongin · Diaphragm Wall

2001

- Nam myeon- Don myeon local road extension paving work, Yangju · Trial digging : 5
- Samsung Electronic Corporation Site renovation, Kiheung
- Jungang-line, double track railway

1999

- Korea Highspeed Rail, Phase 9-1, Joseom Tunnel Kimcheon · IMP : 8,176m
- Metropolitan Double Line Construction for Tap Water, Seoul · Shaft : 2ea · NATM : 1,250m
- Jungbu Naeryuk Expressway, Mehyun bridge work, Chungju · Bridge construction
- Paekche Main Street Construction, Gongju · Bored Pile (R.C.D) : 497ea · Earth Anchor : 64ea

1998

- Wolgok cable tunnel, covered river reinforcement work, Seoul
- Wolgok telephone office, Sun-gwan crossroad cable tunnel work, Seoul
- Munhyun-dong Subway ventilating opening, Busan
- Water intake station, Seongnam

1997

- Seongsan Bridge reinforcement work, Seoul

1996

- Yeongdeungpo-Rail Station, Seoul
 - Water Intake Station, Sokcho
 - LPG Storage Facility, Pyeongtaek
 - Samho industrial complex, industrial machine factory
- Micro-Pile : 17,291m
 - Diaphragm Wall : 7,875m²
 - Diaphragm Wall : 6,573m²
 - Foundation work(R.C.D) : 232ea

1995

- Youngsea-Yeongdeungpo Power Cable Tunnels, Seoul
 - Sewage Treatment Station, Jeongeup
- Diaphragm Wall : 8,894m²
 - Dynamic Compaction : 23,931m²

1994

- Yougong Chemical Complex, Ulsan
- Dynamic Compaction : 86,200m²

1993

- North Sewage Treatment Station, Deagu
 - Second(2) urban expressway (Section No.8), Busan
- Dynamic Compaction : 37,925m²
 - Diaphragm Wall : 11,336m²

1992

- Water intake station, Seongnam

1991

- Yeouido Subway Station 5-17, Seoul
- Diaphragm Wall : 18,790m²

1990

- Han River Downstream Water Intake Station, Seoul
 - Seongsan-dong Power Cable Tunnels, Seoul
- Diaphragm Wall : 22,108m²
 - TAM/G : 12,827m
 - Diaphragm Wall : 3,400m²

1989

- Samsung Dry-Dock, Geojedo
 - Samsung Chemistry complex, Daegu
- Diaphragm Wall : 1,322m²

1987

- Nuclear Power Plant-9,10 Uljin
 - Janghang Port Wharf, Gusan
- Diaphragm Wall : 1,542m²
 - Diaphragm Wall : 24,180m²

1986

- Subway Phase 3-7 Main Track Section, Busan
- Diaphragm Wall : 9,166m²

1985

- Kwangyang Iron Mill Raw Material Processing Facility, Kwangyang
 - Subway Phase 3-7 Shopping Center Section, Busan
 - Subway Phase 3-7 Main Station Section, Busan
- Diaphragm Wall : 4,644m²
 - Diaphragm Wall : 22,000m²
 - Diaphragm Wall : 9,355 m²

1984

- Subway Phase 2-3 Main Track Section, Busan
- Diaphragm Wall : 12,881m²

1983

- Subway Phase 2-3 Shoping Center Section, Busan
- Diaphragm Wall : 8,957m²

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2017

- | | | |
|--|--|----------------|
| • Royal duke, Yeonsan-dong | • PPS : 614m | |
| • Baegot Newtown Sang 4-1BL | • PPS : 727m | |
| • YG Entertainment building | • Diaphragm Wall : 5,781m ² | • PPS : 1,719m |
| • Residential complex, Hwajeong-dong | • Diaphragm Wall : 7,024m ² | • PPS : 1,258m |
| • Vent relocation, Seocho-station | • PPS : 150m | |
| • Naver Business facilities, 178-4, Jeongja-dong | • PPS : 8,967m | |

2016

- | | | |
|---|--|----------------|
| • Pyungchon Highfield knowledge Industry Center | • Diaphragm Wall : 9,250m ² | • PPS : 1,548m |
| • Chungdam Jinheung Villa Reconstruction, Seoul | • PPS : 559m | |
| • Nice Group 1 company building, Seoul | • Diaphragm Wall : 5,330m ² | • PPS : 800m |
| • Samsungdong 167, business facility extension, Seoul | • PPS : 921m | |
| • Pyungchon IS BIZ tower, Anyang | • PPS : 2,707m | |
| • Hillstate Cheonggye, Seoul | • PPS : 1,435m | |
| • Dongtan knowledge Industry Center | • PPS : 2,265m | |
| • Misa Prugio, Hanam | • PPS : 1,362m | |
| • Banpo Central Prugio, Seoul | • PPS : 2,707m | |
| • Yojin Y-city, Ilsan | • PPS : 2,726m | |
| • Yangsan U-Top Ubless Skyview | • Diaphragm Wall : 5,725m ² | • PPS : 855m |

2015

- | | | |
|---|----------------|--------------|
| • Magok Kolon the Future technology center | • PPS : 3,260m | |
| • Songpa Judicial Town Prugio City | • PPS : 2,754m | |
| • Wirye New City IS Central Tower | • PPS : 1,586m | |
| • Maporo 1 district, 54 area urban environmental renewal project, Seoul | | • PPS : 501m |

- | | | |
|---|--|--------------|
| • KT Mokdong branch Data center | • PPS : 1,825m | |
| • Youngjong Megastar, Incheon | • PPS : 3,145m | |
| • Gwangan Mansion Reconstruction Project, Busan | • Diaphragm Wall : 3,726m ² | • PPS : 990m |
| • Sangmu U-top Ubless, Gwangju | • Diaphragm Wall : 5,866m ² | • PPS : 872m |
| • Yongjong Officetel, Incheon | • PPS : 2,420m | |
| • Youngtong station I'PARK, Suwon | • PPS : 2,010m | |

2014

- | | | |
|--|--|----------------|
| • EBS Digital Integration Company office Building, Ilsan | • Diaphragm Wall : 7,577m ² | • PPS : 2,356m |
| • Yeongdeungpo officetel, Seoul | • PPS : 2,716m | |
| • Yonghoman Complex Facility, Busan | • PPS : 1,850m | |
| • Incheon Airport Second Passenger Terminal, Incheon | • Diaphragm Wall : 6,000m ² | |

2013

- | | | |
|--|--|----------------------------------|
| • E-Pyeonhansesang, Gwangyang | • Diaphragm Wall : 6,000m ² | • PPS : 2,420m |
| • Zwitina power station, Intake temporary facilities works, Libya | | • C.B WALL : 8,946m ² |
| • UKGS (UKHAA KHUDAG to GASHUUN SUKHAIT) Railway Project, Mongolia | | • Bored Pile (PRD) : 425ea |

2012

- | | | |
|---|--|--------------|
| • Woolim Fill U APT, Gwangyang | • Barrette : 4,738m ² | |
| • Mak, Hyatt Regency Hotel (Mongolia) | • Bored Pile (PRD) : 5,505m ² | |
| • Jamsil I-Park Officetel, Seoul | • PPS : 950m | |
| • Umyeon Samsung R&D Center, Seoul | • PPS : 5,656m | |
| • Pyeongtaek complex 2-tier SLP(Seawater Lift Pump) | • Diaphragm Wall : 3,597m ² | • PPS : 840m |

2011

- | | | |
|---|--|---------------------------|
| • Algeria Djen Djen Port, harbor structure extention work (ALGERIA) | | |
| • Bulgwangsa, Seoul | • Diaphragm Wall : 4,586m ² | • PPS : 1,931m |
| • Sangam Doosan Weve Centium, Seoul | • Diaphragm Wall : 4,362m ² | • Bored Pile (PRD) : 625m |

2010

- | | | |
|---|--|----------------|
| • Sungsu Wooribank Callcenter | • Diaphragm Wall : 5,000m ² | • PPS : 1,400m |
| • Masan port development (1-1 tier), Masan | • Vibro Compaction : 145,040m | |

2009

- | | | |
|--|--|--------------|
| • Algeria Oman Fertilizer Plant Intake (ALGERIA) | • Diaphragm Wall : 5,627m ² | • PPS Method |
| • Algeria Oman Fertilizer Plant Outfall (ALGERIA) | • Diaphragm Wall : 2,276m ² | • PPS : 108m |
| • New Bong Escape Hydroelectric Power Complex (PAKISTAN) | • C.B WALL : 26,000m ² | |

2008

- Busan Newport Phase-2, Busan
 - Gunsan Hyundai Shipyard, Gunsan
- Vibro Compaction : 207,200m³
 - Stone Column : 47,971m

2007

- North Port Bridge Marine Special Foundation, Busan
- Diaphragm Wall : 6,249m²
 - SCW : 2,400m²

2006

- Busan Newport Phase-1, Busan
 - HOU No.2, LOP Refinery Area GS CALTEX, Yeosu
- Vibro Compaction : 51,200m³
 - Earthwork : 132,791m³

2005

- HOU No.2, VDU Tank Area GS CALTEX, Yeosu
- Stone Column : 161,207m
 - Pavement : 23,618m³

2004

- Hyun-am Bridge, Highway No. 17, Gongju
 - SCCS Project, Mokpo
 - Samsung Corning Ochang factory
- Sinnus/G : 5,392m
 - Micro-Pile : 3,266m
 - Geological Survey: 1

2002

- LG MMA YM-2 Project, Yeosu
- Micro-Pile : 722m

2001

- Yeouido Richencia, Seoul
 - LG Textile Chemistry, Ground reinforcement
 - West Cargo Rail Station, Daegu
- Micro-Pile : 3,637m
 - Micro-Pile : 722m
 - Grouting : 3,989m
 - Cement Bentonite Slurry Wall : 3,045m²

2000

- Samsung Petrochemical, Ground reinforcement, Ulsan
 - Tamjin-dam Detour Construction, Gangjin
 - Factory Foundation Repair, Iksan
- Soil Nailing : 5,744m
 - Micro-Pile : 46ea

1998

- Gangbyeon Expressway Pier foundation Work
- R.C.D[D1500] : 176

1997

- LG Machine, Jeonju
 - Nanjido Cut-off Wall, Seoul
 - Samsung fine chemistry foundation Work
- Dynamic Compaction : 18,900m²
 - Cement Bentonite Slurry Wall : 22,935m²

1996

- LG Chilseo Site, Haman
 - Hanbo Iron Mill Section-A, B COREX, Asan
 - Hanbo Iron Mill Section-B DRI, Asan
- Dynamic Compaction : 19,243m²
 - Diaphragm Wall : 11,634m²
 - Soldier Pile : 12ea
 - Diaphragm Wall : 7,875m²

1995

- Hanbo Iron Mill Section-B COREX, Asan
- Diaphragm Wall : 9,141m²

1994

- Seoksu Interchange, Seoul
- Dynamic Compaction : 23,211m²

1993

- Sanbon Jugong APT, Gunpo
- Dynamic Compaction : 1,978m²

1987

- Dongdeamun Baseball Stadium, Seoul
 - Seoul Station Foundation Work
 - Jugon APT, Sanggye-dong
- Micropile : 8,257m
 - Barrette : 124ea
 - Dynamic Compaction : 2,500m²

1986

- Field Hospital, Gimhae
 - Nuclear Power Plant #2, Uljin
- Dynamic Compaction : 35,500m²
 - Dynamic Compaction : 1,542m²

1985

- Camp Henri Emergency Commander Center, Deagu
- Cement Bentonite Slurry Wall : 17,600m²

1984

- Nuclear Power Plant #1, Uljin
 - LNG Tank Terminal, Pyeongtaek
- Micro-Pile : 350ea
 - Micro-Pile : 54ea