Table IV-1-1 Water Analysis Result (1/5)

Project : HaNoi High-Tech Park. **Location: HoaLac, ThachThat, HaTay.**

PHYSICAL CHARACTER OF WATER

Color : None
Odour : None
Taste : None
Turbidity : Transparent
Atmosphere temperature :
Water temperature :

Sampling location : Borehole N^{0} BH7.
Sampling depth : 2.00 m.
Sampling date : 19/08/1997.
Date of sample reception : 20/08/1997.
Analytical request : Simple

CHEMICAL COMPOSITION OF WATER

Cation	mg/l	mg.eq/l	%mg.eq/l
Ca^{+2}	0.20	0.04	4.4
Mg^{+2}	0.49	0.04	4.4
$Fe^{+2,+3}$	Stain		
NH_4^+			
K^++Na^+	18.86	0.82	91.2
Total	19.55	0.90	100

Anion	mg/l	mg.eq/l	%mg.eq/l
HCO_3^-	6.10	0.10	11
Cl^-	28.30	0.80	89
SO_4^{-2}			
CO_3^{-2}			
NO_3^-			
Total	34.40	0.90	100

OTHER ITEMS

Items	Result
pH	5.3
Total hardnees	0.22 °D
Provisional hardness	0.22 °D
Eternal hardness	0.00 °D

Items	Result (mg/l)
Free CO_2	33.01
Corrosive CO_2	32.00
Dry sediment at 105°C	51.03

Table IV-1-2 Water Analysis Result (2/5)

Project : HaNoi High-Tech Park. **Location: HoaLac, ThachThat, HaTay.**

PHYSICAL CHARACTER OF WATER

Color : None
Odour : None
Taste : None
Turbidity : Transparent
Atmosphere temperature :
Water temperature :

Sampling location : Borehole N^{o} BH4.
Sampling depth : 1.50 m.
Sampling date : 19/08/1997.
Date of sample reception : 20/08/1997.
Analytical request : Simple

CHEMICAL COMPOSITION OF WATER

Cation	mg/l	mg.eq/l	%mg.eq/l
Ca^{+2}	1.60	0.08	16
Mg^{+2}	1.70	0.14	28
$Fe^{+2,+3}$	Stain		
NH_4^+			
K^++Na^+	6.44	0.28	56
Total	9.74	0.50	100

Anion	mg/l	mg.eq/l	%mg.eq/l
HCO_3^-	6.10	0.10	20
Cl^-	14.18	0.40	80
SO_4^{-2}			
CO_3^{-2}			
NO_3^-			
Total	20.28	0.50	100

OTHER ITEMS

Items	Result
pH	5.7
Total hardnees	0.62 °D
Provisional hardness	0.28 °D
Eternal hardness	0.34 °D

Items	Result (mg/l)
Free CO_2	13.20
Corrosive CO_2	13.20
Dry sediment at 105°C	30.92

Table IV-1-3 Water Analysis Result (3/5)

Project : HaNoi High-Tech Park. **Location: HoaLac, ThachThat, HaTay.**

PHYSICAL CHARACTER OF WATER

Color : None
Odour : None
Taste : None
Turbidity : Transparent
Atmosphere temperature :
Water temperature :

Sampling location : Borehole N^{Q} BH3.
Sampling depth : 1.50 m.
Sampling date : 19/08/1997.
Date of sample reception : 20/08/1997.
Analytical request : Simple

CHEMICAL COMPOSITION OF WATER

Cation	mg/l	mg.eq/l	%mg.eq/l
Ca^{+2}	1.20	0.06	12
Mg^{+2}	0.24	0.02	4
$Fe^{+2,+3}$	Stain		
NH_4^+			
K^++Na^+	9.66	0.42	84
Total	11.10	0.50	100

Anion	mg/l	mg.eq/l	%mg.eq/l
HCO_3^-	6.10	0.10	20
Cl^-	14.18	0.40	80
SO_4^{-2}			
CO_3^{-2}			
NO_3^-			
Total	20.28	0.50	100

OTHER ITEMS

Items	Result
pH	6.0
Total hardnees	0.22 °D
Provisional hardness	0.22 °D
Eternal hardness	0.00 °D

Items	Result (mg/l)
Free CO_2	6.60
Corrosive CO_2	6.60
Dry sediment at 105°C	32.28

Table IV-1-4 Water Analysis Result (4/5)

Project : HaNoi High-Tech Park. **Location: HoaLac, ThachThat, HaTay.**

PHYSICAL CHARACTER OF WATER

Color : None.
Odour : None.
Taste : None.
Turbidity : Light turbid.
Atmosphere temperature :
Water temperature :

Sampling location : Lake water (Sample2).
Sampling depth : 0.50 m.
Sampling date : 19/08/1997.
Date of sample reception : 20/08/1997.
Analytical request : Simple

CHEMICAL COMPOSITION OF WATER

Cation	mg/l	mg.eq/l	%mg.eq/l
Ca^{+2}	0.20	0.04	10
Mg^{+2}	1.20	0.10	25
$Fe^{+2,+3}$	0.84	0.03	7.5
NH_4^+			
$K^+ + Na^+$	5.29	0.23	57.5
Total	7.53	0.40	100

Anion	mg/l	mg.eq/l	%mg.eq/l
HCO_3^-	12.20	0.20	50
Cl^-	7.09	0.20	50
SO_4^{-2}			
CO_3^{-2}			
NO_3^-			
Total	19.29	0.40	100

OTHER ITEMS

Items	Result
pH	6.0
Total hardnees	0.39 °D
Provisional hardness	0.39 °D
Eternal hardness	0.00 °D

Items	Result (mg/l)
Free CO_2	4.40
Corrosive CO_2	4.40
Dry sediment at 105°C	24.62

Table IV-1-5 Water Analysis Result (5/5)

Project : HaNoi High-Tech Park. **Location: HoaLac, ThachThat, HaTay.**

PHYSICAL CHARACTER OF WATER

Color : None
Odour : None
Taste : None
Turbidity : Transparent
Atmosphere temperature :
Water temperature :

Sampling location : Lake water (Sample1).
Sampling depth : 0.50 m.
Sampling date : 19/08/1997.
Date of sample reception : 20/08/1997.
Analytical request : Simple

CHEMICAL COMPOSITION OF WATER

Cation	mg/l	mg.eq/l	%mg.eq/l
Ca^{+2}	2.40	0.12	24
Mg^{+2}	0.97	0.08	16
$Fe^{+2,+3}$	0.27	0.01	2
NH_4^+			
$K^+ + Na^+$	6.67	0.29	58
Total	10.31	0.50	100

Anion	mg/l	mg.eq/l	%mg.eq/l
HCO_3^-	12.20	0.20	40
Cl^-	10.63	0.30	60
SO_4^{-2}			
CO_3^{-2}			
NO_3^-			
Total	22.83	0.50	100

OTHER ITEMS

Items	Result
pH	6.3
Total hardnees	0.56 °D
Provisional hardness	0.56 °D
Eternal hardness	0.00 °D

Items	Result (mg/l)
Free CO_2	6.60
Corrosive CO_2	6.60
Dry sediment at 105°C	30.94

Table IV-2-1 Effluent Standard of Industrial Waste Water

no	Parameters and substances	Unit	Limitation Values		
			A	B	C
1	Temperature	°C	40	40	45
2	pH value		6 - 9	5.5 - 9	5 - 9
3	BOD_5 (20° C)	mg/l	20	50	100
4	COD	mg/l	50	100	400
5	Suspended solids	mg/l	50	100	200
6	Arsenic	mg/l	0.05	0.1	0.5
7	Cadmium	mg/l	0.01	0.02	0.5
8	Lead	mg/l	0.1	0.5	1
9	Residual chlorine	mg/l	1	2	2
10	Chromium (VI)	mg/l	0.05	0.1	0.5
11	Chromium (III)	mg/l	0.2	1	2
12	Mineral oil and fat	mg/l	not detectable	1	5
13	Animal-vegetable fat and oil	mg/l	5	10	30
14	Copper	mg/l	0.2	1	5
15	Zinc	mg/l	1	2	5
16	Manganese	mg/l	0.2	1	5
17	Nickel	mg/l	0.2	1	2
18	Organic phosphorous	mg/l	0.2	0.5	1
19	Total phosphorous	mg/l	4	6	8
20	Iron	mg/l	1	5	10
21	Tetrachlorethylene	mg/l	0.02	0.1	0.1
22	Tin	mg/l	0.2	1	5
23	Mercury	mg/l	0.005	0.005	0.01
24	Total nitrogen	mg/l	30	60	60
25	Trichlorethylene	mg/l	0.05	0.3	0.3
26	Ammonia (as N)	mg/l	0.1	1	10
27	Fluoride	mg/l	1	2	5
28	Phenol	mg/l	0.001	0.05	1
29	Sulfide	mg/l	0.2	0.5	1
30	Cyanide	mg/l	0.05	0.1	0.2
31	Coliform	MPN/100ml	5000	10000	-
32	Gross α activity	Bg/l	0.1	0.1	-
33	Gross β activity	Bg/l	1	1	-

Notes :

The column A : discharged into the water bodies being used for sources of domestic water supply.

The column B : To be discharged only into the water bodies being used for navigation, irrigation purposes or for bathing, aquatic breeding and cultivation, etc.

The column C : not be discharged into surroundings.

Source : Vietnam Standard TCVN 5942-1995

Table IV-2-2 Estimate of Consolidation Settlement

Item	Industrial Estate (+4.6m) Boring Hole No /3		Main Road (+3.5m) Boring Hole No /3	
	7	9	7	9
1) Cc	0.15	0.11	0.15	0.11
2) Co	1.247	1.301	1.247	1.301
3) Unit weight of compressible soils (g/cm3)	1.70	1.79	1.70	1.79
4) Unit weight of fill material (g/cm3)	1.72	1.72	1.72	1.72
5) Depth of ground water level (cm)	150	140	150	140
6) Filling height (cm)	460	460	350	350
7) Thickness of compressibl soils (cm) H	800	420	800	420
8) Effective overburden pressure (kg/cm2) Pz	0.43	0.3059	0.43	0.3059
9) Incremental overburden pressure (kg/cm2) dP	0.7912	0.7912	0.602	0.602
10) Consolidation settlement (cm) Sc /1	24.2	11.1	20.3	9.5
11) Time factor Tv (90 % settlement)	0.848	0.848	0.848	0.848
12) Time factor Tv (50 % settlement)	0.196	0.196	0.196	0.196
13) Drainage path (cm) d (=7)/2)	400	210	400	210
14) Coefficient of consolidation (cm2/sec) Cv	0.000777	0.000594	0.000777	0.000594
15) Time (day) t (90% settlement) /2	2,021	729	2,021	729
16) Time (year) t (90% settlement)	5.5	2.0	5.5	2.0
17) Time (day) t (50% settlement) /2	467	168	467	168
18) Time (year) t (50% settlement)	1.3	0.5	1.3	0.5

Note:

/1 $Sc = \frac{Cc}{1+Co} \times H \times \log \frac{Pz + dP}{Pz}$

/2 $t = \frac{Tv \times d \times d}{Cv \times 3,600 \times 24}$

/3 Preconditions for the calculation of consolidation settlement is reffered to the result of core boring test made by JICA Study Team

Table IV-2-3 Road Thickness

Road Classification by Traffic

	Type by ROW						
	50m	26m	22m	20m	14m	12m	7.5m
I Projected Traffic (per one-way, daily)							
1 Internal Road							
1) R & D Zone		0			0		
2) Center Area							
3) Hi-tech Industrial Estate		110		50			
4) Urban/Business Area							
5) Hi-grade Residence			0		0	0	
6) New Town			25		0		0
2 External Road	300	150			0		
II Traffic Classification							
1 Internal Road							
1) R & D Zone		L			L		
2) Center Area							
3) Hi-tech Industrial Estate		A		L			
4) Urban/Business Area							
5) Hi-grade Residence			L		L	L	
6) New Town			L		L		L
2 External Road	B	A			L		

Traffic Classification Standard

Traffic classification	One-way daily traffic of heavy vehicles
L	less than 100
A	100 to 250
B	250 to 1,000
C	1,000 to 3,000

Source: Manual for Asphalt Pavement, Japan Road Association

Target Thickness of Pavement

(unit:cm)

	Type by ROW						
	50m	26m	22m	20m	14m	12m	7.5m
I Total Thickness (H) cm							
1 Internal Road							
1) R & D Zone		35			35		
2) Center Area							
3) Hi-tech Industrial Estate		41		35			
4) Urban/Business Area							
5) Hi-grade Residence			35		35	35	
6) New Town			35		35		35
2 External Road	49	41			35		
II T_A							
1 Internal Road							
1) R & D Zone		14			14		
2) Center Area							
3) Hi-tech Industrial Estate		18		14			
4) Urban/Business Area							
5) Hi-grade Residence			14		14	14	
6) New Town			14		14		14
2 External Road	24	18			14		

Standard of Pavement Thickness (cm)

	L		A		B		C		D	
Design CBR	T_A	H	T_A	H	T_A	H	T_A	H	T_A	H
2	17	52	21	61	29	74	39	90	51	105
3	15	41	19	48	26	58	35	70	45	83
4	14	35	18	41	24	49	32	59	41	70
6	12	27	16	32	21	38	28	47	37	55
8	11	23	14	27	19	32	26	39	34	46
12	-	-	13	21	17	26	23	31	30	36
more than 20	-	-	-	-	-	-	20	23	26	27

Source: Manual for Asphalt Pavement, Japan Road Association

Table IV-2-4 Road Pavement Design

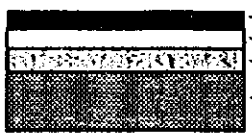
Traffic	Layer	Materials	an	H (cm)	TA (cm)
22m, 20m, 14m, 12m, 7.5m road (L traffic)	Surface & binder layer	1 Hot asphalt mix	1.00	5	5
	Base Course	1 Bituminous stabilizati	0.80	5	4
		2 Gravel & slag	0.55	8	4.4
	Sub-base Course	1 Crusher-run, slag	0.20	17	3.4
		2 Sand	0.20		
			Total	35	16.8
26m road (except R & D Zone) (A traffic)	Surface & binder layer	1 Hot asphalt mix	1.00	5	5
	Base Course	1 Bituminous stabilizati	0.80	8	6.4
		2 Gravel & slag	0.55	8	4.4
	Sub-base Course	1 Crusher-run, slag	0.20	20	4
		2 Sand	0.20		
			Total	41	19.8
50m road (B traffic)	Surface & binder layer	1 Hot asphalt mix	1.00	8	8
	Base Course	1 Bituminous stabilizati	0.80	8	6.4
		2 Gravel & slag	0.55	10	5.5
	Sub-base Course	1 Crusher-run, slag	0.20	25	5
		2 Sand	0.20		
			Total	51	24.9

5cm Surface & binder layer (Hot asphalt mix)
5cm Base Course (Bituminous stabilization)
8cm Base Course (Gravel & slag)
17cm Sub-base Course (Crusher-run, slag)

22m, 20m, 14m, 12m, 7.5m road (L traffic)

5cm Surface & binder layer (Hot asphalt mix)
8cm Base Course (Bituminous stabilization)
8cm Base Course (Gravel & slag)
20cm Sub-base Course (Crusher-run, slag)

26m road (except for R & D Zone) (A traffic)



8cm Surface & binder layer (Hot asphalt mix)
8cm Base Course (Bituminous stabilization)
10cm Base Course (Gravel & slag)
25cm Sub-base Course (Crusher-run, slag)

50m road (B traffic)

$TA=a1T1+a2T2+\cdots+anTn$

Tn: thickness of each layer
an: coefficient in table below

Layer	Materials	an
Surface & binder layer	1 Hot asphalt mix	1.00
Base Course	1 Bituminous stabilizati	0.80
	2 Gravel & slag	0.55
Sub-base Course	1 Crusher-run, slag	0.25
	2 Sand	0.20

Table IV-2-5 Hydraulic Design of Water Supply in Phase 1 (Basic Plan) (1/2)

Parameters / Pipe No	Pipe Material	Flow (L/sec)	Diameter (mm)	Length (m)	Hydraulic Gradient (1/1000)	Velocity (m/sec)	Friction Head Loss (m)	Accumulated Head Loss (m)	Gland Level (m+MSL)	Residual Head (m)
1. Hi-Tech Industry Zone										
1.1 South Zone										
Low Water Level in Reservoir:					16.0 (m+MSL)					
Head of Distribution Pump:					20.0 (m)					
Dynamic Water Level:					36.0 (m)					
HI- 101	DIP	203.0	500	350	3.2	1.0	1.1	1.1	16.0	18.9
HI- 102	DIP	124.1	400	220	3.9	1.0	0.9	2.0	16.0	18.0
HI- 103	DIP	79.1	300	255	6.8	1.1	1.7	2.9	18.0	15.1
HI- 104	DIP	62.9	300	360	4.5	0.9	1.6	4.5	16.0	15.5
HI- 105	DIP	115.2	400	280	3.4	0.9	0.9	2.9	12.0	21.1
HI- 106	DIP	46.3	300	400	2.5	0.7	1.0	5.5	11.0	19.5
HI- 107	DIP	40.8	300	225	2.0	0.6	0.5	6.0	10.0	20.0
HI- 108	DIP	94.8	300	175	9.6	1.3	1.7	4.6	10.0	21.4
HI- 109	DIP	18.3	200	220	3.3	0.6	0.7	5.3	12.0	18.7
HI- 110	DIP	74.4	300	220	6.1	1.1	1.3	6.2	12.0	17.8
HI- 111	DIP	33.2	300	200	1.4	0.5	0.3	6.5	10.0	19.5
HI- 112	DIP	42.5	300	700	2.2	0.6	1.5	8.0	10.0	18.0
1.2 North Zone										
Low Water Level in Reservoir:					16 (m+MSL)					
Head of Distribution Pump:					20 (m)					
Dynamic Water Level:					36 (m)					
HI- 201	DIP	105.8	400	140	2.9	0.8	0.4	0.4	18.0	20.6
HI- 202	DIP	26.2	200	350	6.4	0.8	2.2	2.6	14.0	22.4
HI- 203	DIP	10.9	150	240	5.1	0.6	1.2	3.9	16.0	19.1
HI- 204	DIP	79.7	300	120	6.9	1.1	0.8	1.2	18.0	19.8
HI- 205	DIP	72	300	190	5.7	1.0	1.1	2.3	17.0	19.7
HI- 206	DIP	62.2	300	250	4.4	0.9	1.1	3.4	17.0	18.6
HI- 207	DIP	8.9	100	200	25.3	1.1	5.1	8.5	12.0	18.5
HI- 208	DIP	30.7	200	50	8.6	1.0	0.4	3.9	18.0	17.1
HI- 209	DIP	6.4	150	470	1.9	0.4	0.9	4.3	18.0	16.7
HI- 210	DIP	20.8	200	300	4.2	0.7	1.2	5.1	18.0	15.9
2. New Town Zone										
Low Water Level in Reservoir:					15 (m+MSL)					
Head of Distribution Pump:					35 (m)					
Dynamic Water Level:					50 (m)					
NT- 101	DIP	108.1	400	150	3.0	0.9	0.5	0.5	14.0	35.5
NT- 102	DIP	101.2	400	520	2.7	0.8	1.4	1.8	12.0	36.2
NT- 103	DIP	96.8	300	210	9.9	1.4	2.1	3.9	12.0	34.1
NT- 104	DIP	26.5	200	240	6.5	0.8	1.6	5.5	14.0	30.5
NT- 105	DIP	19.6	150	230	15.1	1.1	3.5	9.0	14.0	27.0
NT- 106	DIP	3.3	100	110	4.0	0.4	0.4	9.4	14.0	26.6
NT- 107	DIP	3.7	100	120	5.0	0.5	0.6	9.4	14.0	26.6
NT- 108	DIP	29.5	200	140	7.9	0.9	1.1	5.0	14.0	31.0
NT- 109	DIP	22.6	150	190	19.7	1.3	3.7	8.8	14.0	27.2
NT- 110	DIP	2.2	100	110	1.9	0.3	0.2	9.0	14.0	27.0
NT- 111	DIP	33.9	200	230	10.3	1.1	2.4	6.3	14.0	29.7
NT- 112	DIP	27	200	200	6.7	0.9	1.3	7.6	14.0	28.4
NT- 113	DIP	4.8	100	170	8.1	0.6	1.4	9.0	14.0	27.0
NT- 114	DIP	9.3	100	210	27.5	1.2	5.8	14.7	14.0	21.3
NT- 115	DIP	2.4	100	260	2.2	0.3	0.6	15.3	14.0	20.7
NT- 116	DIP	9.8	100	200	30.2	1.2	6.0	14.8	14.0	21.2
NT- 117	DIP	2.9	100	170	3.2	0.4	0.5	15.4	14.0	20.6
NT- 118	DIP	15.3	150	130	9.6	0.9	1.2	8.9	14.0	27.1
NT- 119	DIP	8.4	100	270	22.7	1.1	6.1	15.0	14.0	21.0
NT- 120	DIP	1.5	100	300	0.9	0.2	0.3	15.3	14.0	20.7

(Continued)

Table X-2-6 Hydraulic Design of Water Supply in Phase 1 (Basic Plan) (2/2)

Parameters / Pipe No	Pipe Material	Flow (L/sec)	Diameter (mm)	Length (m)	Hydraulic Gradient (1/1000)	Velocity (m/sec)	Friction Head Loss (m)	Accumulated Head Loss (m)	Gland Level (m+MSL)	Residual Head (m)
3. Urban/Buisiness Zone										
LWL in Reservoir:					15 (m+MSL)					
Head of Distribution Pump:					30 (m)					
Dynamic Water Level:					45 (m)					
UB- 201	DIP	12	100	100	44.0	1.5	4.4	4.4	14.0	26.6
UB- 202	DIP	6.5	100	270	14.1	0.8	3.8	8.2	14.0	22.8
UB- 203	DIP	4.1	100	250	6.0	0.5	1.5	9.7	16.0	19.3
UB- 204	DIP	1.7	100	350	1.2	0.2	0.4	10.1	16.0	18.9
UB- 205	DIP	5.5	100	480	10.4	0.7	5.0	9.4	14.0	21.6
UB- 206	DIP	3.1	100	250	3.6	0.4	0.9	10.3	16.0	18.7
UB- 207	DIP	0.7	100	160	0.2	0.1	0.0	10.3	16.0	18.7
3. HHTP Center										
HC- 107	DIP	4.6	100	250	7.5	0.6	1.9	13.8	16.0	15.2
HC- 203	DIP	10.5	200	370	1.2	0.3	0.4	11.8	18.0	15.2
(Note : The HHTP Center Zone is serviced through the elevated tank and the distribution reservoir for R & D Zone)										
5. R & D Zone										
5.1 South Zone										
Law Water Level in Reservoir:					21 (m+MSL)					
Head of Distribution Pump:					45 (m)					
Dynamic Water Level:					66 (m)					
Low Water Level in Elevated Tank:					45 (m+MSL)					
RD- 101	DIP	35.8	200	600	11.4	1.1	6.8	6.8	18.0	41.2
RD- 102	DIP	3	100	700	3.4	0.4	2.4	9.2	16.0	40.8
RD- 103	DIP	32.8	200	940	9.7	1.0	9.1	15.9	18.0	50.1
RD- 104	DIP	32.8	200	60	9.7	1.0	0.6	0.6	18.0	26.4
RD- 105	DIP	14.2	150	310	8.3	0.8	2.6	3.2	16.0	25.8
RD- 106	DIP	9.6	100	300	29.1	1.2	8.7	11.9	14.0	19.1
RD- 108	DIP	15.6	150	270	9.9	0.9	2.7	3.3	16.0	25.7
RD- 109	DIP	12.6	150	260	6.7	0.7	1.7	5.0	14.0	26.0
RD- 110	DIP	9.6	100	340	29.1	1.2	9.9	14.9	14.0	16.1
RD- 111	DIP	3	100	130	3.4	0.4	0.4	15.3	14.0	15.7
RD- 112	DIP	3.6	100	410	4.7	0.5	1.9	17.3	12.0	15.7
5.2 North Zone										
Low Water Level in Reservoir:					21 (m+MSL)					
Head of Distribution Pump:					34 (m)					
Dynamic Water Level:					53 (m)					
Low Water Level in Elevated Tank:					45 (m+MSL)					
RD- 201	DIP	60.4	300	920	4.2	0.9	3.8	3.8	18.0	49.2
RD- 202	DIP	16.7	150	950	11.3	0.9	10.7	11.4	16.0	17.6
RD- 204	DIP	60.4	300	70	4.2	0.9	0.3	0.3	18.0	26.7
RD- 205	DIP	11.2	150	70	5.4	0.6	0.4	0.7	18.0	26.3
RD- 206	DIP	3.2	100	450	3.8	0.4	1.7	2.4	18.0	24.6
RD- 207	DIP	7	100	350	16.2	0.9	5.7	6.3	18.0	20.7
RD- 208	DIP	4.6	100	300	7.5	0.6	2.2	8.6	18.0	18.4
RD- 209	DIP	32.5	200	240	9.5	1.0	2.3	2.6	16.0	26.4
RD- 210	DIP	16.4	150	330	10.9	0.9	3.6	6.2	14.0	24.8
RD- 211	DIP	2.5	100	250	2.4	0.3	0.6	6.8	14.0	24.2
RD- 212	DIP	3.2	100	280	3.8	0.4	1.1	7.2	14.0	23.8
6. Hi-Grade Housing Zone										
Low Water Level in Reservoir:					21 (m+MSL)					
Head of Distribution Pump:					34 (m)					
Dynamic Water Level:					47 (m)					
Low Water Level in Elevated Tank:					38 (m+MSL)					
HH- 301	DIP	16.3	200	1630	2.7	0.5	4.3	4.3	18.0	42.7
HH- 302	DIP	16.3	150	50	10.8	0.9	0.5	0.5	18.0	19.5
HH- 303	DIP	3	100	280	3.4	0.4	0.9	1.5	18.0	18.5
HH- 304	DIP	3	100	650	3.4	0.4	2.2	2.7	18.0	17.3
HH- 305	DIP	6.2	100	270	13.0	0.8	3.5	4.0	18.0	16.0
HH- 306	DIP	1.7	100	440	1.2	0.2	0.5	4.6	18.0	15.4
HH- 307	DIP	1.7	100	500	1.2	0.2	0.6	4.6	18.0	15.4
(Note : The Hi-Grade Housing Zone is serviced through the elevated tank and the distribution reservoir for R & D Zone										

Table IV-2-7 Hydraulic Design of Sewerage Facilities in Phase 1 (Basic Plan) (1/2)

Parameters / Pipe No	Pipe Material	Flow (lit/sec)	Diameter (mm)	Length (m)	Hydraulic Gradient (1/1000)	Velocity (m/sec)	Gland Elevation (m + MSL)	Elevation of Pipe at Down End (m + MSL)	Earth Covering (m)
1. Hi-Tech Industry Zone									
1.2 South Zone									
HI- 101	HCP	22.5	300	260	3.0	0.7	18.0	15.7	2.1
HI- 102	HCP	38.7	300	360	7.0	1.1	16.5	13.2	3.2
HI- 103	HCP	55.3	400	360	7.0	1.4	12.0	10.0	1.8
HI- 104	HCP	60.8	400	220	3.0	0.9	11.0	9.3	1.5
HI- 105	HCP	28.9	300	280	3.0	0.7	14.0	11.7	2.2
HI- 106	HCP	49.3	400	175	7.0	1.4	11.0	9.3	1.5
HI- 107	HCP	10.4	200	220	5.0	0.7	11.0	8.4	2.5
HI- 108	HCP	59.7	400	220	3.0	0.9	11.0	7.7	3.1
HI- 109	HCP	203.0	600	200	2.0	1.0	10.0	7.3	2.4
1.2 North Zone									
HI- 201	HCP	25.1	300	120	3.0	0.7	18.0	16.1	1.7
HI- 202	HCP	5.0	200	150	5.0	0.7	18.0	15.8	2.2
HI- 203	HCP	39.9	300	130	10.0	1.4	16.0	14.4	1.5
HI- 204	HCP	7.7	200	120	5.0	0.7	18.0	15.9	2.0
HI- 205	HCP	9.0	200	210	7.0	0.9	16.0	14.4	1.5
HI- 206	HCP	57.8	400	110	10.0	1.7	14.0	12.4	1.5
HI- 207	HCP	20.8	300	290	5.0	1.0	17.0	14.1	2.8
HI- 208	HCP	41.6	400	240	3.0	0.9	14.0	11.8	2.0
HI- 209	HCP	8.9	200	100	7.0	0.9	14.0	11.8	2.1
HI- 210	HCP	50.5	400	30	3.0	0.9	14.0	11.7	2.1
HI- 211	HCP	6.4	200	20	5.0	0.7	17.0	15.4	1.5
2. New Town Zone									
2.1 South Zone									
NT- 101	HCP	2.5	200	120	5.0	0.7	16.0	13.4	2.5
NT- 102	HCP	5.0	200	100	5.0	0.7	16.0	12.9	3.0
NT- 103	HCP	2.5	200	90	5.0	0.7	16.0	13.6	2.4
NT- 104	HCP	9.9	200	100	5.0	0.7	16.0	12.4	3.5
NT- 105	HCP	2.5	200	90	5.0	0.7	14.0	11.6	2.4
NT- 106	HCP	14.9	200	170	5.0	0.7	14.0	10.7	3.2
NT- 107	HCP	2.5	200	90	5.0	0.7	14.0	11.6	2.4
NT- 108	HCP	19.8	300	100	5.0	1.0	14.0	10.2	3.7
NT- 109	HCP	2.5	200	140	5.0	0.7	14.0	11.3	2.6
NT- 110	HCP	2.5	200	220	5.0	0.7	14.0	10.9	3.0
NT- 111	HCP	27.2	300	150	3.0	0.7	14.0	9.8	4.1
NT- 112	HCP	2.5	200	180	5.0	0.7	14.0	11.1	2.8
NT- 113	HCP	2.5	200	180	5.0	0.7	14.0	10.2	3.7
NT- 114	HCP	5.0	200	110	5.0	0.7	14.0	9.7	4.3
NT- 115	HCP	2.5	200	140	5.0	0.7	14.0	11.3	2.6
NT- 116	HCP	12.4	300	170	3.0	0.7	14.0	9.1	4.7
NT- 117	HCP	2.5	200	240	5.0	0.7	14.0	10.8	3.1
NT- 118	HCP	44.6	400	560	3.0	0.9	12.0	8.0	3.8
2.2 North Zone									
NT- 201	HCP	2.5	200	150	5.0	0.7	16.0	13.3	2.7
NT- 202	HCP	2.5	200	50	5.0	0.7	16.0	13.8	2.2
NT- 203	HCP	7.4	200	100	5.0	0.7	16.0	12.8	3.2
NT- 204	HCP	2.5	200	130	5.0	0.7	16.0	13.4	2.6
NT- 205	HCP	12.3	200	50	6.0	0.8	14.0	12.5	1.5
NT- 206	HCP	2.4	200	90	5.0	0.7	14.0	11.6	2.4
NT- 207	HCP	17.0	300	110	3.0	0.7	14.0	11.2	2.6
NT- 208	HCP	21.8	300	120	3.0	0.7	14.0	10.9	3.0
NT- 209	HCP	2.4	200	290	5.0	0.7	16.0	12.6	3.4
NT- 210	HCP	7.1	200	200	5.0	0.7	14.0	11.6	2.4
NT- 211	HCP	2.4	200	230	5.0	0.7	14.0	10.9	3.1
NT- 212	HCP	2.4	200	50	5.0	0.7	14.0	11.8	2.2
NT- 213	HCP	7.1	200	250	5.0	0.7	14.0	9.6	4.3
NT- 214	HCP	2.4	200	320	5.0	0.7	14.0	10.4	3.5
NT- 215	HCP	31.3	300	190	3.0	0.7	14.0	10.3	3.6
NT- 216	HCP	2.4	200	230	5.0	0.7	14.0	10.9	3.1
NT- 217	HCP	36.1	300	40	3.0	0.7	14.0	10.2	3.7
NT- 218	HCP	40.9	400	100	3.0	0.9	14.0	9.9	3.9

(Continued)

Table IV-2-8 Hydraulic Design of Sewerage Facilities in Phase 1 (Basic Plan) (2/2)

Parameters / Pipe No	Pipe Material	Flow (lit/sec)	Diameter (mm)	Length (m)	Hydrailic Gradient (1/1000)	Velocity (m/sec)	Gland Elevation (m + MSL)	Elevation of Pipe at Down End (m + MSL)	Earth Covering (m)
NT- 219	HCP	2.4	200	170	5.0	0.7	14.0	11.2	2.8
NT- 220	HCP	2.4	200	100	5.0	0.7	16.0	13.5	2.4
NT- 221	HCP	2.4	200	140	5.0	0.7	16.0	13.3	2.6
NT- 222	HCP	7.1	200	100	5.0	0.7	14.0	10.7	3.3
NT- 223	HCP	11.9	200	110	5.0	0.7	14.0	10.1	3.8
NT- 224	HCP	62.3	600	170	3.0	1.2	12.0	9.1	2.6
NT- 225	HCP	2.4	200	200	5.0	0.7	16.0	13.0	2.9
NT- 226	HCP	2.4	200	200	5.0	0.7	12.0	9.0	2.9
NT- 227	HCP	2.4	200	140	5.0	0.7	16.0	13.3	2.6
3. Urban/Buisiness Zone									
UB- 301	HCP	1.5	200	300	5.0	0.7	16.0	13.0	2.9
UB- 302	HCP	3.0	200	300	5.0	0.7	16.0	11.5	4.4
UB- 303	HCP	4.5	200	350	5.0	0.7	14.0	9.8	4.2
UB- 304	HCP	1.5	200	240	5.0	0.7	16.0	13.3	2.6
UB- 305	HCP	3.0	200	260	5.0	0.7	16.0	12.0	3.9
UB- 306	HCP	4.5	200	390	5.0	0.7	14.0	10.1	3.9
UB- 307	HCP	1.5	200	150	5.0	0.7	14.0	11.8	2.2
UB- 308	HCP	12.0	200	50	5.0	0.7	14.0	9.5	4.4
4. HHTP Center Zone									
HC- 101	HCP	3.0	200	350	5.0	0.7	18.0	14.8	3.2
HC- 102	HCP	7.6	200	240	3.0	0.6	16.0	14.0	1.9
HC- 201	HCP	7.8	200	210	5.0	0.7	22.0	19.5	2.5
HC- 202	HCP	12.8	200	450	7.0	0.9	18.0	16.3	1.6
5. R & D Zone									
5.1 South Zone									
RD- 103	HCP	12.6	200	290	6.0	0.8	14.0	12.3	1.6
RD- 104	HCP	17.2	300	340	3.0	0.7	18.0	11.3	6.6
RD- 105	HCP	20.2	300	260	3.0	0.7	17.0	10.5	6.4
RD- 106	HCP	23.2	300	260	3.0	0.7	16.0	9.7	6.1
RD- 107	HCP	26.2	300	380	3.0	0.7	14.0	8.6	5.3
RD- 108	HCP	63.3	400	130	3.0	0.9	14.0	10.2	3.6
RD- 109	HCP	92.5	500	400	3.0	1.1	12.0	7.4	4.4
RD- 110	HCP	96.1	500	400	3.0	1.1	10.0	6.2	3.6
5.2 North Zone									
RD- 203	HCP	19.0	300	380	3.0	0.7	18.0	15.2	2.7
RD- 204	HCP	4.6	200	230	4.0	0.7	18.0	15.6	2.3
RD- 205	HCP	3.2	200	400	3.0	0.6	18.0	15.3	2.6
RD- 206	HCP	7.0	200	320	3.0	0.6	18.0	14.6	3.3
RD- 207	HCP	11.2	200	80	5.0	0.7	18.0	14.2	3.7
RD- 208	HCP	38.3	300	250	3.0	0.7	18.0	13.5	4.4
RD- 209	HCP	46.3	400	330	2.0	0.7	18.0	12.8	5.0
RD- 210	HCP	2.5	200	260	3.0	0.6	16.0	13.7	2.2
RD- 211	HCP	57.1	400	280	2.0	0.7	14.0	12.3	1.6
RD- 212	HCP	60.3	400	850	2.0	0.7	14.0	10.6	3.3
6. Hi-Grade Housing Zone									
HH- 301	VP	1.0	150	330	5.0	0.6	20.0	16.9	3.1
HH- 302	VP	1.0	150	270	5.0	0.6	20.0	17.2	2.8
HH- 303	HCP	3.0	200	290	5.0	0.7	20.0	15.4	4.5
HH- 304	HCP	1.0	150	100	5.0	0.6	19.0	17.0	1.9
HH- 305	HCP	5.3	200	40	5.0	0.7	18.0	15.2	2.7
HH- 306	VP	0.1	150	50	5.0	0.6	18.0	16.3	1.7
HH- 307	HCP	6.3	200	60	5.0	0.7	18.0	14.9	3.0
HH- 308	VP	1.3	150	190	5.0	0.6	19.0	16.6	2.4
HH- 309	VP	1.0	150	130	5.0	0.6	19.0	16.9	2.1
HH- 310	HCP	3.3	200	140	5.0	0.7	19.0	15.9	3.1
HH- 311	HCP	10.1	200	280	5.0	0.7	17.0	13.5	3.4
HH- 312	VP	0.1	150	180	5.0	0.6	17.0	14.6	2.3
HH- 313	VP	0.6	150	180	5.0	0.6	17.0	14.6	2.3
HH- 314	VP	1.9	150	90	5.0	0.6	17.0	14.2	2.8
HH- 315	HCP	2.2	200	400	3.0	0.6	14.0	11.3	2.6
HH- 316	HCP	13.2	300	440	3.0	0.7	14.0	12.2	1.7
HH- 317	HCP	16.1	300	550	3.0	0.7	14.0	9.7	4.2

Table IV-2-9 Hydraulic Design of Drainage Facilities in Phase 1 (Basic Plan) (1/5)

Parameters / Pipe No	Type of Drainage	Accumulated Drainage Area (ha)	Pipe Length in Subject Area (m)	Concentration Time (min)	Rain Fall (mm/hr)	Peak Flow (m3/sec)	Dimensions: Diameter of Pipe (mm)	Dimensions: Width of Channel (mm)	Dimensions: Depth of Channel (mm)	Hydraulic Gradient (1/1000)	Velocity (m/sec)
1. Hi-tech Industry Zone											
1.1 South Zone											
HI- 101	U-Channel	4.2	320	14	136	1.3		800	800	4.0	2.0
HI- 102	U-Channel	5.8	210	17	128	1.6		800	800	10.0	3.2
HI- 103	U-Channel	1.7	140	12	144	0.5		800	800	1.5	1.2
HI- 104	U-Channel	11.7	110	23	114	3.0		1,000	1,000	6.0	2.9
HI- 201	U-Channel	1.7	180	13	142	0.5		600	600	10.0	2.6
HI- 202	U-Channel	3.4	250	16	131	1.0		600	600	13.0	3.0
HI- 203	U-Channel	1.7	220	13	141	0.5		600	600	3.0	1.4
HI- 204	U-Channel	3.4	270	17	129	1.0		600	600	10.0	2.6
HI- 205	U-Channel	1.5	270	14	138	0.5		600	600	10.0	2.6
HI- 206	U-Channel	9.8	170	19	123	2.7		1,000	1,000	6.0	2.9
HI- 207	U-Channel	1.5	200	13	141	0.5		600	600	10.0	2.6
HI- 208	U-Channel	1.3	200	13	141	0.4		400	400	15.0	2.5
HI- 209	U-Channel	13.9	230	16	131	4.1		1,400	1,400	4.0	2.9
HI- 210	U-Channel	15.2	190	19	124	4.2		1,400	1,400	3.0	2.5
HI- 211	U-Channel	1.5	210	13	141	0.5		600	600	2.5	1.3
HI- 212	U-Channel	18.2	150	21	119	4.8		1,400	1,400	3.0	2.5
HI- 213	U-Channel	1.5	480	17	130	0.4		600	600	10.0	2.6
HI- 214	U-Channel	3.0	100	19	122	0.8		600	600	10.0	2.6
HI- 215	U-Channel	25.2	50	21	118	6.6		1,400	1,400	9.0	4.4
HI- 216	U-Channel	1.3	170	12	143	0.4		800	800	12.0	3.5
HI- 301	U-Channel	2.2	350	15	135	0.7		600	600	10.0	2.6
HI- 302	U-Channel	4.4	310	19	123	1.2		800	800	5.0	2.3
HI- 303	U-Channel	2.2	490	17	129	0.6		600	600	10.0	2.6
HI- 304	U-Channel	4.4	300	21	119	1.2		800	800	4.0	2.0
HI- 305	U-Channel	6.6	200	24	113	1.7		1,000	1,000	2.5	1.8
HI- 306	U-Channel	2.0	190	13	142	0.6		800	800	1.5	1.2
HI- 307	U-Channel	4.0	350	18	127	1.1		1,000	1,000	1.5	1.4
HI- 401	U-Channel	1.0	400	16	133	0.3		600	600	10.0	2.6
HI- 402	U-Channel	2.0	370	21	119	0.5		600	600	4.0	1.7
HI- 403	U-Channel	3.0	320	25	110	0.7		800	800	3.0	1.7
HI- 404	U-Channel	4.0	290	29	103	0.9		800	800	2.5	1.6
HI- 405	U-Channel	2.0	250	13	139	0.6		600	600	4.0	1.7
HI- 406	U-Channel	28.0	480	29	103	6.4		1,400	1,400	6.0	3.6
HI- 501	U-Channel	6.0	200	13	141	1.9		1,000	1,000	3.0	2.0
HI- 502	U-Channel	12.0	280	17	130	3.5		1,200	1,200	3.0	2.3
1.1 North Zone											
HI- 701	U-Channel	1.6	300	14	137	0.5		600	600	3.0	1.4
HI- 702	U-Channel	0.1	270	14	138	0.0		400	400	2.0	0.9
HI- 703	U-Channel	1.7	120	16	132	0.5		600	600	15.0	3.2
HI- 801	U-Channel	4.4	130	12	145	1.4		1,000	1,000	3.0	2.0
HI- 802	U-Channel	5.4	130	14	139	1.7		1,000	1,000	3.0	2.0
HI- 803	U-Channel	6.2	200	16	130	1.8		1,000	1,000	3.0	2.0
HI- 804	U-Channel	0.5	100	11	146	0.2		400	400	3.0	1.1
HI- 805	U-Channel	1.0	190	14	137	0.3		600	600	3.0	1.4
HI- 806	U-Channel	0.5	170	12	143	0.2		400	400	3.0	1.1
HI- 807	U-Channel	1.0	120	14	137	0.3		600	600	2.0	1.2
HI- 808	U-Channel	1.3	130	12	145	0.4		600	600	3.0	1.4
HI- 809	U-Channel	9.5	320	21	119	2.5		1,000	1,000	10.0	3.7
HI- 901	U-Channel	5.0	300	14	137	1.5		1,000	1,000	3.0	2.0
HI- 902	U-Channel	10.0	350	19	123	2.7		1,000	1,000	9.0	3.5
HI- 903	U-Channel	2.1	250	13	139	0.6		800	800	1.5	1.2
HI- 904	U-Channel	12.1	200	22	117	3.1		1,000	1,000	10.0	3.7
HI- 905	U-Channel	0.3	250	13	139	0.1		400	400	7.0	1.7
HI- 906	U-Channel	0.6	100	15	135	0.2		400	400	15.0	2.5
HI- 907	U-Channel	0.3	100	11	146	0.1		400	400	15.0	2.5
HI- 908	U-Channel	0.6	250	15	135	0.2		400	400	8.0	1.8
HI- 909	U-Channel	1.2	60	16	132	0.4		600	600	10.0	2.6

(Continued)

Table IV-2-10 Hydraulic Design of Drainage Facilities in Phase 1 (Basic Plan) (2/5)

Parameters / Pipe No	Type of Drainage	Accumulated Drainage Area (ha)	Pipe Length in Subject Area (m)	Concentration Time (min)	Rain Fall (mm/hr)	Peak Flow (m3/sec)	Dimensions: Diameter of Pipe (mm)	Dimensions: Width of Channel (mm)	Dimensions: Depth of Channel (mm)	Hydraulic Gradient (1/1000)	Velocity (m/sec)
2. New Town Zone											
2.1 North Zone											
NT- 101	HCP	0.9	100	11	146	0.3	600			5.0	1.5
NT- 102	HCP	0.9	100	11	146	0.3	600			5.0	1.5
NT- 103	HCP	2.8	50	12	144	0.9	800			17.0	3.4
NT- 104	HCP	0.9	140	12	144	0.3	600			15.0	2.7
NT- 105	HCP	4.7	120	16	132	1.4	800			10.0	2.6
NT- 106	HCP	0.9	230	13	140	0.3	600			7.0	1.8
NT- 107	HCP	0.9	80	11	147	0.3	600			15.0	2.7
NT- 108	HCP	2.8	110	15	135	0.8	800			12.0	2.9
NT- 109	HCP	0.9	200	13	141	0.3	600			15.0	2.7
NT- 110	HCP	0.9	90	11	147	0.3	600			8.0	1.9
NT- 111	HCP	2.8	70	14	138	0.9	800			5.0	1.9
NT- 112	HCP	12.2	100	17	128	3.5	1,200			10.0	3.4
NT- 113	HCP	0.9	240	13	140	0.3	600			12.0	2.4
NT- 114	HCP	26.5	200	25	111	6.5	1,600			8.0	3.7
NT- 115	HCP	28.4	130	26	108	6.8	1,600			8.0	3.7
NT- 116	HCP	41.5	170	29	104	9.6	1,800			8.0	4.0
NT- 117	HCP	68.7	320	33	96	14.7	2,200			8.0	4.6
2.2 West Zone											
NT- 201	HCP	0.7	90	11	147	0.2	600			5.0	1.5
NT- 202	HCP	1.5	150	13	140	0.5	600			5.0	1.5
NT- 203	HCP	0.7	120	12	145	0.2	600			5.0	1.5
NT- 204	HCP	0.7	55	11	149	0.2	600			10.0	2.2
NT- 205	HCP	3.6	45	14	138	1.1	1,000			7.0	2.6
NT- 206	HCP	0.7	80	11	147	0.2	600			6.0	1.7
NT- 207	HCP	5.1	110	15	133	1.5	1,000			5.0	2.2
NT- 208	HCP	0.7	110	12	146	0.2	600			5.0	1.5
NT- 209	HCP	6.5	115	17	128	1.9	1,000			8.0	2.7
NT- 210	HCP	0.7	150	12	144	0.2	600			5.0	1.5
NT- 211	HCP	0.7	50	11	149	0.2	600			10.0	2.2
NT- 212	HCP	2.2	155	14	137	0.7	800			7.0	2.2
NT- 213	HCP	0.7	50	11	149	0.2	600			10.0	2.2
NT- 214	HCP	0.7	55	11	149	0.2	600			10.0	2.2
NT- 215	HCP	2.2	60	12	146	0.7	800			15.0	3.2
NT- 216	HCP	0.7	240	13	140	0.2	600			11.0	2.3
NT- 217	HCP	3.6	50	14	137	1.1	800			15.0	3.2
NT- 218	HCP	0.7	235	13	140	0.2	600			15.0	2.7
NT- 219	HCP	5.1	40	15	136	1.5	1,000			5.0	2.2
NT- 220	HCP	17.6	220	25	109	4.3	1,600			5.0	3.0
NT- 221	HCP	20.5	95	27	107	4.9	1,600			7.0	5.0
NT- 222	HCP	26.3	165	29	103	6.0	1,600			5.0	5.0
2.3 South Zone											
NT- 301	HCP	0.6	40	11	149	0.2	600			15.0	2.7
NT- 302	HCP	0.6	130	12	145	0.2	600			12.0	2.4
NT- 303	HCP	1.9	55	13	142	0.6	800			5.0	1.9
NT- 304	HCP	0.6	160	12	143	0.2	600			5.0	1.5
NT- 305	HCP	3.2	40	13	140	1.0	1,000			5.0	2.2
NT- 306	HCP	0.6	145	12	144	0.2	600			10.0	2.2
NT- 307	HCP	0.6	190	13	142	0.2	600			5.0	1.5
NT- 308	HCP	4.5	50	14	138	1.4	1,000			5.0	2.2
NT- 309	HCP	5.8	50	17	128	1.6	1,000			6.0	2.4
NT- 310	HCP	0.6	80	11	147	0.2	600			7.0	1.8
NT- 311	HCP	7.1	120	20	121	1.9	1,000			15.0	3.7
NT- 312	HCP	0.6	110	12	146	0.2	600			5.0	1.5
NT- 313	HCP	10.3	75	22	116	2.6	1,400			3.0	2.1
NT- 314	HCP	0.6	140	12	144	0.2	600			5.0	1.5

(Continued)

Table IV-2-11 Hydraulic Design of Drainage Facilities in Phase 1 (Basic Plan) (3/5)

Parameters / Pipe No	Type of Drainage	Accumulated Drainage Area	Pipe Length in Subject Area	Concentration Time	Rain Fall	Peak Flow	Dimensions			Hydraulic Gradient	Velocity
							Diameter of Pipe	Width of Channel	Depth of Channel		
		(ha)	(m)	(min)	(mm/hr)	(m3/sec)	(mm)	(mm)	(mm)	(1/1000)	(m/sec)
NT- 315	HCP	0.6	130	12	145	0.2	600			12.0	2.4
NT- 316	HCP	0.6	190	13	142	0.2	600			8.0	1.9
NT- 317	HCP	1.9	45	13	140	0.6	800			5.0	1.9
NT- 318	HCP	9.0	80	21	119	2.4	1,200			5.0	2.4
NT- 319	HCP	0.6	195	13	142	0.2	600			8.0	1.9
NT- 320	HCP	0.6	180	13	142	0.2	600			10.0	2.2
NT- 321	HCP	0.6	60	11	148	0.2	600			8.0	1.9
NT- 322	HCP	2.6	170	15	134	0.8	800			10.0	2.6
NT- 323	HCP	0.6	70	11	148	0.2	600			8.0	1.9
NT- 324	HCP	3.9	50	16	132	1.1	800			5.0	1.5
NT- 325	HCP	0.6	100	11	146	0.2	600			5.0	1.5
NT- 326	HCP	5.1	30	18	127	1.5	800			5.0	1.5
NT- 327	HCP	0.6	110	12	146	0.2	600			5.0	1.5
NT- 328	HCP	6.4	160	20	121	1.7	1,200			3.0	1.9
NT- 329	HCP	9.6	30	21	118	2.5	1,400			3.0	2.1
2.4 East Zone											
NT- 401	HCP	0.6	140	12	144	0.2	600			12.0	2.4
NT- 402	HCP	0.6	110	12	146	0.2	600			5.0	1.5
NT- 403	HCP	1.7	140	14	138	0.5	800			11.0	2.8
NT- 404	HCP	0.6	85	11	147	0.2	600			6.0	1.7
NT- 405	HCP	0.6	120	12	145	0.2	600			5.0	1.5
NT- 406	HCP	1.1	50	12	145	0.4	600			15.0	2.7
NT- 407	HCP	2.3	55	13	142	0.7	800			5.0	1.9
NT- 408	HCP	0.6	100	11	146	0.2	600			5.0	1.5
NT- 409	HCP	0.6	90	11	147	0.2	600			5.0	1.5
NT- 410	HCP	0.6	90	11	147	0.2	600			5.0	1.5
NT- 411	HCP	1.7	65	12	144	0.5	600			15.0	2.7
NT- 412	HCP	3.4	50	13	140	1.1	1,000			3.0	1.7
NT- 413	HCP	5.7	60	14	137	1.7	1,000			15.0	3.7
NT- 414	HCP	8.0	80	15	134	2.4	1,200			5.0	2.4
NT- 415	HCP	0.6	240	13	140	0.2	600			3.0	1.2
NT- 416	HCP	9.1	80	16	130	2.6	1,400			15.0	4.7
NT- 417	HCP	0.6	60	11	148	0.2	600			8.0	1.9
NT- 418	HCP	1.1	50	12	146	0.4	600			5.0	1.5
NT- 419	HCP	2.3	120	13	140	0.7	800			5.0	1.9
NT- 420	HCP	11.9	50	17	128	3.4	1,400			5.0	2.7
NT- 421	HCP	0.6	95	11	147	0.2	600			5.0	1.5
NT- 422	HCP	13.1	45	18	127	3.7	1,600			3.0	2.3
NT- 423	HCP	0.6	130	12	145	0.2	600			5.0	1.5
NT- 424	HCP	12.5	185	22	117	3.2	1,400			4.0	2.4
NT- 425	HCP	0.6	90	11	147	0.2	400			15.0	2.0
NT- 426	HCP	1.1	100	13	142	0.4	600			5.0	1.5
NT- 427	HCP	0.6	140	12	144	0.2	400			10.0	1.7
NT- 428	HCP	1.1	50	13	142	0.4	600			15.0	2.7
NT- 429	HCP	0.6	110	12	146	0.2	600			5.0	1.5
NT- 430	HCP	2.3	35	13	140	0.7	800			15.0	3.2
NT- 431	HCP	4.0	50	14	138	1.2	800			15.0	3.2
NT- 432	HCP	0.6	125	12	145	0.2	600			5.0	1.5
NT- 433	HCP	5.1	95	15	134	1.5	1,000			5.0	2.2
NT- 434	HCP	0.6	180	13	142	0.2	600			3.0	1.2
NT- 435	HCP	0.6	110	12	146	0.2	600			5.0	1.5
NT- 436	HCP	1.7	45	13	140	0.5	800			3.0	1.4
NT- 437	HCP	0.6	115	12	146	0.2	600			5.0	1.5
NT- 438	HCP	2.8	45	14	138	0.9	1,000			5.0	2.2
NT- 439	HCP	0.6	180	13	142	0.2	600			3.0	1.2
NT- 440	HCP	9.1	90	16	130	2.6	1,400			5.0	2.7
NT- 441	HCP	0.6	145	12	144	0.2	600			5.0	1.5

(Continued)

Table IV-2-12 Hydraulic Design of Drainage Facilities in Phase 1 (Basic Plan) (4/5)

Parameters / Pipe No	Type of Drainage	Accumulated Drainage Area	Pipe Length in Subject Area	Concentration Time	Rain Fall	Peak Flow	Dimensions			Hydraulic Gradient	Velocity
							Diameter of Pipe	Width of Channel	Depth of Channel		
		(ha)	(m)	(min)	(mm/hr)	(m3/sec)	(mm)	(mm)	(mm)	(1/1000)	(m/sec)
NT- 442	HCP	10.2	45	17	129	2.9	1,600			5.0	3.0
NT- 443	HCP	0.6	115	12	146	0.2	800			5.0	1.5
NT- 444	HCP	11.4	155	19	123	3.1	1,400			5.0	2.7
3. Urban/Buisiness Zone											
UB- 501	HCP	1.5	315	14	136	0.5	800			5.0	1.9
UB- 502	HCP	3.5	320	19	124	1.0	1,000			4.0	1.9
UB- 503	HCP	1.8	220	13	141	0.6	800			3.0	1.4
UB- 504	HCP	7.3	190	21	118	1.9	1,200			7.0	2.9
UB- 505	HCP	9.3	185	24	112	2.3	1,200			15.0	4.2
UB- 506	HCP	2.0	180	13	142	0.6	600			11.0	2.3
UB- 507	HCP	11.3	40	25	111	2.8	1,200			10.0	3.4
UB- 601	HCP	1.5	190	13	142	0.5	600			10.0	2.2
UB- 602	HCP	3.0	110	14	137	0.9	800			10.0	2.6
UB- 603	HCP	1.5	230	13	140	0.5	600			8.0	1.9
UB- 604	HCP	4.5	30	15	136	1.4	1,000			10.0	3.1
4. HHTP Center Zone											
HC- 101	U-Channel	1.0	190	13	142	0.3		600	600	2.0	1.2
HC- 102	U-Channel	1.5	160	15	135	0.4		600	600	10.0	2.6
HC- 103	U-Channel	1.5	290	14	137	0.5		600	600	2.0	1.2
HC- 104	U-Channel	3.0	40	15	133	0.9		800	800	15.0	3.9
HC- 201	U-Channel	2.5	340	15	135	0.8		800	800	2.0	1.4
HC- 202	U-Channel	6.0	260	18	125	1.7		800	800	15.0	3.9
HC- 203	U-Channel	6.0	20	19	124	1.7		800	800	15.0	3.9
HC- 301	U-Channel	2.5	260	14	139	0.8		600	600	8.0	2.4
HC- 302	U-Channel	3.5	260	14	139	1.1		800	800	9.0	3.0
HC- 303	U-Channel	6.0	50	14	136	1.8		800	800	15.0	3.9
HC- 401	U-Channel	2.5	280	14	138	0.8		600	600	15.0	3.2
HC- 402	U-Channel	5.0	200	17	130	1.4		800	800	5.0	2.3
HC- 403	U-Channel	7.5	30	17	128	2.1		800	800	15.0	3.9
HC- 501	U-Channel	5.0	310	14	136	1.5		1,000	1,000	3.0	2.0
HC- 502	U-Channel	0.5	165	12	143	0.2		400	400	3.0	1.1
HC- 503	U-Channel	5.5	20	15	136	1.7		1,000	1,000	10.0	3.7
HC- 601	U-Channel	5.0	330	15	136	1.5		800	800	6.0	2.5
HC- 602	U-Channel	5.5	145	17	130	1.6		800	800	8.0	2.9
HC- 603	U-Channel	5.5	20	17	129	1.6		800	800	15.0	3.9
5. R & D Zone											
5.1 South Zone											
RD- 101	U-Channel	0.4	230	13	140	0.1		300	300	9.0	1.6
RD- 102	U-Channel	0.9	260	17	129	0.3		400	400	8.0	1.8
RD- 103	U-Channel	0.9	90	18	126	0.3		400	400	10.0	2.0
RD- 104	U-Channel	4.7	220	13	141	1.5		800	800	10.0	3.2
RD- 105	U-Channel	9.5	270	17	129	2.7		1,000	1,000	8.0	3.3
RD- 106	U-Channel	14.3	250	20	120	3.8		1,200	1,200	10.0	4.2
RD- 107	U-Channel	0.5	320	14	136	0.2		400	400	4.0	1.3
RD- 108	U-Channel	1.0	320	19	124	0.3		600	600	6.0	2.0
RD- 109	U-Channel	1.0	20	19	123	0.3		600	600	15.0	3.2
RD- 110	U-Channel	5.0	320	14	136	1.5		800	800	6.0	2.5
RD- 111	U-Channel	7.1	300	19	124	2.0		1,000	1,000	5.0	2.6
RD- 112	U-Channel	9.2	170	21	119	2.4		1,000	1,000	15.0	4.5
RD- 113	U-Channel	0.5	330	15	136	0.2		400	400	3.0	1.1
RD- 114	U-Channel	0.8	170	17	129	0.2		400	400	7.0	1.7
RD- 115	U-Channel	1.0	110	18	125	0.3		400	400	10.0	2.0
RD- 116	U-Channel	0.5	190	13	142	0.2		400	400	3.0	1.1
RD- 117	U-Channel	0.5	50	13	140	0.2		400	400	3.0	1.1
RD- 118	U-Channel	5.8	330	15	136	1.7		1,000	1,000	5.0	2.6
RD- 119	U-Channel	8.0	210	18	127	2.3		1,000	1,000	5.0	2.6
RD- 120	U-Channel	8.0	30	18	126	2.2		1,000	1,000	10.0	3.7

(Continued)

Table IV-2-13 Hydraulic Design of Drainage Facilities in Phase 1 (Basic Plan) (5/5)

Parameters / Pipe No	Type of Drainage	Accumulated Drainage Area (ha)	Pipe Length in Subject Area (m)	Concentration Time (min)	Rain Fall (mm/hr)	Peak Flow (m3/sec)	Dimensions: Diameter of Pipe (mm)	Dimensions: Width of Channel (mm)	Dimensions: Depth of Channel (mm)	Hydrailic Gradient (1/1000)	Velocity (m/sec)
5.1 North Zone											
RD- 201	U-Channel	0.5	340	15	135	0.2		600	600	1.5	1.0
RD- 202	U-Channel	1.0	290	19	124	0.3		800	800	1.5	1.2
RD- 203	U-Channel	1.0	210	22	117	0.3		800	800	10.0	3.2
RD- 204	U-Channel	5.0	190	13	142	1.6		1,000	1,000	3.0	2.0
RD- 205	U-Channel	10.0	190	15	134	3.0		1,000	1,000	3.0	2.0
RD- 206	U-Channel	1.0	180	13	142	0.3		600	600	2.0	1.2
RD- 207	U-Channel	2.0	190	15	134	0.6		800	800	2.0	1.4
RD- 208	U-Channel	2.0	140	17	128	0.6		800	800	10.0	3.2
RD- 209	U-Channel	0.5	210	13	141	0.2		400	400	3.0	1.1
RD- 210	U-Channel	1.0	260	17	130	0.3		400	400	9.0	1.9
RD- 211	U-Channel	4.0	290	14	137	1.2		800	800	7.0	2.7
RD- 212	U-Channel	8.0	200	17	129	2.3		1,000	1,000	6.0	2.9
RD- 213	U-Channel	12.0	300	21	119	3.2		1,200	1,200	4.0	2.6
RD- 214	U-Channel	12.0	30	21	118	3.1		1,200	1,200	10.0	4.2
RD- 215	U-Channel	0.5	270	14	138	0.2		600	600	2.0	1.2
RD- 216	U-Channel	1.0	360	19	124	0.3		600	600	2.0	1.2
RD- 217	U-Channel	1.0	60	20	122	0.3		600	600	2.0	1.2
RD- 218	U-Channel	5.3	190	13	142	1.7		1,000	1,000	3.0	2.0
RD- 219	U-Channel	5.3	70	14	139	1.6		1,000	1,000	10.0	3.7
RD- 220	U-Channel	1.6	260	14	139	0.5		600	600	3.0	1.4
RD- 221	U-Channel	2.6	220	17	130	0.7		800	800	2.0	1.4
RD- 222	U-Channel	7.1	50	17	128	2.0		1,000	1,000	10.0	3.7
RD- 223	U-Channel	1.5	300	14	137	0.5		600	600	3.0	1.4
RD- 224	U-Channel	3.0	290	14	137	0.9		800	800	3.0	1.7
RD- 225	U-Channel	7.0	260	14	139	2.2		1,000	1,000	5.0	2.6
RD- 226	U-Channel	7.0	70	15	136	2.1		1,000	1,000	5.0	2.6
RD- 227	U-Channel	3.0	320	14	136	0.9		800	800	3.0	1.7
RD- 228	U-Channel	6.0	280	18	125	1.7		1,000	1,000	5.0	2.6
RD- 229	U-Channel	6.0	40	19	124	1.6		1,000	1,000	10.0	3.7
RD- 230	U-Channel	1.0	100	18	126	0.3		400	400	9.0	1.9
6. Hi-Grade Housing Zone											
HH- 101	HCP	1.5	190	13	142	0.5	800			3.0	1.4
HH- 102	HCP	3.0	250	16	131	0.9	800			5.0	1.9
HH- 103	HCP	4.5	140	18	126	1.3	1,000			4.0	1.9
HH- 104	HCP	1.5	210	13	141	0.5	800			3.0	1.4
HH- 105	HCP	3.0	190	16	133	0.9	1,000			3.0	1.7
HH- 106	HCP	7.5	80	19	123	2.0	1,200			10.0	3.4
HH- 201	HCP	1.8	240	13	140	0.6	800			5.0	1.9
HH- 202	HCP	3.6	285	17	128	1.0	1,000			4.0	1.9
HH- 203	HCP	5.4	90	19	125	1.5	1,000			5.0	2.2
HH- 204	HCP	1.8	255	14	139	0.6	800			5.0	1.9
HH- 205	HCP	3.6	280	17	127	1.0	1,000			5.0	2.2
HH- 206	HCP	9.0	120	20	120	2.4	1,000			12.0	3.3
HH- 301	HCP	1.3	240	13	140	0.4	600			5.0	1.5
HH- 302	HCP	1.3	90	11	147	0.4	600			6.0	1.7
HH- 303	HCP	3.9	65	14	137	1.2	1,000			3.0	1.7
HH- 304	HCP	1.3	240	13	140	0.4	800			3.0	1.4
HH- 305	HCP	5.2	0	14	137	1.6	1,000			10.0	3.1

Table IV-2-14 Building Coverage Ratio (BCR) (1/2)

(Less than 500 m² of Building Area)

Building Area (m²)	<50m²	50~100	100~200	200~300	300~400	400~500
Maximum BCR (%)	100	90	80	70	60	50

Source: MOC

Table IV-2-15 Building Coverage Ratio (BCR) and Floor Area Ratio (FAR)(2/2)

(More than 500 m² of Building Area)

Nos. of Floors	Maximum BCR (%)	Maximum FAR (%)
1	70	70
2	60	120
3	53	159
4	47	188
5	40	200
6	39	234
7	36	252
8	33	254
9	31	270
10	28	280
11	26	286
12	24	288
13	22	290
14	21	294
~15	20	300~500

Source: MOC

LOCATION: HANOI HIGH - TECH PARK

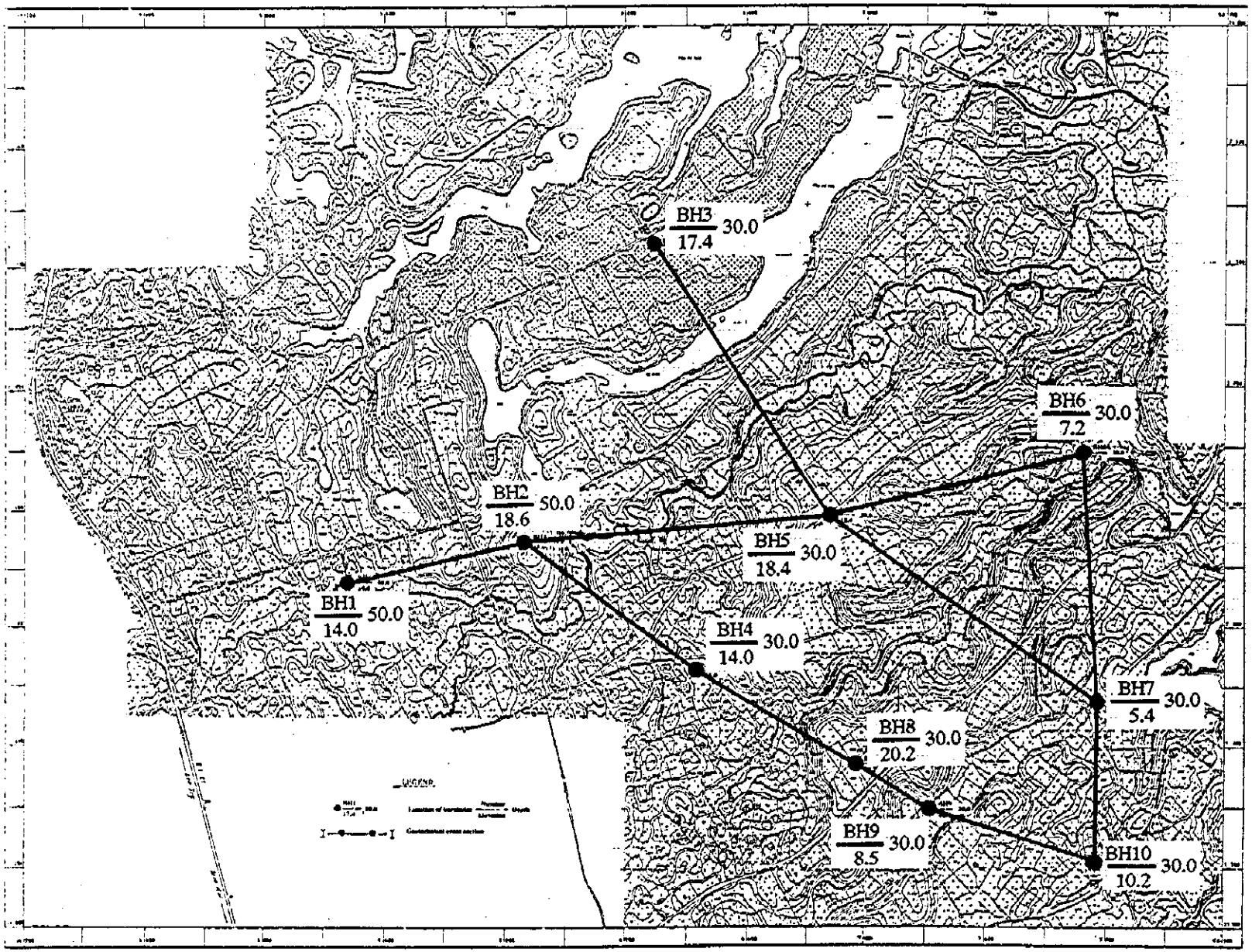


Figure IV-1-1 Sketch of Position of Investigational Borehole

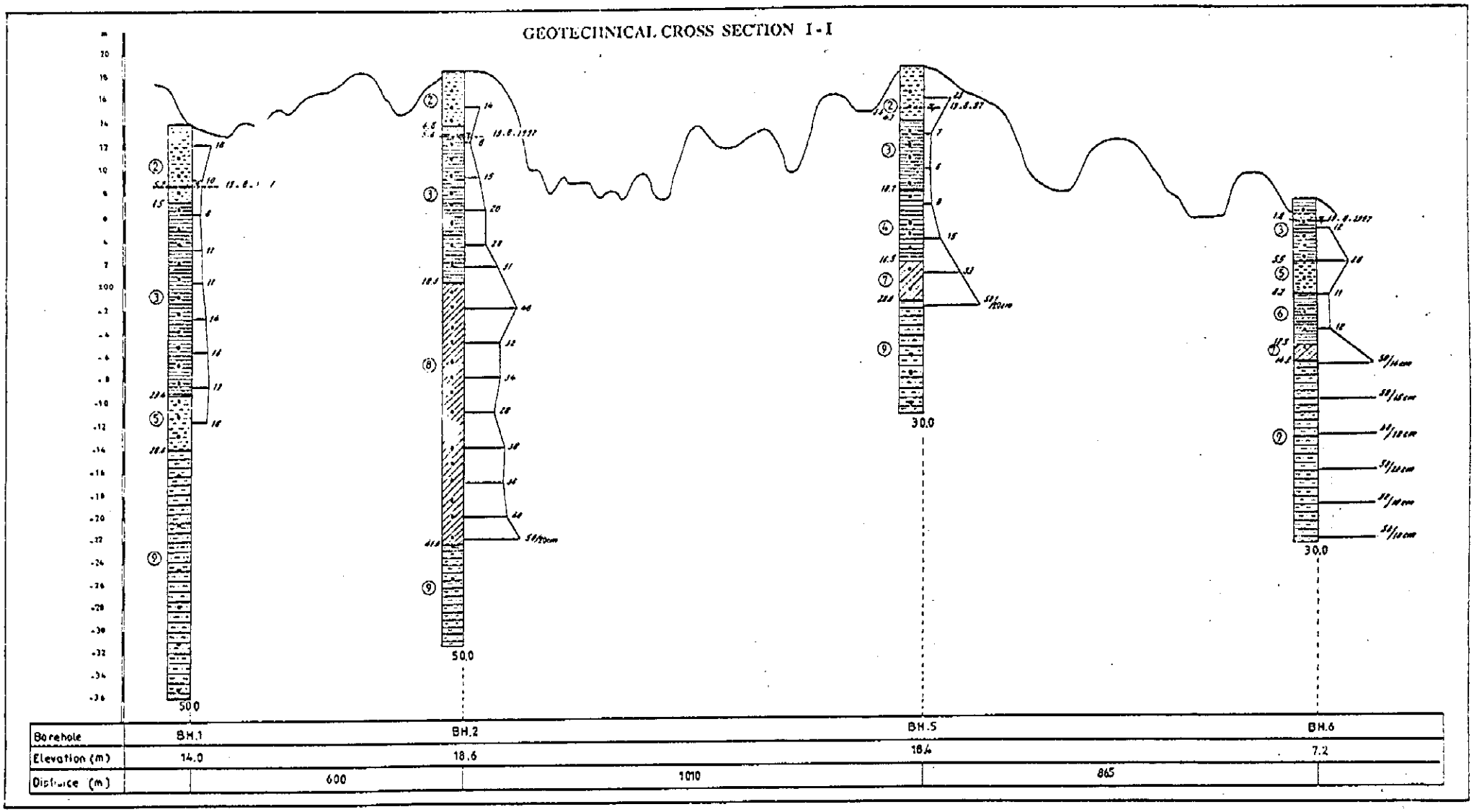


Figure IV-1-2 Results of Geotechnical Investigation (1/17)

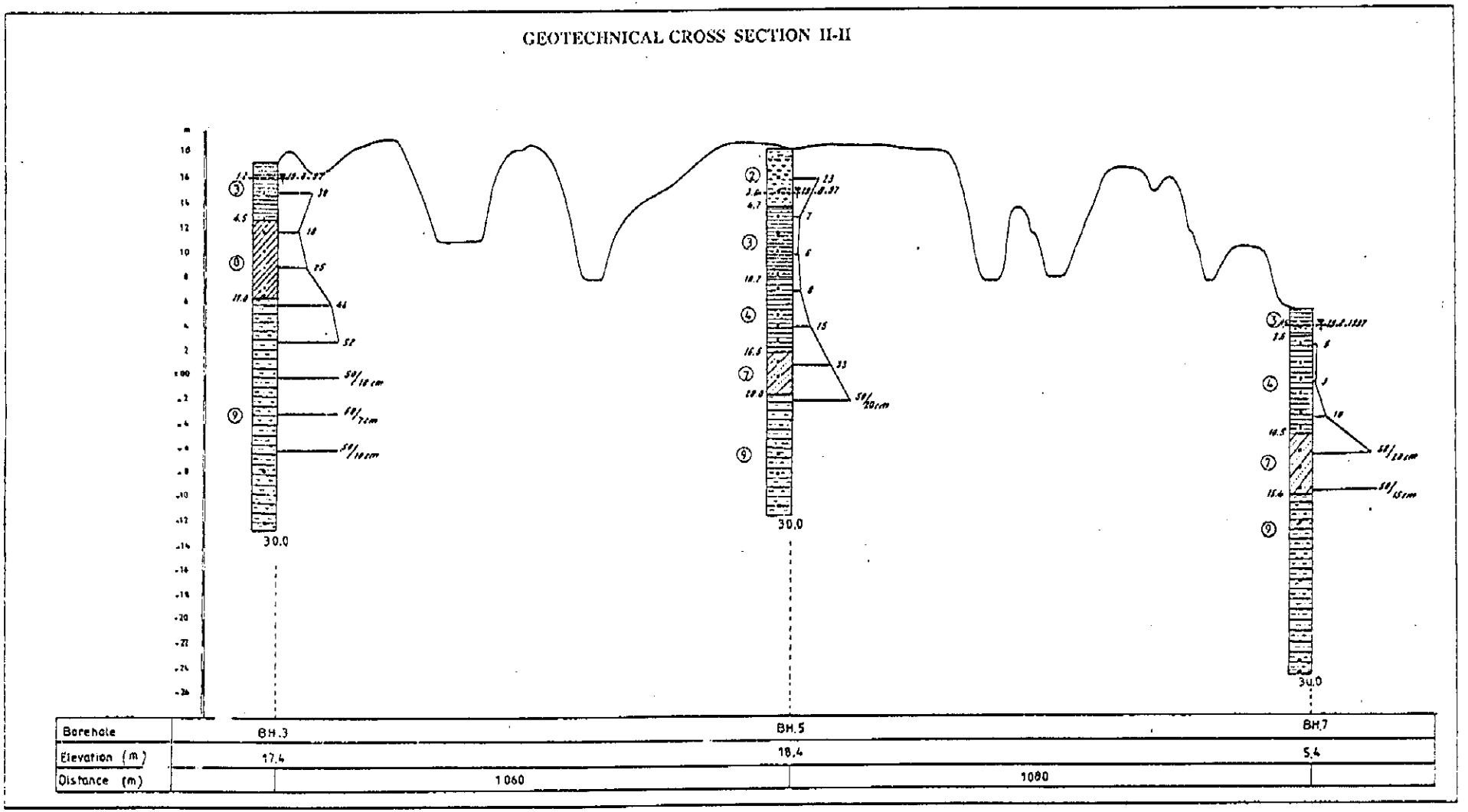


Figure IV-1-3 Results of Geotechnical Investigation (2/17)

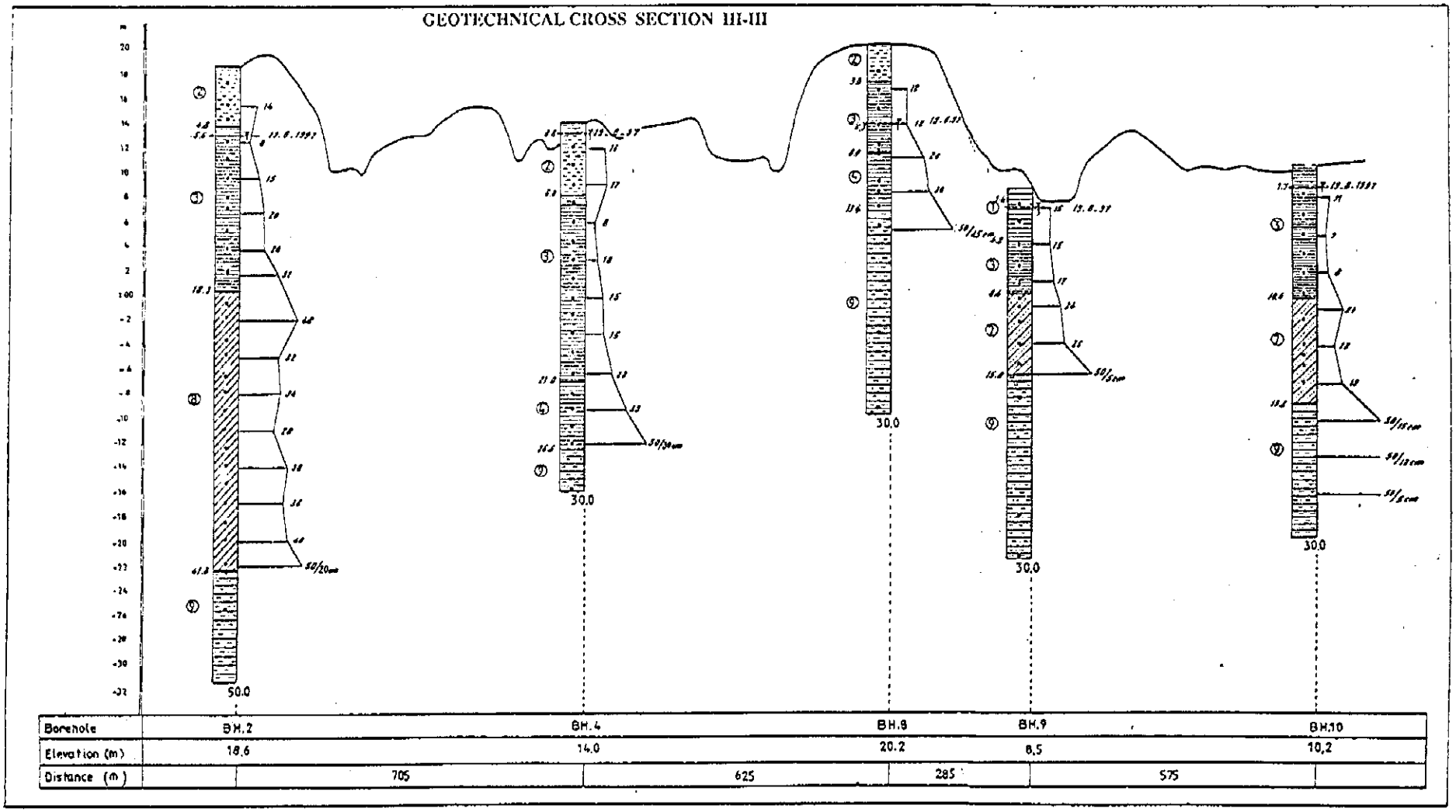


Figure IV-1-4 Results of Geotechnical Investigation (3/17)

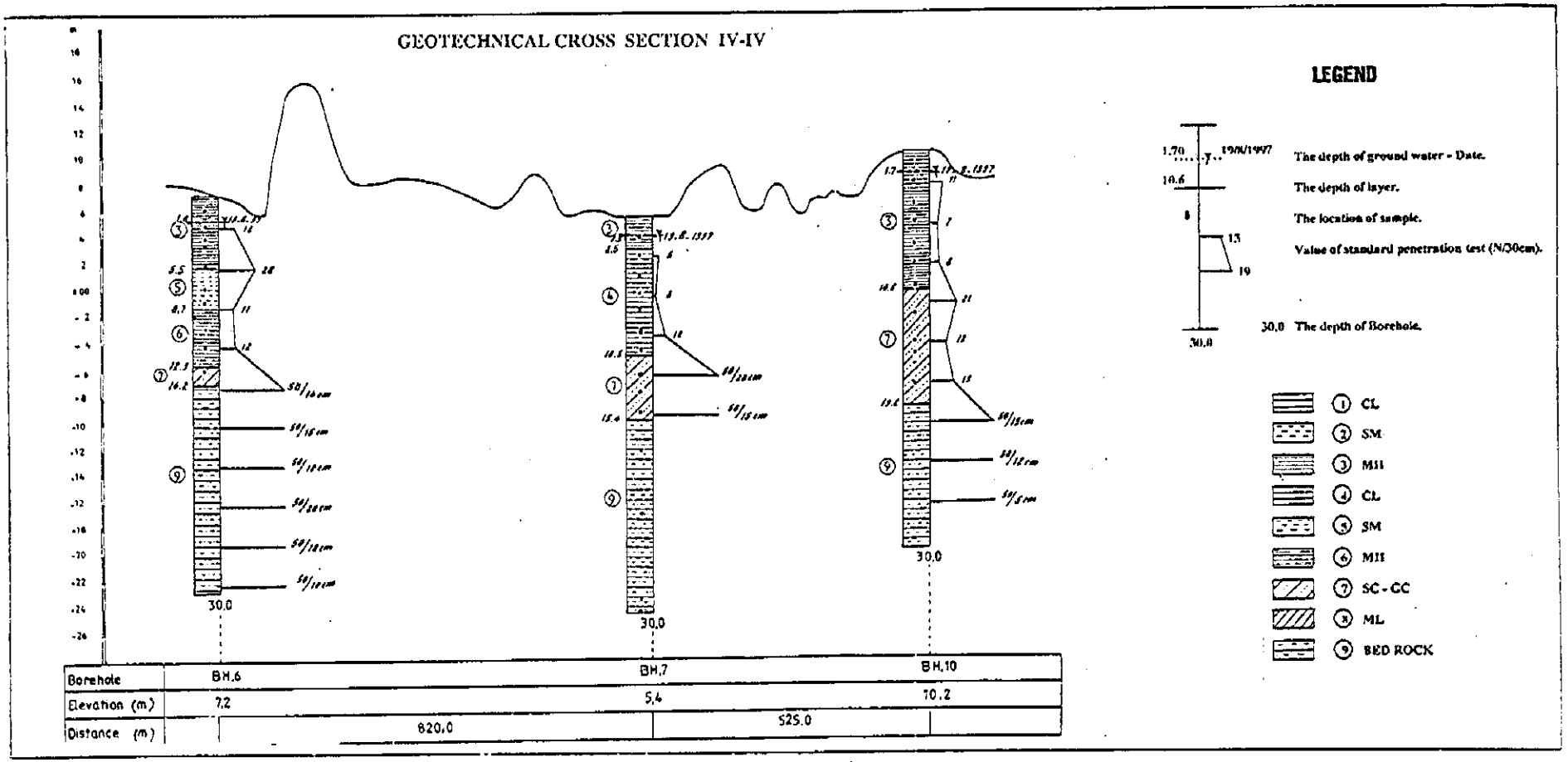


Figure IV-1-5 Results of Geotechnical Investigation (4/17)

BOREHOLE LOG

Project:	HaNoi High-Tech Park	Location:	HoaLac, ThachThat, HaTay
Borehole Number:	BH1	Drilling equipment:	UGB - 50M
Depth (m):	50.0	Scale:	1/200
Elevation (m):	14.0	Water level (m):	5.2
Commenced:	14/8/97	Finished:	19/8/97
Described by:	Eng. Geo. Pham Anh Tuan	Checked by:	Eng. Geo. Nguyen Xuan Hien

Scale bar (m)	Depth (m) From	Depth (m) To	Thickness (m)	DESCRIPTION OF SOIL AND ROCK	Log	Depth of sample (m)	Standar Penetration Test - S.P.T Depth (m)	Blows/10cm	Graphic N-value curve 10 20 30 40 50
2							1.70-2.15	6-6-6	18
4			6.5	Yellowish grey, yellowish brown, redish brown, CLAY (SM), occasionalli Sandy CLAY, stiff to firm, contains gravely sand.		3.0-3.2 4.5-4.7	4.70-5.15	3-3-4	10
6	0.0	6.5				6.0-6.2			
8						7.5-7.7	7.70-8.15	1-3-4	8
10						9.0-9.2 10.5-10.7	10.7-11.15	3-4-4	11
12						12.0-12.2			
14			16.9	Redish brown, light grey, mottled, CLAY, occasionalli Silty CLAY, firm to stiff, bottom of layer: mixed gravel of quatrz (MH).		13.5-13.7	13.7-14.15	3-4-4	11
16						15.0-15.2 16.5-16.7	16.7-17.15	4-5-5	14
18						18.0-18.2			
20						19.5-19.7	19.7-20.15	5-5-6	16
22	6.5	23.4				21.0-21.2 22.5-22.7	22.7-23.15	4-6-7	17
24						24.0-24.2			
26			4.6	Yellowish grey, yellowish brown, redish brown CLAY, occasionalli sandy CLAY, firm, contains gravely sand (SM).		25.5-25.7	25.7-26.15	4-6-6	16
28	23.4	28.0				27.0-27.2			
30						30.0-30.2			
32			22.0	BED ROCK: Greenish grey, dark-grey, Thick layer of LIMESTONE, weak weathered, the very cracking, very hard.					
34						34.5-34.7			
36									

Figure IV-1-6 Results of Geotechnical Investigation (5/17)

BOREHOLE LOG

Project:	HaNoi High-Tech Park	Location:	HoaLac, ThachThat, HaTay
Borehole Number:	BH1	Drilling equipment:	UGB - 50M
Depth (m):	50.0	Scale:	1/200
Elevation (m):	14.0	Water level (m):	5.2
Commenced:	14/8/97	Finished:	19/8/97
Described by:	Eng. Geo. Pham Anh Tuan	Checked by:	Eng. Geo. Nguyen Xuan Hien

Scale bar (m)	Depth (m) From	Depth (m) To	Thickness (m)	DESCRIPTION OF SOIL AND ROCK	Log	Depth of sample (m)	Standar Penetration Test - S.P.T Depth (m)	Blows/10cm	Graphic N-value curve 10 20 30 40 50
36						34.5-34.7			
38						38.5-38.7			
40									
42			22.0	BED ROCK: Greenish grey, dark-grey, LIMESTONE, weak weathered, the very cracking, very hard.		41.5-41.7			
44									
46						45.0-45.2			
48									
50	28.0	50.0				49.0-49.2			
52									
54									
56									
58									
60									

Figure IV-1-7 Results of Geotechnical Investigation (6/17)

BOREHOLE LOG

Project:	HaNoi High-Tech Park	Location:	HoaLac, ThachThat, HaTay
Borehole Number:	BH2	Drilling equipment:	UKB - 500C
Depth (m):	50.0	Scale:	1/200
Elevation (m):	18.6	Water level (m):	5.6
Commenced:	10/8/1997	Finished:	12/8/1997
Described by:	Eng. Geo. Nguyen Viet Cuong	Checked by:	Eng. Geo. Nguyen Xuan Hien

Scale bar (m)	Depth (m) From	Depth (m) To	Thickness (m)	DESCRIPTION OF SOIL AND ROCK	Log	Depth of sample (m)	Standar Penetration Test - S.P.T Depth (m)	Blows/10cm	Graphic N-value curve 10 20 30 40 50
2						1.3-1.5			
4			4.8	Yellowish grey, yellowish brown, redish brown CLAY, occasionalli sandy CLAY, firm, contains gravely sand (SM).		3.0-3.2	3.2-3.65	4-4-6	14
	0.0	4.8				4.0-4.2			
6						6.0-6.2	6.2-6.65	2-3-3	8
8						7.5-7.7			
10						9.0-9.2	9.2-9.65	5-4-6	15
12			13.5	Redish brown, light grey, mottled CLAY, occasionalli silty CLAY, firm to stiff (MH).		10.5-10.7 11.3-11.5	12.0-12.45	6-6-8	20
14						13.0-13.2 14.8-15.0	15.0-15.45	7-6-7	20
16						16.5-16.7 16.7-16.9	16.9-17.35	10-11-10	31
18	4.8	18.3							
20						19.0-19.2 20.5-20.7	20.7-21.15	12-17-19	48
22						22.0-22.2			
24						23.0-23.7 25.0-25.2	23.7-24.15	10-11-11	32
26			22.7	Grey, milky grey, Silty CLAY (ML), occasionalty CLAY, hard, mixed slabs and cobbles of strongly weathered siltstone.		26.4-26.6 27.8-28.0	26.6-27.05	11-9-14	34
28						29.4-29.6 30.5-30.7	29.6-30.05	10-9-9	28
30									
32						32.0-32.2 33.5-33.7	32.6-33.05	12-12-14	38
34									
36						35.4-35.6	35.6-36.05	10-12-14	36

Figure IV-1-8 Results of Geotechnical Investigation (7/17)

BOREHOLE LOG

Project:	HaNoi High-Tech Park	Location:	HoaLac, ThachThat, HaTay
Borehole Number:	BH2	Drilling equipment:	UKB - 500C
Depth (m):	50.0	Scale:	1/200
Elevation (m):	18.6	Water level (m):	5.6
Commenced:	10/8/1997	Finished:	12/8/1997
Described by:	Eng. Geo. Nguyen Viet Cuong	Checked by:	Eng. Geo. Nguyen Xuan Hien

Scale bar (m)	Depth (m) From	Depth (m) To	Thickness (m)	DESCRIPTION OF SOIL AND ROCK	Log	Depth of sample (m)	Standar Penetration Test - S.P.T Depth (m)	Blows/10cm	Graphic N-value curve 10 20 30 40 50
36						35.4-35.6	35.6-36.05	10-12-14	36
38			22.7	Grey, milky grey Silty CLAY (ML), occasionally CLAY, hard, mixed slabs and cobbles of strongly weathered siltstone.		38.8-37.0			
						38.5-38.7	38.7-39.15	13-14-13	40
40	18.3	41.0				40.4-40.6	40.8-41.0	50/20cm	
42						41.0-41.2			>50
44						43.0-43.2			
46			9.0	Dark-grey, dark-blue, thin layer of SILTSTONE, weak weathered, the very cracking, very hard.					
48									
50	42.5	50.0							
52									
54									
56									
58									
60									

Figure IV-1-9 Results of Geotechnical Investigation (8/17)

BOREHOLE LOG

Project:	HaNoi High-Tech Park	Location:	HoaLac, ThachThat, HaTay
Borehole Number:	BH3	Drilling equipment:	UGB - 50M
Depth (m):	30.0	Scale:	1/200
Elevation (m):	17.4	Water level (m):	1.2
Commenced:	09/8/1997	Finished:	10/8/1997
Described by:	Eng. Geo. Phan Viet Hue	Checked by:	Eng. Geo. Nguyen Xuan Hien

Scale bar (m)	Depth (m) From	Depth (m) To	Thickness (m)	DESCRIPTION OF SOIL AND ROCK	Log	Depth of sample (m)	Standar Penetration Test - S.P.T Depth (m)	Blows/10cm	Graphic N-value curve 10 20 30 40 50
2			4.5	Brownish grey, yellowish grey, CLAY (MH), hard, mixed with brown laterite clods.		2.3-2.5	2.5-2.95	10-10-10	30
4	0.0	4.5				4.3-4.5			
6						5.3-5.5	5.5-5.95	5-6-7	18
8			6.5	Mottled, pinkish brown, brownish red, brownish yellow, Silty CLAY (ML), mixed brown lateritic gravel.		6.8-7.0			
10	4.5	11.0				8.3-8.5	8.5-8.95	8-8-9	25
12						9.8-10.0			
14						10.8-11.0	11.5-11.95	12-15-19	46
16							14.5-14.95	17-17-18	52
18							16.5-16.68	50/18cm	>50
20			9.0	Dark-grey, dark-blue, Thin layer of SILTSTONE mixed coal, on the top of layer: the very cracking, strongly weathered.			19.5-19.57	50/7cm	>50
22									
24							23.5-23.6	50/10cm	>50
26						25.0-25.2			
28									
30	11.0	30.0				29.3-29.5			
32									
34									
36									

Figure IV-1-10 Results of Geotechnical Investigation (9/17)

BOREHOLE LOG

Project:	HaNoi High-Tech Park	Location:	HoaLac, ThachThat, HaTay
Borehole Number:	BH4	Drilling equipment:	UGB - 50M
Depth (m):	30.0	Scale:	1/200
Elevation (m):	14.0	Water level (m):	0.8
Commenced:	09/08/1997	Finished:	10/08/1997
Described by:	Eng. Geo. Phan Viet Hue	Checked by:	Eng. Geo. Nguyen Xuan Hien

Scale bar (m)	Depth (m) From	Depth (m) To	Thickness (m)	DESCRIPTION OF SOIL AND ROCK	Log	Depth of sample (m)	Standar Penetration Test - S.P.T Depth (m)	Blows/10cm	Graphic N-value curve 10 20 30 40 50
2						2.0-2.2	2.2-2.65	5-5-6	16
4			6.0	Yellowish grey, CLAY (SM), stiff, mixed with brown lateritic gravel.		3.5-3.7			
6	0.0	6.0				5.0-5.2	5.2-5.65	5-6-6	17
8						6.5-6.7			
10						8.0-8.2	8.2-8.65	3-3-2	8
12						9.5-9.7			
14			15.0	Yellowish grey, veins light-grey, dark-grey, CLAY (MH), occasionally Silty CLAY, firm to stiff.		11.0-11.2	11.2-11.65	4-3-3	10
16						12.5-12.7			
18						14.2-14.4	14.4-14.85	4-5-6	15
20	6.0	21.0				15.5-15.7			
22						17.2-17.4	17.4-17.85	4-5-6	15
24			5.6	Yellowish grey, yellowish brown, Silty CLAY (CL), mixed with gravel of weathered stone		18.5-18.7			
26	21.0	26.6				20.3-20.5	20.5-20.95	6-8-8	22
28						22.0-22.2			
30	26.6	30.0	3.4	BED ROCK: Darkish grey, grey, LIME-TUF, the very cracking, very hard.		23.2-23.4	23.5-23.95	8-11-14	33
32						24.5-24.7			
34						26.2-26.4	26.4-26.7	50/30cm	50
36						29.8-30.0			

Figure IV-1-11 Results of Geotechnical Investigation (10/17)

BOREHOLE LOG

Project:	HaNoi High-Tech Park	Location:	HoaLac, ThachThat, HaTay
Borehole Number:	BH5	Drilling equipment:	UGB - 50M
Depth (m):	30.0	Scale:	1/200
Elevation (m):	18.4	Water level (m):	3.6
Commenced:	16/08/1997	Finished:	17/08/1997
Described by:	Eng. Geo. Do Van Han	Checked by:	Eng. Geo. Nguyen Xuan Hien

Scale bar (m)	Depth (m) From	Depth (m) To	Thickness (m)	DESCRIPTION OF SOIL AND ROCK	Log	Depth of sample (m)	Standar Penetration Test - S.P.T Depth (m)	Blows/10cm	Graphic N-value curve 10 20 30 40 50
2	0.0	4.7	4.7	Redish brown, yellowish brown, CLAY to Silty CLAY (SM), stiff, mixed with brown lateritic gravel.		2.3-2.5 3.5-3.7	2.5-2.95	6-7-10	23
4									
6	4.7	10.7	6.0	Yellowish brown, Redish brown, CLAY (MH), occasionally Silty CLAY, firm, mixed with brown lateritic gravel.		5.3-5.5 6.6-6.8 6.8-7.0 8.2-8.4	5.5-5.95 8.5-8.95	3-2-2 2-2-2	7 6
8									
10						10.2-10.4			
12	10.7	16.5	5.8	Yellowish grey, light-grey, Silty CLAY (CL), firm to stiff, with quarzic gravel.		11.3-11.5 13.5-13.7 14.3-14.5 15.4-15.6	11.5-11.95 14.5-14.95	3-2-3 4-4-7	8 15
14									
16									
18	16.5	20.0	3.5	Yellowish grey, light-grey, Silty CLAY (SC), stiff to hard, with gravel.		17.2-17.4 18.5-18.7	17.5-17.95	7-12-14	33
20							20.5-20.7	50/20cm	>50
22	20.0	30.0	10.0	BED ROCK: Darkish grey, grey, Thin layer of SILTSTONE mixed with coal . On the top: the very cracking, strongly weathered, very hard.		24.6-24.8 26.2-26.4 29.1-29.3			
24									
26									
28									
30									
32									
34									
36									

Figure IV-1-12 Results of Geotechnical Investigation (11/17)

BOREHOLE LOG

Project:	HaNoi High-Tech Park	Location:	HoaLac, ThachThat, HaTay
Borehole Number:	BH6	Drilling equipment:	UGB - 50M
Depth (m):	30.0	Scale:	1/200
Elevation (m):	7.2	Water level (m):	1.8
Commenced:	11/08/1997	Finished:	13/08/1997
Described by:	Eng. Geo. Do Van Han	Checked by:	Eng. Geo. Nguyen Xuan Hien

Scale bar (m)	Depth (m) From	Depth (m) To	Thickness (m)	DESCRIPTION OF SOIL AND ROCK	Log	Depth of sample (m)	Standar Penetration Test - S.P.T Depth (m)	Blows/10cm	Graphic N-value curve 10 20 30 40 50
2						1.0-1.2			
4	0.0	5.5	5.5	Brownish grey, yellowish grey, brownish red, CLAY (MH), firm, mixed with brown lateritic gravel and quarzic gravel.		2.2-2.4 3.2-3.4 4.0-4.2 5.0-5.2	2.5-2.95	3-4-5	12
6	5.5	8.7	3.2	Yellowish brown, Redish brown, milky grey, CLAY to Silty CLAY (SM), stiff, mixed with brown lateritic gravel.		7.0-7.2 8.0-8.2	5.5-5.95 8.5-8.95	7-10-11 2-4-5	28 11
10	8.7	12.9	4.2	Yellowish grey, yellowish brown, veins brownish violet, CLAY to Silty CLAY (MH), firm.		10.0-10.2 11.2-11.4	11.5-11.95	3-4-5	12
14	12.9	14.2	1.3	Yellowish grey, milky grey, Silty CLAY (SC), stiff to hard		13.0-13.2	14.5-14.75	50/14cm	>50
16							17.5-17.65	50/15cm	>50
18									
20							20.5-20.62	50/12cm	>50
22			15.8	BED ROCK: Darkish grey, grey, dark, Thin layer of SILTSTONE mixed with coal , strongly weathered, to medium weathered.			23.5-23.70	50/20cm	>50
24									
26							26.5-26.68	50/18cm	>50
28									
30	14.2	30.0					29.5-29.60	50/10cm	>50
32									
34									
36									

Figure IV-1-13 Results of Geotechnical Investigation (12/17)

BOREHOLE LOG

Project:	HaNoi High-Tech Park	Location:	HoaLac, ThachThat, HaTay
Borehole Number:	BH7	Drilling equipment:	UGB - 50M
Depth (m):	30.0	Scale:	1/200
Elevation (m):	5.4	Water level (m):	1.5
Commenced:	14/08/1997	Finished:	15/08/1997
Described by:	Eng. Geo. Pham Van Quyet	Checked by:	Eng. Geo. Nguyen Xuan Hien

Scale bar (m)	Depth (m) From	Depth (m) To	Thickness (m)	DESCRIPTION OF SOIL AND ROCK	Log	Depth of sample (m)	Standar Penetration Test - S.P.T Depth (m)	Blows/10cm	Graphic N-value curve 10 20 30 40 50
2	0.0	2.5	2.5	Brownish grey, CLAY (MH), hard, mixed with brown lateritic gravel.		1.6-1.8			
						2.8-3.0	3.0-3.45	1-2-2	5
4						4.5-4.7			
6			8.0	Yellowish brown, CLAY (CL), firm, mixed with gravely sand.		6.0-6.2	6.2-6.65	1-1-1	3
						7.0-7.2			
8						8.6-8.8			
10	2.5	10.5				8.8-9.0	9.0-9.45	3-3-4	10
						10.0-10.2			
12			4.9	GRAVEL and COBBLE of quarz (diameter: 10 - 50mm), dense, mixed with Sandy Clay and Coarse Sand. (GC)		11.8-12.0	12.0-12.20	50/20cm	>50
						13.2-13.4			
14						14.8-15.0	15.0-15.15	50/15cm	
	10.5	15.4							>50
16									
18						17.5-17.7			
20									
22			14.6	BED ROCK: Darkish grey, grey, Thin layer of SILTSTONE, very hard, strongly weathered to medium weathered.		22.4-22.6			
24									
26									
28						28.9-29.1			
30	15.4	30.0				29.8-30.0			
32									
34									
36									

Figure IV-1-14 Results of Geotechnical Investigation (13/17)

BOREHOLE LOG

Project:	HaNoi High-Tech Park	Location:	HoaLac, ThachThat, HaTay
Borehole Number:	BH8	Drilling equipment:	UKB - 500C
Depth (m):	30.0	Scale:	1/200
Elevation (m):	20.2	Water level (m):	6.3
Commenced:	13/08/1997	Finished:	14/08/1997
Described by:	Eng. Geo. Nguyen Viet Cuong	Checked by:	Eng. Geo. Nguyen Xuan Hien

Scale bar (m)	Depth (m) From	Depth (m) To	Thickness (m)	DESCRIPTION OF SOIL AND ROCK	Log	Depth of sample (m)	Standar Penetration Test - S.P.T Depth (m)	Blows/10cm	Graphic N-value curve 10 20 30 40 50
2	0.0	3.0	3.0	Yellowish brown, Redish brown, CLAY (SM), firm, mixed with brown lateritic gravel.		2.0-2.2			
4	3.0	8.8	5.8	Redish brown, yellowish brown, CLAY (MH), firm, mixed with gravely sand.		3.3-3.5	3.5-3.95	3-4-5	12
6						5.0-5.2			
8						6.2-6.4	6.4-6.85	3-4-5	12
10						8.0-8.2			
12	8.8	13.4	4.6	Redish brown, yellowish brown, milky grey, CLAY (CL), stiff.		8.6-8.8			
14						8.8-9.0	9.0-9.45	7-9-10	26
16						11.0-11.2			
18						11.8-12.0	12.0-12.45	9-10-11	30
20						13.0-13.2			
22			16.6	BED ROCK: Darkish grey, grey, dark, Thin layer of SILTSTONE mixed coal, very hard, strongly weathered.		14.7-14.9	15.0-15.15	50/15cm	>50
24						23.5-23.7			
26									
28									
30	13.4	30.0				29.5-29.7			
32									
34									
36									

Figure IV-1-15 Results of Geotechnical Investigation (14/17)

BOREHOLE LOG

Project:	HaNoi High-Tech Park	Location:	HoaLac, ThachThat, HaTay
Borehole Number:	BH9	Drilling equipment:	UGB - 50M
Depth (m):	30.0	Scale:	1/200
Elevation (m):	8.5	Water level (m):	1.4
Commenced:	14/08/1997	Finished:	16/08/1997
Described by:	Eng. Geo. Do Van Han	Checked by:	Eng. Geo. Nguyen Xuan Hien

Scale bar (m)	Depth (m) From	Depth (m) To	Thickness (m)	DESCRIPTION OF SOIL AND ROCK	Log	Depth of sample (m)	Standar Penetration Test - S.P.T Depth (m)	Blows/10cm	Graphic N-value curve 10 20 30 40 50
2			4.2	Yellowish grey, redish brown, CLAY (CL), firm, mixed with brown laterritic gravel.		1.2-1.4	1.5-1.95	4-5-6	15
4	0.0	4.2				2.5-2.7			
6			4.2	Yellowish grey, redish brown, CLAY (MH), firmto stiff, mixed with brown laterritic gravel.		4.3-4.5	4.5-4.95	5-5-5	15
8	4.2	8.4				5.8-6.0			
10			6.6	Yellowish grey, milky grey, Silty CLAY (SC), stiff to hard.		7.3-7.6	7.5-7.95	3-6-8	17
12						8.5-8.7			
14	8.4	15.0				9.3-9.5	9.5-9.95	8-7-9	24
16			15.0	BED ROCK: Darkish grey, grey, dark, Thin layer of SILTSTONE mixed coal, very hard, Medium weathered to lightly weathered.		10.5-10.7			
18						12.3-12.5	12.5-12.95	8-8-10	26
20						14.2-14.5	15.0-15.05	50/5cm	>50
22						16.8-17.0			
24						20.3-20.5			
26						26.2-26.4			
28						29.7-29.9			
30	15.0	30.0							
32									
34									
36									

Figure IV-1-16 Results of Geotechnical Investigation (15/17)

BOREHOLE LOG

Project:	HaNoi High-Tech Park	Location:	HoaLac, ThachThat, HaTay
Borehole Number:	BH10	Drilling equipment:	UGB - 50M
Depth (m):	30.0	Scale:	1/200
Elevation (m):	10.2	Water level (m):	1.7
Commenced:	12/08/1997	Finished:	15/08/1997
Described by:	Eng. Geo. Phan Viet Hue	Checked by:	Eng. Geo. Nguyen Xuan Hien

Scale bar (m)	Depth (m) From	Depth (m) To	Thickness (m)	DESCRIPTION OF SOIL AND ROCK	Log	Depth of sample (m)	Standar Penetration Test - S.P.T Depth (m)	Blows/10cm	Graphic,N-value curve 10 20 30 40 50
2	0.0	10.6	10.6	Mottled, yellowish brown, redish brown, CLAY (MH), firm, mixed with brown lateritic gravel.		2.3-2.5	2.5-2.95	3-3-5	11
4						3.8-4.0			
6						5.3-5.5	5.5-5.95	2-2-3	7
8						6.8-7.0			
10						8.3-8.5	8.5-8.95	3-2-3	8
12	10.6	19.2	8.6	Yellowish grey, yellowish brown, CLAY (SC), stiff.		10.2-10.4	11.5-11.95	6-7-8	21
14						11.3-11.5			
16						13.0-13.2	14.5-14.95	3-4-6	13
18						14.3-14.5			
20	19.2	30.0	10.8	BED ROCK: Grey, yellowish grey, SANDSTONE, Strongly weathered, the very cracking.		15.2-15.4	17.5-17.95	5-7-7	19
22						16.0-16.2	20.5-20.65	50/15cm	>50
24							24.5-24.62	50/12cm	>50
26							27.5-27.55	50/5cm	>50
28									
30									
32									
34									
36									

Figure IV-1-17 Results of Geotechnical Investigation (16/17)

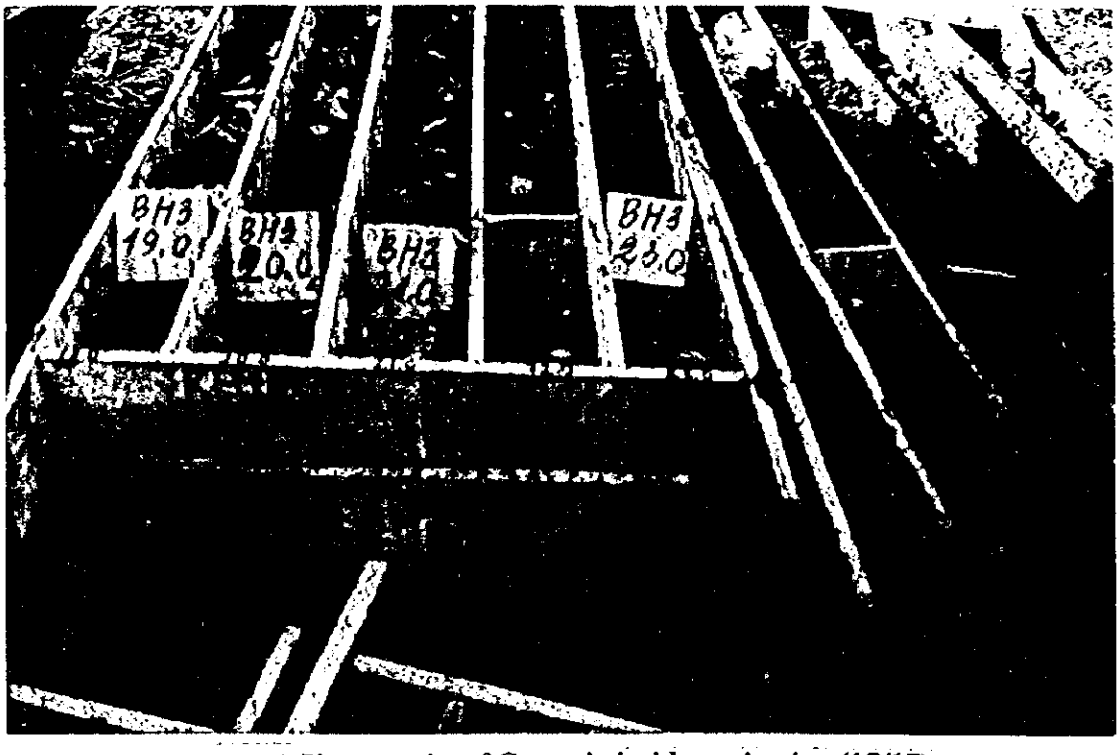


Figure IV-1-18 Photographs of Geotechnical Investigation (17/17)

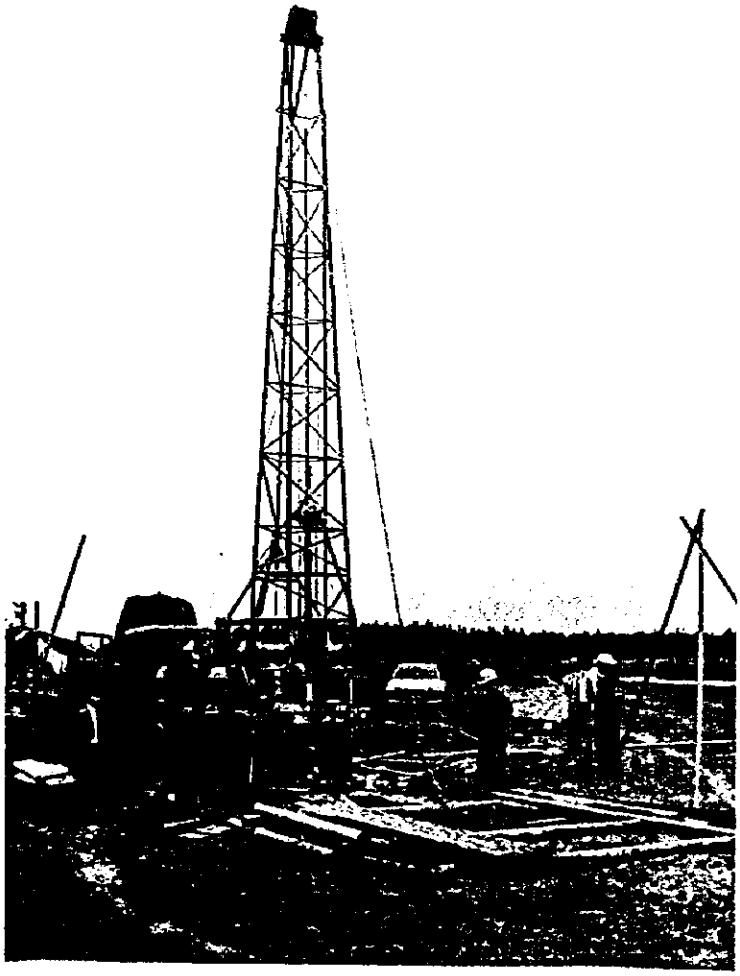
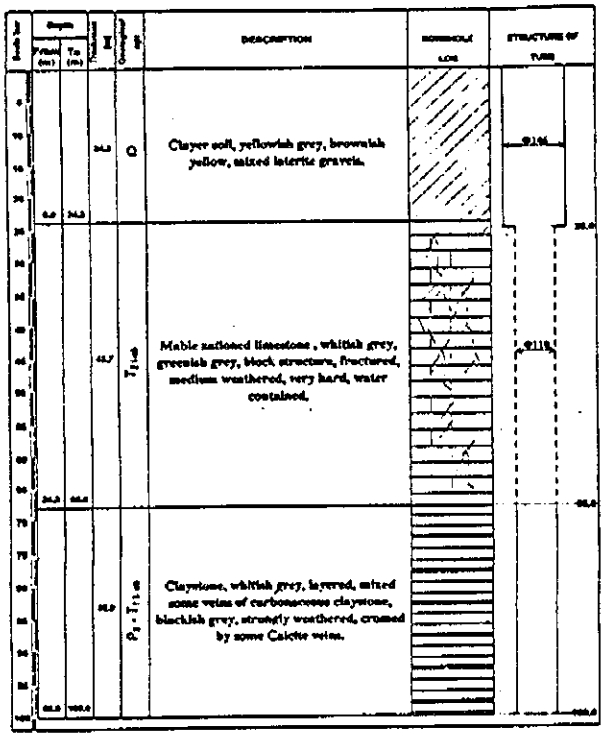
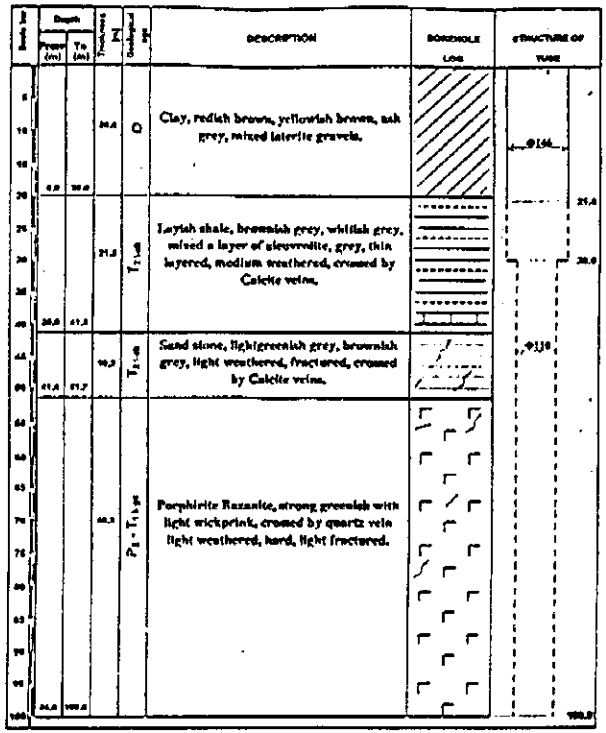


Figure IV-1-19 Photograph of Groundwater Exploitation Test

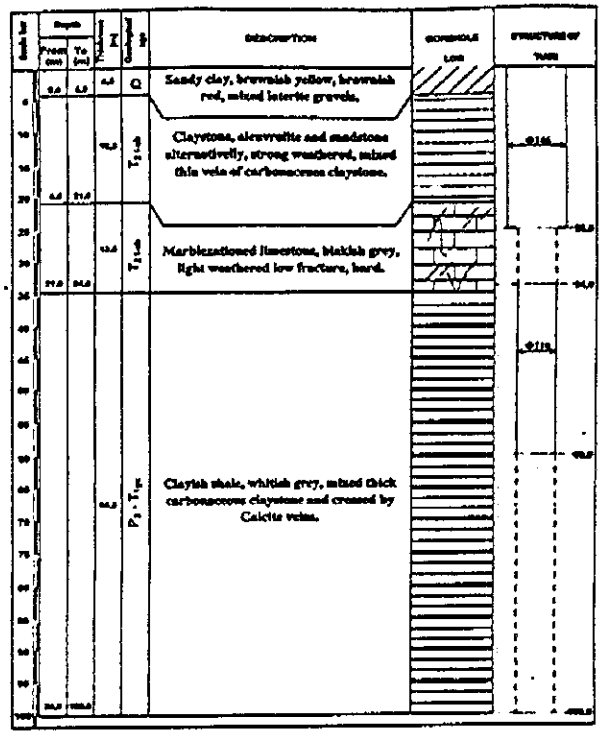
Figure IV-1-20 Photograph of Physico-geological Survey



Borehole K-1



Borehole K-2



Borehole K-3

JAPAN INTERNATIONAL COOPERATION AGENCY	
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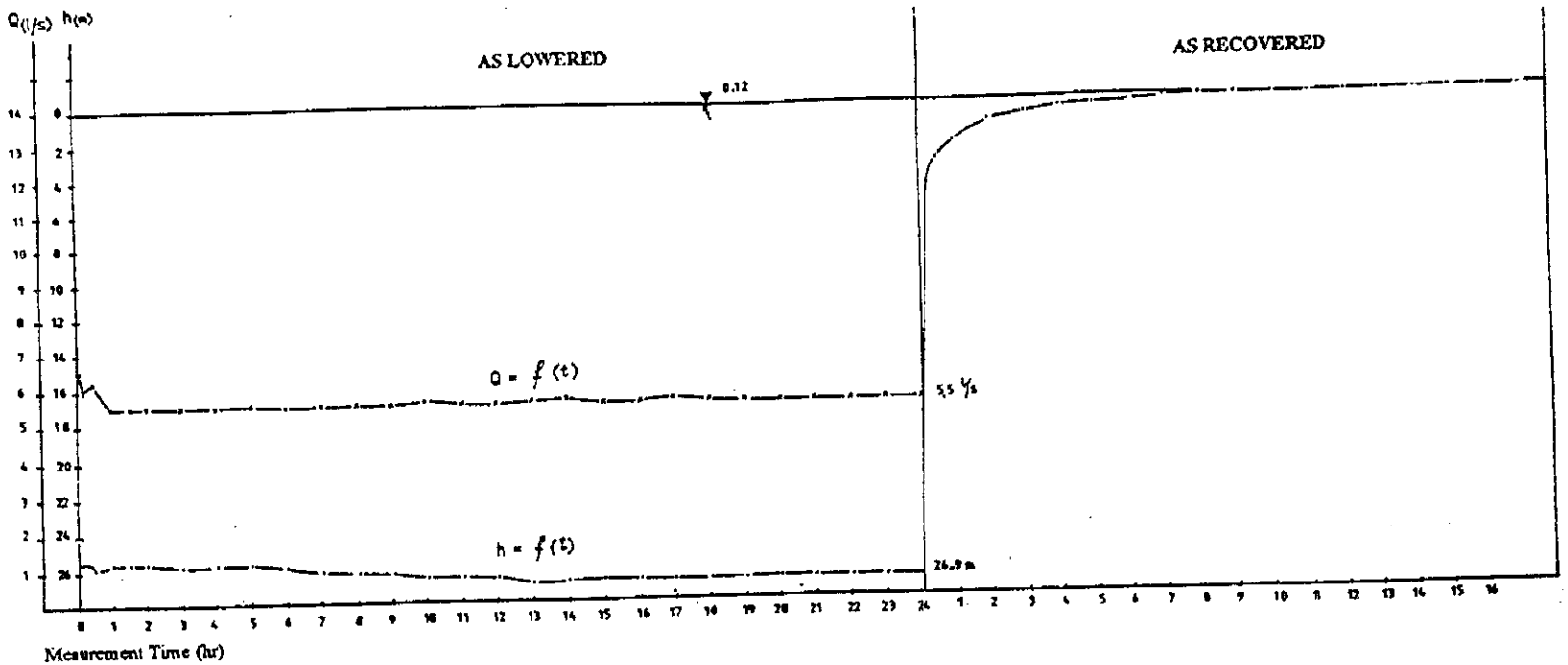
THE MASTER PLAN AND FEASIBILITY STUDY ON THE HOA LAC HIGH-TECH PARK PROJECT IN THE SOCIALIST REPUBLIC OF VIETNAM	
Figure IV-1-21 Stratum and Structure of Boreholes	
NIPPON KOEI CO., LTD. JAPAN INDUSTRIAL LOCATION CENTER PACIFIC CONSULTANTS INTERNATIONAL	



Borehole K-1

Note : "Q" and "h" stand for pumping discharge (lit/sec) and water level (m), respectively.

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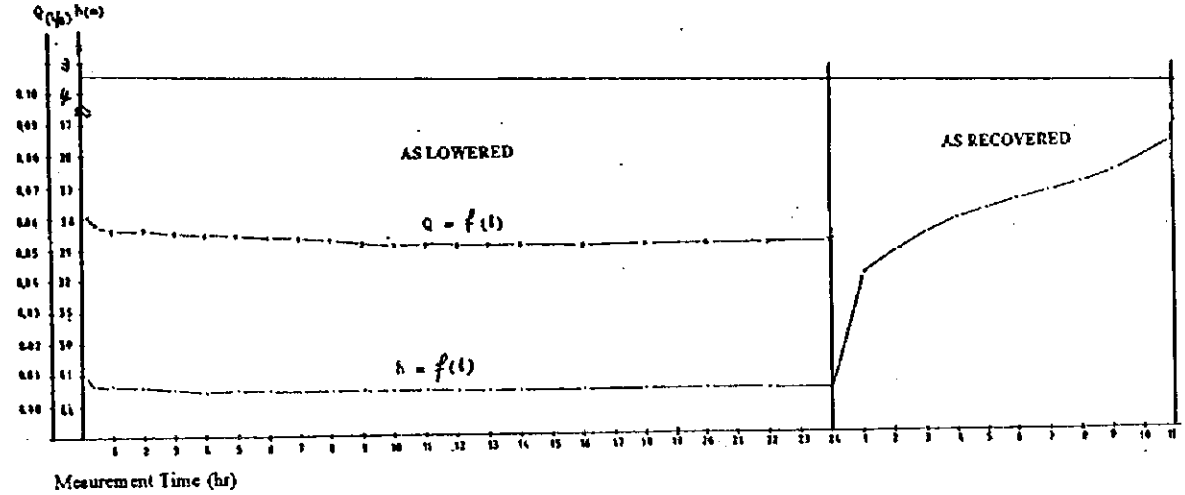
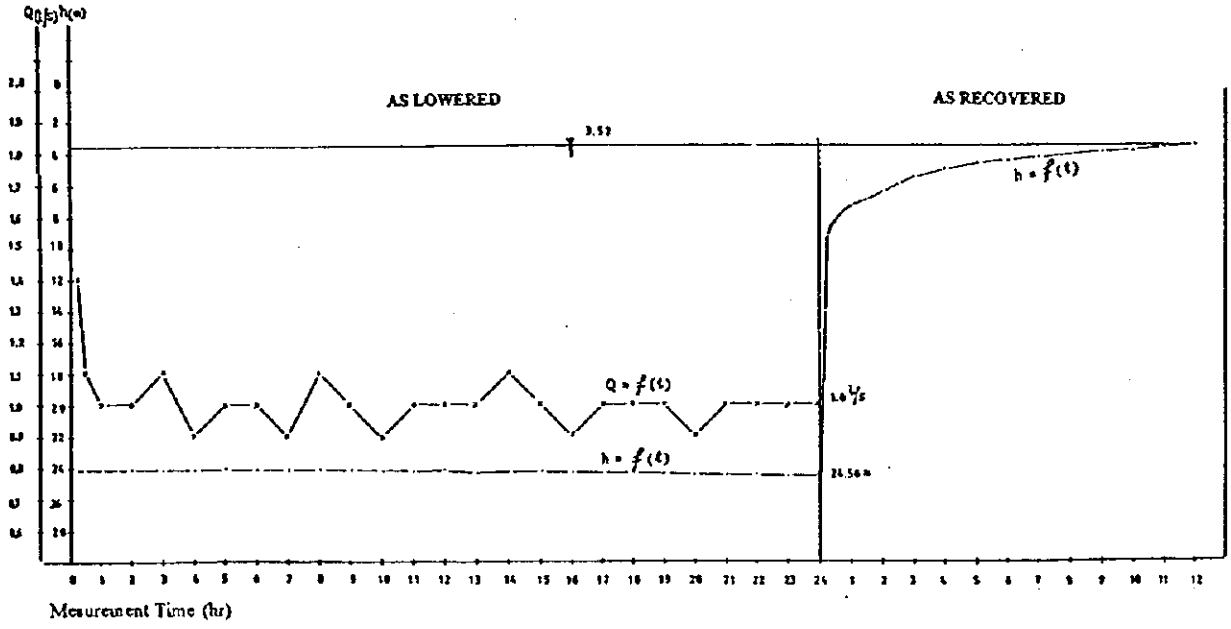
THE MASTER PLAN AND FEASIBILITY STUDY ON THE HANOI HIGH-TECH PARK PROJECT IN THE SOCIALIST REPUBLIC OF VIETNAM
Figure IV-1-22 Pumping Test Results of Borehole K-1
NIPPON KOEI CO., LTD. JAPAN INDUSTRIAL LOCATION CENTER PACIFIC CONSULTANTS INTERNATIONAL



Borehole K-2



Borehole K-3

Note : "Q" and "h" stand for pumping discharge (lit/sec) and water level (m), respectively.

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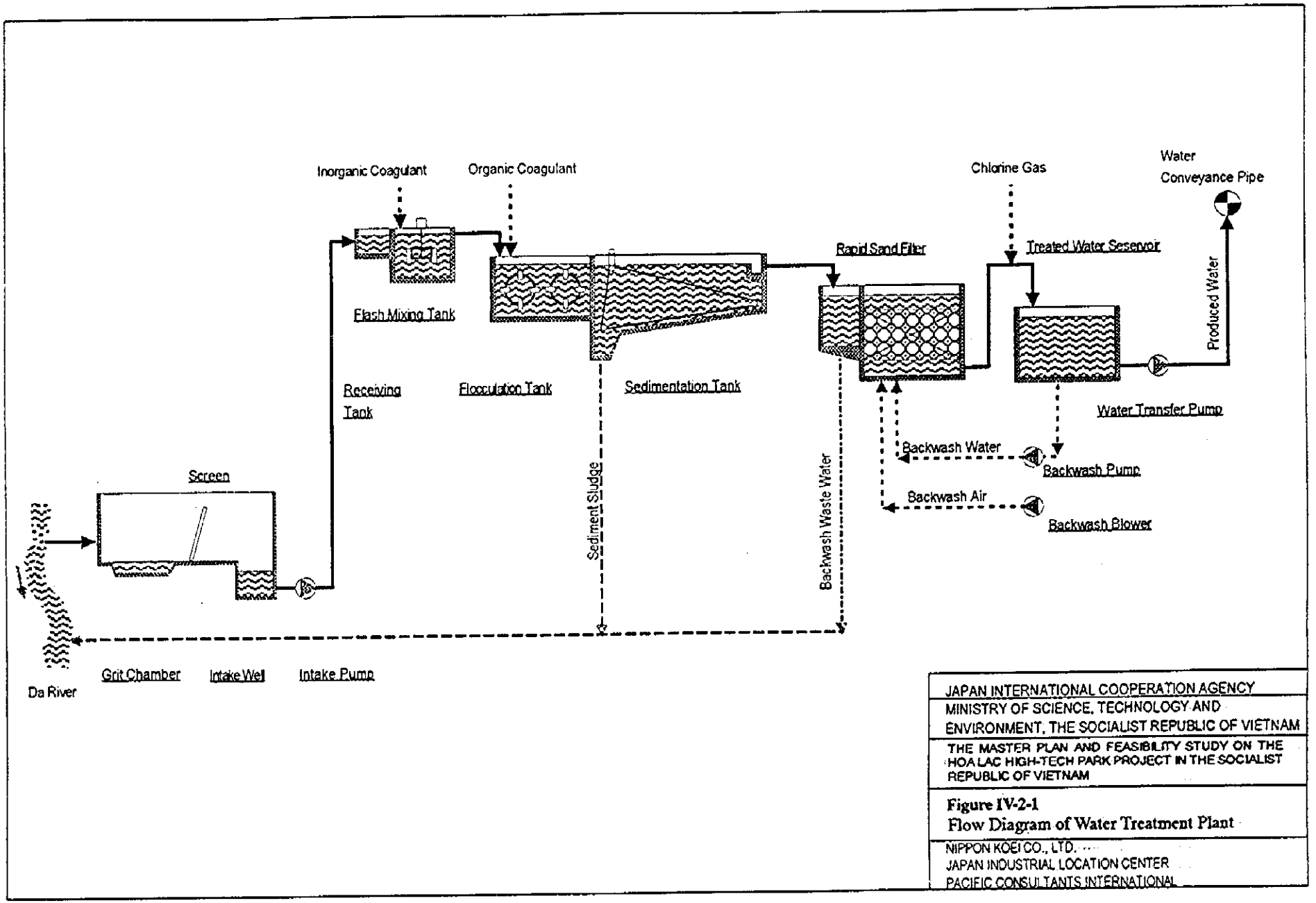
THE MASTER PLAN AND FEASIBILITY STUDY ON THE HOA LAC HIGH-TECH PARK PROJECT IN THE SOCIALIST REPUBLIC OF VIETNAM
Figure IV-1-23 Pumping Test Results of Borehole K-2 and K3
NIPPON KOEI CO., LTD. JAPAN INDUSTRIAL LOCATION CENTER PACIFIC CONSULTANTS INTERNATIONAL



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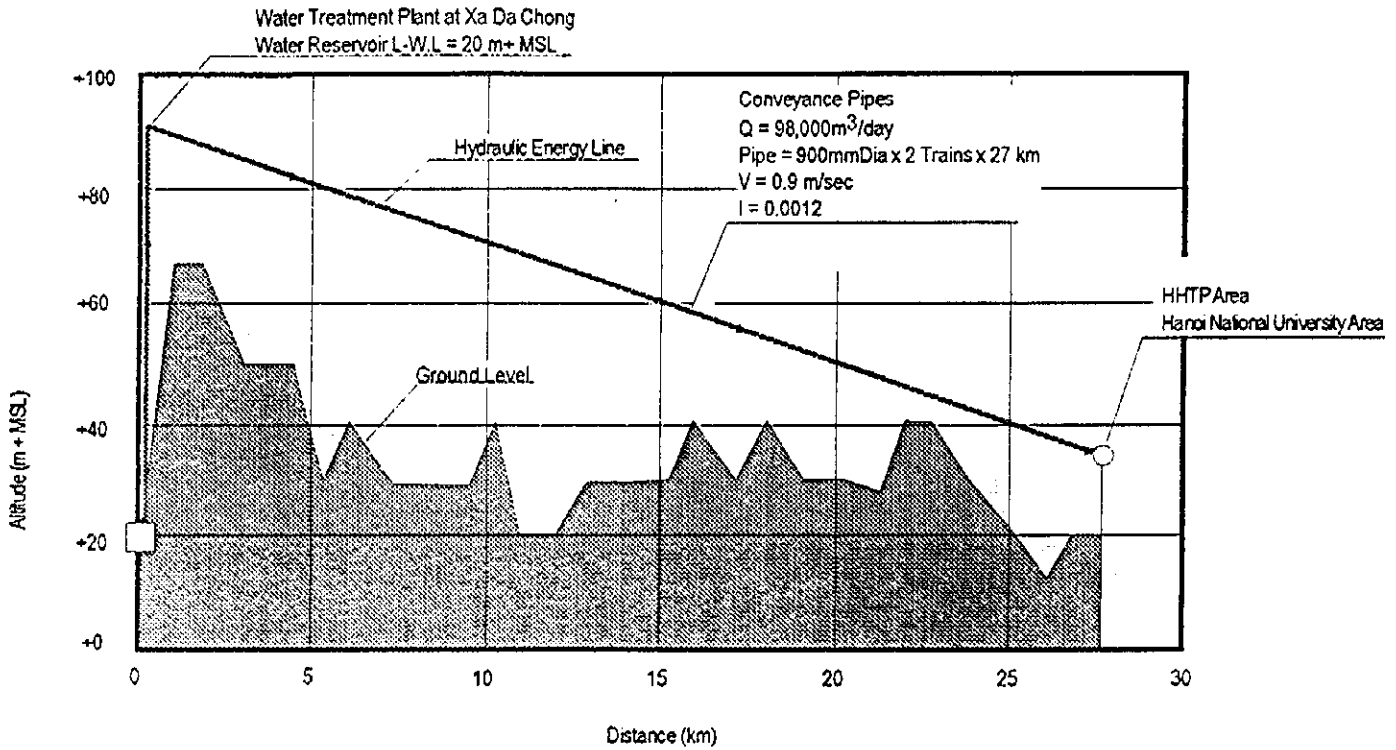
THE MASTER PLAN AND FEASIBILITY STUDY ON THE HOA LAC HIGH-TECH PARK PROJECT IN THE SOCIALIST REPUBLIC OF VIETNAM
Figure IV-2-1 **Flow Diagram of Water Treatment Plant**
NIPPON KOEI CO., LTD. JAPAN INDUSTRIAL LOCATION CENTER PACIFIC CONSULTANTS INTERNATIONAL



Source : JICA Study Source

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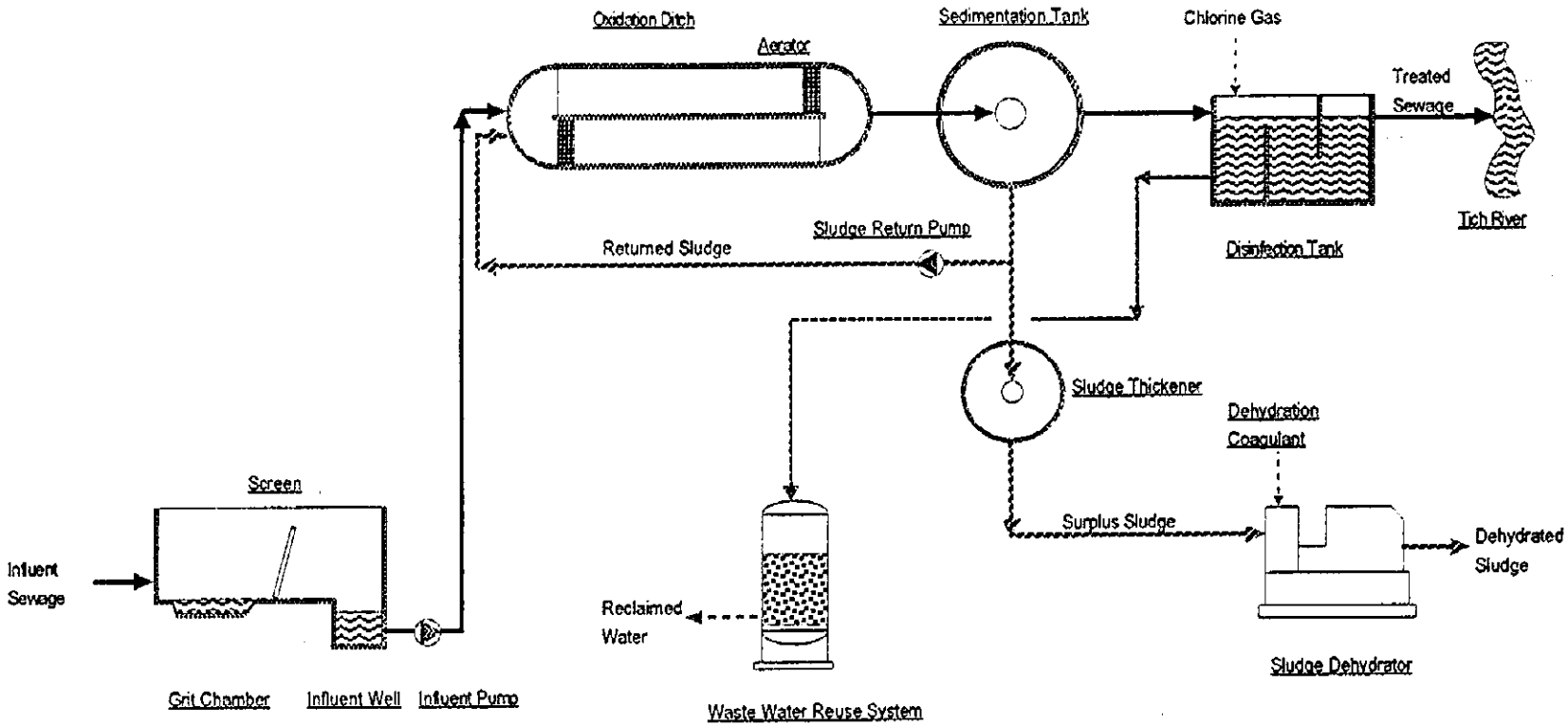
THE MASTER PLAN AND FEASIBILITY STUDY ON THE HOA LAC HIGH-TECH PARK PROJECT IN THE SOCIALIST REPUBLIC OF VIETNAM
Figure IV-2-2 **Hydraulic Profile of Water Conveyance Pipes**
NIPPON KOEI CO., LTD JAPAN INDUSTRIAL LOCATION CENTER PACIFIC CONSULTANTS INTERNATIONAL



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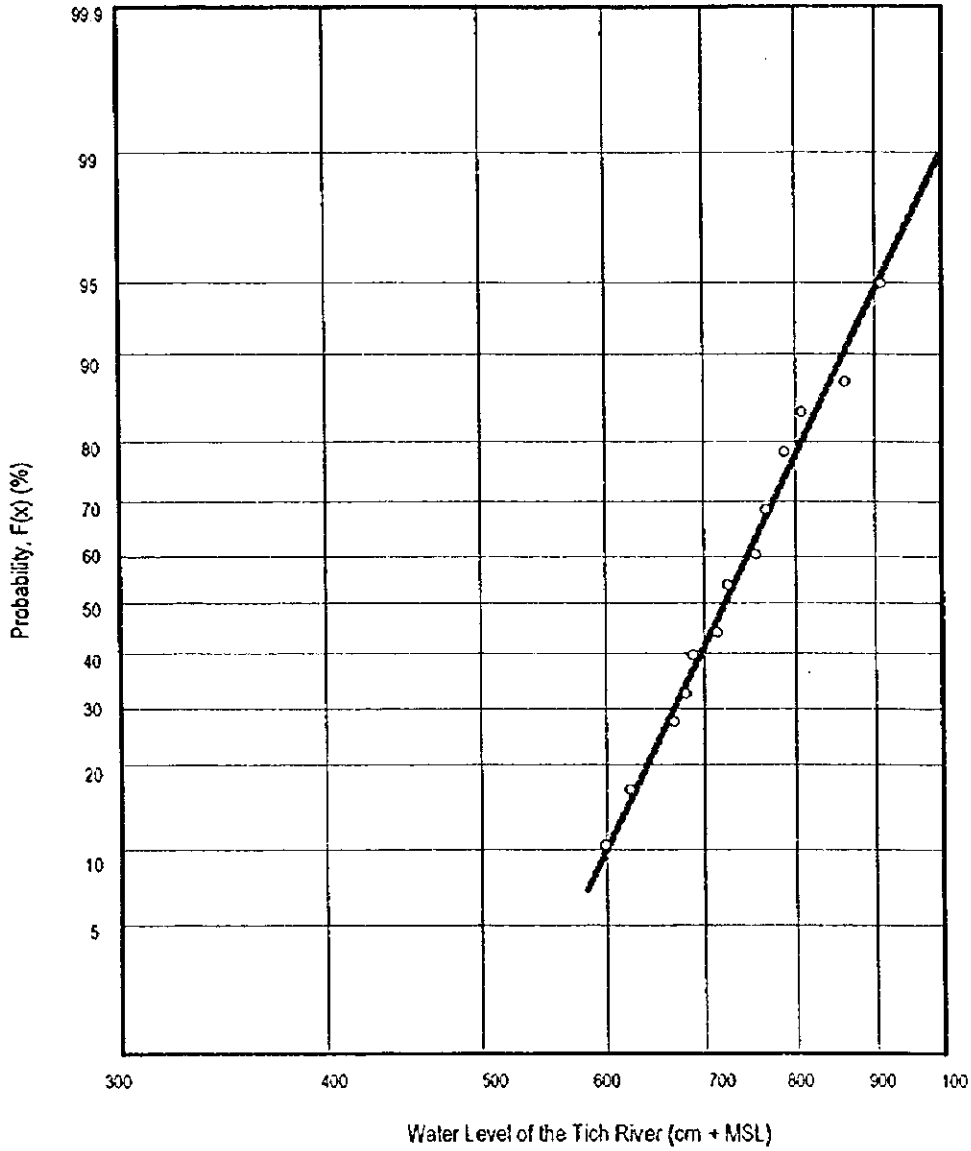
THE MASTER PLAN AND FEASIBILITY STUDY ON THE HOA LAC HIGH-TECH PARK PROJECT IN THE SOCIALIST REPUBLIC OF VIETNAM
Figure IV-2-3 **Flow Diagram of Sewage Treatment Plant**
NIPPON KOEI CO., LTD. JAPAN INDUSTRIAL LOCATION CENTER PACIFIC CONSULTANTS INTERNATIONAL



Note : The data were recorded at the Kim Quan gauging station by the Observatory of Hydrometeorology and Environment Control of the Red River Delta.

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THE MASTER PLAN AND FEASIBILITY STUDY ON THE HOA LAC HIGH-TECH PARK PROJECT IN THE SOCIALIST REPUBLIC OF VIETNAM

Figure IV-2-4
Annual Maximum Water Level of Tich River

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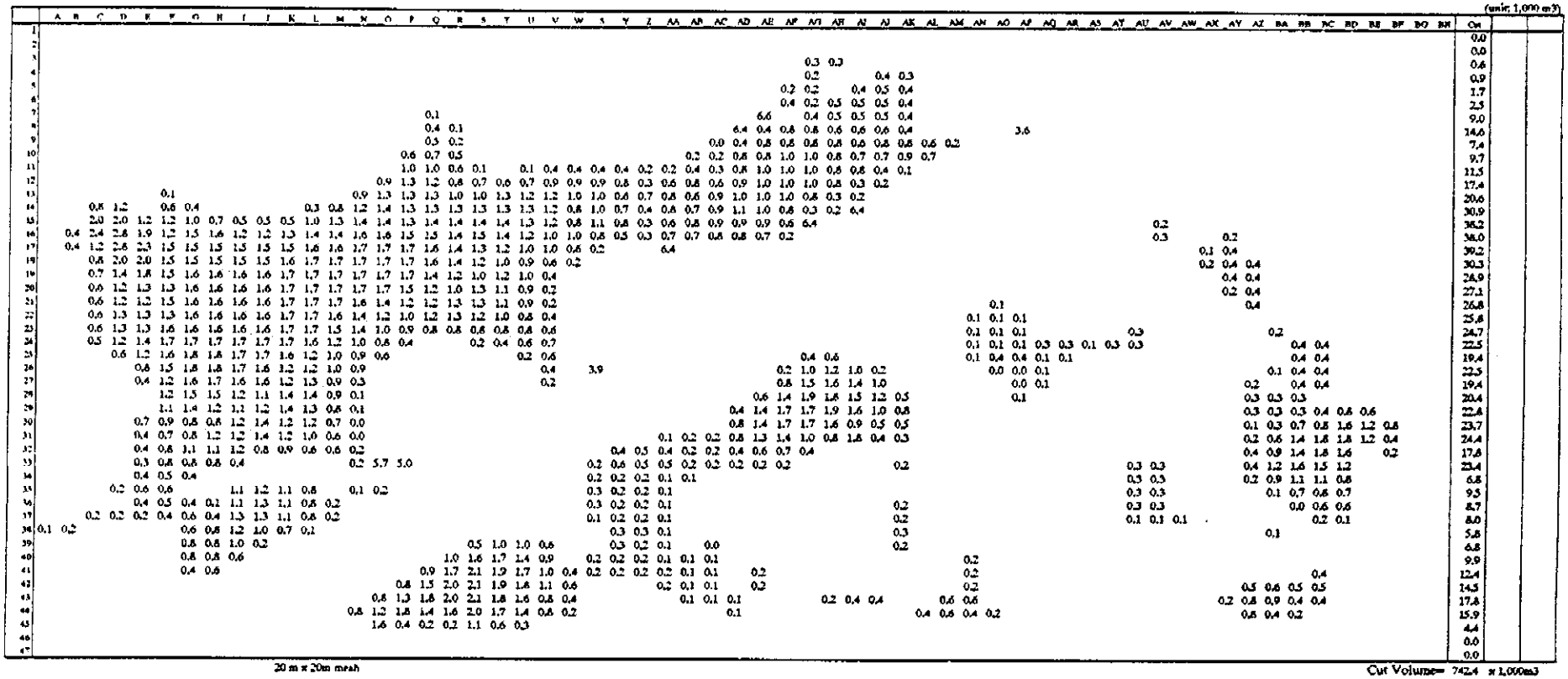


Figure IV-2-5 Distribution of Cut Area and Volume

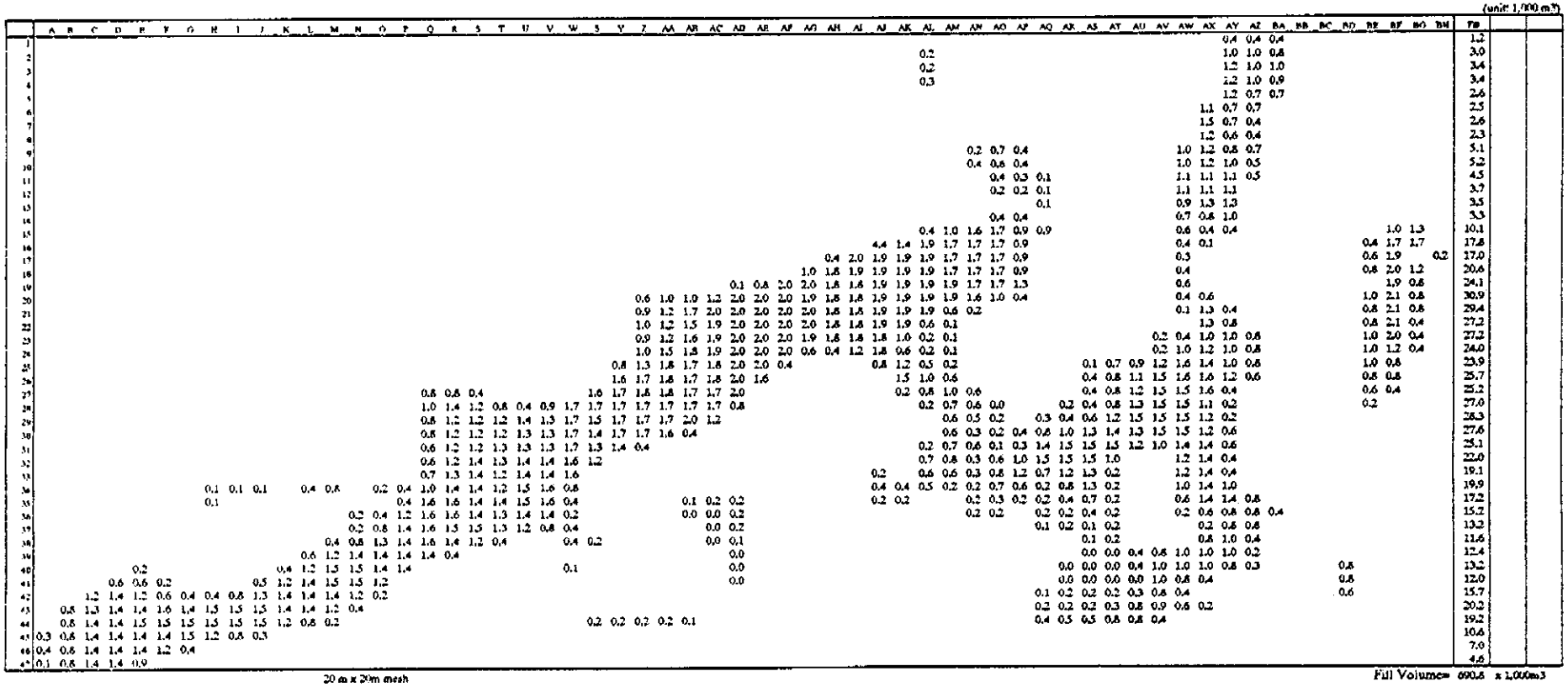
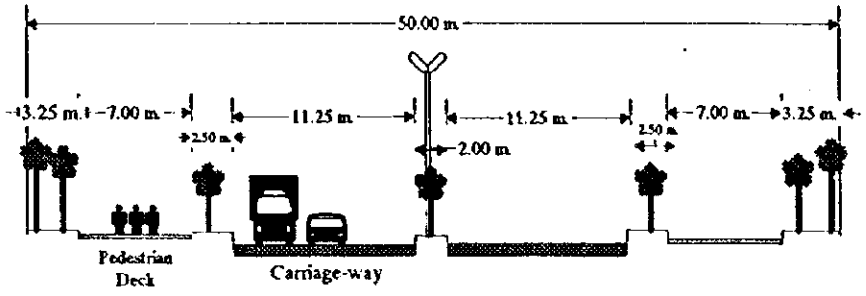
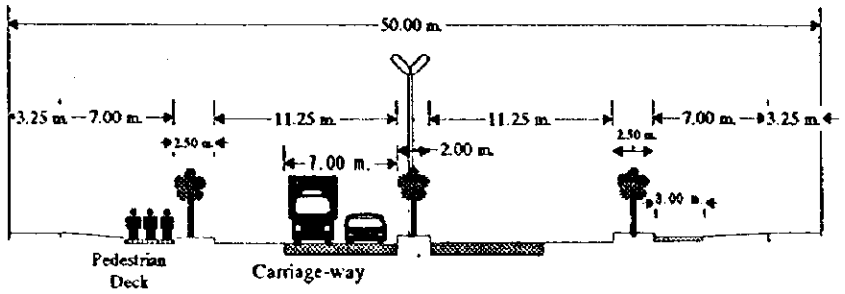


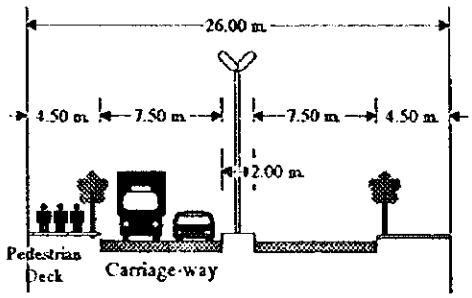
Figure IV-2-6 Distribution of Fill Area and Volume



Main Road in Hanoi High-Tech Park (in 2020)



Main Road in Hanoi High-Tech Park (in 2005)



Sub-Main Road in Hanoi High-Tech Park

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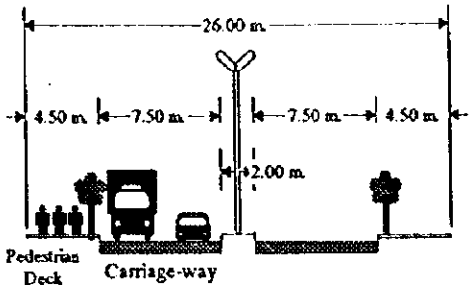
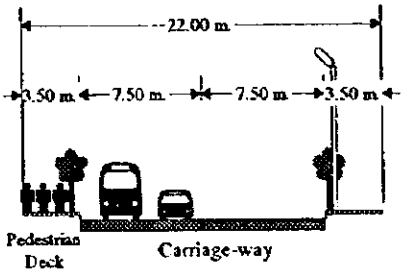
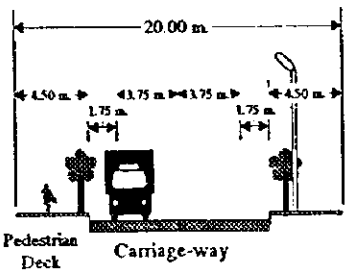
Figure IV-2-7 Standard Road Section (1)
NIPPON KOEI CO., LTD. JAPAN INDUSTRIAL LOCATION CENTER PACIFIC CONSULTANTS INTERNATIONAL



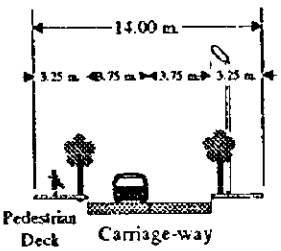
Main Road in Hi-Tech Industrial Estate



Main Road in New Town



Sub-Main Road in Hi-Tech Industrial Estate



Feeder Road in New Town

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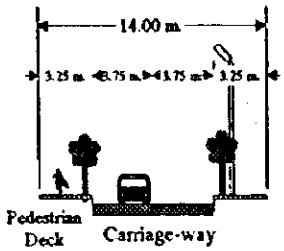
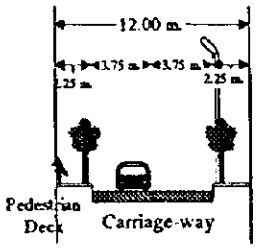
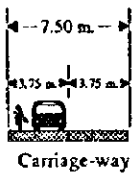
MINISTRY OF SCIENCE, TECHNOLOGY AND ENVIRONMENT THE SOCIALIST REPUBLIC OF VIETNAM
Figure IV-2-8 Standard Road Section (2)
NIPPON KOEI CO., LTD. JAPAN INDUSTRIAL LOCATION CENTER PACIFIC CONSULTANTS INTERNATIONAL



Feeder Road in Hi-Grade Residence



Collector Road in Hi-Grade Residence



Collector Road in New Town

JAPAN INTERNATIONAL COOPERATION AGENCY
MINISTRY OF SCIENCE, TECHNOLOGY AND ENVIRONMENT THE SOCIALIST REPUBLIC OF VIETNAM
Figure IV-2-9 Standard Road Section (3)
NIPPON KOEI CO., LTD. JAPAN INDUSTRIAL LOCATION CENTER PACIFIC CONSULTANTS INTERNATIONAL