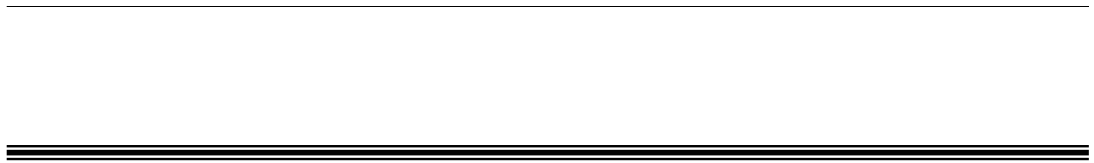


2
0
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6
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12
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2016. 12

()

Jung Min Geo Tech Co., Ltd.

제 출 문

귀중

귀사에서 의뢰하신 “국립국악원 공연연습장 건립공사 지반조사”에 대한 과업을 수행 완료하고 그 결과를 분석, 검토하여 이에 보고서를 작성 제출합니다.

2016 년 12 월

서울특별시 서초구 남부순환로 350길
29-3, 2층 201호 (양재동, 영천빌딩)

주식회사 정민지오테크

대표이사 이윤상





		4 (NX-4)	·	· 가
		4	·	·
		1.0m	·	·
		1	· P S	·
			·	
		4	·	·
		4	·	·

(: m)

								G.L(-)m
BH-1	0.0~0.4 (0.4)	0.4~11.0 (10.6)	11.0~13.8 (2.8)	13.8~19.0 (5.2)	19.0~22.0 (3.0)	22.0~30.0 (8.0)	30.0	16.0
BH-2	0.0~1.0 (1.0)	1.0~15.0 (14.0)	15.0~18.0 (3.0)	-	-	-	18.0	16.8
BH-3	0.0~0.6 (0.6)	0.6~17.0 (16.4)	17.0~20.0 (3.0)	-	-	-	20.0	17.6
BH-4	0.0~0.5 (0.5)	0.5~12.0 (11.5)	12.0~15.0 (3.0)	-	-	-	15.0	

	(m)	N	
	0.4~1.0	-	
	10.6~16.4	16~50	
	2.8~3.0	50	

Down Hole

	(m/sec)		
BH-1	599	Sc	

	(m)	Wn(%)	Gs	(%)		(%)					(USCS)
				LL	PI	4.75 mm	2.0 mm	0.425 mm	0.075 mm	0.002 mm	
BH-1	3.0	14.7	2.644	N.P	N.P	89.0	84.9	51.7	25.6	6.0	SM
BH-2	6.0	9.1	2.611	N.P	N.P	38.8	37.9	34.3	22.6	5.4	GM
BH-3	9.0	20.2	2.674	28.6	8.4	100	99.7	82.3	43.8	12.5	SC
BH-4	10.0	15.5	2.647	N.P	N.P	98.6	95.9	66.3	31.0	9.0	SM

		(m)	(kN/m ³)	(Mpa)	
BH-1		17.0~17.2	24.81	6.07	-
BH-1		20.2~20.5	27.82	115.50	-
BH-1		22.3~22.5	27.96	143.09	-
BH-1		24.8~25.0	27.92	51.15	-

목 차

1

1.1	.....	2
1.2	.....	2
1.3	.....	2
1.4	.....	3
1.5	.....	3

2

2.1	.....	5
2.2	.....	5
2.3	.....	6
2.4 Down Hole	.....	8
2.5	.....	9
2.6	.....	11

3

3.1	.....	13
3.2	.....	16

4

4.1	.....	23
4.2	.....	24
4.3	.....	27
4.4 Down Hole	.....	28
4.5	.....	29
4.6	.....	30

5

5.1

5.2

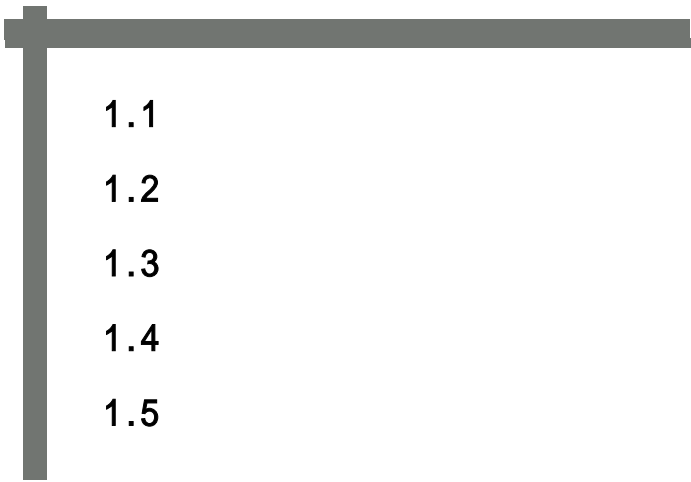
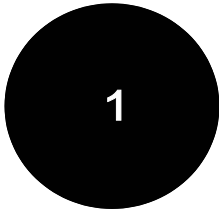
5.3

5.4 Down Hole

5.5

5.6

6



1.1

1.2

1.3

1.4

1.5



1.

1.1

150-124

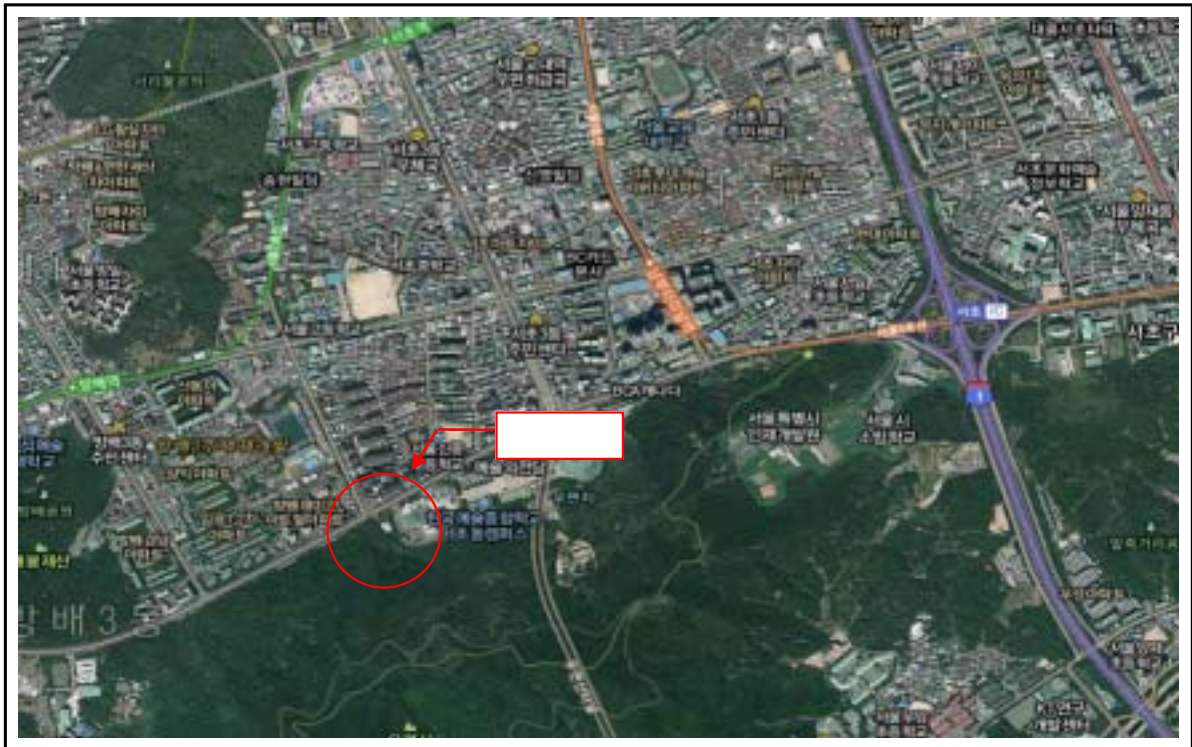
“

”

1.2

150-124

1.1



1.1

1.3

- : 2016 11 22 ~ 2016 11 23
- : 2016 11 24 ~ 2016 12 02
- : 2016 12 02 ~ 2016 12 06

1.4

P U M P E N G I N E	POWER 4000D	1		
	MG - 5	1		
	10HP	1		-
	KSF-2318	1		
	-	1		

1.5

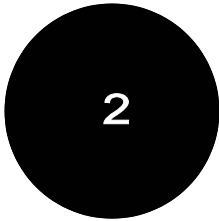
① : , ,

② : NX 4 .

③

④

		4 (NX-4)	·	· 가
		4	·	·
		1.0m	·	·
		1	· P S	·
		4	·	·
		4	·	·



- 2.1
- 2.2
- 2.3
- 2.4 Down Hole
- 2.5
- 2.6


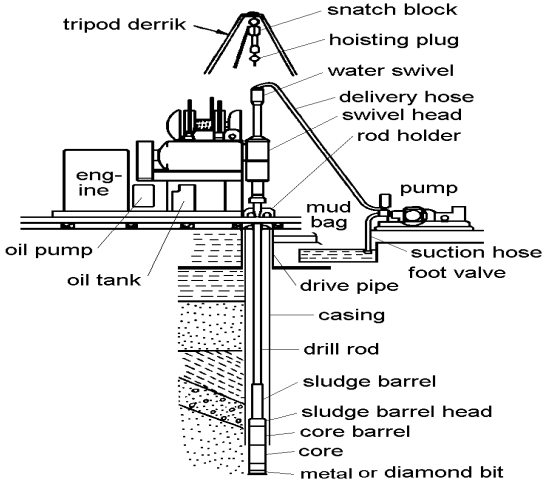


2.

2.1

NX 4

2.2

	<ul style="list-style-type: none">
<ul style="list-style-type: none"> NX Size(76mm) Casing 1.0m Split Spoon Sampler, Piston Sampler, D-3 Core Barrel+ Diamond Bit 30.0m, 15.0m 3.0m 	
	

2.3

-
-

<ul style="list-style-type: none"> • (KS F 2307) • 가 , • , • 63.5kg, 76cm • (15cm) 30cm • 15cm (N) • 30cm 50 50/ • (cm) • 1.0m • Split Barrel - • (N = 50/10) 	

1) N

		<ul style="list-style-type: none"> • • • ()
N		<ul style="list-style-type: none"> • (Dr), (φ) • • • 가
		<ul style="list-style-type: none"> • (q_u), (c_u) • •

2) N , (Dunham, 1954)

가	가	$= \sqrt{12N} + 15$
가	가	$= \sqrt{12N} + 20$
가	가	$= \sqrt{12N} + 20$
가	가	$= \sqrt{12N} + 25$

) , 1994, , p72

3) N , Dr , (Peck-Meyerhof, 1956)

N		Dr		
			Peck	Meyerhof
0 - 4	Very loose	0.0 - 0.2	< 28.5	< 30
4 - 10	Loose	0.2 - 0.4	28.5 - 30	30 - 35
10 - 30	Medium	0.4 - 0.6	30 - 36	35 - 40d
30 - 50	Dense	0.6 - 0.8	36 - 41	40 - 45
50 <	Very dense	0.8 - 1.0	41 <	45 <

) , 1994, , p71

4) consistency, N , q_u (Terzaghi-Peck, 1948)

Consistency	N	q_u (kPa)
Very soft	< 2	< 25
Soft	2 - 4	25 - 50
Medium	4 - 8	50 - 100
Stiff	8 - 15	100 - 200
Very stiff	15 - 30	200 - 400
Hard	30 <	400 <

) , 1994, , p73

5) N

	N	(γ_t) (γ_{sub})	
		(γ_t)	(γ_{sub})
	50	20	10
	40~50	19	9
	30~40	18	8
	30	16	6
	20	17	7
	20	14~16	4~6

6) N Es

	(Es, KPa)	
	$Es = 500(N+15)$ $Es = 18,000+750N$ $Es = 320(N+15)$ $Es = 300(N+6)$ $Es = 1200(N+6)$	D'Appolinis et al. (1970)

2.4 Down Hole



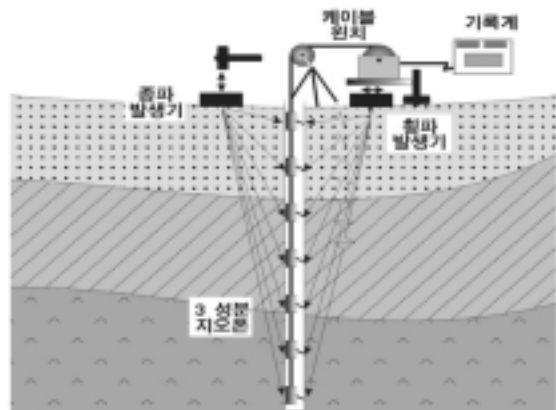
- (V_p, V_s)
- (V_s) (G_d, E_d)

- , 3 (triaxial geophone)
(P, S)
- , (P) (S)
- S 180°
- P, S
- (G_d, E_d, K_d)

$$- G_d = \cdot V_s^2$$

$$- E_d = 2G_d \cdot (1 +) \quad - K_d = \frac{E_d}{3(1-2)}$$

- $$= \frac{(V_p^2 - 2V_s^2)}{2(V_p^2 - 2V_s^2)}, V_p, V_s :$$
- $$- / (/ V_s) + (/ V_s)$$



2.5



- /
-



			KS F 2306	
			KS F 2308	
			KS F 2302	
	•		KS F 2303	

2.5.1 (KS F 2306)

•			
•			
•	110 ± 5	12	24

2.5.2 (KS F 2308)

•		가	15
•			,
•	,	,	

2.5.3 (KS F 2302)

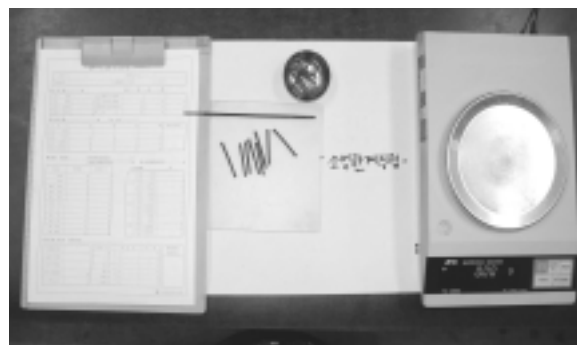
•			
•		,	가
•		, 100mm	0.001mm
•	(Gravel),	(Sand),	(Slit), (Clay)

2.5.4 (KS F 2303)

Consistency

1cm 1 2 25
 1.5cm
 3mm

E



2.6

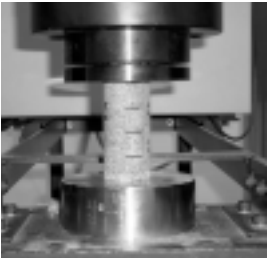


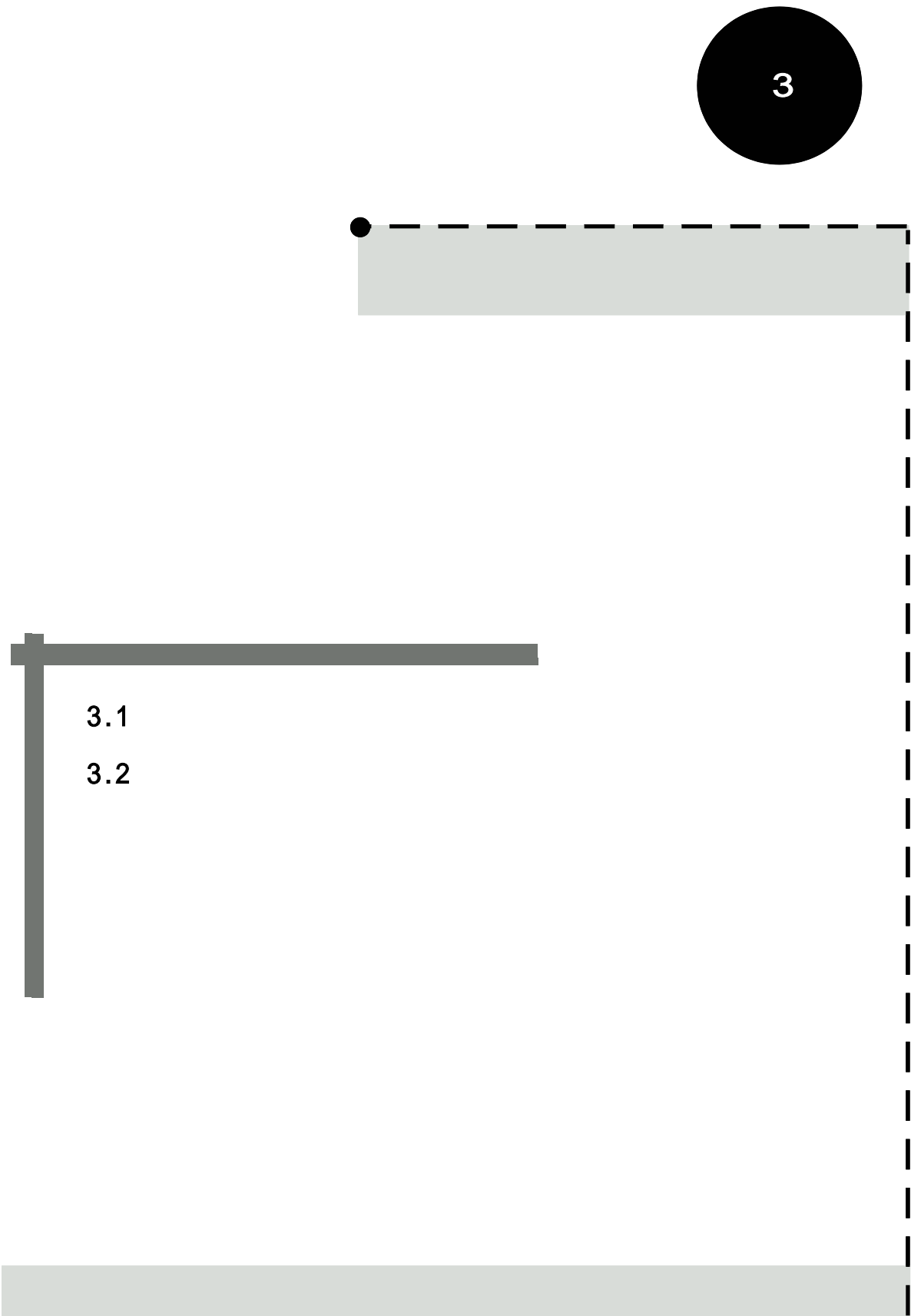
-
-

C

			<ul style="list-style-type: none">••	ASTM D2938 ASTM D3148	

2.6.1 (ASTM D2938, ASTM D3148)

<ul style="list-style-type: none">•	ASTM/D2938, MTS 315 System	ASTM/D3148	
160 가	$(kg) = \frac{\text{---} (kg)}{(cm^2)}$		



3.

3.1

3.1.1



(: mm)

	/ / / / (mm)									
(USCS)	Gravel		Sand						Silt	clay
			coarse			fine				
	4.75		0.425			0.075			0.002	
KS F2302-64	(G)				(S)				(M)	(C)
					가					
	75	19	4.75	2.0	0.425		0.075		0.005	



				가
(sand)	가		가	
(silty sand)	가	가		
(sand silt)	가 가 가	가		
(silt)	가 80%			
(clay)	가			

consistency

A.Casagrande가

(Unified Standard Classification System)



200 (0.075mm) 50%	(Gravel) : 4 (4.76mm) 50%		GW	가	200 5% GP, SW, SP, GW	$C_u > 4 \quad C_u = \frac{D_{60}}{D_{10}}$ $1 < C_c < 3 \quad C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
			GP	가		GW
			GM	,		Atterberg 가 A
			GC	.		4-7 Atterberg A
	(Sand) : 4 (4.76mm) 50%		SW	가	200 12% GC, SM, SC, GM	2
			SP	가		$C_u > 6$ $1 < C_c < 3$
			SM	.		SW
			SC	.		Atterberg 가 A
						4-7 Atterberg A
						2
200 (0.075mm) 50%	50%		ML	가 , ,	(Plasticity Chart)	
			CL	, , ,		
			OL			
	50%		MH	, ,		
			CH	,		
			OH			
			Pt			

*

: ASTM D-2487(Unified Soil Classification System)

3.1.2

3

(淡-light)

(暗-dark)

混色



色	1	淡 ()				暗 ()					
	2	粉紅 ()	紅 ()	黃 ()	褐 ()	橄欖 ()	綠 ()	灰 ()			
	3	粉紅 ()	赤 ()	黃 ()	褐 ()	橄欖 ()	綠 ()	青 ()	白 ()	灰 ()	黑 ()

3.1.3

(N)

(N)



(Relative Density)

N-	(Relative Density)	()		Feel or touch
		Peck	Meyerhof	
0~4		28.5 °	30 °	D13
4~10		28.5~30 °	30~35 °	가
10~30		30~36 °	35~40 °	D13 5
30~50		36~41 °	40~45 °	D13 5 30cm
50		41 °	45 °	D13 5 5-6cm 가



(Consistency)

N-	(Consistency)	(kPa)	Feel or touch
2		25	10 cm
2~4		25~50	가 10 cm
4~8		50~100	가 10 cm
8~15		100~200	가
15~30		200~400	
30		400	가

3.1.4

4가



(%)	
0 ~ 10	(Dry)
10 ~ 30	(Moist)
30 ~ 70	(Wet)
70	(Saturated)

3.2

, , , , 가

3.2.1

1)

(fresh), (slightly

weathered)



(ISRM, 1978)

(Residual Soil)	RS	가 . 가 .
(Completely weathered)	CW	.
(Highly weathered)	HW	(core stone)
(Moderately weathered)	MW	.
(Slightly weathered)	SW	(F)
(Fresh)	F	.

2)

(close), (wide) .
 (, ,), , (, , ,),
 (, , ,) .



(ISRM, 1978)

(Joint)	
6.0m	(extremely wide)
2.0 ~ 6.0m	(very wide)
0.6 ~ 2.0m	(wide)
0.2 ~ 0.6m	(moderate)
6.0 ~ 20.0cm	(close)
2.0 ~ 6.0cm	(very close)
2.0cm	(extremely close)

3)

,
 (intact rock) .



(ISRM, 1978)

		MPa
(extremely strong)	1	250
(very strong)		100 ~ 250
(strong)		500 ~ 100
(moderately strong)		25 ~ 50
(weak)		5 ~ 25
(very weak)		1 ~ 5
(extremely weak)		0.25 ~ 1

3.2.2

1)

“ () ”



()

	(MPa)	(km/sec)	(kN/cm ²)							
						(%)	RQD (%)			
	< 5	< 1.2	10 ~ 40	1	가	-	-		-	
	5 ~ 25	1.2 ~ 2.5	40 ~ 100	1 ~ 4	~ () 가 가	40	10		5cm	가 ,
	25 ~ 50	2.5 ~ 3.5	100 ~ 500	4	~ 10cm 5cm 가 가	40 ~70	10 ~ 70		10cm	
	50 ~ 100	3.5 ~ 4.5	500 ~ 1000	-	~ 20cm 가 1m 5~6	70	70 ~ 90		5 ~ 15	
	100	4.5	1000	-	~ 20cm 가	90	90		20 ~ 50	

)

2)

E

	()		Vp(km/sec)
(DS)	,		-
(RS)	² 가	N < 50 /10cm	< 1.2
(WR)	가 , 가 , 가	TCR 10% N 50 /10cm qu < 10MPa	1.0~2.5
(SR)	가 , 가	TCR 30% RQD 10% qu 10MPa Js 20cm	2.5~3.2
(MR)	가	TCR 60% RQD 25% qu 25MPa Js 60cm	3.0~4.2
(HR)	,	TCR 80% RQD 50% qu 50MPa Js 200cm	4.0~5.0
(XHR)		TCR 90% RQD 75% qu 100MPa Js 300cm	> 4.8

) N: , TCR : , RQD : , qu :
Js : , TCR RQD NX

3.2.3 ISRM()

ISRM Suggested Method

E

(Completely Weathered. CW)	가	D - 5
(Highly Weathered. HW)	가	D - 4
(Moderately Weathered. MW)	가	D - 3
(Slightly Weathered. SW)		D - 2
(Fresh. F)		D - 1

E

(Very Weak)	가 가	S-5
(Weak)		S-4
(Moderately Strong)	1 가	S-3
(Strong)	1~2 가	S-2
(Very Strong)		S-1

E

Joint	Compactness	
5cm	(Highly Fractured)	F-5
5cm ~ 10cm	(Fractured)	F-4
10cm ~ 20cm	(Moderately Fractured)	F-3
20cm ~ 100cm	(Slightly Fractured)	F-2
100cm	(Solid)	F-1

3.2.4 R.Q.D(Rock Quality Designation)

Deere(1967) 가 R.Q.D(Rock Quality Designation) 가 T.C.R(Total Core Recovery) Core 가 10cm R.Q.D. R.Q.D가 "0"



가(Deere, 1968)

R.Q.D (%)	Rock Quality
0~25	(Very Poor)
25~50	(Poor)
50~75	(Fair)
75~90	(Good)
90~100	(Excellent)

3.2.5 R.Q.D T.C.R

•T.C.R(Total Core Recovery) :

$$T.C.R(\%) = \frac{\text{회수된 Core의 길이}}{\text{총 시추길이}} \times 100(\%)$$

$$TCR = (38+17+7+20+43)/200 \times 100\% = 63\%$$

•R.Q.D(Rock Quality Designation) :

$$R.Q.D(\%) = \frac{10\text{cm 이상인 Core 길이의 합}}{\text{총 시추길이}} \times 100(\%)$$

$$RQD = (38+17+20+43)/200 \times 100\% = 59\%$$

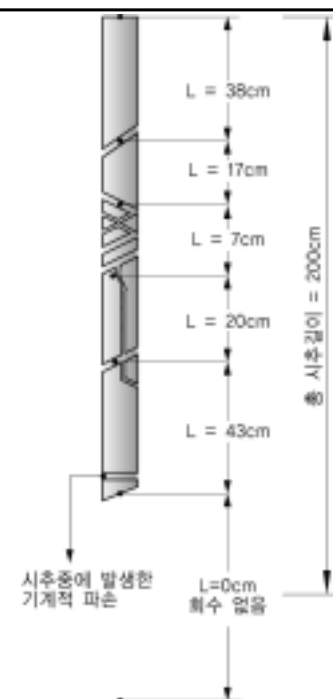
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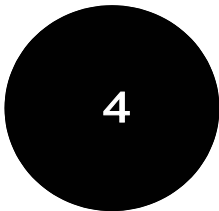
•

10cm

R.Q.D

, , , ,







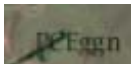
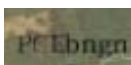
- 4.1
- 4.2
- 4.3
- 4.4 Down Hole
- 4.5
- 4.6



4.

4.1

- 150-124
- ,
- (229m), (632m), (481m), (306m), (293m)
-
- 1982 ()
- (1:50,000)

< >		
		
	< >	
	4	
		
		Pcpgn :

4.2

4.2.1

0.4~1.0m

4.2.2

10.6~16.4m

16 /30cm~50 /14cm (Medium)~ (Very Dense)

N

4.2.3

2.8~3.0m

가

N 50 /10cm~50 /2cm (Very Dense)

4.2.4

BH-1 5.2m

가

(T.C.R) 35~51%, (R.Q.D)가 0~6%

4.2.5

BH-1 , 3.0m .
 가 ~ , ~ ,
 , ,
 (T.C.R) 90%, (R.Q.D)가 32% .

4.2.6

BH-1 , 8.0m .
 가 ~ , ~ ,
 , ,
 (T.C.R) 100%, (R.Q.D)가 80~95% .



(: m)

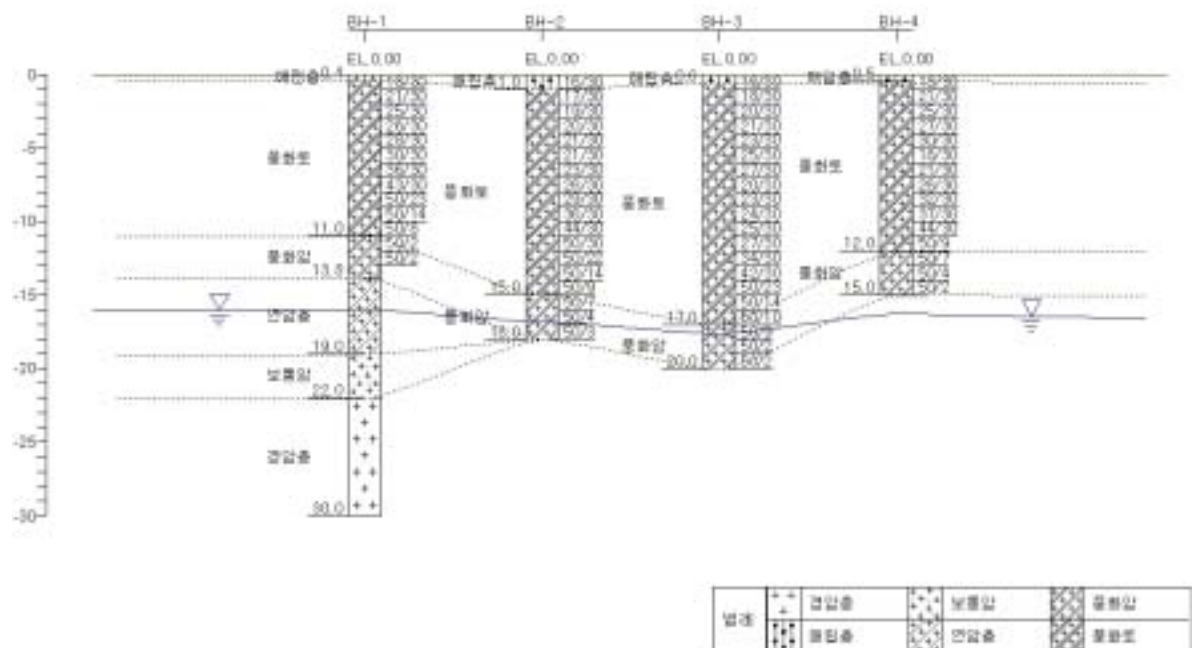
								G.L(-)m
BH-1	0.0~0.4 (0.4)	0.4~11.0 (10.6)	11.0~13.8 (2.8)	13.8~19.0 (5.2)	19.0~22.0 (3.0)	22.0~30.0 (8.0)	30.0	16.0
BH-2	0.0~1.0 (1.0)	1.0~15.0 (14.0)	15.0~18.0 (3.0)	-	-	-	18.0	16.8
BH-3	0.0~0.6 (0.6)	0.6~17.0 (16.4)	17.0~20.0 (3.0)	-	-	-	20.0	17.6
BH-4	0.0~0.5 (0.5)	0.5~12.0 (11.5)	12.0~15.0 (3.0)	-	-	-	15.0	



SECTION (A-A')

지층 단면도
A-A'

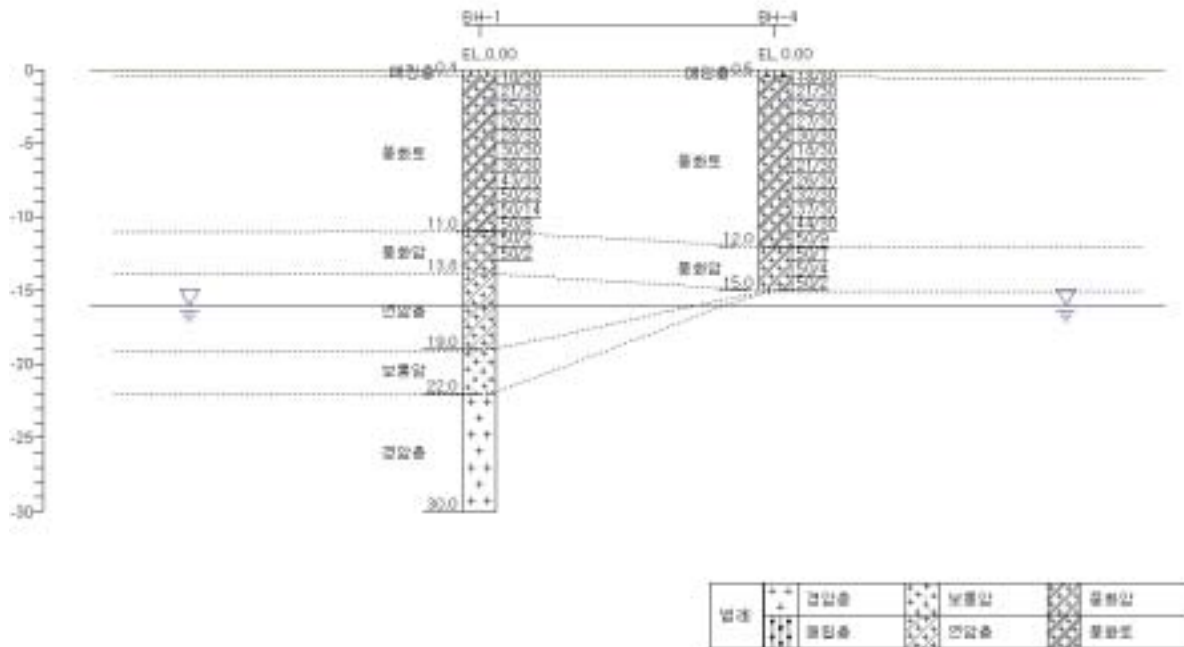
FREE SCALE



SECTION (B-B')

지층 단면도
B-B'

FREE SCALE



4.3

가

가

24

16.0~17.6m



	(GL.(-) m)	
BH-1	16.0	-
BH-2	16.8	-
BH-3	17.6	-
BH-4		-

4.4 Down Hole

(P, S

)

가



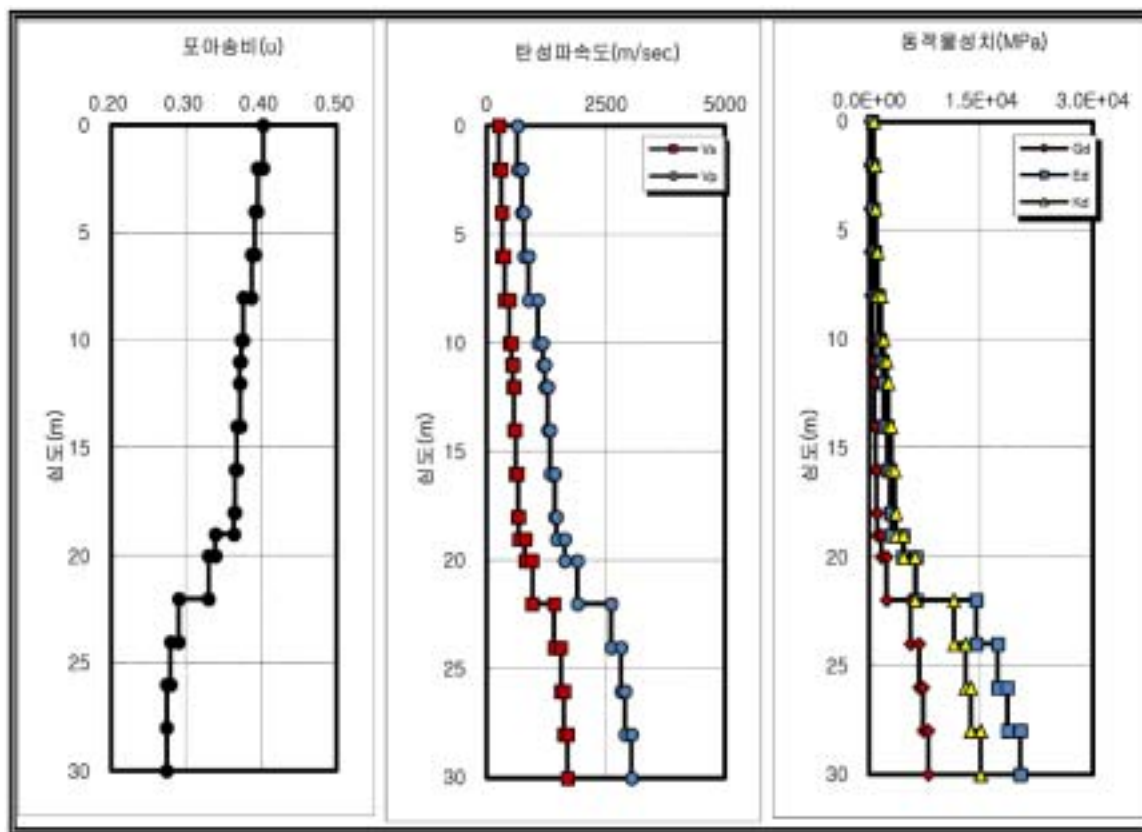
		30m			
		(m/s)		(S _u)	
S _A		1,500	-	-	
S _B		760~1,500	-	-	
S _C		360~760	> 50	> 100	
S _D		180~360	15~50	50~100	
S _E		180	< 15	< 50	
S _F	가				

*

()

◆ BH-1 Down Hole

(GL- m)			()		()			
			V _s (m/sec)	V _p (m/sec)	G _d (MPa)	K _d (MPa)	E _d (MPa)	d
0.0~11.0	11.0		384	889	3.03E+02	1.20E+03	8.38E+02	0.39
11.0~13.8	2.8		569	1257	6.94E+02	2.46E+03	1.90E+03	0.37
13.8~19.0	5.2		651	1412	9.97E+02	3.36E+03	2.72E+03	0.36
19.0~22.0	3.0		888	1778	2.03E+03	5.41E+03	5.40E+03	0.33
22.0~30.0	8.0		1577	2847	6.88E+03	1.32E+04	1.76E+04	0.28
GL- 30.0m			V _s (전단파속도) = 599m/sec "Sc"					



4.5



	(m)	Wn(%)	Gs	(%)		(%)					(USCS)
				LL	PI	4.75 mm	2.0 mm	0.425 mm	0.075 mm	0.002 mm	
BH-1	3.0	14.7	2.644	N.P	N.P	89.0	84.9	51.7	25.6	6.0	SM
BH-2	6.0	9.1	2.611	N.P	N.P	38.8	37.9	34.3	22.6	5.4	GM
BH-3	9.0	20.2	2.674	28.6	8.4	100	99.7	82.3	43.8	12.5	SC
BH-4	10.0	15.5	2.647	N.P	N.P	98.6	95.9	66.3	31.0	9.0	SM

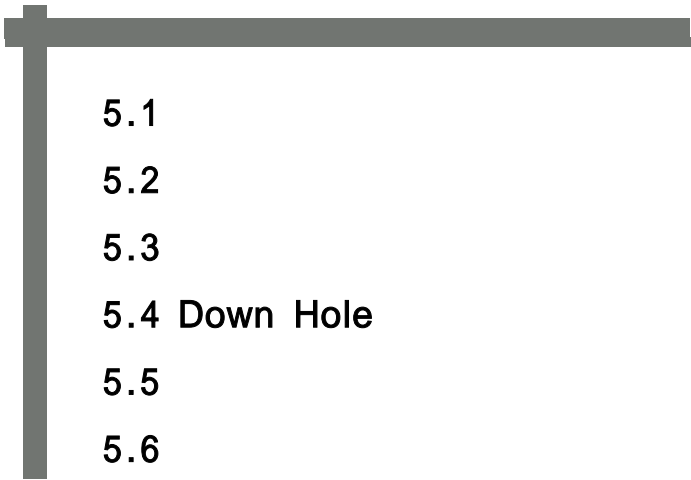
4.6

가



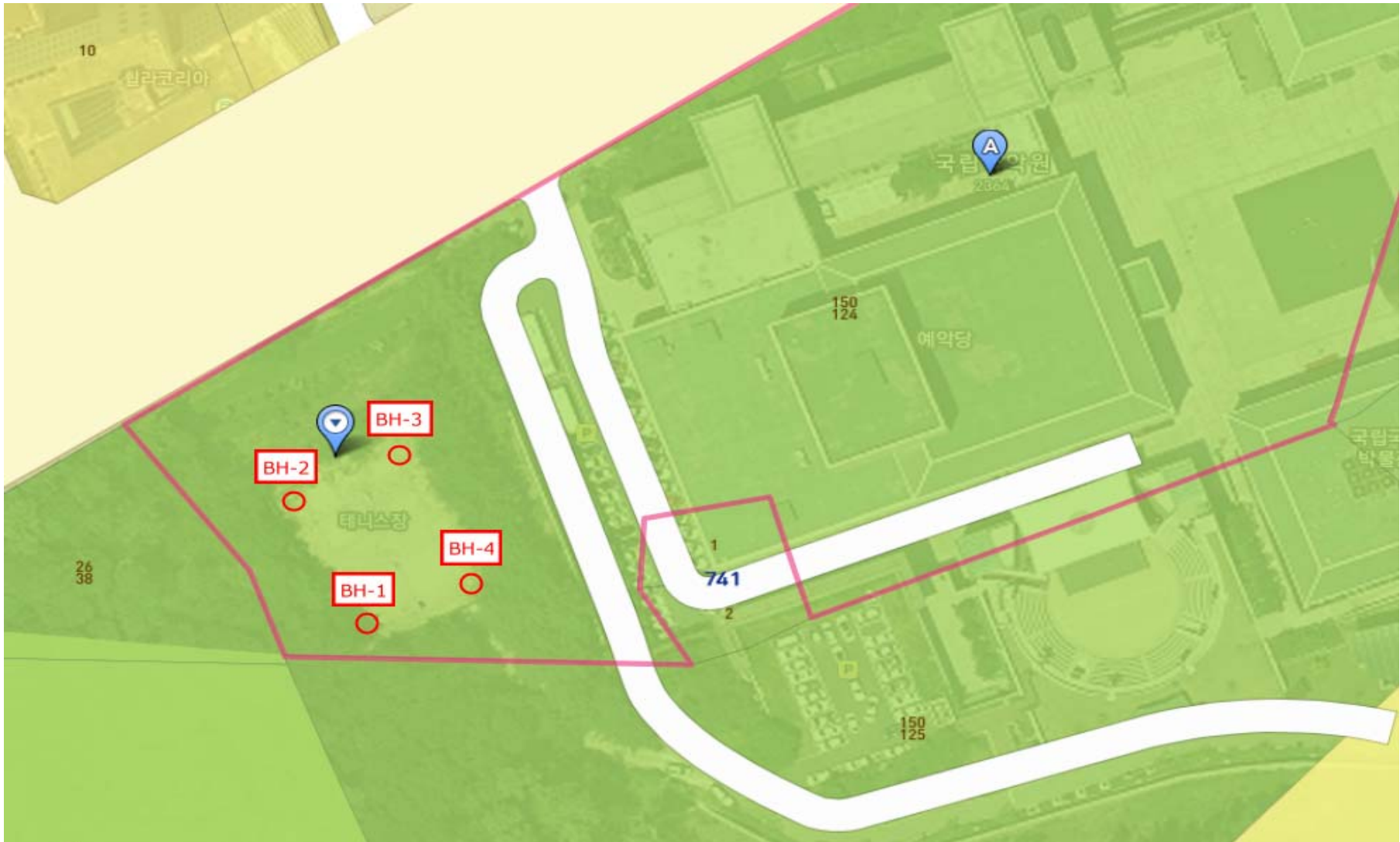
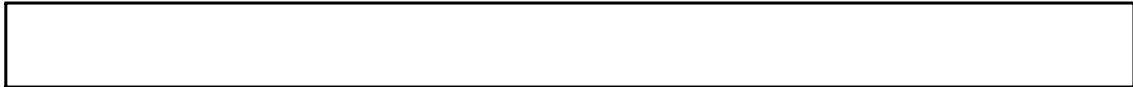
		(m)	(kN/m ³)	(Mpa)	
BH-1		17.0~17.2	24.81	6.07	-
BH-1		20.2~20.5	27.82	115.50	-
BH-1		22.3~22.5	27.96	143.09	-
BH-1		24.8~25.0	27.92	51.15	-



- 
- 5.1
 - 5.2
 - 5.3
 - 5.4 Down Hole
 - 5.5
 - 5.6



5.1 시추조사 위치도



5.2 시추주상도

[illegible]

()

REMARKS

○ U.D. SAMPLE

◎ S.P.T. SAMPLE

● CORE SAMPLE

⊗ DISTURBED SAMPLE

DRILL LOG

PROJECT		HOLE No.		BH-2		()		REMARKS	
LOCATION		127'00"26.81 37'28"38.53		ELEVATION				<input type="radio"/> U.D. SAMPLE <input type="radio"/> S.P.T. SAMPLE <input checked="" type="radio"/> CORE SAMPLE <input type="radio"/> DISTURBED SAMPLE	
DATE		2016 11 22 ~ 11 23		GROUND WATER (GL-)		16.8 m			
				INSPECTOR					

Elev. m	Scale m	Depth m	Thick- ness m	Colum- nar Section	Description	U S C S	Sample		Standard Penetration Test						
									N (/cm)	N blow 10 20 30 40 50					
-1.00		1.0	1.0	•••••	* 0.0~1.0m		S-1	◎	1.0	16/30					
				+++++	* 1.0~15.0m		S-2	◎	2.0	17/30					
				+++++	~		S-3	◎	3.0	19/30					
				+++++	,		S-4	◎	4.0	20/30					
	5			+++++			S-5	◎	5.0	21/30					
				+++++			S-6	◎	6.0	21/30					
				+++++			S-7	◎	7.0	23/30					
				+++++			S-8	◎	8.0	26/30					
				+++++			S-9	◎	9.0	29/30					
	10			+++++			S-10	◎	10.0	36/30					
				+++++			S-11	◎	11.0	44/30					
				+++++			S-12	◎	12.0	50/30					
				+++++			S-13	◎	13.0	50/22					
				+++++			S-14	◎	14.0	50/14					
-15.00	15	15.0	14.0	+++++	* 15.0~18.0m		S-15	◎	15.0	50/ 9					
				+++++	~		S-16	◎	16.0	50/ 7					
				+++++	,		S-17	◎	17.0	50/ 4					
-18.00		18.0	3.0	+++++			US		18.0	50/ 3					
					18.0m										

DRILL LOG

PROJECT		HOLE No.		BH-3		REMARKS			
LOCATION		ELEVATION		(GL-) 17.6 m		<input type="radio"/> U.D. SAMPLE <input type="radio"/> S.P.T. SAMPLE <input checked="" type="radio"/> CORE SAMPLE <input type="radio"/> DISTURBED SAMPLE			
DATE		INSPECTOR							
127'00"27.58 37'28"38.88		2016 11 23							
Elev. m	Scale m	Depth m	Thick- ness m	Colum- nar Section	Description	U S C S	Sample	Standard Penetration Test	
								N (/cm)	N blow
								10	20 30 40 50
-0.60		0.6	0.6		* 0.0~0.6m		S-1	1.0 16/30	
					* 0.6~17.0m		S-2	2.0 18/30	
							S-3	3.0 20/30	
							S-4	4.0 21/30	
							S-5	5.0 23/30	
							S-6	6.0 25/30	
							S-7	7.0 27/30	
							S-8	8.0 20/30	
							S-9	9.0 23/30	
							S-10	10.0 24/30	
							S-11	11.0 25/30	
							S-12	12.0 27/30	
							S-13	13.0 34/30	
							S-14	14.0 42/30	
							S-15	15.0 50/23	
							S-16	16.0 50/14	
-17.00		17.0	16.4		* 17.0~20.0m		S-17	17.0 50/10	
							S-18	18.0 50/ 9	
							US	19.0 50/ 2	
-20.00		20.0	3.0				US		

()

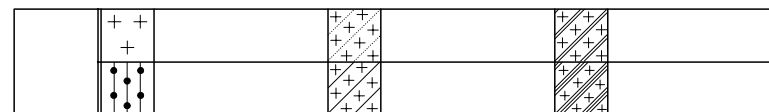
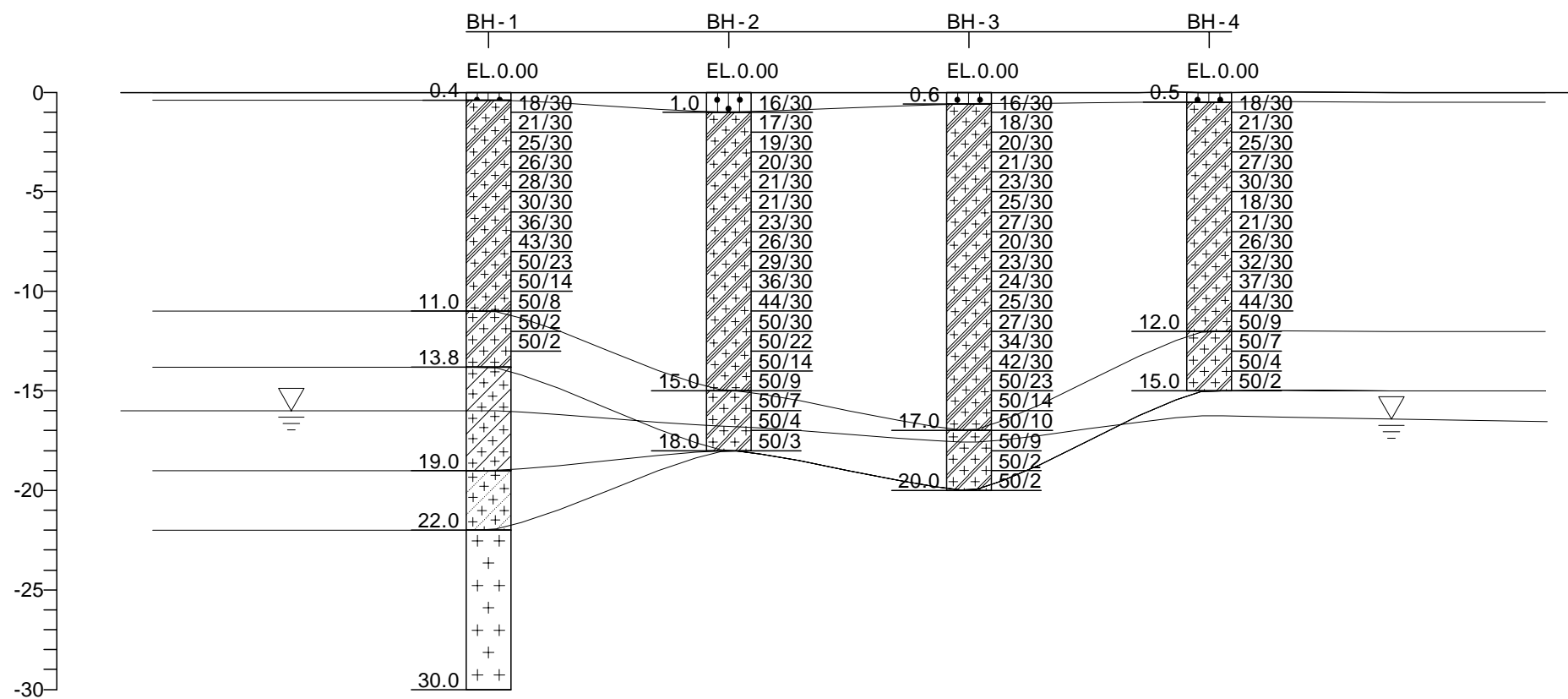
DRILL LOG

PROJECT		HOLE No.		BH-4		REMARKS		
LOCATION		ELEVATION		GROUND WATER (GL-)		INSPECTOR		
DATE		2016 11 23						
Elev. m	Scale m	Depth m	Thick- ness m	Colum- nar Section	Description	U S C S	Sample	Standard Penetration Test
								N (/cm)
								10 20 30 40 50
-0.50		0.5	0.5		* 0.0~0.5m		S-1	1.0 18/30
					* 0.5~12.0m		S-2	2.0 21/30
					~		S-3	3.0 25/30
					,		S-4	4.0 27/30
	5						S-5	5.0 30/30
							S-6	6.0 18/30
							S-7	7.0 21/30
							S-8	8.0 26/30
							S-9	9.0 32/30
	10						S-10	10.0 37/30
							S-11	11.0 44/30
-12.00		12.0	11.5		* 12.0~15.0m		S-12	12.0 50/ 9
					~		S-13	13.0 50/ 7
					,		S-14	14.0 50/ 4
-15.00	15	15.0	3.0		15.0m		US	15.0 50/ 2

5.3 지층 단면도

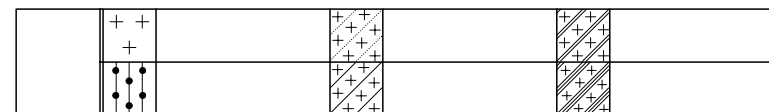
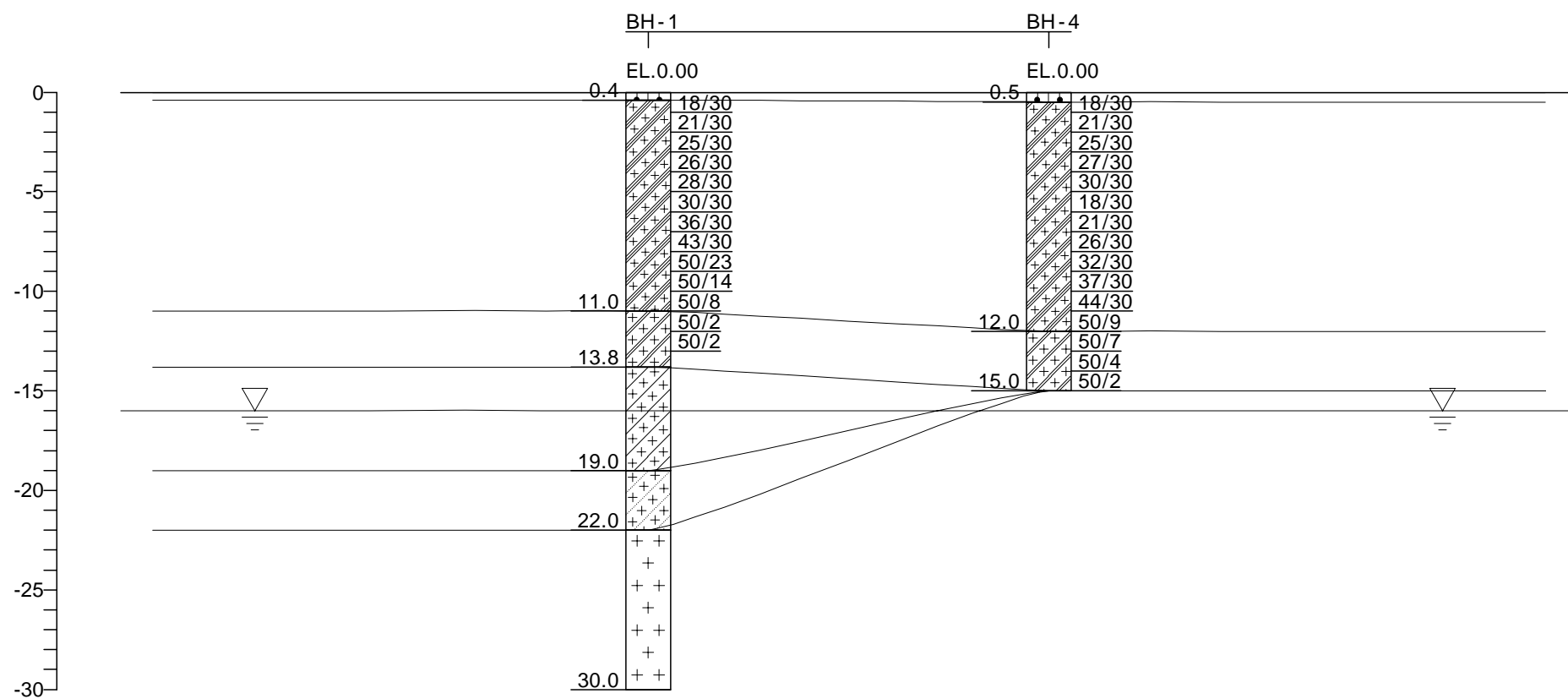
FREE SCALE

A-A'



FREE SCALE

B-B'

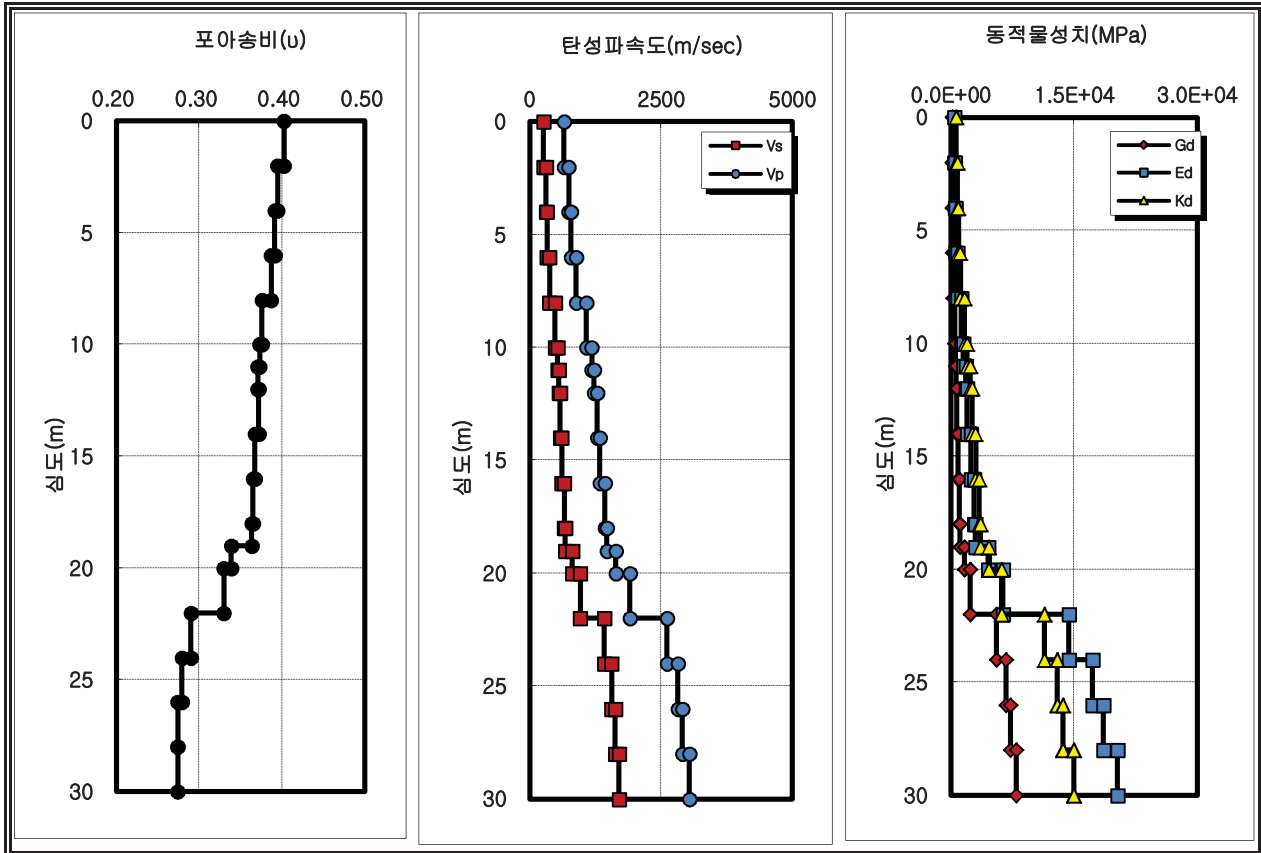


5.4 DOWN HOLE 시험성과

Down Hole Test

조사명	국립국악원 공연연습장 건립사업 지반조사		
공번	BH-1	심도	30.0m
시험장비	Borehole Pick	시험일자	2016. 11.

심도	Vp	Vs	포아송비	전단탄성율	체적탄성율	동탄성계수
2.0	655	265	0.40	1.36E+02	6.50E+02	3.82E+02
4.0	745	311	0.39	1.88E+02	8.26E+02	5.23E+02
6.0	785	332	0.39	2.14E+02	9.10E+02	5.95E+02
8.0	884	380	0.39	2.80E+02	1.14E+03	7.76E+02
10.0	1080	482	0.38	4.50E+02	1.66E+03	1.24E+03
11.0	1184	533	0.37	5.51E+02	1.98E+03	1.51E+03
12.0	1230	558	0.37	6.67E+02	2.35E+03	1.83E+03
14.0	1284	580	0.37	7.21E+02	2.57E+03	1.98E+03
16.0	1335	612	0.37	8.79E+02	3.01E+03	2.40E+03
18.0	1430	660	0.36	1.02E+03	3.44E+03	2.79E+03
19.0	1470	681	0.36	1.09E+03	3.62E+03	2.97E+03
20.0	1644	812	0.34	1.68E+03	4.65E+03	4.50E+03
22.0	1912	964	0.33	2.37E+03	6.17E+03	6.30E+03
24.0	2611	1420	0.29	5.56E+03	1.14E+04	1.43E+04
26.0	2821	1562	0.28	6.72E+03	1.30E+04	1.72E+04
28.0	2912	1625	0.27	7.28E+03	1.37E+04	1.85E+04
30.0	3045	1699	0.27	7.95E+03	1.49E+04	2.03E+04



5.5 실내토질시험 성과

SOIL TEST SUMMARY TABLE

PROJECT :

DATE : 2016 11

[illegible]

KS F 2301 - 02

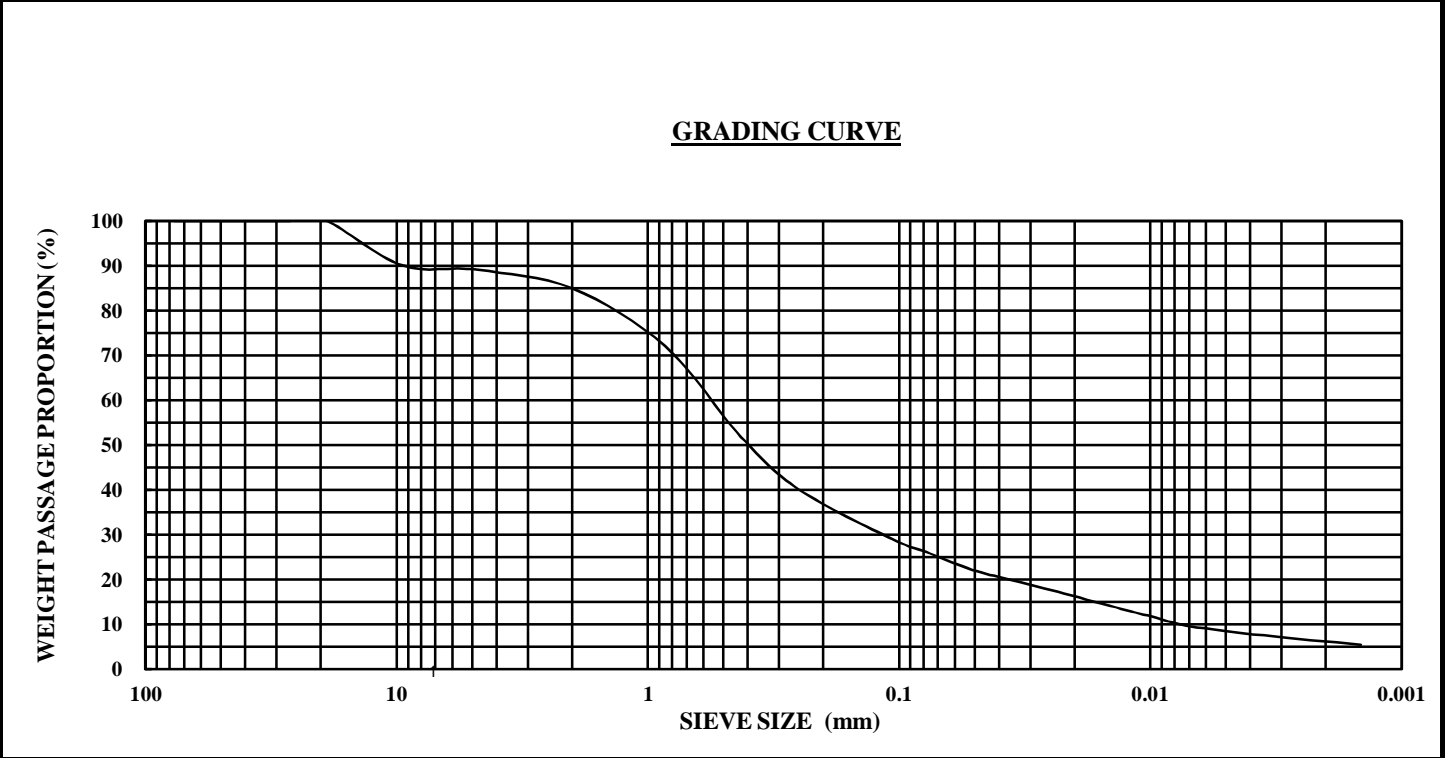
Classification of a Soil (USCS)

1. :

2. : BH-1 3.0m

3. : 2016. 11

(%)	14.7	(Cu)	77.8	
(g/cm³)	2.644	(Cg)	3.2	
(%)	N.P.	4.75mm	(%)	89.0
(%)	N.P.	0.075mm	(%)	25.6
(%)	N.P.	0.005mm	(%)	8.4
(USCS)	SM Silty sand	0.002mm	(%)	6.0



KS F 2301 - 02		Classification of a Soil (USCS)		
1. :				
2. : BH-2 6.0m		3. : 2016. 11		
(%)	9.1	(Cu)	2635.7	
(g/cm³)	2.611	(Cg)	0.2	
(%)	N.P.	4.75mm	(%)	38.8
(%)	N.P.	0.075mm	(%)	22.6
(%)	N.P.	0.005mm	(%)	7.1
(USCS)	GM	0.002mm	(%)	5.4
Silty gravel with sand				
<div>GRADING CURVE</div> <div><div>WEIGHT PASSAGE PROPORTION (%)</div><div><div><div>100</div><div>90</div><div>80</div><div>70</div><div>60</div><div>50</div><div>40</div><div>30</div><div>20</div><div>10</div><div>0</div></div><div><div><div>100</div><div>10</div><div>1</div><div>0.1</div><div>0.01</div><div>0.001</div></div><div>SIEVE SIZE (mm)</div></div></div></div>				

KS F 2301 - 02		Classification of a Soil (USCS)																																																																															
1. :																																																																																	
2. : BH-3 9.0m 3. : 2016. 11																																																																																	
(%)	20.2	(Cu)																																																																															
(g/cm³)	2.674	(Cg)																																																																															
(%)	28.6	4.75mm	(%) 100.0																																																																														
(%)	20.2	0.075mm	(%) 43.8																																																																														
(%)	8.4	0.005mm	(%) 15.9																																																																														
(USCS)	SC Clayey sand	0.002mm	(%) 12.5																																																																														
GRADING CURVE																																																																																	
<table><caption>Grading Curve Data</caption><thead><tr><th>Sieve Size (mm)</th><th>Weight Passage Proportion (%)</th></tr></thead><tbody><tr><td>100</td><td>100</td></tr><tr><td>75</td><td>100</td></tr><tr><td>60</td><td>100</td></tr><tr><td>4.75</td><td>100</td></tr><tr><td>2.5</td><td>100</td></tr><tr><td>1.5</td><td>100</td></tr><tr><td>1.18</td><td>100</td></tr><tr><td>0.85</td><td>100</td></tr><tr><td>0.6</td><td>100</td></tr><tr><td>0.425</td><td>100</td></tr><tr><td>0.3</td><td>100</td></tr><tr><td>0.25</td><td>100</td></tr><tr><td>0.2</td><td>100</td></tr><tr><td>0.15</td><td>100</td></tr><tr><td>0.125</td><td>100</td></tr><tr><td>0.1</td><td>100</td></tr><tr><td>0.075</td><td>43.8</td></tr><tr><td>0.06</td><td>35</td></tr><tr><td>0.05</td><td>30</td></tr><tr><td>0.0425</td><td>25</td></tr><tr><td>0.0375</td><td>20</td></tr><tr><td>0.03</td><td>15</td></tr><tr><td>0.025</td><td>12.5</td></tr><tr><td>0.02</td><td>12.5</td></tr><tr><td>0.015</td><td>12.5</td></tr><tr><td>0.0125</td><td>12.5</td></tr><tr><td>0.01</td><td>12.5</td></tr><tr><td>0.0075</td><td>12.5</td></tr><tr><td>0.006</td><td>12.5</td></tr><tr><td>0.005</td><td>12.5</td></tr><tr><td>0.00425</td><td>12.5</td></tr><tr><td>0.00375</td><td>12.5</td></tr><tr><td>0.003</td><td>12.5</td></tr><tr><td>0.0025</td><td>12.5</td></tr><tr><td>0.002</td><td>12.5</td></tr><tr><td>0.0015</td><td>12.5</td></tr><tr><td>0.00125</td><td>12.5</td></tr><tr><td>0.001</td><td>12.5</td></tr></tbody></table>				Sieve Size (mm)	Weight Passage Proportion (%)	100	100	75	100	60	100	4.75	100	2.5	100	1.5	100	1.18	100	0.85	100	0.6	100	0.425	100	0.3	100	0.25	100	0.2	100	0.15	100	0.125	100	0.1	100	0.075	43.8	0.06	35	0.05	30	0.0425	25	0.0375	20	0.03	15	0.025	12.5	0.02	12.5	0.015	12.5	0.0125	12.5	0.01	12.5	0.0075	12.5	0.006	12.5	0.005	12.5	0.00425	12.5	0.00375	12.5	0.003	12.5	0.0025	12.5	0.002	12.5	0.0015	12.5	0.00125	12.5	0.001	12.5
Sieve Size (mm)	Weight Passage Proportion (%)																																																																																
100	100																																																																																
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1.18	100																																																																																
0.85	100																																																																																
0.6	100																																																																																
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0.00125	12.5																																																																																
0.001	12.5																																																																																

KS F 2301 - 02

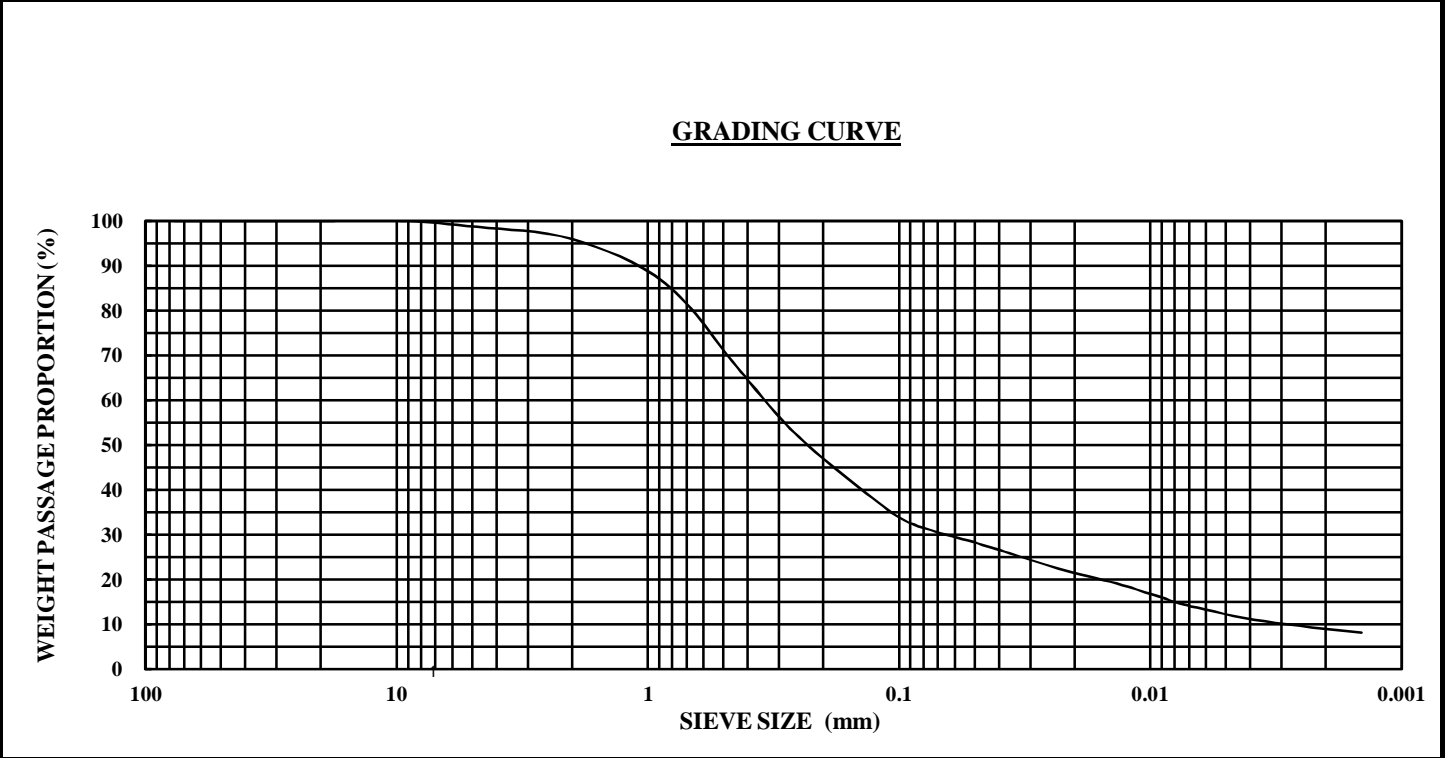
Classification of a Soil (USCS)

1. :

2. : BH-4 10.0m

3. : 2016. 11

(%)	15.5	(Cu)	116.8
(g/cm ³)	2.647	(Cg)	4.1
(%)	N.P.	4.75mm	(%) 98.6
(%)	N.P.	0.075mm	(%) 31.0
(%)	N.P.	0.005mm	(%) 12.4
(USCS)	SM Silty sand	0.002mm	(%) 9.0



5.6 실내 암석 시험 성과

ROCK TEST SUMMARY TABLE

PROJECT :

DATE : 2016 11







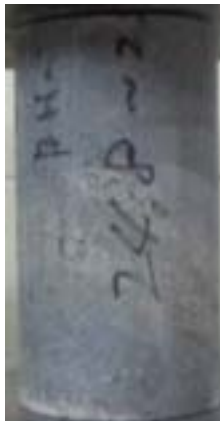

[illegible]

Unconfined Compression Test For Rock Core

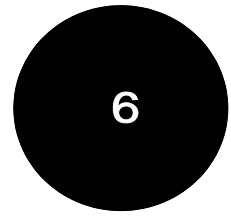
Project			
Test Method	KS E 3033	Test Date	2016 11

Test No.	Sample No.	Sampling Depth (m)	Diameter (mm)	Height (mm)	Weight (g)	Unit Weight (kN/m ³)	Failure Load (KN)	Comp. Strength (MPa)
1	BH-1	17.0~17.2	50.3	110.8	545.5	24.81	12.0	6.07
2	BH-1	20.2~20.5	50.6	109.7	613.6	27.82	232.2	115.50
3	BH-1	22.3~22.5	50.4	107.1	596.2	27.96	284.9	143.09
4	BH-1	24.8~25.0	50.2	92.2	509.1	27.92	101.2	51.15
Average								

Pictures of Failure

1			2		
3			4		

Remarks			
Operator		Approved	





BH - 1



BH - 1



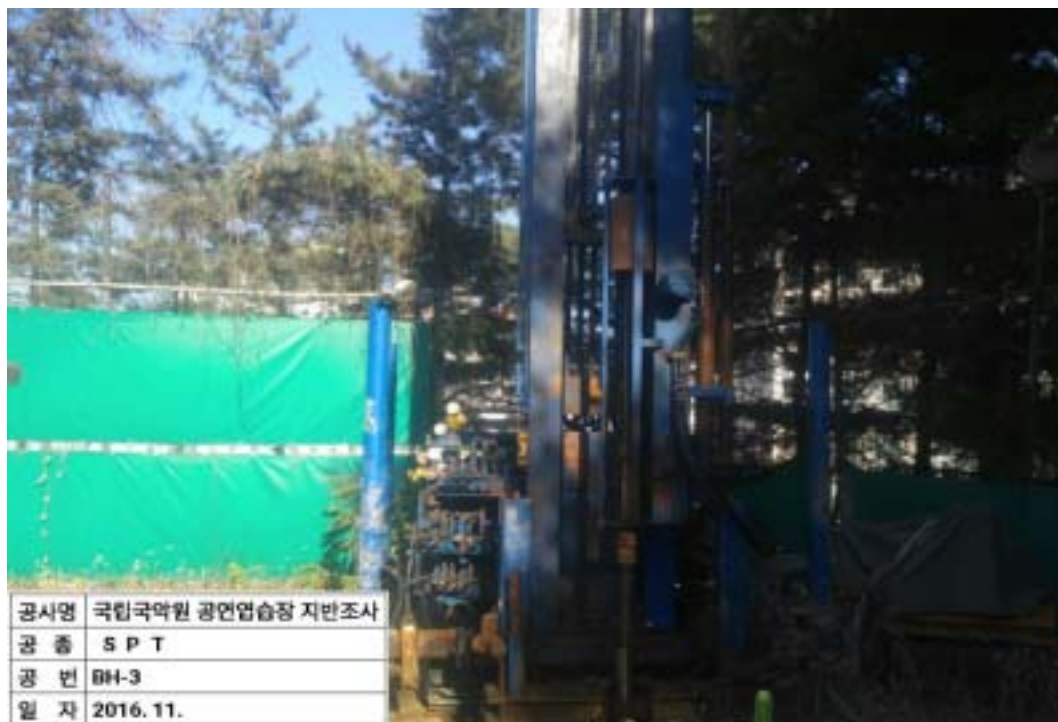
BH - 2



BH - 2



BH - 3



BH - 3



BH - 4



BH - 4



공사명	국립국악원 공연연습장 신축공사
공 종	지반조사
위 치	BH-1
내 용	다운홀시험
일 자	2016.11.23

BH - 1



BH - 1 (1)



BH-1 (2)



BH-1 (3)



BH-2, 3, 4