

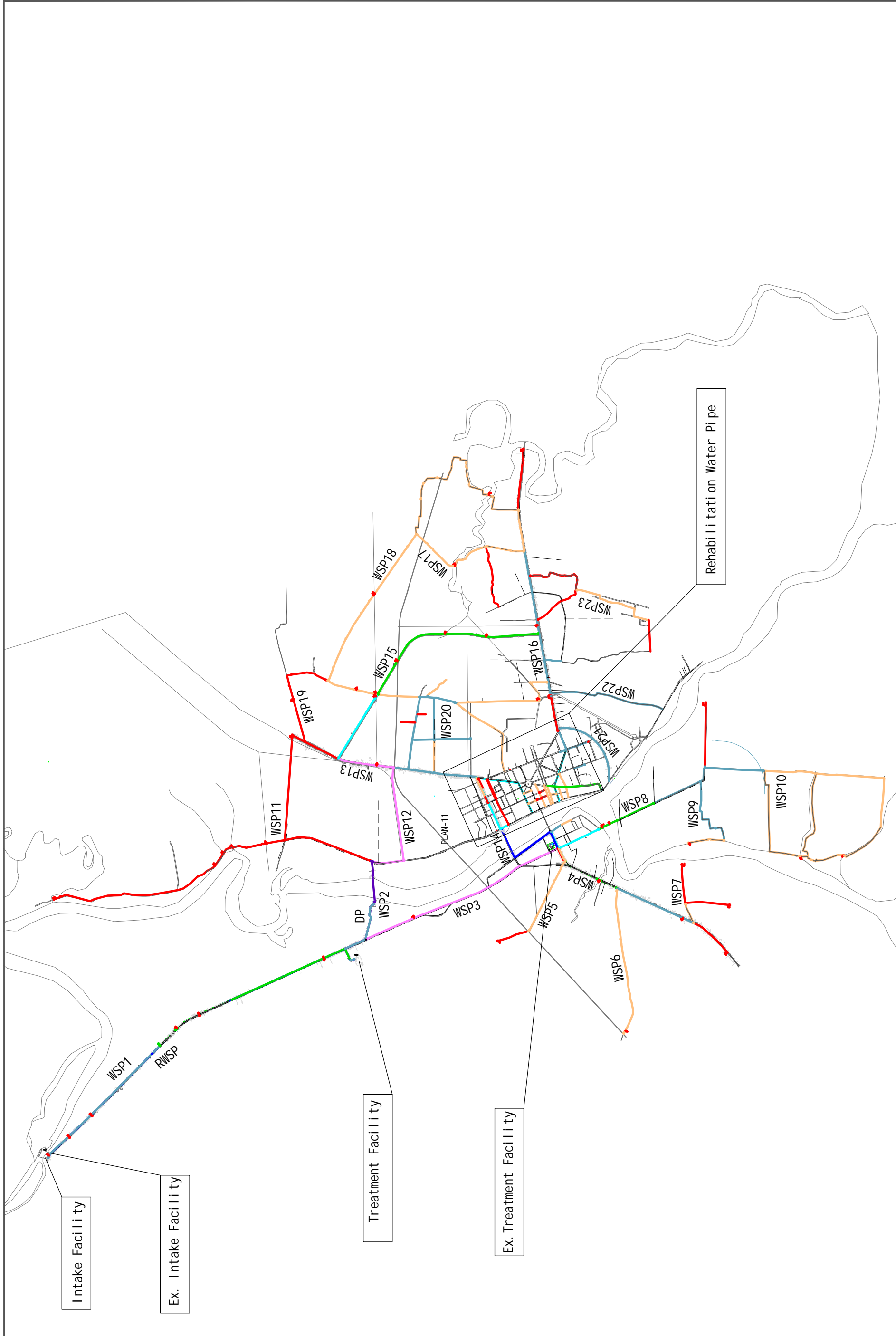
7. その他の資料・情報

7.1 概略設計図面

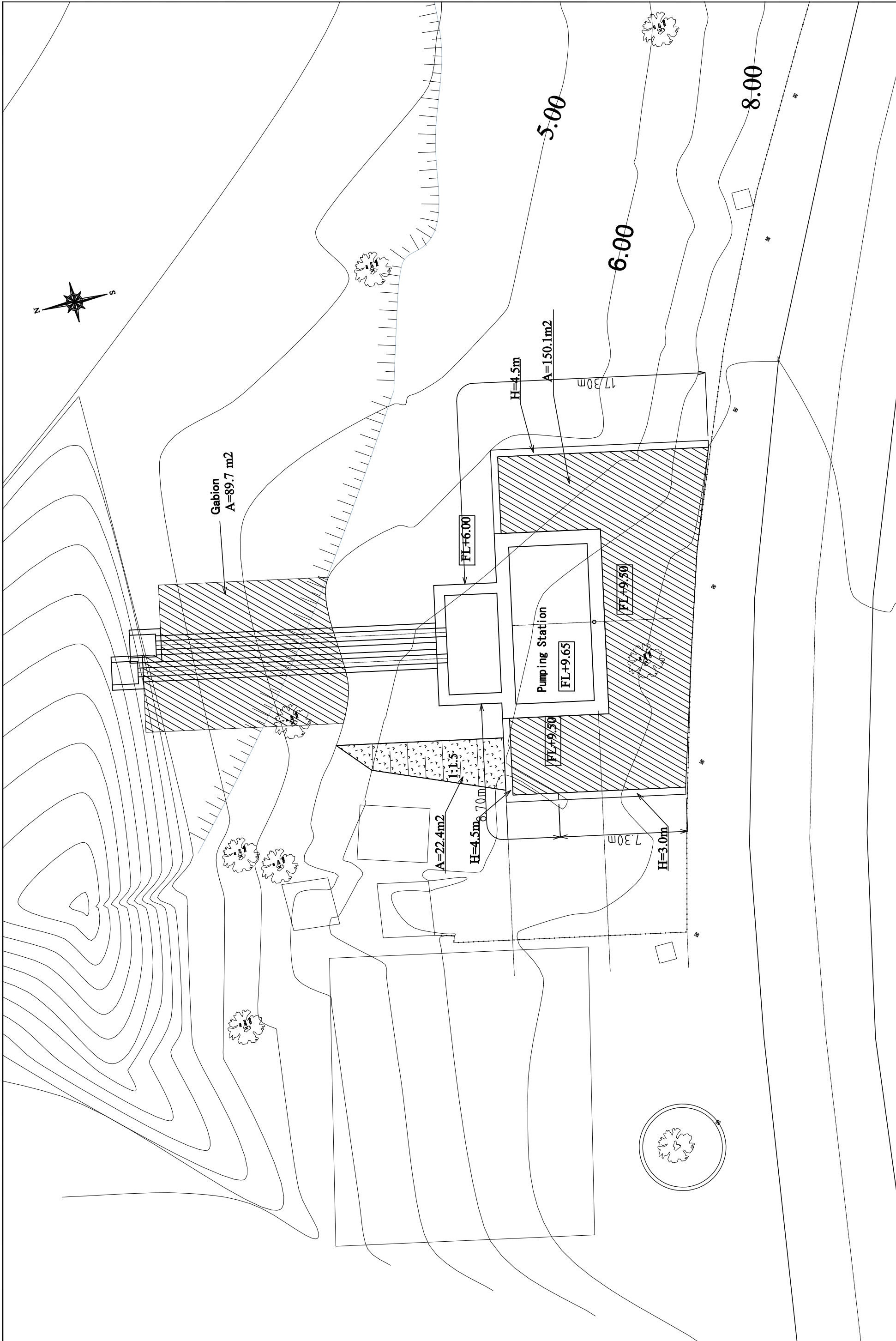
概略設計図面リスト

番号	施設区分	図面標題	図番号
1.	全体(G)	全体施設位置図	G1
2.	取水施設(I)	取水施設平面図	KI-1
		取水施設構造図	KI-
3.	導水施設(R)	導水管路布設概要図	KD-2, KD-3, KD-4
4.	浄水施設(T)	浄水施設全体平面図	KT-1
		浄水施設水位高低図	KT-2
		着水井/ブロック形成/沈澱池/ろ過池構造図(1)	KT-3
		着水井/ブロック形成/沈澱池/ろ過池構造図(2)	KT-4
		着水井/ブロック形成/沈澱池/ろ過池構造図(3)	KT-5
		着水井/ブロック形成/沈澱池/ろ過池構造図(4)	KT-6
		着水井/ブロック形成/沈澱池/ろ過池構造図(5)	KT-7
		着水井/ブロック形成/沈澱池/ろ過池構造図(6)	KT-8
		着水井/ブロック形成/沈澱池/ろ過池構造図(7)	KT-9
		配水池構造図(1)	KT-10
		配水池構造図(2)	KT-11
		高架水槽構造図(1)	KT-12
		排水池構造図(1)	KT-13
		排水池構造図(2)	KT-14
		ラグーン構造図(1)	KT-15
		ラグーン構造図(2)	KT-16
5.	送配水施設(D)	送配水管路布設概要図	KD-1
		送配水管路布設詳細図(1)	KD-2
		送配水管路布設詳細図(2)	KD-3
		送配水管路布設詳細図(3)	KD-4
		送配水管路布設詳細図(4)	KD-5
		送配水管路布設詳細図(5)	KD-6
		送配水管路布設詳細図(6)	KD-7
		送配水管路布設詳細図(7)	KD-8
		送配水管路布設詳細図(8)	KD-9
		送配水管路布設詳細図(9)	KD-10
		送配水管路布設詳細図(10)	KD-11
		送配水管路布設詳細図(11)	KD-12
		送配水管路布設詳細図(12)	KD-13
		送配水管路布設詳細図(13)	KD-14
		送配水管路布設詳細図(14)	KD-15
		送配水管路布設詳細図(15)	KD-16
		送配水管路布設詳細図(16)	KD-17
		送配水管路布設標準図(1)	TYP-1
		送配水管路布設標準図(2)	TYP-2
		送配水管路布設標準図(3)	TYP-3
		送配水管路布設標準図(4)	TYP-4
		送配水管路布設標準図(5)	TYP-5
		送配水管路布設標準図(6)	TYP-6
		送配水管路布設標準図(7)	TYP-7
送配水管路布設標準図(8)	TYP-8		
送配水管路布設標準図(9)	TYP-9		
送配水管路布設標準図(10)	TYP-10		
送配水管路布設標準図(11)	TYP-11		
送配水管路布設標準図(12)	TYP-12		

出典：JICA 調査団



PROJECT	DESCRIPTION		MINISTRY OF INDUSTRY & HANDICRAFT		APPROVED BY	DATE	DRAWING No
	General Layout of Kampot		NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU		PREPARED BY	DATE	G-01
THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE							SCALE
							1:50000

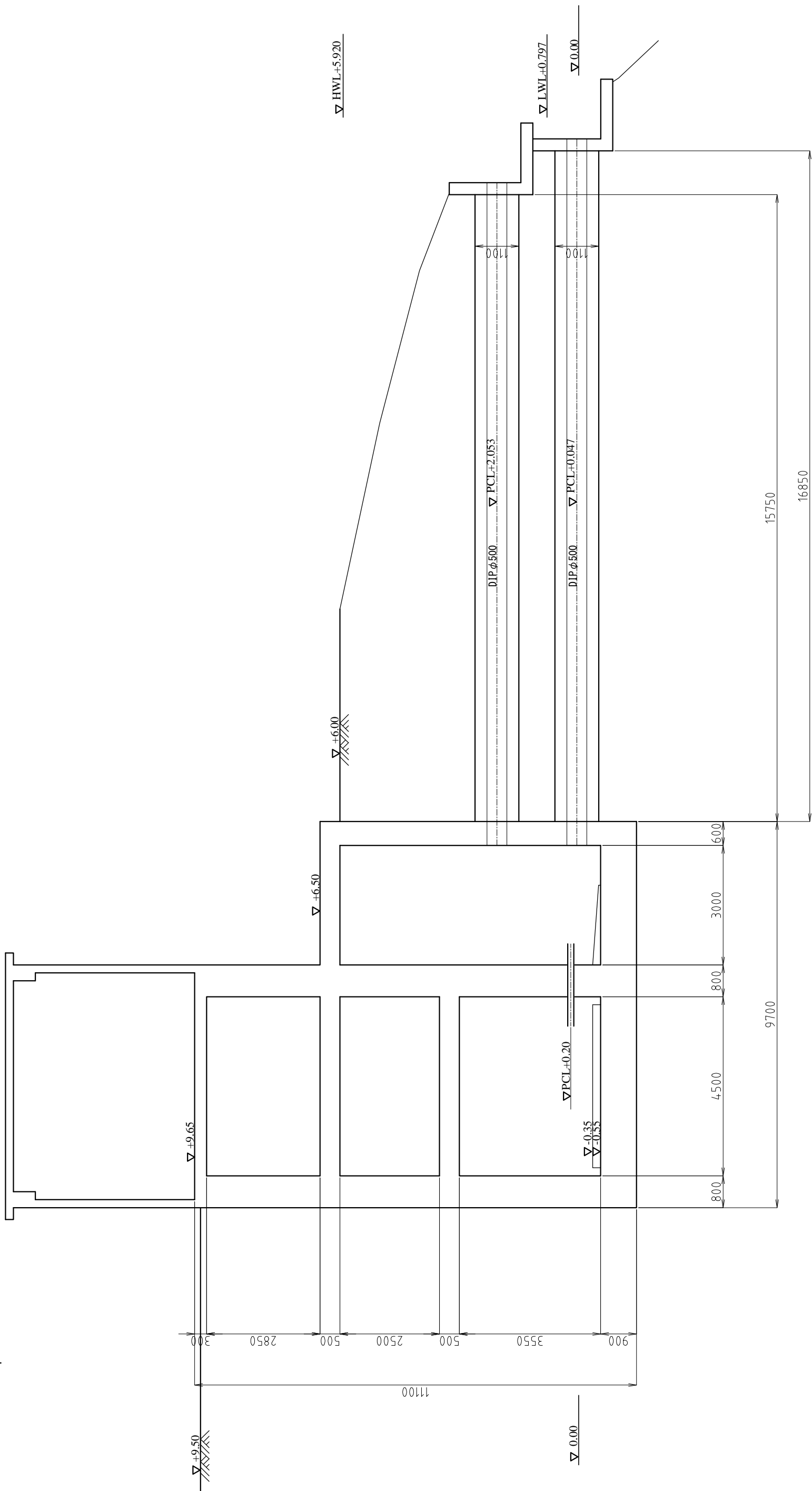


PROJECT	THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE		DESCRIPTION	Raw Water Pump Station General Plan		APPROVED BY	DATE	DRAWING No	KL-01
	MINISTRY OF INDUSTRY & HANDICRAFT NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU			PREPARED BY	DATE				SCALE

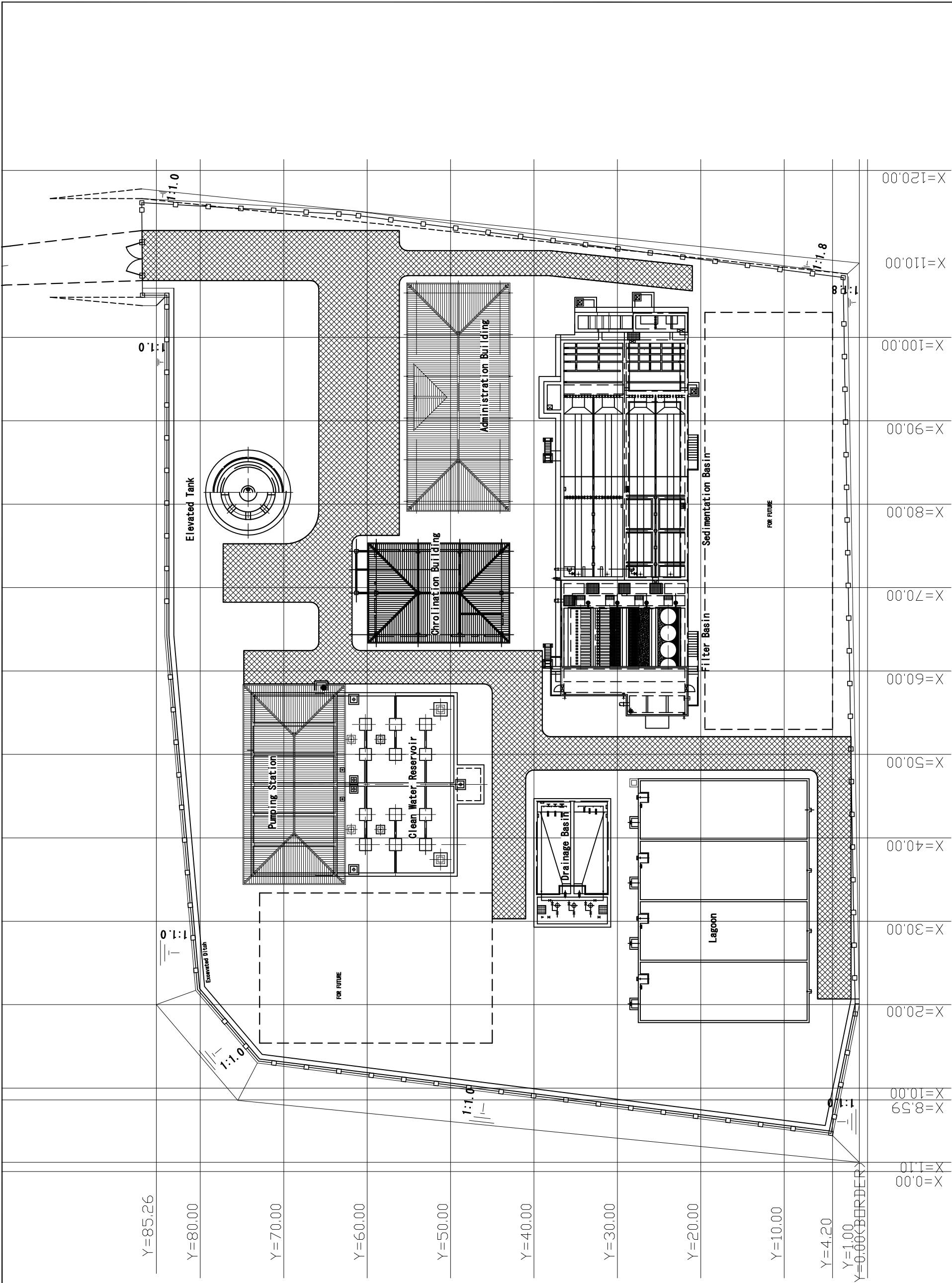
Raw Water Pump Station
Scale=1/100

Y=0.0

A-A

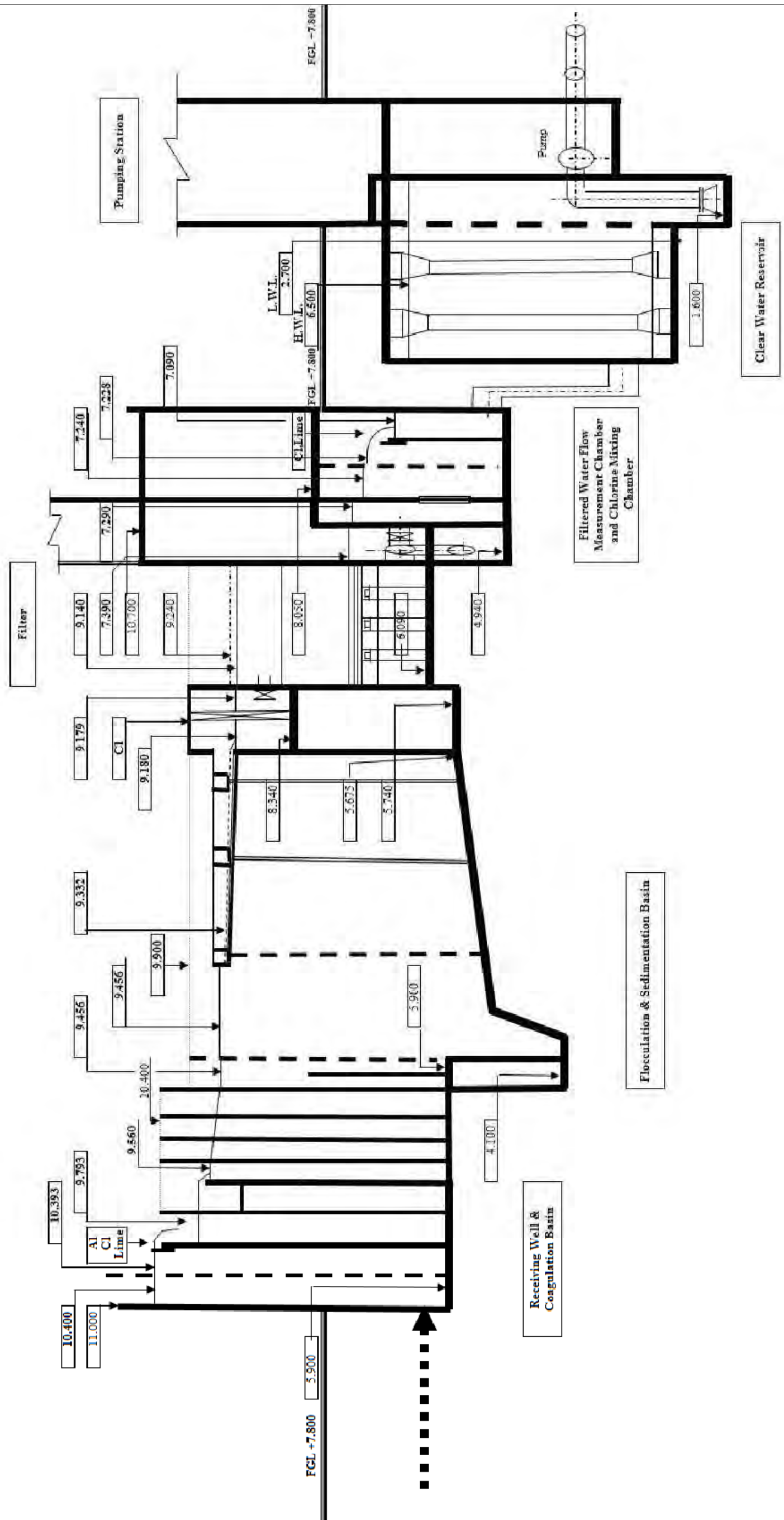


PROJECT	THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE			DESCRIPTION	Raw Water Pump Station Facilities Structure			APPROVED BY	DATE	DRAWING No	KI-02
	MINISTRY OF INDUSTRY & HANDICRAFT				NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU						PREPARED BY

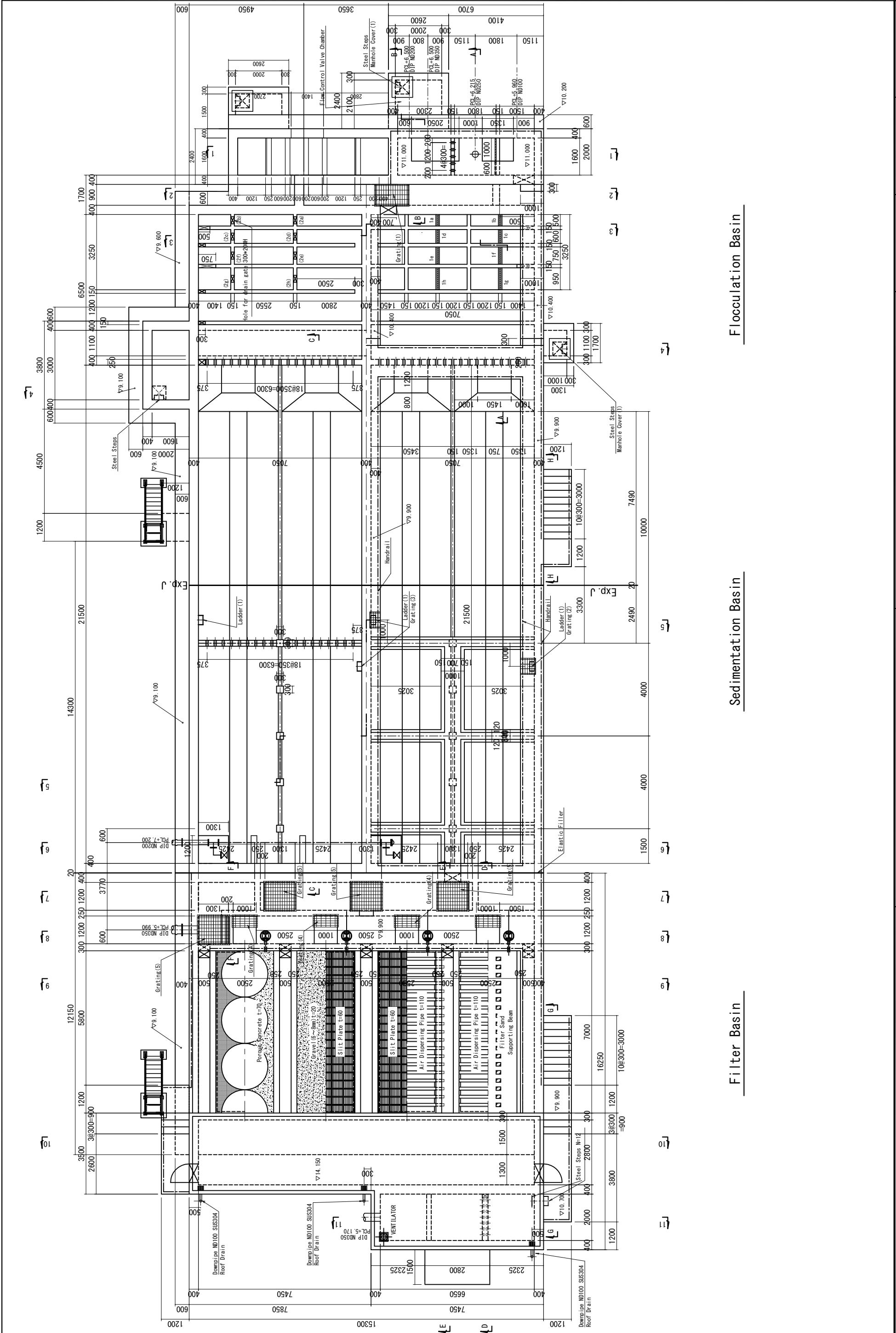


PROJECT	DESCRIPTION	APPROVE BY	DATE
THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE	Water Treatment Plant General Plan		
	MINISTRY OF INDUSTRY & HANDICRAFT NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU	PREPARED BY	DATE
		DRAWING No	SCALE
		KT-01	1:500

FLOW DIAGRAM OF KAMPOT WATER TREATMENT PLANT



PROJECT THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE	DESCRIPTION Flow Diagram of Kampot Water Treatment Plant	APPROVED BY MINISTRY OF INDUSTRY & HANDICRAFT	DATE DATE	DRAWING No KT-02
		PREPARED BY NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU	DATE DATE	SCALE NONE

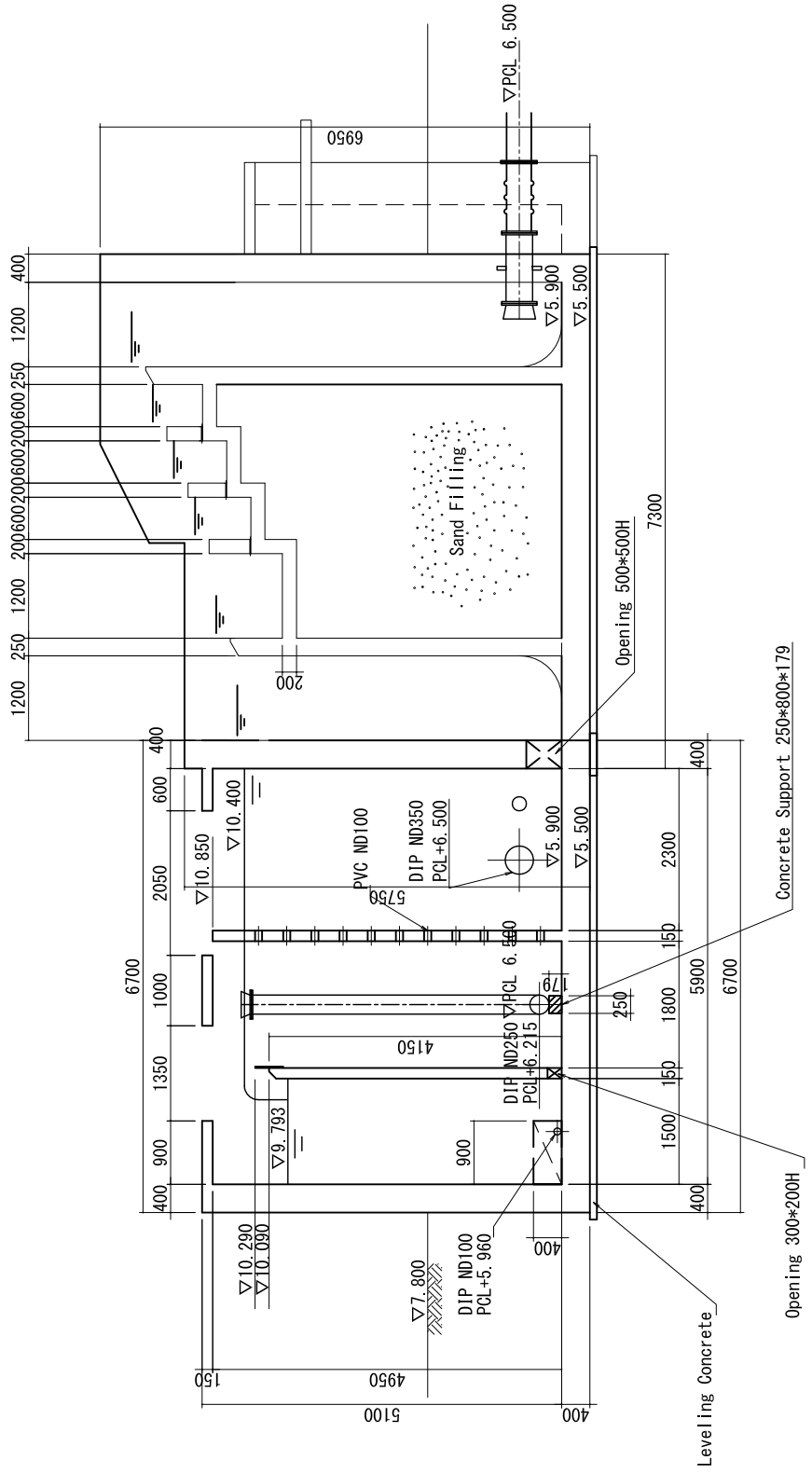


Flocculation Basin

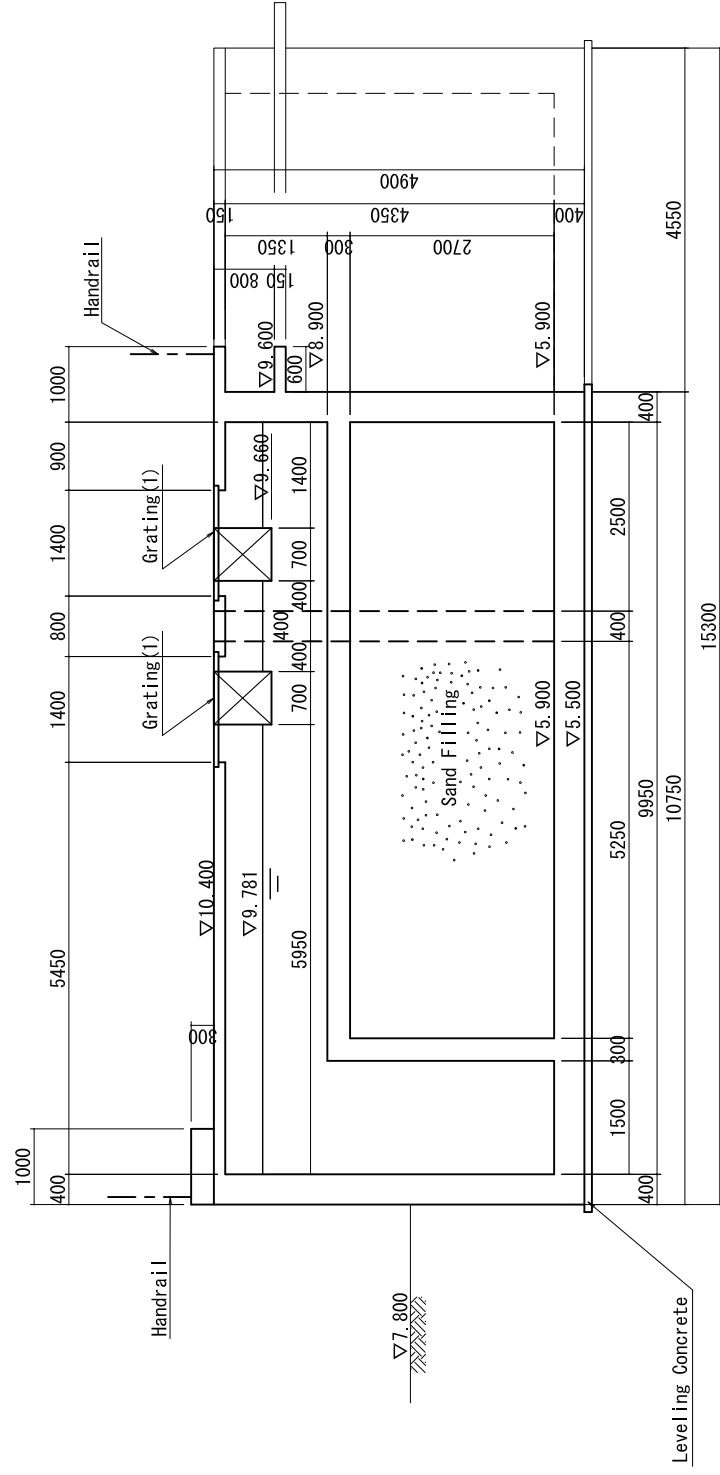
Sedimentation Basin

Filter Basin

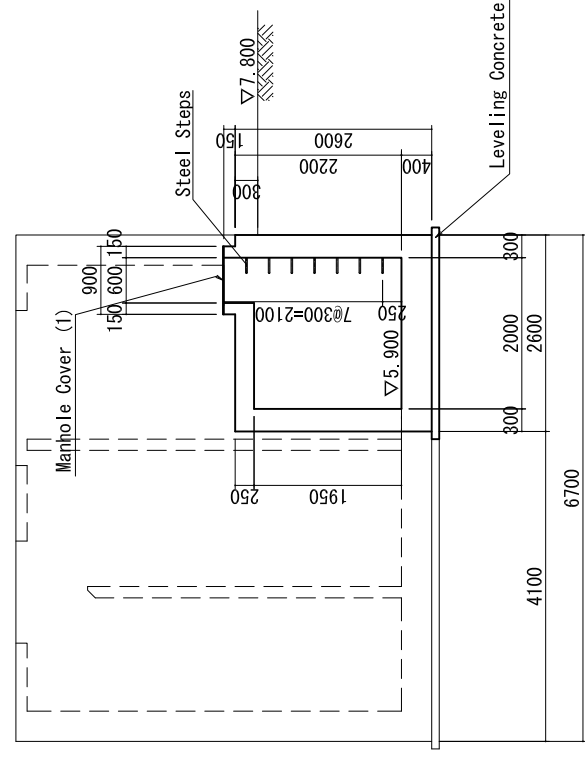
PROJECT	DESCRIPTION			DRAWING No
	Water Treatment Facilities Structure(1)			
THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE				DATE
MINISTRY OF INDUSTRY & HANDICRAFT				APPROVED BY
NIHON SUIDO CONSULTANTS CO., LTD.				PREPARED BY
WATER AND SEWER BUREAU, CITY OF KITAKYUSHU				SCALE
				1:150



1 - 1 section

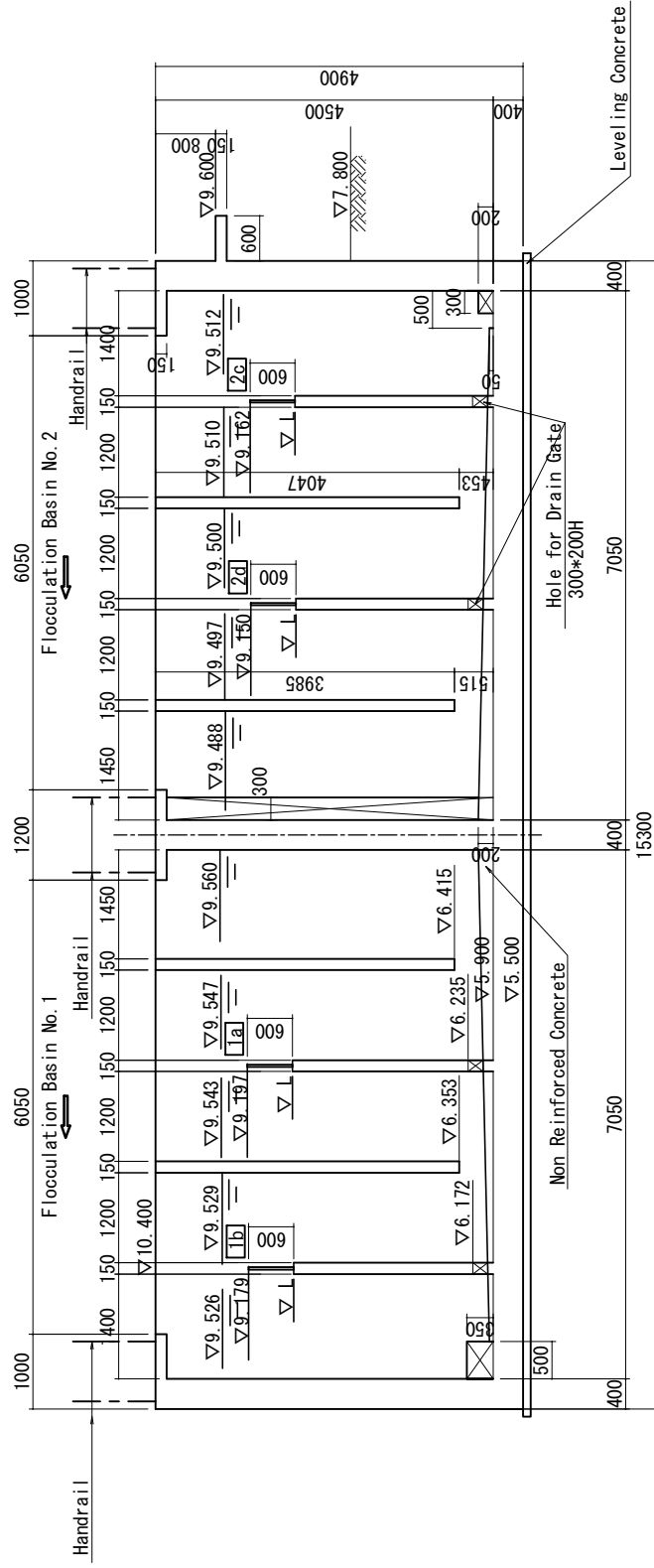


2 - 2 section

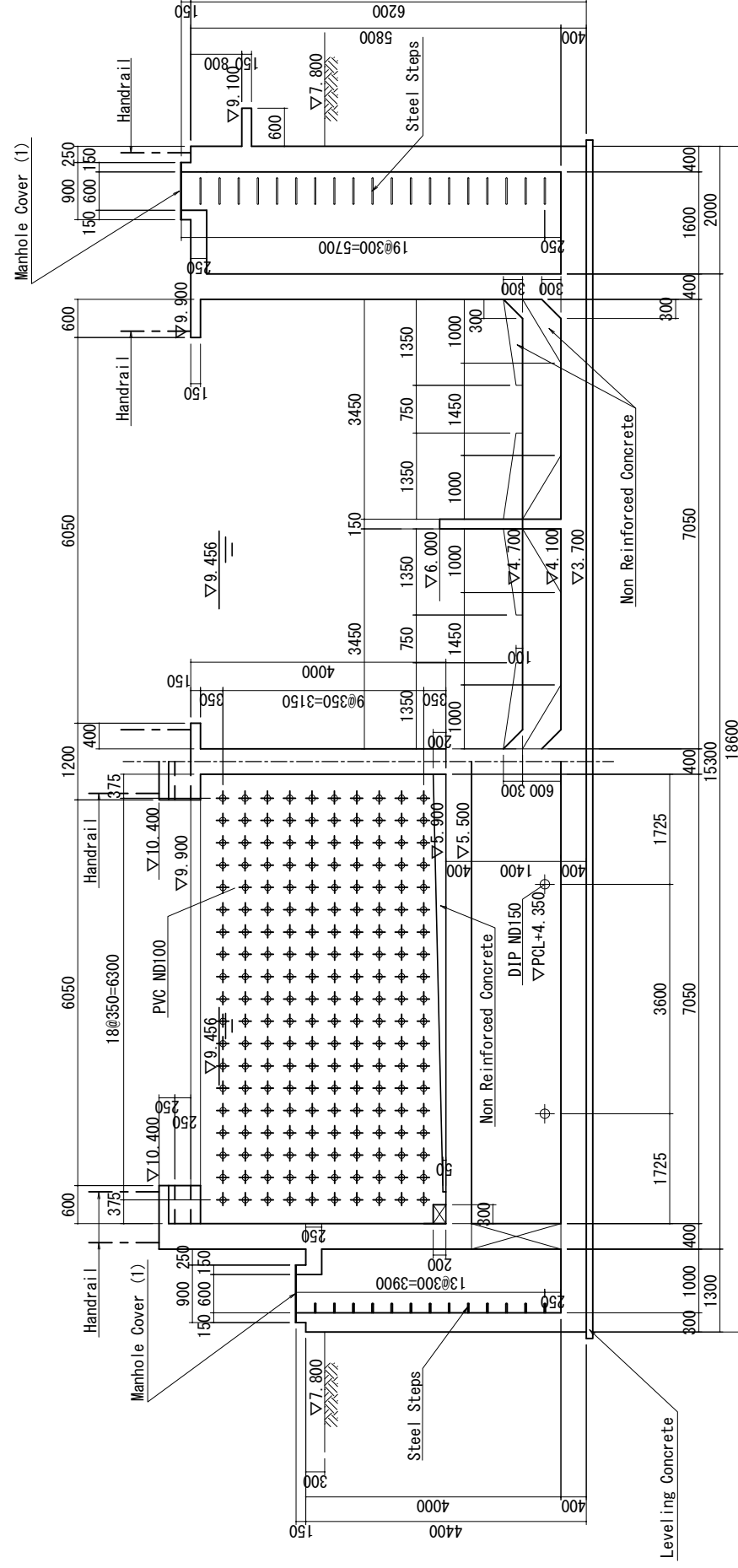


Flow Control Valve Chamber

PROJECT	DESCRIPTION	APPROVED BY	DATE	DRAWING No
THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE	Water Treatment Facilities Structure(2)	PREPARED BY	DATE	KT-04
				SCALE
				1:100

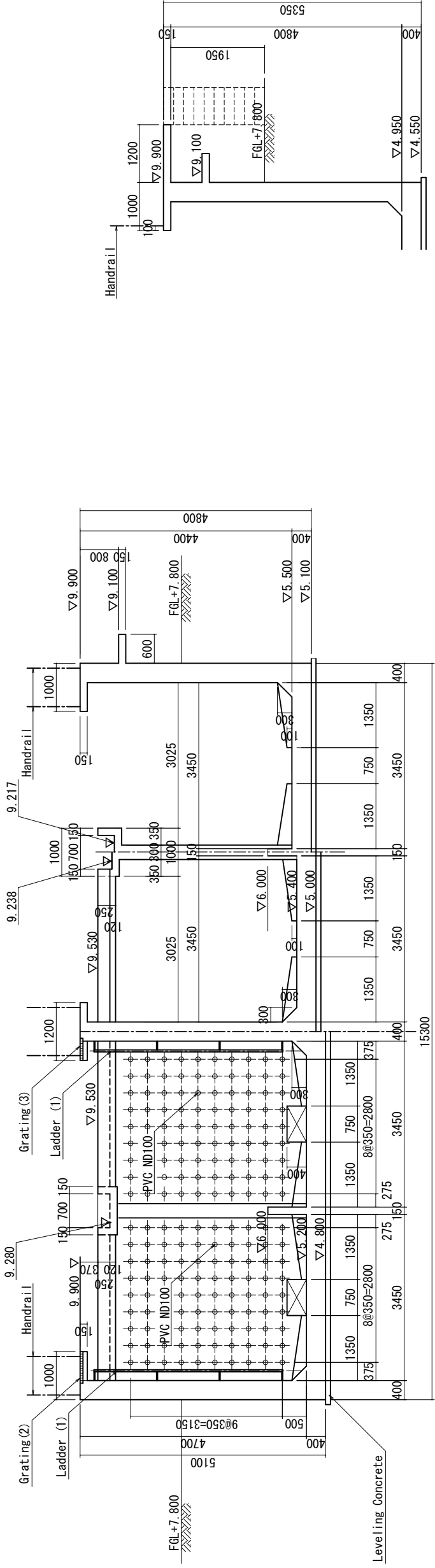


3 - 3 section



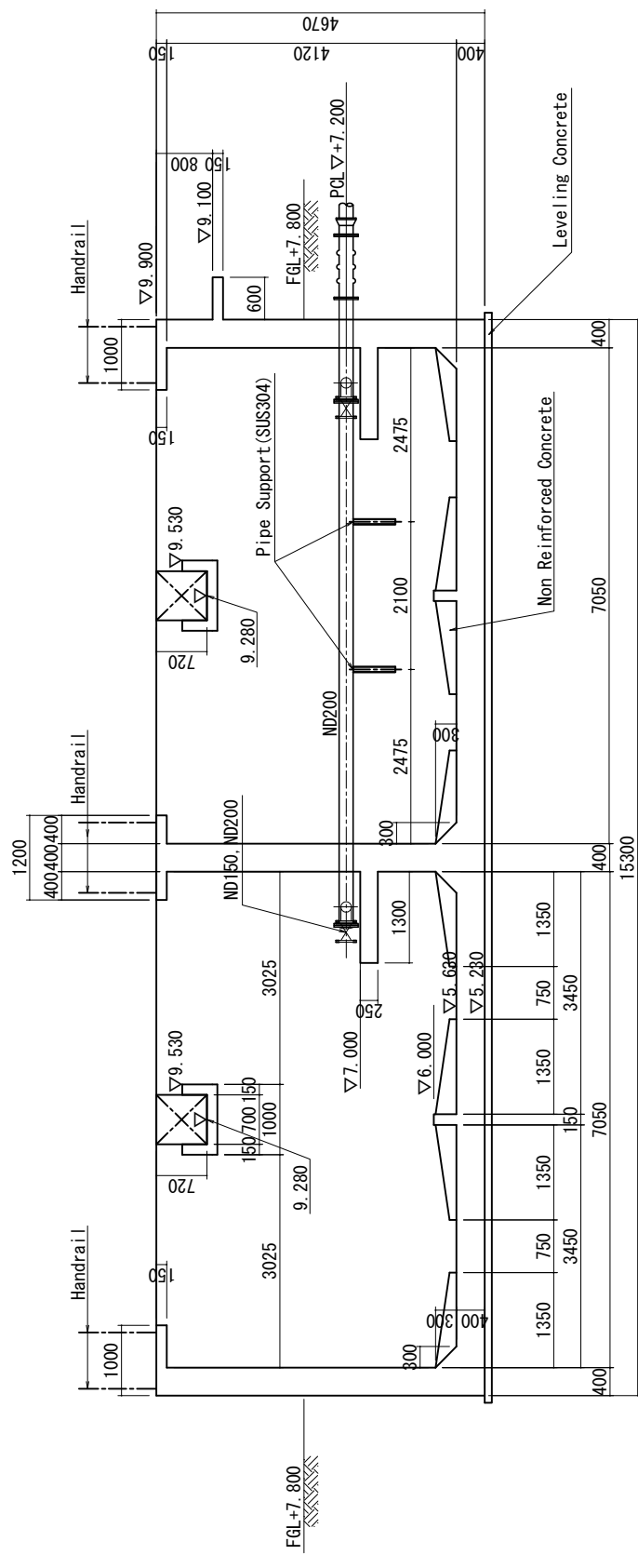
4 - 4 section

PROJECT	DESCRIPTION	APPROVED BY	DATE	DRAWING No
				KT-05
THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE	Water Treatment Facilities Structure(3)	PREPARED BY	DATE	SCALE
				1:100



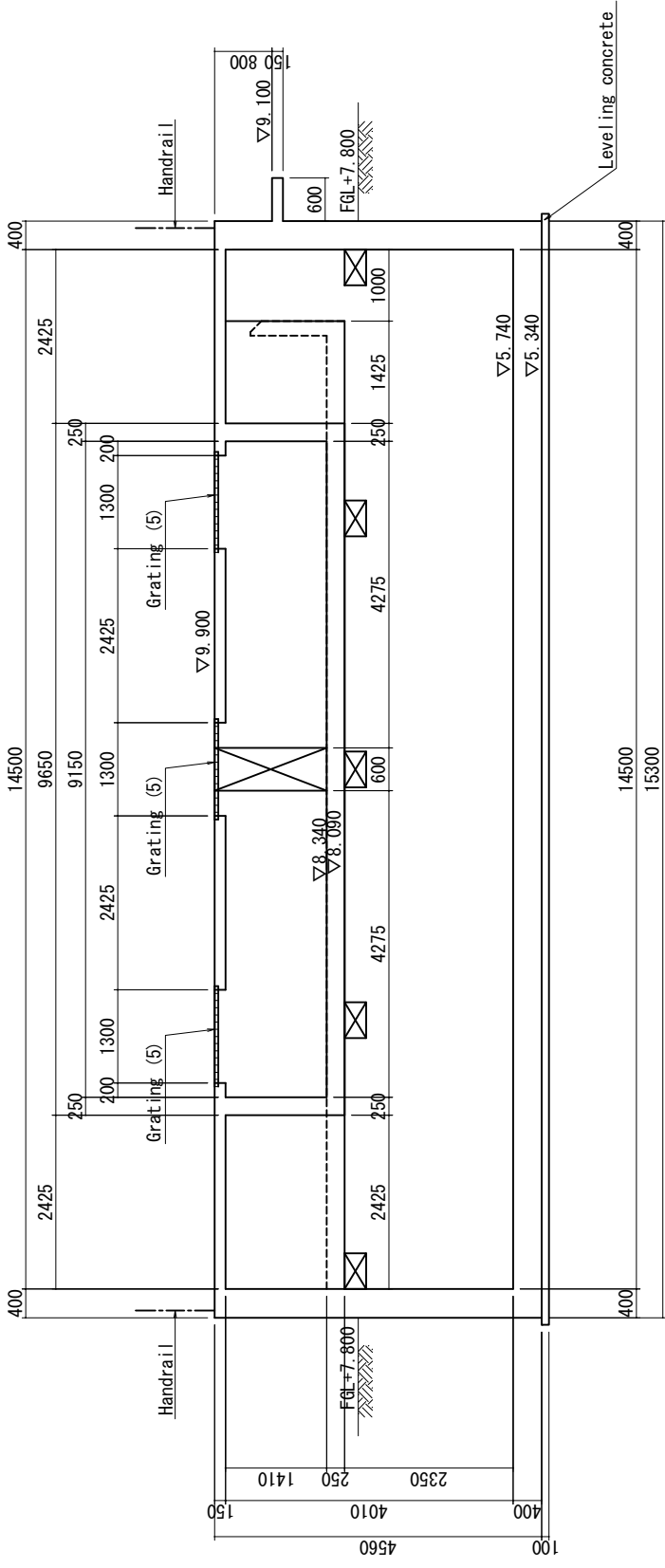
5 - 5 section

Stage (Steel Stairs)

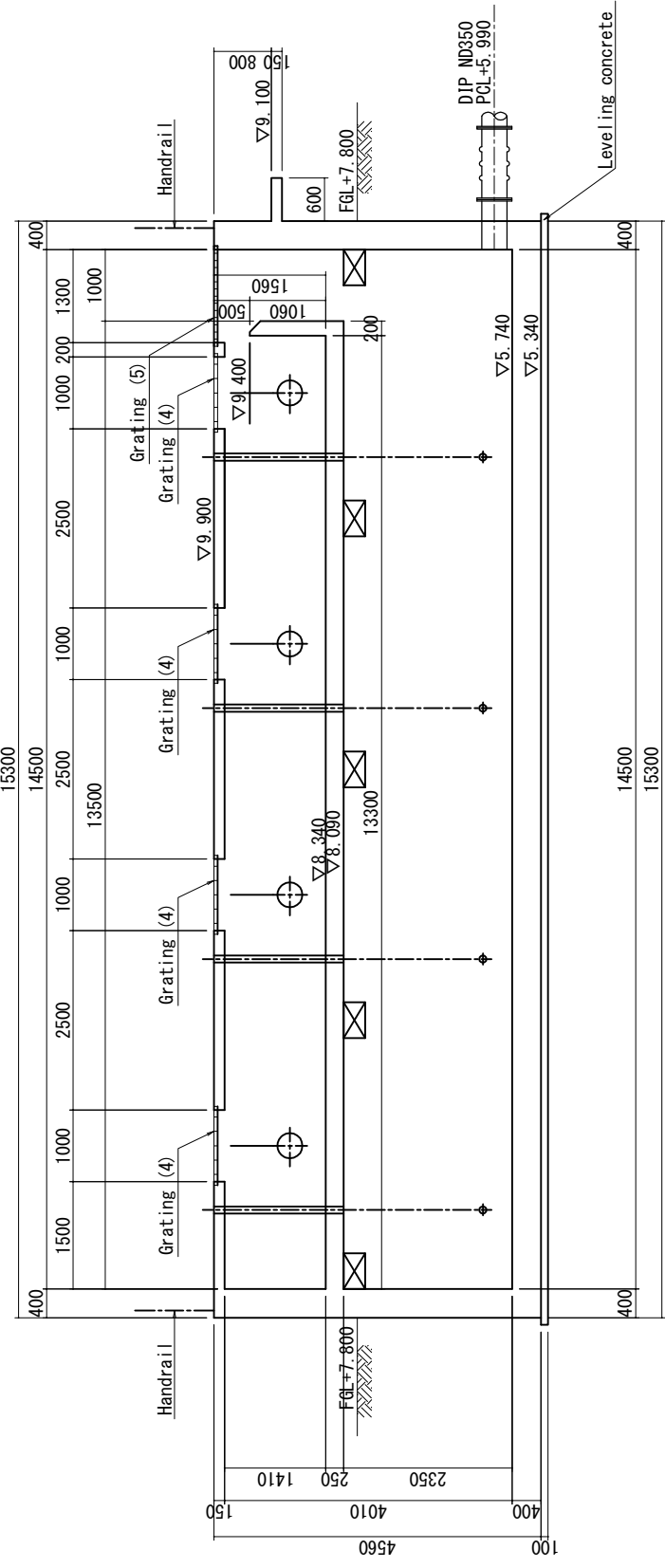


6 - 6 section

PROJECT	DESCRIPTION	MINISTRY OF INDUSTRY & HANDICRAFT NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU	APPROVED BY	DATE	DRAWING No
			PREPARED BY	DATE	KT-06
THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE			SCALE 1:100		

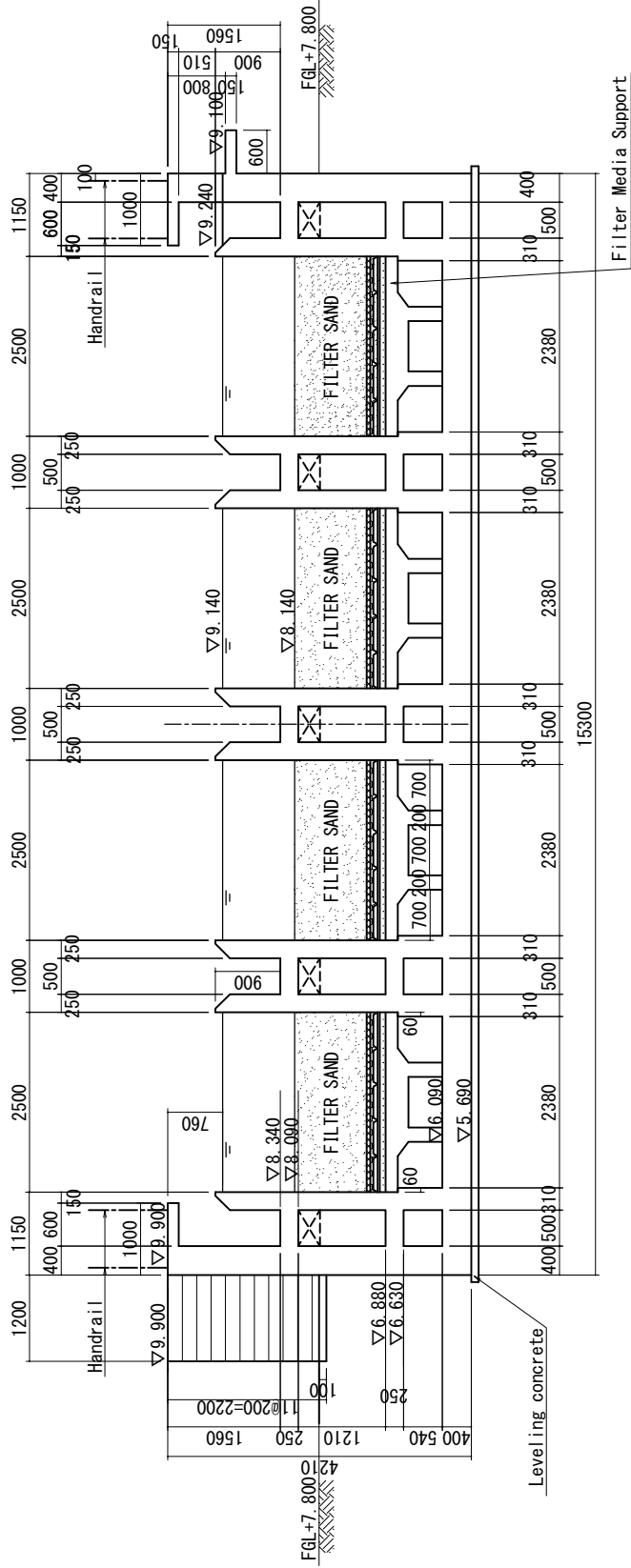


7 - 7 section

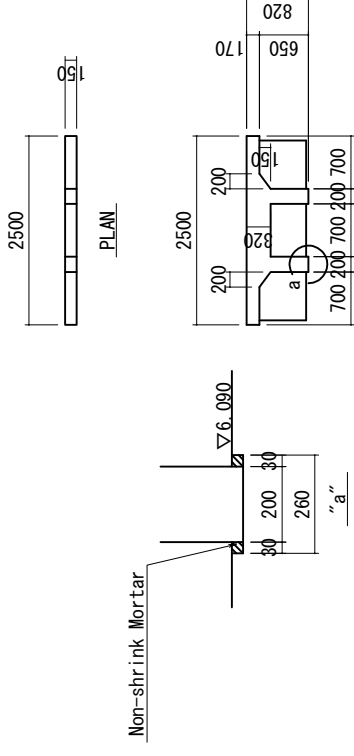


8 - 8 section

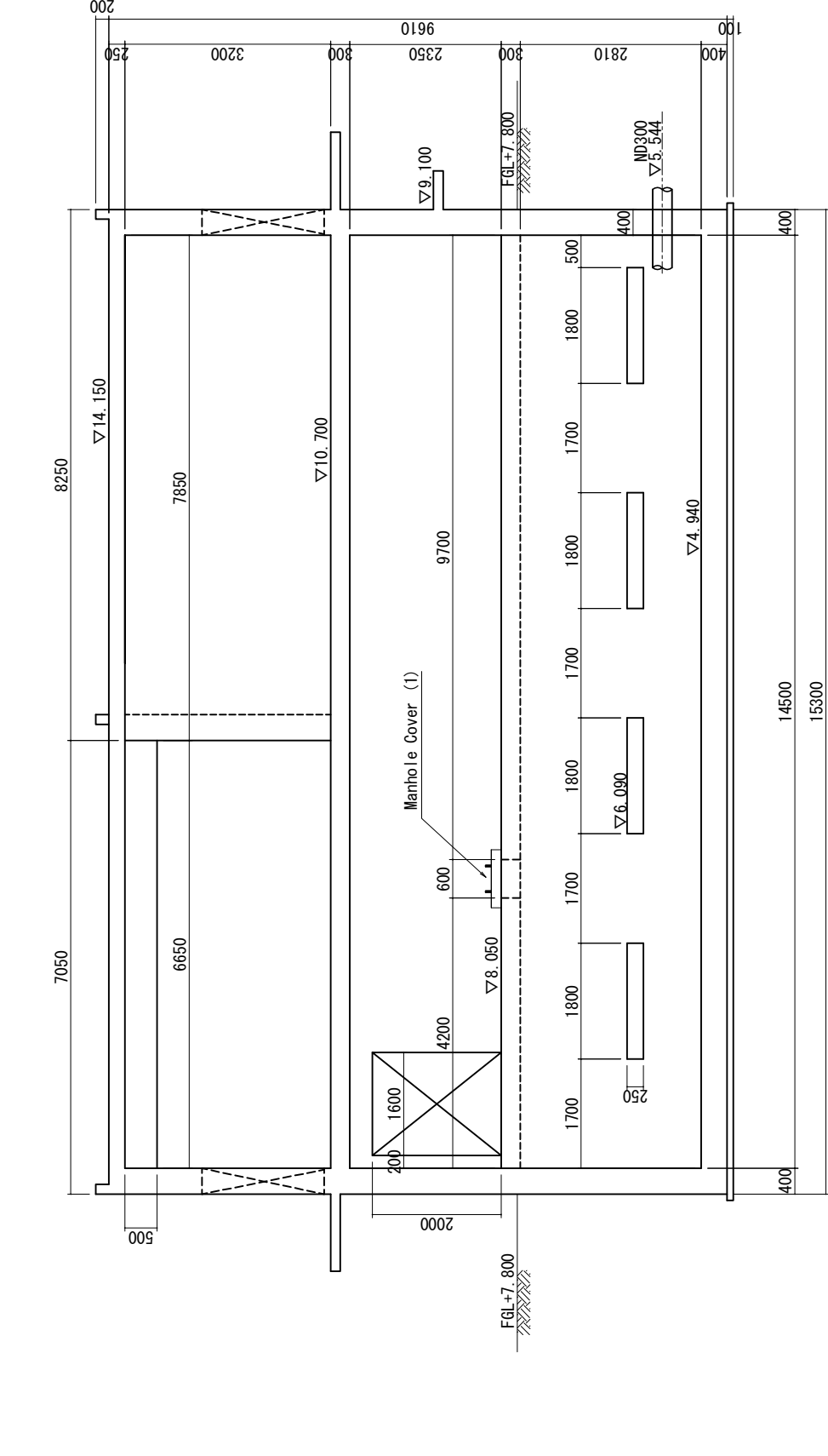
PROJECT	DESCRIPTION	APPROVED BY	DATE	DRAWING No
				KT-07
THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE	Water Treatment Facilities Structure(5)	PREPARED BY	DATE	SCALE
				1:100
MINISTRY OF INDUSTRY & HANDICRAFT NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU				



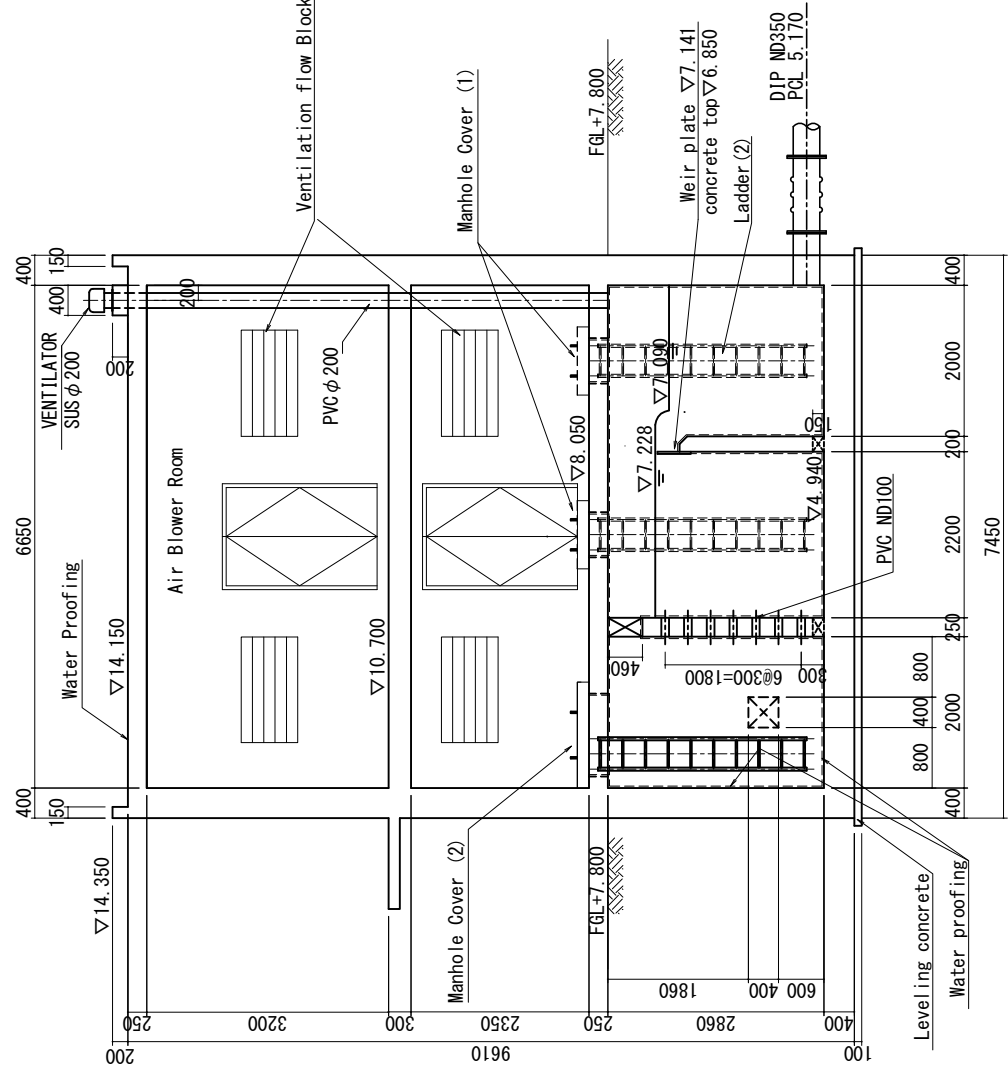
9 - 9 section



Filter Media Support

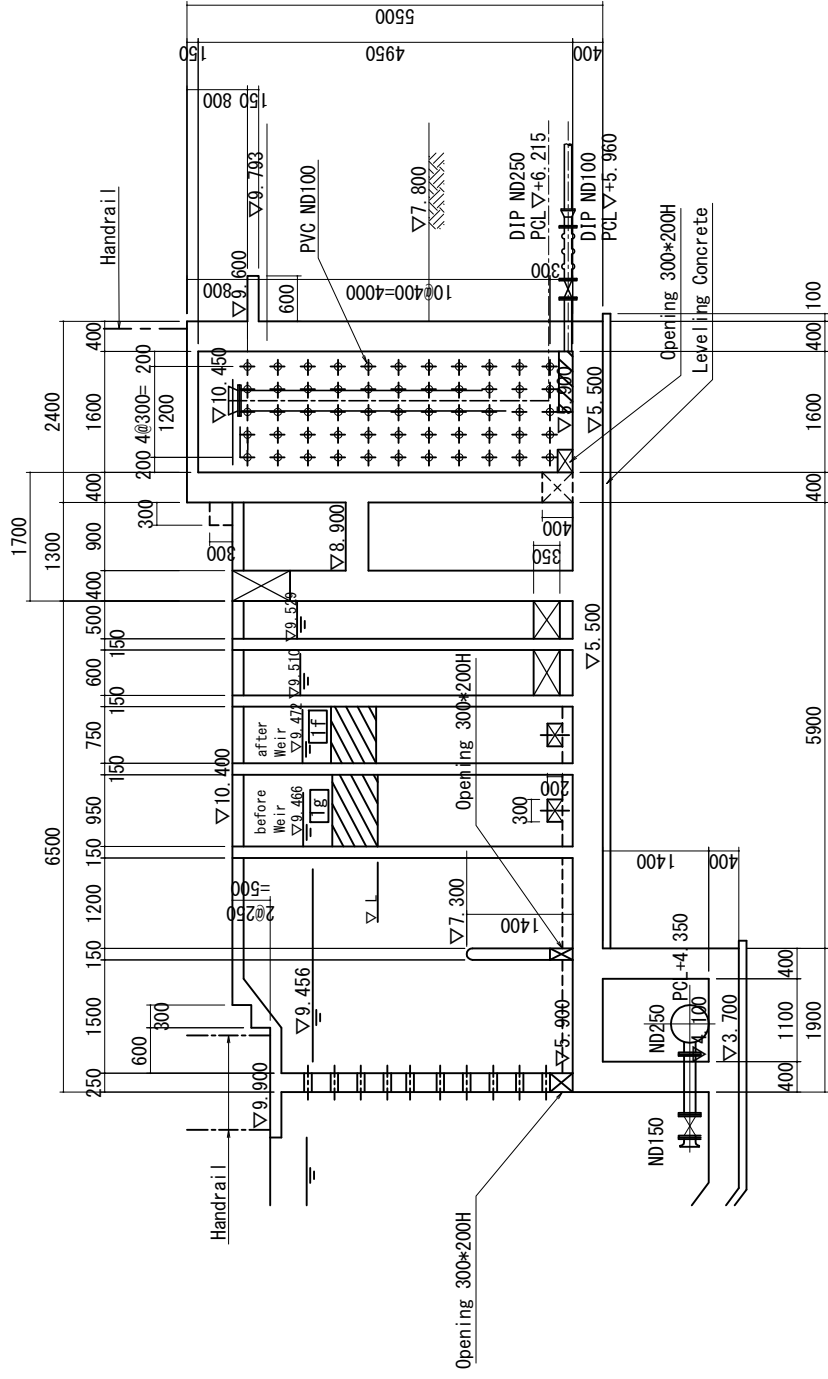


10 - 10 section



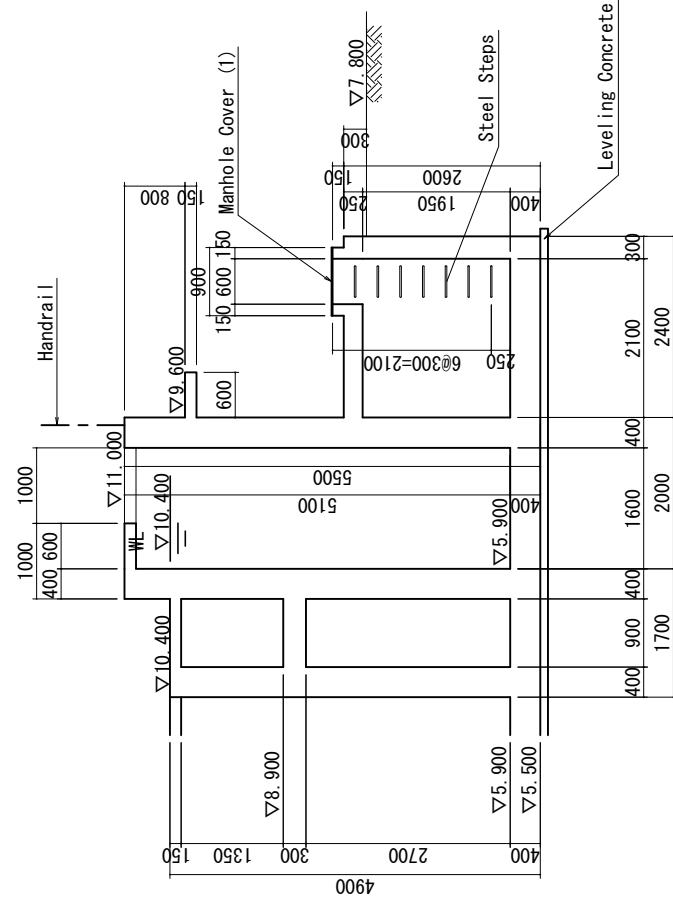
11 - 11 section

PROJECT	THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE		DESCRIPTION	Water Treatment Facilities Structure(6)		DRAWING No	KT-08		
	MINISTRY OF INDUSTRY & HANDICRAFT			NIHON SUIDO CONSULTANTS CO., LTD.			DATE		SCALE
MINISTRY OF INDUSTRY & HANDICRAFT		NIHON SUIDO CONSULTANTS CO., LTD.		WATER AND SEWER BUREAU, CITY OF KITAKYUSHU		APPROVED BY		DATE	
MINISTRY OF INDUSTRY & HANDICRAFT		NIHON SUIDO CONSULTANTS CO., LTD.		WATER AND SEWER BUREAU, CITY OF KITAKYUSHU		PREPARED BY		DATE	



A - A section

Top elevation of concrete at Weir position



B - B section

No.	Inlet W. L. (before Weir) ∇ L	Width	Top of Concrete ∇ L
a	9.547	500	8.597
b	9.529	500	8.579
c	9.512	600	8.562
d	9.500	600	8.550
e	9.482	750	8.532
f	9.474	750	8.524
g	9.466	950	8.516
h	9.461	950	8.511

PROJECT

THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE

DESCRIPTION

Water Treatment Facilities Structure(7)

MINISTRY OF INDUSTRY & HANDICRAFT

NIHON SUIDO CONSULTANTS CO., LTD.
WATER AND SEWER BUREAU, CITY OF KITAKYUSHU

DATE

APPROVED BY

DRAWING No

KT-09

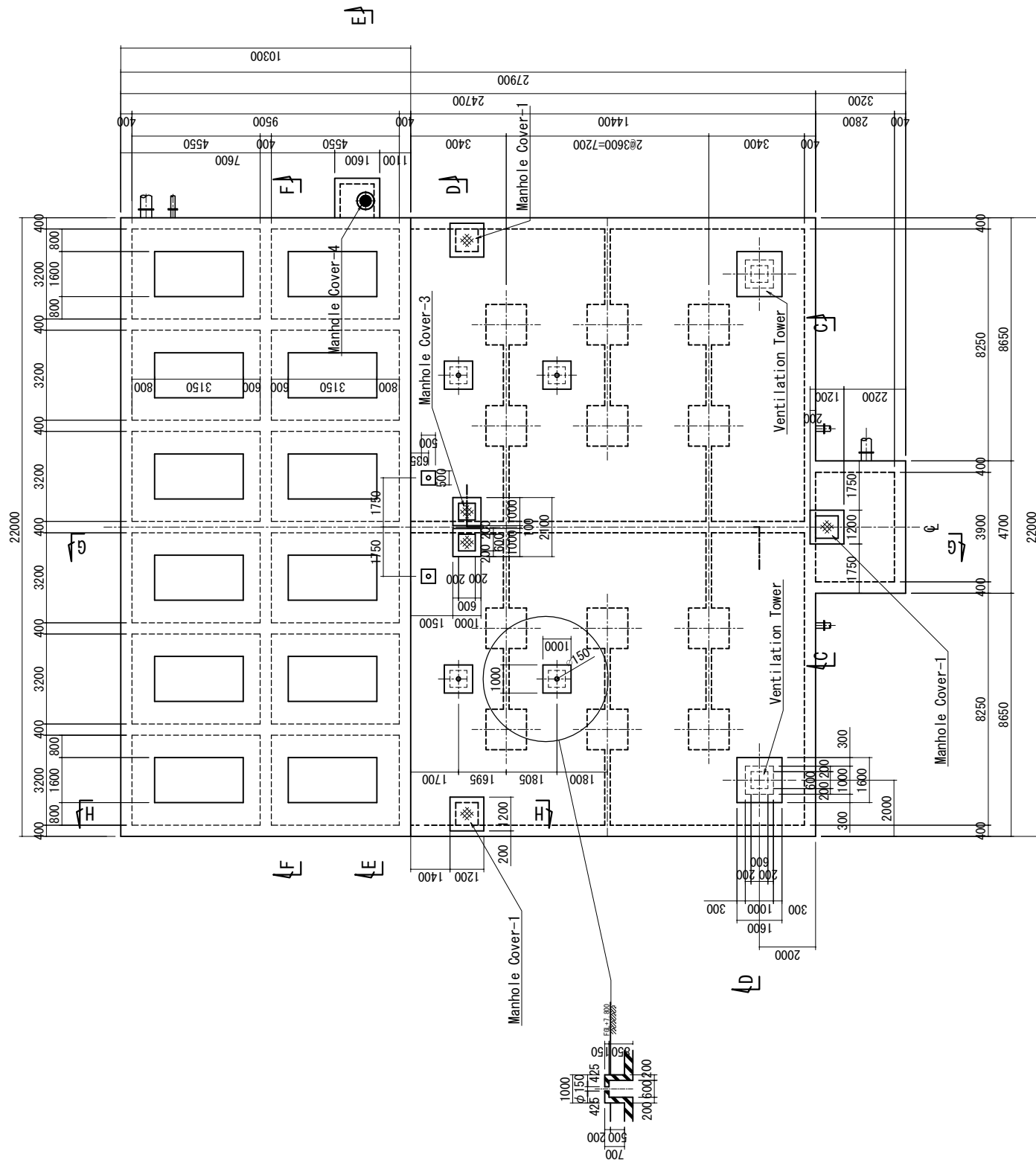
DATE

PREPARED BY

SCALE

1:100

Service Reservoir and Pumping Station
Scale=1/200

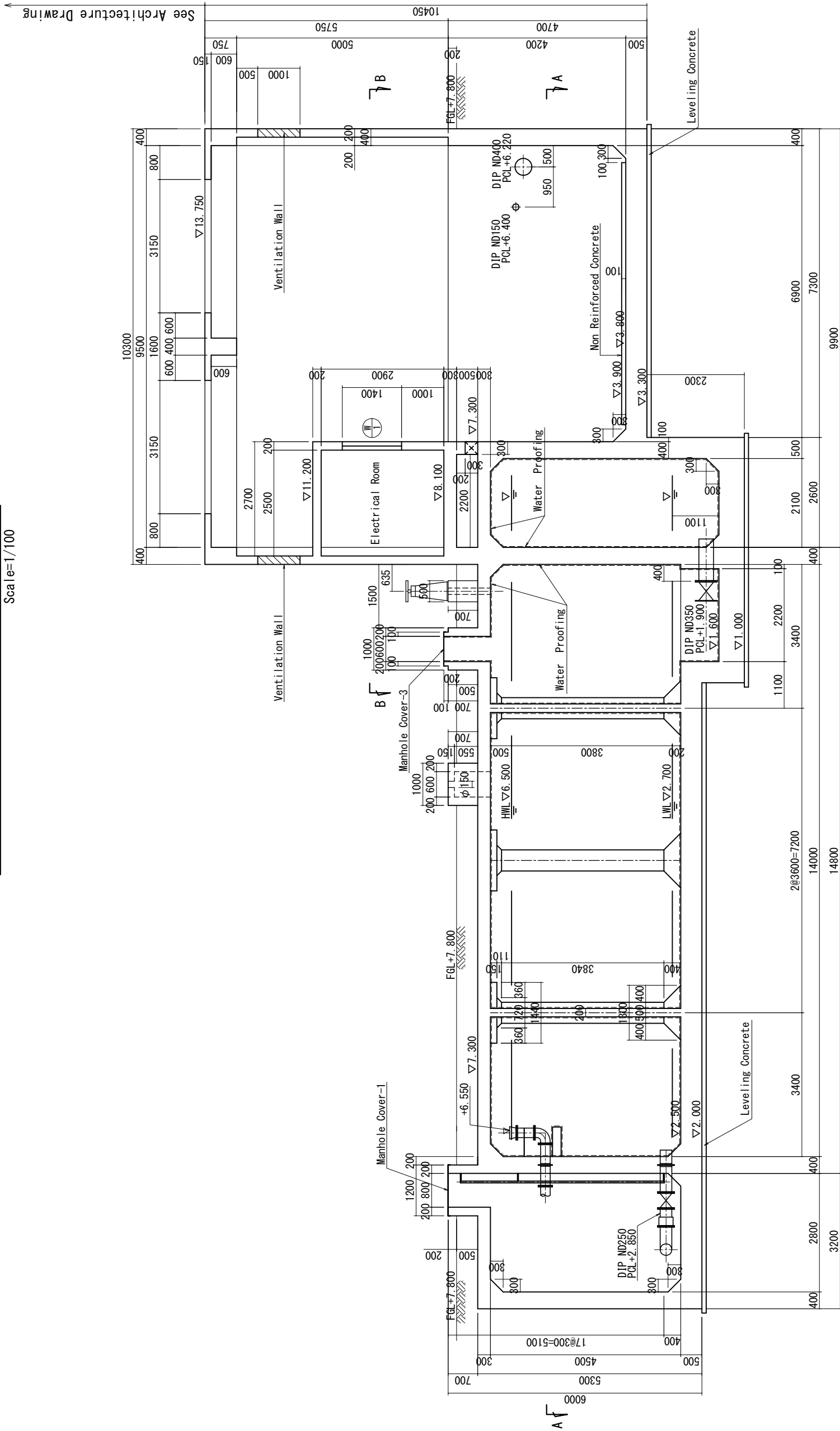


PLAN

PROJECT	DESCRIPTION	MINISTRY OF INDUSTRY & HANDICRAFT NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU	APPROVED BY	DATE	DRAWING No
			PREPARED BY	DATE	SCALE
THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE					KT-10
					1:200

Service Reservoir and Pumping Station

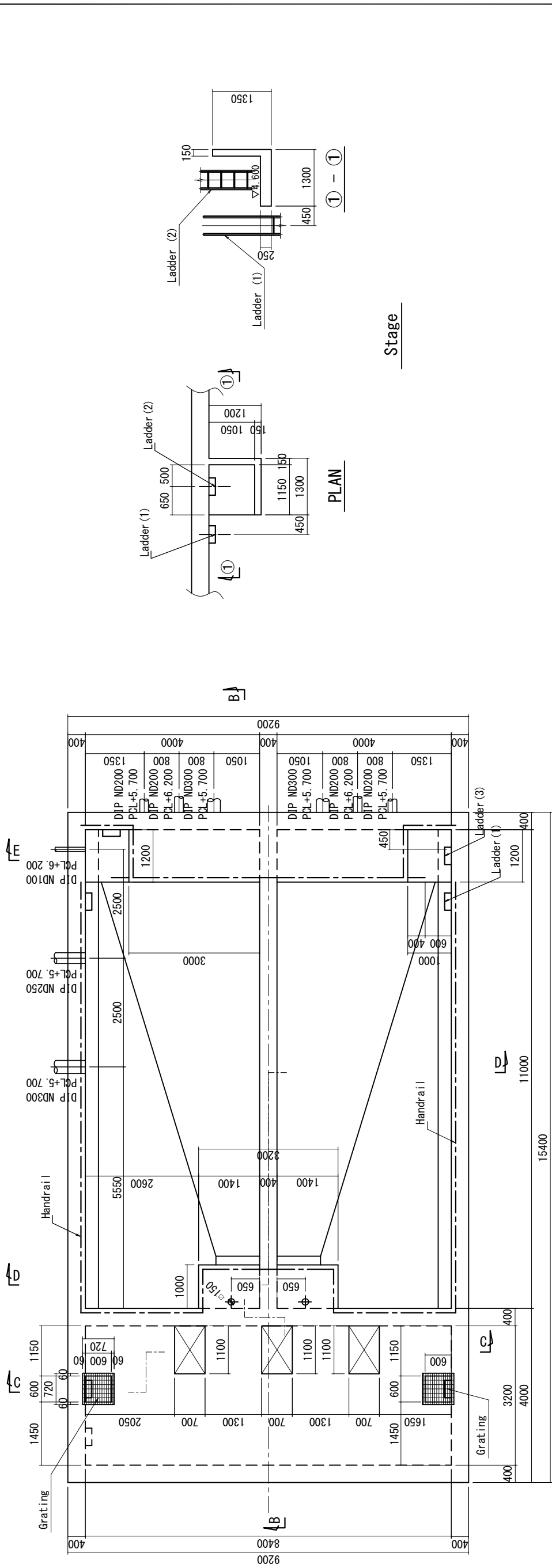
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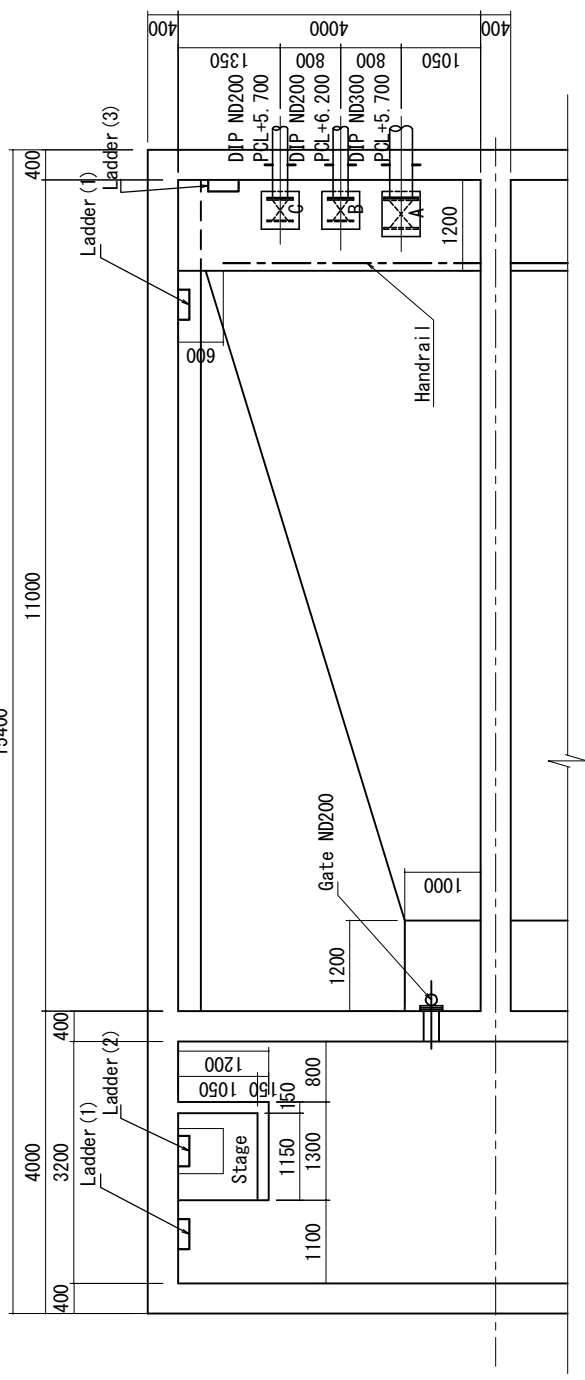
See Architecture Drawing

G - G section

PROJECT	DESCRIPTION	MINISTRY OF INDUSTRY & HANDICRAFT	APPROVED BY	DATE	DRAWING No
	Service Reservoir and Pumping Station Structure(2)	NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU	PREPARED BY	DATE	KT-11
THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE					SCALE
					1:100

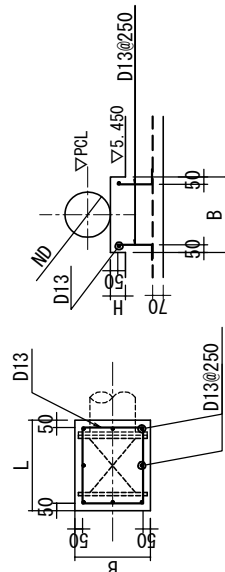


PLAN

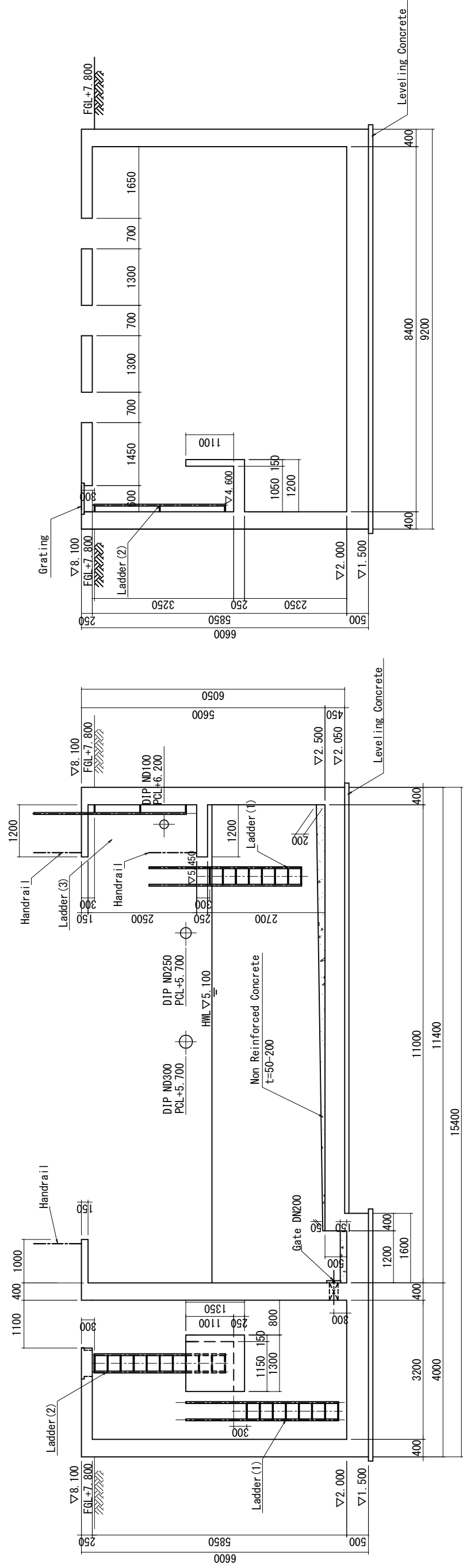


A - A section

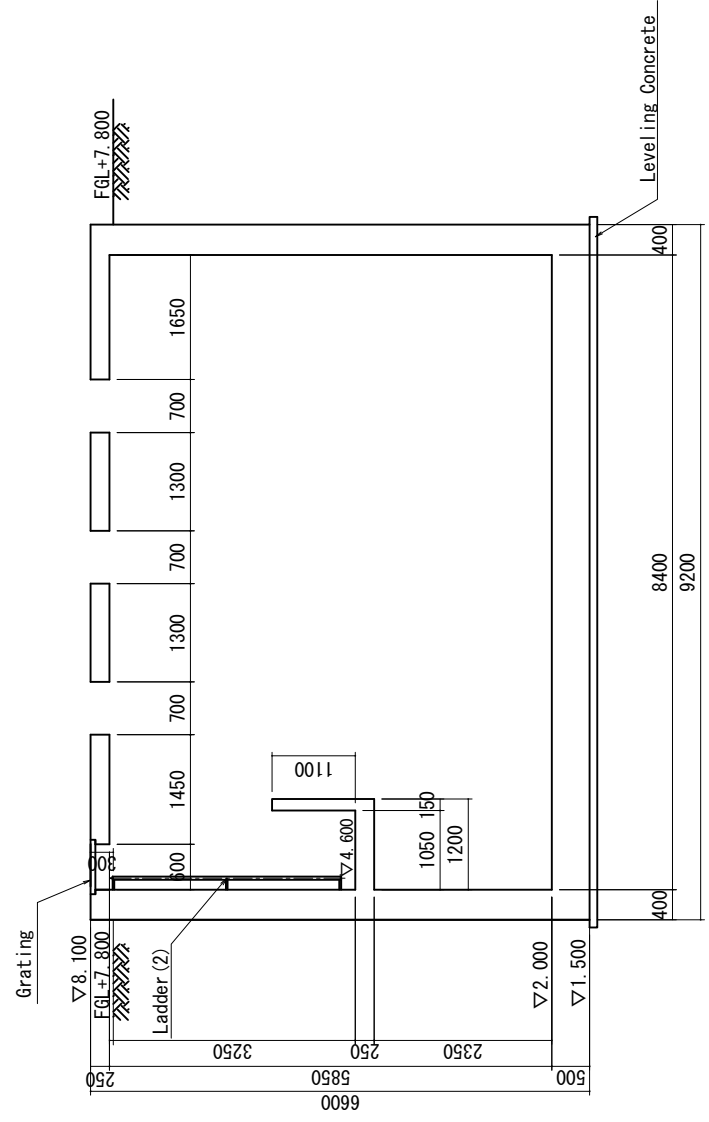
	ND (mm)	PCL (m)	B (mm)	L (mm)	H (mm)
A	300	+5.700	500	600	100
B	200	+6.200	500	500	650
C	200	+5.700	500	500	150



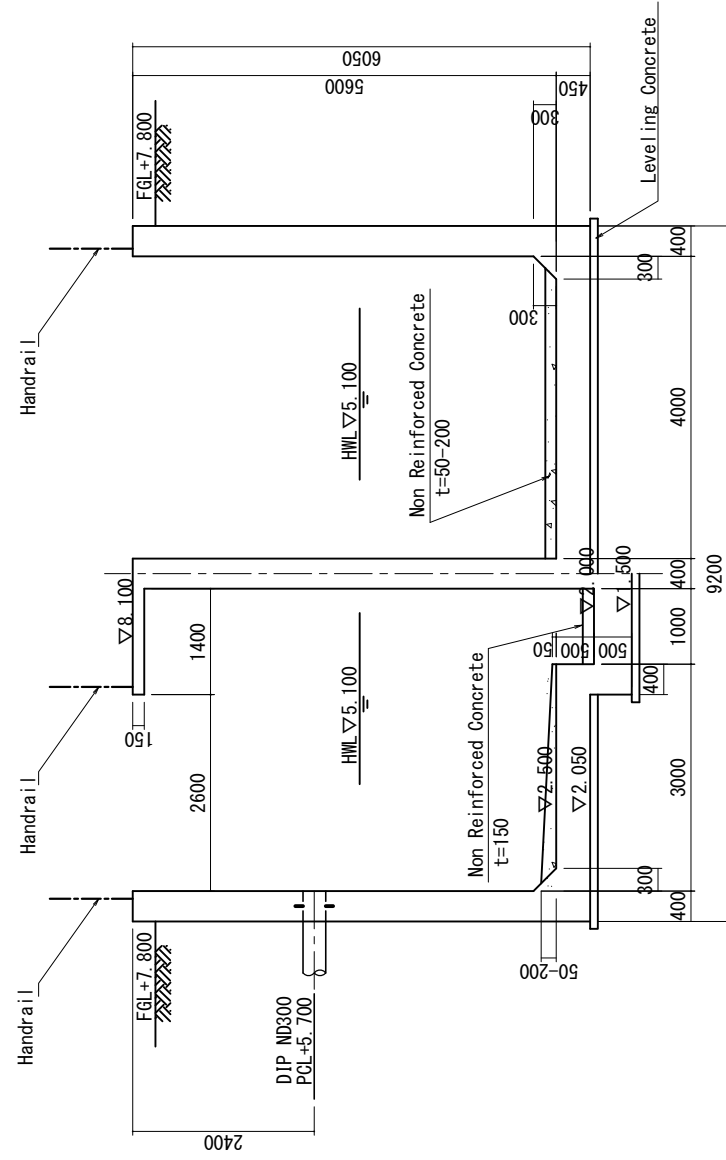
PROJECT	THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE	DESCRIPTION	Drainage Basin Structure(1)	MINISTRY OF INDUSTRY & HANDICRAFT	APPROVED BY	DATE	DRAWING No
				NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU	PREPARED BY	DATE	KT-13
				SCALE		1:100, None	



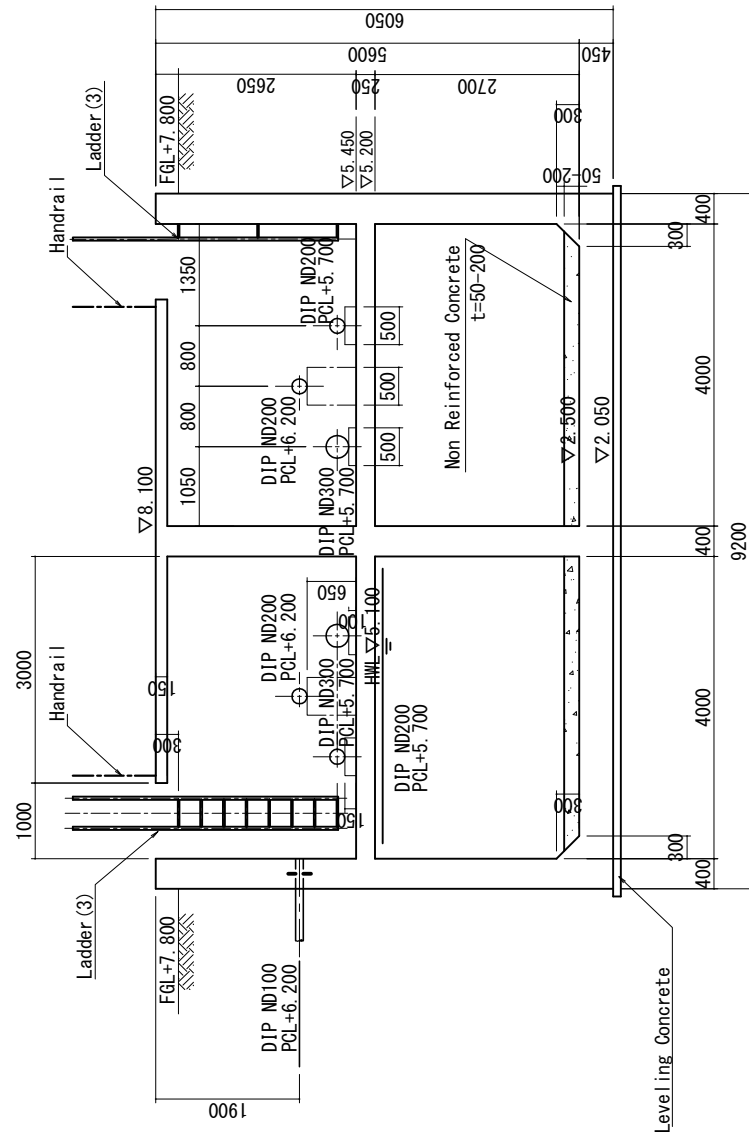
B - B section



C - C section

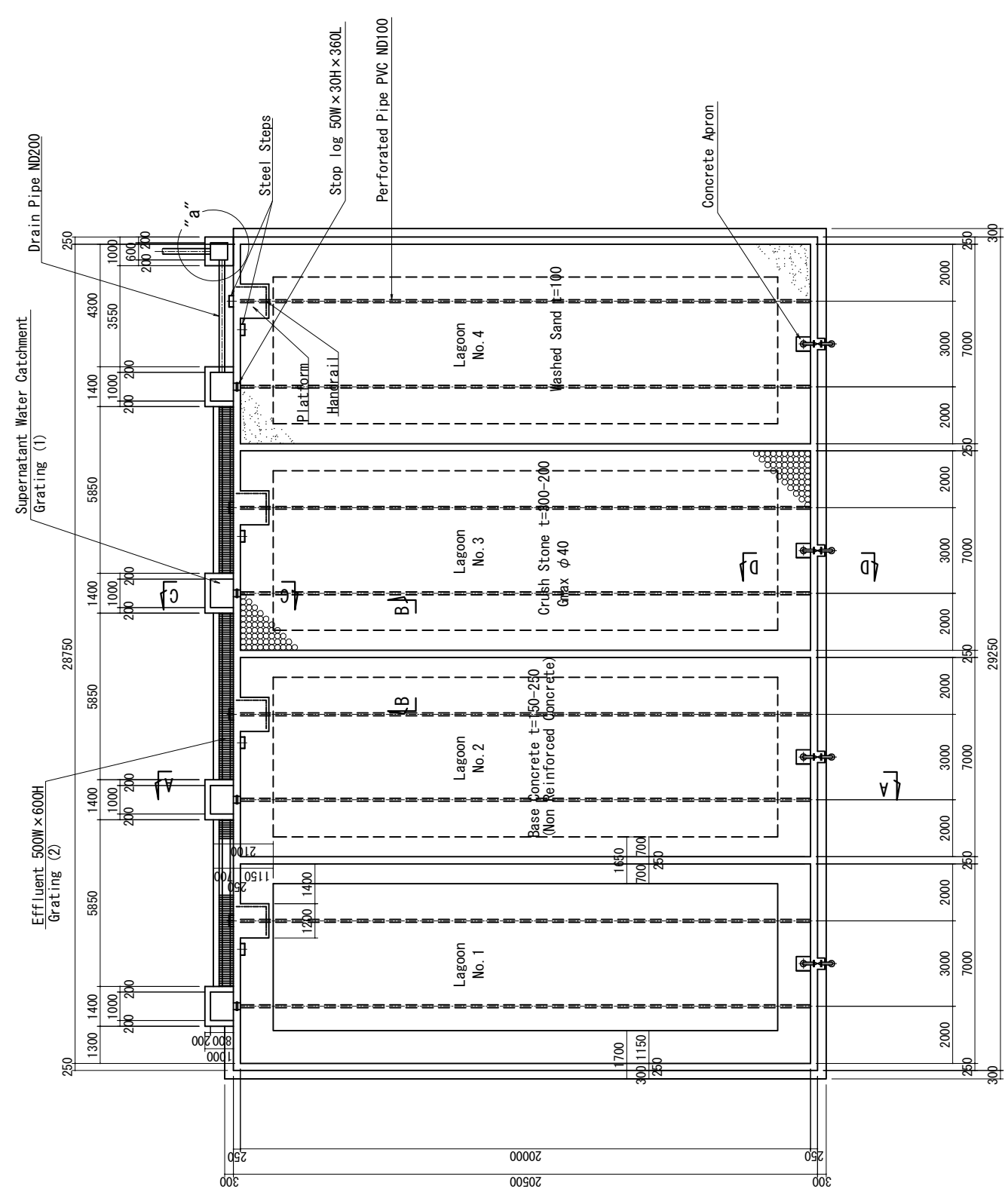
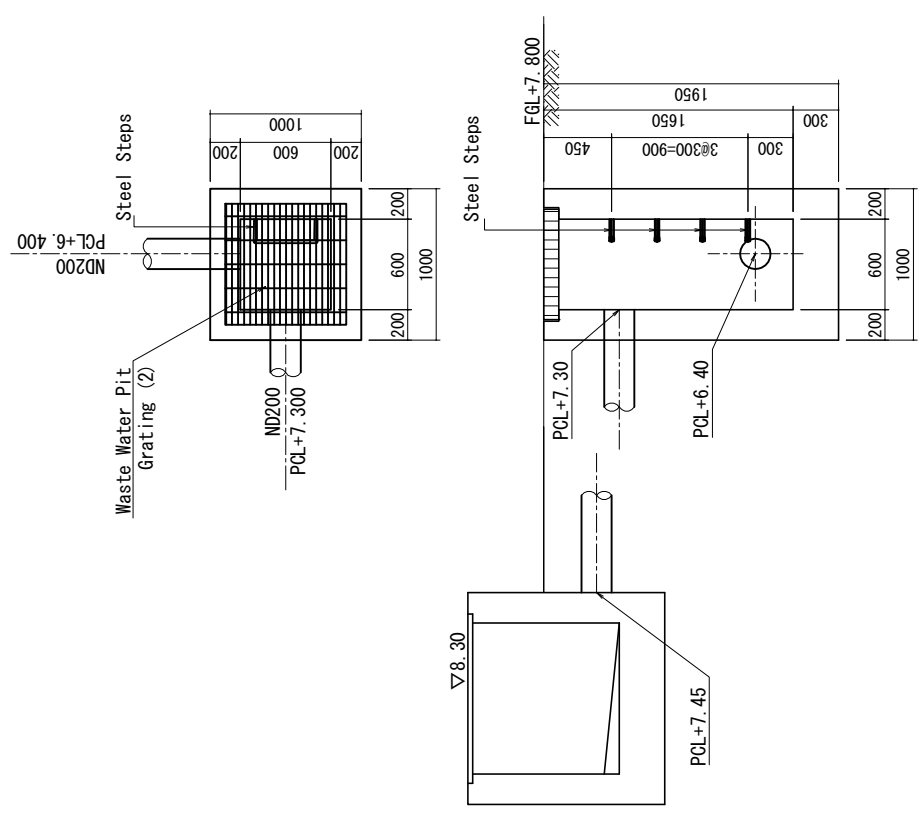


D - D section



E - E section

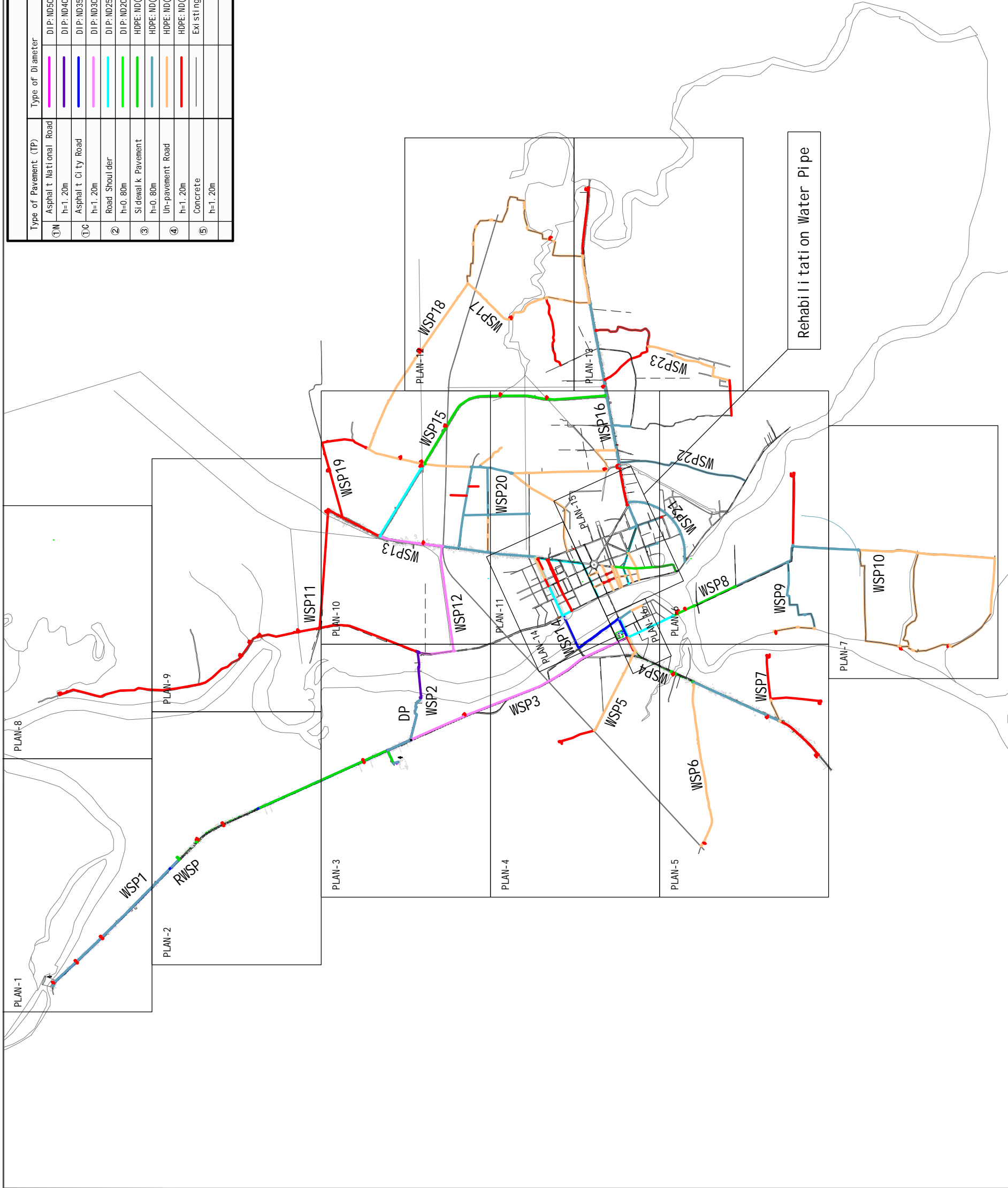
PROJECT	MINISTRY OF INDUSTRY & HANDICRAFT		APPROVED BY	DATE	DRAWING No
	NIHON SUIDO CONSULTANTS CO., LTD.		PREPARED BY	DATE	KT-14
THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE			DESCRIPTION		
			Drainage Basin Structure(2)		
			SCALE		
			1:100		

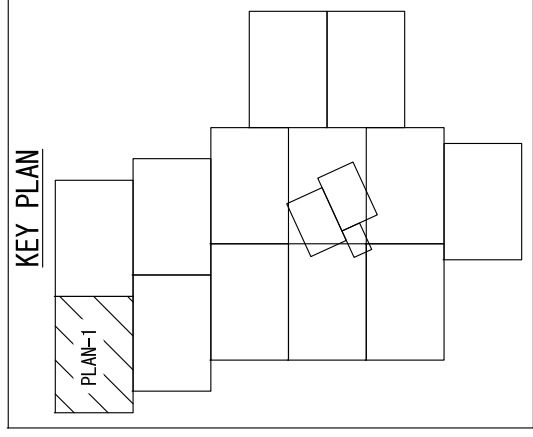
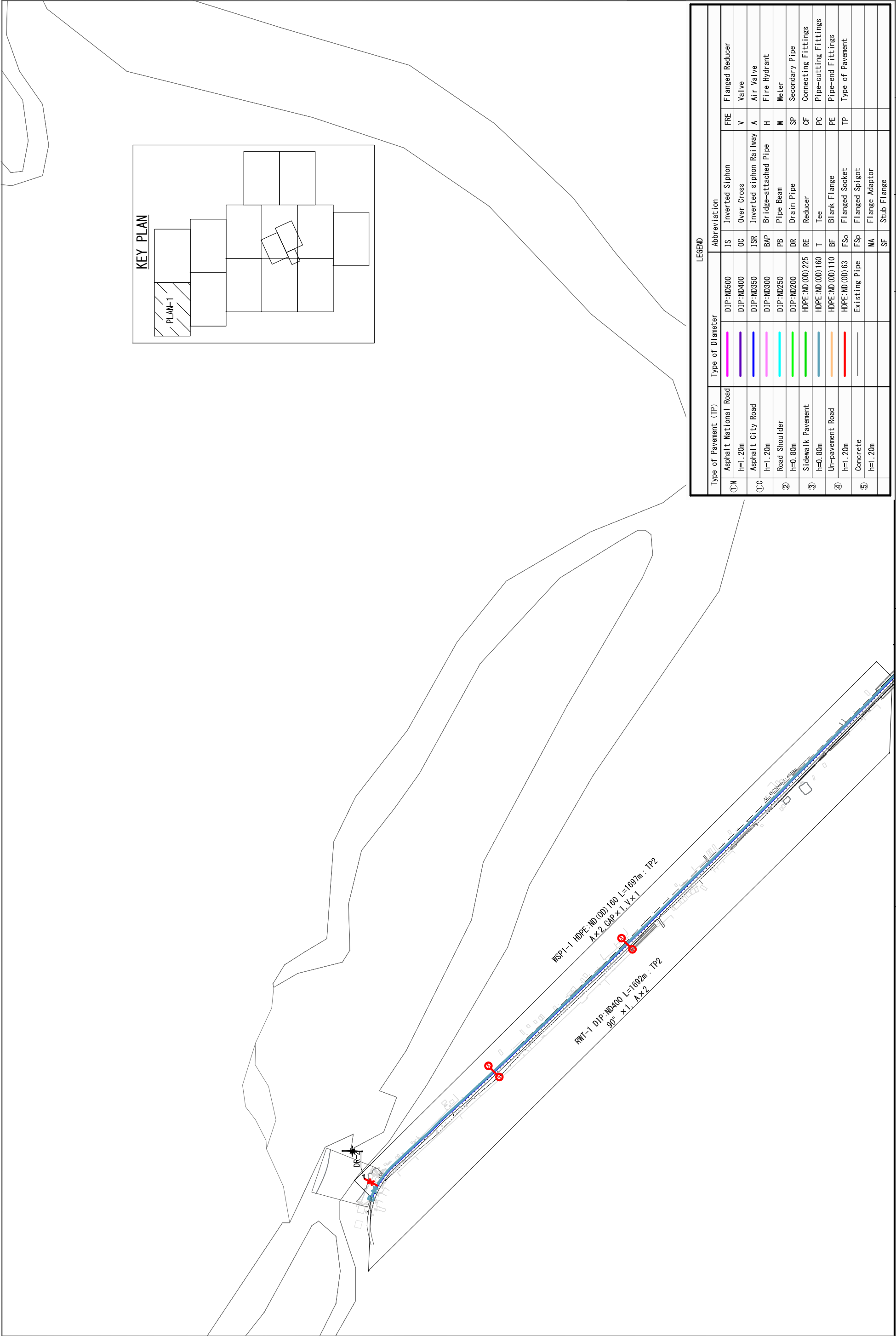


PLAN
Scale=1/200

PROJECT	DESCRIPTION	MINISTRY OF INDUSTRY & HANDICRAFT	APPROVED BY	DATE	DRAWING No
		NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU	PREPARED BY	DATE	KT-15 SCALE 1:200

Type of Pavement (TP)		Type of Diameter		Abbreviation		
①M	Asphalt National Road h=1, 20m	DIP: ND500	IS	Inverted Siphon	FRE	Flanged Reducer
①C	Asphalt City Road h=1, 20m	DIP: ND400	OC	Over Cross	V	Valve
②	Road Shoulder h=0, 80m	DIP: ND350	ISR	Inverted siphon Railway	A	Air Valve
③	Sidewalk Pavement h=0, 80m	DIP: ND300	BAP	Bridge-attached Pipe	H	Fire Hydrant
④	Un-pavement Road h=1, 20m	DIP: ND250	PB	Pipe Beam	M	Meter
⑤	Concrete h=1, 20m	DIP: ND200	DR	Drain Pipe	SP	Secondary Pipe
		HDPE: ND(OD)225	RE	Reducer	CF	Connecting Fittings
		HDPE: ND(OD)160	T	Tee	PC	Pipe-cutting Fittings
		HDPE: ND(OD)110	BF	Blank Flange	PE	Pipe-end Fittings
		HDPE: ND(OD)63	FSo	Flanged Socket	TP	Type of Pavement
		Existing Pipe	FSp	Flanged Spigot		
			MA	Flange Adaptor		
			SF	Stub Flange		





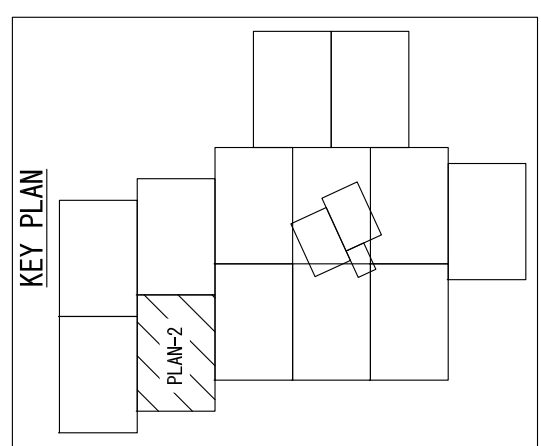
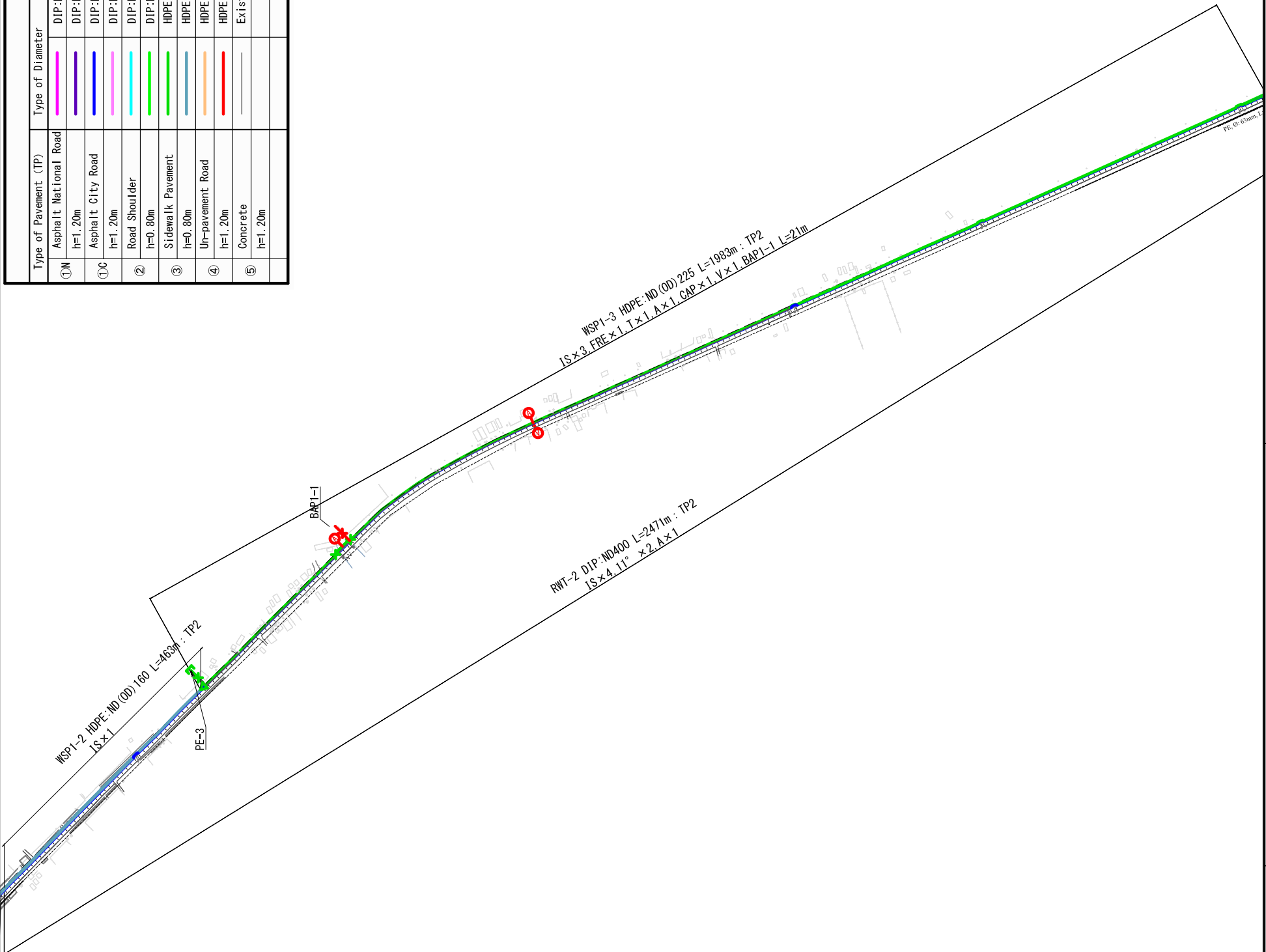
LEGEND

Type of Pavement (TP)	Type of Diameter	Abbreviation	Flanged Reducer
①N Asphalt National Road h=1.20m	DIP:ND500	IS Inverted Siphon	Flanged Reducer
①C Asphalt City Road h=1.20m	DIP:ND400	OC Over Cross	Valve
② Road Shoulder h=0.80m	DIP:ND350	ISR Inverted siphon Railway	Air Valve
③ Sidewalk Pavement h=0.80m	DIP:ND300	BAP Bridge-attached Pipe	Fire Hydrant
④ Ur-pavement Road h=1.20m	DIP:ND250	PB Pipe Beam	Meter
⑤ Concrete h=1.20m	DIP:ND200	DR Drain Pipe	Secondary Pipe
	HDPE:ND(OD)225	RE Reducer	Connecting Fittings
	HDPE:ND(OD)160	T Tee	Pipe-cutting Fittings
	HDPE:ND(OD)110	BF Blank Flange	Pipe-end Fittings
	HDPE:ND(OD)63	FSo Flanged Socket	Type of Pavement
	Existing Pipe	FSp Flanged Spigot	
		MA Flange Adaptor	
		SF Stub Flange	

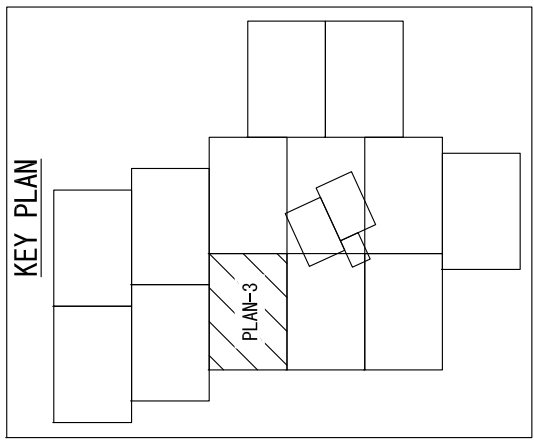
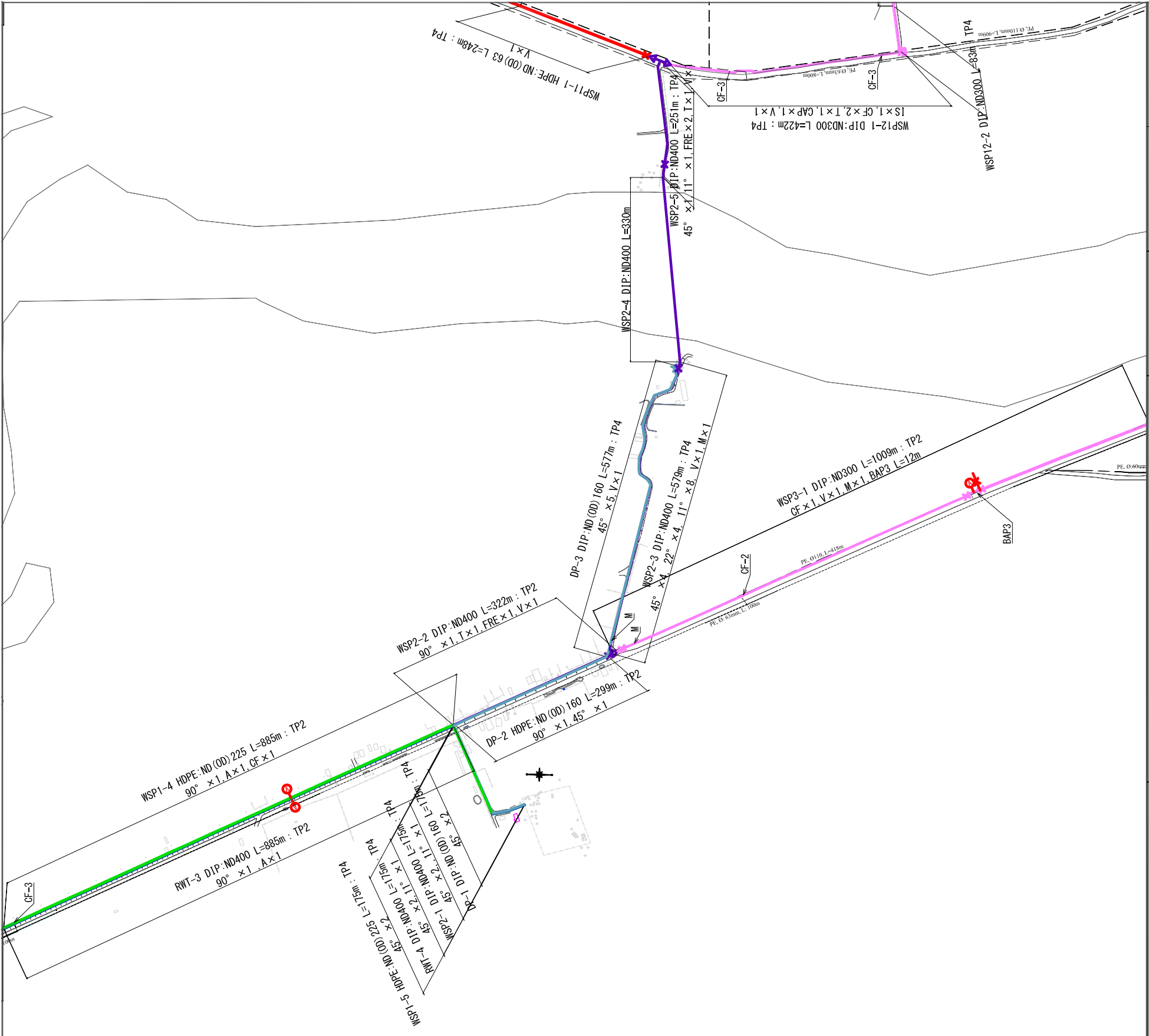
PROJECT THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE	DESCRIPTION Distribution Pipe Plan(1)	MINISTRY OF INDUSTRY & HANDICRAFT	APPROVED BY	DATE	DRAWING No KD-02
		NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU	PREPARED BY	DATE	SCALE 1:8000

LEGEND

Type of Pavement (TP)	Type of Diameter	Abbreviation	Flanged Reducer
①N Asphalt National Road h=1.20m	DIP:ND500	IS Inverted Siphon	FRE Flanged Reducer
①C Asphalt City Road h=1.20m	DIP:ND400	OC Over Cross	V Valve
② Road Shoulder h=0.80m	DIP:ND350	ISR Inverted siphon Railway	A Air Valve
③ Sidewalk Pavement h=0.80m	DIP:ND300	BAP Bridge-attached Pipe	H Fire Hydrant
④ Un-pavement Road h=1.20m	DIP:ND250	PB Pipe Beam	M Meter
⑤ Concrete h=1.20m	DIP:ND200	DR Drain Pipe	SP Secondary Pipe
	HDPE:ND(OD)225	RE Reducer	CF Connecting Fittings
	HDPE:ND(OD)160	T Tee	PC Pipe-cutting Fittings
	HDPE:ND(OD)110	BF Blank Flange	PE Pipe-end Fittings
	HDPE:ND(OD)63	FSo Flanged Socket	TP Type of Pavement
	Existing Pipe	FSp Flanged Spigot	
		MA Flange Adaptor	
		SF Stub Flange	



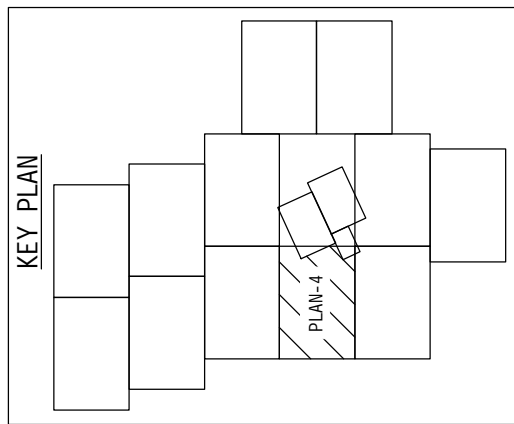
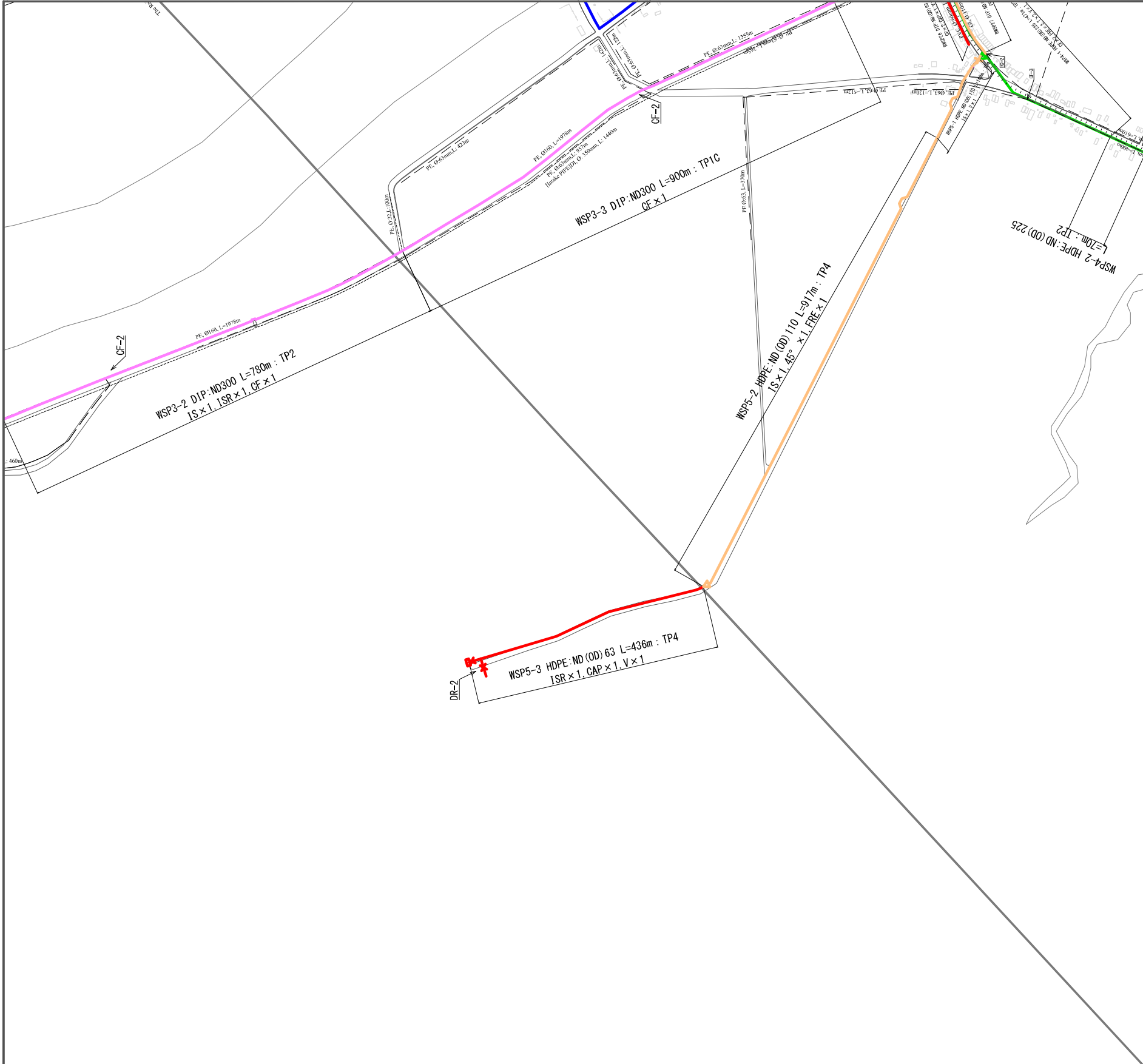
PROJECT	THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE	
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APPROVED BY	MINISTRY OF INDUSTRY & HANDICRAFT	DATE
PREPARED BY	NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU	DATE
DRAWING No	KID-03	SCALE
		1:8000



LEGEND

Type of Pavement (TP)	Type of Diameter	Abbreviation	Flanged Reducer
①N Asphalt National Road h=1.20m	DIP:ND500	IS Inverted Siphon	FRE
①C Asphalt City Road h=1.20m	DIP:ND400	OC Over Cross	V Valve
② Road Shoulder h=0.80m	DIP:ND350	ISR Inverted siphon Railway	A Air Valve
③ Sidewalk Pavement h=0.80m	DIP:ND300	BAP Bridge-attached Pipe	H Fire Hydrant
④ Un-pavement Road h=1.20m	DIP:ND250	PB Pipe Beam	M Meter
⑤ Concrete h=1.20m	DIP:ND200	DR Drain Pipe	SP Secondary Pipe
	HDPE:ND(OD)225	RE Reducer	CF Connecting Fittings
	HDPE:ND(OD)160	T Tee	PC Pipe-cutting Fittings
	HDPE:ND(OD)110	BF Blank Flange	PE Pipe-end Fittings
	HDPE:ND(OD)63	FSo Flanged Socket	TP Type of Pavement
	Existing Pipe	FSp Flanged Spigot	
		MA Flange Adaptor	
		SF Stub Flange	

PROJECT	MINISTRY OF INDUSTRY & HANDICRAFT		APPROVED BY	DATE	DRAWING No
	NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU		PREPARED BY	DATE	KD-04
THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE			SCALE		
			1:8000		

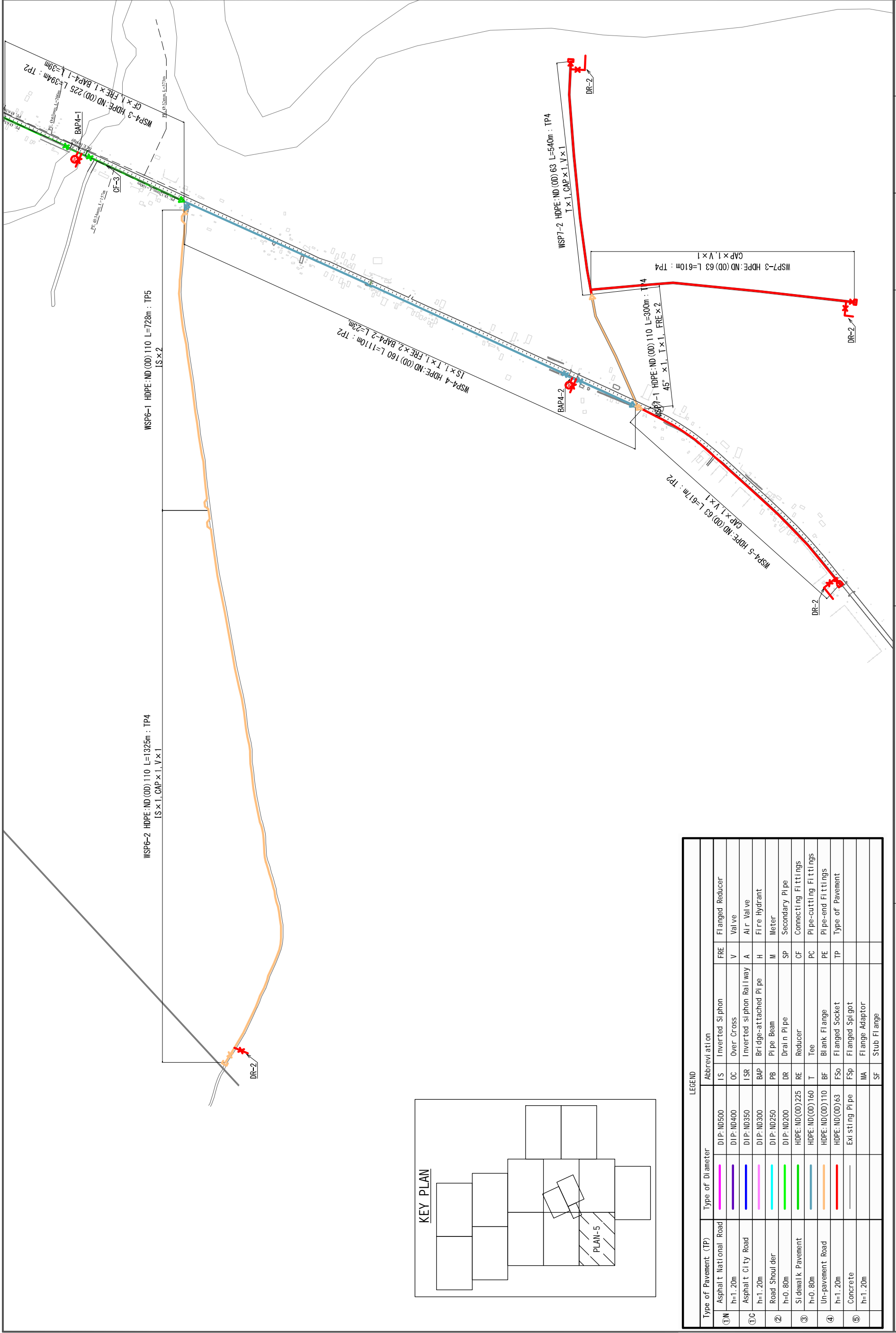


LEGEND

Type of Pavement (TP)	Type of Diameter	Abbreviation	Flanged Reducer	Valve	Fire Hydrant	Meter	Secondary Pipe	Connecting Fittings	Pipe-cutting Fittings	Pipe-end Fittings	Type of Pavement
① Asphalt National Road h=1.20m	DIP: ND500	IS	Inverted Siphon	FRE	Flanged Reducer						
② Asphalt City Road h=1.20m	DIP: ND400	OC	Over Cross	V	Valve						
③ Road Shoulder h=0.80m	DIP: ND350	ISR	Inverted siphon Railway	A	Air Valve						
④ Sidewalk Pavement h=0.80m	DIP: ND300	BAP	Bridge-attached Pipe	H	Fire Hydrant						
⑤ Un-pavement Road h=1.20m	DIP: ND250	PB	Pipe Beam	M	Meter						
⑥ Concrete	DIP: ND200	DR	Drain Pipe	SP	Secondary Pipe						
⑦ Existing Pipe	HDPE: ND(OD)225	RE	Reducer	CF	Connecting Fittings						
	HDPE: ND(OD)160	T	Tee	PC	Pipe-cutting Fittings						
	HDPE: ND(OD)110	BF	Blank Flange	PE	Pipe-end Fittings						
	HDPE: ND(OD)63	FSp	Flanged Socket	TP	Type of Pavement						
		FSp	Flanged Socket								
		MA	Flange Adaptor								
		SF	Stub Flange								

PROJECT	MINISTRY OF INDUSTRY & HANDICRAFT		APPROVED BY	DATE	DRAWING NO
	NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU		PREPARED BY	DATE	KD-05
DESCRIPTION			SCALE		
Distribution Pipe Plan(4)			1:8000		

THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE



LEGEND

Type of Pavement (TP)	Type of Diameter	Abbreviation	IS	Inverted Siphon	FRE	Flanged Reducer
① N Asphalt National Road h=1.20m	DIP: ND500	IS	OC	Over Cross	V	Valve
① OC Asphalt City Road h=1.20m	DIP: ND400	OC	ISR	Inverted siphon Railway	A	Air Valve
② Road Shoulder h=0.80m	DIP: ND350	ISR	BAP	Bridge-attached Pipe	H	Fire Hydrant
③ Sidewalk Pavement h=0.80m	DIP: ND300	BAP	PB	Pipe Beam	M	Meter
④ Un-pavement Road h=1.20m	DIP: ND250	PB	DR	Drain Pipe	SP	Secondary Pipe
⑤ Concrete h=1.20m	HDPE: ND(OD)225	DR	RE	Reducer	CF	Connecting Fittings
	HDPE: ND(OD)160	RE	T	Tee	PC	Pipe-cutting Fittings
	HDPE: ND(OD)110	T	BF	Blank Flange	PE	Pipe-end Fittings
	HDPE: ND(OD)63	BF	FSo	Flanged Socket	TP	Type of Pavement
	Existing Pipe	FSo	FSp	Flanged Spigot		
		FSp	WA	Flange Adaptor		
		WA	SF	Stub Flange		

PROJECT

**THE PROJECT FOR EXPANSION AND IMPROVEMENT OF
WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE**

DESCRIPTION
Distribution Pipe Plan(5)

MINISTRY OF INDUSTRY & HANDICRAFT

NIHON SUIDO CONSULTANTS CO., LTD.
WATER AND SEWER BUREAU, CITY OF KITAKYUSHU

APPROVED BY

PREPARED BY

DATE

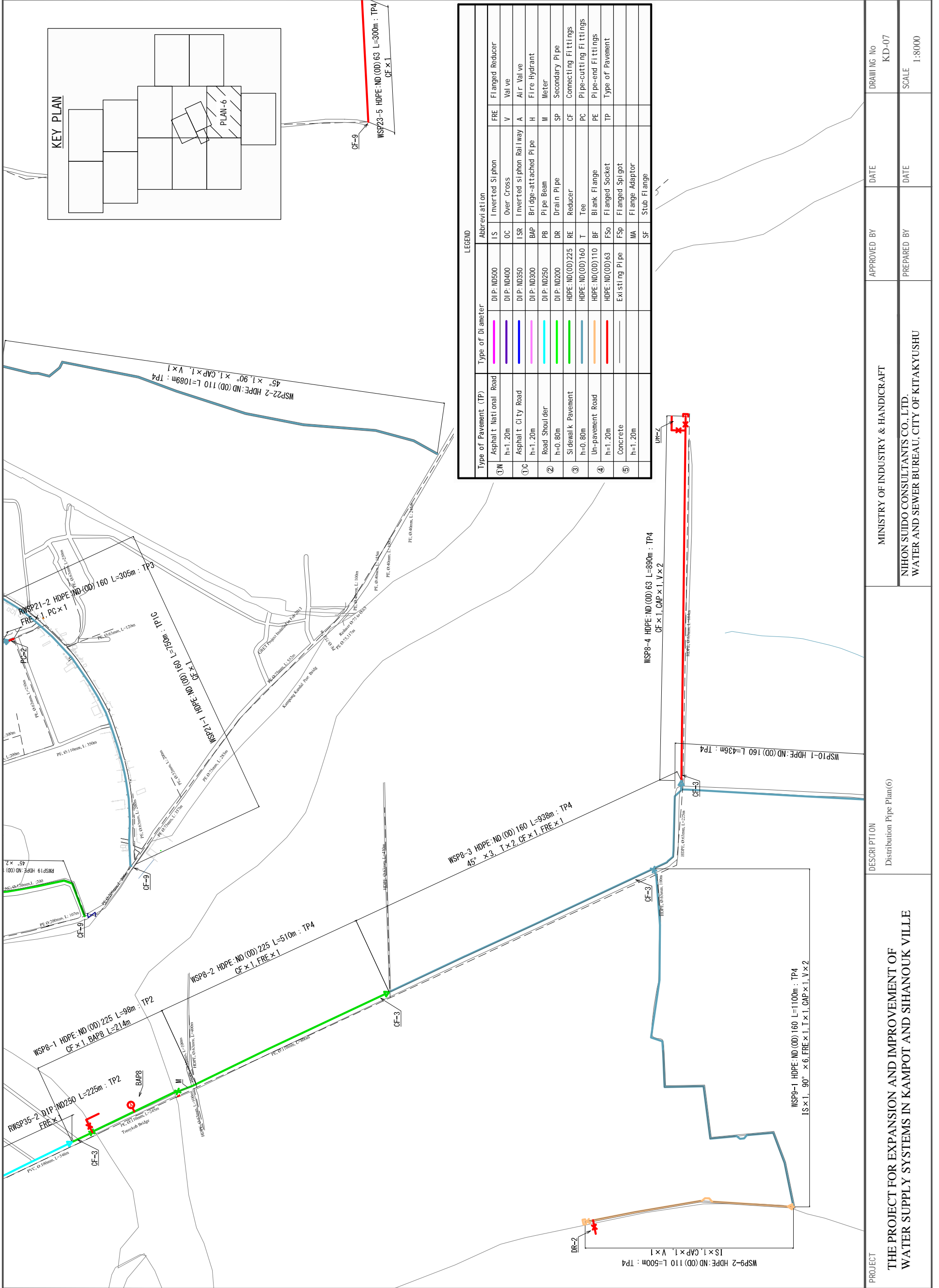
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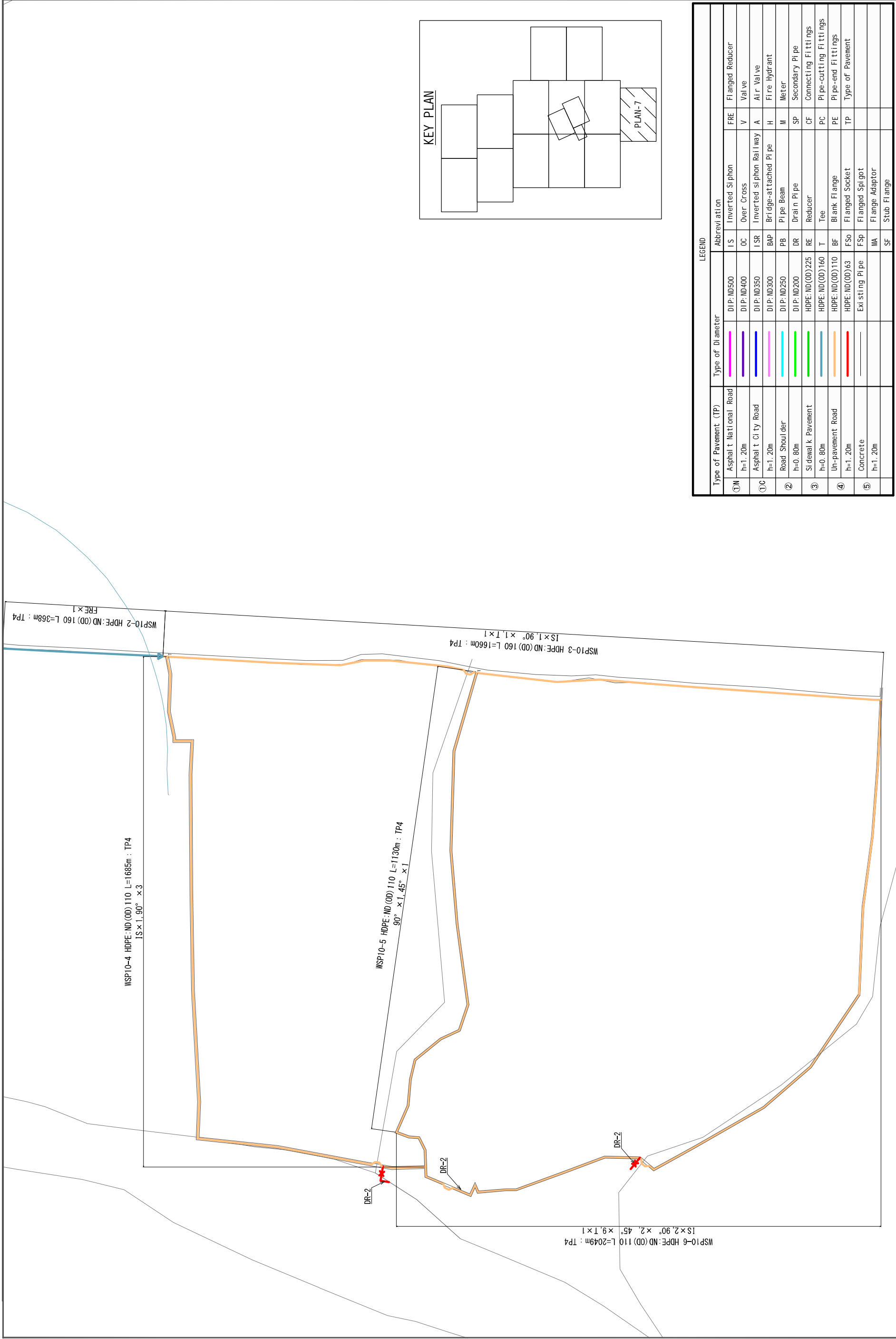
KD-06

SCALE

1:8000



PROJECT	THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE		MINISTRY OF INDUSTRY & HANDICRAFT	APPROVED BY	DATE	DRAWING NO
	Distribution Pipe Plan(6)		NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU	PREPARED BY	DATE	KD-07
DESCRIPTION						SCALE
						1:8000

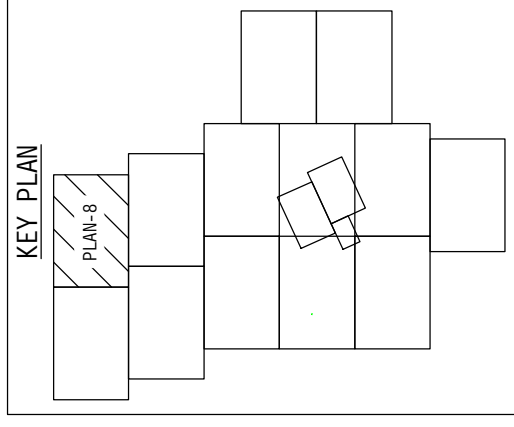


LEGEND

Type of Pavement (TP)	Type of Diameter	Abbreviation	Abbreviation
①W Asphalt National Road h=1, 20m	DIP: ND500	IS	Inverted Siphon
①C Asphalt City Road h=1, 20m	DIP: ND400	OC	Over Cross
② Road Shoulder h=0, 80m	DIP: ND350	ISR	Inverted siphon Railway
③ Sidewalk Pavement h=0, 80m	DIP: ND300	BAP	Bridge-attached Pipe
④ Un-pavement Road h=1, 20m	DIP: ND250	PB	Pipe Beam
⑤ Concrete h=1, 20m	DIP: ND200	DR	Drain Pipe
	HDPE:ND(OD)225	RE	Reducer
	HDPE:ND(OD)160	T	Tee
	HDPE:ND(OD)110	BF	Blank Flange
	HDPE:ND(OD)63	FSo	Flanged Socket
	Existing Pipe	FSp	Flanged Spigot
		MA	Flange Adaptor
		SF	Stub Flange
		FRE	Flanged Reducer
		V	Valve
		A	Air Valve
		H	Fire Hydrant
		M	Meter
		SP	Secondary Pipe
		CF	Connecting Fittings
		PC	Pipe-cutting Fittings
		PE	Pipe-end Fittings
		TP	Type of Pavement

PROJECT	MINISTRY OF INDUSTRY & HANDICRAFT		APPROVED BY	DATE	DRAWING NO
	THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE				KD-08
DESCRIPTION	Distribution Pipe Plan(7)		PREPARED BY	DATE	SCALE
					1:8000

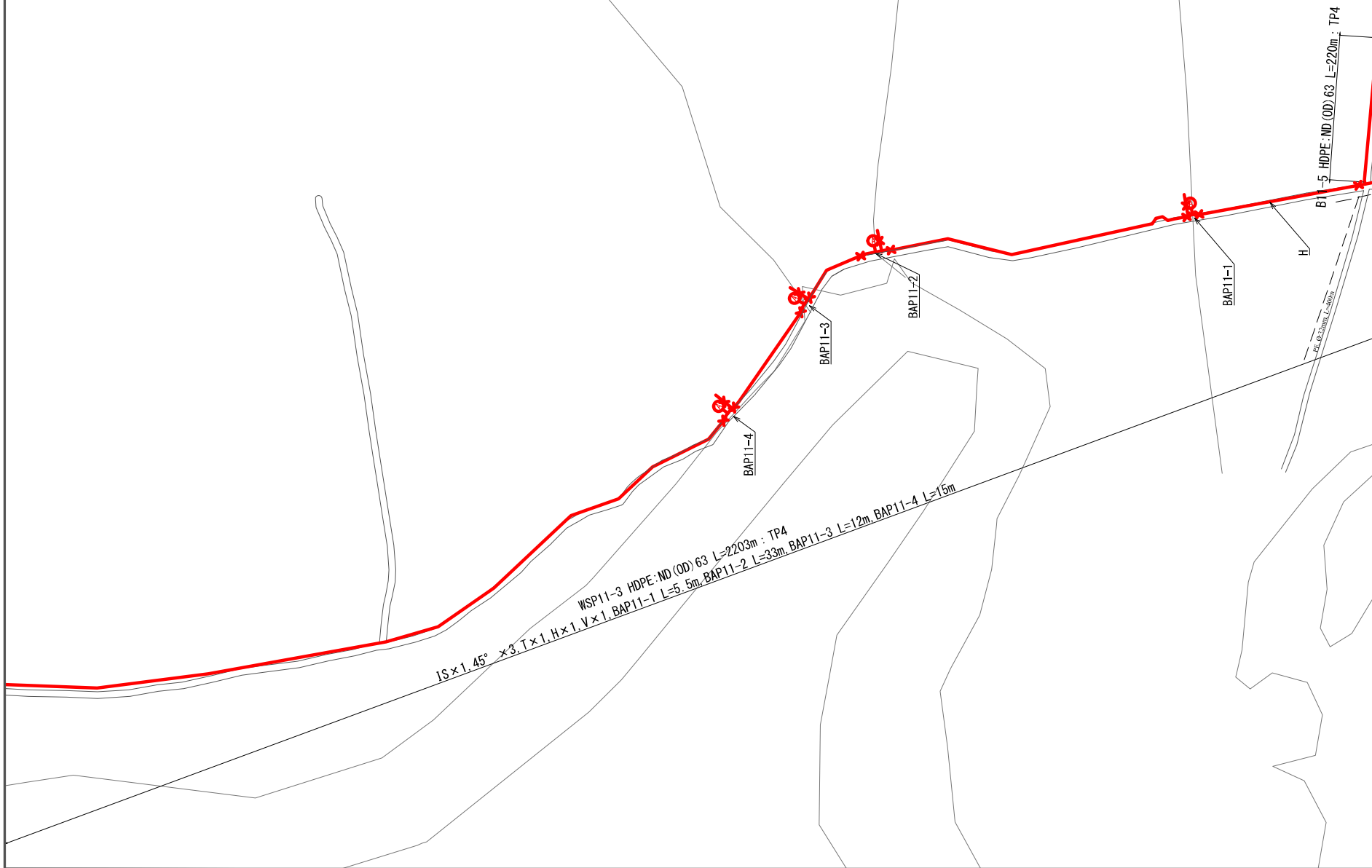
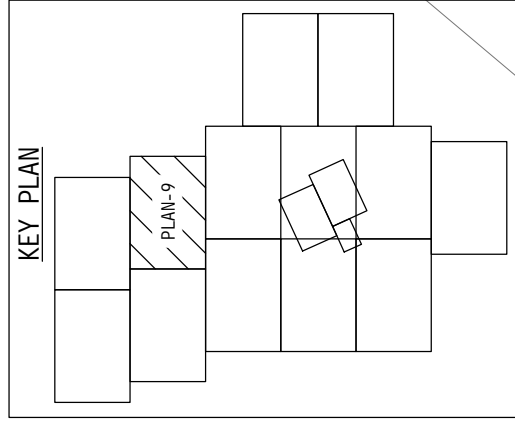
LEGEND		
Type of Pavement (TP)	Type of Diameter	Abbreviation
①M Asphalt National Road h=1, 20m	DIP: ND500	IS Inverted Siphon
	DIP: ND400	OC Over Cross
①C Asphalt City Road h=1, 20m	DIP: ND350	ISR Inverted siphon Railway
	DIP: ND300	BAP Bridge-attached Pipe
② Road Shoulder h=0, 80m	DIP: ND250	PB Pipe Beam
	DIP: ND200	DR Drain Pipe
③ Sidewalk Pavement h=0, 80m	HDPE: ND(OD)225	RE Reducer
	HDPE: ND(OD)160	T Tee
④ Un-pavement Road h=1, 20m	HDPE: ND(OD)110	BF Blank Flange
	HDPE: ND(OD)63	FSo Flanged Socket
⑤ Concrete h=1, 20m	Existing Pipe	FSp Flanged Spigot
		MA Flange Adaptor
		SF Stub Flange



PROJECT	DESCRIPTION	APPROVED BY	DATE	DRAWING No
THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE	Distribution Pipe Plan(8)			KD-09
		PREPARED BY	DATE	SCALE
				1:8000

LEGEND

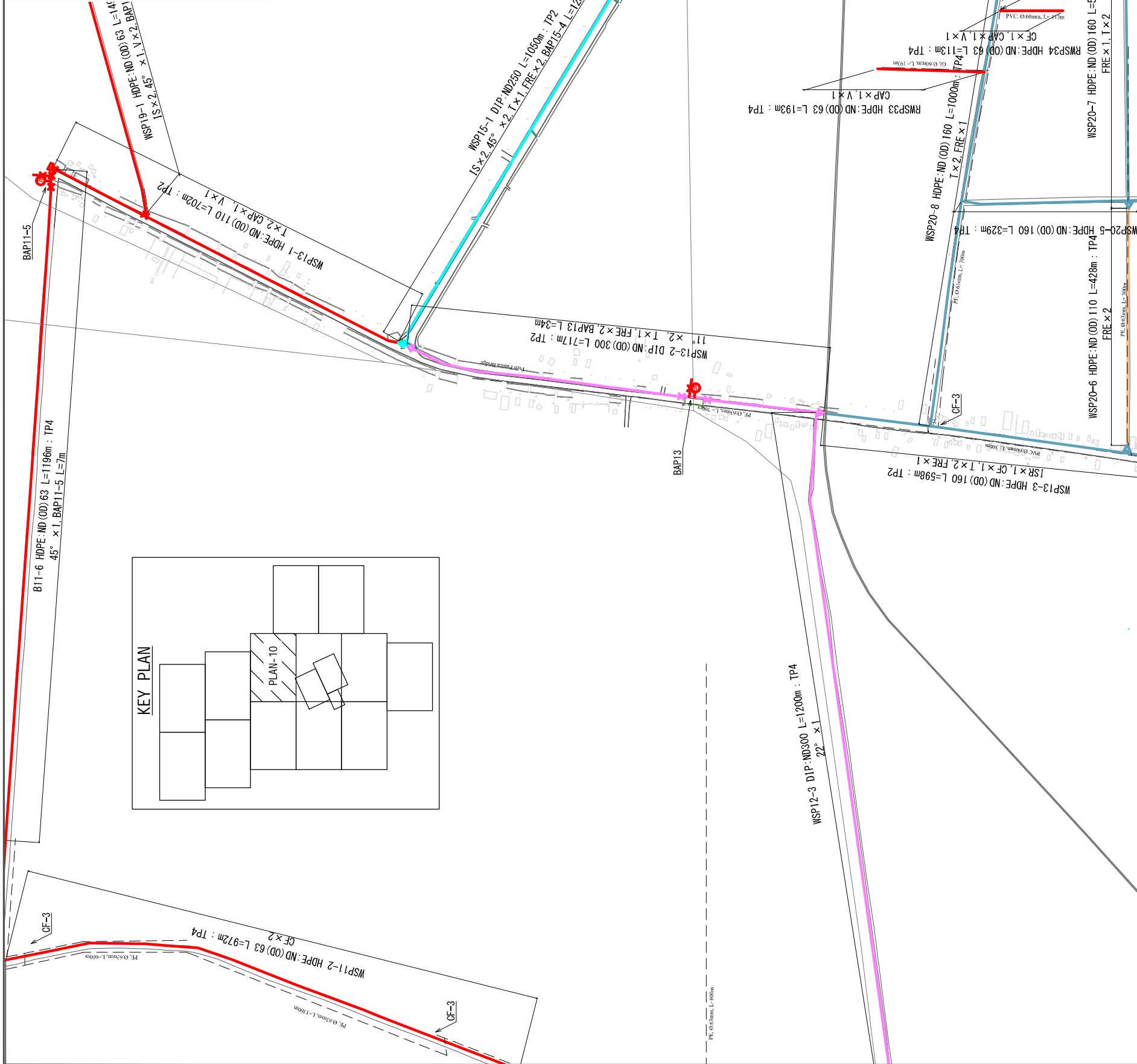
Type of Pavement (TP)	Type of Diameter	Abbreviation
①M Asphalt National Road h=1, 20m	DIP: ND500	IS Inverted Siphon
	DIP: ND400	OC Over Cross
①C Asphalt City Road h=1, 20m	DIP: ND350	ISR Inverted siphon Railway
	DIP: ND300	BAP Bridge-attached Pipe
② Road Shoulder h=0, 80m	DIP: ND250	PB Pipe Beam
	DIP: ND200	DR Drain Pipe
③ Sidewalk Pavement h=0, 80m	HDPE: ND(OD)225	RE Reducer
	HDPE: ND(OD)160	T Tee
④ Un-pavement Road h=1, 20m	HDPE: ND(OD)110	BF Blank Flange
	HDPE: ND(OD)63	FSo Flanged Socket
⑤ Concrete h=1, 20m	Existing Pipe	FSp Flanged Spigot
		MA Flange Adaptor
		SF Stub Flange
		FRE Flanged Reducer
		V Valve
		A Air Valve
		H Fire Hydrant
		M Meter
		SP Secondary Pipe
		CF Connecting Fittings
		PC Pipe-cutting Fittings
		PE Pipe-end Fittings
		TP Type of Pavement



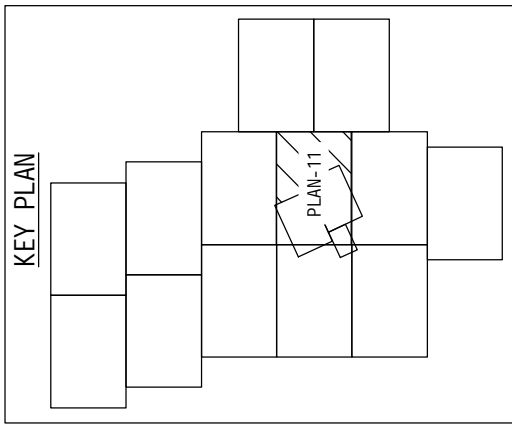
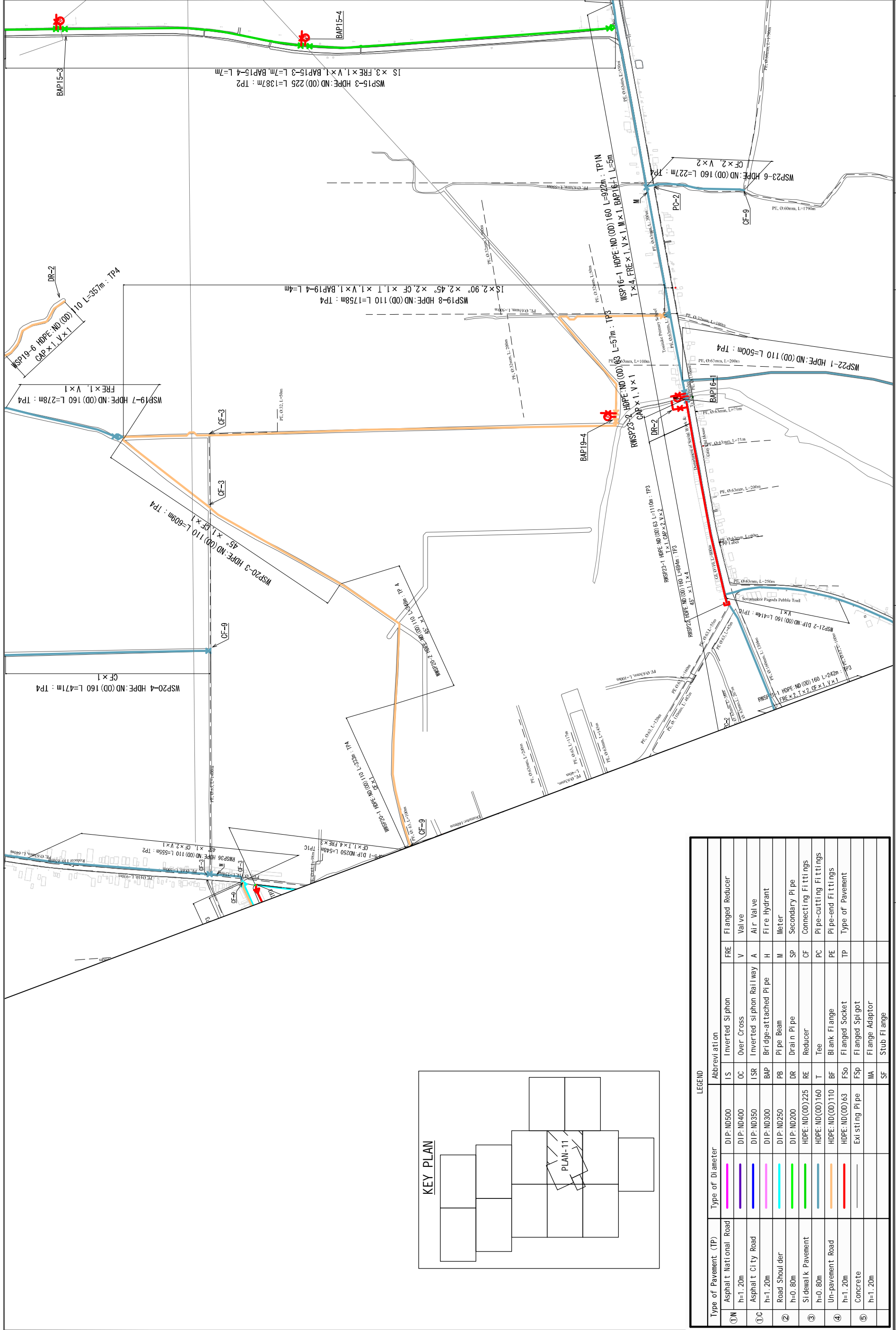
PROJECT	THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE	DESCRIPTION	Distribution Pipe Plan(9)	MINISTRY OF INDUSTRY & HANDICRAFT	APPROVED BY	DATE	DRAWING No
				NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU	PREPARED BY	DATE	KD-10
						SCALE	
						1:8000	

LEGEND

Type of Pavement (TP)	Type of Diameter	Abbreviation	Flanged Reducer
① M Asphalt National Road h=1, 20m	DIP: ND500	IS Inverted Siphon	FRE
① C Asphalt City Road h=1, 20m	DIP: ND400	OC Over Cross	V Valve
② Road Shoulder h=0, 80m	DIP: ND350	ISR Inverted siphon Railway	A Air Valve
③ Sidewalk Pavement h=0, 80m	DIP: ND300	BAP Bridge-attached Pipe	H Fire Hydrant
④ Un-pavement Road h=1, 20m	DIP: ND250	PB Pipe Beam	M Meter
⑤ Concrete h=1, 20m	DIP: ND200	DR Drain Pipe	SP Secondary Pipe
	HDPE: ND(OD)225	RE Reducer	CF Connecting Fittings
	HDPE: ND(OD)160	T Tee	PC Pipe-cutting Fittings
	HDPE: ND(OD)110	BF Blank Flange	PE Pipe-end Fittings
	HDPE: ND(OD)63	FSo Flanged Socket	TP Type of Pavement
	Existing Pipe	FSp Flanged Spigot	
		MA Flange Adaptor	
		SF Stub Flange	



PROJECT	THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE		MINISTRY OF INDUSTRY & HANDICRAFT	APPROVED BY	DATE	DRAWING NO
	Distribution Pipe Plan(10)		NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU	PREPARED BY	DATE	KD-11
			SCALE		1:8000	



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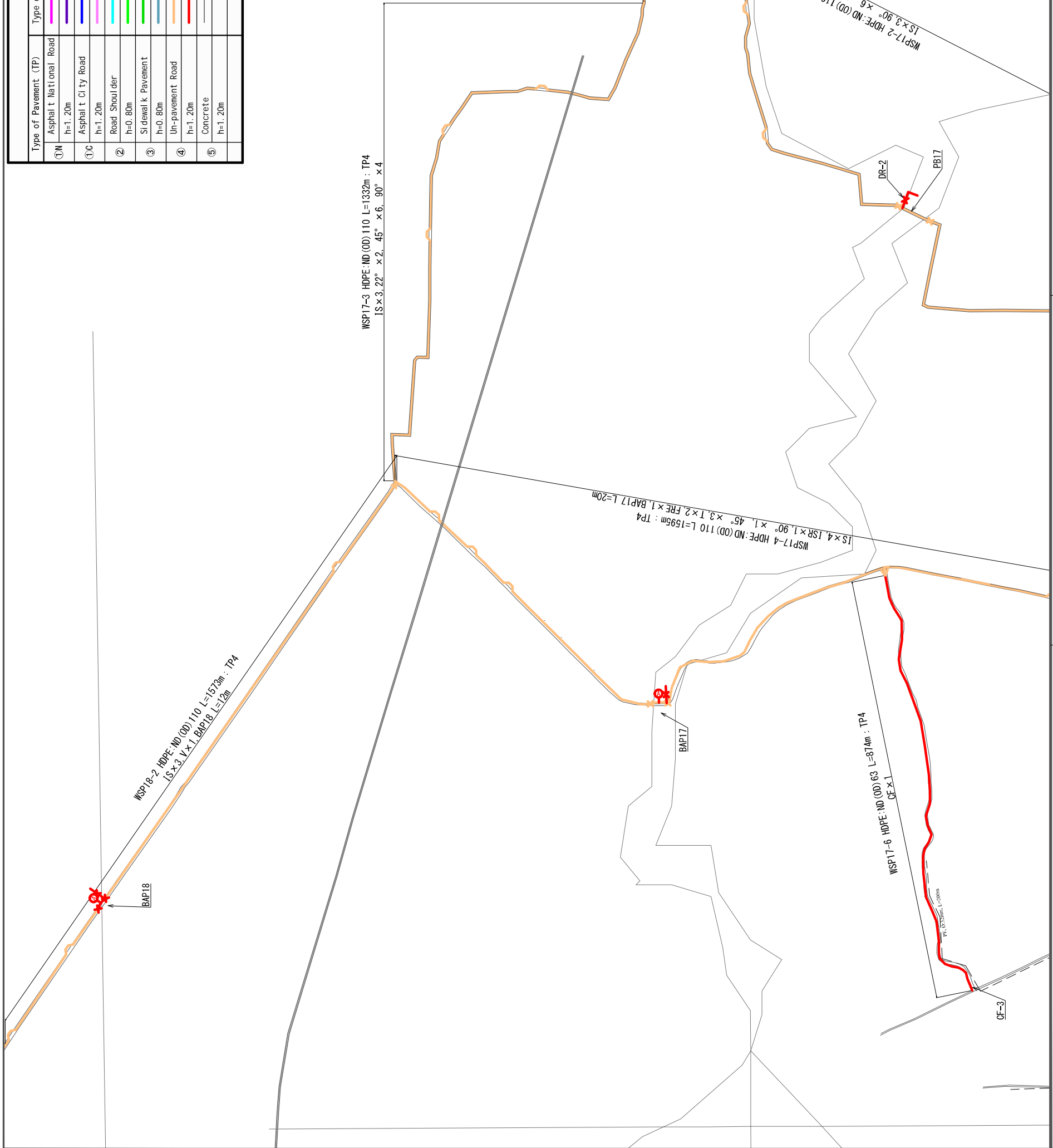
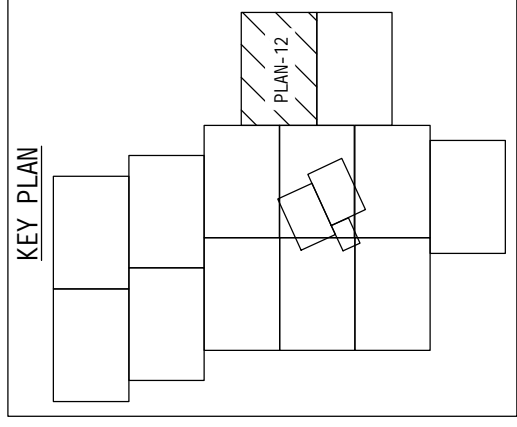
Type of Pavement (TP)	Type of Diameter	Abbreviation	FRE	Flanged Reducer
① Asphalt National Road h=1.20m	DIP: ND500	IS	Inverted Siphon	FRE
② Asphalt City Road h=1.20m	DIP: ND400	OC	Over Cross	V
③ Road Shoulder h=0.80m	DIP: ND350	ISR	Inverted siphon Railway	A
④ Sidewalk Pavement h=0.80m	DIP: ND300	BAP	Bridge-attached Pipe	H
⑤ Un-pavement Road h=1.20m	DIP: ND250	PB	Pipe Beam	M
Concrete h=1.20m	DIP: ND200	DR	Drain Pipe	Sp
	HDPE: ND(OD)225	RE	Reducer	CF
	HDPE: ND(OD)160	T	Tee	PC
	HDPE: ND(OD)110	BF	Blank Flange	PE
	HDPE: ND(OD)63	FSo	Flanged Socket	TP
	Existing Pipe	FSp	Flanged Spigot	
		MA	Flange Adaptor	
		SF	Stub Flange	

PROJECT	DESCRIPTION Distribution Pipe Plan(11)	APPROVED BY	DATE
THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE		MINISTRY OF INDUSTRY & HANDICRAFT	
		APPROVED BY	DATE
		PREPARED BY	DATE
		DRAWING NO KD-12	SCALE 1:8000

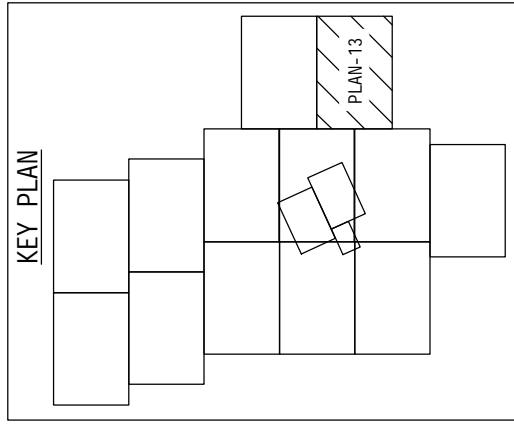
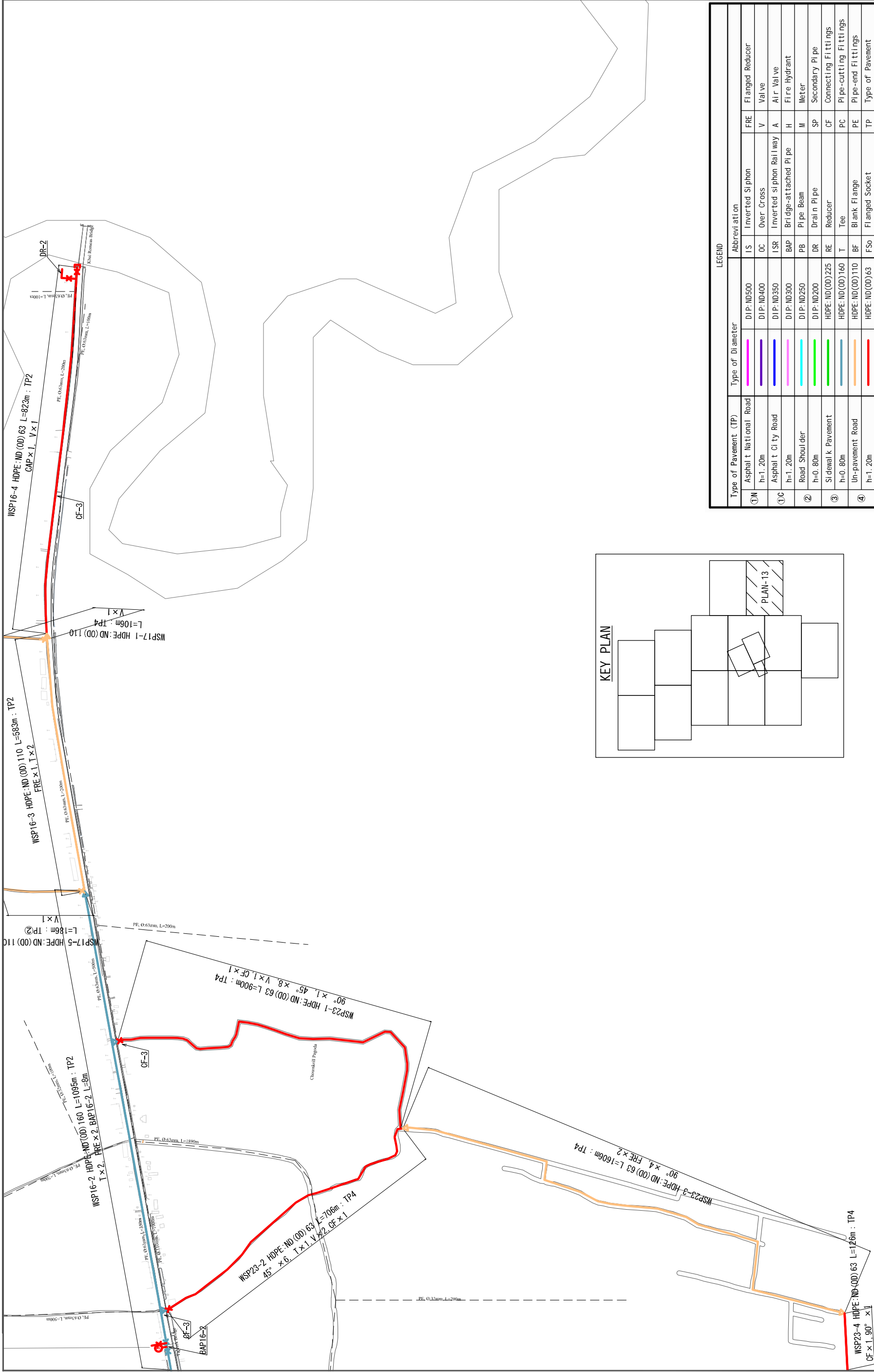
MINISTRY OF INDUSTRY & HANDICRAFT
NIHON SUIDO CONSULTANTS CO., LTD.
WATER AND SEWER BUREAU, CITY OF KITAKYUSHU

LEGEND

Type of Pavement (TP)	Type of Diameter	Abbreviation
①M Asphalt National Road h=1.20m	DIP: ND500	IS Inverted Siphon
DIP: ND400	OC Over Cross	FRE Valve
①C Asphalt City Road h=1.20m	DIP: ND350	ISR Inverted siphon Railway
DIP: ND300	BAP Bridge-attached Pipe	A Air Valve
② Road Shoulder h=0.80m	DIP: ND250	H Fire Hydrant
DIP: ND200	PB Pipe Beam	M Meter
③ Sidewalk Pavement h=0.80m	HDPE: ND(OD)225	SP Secondary Pipe
HDPE: ND(OD)160	RE Reducer	CF Connecting Fittings
④ Un-pavement Road h=1.20m	HDPE: ND(OD)110	T Tee
Concrete	HDPE: ND(OD)63	BF Blank Flange
Existing Pipe	FSo Flanged Socket	PE Pipe-end Fittings
	MA Flange Adaptor	TP Type of Pavement
	SF Stub Flange	



PROJECT	THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE		DESCRIPTION	Distribution Pipe Plan(1/2)	MINISTRY OF INDUSTRY & HANDICRAFT	APPROVED BY	DATE	DRAWING No	KD-13
					NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU	PREPARED BY	DATE	SCALE	1:8000

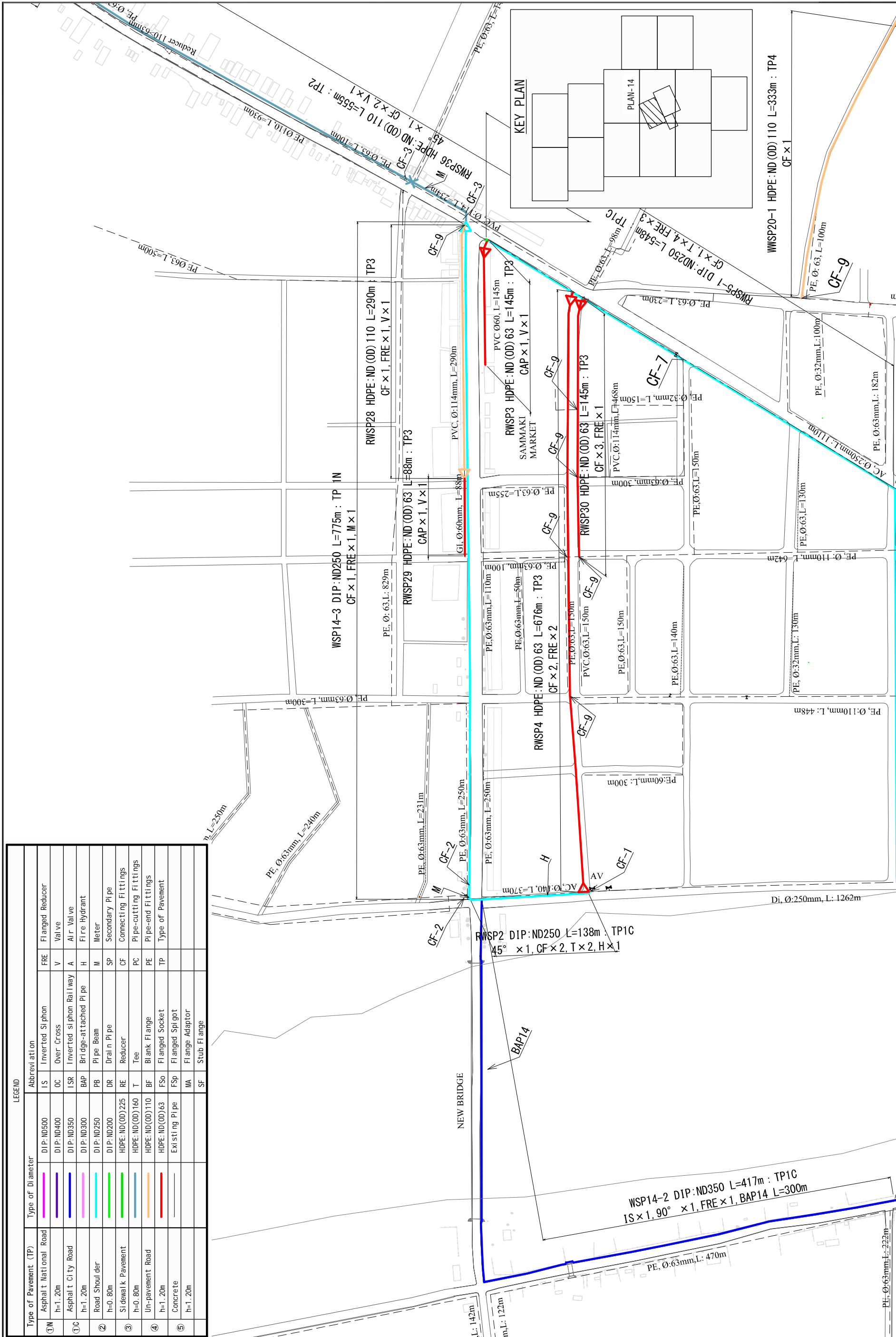


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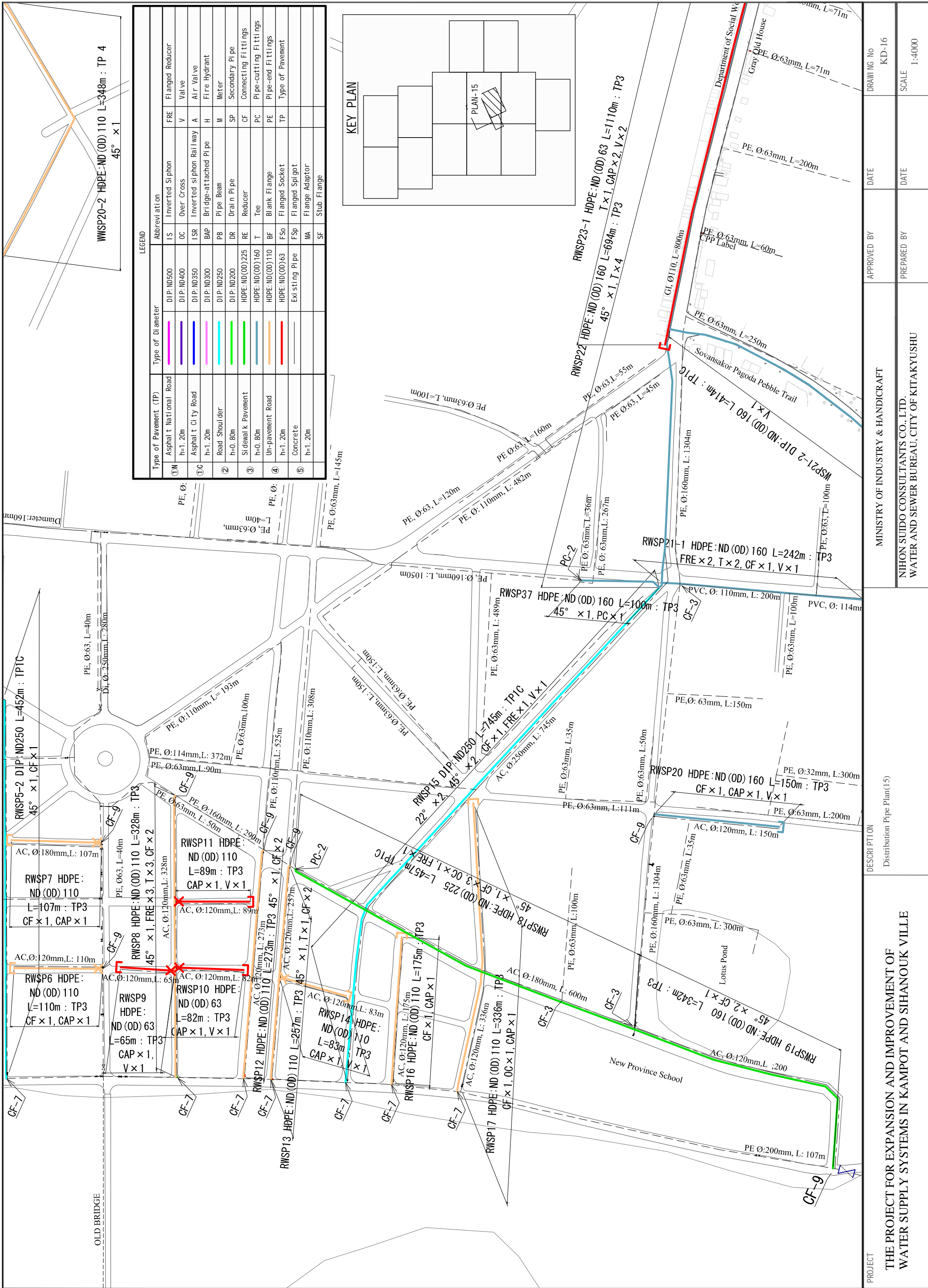
Type of Pavement (TP)	Type of Diameter	Abbreviation	Flanged Reducer
①W Asphalt National Road h=1.20m	DIP: ND500	IS Inverted Siphon	FRE Flanged Reducer
①C Asphalt City Road h=1.20m	DIP: ND400	OC Over Cross	V Valve
② Road Shoulder h=1.20m	DIP: ND350	ISR Inverted siphon Rail way	A Air Valve
③ Sidewalk Pavement h=0.80m	DIP: ND300	BAP Bridge-attached Pipe	H Fire Hydrant
④ Un-pavement Road h=1.20m	DIP: ND250	PB Pipe Beam	M Meter
Concrete h=1.20m	DIP: ND200	DR Drain Pipe	SP Secondary Pipe
	HDPE: ND(OD)225	RE Reducer	CF Connecting Fittings
	HDPE: ND(OD)160	T Tee	PC Pipe-cutting Fittings
	HDPE: ND(OD)110	BF Blank Flange	PE Pipe-end Fittings
	HDPE: ND(OD)63	FSo Flanged Socket	TP Type of Pavement
	Existing Pipe	FSp Flanged Spigot	
		MA Flange Adaptor	
		SF Stub Flange	

PROJECT	DESCRIPTION Distribution Pipe Plan(1.3)	MINISTRY OF INDUSTRY & HANDICRAFT	APPROVED BY	DATE	DRAWING NO
			PREPARED BY	DATE	KD-14
THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE			NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU		
			SCALE 1:8000		

Type of Pavement (TP)		Type of Diameter		Abbreviation	
①	Asphalt National Road h=1.20m	DIP:ND500	IS	Inverted Siphon	FRE
②	Asphalt City Road h=1.20m	DIP:ND400	OC	Over Cross	V
③	Road Shoulder h=0.80m	DIP:ND350	ISR	Inverted siphon Railway	A
④	Sidewalk Pavement h=0.80m	DIP:ND300	BAP	Bridge-attached Pipe	H
⑤	Un-pavement Road h=1.20m	DIP:ND250	PB	Pipe Beam	M
	Concrete h=1.20m	DIP:ND200	DR	Drain Pipe	SP
		HDPE:ND(OD)225	RE	Reducer	CF
		HDPE:ND(OD)160	T	Tee	PC
		HDPE:ND(OD)110	BF	Blank Flange	PE
		HDPE:ND(OD)63	FSo	Flanged Socket	TP
		Existing Pipe	FSp	Flanged Spigot	
			MA	Flange Adaptor	
			SF	Stub Flange	



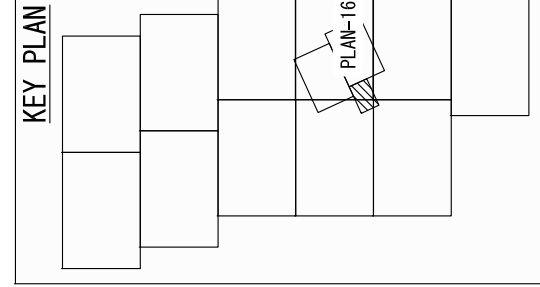
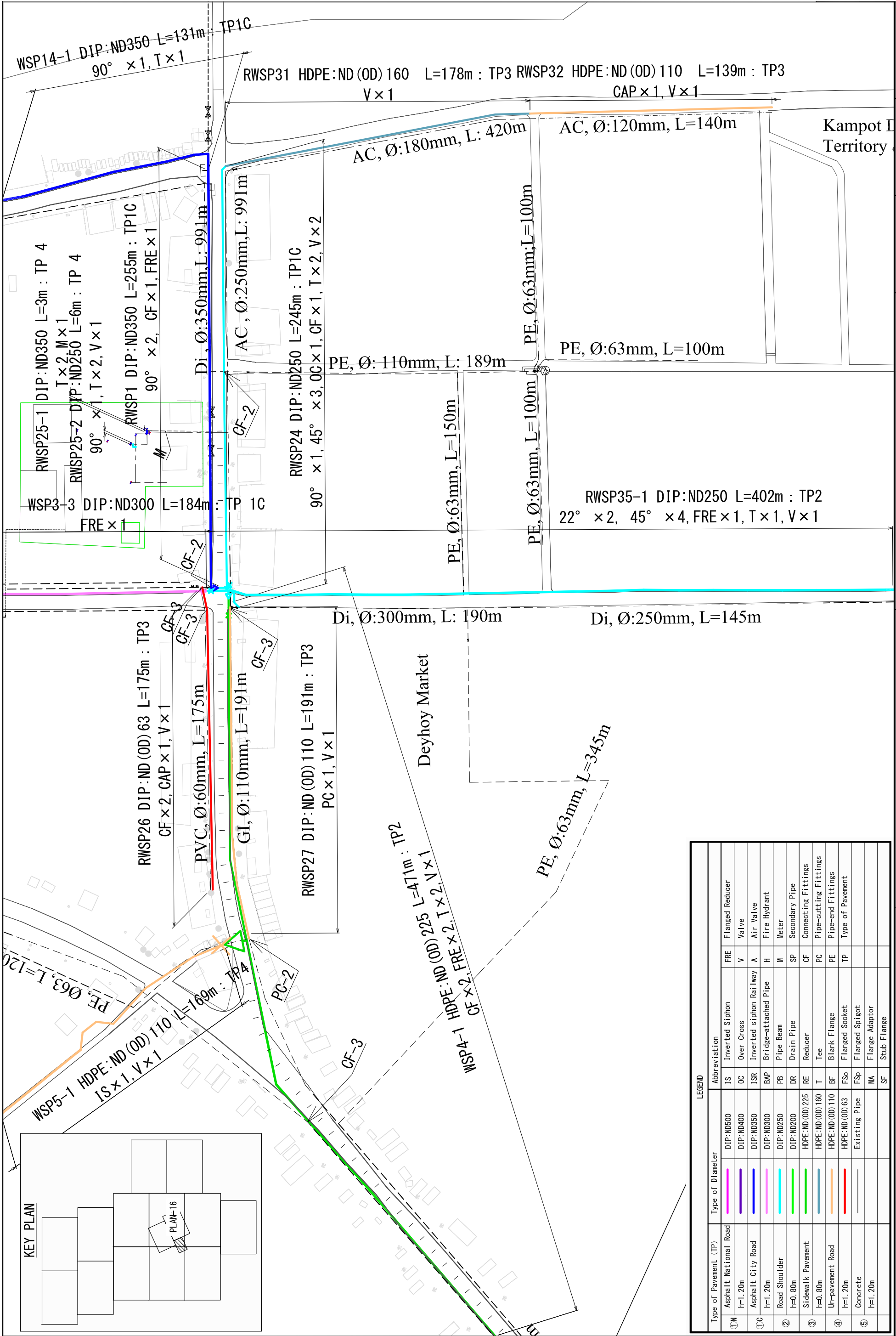
PROJECT	THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE	
DESCRIPTION	Distribution Pipe Plan(1:4)	
MINISTRY OF INDUSTRY & HANDICRAFT	APPROVED BY	DATE
NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU	PREPARED BY	DATE
	DRAWING NO	KD-15
	SCALE	1:4000



LEGEND

Type of Pavement (TP)	Type of Diameter	Abbreviation
① Asphalt National Road h=1.20m	DIP: ND500	IS Inverted Siphon
② Asphalt City Road h=1.20m	DIP: ND400	OC Over Cross
③ Road Shoulder h=0.80m	DIP: ND350	ISR Inverted siphon Railway
④ Sidewalk Pavement h=0.80m	DIP: ND300	BAP Bridge-attached Pipe
⑤ Un-pavement Road h=1.20m	DIP: ND250	PB Pipe Beam
Concrete h=1.20m	DIP: ND200	DR Drain Pipe
	HDPE: ND(OD)225	RE Reducer
	HDPE: ND(OD)160	T Tee
	HDPE: ND(OD)110	BF Blank Flange
	HDPE: ND(OD)63	F50 Flanged Socket
	Existing Pipe	F5P Flanged Spigot
		MA Flange Adaptor
		SF Stub Flange

PROJECT	THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE	
DESCRIPTION	Distribution Pipe Plan(1:5)	
MINISTRY OF INDUSTRY & HANDICRAFT	APPROVED BY	DATE
NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU	PREPARED BY	DATE
	DRAWING NO	KD-16
	SCALE	1:4000



LEGEND

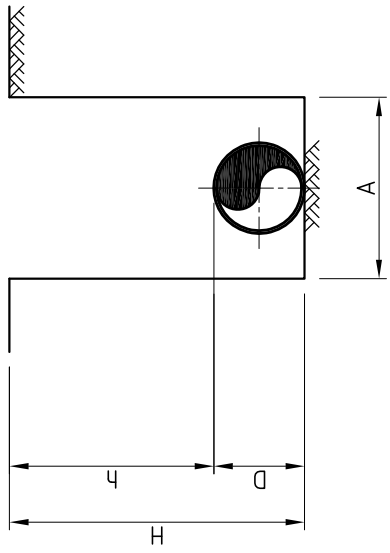
Type of Pavement (TP)	Type of Diameter	Abbreviation	IS	Inverted Siphon	FRE	Flanged Reducer
Asphalt National Road h=1.20m	DIP:ND500	OC	Over Cross	V	Valve	
Asphalt City Road h=1.20m	DIP:ND350	ISR	Inverted siphon Railway	A	Air Valve	
Road Shoulder h=0.80m	DIP:ND250	BAP	Bridge-attached Pipe	H	Fire Hydrant	
Sidewalk Pavement h=0.80m	DIP:ND200	PB	Pipe Beam	M	Meter	
Un-pavement Road h=1.20m	HDPE:ND(OD)160	DR	Drain Pipe	SP	Secondary Pipe	
Concrete h=1.20m	HDPE:ND(OD)110	RE	Reducer	CF	Connecting Fittings	
	HDPE:ND(OD)63	T	Tee	PC	Pipe-cutting Fittings	
	Existing Pipe	BF	Blank Flange	PE	Pipe-end Fittings	
		FSo	Flanged Socket	TP	Type of Pavement	
		MA	Flange Adaptor			
		SF	Stub Flange			

PROJECT DESCRIPTION
Distribution Pipe Plan(16)

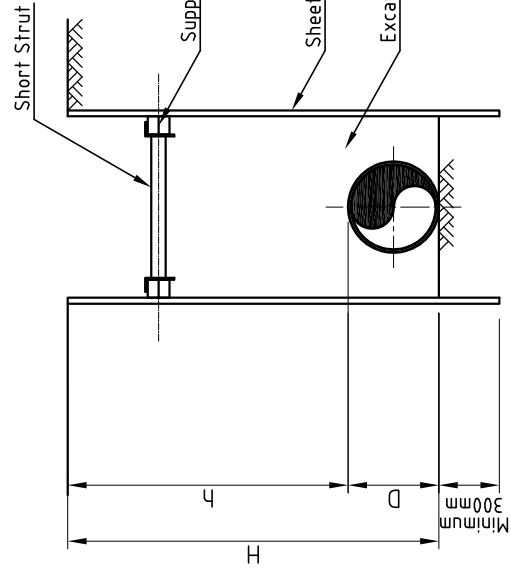
THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE

MINISTRY OF INDUSTRY & HANDICRAFT	APPROVED BY	DATE	DRAWING No KD-17
NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU	PREPARED BY	DATE	SCALE 1:2000

Typical Drawing for Pipe Laying



MACHINE EXCAVATION
NORMAL PART

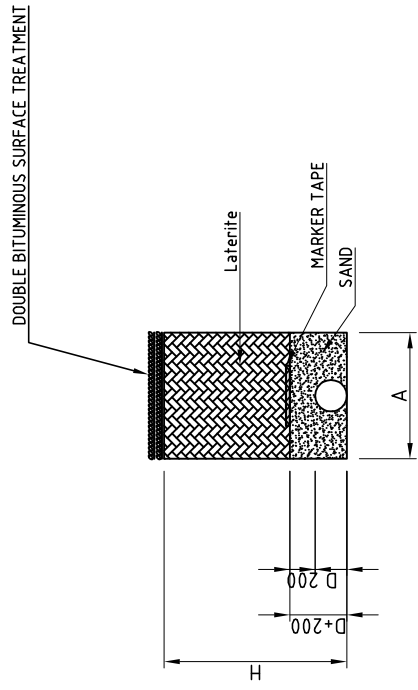


MACHINE EXCAVATION
SHEET PILE PART

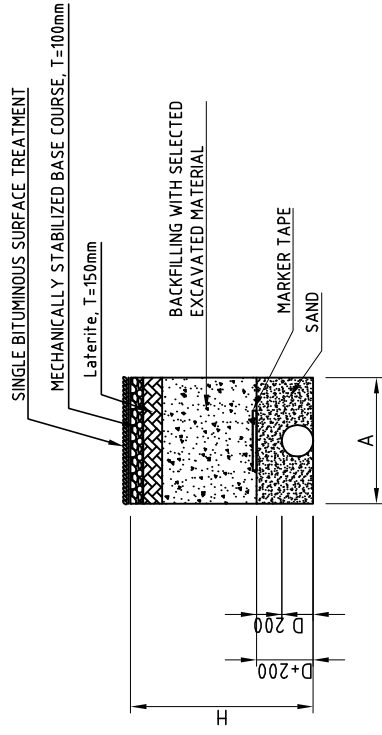
TYPICAL SIZE OF TRENCH EXCAVATION (MACHINE EXCAVATION)

PIPE MATERIAL	NORMAL PART			SHEET PILE PART		
	TRENCH WIDTH A(m)	DEPTH OF COVER #1 h(m)	EXCAVATION DEPTH H(m)	TRENCH WIDTH A(m)	DEPTH OF COVER #1 h(m)	EXCAVATION DEPTH H(m)
HDPE	50(63)	0.50	0.8/1.2	0.70	-	H ± 150
	75(90)	0.50	0.8/1.2	0.70	-	H ± 150
	100(110)	0.50	0.8/1.2	0.75	-	H ± 150
	150(160)	0.50	0.8/1.2	0.80	-	H ± 150
	200(220)	0.50	0.8/1.2	0.85	-	H ± 150
DIP	250	0.50	0.8/1.2	0.85	-	H ± 150
	300	0.55	0.8/1.2	0.90	-	H ± 150
	350	0.60	0.8/1.2	1.00	-	H ± 150
	400	0.70	0.8/1.2	1.20/1.60	-	H ± 150

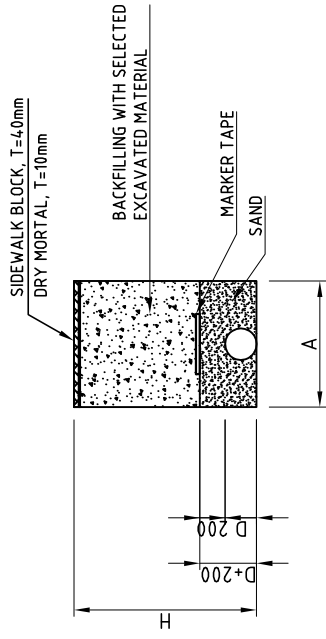
*1 Depth of cover : Depend on the site condition.



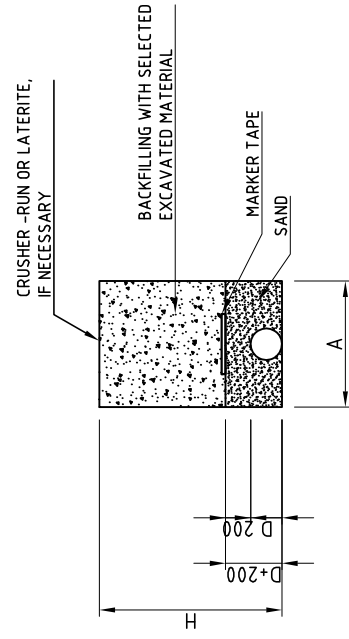
BACKFILL
TP-1M, ROADWAY OF THE NATIONAL ROAD



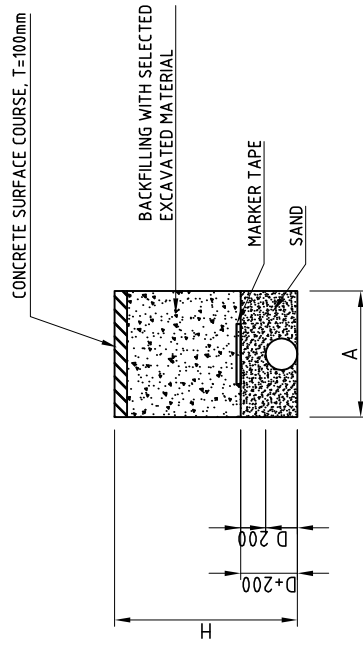
BACKFILL
TP-1C, CITY ROAD (PAVING) SHOULDER OF THE NATIONAL ROAD



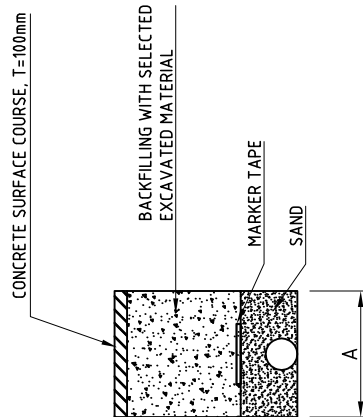
BACKFILL
TP-3, SIDEWALK



BACKFILL
TP-4, UN-PAVING SURFACE



BACKFILL
TP-2, ROAD SHOULDER



BACKFILL
TP-5, CONCRETE SURFACE COURSE

PROJECT

THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE

DESCRIPTION

Typical Drawing for Pipe Laying (1)

MINISTRY OF INDUSTRY & HANDICRAFT

NIHON SUIDO CONSULTANTS CO., LTD.
WATER AND SEWER BUREAU, CITY OF KITAKYUSHU

APPROVED BY

DRAWING No

PREPARED BY

TYP-01

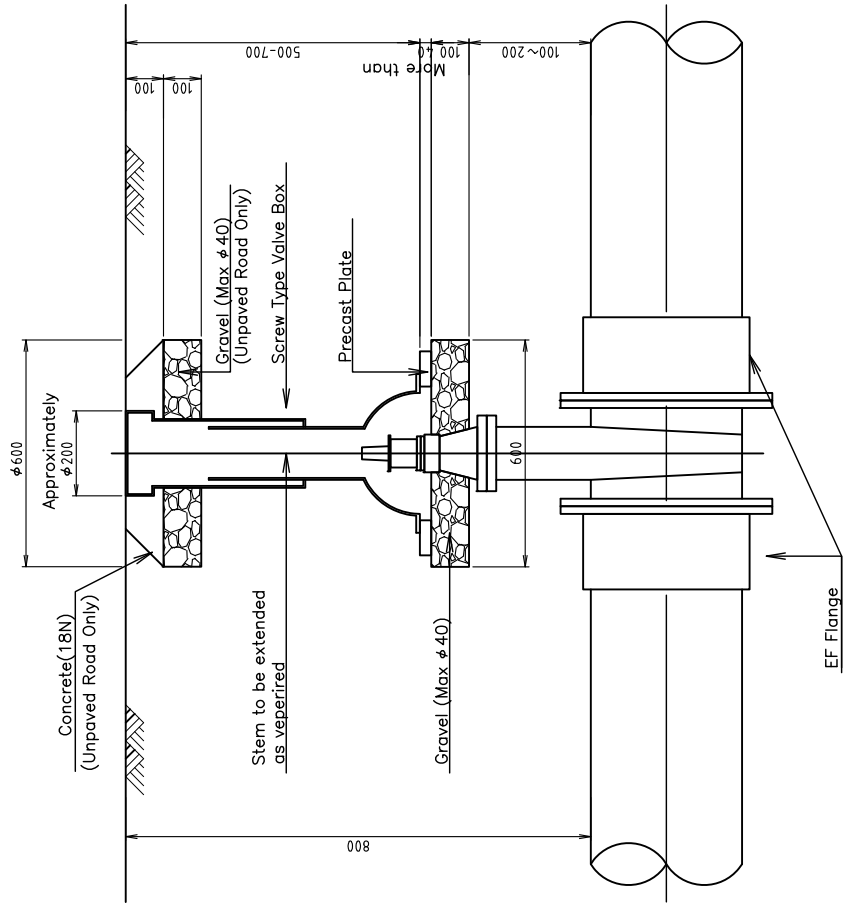
DATE

DATE

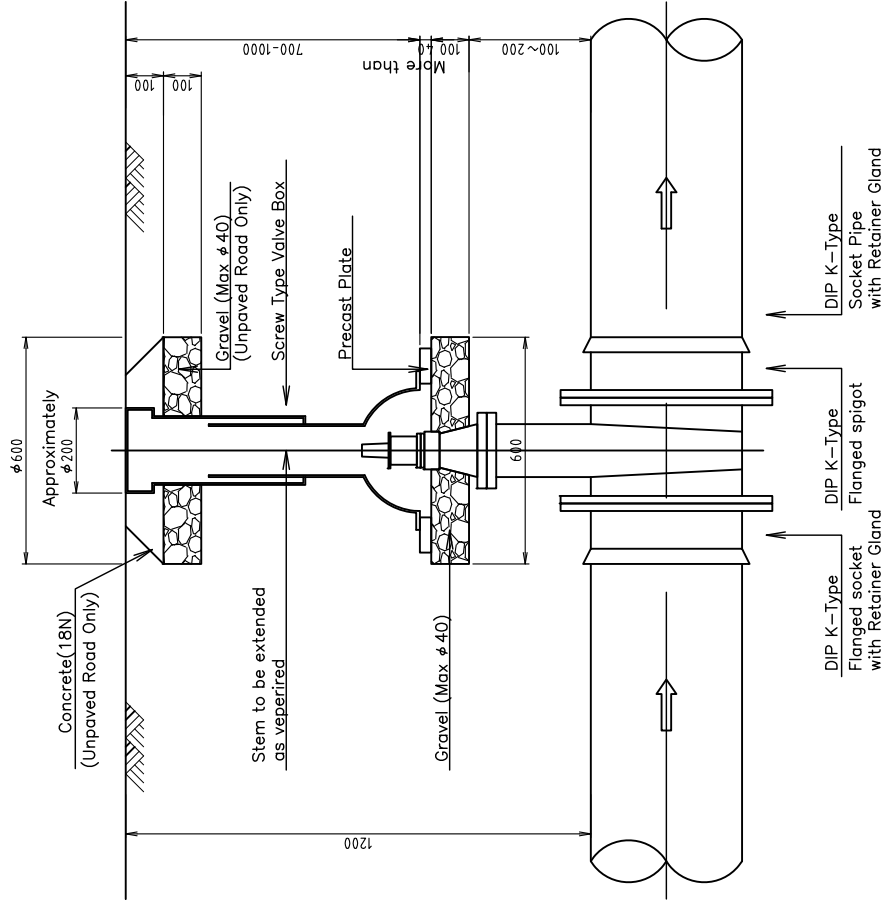
SCALE

None

Typical Drawing for Sluice Valve



SLUICE VALVE INSTALLATION
(HDPE:ND(OD)63-220)



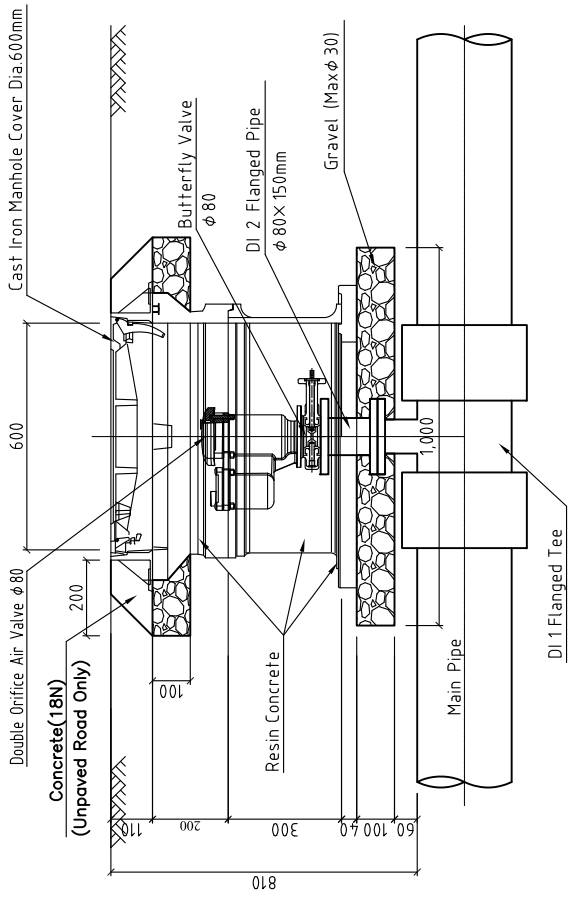
SLUICE VALVE INSTALLATION
(DIP:ND250-400)

NOTE

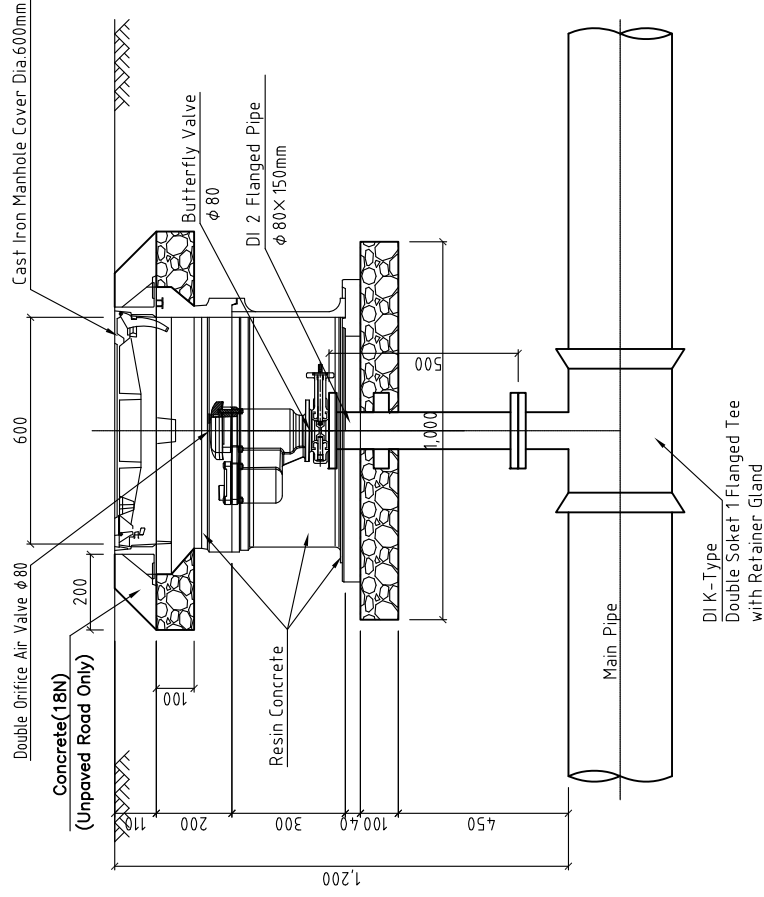
1. ALL SLUICE VALVES LESS THAN 400mm DIA WILL HAVE NO CHAMBERS AND WILL BE INSTALLED SEEMILER TO WASH OUT VALVES HEAVY-DUTY SURFACE BOXES AT THE ROAD LEVEL TO OPERATE THEM.
2. ALL DIMENSIONS ARE IN mm.

PROJECT THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE	DESCRIPTION Typical Drawing for Pipe Laying (2) Sluice Valve	APPROVED BY MINISTRY OF INDUSTRY & HANDICRAFT	DATE _____	DRAWING No TYP-002
PREPARED BY NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU	DATE _____	SCALE 1:20		

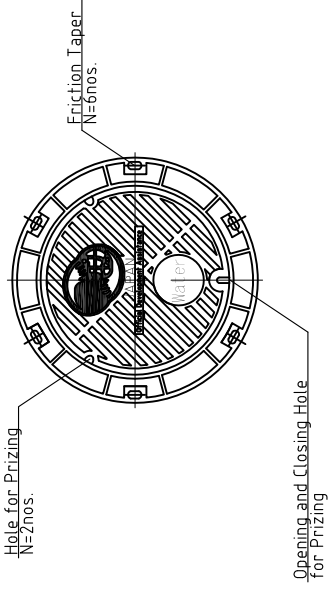
Typical Drawing for Installation of Air Valve and Washout



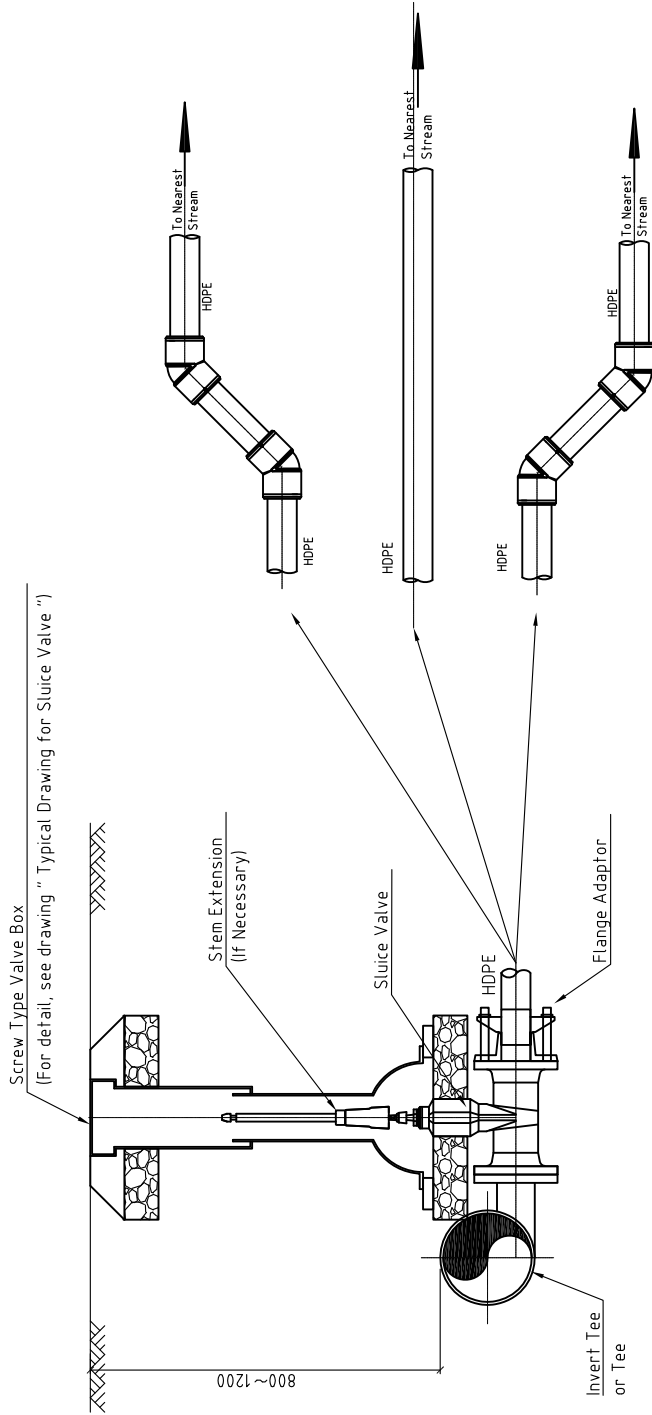
SINGLE ORIFICE AIR VALVE CHAMBER
 MAIN PIPE \leq ND(OD)220 (HDPE)



SINGLE ORIFICE AIR VALVE CHAMBER
 MAIN PIPE ND250~350 (DIP)



CAST IRON MANHOLE COVER
 ϕ 500 (No.3 Type)



CRITERIA FOR AIR VALVE AND WASH OUT

MAIN PIPE	MAIN PIPE MATERIAL	BRANCH PIPE for AIR VALVE	BRANCH PIPE for WASH OUT
ϕ 50(63)	HDPE	ϕ 50	ϕ 50
ϕ 75(90)		ϕ 80	ϕ 50
ϕ 100(110)		ϕ 80	ϕ 50
ϕ 150(160)		ϕ 80	ϕ 50
ϕ 200(225)		ϕ 80	ϕ 50
ϕ 250	DIP	ϕ 80	ϕ 100
ϕ 300		ϕ 80	ϕ 100
ϕ 350		ϕ 80	ϕ 100

NOTE

1. THE THICKNESS OF THE BLINDING LAYER SPECIFIED IN THE DRAWING IS FOR NORMAL SOIL TYPES. HOWEVER, IF THE STRUCTURE IS FOUNDED ON VERY WEAK SOIL SUCH AS PEAT, A GROUND STABILIZATION METHOD, AS DIRECTED BY THE ENGINEER, SHALL BE FOLLOWED.
2. THE TOP OF THE AIR VALVE CHAMBER SHOULD BE AT THE SAME LEVEL AS THE ROAD TOP LEVEL.
3. THE VALVE BOXES FOR WASHOUT MAY BE ON THE BANK OF THE ROAD.
4. ALL DIMENSIONS ARE IN mm.

PROJECT

THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE

DESCRIPTION

Typical Drawing for Pipe Laying (3)
 Installation of Air Valve and Washout

MINISTRY OF INDUSTRY & HANDICRAFT

NIHON SUIDO CONSULTANTS CO., LTD.
 WATER AND SEWER BUREAU, CITY OF KITAKYUSHU

APPROVED BY

PREPARED BY

DATE

DATE

DRAWING No

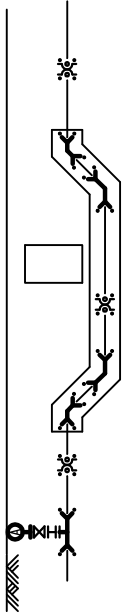
TYP-03

SCALE

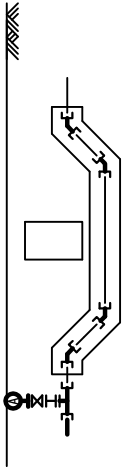
1:20

Typical Drawing for Connecting

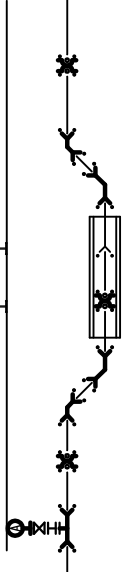
IS (Inverted siphon)



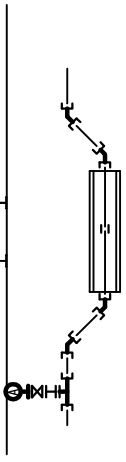
IS (Inverted siphon)



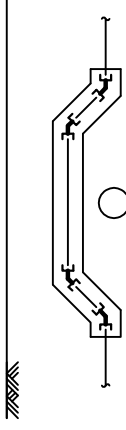
ISR (Inverted Siphon Railway)



ISR (Inverted Siphon Railway)



OC-2 (Over Cross)



Material	Joint Type	Diameter	Number
Double Socket Bend	DIP(T)	200~500 x 45°	4
Double Socket Tee	DIP(T)	200~500	1
Collar	DIP(K)	200~500	3
Restrained Coupling	DIP(T)	200~500	10
Restrained Coupling	DIP(K)	200~500	6
Air Valve	—	25	1
Ball Valve	—	80 x 100H	1
Flange Extension Pipe	—	80 x 500H (h=1.20m)	1
Flange Extension Pipe	—	80 x 150H (h=0.80m)	1
Flange Joint	—	200~500	2

Material	Joint Type	Diameter	Number
Double Socket Bend	HDPE	63~225 x 45°	4
Double Socket Tee	HDPE	63~225 x 80	1
Air Valve	—	25	1
Ball Valve	—	80 x 100H	1
Flange Extension Pipe	—	80 x 500H (h=1.20m)	1
Flange Extension Pipe	—	80 x 150H (h=0.80m)	1
Flange Joint	—	63~225	2

Material	Joint Type	Diameter	Number
Double Socket Bend	DIP(T)	200~500 x 45°	4
Double Socket Tee	DIP(T)	200~500	1
Collar	DIP(K)	200~500	3
Restrained Coupling	DIP(T)	200~500	10
Restrained Coupling	DIP(K)	200~500	6
Air Valve	—	25	1
Ball Valve	—	80 x 100H	1
Flange Extension Pipe	—	80 x 500H (h=1.20m)	1
Flange Extension Pipe	—	80 x 150H (h=0.80m)	1
Flange Joint	—	200~500	2

Material	Joint Type	Diameter	Number
Double Socket Bend	HDPE	63~225 x 45°	4
Double Socket Tee	HDPE	63~225 x 80	1
Socket	HDPE	63~225	1
Air Valve	—	25	1
Ball Valve	—	80 x 100H	1
Flange Extension Pipe	—	80 x 500H (h=1.20m)	1
Flange Extension Pipe	—	80 x 150H (h=0.80m)	1
Flange Joint	—	63~225	2

Material	Joint Type	Diameter	Number
Double Socket Bend	HDPE	63~225 x 45°	4

PO-1 (Pipe cutting fittings-1)



Material	Joint Type	Diameter	Number
Collar	DIP(K)	200~500	1
Flanged Socket	DIP(T)	200~500	1
Flanged Spigot	DIP(T)	200~500	1
Valve	—	200~500	1
Restrained Coupling	DIP(T)	200~500	1
Restrained Coupling	DIP(K)	200~500	2
Flange Joint	—	200~500	2

PC-2 (Pipe cutting fittings-2)



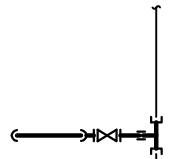
Material	Joint Type	Diameter	Number
Mechanical Adapter	HDPE	63~225	1
Stub Flange	HDPE	63~225	1
Socket	HDPE	63~225	1
Valve	—	63~225	1
Flange Joint	—	63~225	2

PC-3 (Pipe cutting fittings-1)



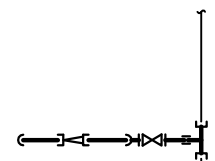
Material	Joint Type	Diameter	Number
Socket	HDPE	63~225	1
Flange Joint	—	63~225	1

PE-1 (Pipe end fittings-1)



Material	Joint Type	Diameter	Number
Straight Pipe	HDPE	63	0.12rail
Double Socket Tee	HDPE	80~225	1
Mechanical Adapter	HDPE	63~225	1
Stub Flange	HDPE	63~225	1
Socket	HDPE	63~225	1
Cap	HDPE	63~225	1
Valve	—	63~225	1
Flange Joint	—	63~225	2

PE-2 (Pipe end fittings-2)



Material	Joint Type	Diameter	Number
Straight Pipe	HDPE	63	0.12rail
Double Socket Tee	HDPE	80~225	1
Double Socket Reducer	HDPE	63~225	1
Mechanical Adapter	HDPE	63~225	1
Stub Flange	HDPE	63~225	1
Socket	HDPE	63~225	1
Cap	HDPE	63~225	1
Valve	—	63~225	1
Flange Joint	—	63~225	2

PROJECT

THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE

DESCRIPTION

Typical Drawing for Pipe Laying (4) Connecting

MINISTRY OF INDUSTRY & HANDICRAFT

NIHON SUIDO CONSULTANTS CO., LTD.
WATER AND SEWER BUREAU, CITY OF KITAKYUSHU

APPROVED BY

DRAWING No

TYP-04

DATE

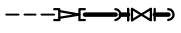
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DATE

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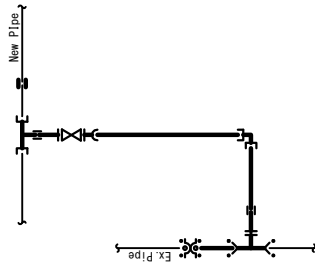
Typical Drawing for Connecting

PE-3



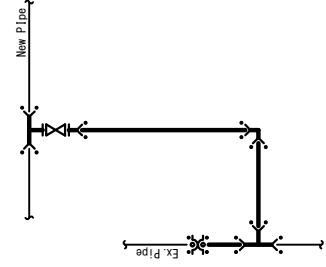
Material	Joint Type	Diameter	Number
Straight Pipe	HDPE	63	0.12roll
Double Socket Reducer	HDPE	80~225	1
Mechanical Adapter	HDPE	63~225	1
Stub Flange	HDPE	63~225	1
Cap	HDPE	63~225	1
Valve	—	63~225	1
Flange Joint	—	63~225	2

CF-3-2(Connecting fittings-3-2)



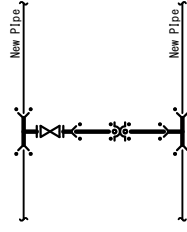
Material	Joint Type	Diameter	Number	Remarks
Straight Pipe	HDPE	63	0.24roll	
Straight Pipe	DIP(T)	80~225	2	
Double Socket Tee	DIP(T)	200~500	1	New x Ex
Double Socket Tee	HDPE	200~500	1	Ex. Diameter
Double Socket Bend	HDPE	63~225	1	Ex. Diameter
Socket	HDPE	63~225 x 90°	1	New Pipe Diameter
Socket	HDPE	63~225	1	Ex. Diameter
Mechanical Adapter	HDPE	63~225	2	Ex. Diameter
Stub Flange	HDPE	63~225	2	Ex. Diameter
Valve	—	63~225	1	Ex. Diameter
Flange Joint	—	63~225	3	Ex. Diameter
Collar	DIP(K)	200~500	1	Ex. Diameter
Restrained Coupling	DIP(T)	200~500	2	Ex. Diameter
Restrained Coupling	DIP(K)	200~500	2	Ex. Diameter

CF-1(Connecting fittings-1)



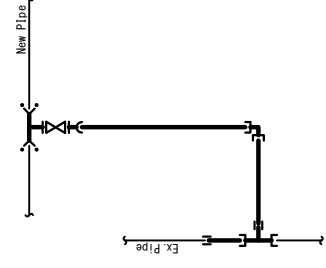
Material	Joint Type	Diameter	Number	Remarks
Straight Pipe	DIP(T)	200~500	2	Ex. Diameter
Triple Socket Tee	DIP(T)	200~500	1	Ex. Diameter
Double Socket Tee	DIP(T)	200~500	1	New x Ex
Double Socket Bend	DIP(T)	200~500 x 90°	1	Ex. Diameter
Collar	DIP(K)	200~500	1	Ex. Diameter
Flanged Socket	DIP(T)	200~500	1	Ex. Diameter
Restrained Coupling	DIP(T)	200~500	2	New Pipe Diameter
Restrained Coupling	DIP(T)	200~500	6	Ex. Diameter
Restrained Coupling	DIP(K)	200~500	2	Ex. Diameter
Valve	—	200~500	1	Ex. Diameter
Flange Joint	—	200~500	2	Ex. Diameter

CF-4(Connecting fittings-4)



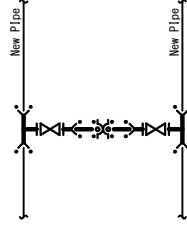
Material	Joint Type	Diameter	Number
Straight Pipe	DIP(T)	200~500	1
Triple Socket Tee	DIP(T)	200~500	1
Double Socket Tee	DIP(T)	200~500	1
Collar	DIP(K)	200~500	1
Flanged Socket	DIP(T)	200~500	1
Restrained Coupling	DIP(T)	200~500	6
Restrained Coupling	DIP(K)	200~500	2
Valve	—	200~500	1
Flange Joint	—	200~500	2

CF-2(Connecting fittings-2)



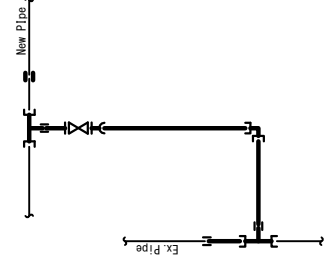
Material	Joint Type	Diameter	Number	Remarks
Straight Pipe	HDPE	63	0.24roll	
Double Socket Tee	DIP(T)	80~225	2	
Double Socket Tee	DIP(T)	200~500	1	New x Ex
Double Socket Tee	HDPE	63~225	1	Ex x Ex
Double Socket Bend	HDPE	63~225 x 90°	1	Ex. Diameter
Socket	HDPE	63~225	2	Ex. Diameter
Mechanical Adapter	HDPE	63~225	1	Ex. Diameter
Restrained Coupling	DIP(T)	200~500	2	New Pipe Diameter
Valve	—	63~225	1	Ex. Diameter
Flange Joint	—	63~225	2	Ex. Diameter

CF-4-2(Connecting fittings-4-2)



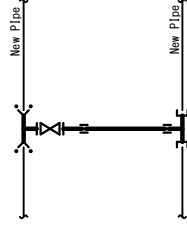
Material	Joint Type	Diameter	Number
Straight Pipe	DIP(T)	200~500	1
Double Socket Tee	DIP(T)	200~500	2
Collar	DIP(K)	200~500	1
Flanged Socket	DIP(T)	200~500	2
Restrained Coupling	DIP(T)	200~500	6
Restrained Coupling	DIP(K)	200~500	2
Valve	—	200~500	2
Flange Joint	—	200~500	4

CF-3(Connecting fittings-3)



Material	Joint Type	Diameter	Number	Remarks
Straight Pipe	HDPE	63	0.24roll	
Double Socket Tee	HDPE	80~225	2	
Double Socket Tee	HDPE	63~225	1	New x Ex
Double Socket Tee	HDPE	63~225	1	Ex. Diameter
Double Socket Bend	HDPE	63~225 x 90°	1	Ex. Diameter
Socket	HDPE	63~225	1	New Pipe Diameter
Socket	HDPE	63~225	3	Ex. Diameter
Mechanical Adapter	HDPE	63~225	1	Ex. Diameter
Stub Flange	HDPE	63~225	1	Ex. Diameter
Valve	—	63~225	1	Ex. Diameter
Flange Joint	—	63~225	2	Ex. Diameter

CF-5(Connecting fittings-5)



Material	Joint Type	Diameter	Number
Straight Pipe	HDPE	63	0.12roll
Double Socket Tee	HDPE	80~225	1
Double Socket Tee	DIP(T)	200~500	1
Socket	HDPE	63~225	1
Stub Flange	HDPE	63~225	1
Restrained Coupling	DIP(T)	200~500	2
Valve	—	63~225	1
Flange Joint	—	63~225	2

PROJECT

THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE

DESCRIPTION

Typical Drawing for Pipe Laying (5)
Connecting

MINISTRY OF INDUSTRY & HANDICRAFT

NIHON SUIDO CONSULTANTS CO., LTD.
WATER AND SEWER BUREAU, CITY OF KITAKYUSHU

APPROVED BY

DRAWING NO

TYP-05

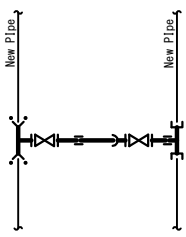
PREPARED BY

SCALE

None

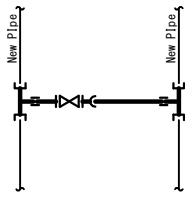
Typical Drawing for Connecting

CF-5-2(Connecting fittings-5-2)



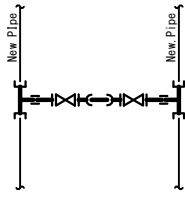
Material	Joint Type	Diameter	Number
Straight Pipe	HDPE	63	0.12roll
		80~225	1
Double Socket Tee	DIP(T)	200~500	1
Double Socket Tee	HDPE	63~225	1
Socket	HDPE	63~225	2
Mechanical Adapter	HDPE	63~225	1
Stub Flange	HDPE	63~225	2
Valve	HDPE	63~225	1
Flange Joint	HDPE	63~225	2
Flange Joint	—	200~500	2
Flange Joint	—	200~500	4

CF-6(Connecting fittings-6)



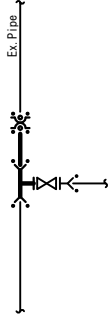
Material	Joint Type	Diameter	Number
Straight Pipe	HDPE	63~225	1
		63~225	2
Double Socket Tee	HDPE	63~225	2
Socket	HDPE	63~225	1
Mechanical Adapter	HDPE	63~225	1
Stub Flange	HDPE	63~225	1
Valve	—	63~225	1
Flange Joint	—	63~225	2

CF-6-2(Connecting fittings-6-2)



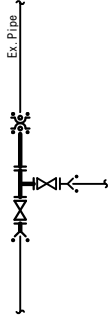
Material	Joint Type	Diameter	Number
Straight Pipe	HDPE	63	0.12roll
		80~225	1
Double Socket Tee	HDPE	63~225	2
Socket	HDPE	63~225	2
Mechanical Adapter	HDPE	63~225	2
Stub Flange	HDPE	63~225	2
Valve	—	63~225	2
Flange Joint	—	63~225	4

CF-7(Connecting fittings-7)



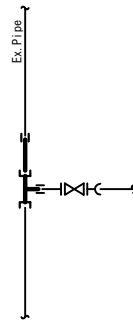
Material	Joint Type	Diameter	Number
Straight Pipe	DIP(T)	200~500	1
Double Socket Tee	DIP(T)	200~500	1
Collar	DIP(K)	200~500	1
Restrained Coupling	DIP(T)	200~500	2
Restrained Coupling	DIP(K)	200~500	2

CF-8(Connecting fittings-8)



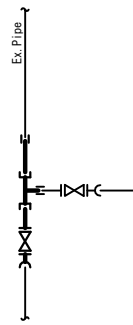
Material	Joint Type	Diameter	Number
Triple Flanged Tee	DIP(T)	200~500	1
Collar	DIP(K)	200~500	1
Flanged Socket	DIP(T)	200~500	1
Flanged Spigot	DIP(T)	200~500	1
Valve	—	200~500	1
Restrained Coupling	DIP(T)	200~500	1
Restrained Coupling	DIP(K)	200~500	2
Flange Joint	—	200~500	3

CF-9(Connecting fittings-9)



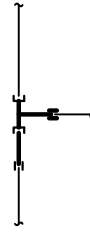
Material	Joint Type	Diameter	Number
Straight Pipe	HDPE	63	0.12roll
		80~225	1
Double Socket Tee	HDPE	63~225	1
Socket	HDPE	63~225	1

CF-10(Connecting fittings-10)



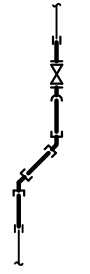
Material	Joint Type	Diameter	Number
Straight Pipe	HDPE	63	0.12roll
		80~225	1
Double Socket Tee	HDPE	63~225	1
Mechanical Adapter	HDPE	63~225	1
Stub Flange	HDPE	63~225	1
Socket	HDPE	63~225	1
Valve	—	63~225	1
Flange Joint	—	63~225	2

CF-11



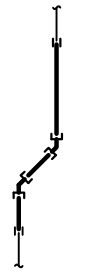
Material	Joint Type	Diameter	Number
Straight Pipe	HDPE	63	0.12roll
		80~225	1
Double Socket Tee	HDPE	63~225	1
Socket	HDPE	63~225	2

CF-12



Material	Joint Type	Diameter	Number
Straight Pipe	HDPE	63	0.12roll
		80~225	1
Double Socket Bend	HDPE	63~225x45°	2
Socket	HDPE	63~225	1
Mechanical Adapter	HDPE	63~225	1
Valve	—	63~225	1
Flange Joint	—	63~225	2
Stub Flange	HDPE	63~225	1

CF-13



Material	Joint Type	Diameter	Number
Straight Pipe	HDPE	63	0.12roll
		80~225	1
Double Socket Bend	HDPE	63~225x45°	2
Socket	HDPE	63~225	1

PROJECT

THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE

DESCRIPTION

Typical Drawing for Pipe Laying (6)
Connecting

MINISTRY OF INDUSTRY & HANDICRAFT

NIHON SUIDO CONSULTANTS CO., LTD.
WATER AND SEWER BUREAU, CITY OF KITAKYUSHU

DATE

APPROVED BY

DRAWING No

TYP-06

DATE

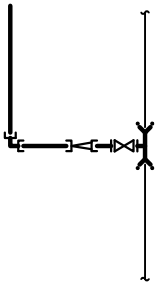
PREPARED BY

SCALE

None

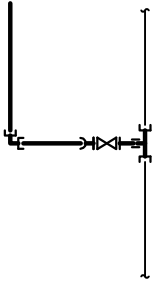
Typical Drawing for Connecting

DR-1(Drain pipe fittings-1)



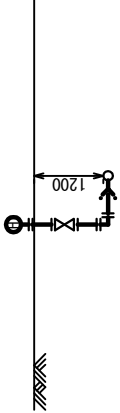
Material	Joint Type	Diameter	Number
Double Socket Tee	DIP (T)	200~500	1
Restrained Coupling	DIP (T)	200~500	2
Straight Pipe	HDPE	63	2
Double Socket Bend	HDPE	63×90°	1
Double Socket Reducer	HDPE	63~225	1
Stub Flange	HDPE	63~225	1
Valve	—	63~225	1
Flange Joint	—	63~225	2

DR-2(Drain pipe fittings-2)



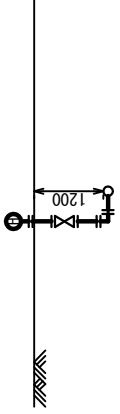
Material	Joint Type	Diameter	Number
Straight Pipe	HDPE	63	0.24roll
Double Socket Tee	HDPE	80~225	2
Double Socket Bend	HDPE	63~225×63	1
Mechanical Adapter	HDPE	63×90°	1
Stub Flange	HDPE	63~225	1
Socket	HDPE	63~225	1
Valve	—	63~225	1
Flange Joint	—	63~225	2

H-1(Fire Hydrant-1)



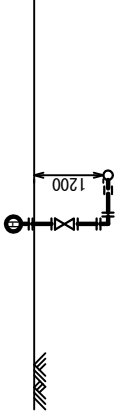
Material	Joint Type	Diameter	Number
Triple Socket Tee	DIP (T)	300~500×100	1
Flanged Spigot	DIP (T)	100	1
Double Flanged Bend	—	100×90°	1
Flange Extension Pipe	—	100×350H	1
Flange Extension Pipe	—	100×660H	1
Ball Valve	—	100×100H	1
Fire Hydrant (Double Mouths)	—	100	1
Restrained Coupling	DIP (T)	100	1
Flange Joint	—	100	5

H-2(Fire Hydrant-2)



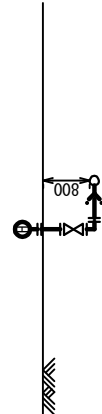
Material	Joint Type	Diameter	Number
Double Socket Tee	HDPE	250×100	1
Double Flanged Bend	—	100×90°	1
Flange Extension Pipe	—	100×350H	1
Flange Extension Pipe	—	100×660H	1
Ball Valve	—	100×100H	1
Fire Hydrant (Single Mouth)	—	100	1
Flange Joint	—	100	5

H-3(Fire Hydrant-3)



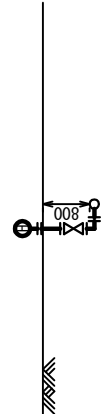
Material	Joint Type	Diameter	Number
Double Socket Tee	HDPE	110~200×63	1
Socket	HDPE	80	1
Stub Flange	HDPE	80	1
Double Flanged Bend	—	80	1
Flange Extension Pipe	—	80×400H	1
Flange Extension Pipe	—	80×650H	1
Ball Valve	—	80×100H	1
Fire Hydrant (Single Mouth)	—	80	1
Flange Joint	—	80	5

H-4(Fire Hydrant-4)



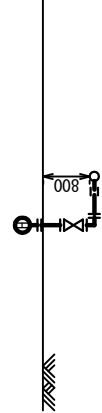
Material	Joint Type	Diameter	Number
Triple Socket Tee	DIP (T)	300~500×100	1
Flanged Spigot	DIP (T)	100	1
Double Flanged Bend	—	100×90°	1
Flange Extension Pipe	—	100×660H	1
Ball Valve	—	100×100H	1
Fire Hydrant (Double Mouths)	—	100	1
Restrained Coupling	DIP (T)	100	1
Flange Joint	—	100	4

H-5(Fire Hydrant-5)



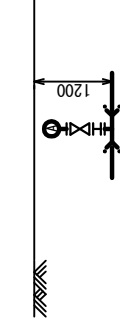
Material	Joint Type	Diameter	Number
Triple Socket Tee	DIP (T)	250×100	1
Flanged Spigot	DIP (T)	100	1
Double Flanged Bend	—	100	1
Flange Extension Pipe	—	100×660H	1
Ball Valve	—	100×100H	1
Fire Hydrant (Single Mouth)	—	100	1
Restrained Coupling	DIP (T)	100	1
Flange Joint	—	100	4

H-6(Fire Hydrant-6)



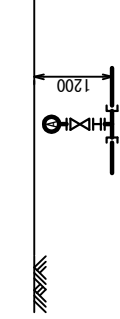
Material	Joint Type	Diameter	Number
Double Socket Tee	HDPE	110~220×80	1
Socket	HDPE	80	1
Stub Flange	HDPE	80	1
Double Flanged Bend	—	80	1
Flange Extension Pipe	—	80×650H	1
Ball Valve	—	80×100H	1
Fire Hydrant (Single Mouth)	—	80	1
Flange Joint	—	80	4

A-1(Air Valve-1)



Material	Joint Type	Diameter	Number
Double Socket Tee	DIP (T)	200~500×80	1
Flange Extension Pipe	—	80×500H	1
Ball Valve	—	80×100H	1
Air Valve	—	25	1
Restrained Coupling	DIP (T)	200~500	2
Flange Joint	—	80	3

A-2(Air Valve-2)



Material	Joint Type	Diameter	Number
Double Socket Tee	HDPE	110~220×80	1
Flange Extension Pipe	—	80×500H	1
Ball Valve	—	80×100H	1
Air Valve	—	25	1
Flange Joint	—	80	3

PROJECT

THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE

DESCRIPTION

Typical Drawing for Pipe Laying (7)
Connecting

MINISTRY OF INDUSTRY & HANDICRAFT

NIHON SUIDO CONSULTANTS CO., LTD.
WATER AND SEWER BUREAU, CITY OF KITAKYUSHU

APPROVED BY

DRAWING No

TYP-07

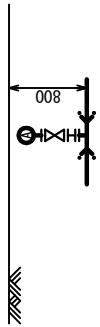
PREPARED BY

SCALE

None

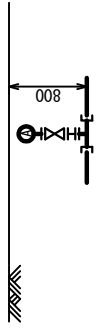
Typical Drawing for Connecting

A-3 (Air Valve-3)



Material	Joint Type	Diameter	Number
Double Socket Tee	DIP(T)	200~500 x 80	1
Flange Extension Pipe	—	80 x 150H	1
Ball Valve	—	80 x 100H	1
Air Valve	—	25	1
Restrained Coupling	DIP(T)	200~500	2
Flange Joint	—	200~500	3

A-4 (Air Valve-4)



Material	Joint Type	Diameter	Number
Double Socket Tee	HDPE	110~220 x 80	1
Flange Extension Pipe	—	80 x 150H	1
Ball Valve	—	80 x 100H	1
Air Valve	—	25	1
Flange Joint	—	110~220	3

PROJECT

THE PROJECT FOR EXPANSION AND IMPROVEMENT OF
WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE

DESCRIPTION

Typical Drawing for Pipe Laying (8)
Connecting

MINISTRY OF INDUSTRY & HANDICRAFT

NIHON SUIDO CONSULTANTS CO., LTD.
WATER AND SEWER BUREAU, CITY OF KITAKYUSHU

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PREPARED BY

DATE

DATE

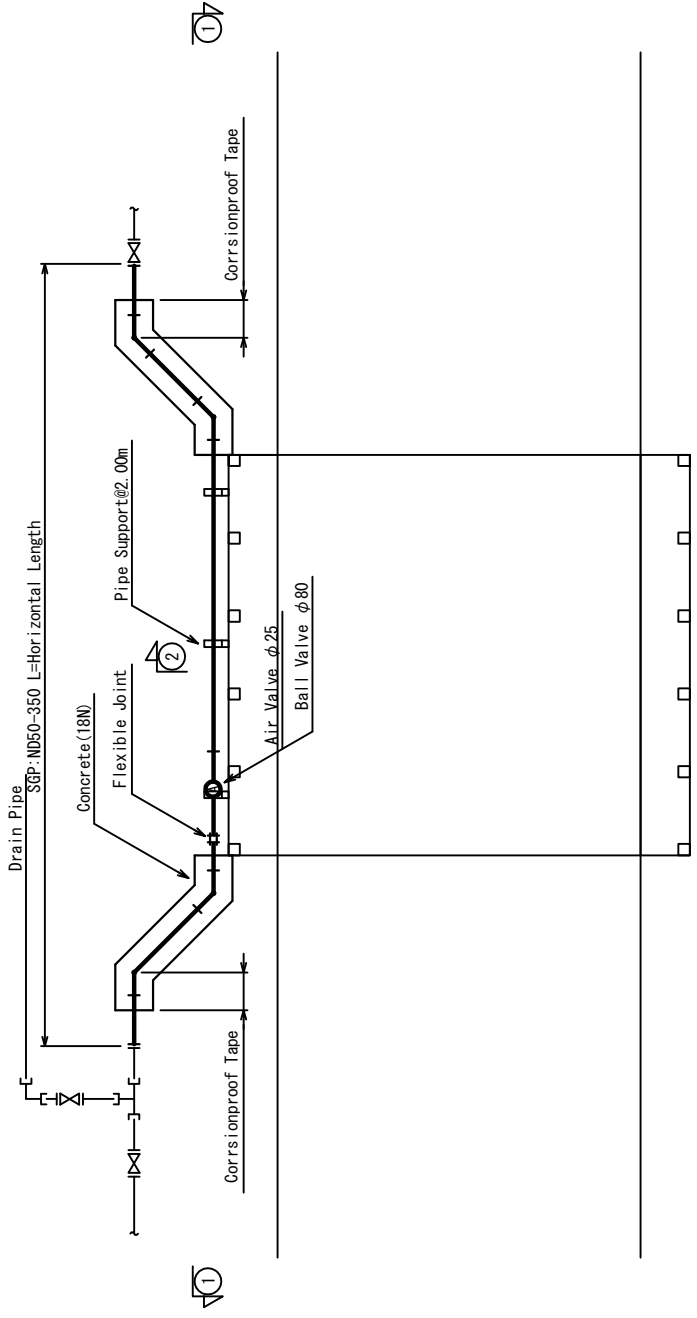
DRAWING No

TYP-08

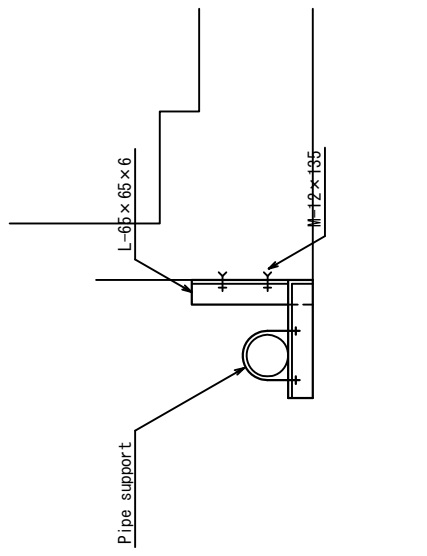
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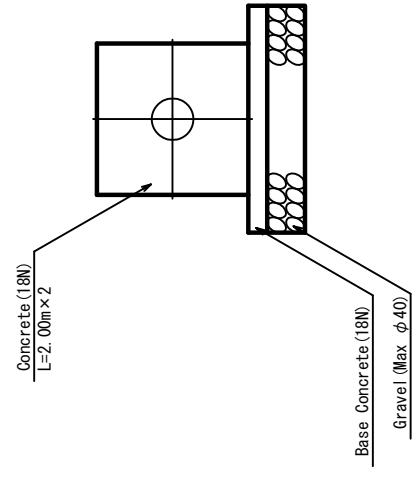
Plan (Bridge attached pipe) 1/50



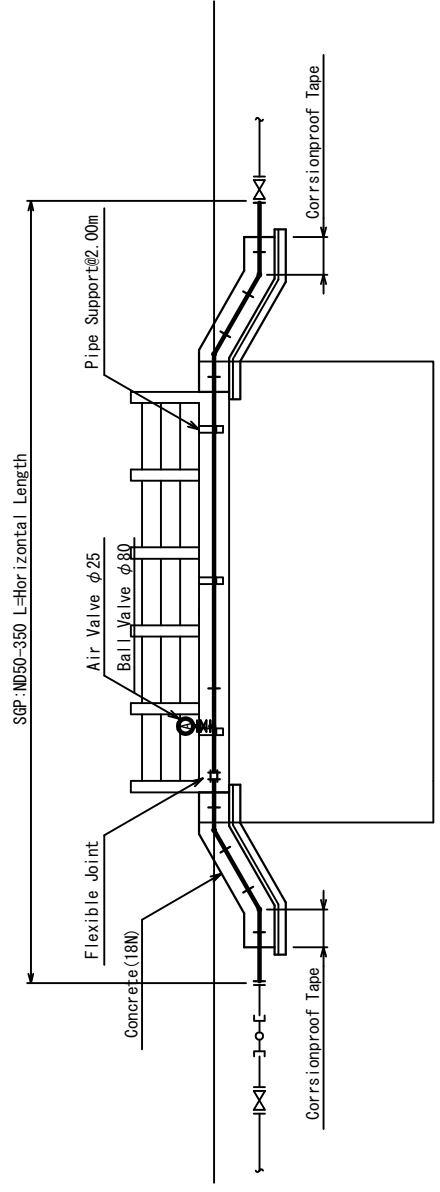
PIPE SUPPORT 1/10



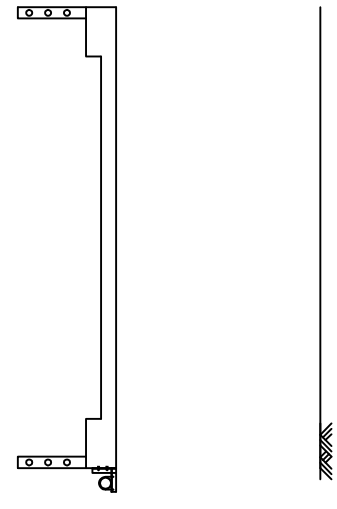
Concrete 1/10



Section 1-1 1/50

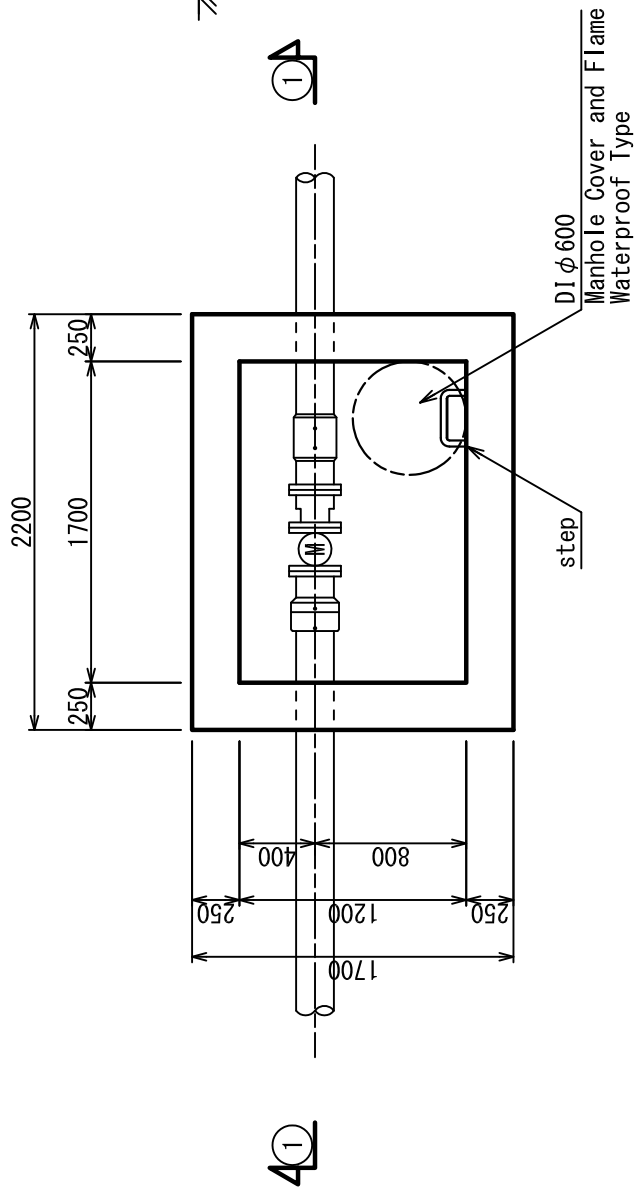


Section 2-2 1/50

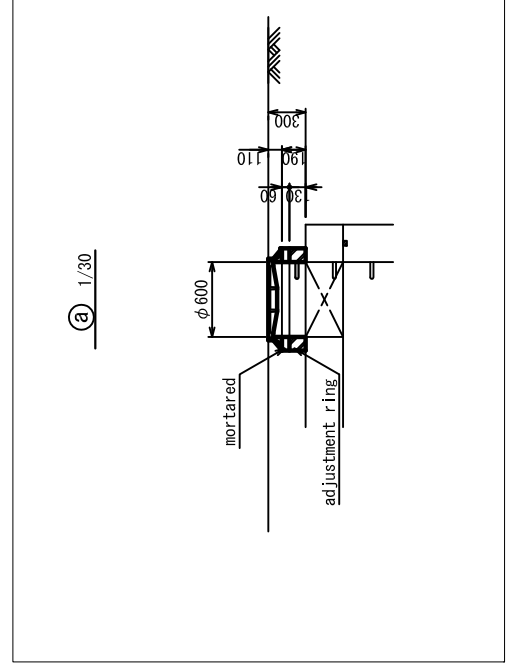
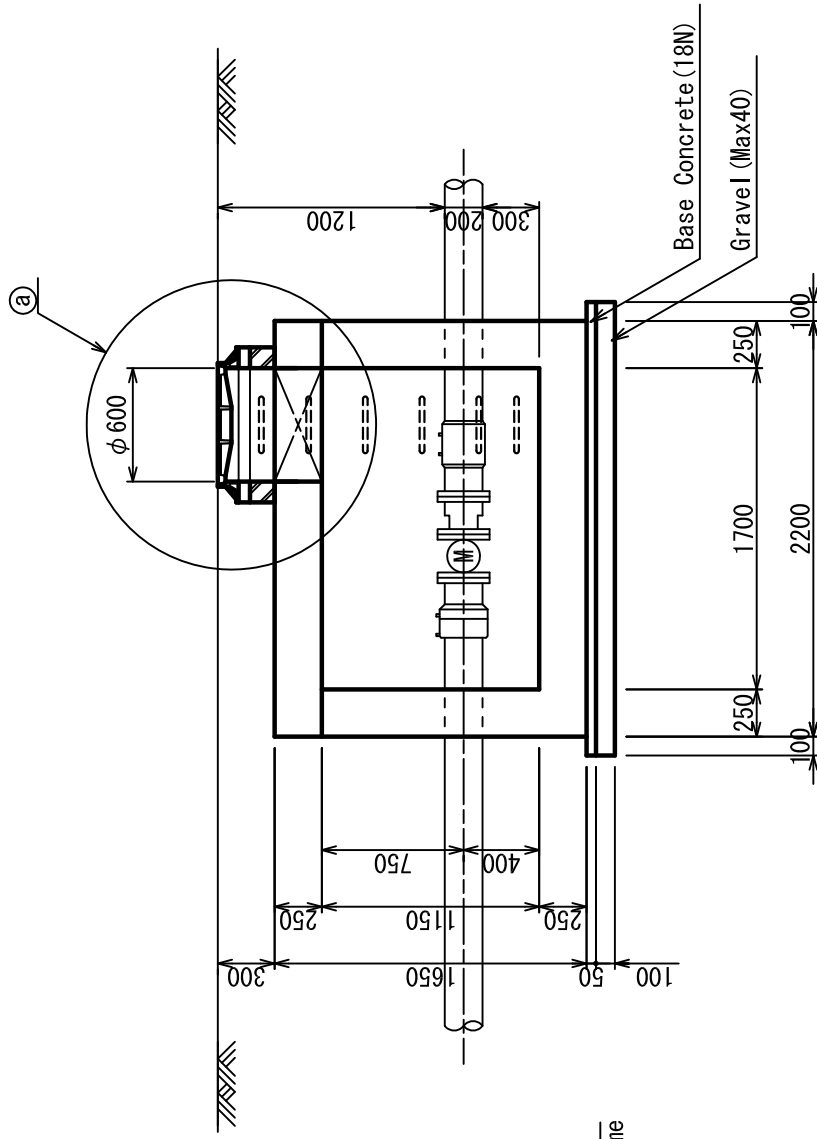


PROJECT	THE PROJECT FOR EXPANSION OF WATER SUPPLY SYSTEMS IN KAMPONG CHAM AND BATTAMBANG	DESCRIPTION Typical Drawing for Pipe Laying (9) Bridge Attached Pipe	MINISTRY OF INDUSTRY & HANDICRAFT	APPROVED BY	DATE	DRAWING No
			NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU	PREPARED BY	DATE	TYP-09 SCALE As Shown

Upper Plan 1/50

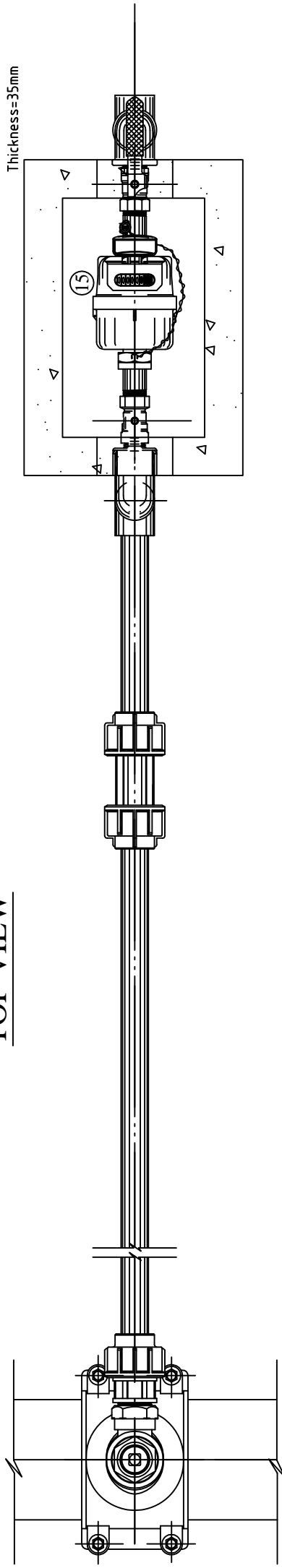


Section 1-1 1/50

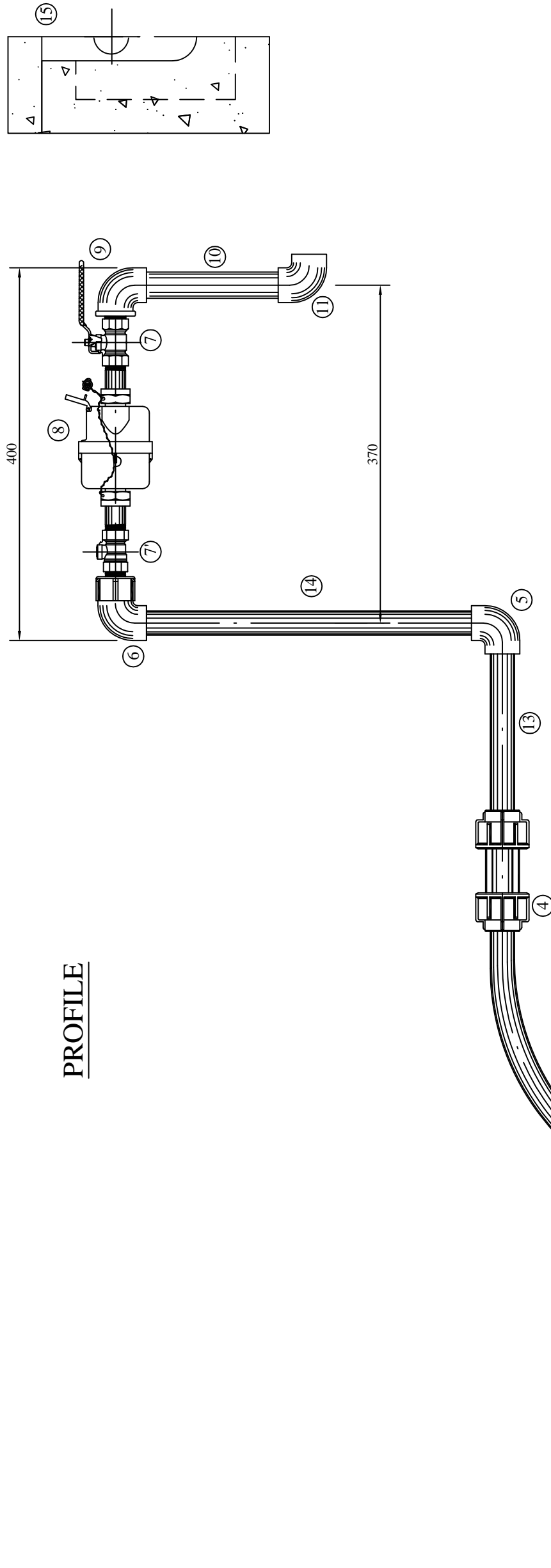


PROJECT	DESCRIPTION	APPROVED BY	DATE	DRAWING No
				TYP-10
THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE	Typical Drawing for Pipe Laying (10) Water Flow Meter Chamber	MINISTRY OF INDUSTRY & HANDICRAFT NIHON SUIDO CONSULTANTS CO., LTD. WATER AND SEWER BUREAU, CITY OF KITAKYUSHU	DATE	SCALE
				As shown

TOP VIEW



PROFILE



List of Pipe and Fittings

No	Description	Size	Unit	Quantity
1	Clamp Saddle	Ø Main Pipe X 1"	PC	1
2	Brass Ferrule	1"	PC	1
3	Compression Male Adaptor	25mm X 1"	PC	1
4	Compression Coupling	25mm	PC	1
5	PE Socket Fusion Elbow 90°	25mm	PC	1
6	PE Brass Thread Male and Socket Fusion Elbow 90°	25 X 1/2"	PC	1
7	Brass Ball Valve	1/2"	PCs	1
7	Brass Lock Valve	1/2"	PCs	1
8	Volume Metric Watermeter	15mm	PC	1
9	PVC Thread Male and Socket Elbow 90°	21mm X 1/2"	PC	1
10	PVC Short Pipe	21mm	mm	220
11	PVC Elbow 90°	21mm	PC	1
12	HDPE Pipe	25mm	m	Depended on Request
13	HDPE Pipe	25mm	mm	1000
14	HDPE Pipe	25mm	mm	400
15	Meter Box, Concrete, with cover	200x400x200x35	mm	1

PROJECT

THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE

DESCRIPTION

Typical Drawing for Pipe Laying (11)
15mm Water Meter with Clamp Saddle for HDPE Main Pipe

MINISTRY OF INDUSTRY & HANDICRAFT

NIHON SUIDO CONSULTANTS CO., LTD.
WATER AND SEWER BUREAU, CITY OF KITAKYUSHU

APPROVED BY

PREPARED BY

DATE

DATE

DRAWING No

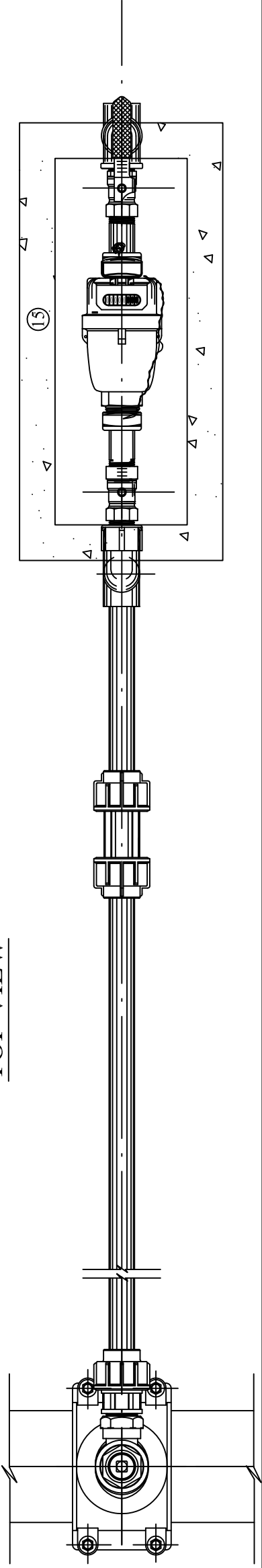
TYP-11

SCALE

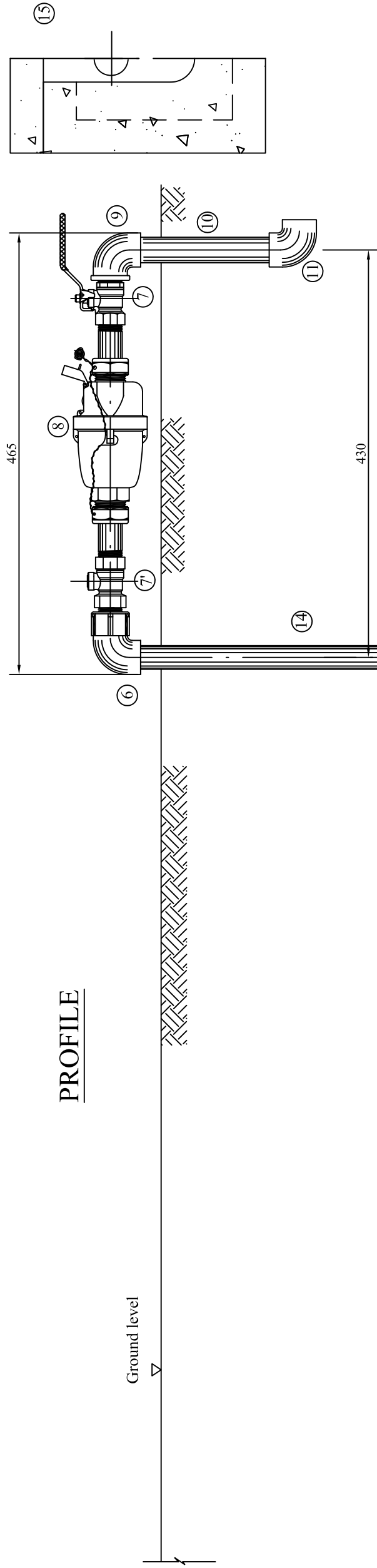
None

TOP VIEW

Thickness=35mm



PROFILE



List of Pipe and Fittings

No	Description	Size	Unit	Quantity
1	Clamp Saddle	Ø Main Pipe X 1"	PC	1
2	Brass Ferrule	1"	PC	1
3	Compression Male Adaptor	25mm X 1"	PC	1
4	Compression Coupling	25mm	PC	1
5	PE Socket Fusion Elbow 90°	25mm	PC	1
6	PE Socket Fusion Elbow 90°	25 X 3/4"	PC	1
7	Brass Ball Valve	3/4"	PCs	1
7'	Brass Lock Valve	3/4"	PCs	1
8	Volume Metric Watermeter	20mm	PC	1
9	PVC Thread Male and Socket Elbow 90°	27mm x 3/4"	PC	1
10	PVC Short Pipe	27mm	mm	220
11	PVC Elbow 90°	27mm	PC	1
12	HDPE Pipe	25mm	m	Depended on Request
13	HDPE Pipe	25mm	mm	1000
14	HDPE Pipe	25mm	mm	400
15	Meiter Box, Concrete, with cover	200x400x200x35	mm	1



PROJECT

THE PROJECT FOR EXPANSION AND IMPROVEMENT OF WATER SUPPLY SYSTEMS IN KAMPOT AND SIHANOUK VILLE

DESCRIPTION

Typical Drawing for Pipe Laying (12)
20mm Water Meter with Clamp Saddle for HDPE Main Pipe

MINISTRY OF INDUSTRY & HANDICRAFT

NIHON SUIDO CONSULTANTS CO., LTD.
WATER AND SEWER BUREAU, CITY OF KITAKYUSHU

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PREPARED BY

DATE

DATE

DRAWING No

TYP-12

SCALE

None

7.2 カンボジア国及びカンボット州の人口データ

Population by Province in Cambodia

Cambodia/Province	Population		
	1998	2008	2013
Cambodia	11,437,656	13,395,682	14,676,591
Banteay Meanchey	577,772	677,872	729,569
Battambang	793,129	1,025,174	1,121,019
Kampong Cham	1,608,914	1,679,992	1,757,223
Kampong Chhnang	417,693	472,341	523,202
Kampong Speu	598,882	716,944	755,465
Kampong Thom	569,060	631,409	690,414
Kampot	528,405	585,850	611,557
Kandal	1,075,125	1,091,170	1,115,965
Koh Kong	116,061	117,481	122,263
Kratie	263,175	319,217	344,195
MondulKiri	32,407	61,107	72,680
Phnom Penh	999,804	1,501,725	1,688,044
PreahVihear	119,261	171,139	235,370
Prey Veng	926,042	947,372	1,156,739
Pursat	360,445	397,161	435,596
RatanakKiri	94,243	150,466	183,699
Siem Reap	696,164	896,443	922,982
Preah Sihanouk	171,735	221,396	250,180
Stung Treng	81,074	111,671	122,791
SvayRieng	478,252	482,788	578,380
Takeo	790,168	844,906	923,373
Otdar Meanchey	68,279	185,819	231,390
Kep	28,660	35,753	38,701
Pailin	22,906	70,486	65,795

Data Source: National Institute of Statistics, Ministry of Planning, Cambodia

Population by Commune in Kampot Province

Province District/City Sangkat/Commune	Population		Growth Rates (1998-2008)	
	1998	2008	Decadal	Annual
07 KAMPOT				
- Total	528,405	585,850	10.87	1.03
- Urban	45,250	48,274	6.68	0.65
- Rural	483,155	537,576	11.26	1.07
01 Angkor Chey	72,459	72,684	0.31	0.03
Commune				
01 Angk Phnum Touch	4,054	4,286	5.72	0.56
02 Ankor Chey	4,073	4,160	2.14	0.21
03 Champei	8,427	8,709	3.35	0.33
04 Dambouk Khpos	13,937	13,887	-0.36	-0.04
05 Dan Koum	5,396	5,299	-1.80	-0.18
06 Daeum Doung	2,574	2,510	-2.49	-0.25
07 Mroum	4,242	4,332	2.12	0.21
08 Phnum Kong	9,926	10,002	0.77	0.08
09 Praphnum	4,889	5,012	2.52	0.25
10 Samlanh	6,044	6,107	1.04	0.10
11 Tani	8,897	8,380	-5.81	-0.60
02 Banteay Meas	81,542	83,022	1.82	0.18
Commune				
01 Banteay Meas Khang Kaeut	7,731	7,683	-0.62	-0.06
02 Banteay Meas Khang Lech	6,989	7,043	0.77	0.08
03 Prey Tonle	2,240	2,407	7.46	0.72
04 Samraong Kraom	5,627	5,316	-5.53	-0.57
05 Samraong Leu	5,268	5,433	3.13	0.31
06 Sdach Kong Khang Cheung	5,253	5,550	5.65	0.55
07 Sdach Kong Khang Lech	4,232	4,311	1.87	0.18
08 Sdach Kong Khang Tboung	2,655	2,719	2.41	0.24
09 Tnoat Chong Srang	7,369	7,277	-1.25	-0.13
10 Trapeang Sala Khang Kaeut	3,936	3,979	1.09	0.11
11 Trapeang Sala Khang Lech	4,952	4,557	-7.98	-0.83
12 Tuk Meas Khang Kaeut	4,831	4,923	1.90	0.19
13 Tuk Meas Khang Lech	9,112	10,697	17.39	1.60
14 Voat Angk Khang Cheung	6,115	5,782	-5.45	-0.56
15 Voat Angk Khang Tboung	5,232	5,345	2.16	0.21
03 Chhuk	78,951	99,587	26.14	2.32
Commune				
01 Baniev	5,379	5,161	-4.05	-0.41
02 Takaen	3,487	13,678	292.26	13.67
03 Boeng Nimol	5,714	5,819	1.84	0.18
04 Chhuk	7,451	7,879	5.74	0.56
05 Doun Yay	5,687	5,514	-3.04	-0.31
06 Krang Sbov	5,553	4,983	-10.26	-1.08
07 Krang Snay	10,245	9,685	-5.47	-0.56
08 Lbaeuk	6,370	7,967	25.07	2.24

Province District/City Sangkat/Commune	Population		Growth Rates (1998-2008)	
	1998	2008	Decadal	Annual
09 Trapeang Phleang	1,657	10,415	528.55	18.38
10 Mean Chey	4,293	4,010	-6.59	-0.68
11 Neareay	5,079	5,059	-0.39	-0.04
12 Satr Pong	6,602	7,607	15.22	1.42
13 Trapeang Bei	5,044	5,860	16.18	1.50
14 Tramaeng	6,390	5,950	-6.89	-0.71
04 Chum Kiri	39,320	47,176	19.98	1.82
Commune				
01 Chres	5,572	7,179	28.84	2.53
02 Chumpu Voan	6,703	7,930	18.31	1.68
03 Snay Anhchit	4,505	5,270	16.98	1.57
04 Srae Chaeng	7,518	10,075	34.01	2.93
05 Srae Knong	5,091	5,678	11.53	1.09
06 Srae Samraong	3,871	4,094	5.76	0.56
07 Trapeang Reang	6,060	6,950	14.69	1.37
05 Dang Tong	50,167	54,261	8.16	0.78
Commune				
01 Damnak Sokram	3,617	3,469	-4.09	-0.42
02 Dang Tong	9,633	9,791	1.64	0.16
03 Khcheay Khang Cheung	4,621	4,464	-3.40	-0.35
04 Khcheay Khang Tboundg	4,861	4,920	1.21	0.12
05 Mean Ritth	4,540	5,098	12.29	1.16
06 Srae Chea Khang Cheung	2,851	4,060	42.41	3.54
07 Srae Chea Khang Tboundg	1,954	2,692	37.77	3.20
08 Totung	6,454	6,115	-5.25	-0.54
09 Angk Romeas	5,910	6,752	14.25	1.33
10 L'ang	5,726	6,900	20.50	1.87
06 Kampong Trach	83,061	85,776	3.27	0.32
Commune				
01 Boeng Sala Khang Cheung	6,691	6,694	0.04	0.00
02 Boeng Sala Khang Tboundg	7,319	7,683	4.97	0.49
03 Damnak Kantuot Khang Cheung	5,878	5,602	-4.70	-0.48
04 Damnak Kantuot Khang Tboundg	7,119	7,336	3.05	0.30
05 Kampong Trach Khang Kaeut	9,214	9,455	2.62	0.26
06 Kampong Trach Khang Lech	5,540	5,749	3.77	0.37
07 Kanthaor Khang Cheung	2,589	2,309	-10.81	-1.14
08 Kanthaor Khang Kaeut	4,403	4,345	-1.32	-0.13
09 Kanthaor Khang Lech	4,655	4,578	-1.65	-0.17
12 Preaek Kroes	8,694	8,785	1.05	0.10
13 Ruessei Srok Khang Kaeut	4,117	4,301	4.47	0.44
14 Ruessei Srok Khang Lech	9,413	10,356	10.02	0.95
15 Svay Tong Khang Cheung	3,150	3,391	7.65	0.74
16 Svay Tong Khang Tboundg	4,279	5,192	21.34	1.93
07 Tuek Chhou	89,779	106,977	19.16	1.75
Commune				
01 Boeng Tuk	4,272	5,369	25.68	2.29
02 Chum Kriel	5,531	5,834	5.48	0.53
03 Kampong Kraeng	6,142	6,426	4.62	0.45

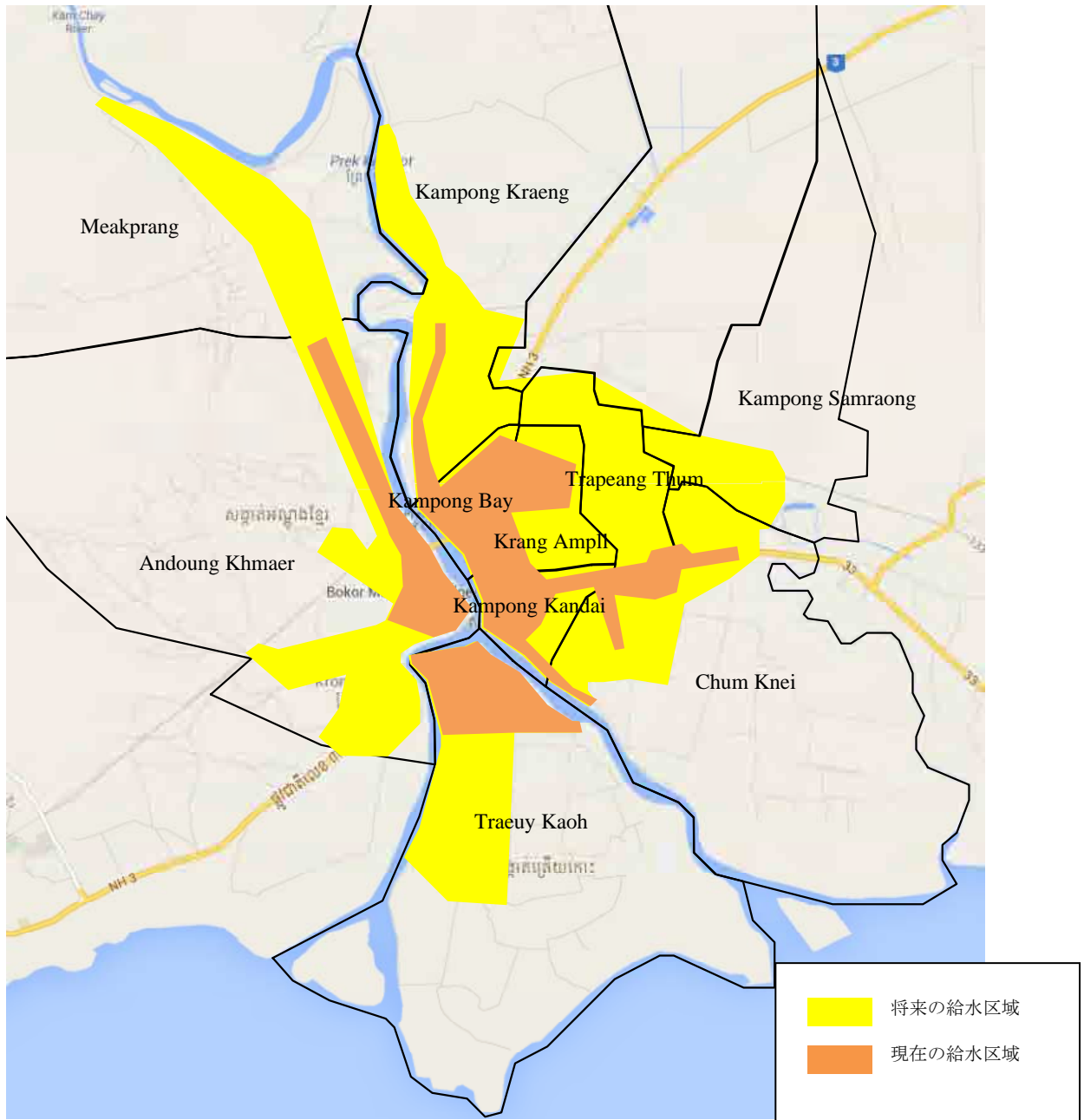
Province District/City Sangkat/Commune	Population		Growth Rates (1998-2008)	
	1998	2008	Decadal	Annual
04 Kampong Samraong	2,784	2,896	4.02	0.39
05 Kandaol	8,048	11,341	40.92	3.43
07 Kaoh Touch	4,989	6,698	34.26	2.95
08 Koun Satv	6,825	8,473	24.15	2.16
09 Makprang	4,910	5,104	3.95	0.39
11 Preaek Tnoat	7,839	8,958	14.27	1.33
12 Prey Khmum	5,986	6,466	8.02	0.77
13 Prey Thnang	8,626	10,411	20.69	1.88
15 Stueng Kaev	4,260	5,604	31.55	2.74
16 Thmei	6,455	8,304	28.64	2.52
17 Trapeang Pring	5,633	6,883	22.19	2.00
18 Trapeang Sangkae	5,016	5,441	8.47	0.81
<i>19 Trapeang Thum</i>	2,463	2,769	12.42	1.17
08 Krong Kampot	33,126	36,367	9.78	0.93
Commune				
<i>01 Kampong Kandal</i>	8,146	8,285	1.71	0.17
<i>02 Krang Ampil</i>	4,156	4,632	11.45	1.08
<i>03 Kampong Bay</i>	6,613	6,376	-3.58	-0.36
<i>04 Andoung Khmer</i>	9,127	10,923	19.68	1.80
05 Traeuy Kaoh	5,084	6,151	20.99	1.91

Data Source: National Institute of Statistics, Ministry of Planning, Cambodia

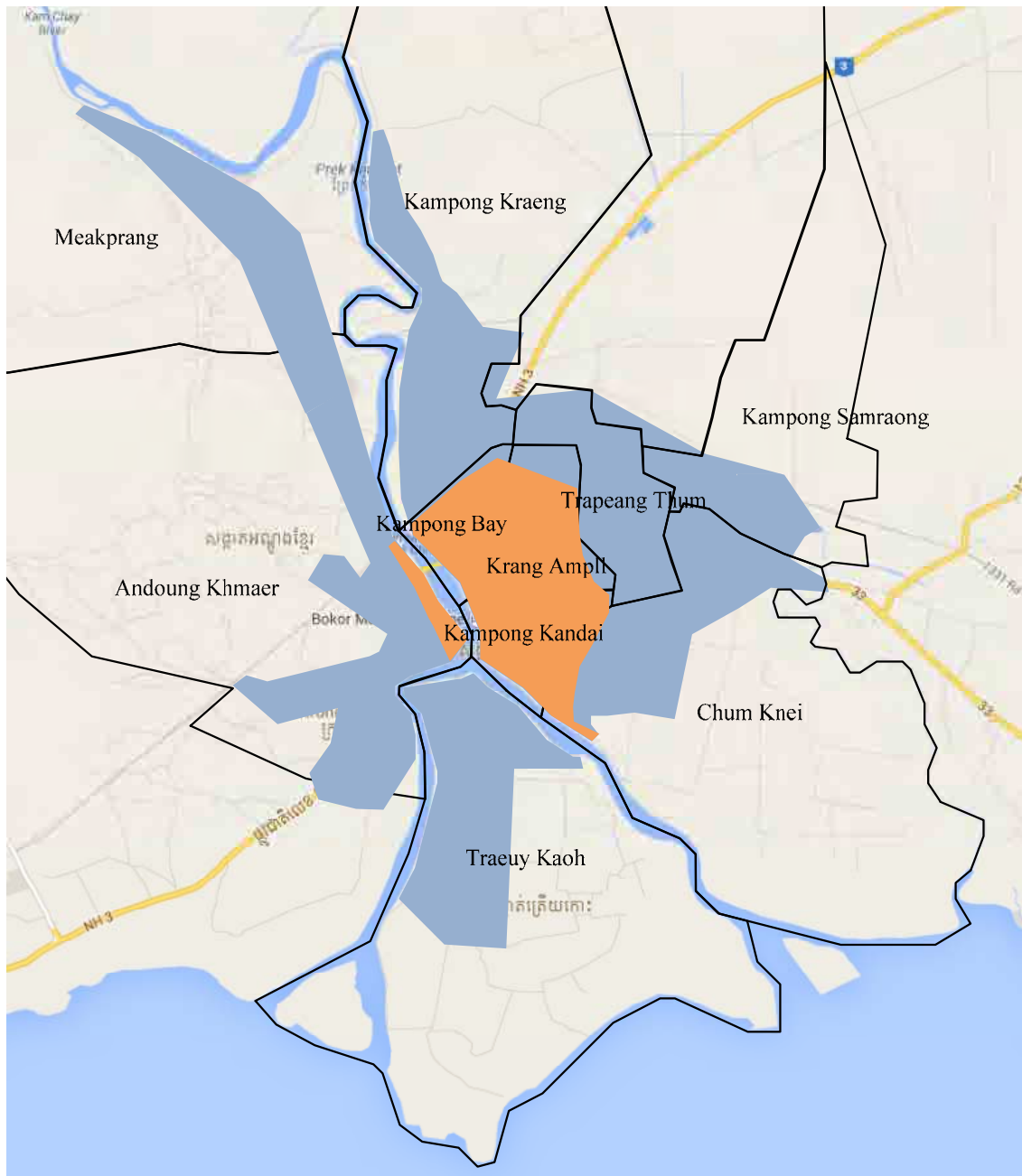
7.3 需要予測に係る付属データ



将来の給水区域に係るコミューン行政区域
Administrative Boundary of Commune

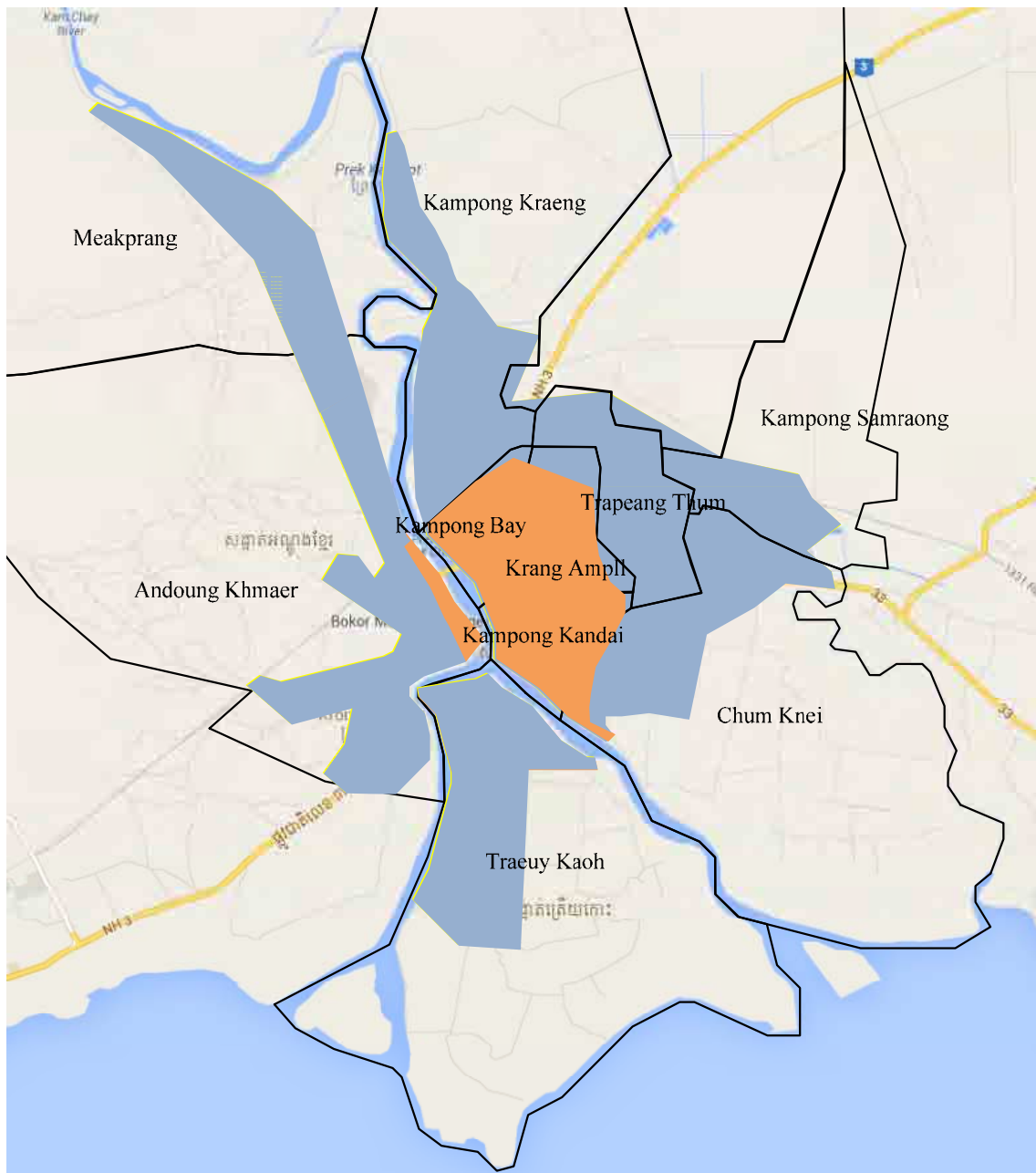


現在の給水区域と将来の給水区域
Existing and Future Service Areas



事業実施後の新設浄水場及び既存浄水場の給水区域

Areas supplied by Existing and New Plants



現在の給水区域と将来の既存浄水場からの給水区域
Present and Future Service Areas supplied by Existing Plant

給水人口の経年変化

Population in Future Service Area by Commune, including areas where do not included in the existing service area										
	District/Commune	2013	2014	2015	2016	2017	2018	2019	2020	2021
0707	Tuek Chhou									
070702	Chum Kriel	5,955	5,979	6,003	6,026	6,049	6,072	6,095	6,118	6,141
070703	Kampong Kraeng	5,098	5,114	5,131	5,148	5,164	5,180	5,196	5,212	5,228
070704	Kampong Samraong	2,939	2,947	2,955	2,964	2,972	2,979	2,987	2,995	3,002
070709	Makprang	2,782	2,790	2,797	2,805	2,812	2,819	2,827	2,834	2,841
070719	Trapeang Thum	2,917	2,947	2,977	3,007	3,038	3,069	3,100	3,131	3,162
0708	Krong Kampot									
070801	Kampong Kandal	8,329	8,337	8,344	8,351	8,358	8,364	8,370	8,376	8,381
070802	Krrang Ampil	4,839	4,880	4,922	4,965	5,007	5,049	5,092	5,135	5,177
070803	Kampong Bay	6,268	6,246	6,224	6,201	6,178	6,156	6,132	6,109	6,086
070804	Andoung Khmer	11,756	11,929	12,104	12,281	12,459	12,640	12,823	13,008	13,195
070805	Traeuy Kaoh	6,651	6,755	6,860	6,966	7,074	7,183	7,294	7,406	7,519
	Total	57,533	57,924	58,317	58,713	59,112	59,513	59,917	60,324	60,733
Population in Future Service Area by Commune, including areas where do not included in the existing service area										
	District/Commune/Village	2013	2014	2015	2016	2017	2018	2019	2020	2021
0707	Tuek Chhou									
070702	Chum Kriel	5,955	5,979	6,003	6,026	6,049	6,072	6,095	6,118	6,141
070703	Kampong Kraeng	5,098	5,114	5,131	5,148	5,164	5,180	5,196	5,212	5,228
	<i>Markprang*</i>	<i>1,913</i>	<i>1,919</i>	<i>1,925</i>	<i>1,931</i>	<i>1,937</i>	<i>1,944</i>	<i>1,950</i>	<i>1,955</i>	<i>1,961</i>
	<i>Preyhnout</i>	879	882	885	888	890	893	896	899	901
	<i>Kampongreng*</i>	<i>1,523</i>	<i>1,528</i>	<i>1,533</i>	<i>1,538</i>	<i>1,543</i>	<i>1,548</i>	<i>1,552</i>	<i>1,557</i>	<i>1,562</i>
	<i>Kampongrong*</i>	<i>783</i>	<i>786</i>	<i>788</i>	<i>791</i>	<i>794</i>	<i>796</i>	<i>798</i>	<i>801</i>	<i>803</i>
070704	Kampong Samraong*	2,939	2,947	2,955	2,964	2,972	2,979	2,987	2,995	3,002
070709	Makprang	2,782	2,790	2,797	2,805	2,812	2,819	2,827	2,834	2,841
070719	Trapeang Thum	2,917	2,947	2,977	3,007	3,038	3,069	3,100	3,131	3,162
0708	Krong Kampot									
070801	Kampong Kandal	8,329	8,337	8,344	8,351	8,358	8,364	8,370	8,376	8,381
070802	Krrang Ampil	4,839	4,880	4,922	4,965	5,007	5,049	5,092	5,135	5,177
070803	Kampong Bay	6,268	6,246	6,224	6,201	6,178	6,156	6,132	6,109	6,086
070804	Andoung Khmer	11,756	11,929	12,104	12,281	12,459	12,640	12,823	13,008	13,195
070805	Traeuy Kaoh	6,651	6,755	6,860	6,966	7,074	7,183	7,294	7,406	7,519
	Total	57,533	57,924	58,317	58,713	59,112	59,513	59,917	60,324	60,733
Population in Service Area by Commune										
	District/Commune/Village	2013	2014	2015	2016	2017	2018	2019	2020	2021
0707	Tuek Chhou									
070702	Chum Kriel	5,955	5,979	6,003	6,026	6,049	6,072	6,095	6,118	6,141
070703	Kampong Kraeng	879	882	885	888	2,433	3,237	5,196	5,212	5,228
	<i>Markprang*</i>							<i>1,950</i>	<i>1,955</i>	<i>1,961</i>
	<i>Preyhnout</i>	879	882	885	888	890	893	896	899	901
	<i>Kampongreng*</i>					<i>1,543</i>	<i>1,548</i>	<i>1,552</i>	<i>1,557</i>	<i>1,562</i>
	<i>Kampongrong*</i>						<i>796</i>	<i>798</i>	<i>801</i>	<i>803</i>
070704	Kampong Samraong*		982	1,970	2,964	2,972	2,979	2,987	2,995	3,002
070709	Makprang	2,782	2,790	2,797	2,805	2,812	2,819	2,827	2,834	2,841
070719	Trapeang Thum	2,917	2,947	2,977	3,007	3,038	3,069	3,100	3,131	3,162
0708	Krong Kampot									
070801	Kampong Kandal	8,329	8,337	8,344	8,351	8,358	8,364	8,370	8,376	8,381
070802	Krrang Ampil	4,839	4,880	4,922	4,965	5,007	5,049	5,092	5,135	5,177
070803	Kampong Bay	6,268	6,246	6,224	6,201	6,178	6,156	6,132	6,109	6,086
070804	Andoung Khmer	11,756	11,929	12,104	12,281	12,459	12,640	12,823	13,008	13,195
070805	Traeuy Kaoh	6,651	6,755	6,860	6,966	7,074	7,183	7,294	7,406	7,519
	Total	50,375	51,726	53,085	54,453	56,381	57,569	59,917	60,324	60,733
Note: *, Commune or villages are not included in the existing service area in 2013, and will be covered by future service area.										

7.4 基本情報チェックシート

上水道案件 セクター／水道事業体 基本情報チェックシート

国名：カンボジア王国 水道事業体名：カンポット水道局

No.	指標・情報	重要度	数値・情報	単位	出典
セクター概要					
1	国家人口	★★	1,468	万人	2013年、Cambodia Inter-Censal Population Survey 2013、カンボジア国計画省
	一人当たりGDP	★★	1,088	USD/人	2014年推計値、IMF
2	年間降水量	☆	1,584	mm/年	2010年、Statistic Yearbook 2011、カンボジア国計画省
	気候帯	☆	熱帯モンスーン		Statistic Yearbook 2011、カンボジア国計画省
3	改善された水源へのアクセス率	★★	94	%	Progress on Sanitation and Drinking-water, 2014 update, WHO/UNISEF Joint Monitoring Programme
4	水道セクターのガバナンス	★★	都市部への水供給は工業・手工芸省工業総局水道部が管轄しており、各州の工業・手工芸局の下部組織である水道局が実際の水供給に係る運営・維持管理を行っている。 全24州のうち、プノンペン市及びシェムリアップ市の水供給は水道公社、12州の州都が公営水道（水道局）、それ以外は民間企業が水供給を行っている。 農村部への水道供給は農村開発省技術総局農村給水局が所管している。		カンボジア国上水道セクター情報収集・確認調査、2010年6月
5	主要な開発方針、開発課題	★★	カンボジア国政府は、水道セクターの国家方針として、「国民が安全な水の供給を受け、衛生施設を有し、安全で衛生的かつ環境に適応した生活環境を享受する」を掲げている。 NSDPによれば、2025年の目標として、都市部での安全な水にアクセスできる人の割合を100%としている。 水道法等の関連法律がなく、現在その制定を進めている。 工業手工芸省から飲料水に関する水質基準が出されている。		National Policy on Water Supply and Sanitation, 2003 国家戦略開発計画 (NSDP, 2014-2018)

No.	指標・情報	重要度	数値・情報	単位	出典
水道事業体の概要					
1	水道事業体の形態、監督・規制体制	★★	カンポット州都市部への水供給は、カンポット州工業・手工芸局の管轄下にあるカンポット水道局が行っている。		カンボジア国水道事業人材育成プロジェクト・フェーズ3、モニタリング報告書、2014年5月
2	当該水道事業体の計画給水区域	☆	2区 (Krong Kampot, Tuek Chhou)、9 コミューン、21 村		
3	水源	★★	表流水：プレ・カンポット川 (タック・チュー川)		
4	水源開発余力	☆	5.00 m ³ /s：取水施設上流のダムからの最小流量 0.07 m ³ /s：既存取水施設取水量		
5	水道普及率	★★	51 (2013年、給水人口 24,465 人/ 給水区域内人口 47,725 人)	%	
6	給水人口	★★	24,465 (2013年)	人	
7	一日平均給水量	★★	4,482 (2013年)	m ³ /日	
8	一人一日平均給水量	★★	183 (2013年、一日平均給水量 4,482 m ³ /日 ÷ 給水人口 24,465 人)	リットル /人/日	
9	給水時間	★★	24 (2013年)	時間	
10	無収水率	★★	17.8 (2013年、1— (有収水量 1,344,923 m ³ /年 ÷ 総給水量 1,635,809m ³ / 年))	%	
11	財務規模、収支	★★	<2013年度> 総収益：1,910 百万リエル (47.74 百万円) 総費用：1,922 百万リエル (48.06 百万円) (原価償却費込) 純利益：-12 百万リエル (-0.32 百万円)		
12	水道料金水準	★★	1,400 リエル/m ³ (0.35USD/m ³)	円または USD/m ³	
13	料金徴収率	☆	103 (2013年)	%	
14	メーター設置率	☆	100 (2013年)	%	
15	1,000 接続当たりの職員数	☆	6.7 (2013年)	人/1,000 栓	
16	施設の状況、施設の運転・維持管理状況	★★	上水道施設は 2006 年に ADB が改修事業を行い、カンポット水道局の給水能力は 5,760m ³ /日となっている。 既存の上水道施設の状況としては、流量計の故障が報告されちるものの他の主要施設については稼働している。 2015年より ADB の既存施設改修		

No.	指標・情報	重要度	数値・情報	単位	出典
			<p>が実施される予定である。</p> <p>支出計画として毎月一定金額の修繕維持費が計上されているが、施設/設備改修計画はない。</p> <p>施設の運営維持管理については、2012年3月まで実施された技術協力プロジェクト「水道事業人材育成プロジェクト・フェーズ2」の実施により、基本的な技術力をカンポット水道局は有している。</p>		
17	水道事業体の業務目標と課題	★★	<p>カンポット水道事業に係る中長期計画はなく、毎年、水道局が年次事業計画(Business Plan)を策定し、カンポット州工業・手工芸局(DIH)の承認を受け、DIHから工業手工芸省(MIH)大臣宛てに提出されている。2014年の計画では、2013年の給水率51%を55%まで引き上げる計画としており、年間324個の接続を予定している。無収水率は15%を目指している。</p> <p>主な課題としては、水道事業人材育成プロジェクト・フェーズ2により、水道局職員の技術面の指導・能力向上が行われ、配水エリアのブロック化についての基礎知識はあるものの、実質的にはブロック化されていない。これは、配水ブロック単位での流量管理手法がカンポット水道局内部で確立されていないことによる。</p>		カンボジア国水道事業人材育成プロジェクト・フェーズ3、モニタリング報告書、2014年5月 Business Plan for 2014, Kampot Waterworks, March 2014

7.5 アンケート調査結果

Summary of the Household Survey

1. Objectives

Social conditions survey was conducted as a part of collection of baseline data under the Project to confirm people's awareness of importance/necessity of public water supply system. This survey provides necessary information to determine appropriate service charge for beneficiaries and will subsequently contribute to the development of overall water supply service system.

The objectives of household survey are:

- To collect the base line data
- To understand the current situation of water utilization in Kampot town
- To know the income and expend of household
- To identify the willingness to pay and other issue for the resident without water supply utilization
- To understand the sustainable water charge and water tariff

2. Scope of Work

The households' survey has been conducted as interview survey to randomly selected 100 households in planed water supply area in Kampot city. The survey was conducted through the questionnaire which has been delivered to target residents of no access to water supply and residents have access to water supply.

3. Methodology

The households' survey was conducted on 103 samples where 71 HHs survey on no water supply connection and 32 HHs focus on have water supply connection. The sample households were selected by random method. The interview covered 103 household over the different areas of the eight Sangkat in Kampot town. The surveyed number of households for service area and non-service area show in the table below:

Table1: The surveyed villages of the service area

Commune	Village	Number of interview (HH)
Chum Kriel	Chum Kriel	2
	Kampong Kandal	2
Makprang	Kampong Kraeng	2
	Snam Prampi	0
Prey Khmum	Prey Tump	0
Trapeang Thum	Krang	2
Angdoun Khmaer	Ou Touch	4
	TaDoeb	0

Traeuy Kaoh	Daun Taok	2
	Boeng Ta Pream	0
Kampong Bay	Kampong Bay Tboung	8
Kampong Kandal	Sovann Sakor	5
	Mouy Ousaphea	5
Total		32

Table 2: The surveyed villages of the non-service area

Commune	Village	Number of interview (HH)
Chum Kriel	Chum Kriel	7
	Kampong Kandal	7
Makprang	Kampong Kraeng	7
	Snam Prampi	9
Prey Khmum	Prey Tump	7
Trapeang Thum	Krang	7
Angdoug Khmaer	Ou Touch	5
	Ta Doeb	7
Traeuy Kaoh	Daun Taok	8
	Boeng Ta Pream	7
Kampong Bay	Kampong Bay Tboung	0
Kampong Kandal	Sovann Sakor	0
	Mouy Ousaphea	0
Total		71

4. Results

4.1 The current Service Area Aspects

4.1.1 Households' Income and Expenditure

Based on the survey, the answer on cash income is not an appropriate way to identify the wealth condition of the households because most of people do not provide the real information about the households' income.

The distribution of monthly income of households in service area indicates a great variation around the mean and a big income difference between the very poor households (very low income) and very rich households (very high income). The average monthly income is 1,092,000 Riel.

The average of household expenditure in the service area is around 954,000 Riel per month. Household spend the money on electricity around 251,000 Riel per month while the monthly expenditure on telephone is around 50,000.

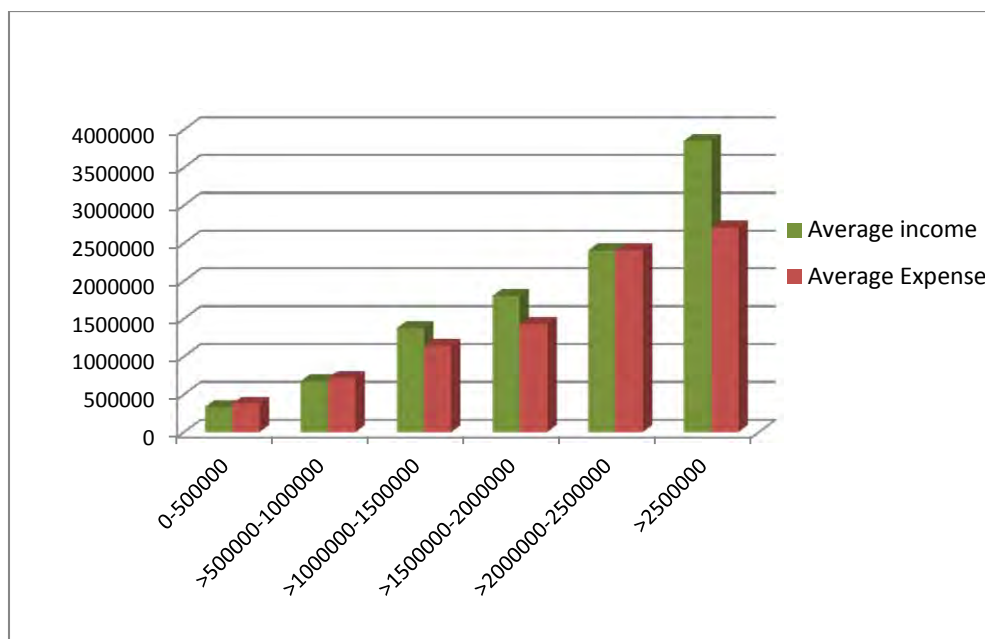


Figure 3: Household's income and expenditure in the service area

4.1.2 Satisfactory with the Water supply Service

Regarding to the quality of water about 84 % has no problem with the water quality while 16% of interviewed household have problem concerning to water quality such smell of chlorine, turbidity. Table below show the percentage of problem that household concerned with the quality of water:

Table 3: Problem to quality of water

Problem to quality of water	Percentage (%)
smell	40
turbidity	40
color	40
not clean	20
Leakage of pipeline	20

Among household interviewed about 81% are satisfied with the current public water supply service while 16 % are not satisfied with this service. However, 3% said the current service is acceptable. Table below shows the percentage of caused that made household did not satisfy with the service:

Table 4: Kind of not satisfied with current public water supply

Not satisfied	Percentage (%)
Pressure	20
color	20
water supply period not enough	60

4.1.3 Waterborne Diseases

About 10% of interviewed household said their family members have suffered from waterborne diseases such as diarrhea. The frequency of illness is 2 per person per year. They spend about 20,000 Riel on each treatment. The other 90% said they have not suffered from waterborne diseases.

Table 5: Suffered from waterborne diseases

Suffered from diseases	10%	Diarrhea	100%
		typhoid,	0
		cholera	0
Not Suffered from diseases	90%		

Regarding to the way of household drink water, 81% said they always drink the boiled water while 19% drink water direct without boiling.

Table 6: Type of drinking water

Type of Drinking water	Percentage (%)
Boiling	81
Direct without boiling	19

4.1.4 Request to Kampot Water Work

Regarding to the request to Kampot water work about 28% of interviewed household request to improve water supply volume, 41% request to improve water supply hours, 49% request to improve water pressure, 46 % request to improve water quality. The current water tariff in Kampot is 1,400 Riel per cubic meter and water connection fee is 113 USD. Related to this issue about 20% of interviewed household have requested to reduce water tariff while 18% requested to reduce water connection fee. About 24% of household have requested to expand the pipe network to area that have no public water supply service in their community.

Table 7: Request to Kampot water work to improve

Request to Kampot water work	Percentage
Water supply volume	28
Water supply hours	41
Water pressure	49
Water quality	46
Water tariff (reduce the price)	20
Time to repair if leaked	17
Expand pipe network	24
Reduce water connection fee	18

4.2 The Non Service Area Setting

4.2.1 Household Income and Expenditure

The average monthly income in the non-service area is 1,080,600 Riel. The lowest monthly income falls down to 200,000 Riel per month for very poor households, while the highest household income can reach up to 2,500,000 Riel per month for rich households. However, the pattern shows that there is no big gap between the low and high income in the non-service area.

The average of household expenditure in the service area is around 796,300 Riel per month. Households spend money on electricity around 51,530 Riel per month while the monthly expenditure on telephone is around 31,600 Riel.

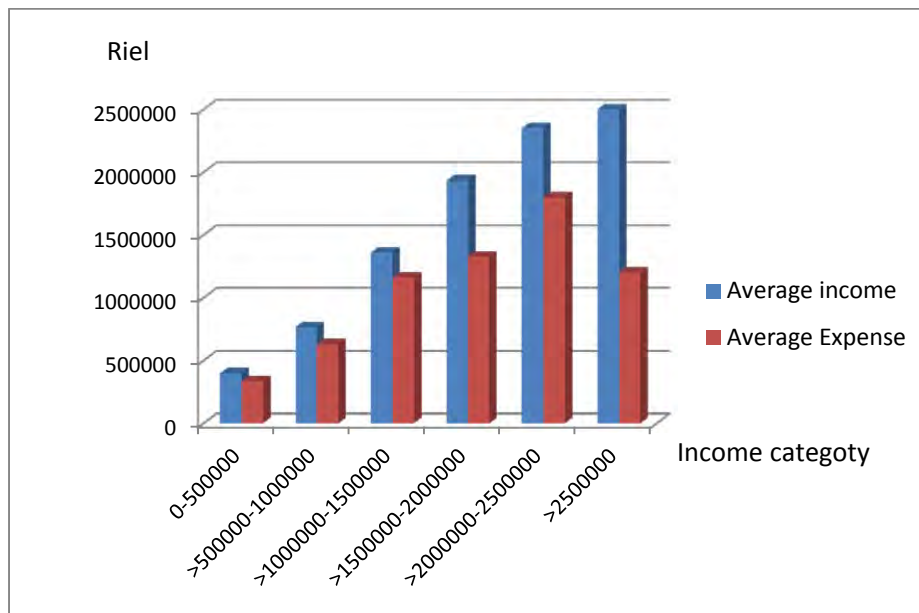


Figure 6: Households' monthly average income and expenditure by income category

4.2.2 Water Sources

About 82% of surveyed households in non-service area purchase water from water vender while 13% of households use well water and 5% buy the water from their neighbors. The result of interview showed that among households who purchase water from the vendors, 38% buy the water for drinking and cooking. However, they use the supplementary water from other sources such as well, spring for bathing, cleaning and for other purpose.

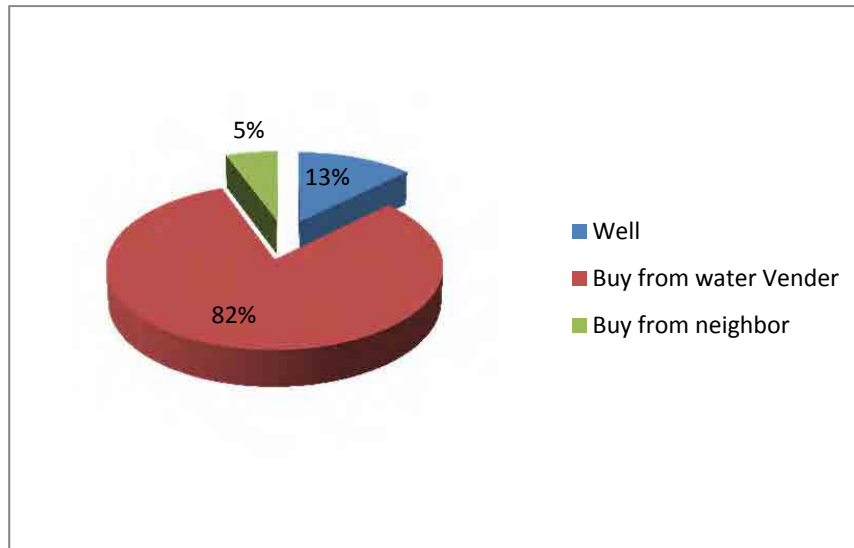


Figure 7: Water sources in the non-service area

Among the households who buy water from water vendors, 61% said that they have difficulty to bring the water from the water sources to their house such as the volume of water at the stock is not enough for the consumer especially in summer, water pressure is low sometime, and the delivery is not on time. The household in non-public water user spend in average 48,963 Riel per month to buy the water from water vender.

There is no any discrimination of the work between male and female.

4.2.3 Willingness to Connect to and Pay for the New Water Supply

There is no classification of water tariff in Kampot. Currently the price of water in Kampot town is 1,400 Riel per cubic meter. However, the current cost of connection of water is 474,600 Riel (113 USD).

Regarding to the question if the public water supply pipes comes near your house, do you want to use the public water supply? About 92% said they want to use the public water supply with the affordability to pay for the water fee in average 30,750 Riel per month. About 8% said they will not use because they can buy water from their neighbor and they don't need to spend money on the connection fee.

4.2.4 Affordability analysis

About 66% of total interviewed households can afford for the connection fee (113 USD). The other 31% said they can not afford with this connection fee. Among households who cannot afford the current cost of connection (474,600 Riel), 64% said they are willing to pay in the average 248,570 Riel while the other 18% are willing to pay by installment of 20,000 Riel to 50,000 Riel per month without interest.

4.2.5 Waterborne Diseases

About 17% of interviewed households said their families members have suffered from waterborne diseases such as diarrhea or typhoid. The frequency of illness is two time per year. They spend about 70,000 Riel on each treatment. The other 83% said they have not suffered from waterborne diseases.

Table 8: Suffered from waterborne diseases

Suffered from diseases	17%	Diarrhea	77%
		typhoid,	23%
		cholera	0
Not Suffered from diseases	83%		

4.3 Water Supply Condition (Service & Non-service areas)

4.3.1 Kinds of water source

In the service area 100% of household use public water supply. About 3% use well water as the additional sources. The source of water use in the service area show in the table below:

Table 9: Sources of water in the service area

Source of water	Percentage
Public water supply	100%
Well (own well) (additional use to public water supply)	3%

In Non-service area 84% of total household use water source from water vendor while 12% use water from the well. The other 4% use water from the spring. Among those household about 31% use mix sources of water such as water vendor, rain, well and spring. The sources of water use by household in the non-service area shows in table below:

Table 10: Sources of water in Non-service area

Source of water	Percentage (%)	Other
Well	12%	Own well 95%, other well 5%
Spring	4%	
Water vendor	53%	
Mix sources of water	31%	water vendor, rain, well, spring

4.3.2 Public water users

The purpose of public water use shows in the table below:

Table 11: Purpose of public water use

Purpose	Percentage	Other
Drinking	84%	Direct without boiling=3%, After boiling 97%
Cooking	100%	
Washing clothing	97%	
Bathing or taking shower	94%	
Gardening or washing car	84%	
Other		

Regarding to interview about 87.5% said they have no problem with public water while 12.5% said they have some problem in public water.

Table 12: Problem in public water

Problem with public water	12.5%	Quality not enough	20%
		Pressure not enough	80%
No problem with public water	87.5%		

Through the interview 100% of household said the water supplied to household for 24 hours.

The table below shows the problem concerning to quality of public water.

Table 13: Problem concerning to quality of public water

No problem	84%		
Problem	16%	Smell	40%
		Turbidity	40%
		Color	40%
		Not clean	20%
		Leakage	20%

The average expense on water for each category show in the table below:

Table 14: Average expense on water for each category

Categories	Riel/Month
Household	14,000
Hotel/Guest house/Restaurant	144,200
Water vender	301,000
Car washing garage	84,000
Small business shop	322,00

Table 15: Percentage of household willing to pay for the service per month

Categories	Percentage (%)
Willing not to pay for the new service	50
Keep the same	28
Cheaper	6

Willing to pay from 15000-30000Riel/month	9
Willing to pay from 150000-300000Riel/month	6

4.3.3 Non public water users

About 30% of household in the survey area uses well. The average depth is about 13 meter. The type of well use by household show in the table below:

Table 16: Type of well use in the survey area

Type of well	Percentage (%)
Open well	5%
Deep well with pump	29%
Other (water vender)	67%

Table 17: Water quality

Drinkable	33%
Not drinkable	67%

Table 18: Stability of water quality

Stable	29%
Unstable	71%

Table 19: Stability of water amount

Stable	43%
Unstable	57%

Table 20: Purpose to use the other water than public water

Categories	Percentage (%)	Type of drinking	Percentage (%)
inking	72	Direct without boiling	9
		After boiling	91
Cooking	86		
Washing clothing	94		
Bathing or showering	96		
Gardening or washing car	76		

4.3.4 Common condition

Regarding to the survey about 38% of total household buys bottle water while the other 62% does not buy. The reason to buy bottle water show in table below:

Table 21: Reason of buying bottle water

For drinking	59%
Bottle water is clean and easy to drink (no need to boil)	41%

Based on the interview each family consumes bottle water about 8 liters per day. It mean a person drink 1.6 liters per day.

About 78% of total household have the request for public water supply service while 22 % said they don't have any request. The kind of request show in the table below:

Table 22: Kind of request for public water supply

Kind of request	Percentage (%)
Water supply volume	34
Water supply hour	61
Water quality	40
Water tariff	26
Time to repair if leaked	46
Other (Expand pipe network)	34

Most of household think it is valuable for water public service in their village. The table below shows their thinking item:

Table 23: Valuable for public water service

Item	Percentage (%)
None	-
Stability	71
Safety	73
Cost performance	20
Publicity	37
Others (please specify:	4

7.6 配水管網の水理計算書

本調査の送配水管の管網計算は、EPANET ver2.0 を用い、下記条件で行った。

管水路の流量公式：ヘーゼン・ウィリアムズ公式

流速係数：110

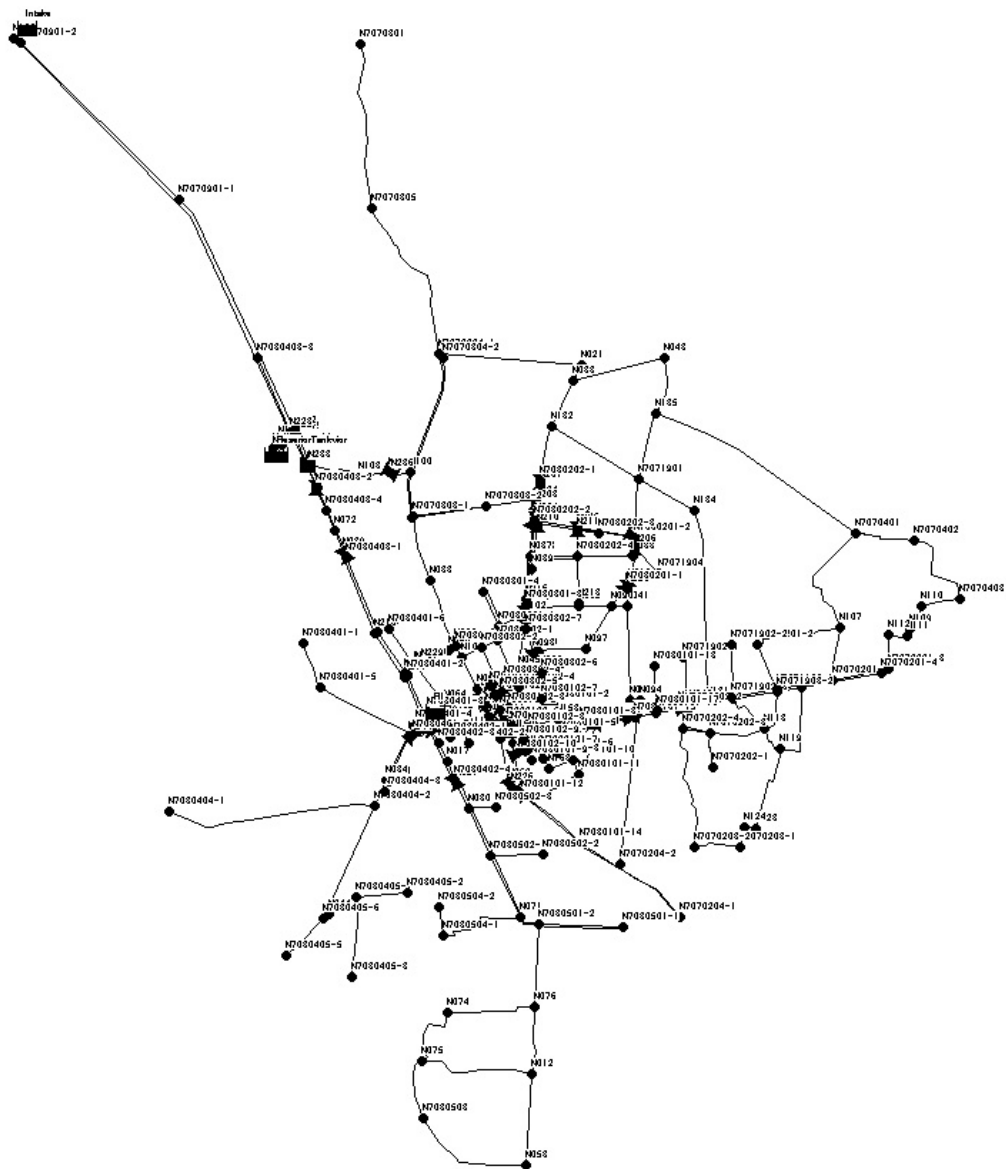
最小残存水圧：50kPa 以上（表 3.2.2.6-3 参照）

時間係数：1.69（表 3.2.2.6-4 参照）

送配水施設計画のための管網計算で特に留意した点は下記のとおりである。

残存水頭を確保できるような送配水管口径を確保する。

水理計算管網モデル、管網計算データ及び計算結果を以下に示す。



Node data

Node ID	Elevation(m)	Base Demand(m ³ /d)	Residual pressure(m)	
			Peak Demand	Average Demand
N7070201-1	3.73	82	24.79	52.14
N7070201-2	2.85	82	20.21	51.65
N7070201-3	3.92	82	19.52	50.68
N7070201-4	3.50	82	25.28	52.43
N7070202-1	3.20	103	17.07	50.6
N7070202-2	3.78	103	5.29	15.89
N7070202-3	3.20	103	25.52	52.72
N7070202-4	3.38	103	32.48	54.33
N7070203-1	2.60	106	14.55	50.42
N7070203-2	2.64	106	13.61	50.15
N7070204-1	2.20	153	6.2	17.3
N7070204-2	3.49	153	6.41	16.39
N7070301	4.61	413	35.91	54.26
N7070303-1	4.20	109	53.66	59.01
N7070303-2	4.00	60	50.24	58.31
N7070304-1	3.93	227	52.71	58.98
N7070304-2	3.93	50	48.04	57.81
N7070305	4.30	212	42.12	56.05
N7070401	3.56	286	16.48	50.19
N7070402	3.14	144	15.08	50.15
N7070403	2.60	186	15.61	50.69
N7070901-1	10.03	300	12.33	14.31
N7070901-2	9.31	282	9.09	14.04
N7071901	3.58	219	41.05	56.32
N7071902-1	2.84	64	5.93	16.75
N7071902-2	2.80	64	28.59	53.79
N7071902-3	4.07	64	30.28	53.26
N7071903-1	4.20	99.5	27.36	52.43
N7071903-2	4.20	99.5	25.72	52.02
N7071904	2.90	242	32	54.57
N7080101-1	3.65	58	9.58	17.06
N7080101-10	3.11	60	9.63	17.48
N7080101-11	3.22	57	9.5	17.37
N7080101-12	2.74	57	11.01	18.1
N7080101-13	3.14	57	7.4	16.9
N7080101-14	3.33	57	6.14	16.44
N7080101-15	3.14	57	7.4	16.9
N7080101-16	3.50	57	6.72	16.46
N7080101-17	3.50	57	7.21	16.58
N7080101-18	2.80	57	7.21	17.1
N7080101-2	3.80	57	9.46	16.92
N7080101-3	4.00	57	9.01	16.65
N7080101-4	4.00	57	8.91	16.63
N7080101-5	4.00	57	8.78	16.6
N7080101-6	3.20	57	8.55	17.14
N7080101-7	3.20	57	9.46	17.37
N7080101-8	3.20	57	9.91	17.48
N7080101-9	3.30	57	8.97	17.17
N7080102-1	3.14	89.1	10.1	17.57
N7080102-10	3.30	89.1	10.6	17.58
N7080102-2	3.30	89.1	11.02	17.68
N7080102-3	3.30	89.1	10.97	17.67
N7080102-4	2.91	89.1	10.62	17.88
N7080102-5	3.30	89.1	11.02	17.68
N7080102-6	3.30	89.1	11.13	17.71
N7080102-7	3.65	89.1	10.21	17.22
N7080102-8	4.00	89.1	10.17	16.95

Node data

Node ID	Elevation(m)	Base Demand(m ³ /d)	Residual pressure(m)	
			Peak Demand	Average Demand
N7080102-9	3.30	89.1	8.81	17.13
N7080201-1	3.02	368.5	5.83	16.6
N7080201-2	3.08	368.5	34.97	55.17
N7080202-1	3.77	131.5	47.69	57.84
N7080202-2	3.77	131.5	37.91	55.39
N7080202-3	3.00	131.5	26.5	53.11
N7080202-4	3.04	131.5	36.1	55.49
N7080301-1	3.00	207	15.65	19.07
N7080301-2	3.66	204	15.9	18.63
N7080301-3	3.66	204	14.06	18.18
N7080301-4	3.00	204	15.12	18.93
N7080302-1	3.07	90	11.43	17.96
N7080302-2	2.97	90	11.41	18.03
N7080302-3	3.13	90	11.76	17.99
N7080302-4	3.44	90	11.17	17.62
N7080302-5	3.26	91	11.6	17.86
N7080302-6	2.80	90	11.61	18.21
N7080302-7	3.50	90	10.57	17.42
N7080401-1	6.32	50	14.09	47.52
N7080401-2	3.77	100	12.35	17.66
N7080401-3	3.34	150	18.23	19.46
N7080401-4	3.61	100	15.46	18.56
N7080401-5	6.19	50	17.01	48.35
N7080401-6	3.61	53	12.8	17.9
N7080401-7	3.61	50	42.87	56.75
N7080402-1	2.28	200	19.66	20.61
N7080402-2	2.82	200	18.9	20.02
N7080402-3	3.36	200	19.37	19.73
N7080402-4	2.86	138	18.92	19.99
N7080403-1	3.25	176	14.77	18.66
N7080403-2	4.25	77	8.12	16.25
N7080403-3	8.30	176	15.23	16.33
N7080403-4	4.00	100	8.88	16.62
N7080404-1	11.01	121	21.75	45.92
N7080404-2	3.64	122	33.69	54.44
N7080404-3	3.73	121	32.28	54.02
N7080405-1	4.72	80	24.54	51.33
N7080405-2	2.43	80	18.96	51.65
N7080405-3	2.93	80	15.44	50.4
N7080405-5	4.91	80	19.15	49.85
N7080405-6	5.74	151	26.4	51.04
N7080501-1	2.68	200.5	14.63	50.38
N7080501-2	2.80	200.5	17.77	51.08
N7080502-1	3.12	140	28.96	53.64
N7080502-2	3.00	100	17.85	50.95
N7080502-3	4.00	40	37.55	55.13
N7080503	3.00	413	6.81	48.19
N7080504-1	2.80	224	15.09	50.41
N7080504-2	2.80	224	11.79	49.58

Link Data

Link ID	Start Node	End Node	Length(m)	Diameter(mm)	Peak Demand		Average Demand	
					Flow(m ³ /d)	Velocity(m/s)	Flow(m ³ /d)	Velocity(m/s)
OP-001	R1	N001	35	350	9644	1.16	4565	0.55
OP-002	N001	N003	37	350	7378	0.89	3492	0.42
OP-003	N001	N002	97	350	2266	0.27	1073	0.13
OP-004	N003	N004	117	350	7378	0.89	3492	0.42
EP-007	N7080301-1	N7080301-4	700	55.4	27	0.13	13	0.06
NP-008	N7080202-2	N086	414	141	968	0.72	458	0.34
NP-010	N064	N137	477	350	7378	0.89	3492	0.42
EP-011	N7080101-12	N7080101-14	1192	61.4	82	0.32	39	0.15
EP-012	N031	N7080402-1	192	96.8	338	0.53	160	0.25
EP-013	N008	N030	500	141	597	0.44	282	0.21
NP-014	N7080401-7	N7080401-5	1037	55.4	169	0.81	80	0.38
EP-016	N7071903-2	N120	235	96.8	158	0.25	75	0.12
EP-017	N7080501-2	N7080501-1	889	55.4	63	0.3	30	0.14
NP-018	N7080501-2	N076	824	141	698	0.52	330	0.24
EP-019	N7080101-14	N7070204-1	536	61.4	60	0.23	28	0.11
EP-021	N030	N036	600	141	597	0.44	282	0.21
OP-022	N7080402-3	N017	299	141	233	0.17	110	0.08
EP-023	N7070303-1	N7070304-2	948	55.4	85	0.41	40	0.19
EP-024	N038	N037	20	250	1458	0.34	690	0.16
EP-025	N036	N7080403-1	928	141	597	0.44	282	0.21
EP-026	N7080403-3	N223	209	96.8	-297	0.47	-141	0.22
OP-027	N7080403-4	N072	1000	96.8	-299	0.47	-142	0.22
EP-028	N098	N7080302-7	140	141	248	0.18	117	0.09
EP-029	N037	N7080302-6	300	250	1399	0.33	662	0.16
EP-030	N234	N7080302-1	600	96.8	59	0.09	28	0.04
EP-031	N235	N7080302-2	600	96.8	122	0.19	58	0.09
EP-032	N054	N105	357	250	-4460	1.05	-2111	0.5
EP-033	N040	N7080101-2	362	141	685	0.51	324	0.24
OP-034	N7080301-2	N7080301-1	500	250	2288	0.54	1083	0.26
NP-035	N7071901	N135	767	96.8	405	0.64	192	0.3
NP-036	N024	N132	757	250	3893	0.92	1843	0.43
OP-037	N018	N049	234	141	96	0.07	45	0.03
EP-038	N7080301-3	N016	100	96.8	-345	0.54	-163	0.26
EP-040	N049	N085	400	55.4	96	0.46	45	0.22
OP-041	N165	N068	1300	141	272	0.2	129	0.1
EP-042	N152	N052	835	250	1334	0.31	631	0.15
OP-043	N052	N7080102-10	352	198.2	489	0.18	232	0.09
EP-044	N226	N009	170	176.2	844	0.4	400	0.19
NP-045	N7080101-12	N077	1500	141	393	0.29	186	0.14
NP-046	N012	N053	500	96.8	286	0.45	135	0.21
EP-047	N027	N080	242	96.8	344	0.54	163	0.26
EP-048	N071	N7080501-2	224	96.8	373	0.59	177	0.28
EP-049	N7080101-16	N028	300	96.8	282	0.44	134	0.21
EP-050	N202	N106	564	96.8	286	0.45	135	0.21
NP-051	N7070201-3	N7070201-1	569	96.8	-446	0.7	-211	0.33
NP-052	N7070201-1	N7071903-1	570	141	-908	0.67	-430	0.32
NP-054	N7080101-17	N026	162	141	-96	0.07	-46	0.03
NP-055	N131	N7071902-3	258	141	1649	1.22	780	0.58
NP-056	N7071902-3	N7071903-1	381	141	1076	0.8	509	0.38
NP-057	N034	N7080404-2	278	141	1207	0.89	571	0.42
NP-058	N7080401-5	N7080401-1	447	55.4	85	0.41	40	0.19
NP-059	N7080405-6	N7080405-5	544	55.4	135	0.65	64	0.31
NP-060	N7080404-2	N7080404-1	2162	96.8	204	0.32	97	0.15
NP-061	N7080404-2	N7080405-6	1240	141	796	0.59	377	0.28
NP-062	N044	N7080405-1	364	96.8	406	0.64	192	0.3
NP-063	N7080405-1	N7080405-2	530	55.4	135	0.65	64	0.31
NP-064	N7080405-1	N7080405-3	733	55.4	135	0.65	64	0.31
EP-065	N7080502-1	N071	697	96.8	578	0.91	274	0.43
NP-066	N071	N7080504-1	1080	141	757	0.56	358	0.27
NP-067	N7080504-1	N7080504-2	500	96.8	379	0.6	179	0.28
NP-068	N076	N012	706	141	486	0.36	230	0.17
NP-069	N076	N074	1050	96.8	212	0.33	100	0.16
NP-070	N074	N075	560	96.8	212	0.33	100	0.16
NP-071	N012	N075	1200	96.8	200	0.31	95	0.15
NP-072	N075	N7080503	575	96.8	412	0.65	195	0.31
NP-073	N7080503	N053	1248	96.8	-286	0.45	-135	0.21
EP-074	N7080502-1	N7080502-2	500	55.4	169	0.81	80	0.38
EP-075	N080	N7080502-1	557	96.8	688	1.08	326	0.51
EP-076	N080	N7080502-3	400	55.4	68	0.32	32	0.15

Link Data

Link ID	Start Node	End Node	Length(m)	Diameter(mm)	Peak Demand		Average Demand	
					Flow(m ³ /d)	Velocity(m/s)	Flow(m ³ /d)	Velocity(m/s)
NP-077	N7070304-1	N7070305	1446	141	1056	0.78	500	0.37
NP-078	N7070301	N7070305	1800	141	-698	0.52	-330	0.24
NP-079	N7070304-1	N021	1045	28	13	0.25	6	0.12
NP-080	N083	N021	190	28	-13	0.25	-6	0.12
NP-081	N083	N048	948	28	15	0.28	7	0.13
NP-083	N205	N086	592	141	-524	0.39	-248	0.18
NP-084	N085	N090	230	55.4	96	0.46	45	0.22
NP-085	N041	N090	170	55.4	-33	0.16	-14	0.07
NP-086	N7080202-4	N211	303	141	-154	0.11	-73	0.05
NP-088	N7080202-4	N088	572	141	-69	0.05	-33	0.02
NP-089	N7080201-2	N091	90	141	409	0.3	194	0.14
NP-091	N228	N041	217	141	-247	0.18	-115	0.09
NP-092	N090	N227	230	141	376	0.28	180	0.13
NP-095	N091	N7071904	400	96.8	409	0.64	194	0.3
NP-096	N041	N093	532	96.8	-214	0.34	-101	0.16
NP-097	N093	N094	97	96.8	-214	0.34	-101	0.16
NP-098	N094	N026	145	96.8	-214	0.34	-101	0.16
EP-099	N7080101-16	N7080101-18	415	96.8	96	0.15	46	0.07
EP-100	N7070202-2	N7071902-1	476	96.8	108	0.17	51	0.08
EP-101	N098	N035	123	141	-561	0.42	-266	0.2
NP-102	N019	N097	526	96.8	313	0.49	148	0.23
NP-103	N090	N097	561	96.8	-313	0.49	-148	0.23
EP-104	N7070303-2	N7070303-1	415	55.4	-101	0.49	-48	0.23
NP-105	N100	N7070304-1	256	141	1453	1.08	688	0.51
NP-106	N233	N103	584	350	7129	0.86	3375	0.41
NP-107	N103	N101	307	350	7129	0.86	3375	0.41
NP-108	N236	N100	223	350	7129	0.86	3375	0.41
EP-109	N7071903-2	N7070201-2	504	55.4	129	0.62	61	0.29
EP-110	N7071902-2	N106	296	55.4	-108	0.52	-51	0.25
NP-111	N7070201-1	N107	536	96.8	324	0.51	153	0.24
NP-112	N107	N7070201-2	903	28	10	0.18	5	0.09
NP-113	N107	N7070401	1248	96.8	314	0.49	149	0.23
NP-114	N7070401	N7070402	592	96.8	251	0.39	119	0.19
NP-115	N7070403	N110	233	96.8	-307	0.48	-145	0.23
NP-116	N110	N109	316	96.8	-307	0.48	-145	0.23
NP-117	N109	N111	47	96.8	-307	0.48	-145	0.23
NP-118	N111	N112	195	96.8	-307	0.48	-145	0.23
NP-119	N112	N7070201-3	378	96.8	-307	0.48	-145	0.23
NP-120	N106	N118	403	55.4	132	0.63	62	0.3
EP-121	N7071903-2	N118	461	55.4	56	0.27	26	0.13
EP-122	N118	N7070202-3	535	55.4	-14	0.07	-7	0.03
EP-123	N7070202-3	N7070202-4	280	55.4	-181	0.87	-86	0.41
EP-124	N243	N7070202-4	217	55.4	53	0.26	25	0.12
NP-125	N7070202-3	N7070202-1	356	55.4	174	0.84	82	0.4
NP-126	N118	N119	304	55.4	201	0.96	95	0.46
NP-127	N119	N120	919	28	-20	0.37	-9	0.17
NP-128	N119	N123	519	96.8	221	0.35	104	0.16
NP-129	N123	N124	115	96.8	221	0.35	104	0.16
NP-130	N124	N7070203-1	210	96.8	221	0.35	104	0.16
EP-131	N7070203-2	N7070202-4	1277	55.4	-138	0.66	-65	0.31
NP-132	N126	N-WTP-Reservior	53	400	-11400	1.05	-5396	0.5
NP-133	N126	N127	163	400	11400	1.05	5396	0.5
NP-134	N127	N104	305	400	11400	1.05	5396	0.5
NP-135	N-WTP-reciving	N130	53	400	-14788	1.36	-7000	0.64
NP-136	N130	N129	163	400	-14788	1.36	-7000	0.64
NP-137	N129	N128	5	400	-14788	1.36	-7000	0.64
NP-138	Intake	N128	27	400	14788	1.36	7000	0.64
NP-139	N132	N7071901	1017	250	3892	0.92	1842	0.43
NP-140	N7071901	N134	523	250	2609	0.62	1235	0.29
NP-141	N131	N134	2123	250	-2609	0.62	-1235	0.29
NP-142	N7071901	N7080201-2	579	96.8	508	0.8	240	0.38
NP-143	N083	N132	519	28	-1	0.03	-1	0.01
NP-144	N135	N048	595	28	-15	0.28	-7	0.13
NP-145	N135	N7070401	2359	96.8	420	0.66	199	0.31
OP-146	N022	N011	330	141	338	0.25	160	0.12
EP-147	N7080401-2	N066	93	55.4	-169	0.81	-80	0.38
EP-148	N7080401-6	N066	260	55.4	-90	0.43	-42	0.2
NP-149	N059	N043	251	350	7119	0.86	3370	0.41
NP-150	N131	N242	306	141	960	0.71	454	0.34

Link Data

Link ID	Start Node	End Node	Length(m)	Diameter(mm)	Peak Demand		Average Demand	
					Flow(m ³ /d)	Velocity(m/s)	Flow(m ³ /d)	Velocity(m/s)
NP-151	N7070402	N7070403	882	96.8	7	0.01	4	0.01
NP-152	N043	N7080301-2	75	350	7119	0.86	3370	0.41
NP-153	N229	N137	60	350	-7119	0.86	-3370	0.41
NP-154	N064	N004	134	350	-7378	0.89	-3492	0.42
NP-157	N027	N080	242	198	2262	0.85	1071	0.4
NP-158	N026	N7070204-2	1580	141	259	0.19	122	0.09
NP-159	N054	N045	413	250	-1152	0.27	-545	0.13
NP-160	N045	N063	478	250	-1152	0.27	-545	0.13
OP-161	N062	N7080301-1	400	250	-1594	0.38	-754	0.18
EP-162	N054	N013	125	250	5612	1.32	2656	0.63
OP-163	N063	N7080302-1	309	55.4	97	0.47	46	0.22
OP-164	N102	N063	131	250	1249	0.29	591	0.14
OP-165	N175	N7080101-13	428	96.8	96	0.15	46	0.07
EP-166	N230	N070	1007	141	-571	0.42	-270	0.2
NP-167	N165	N070	20	141	-70	0.05	-33	0.02
NP-168	N077	N175	428	141	665	0.49	315	0.23
NP-169	N7070901-2	N7070901-1	2443	141	-477	0.35	-226	0.17
NP-170	N225	N219	700	300	4271	0.7	2022	0.33
EP-171	N002	N7080401-3	30	55.4	254	1.22	120	0.58
OP-172	N011	N7080402-2	179	96.8	338	0.53	160	0.25
OP-173	N025	N7080402-3	119	141	571	0.42	270	0.2
OP-174	N017	N7080402-4	305	96.8	233	0.37	110	0.17
OP-175	N020	N031	134	250	676	0.16	320	0.08
OP-176	N031	N022	117	250	338	0.08	160	0.04
NP-177	N002	N020	15	350	1247	0.15	590	0.07
NP-178	N080	N7080502-1	557	141	1850	1.37	876	0.65
NP-179	N7080502-1	N071	697	141	1555	1.15	736	0.55
EP-180	N7080401-4	N002	175	55.4	-169	0.81	-80	0.38
NP-181	N208	N034	540	141	1411	1.05	668	0.5
NP-182	N7080405-6	N044	20	96.8	406	0.64	192	0.3
EP-183	N010	N7080404-3	100	55.4	204	0.98	97	0.46
EP-184	N072	N039	470	114.6	-299	0.34	-142	0.16
NP-185	N7070901-1	N222	1800	198.2	-984	0.37	-466	0.17
EP-192	N062	N102	20	96.8	1249	1.96	591	0.93
NP-193	N7080301-2	N105	124	250	4486	1.06	2124	0.5
EP-194	N7080101-15	N7080101-16	200	141	475	0.35	225	0.17
EP-195	N106	N7071903-2	381	96.8	511	0.8	242	0.38
OP-196	N7080302-4	N141	107	96.8	-152	0.24	-72	0.11
OP-197	N7080302-3	N142	110	96.8	-152	0.24	-72	0.11
EP-198	N005	N142	135	250	2617	0.62	1239	0.29
EP-199	N142	N7080302-5	79	250	2465	0.58	1167	0.28
EP-200	N7080302-5	N141	73	250	2189	0.52	1036	0.24
EP-201	N141	N038	71	250	2037	0.48	964	0.23
OP-202	N108	N114	100	96.8	387	0.61	183	0.29
OP-203	N114	N117	100	96.8	86	0.14	41	0.06
OP-204	N117	N113	128	96.8	-64	0.1	-31	0.05
OP-205	N114	N7080102-2	82	96.8	151	0.24	71	0.11
OP-206	N117	N7080102-3	87	96.8	151	0.24	71	0.11
OP-207	N7080102-1	N114	65	55.4	-151	0.72	-71	0.34
OP-208	N125	N144	274	96.8	194	0.3	92	0.14
EP-209	N015	N108	80	250	2995	0.71	1418	0.33
EP-210	N108	N125	80	250	2607	0.61	1234	0.29
EP-211	N125	N146	35	250	2414	0.57	1143	0.27
EP-212	N144	N133	261	96.8	194	0.3	92	0.14
EP-213	N7080102-4	N133	193	96.8	-194	0.3	-92	0.14
EP-214	N7080102-4	N138	372	96.8	43	0.07	20	0.03
EP-215	N145	N7080102-7	308	96.8	151	0.24	71	0.11
OP-216	N148	N138	750	141	478	0.35	226	0.17
OP-217	N138	N149	20	141	521	0.39	246	0.18
EP-218	N146	N148	90	250	2113	0.5	1000	0.24
OP-219	N150	N7080102-6	175	96.8	151	0.24	71	0.11
OP-220	N152	N7080102-8	336	96.8	151	0.24	71	0.11
EP-221	N154	N7080102-9	100	55.4	151	0.72	71	0.34
EP-222	N046	N156	134	141	703	0.52	333	0.25
EP-223	N156	N078	134	141	607	0.45	287	0.21
EP-224	N156	N7080101-9	150	55.4	96	0.46	46	0.22
EP-225	N158	N7080101-5	489	55.4	26	0.12	12	0.06
OP-226	N078	N7080101-8	150	141	96	0.07	46	0.03
EP-227	N7080101-7	N163	200	55.4	-12	0.06	-6	0.03

Link Data

Link ID	Start Node	End Node	Length(m)	Diameter(mm)	Peak Demand		Average Demand	
					Flow(m ³ /d)	Velocity(m/s)	Flow(m ³ /d)	Velocity(m/s)
EP-228	N163	N7080101-10	250	55.4	-12	0.06	-6	0.03
OP-229	N7080101-10	N070	257	141	-210	0.16	-99	0.07
EP-230	N164	N7080101-6	150	55.4	96	0.46	46	0.22
EP-231	N014	N164	138	141	-330	0.24	-156	0.12
EP-232	N078	N164	138	141	427	0.32	202	0.15
OP-233	N7080101-10	N7080101-11	134	141	96	0.07	46	0.03
OP-234	N169	N154	90	198.2	515	0.19	244	0.09
OP-235	N154	N7080102-10	90	198.2	364	0.14	173	0.06
EP-236	N038	N113	100	141	580	0.43	274	0.2
EP-237	N113	N170	190	141	515	0.38	244	0.18
OP-238	N171	N7080102-5	83	96.8	151	0.24	71	0.11
OP-239	N171	N146	100	96.8	-301	0.47	-143	0.22
OP-240	N171	N145	157	96.8	151	0.24	71	0.11
OP-241	N170	N169	280	198.2	515	0.19	244	0.09
EP-242	N7080101-2	N158	120	141	395	0.29	187	0.14
EP-243	N158	N7080101-4	210	141	369	0.27	175	0.13
EP-244	N7080101-2	N7080101-1	50	96.8	98	0.15	46	0.07
EP-245	N7080101-3	N7080101-2	482	96.8	-96	0.15	-46	0.07
EP-246	N148	N150	70	250	1635	0.39	774	0.18
EP-247	N150	N152	80	250	1484	0.35	703	0.17
OP-248	N068	N232	50	141	272	0.2	129	0.1
NP-249	N175	N026	20	141	569	0.42	269	0.2
NP-252	N100	N023	460	300	5676	0.93	2687	0.44
NP-253	N7071902-3	N106	30	141	465	0.34	220	0.16
NP-254	N242	N202	30	141	960	0.71	454	0.34
NP-255	N243	N7070202-4	217	141	620	0.46	294	0.22
NP-256	N7080501-2	N7080501-1	889	96.8	275	0.43	130	0.21
NP-257	N7080301-4	N7080301-1	700	141	-318	0.24	-150	0.11
NP-259	N023	N024	1350	300	5306	0.87	2512	0.41
NP-260	N023	N7070303-1	30	96.8	370	0.58	175	0.28
NP-261	N203	N7080202-2	210	96.8	1191	1.87	564	0.89
NP-262	N219	N218	928	250	4271	1.01	2022	0.48
NP-263	N218	N217	600	250	4271	1.01	2022	0.48
NP-264	N217	N237	530	250	4271	1.01	2022	0.48
NP-265	N066	N137	50	55.4	-259	1.24	-122	0.59
NP-266	ReserriorTank	N029	53	198.2	1281	0.48	606	0.23
NP-267	N029	N032	163	198.2	1281	0.48	606	0.23
NP-270	N7080202-3	N086	260	55.4	-222	1.07	-105	0.51
NP-271	N7080202-1	N024	730	96.8	-222	0.35	-105	0.17
NP-272	N149	N070	330	141	521	0.39	246	0.18
NP-273	N7080101-4	N165	150	141	272	0.2	129	0.1
NP-274	N7070202-4	N7070202-3	280	55.4	181	0.87	86	0.41
NP-275	N7080101-12	N7080101-14	1192	96.8	273	0.43	129	0.2
EP-276	N120	N7070201-4	815	96.8	139	0.22	66	0.1
NP-277	N088	N201	180	141	-69	0.05	-33	0.02
NP-278	N086	N201	592	141	69	0.05	33	0.02
NP-280	N7080401-7	N240	189	141	-1665	1.23	-788	0.58
NP-281	N105	N7080302-2	227	28	26	0.49	12	0.23
NP-282	N7080302-2	N7080302-1	165	28	-4	0.08	-2	0.04
NP-289	N7080101-5	N165	10	55.4	-70	0.34	-33	0.16
NP-290	N078	N7080101-7	75	55.4	84	0.4	40	0.19
NP-291	N241	N027	705	198.2	2606	0.98	1234	0.46
NP-292	N222	N032	57	198.2	-1281	0.48	-606	0.23
NP-293	N223	N222	15	96.8	-297	0.47	-141	0.22
NP-296	N071	N7080501-2	224	141	1003	0.74	475	0.35
NP-297	N243	N202	30	141	-674	0.5	-319	0.24
NP-298	N7080101-14	N7070204-1	536	96.8	199	0.31	94	0.15
NP-299	N208	N7080401-7	10	141	-1411	1.05	-668	0.5
NP-300	N034	N010	20	55.4	204	0.98	97	0.46
OP-301	N7080403-4	N224	550	96.8	130	0.2	62	0.1
NP-302	N7070203-2	N7070203-1	450	55.4	-42	0.2	-20	0.09

7.7 用地取得に関する資料



ព្រះរាជាណាចក្រកម្ពុជា
ជាតិ សាសនា ព្រះមហាក្សត្រ

ក្រសួងឧស្សាហកម្ម និងសិប្បកម្ម
Ministry of Industry & Handicraft
លេខ: ៥១៤ MIH / 2014

រាជធានីភ្នំពេញ ថ្ងៃទី ២២ ខែ កញ្ញា ឆ្នាំ ២០១៤

ជម្រាបជូន
ឯកឧត្តមរដ្ឋមន្ត្រី ក្រសួងសេដ្ឋកិច្ច និងហិរញ្ញវត្ថុ

- កម្មវត្ថុ:** សំណើសុំប្រើប្រាស់ចំរើការរបស់អង្គការដ្ឋានទឹកខេត្តកំពតចំនួន 154,000 ដុល្លារអាមេរិក (មួយរយហាសិបបួនពាន់ ដុល្លារអាមេរិកគត) សម្រាប់ទិញដី សាងសង់រោងចក្រផលិតទឹកស្អាត របស់អង្គការដ្ឋានទឹកខេត្តកំពត ក្រោមជំនួយគិតសំណងរបស់ រាជរដ្ឋាភិបាលជប៉ុន។
- យោង :** -Minutes of Discussions រវាងក្រសួងឧស្សាហកម្ម និងសិប្បកម្ម និងក្រុមការងារសិក្សារៀបចំគម្រោង របស់អង្គការ JICA ចុះថ្ងៃទី១០ ខែមិថុនា ឆ្នាំ២០១៤។
-ប្រកាសលេខ ៥១៤ MIH/2014 ចុះថ្ងៃទី២២ ខែសីហា ឆ្នាំ២០១៤ របស់ក្រសួងឧស្សាហកម្ម និងសិប្បកម្ម

តបតាមកម្មវត្ថុ និងយោងខាងលើ ខ្ញុំសូមជម្រាបជូន **ឯកឧត្តមរដ្ឋមន្ត្រី** មេត្តាជ្រាបថា៖ គណៈកម្មការអន្តរក្រសួង វាយតម្លៃទិញដីក្នុងក្របខណ្ឌ គម្រោងពង្រីកប្រព័ន្ធផ្គត់ផ្គង់ទឹកស្អាតខេត្តកំពត បានរៀបចំកិច្ចប្រជុំវាយតម្លៃទិញដីសម្រាប់សាងសង់រោងចក្រផលិតទឹកស្អាតថ្មី ចំនួនពីរលើក្រុមហ៊ុនហើយ ដោយមានការចូលរួមពីតំណាងអន្តរក្រសួង និងគ្រប់ភាគីពាក់ព័ន្ធដូចមានបញ្ជីត្រួតពិនិត្យជាមួយ ដើម្បីពិភាក្សា និងចេញ ពិនិត្យដីពាក់ព័ន្ធនានា នឹងតម្លៃដី ដែលជាចុងក្រោយអង្គប្រជុំបានឯកភាពគ្នាដោយបានបញ្ជាក់ថា ទីតាំងនេះ អាចធ្វើបណ្តឹងសុំទិញបាន នឹងព័ត៌មានដែលបានសម្រេចចុងក្រោយគឺ តម្លៃ ១៦ដុល្លារអាមេរិក/ម៉ែត្រការ៉េ ដាក់ជូនថ្នាក់ដឹកនាំ ក្រសួងឧស្សាហកម្ម និងសិប្បកម្ម និងក្រសួងសេដ្ឋកិច្ច និងហិរញ្ញវត្ថុ ដើម្បីពិនិត្យ និងសម្រេច។

ខ្ញុំបានពិនិត្យ និងឯកភាព រួចហើយតាមការសម្រេចរបស់អង្គប្រជុំទាំង២លើក ដែលបានចែងក្នុងកំណត់ហេតុអង្គប្រជុំ ក្នុងន័យនេះ ខ្ញុំសូមជម្រាបជូន **ឯកឧត្តមរដ្ឋមន្ត្រី** នូវកំណត់ហេតុទាំង២លើក ដែលគណៈកម្មការអន្តរក្រសួងបានប្រជុំពិភាក្សានៅខេត្តកំពត នាពេលកន្លងមក។ ដើម្បីបំពេញផែនការអនុវត្តគម្រោងឲ្យទាន់ពេលវេលារបស់ប្រទេសម្ចាស់ជំនួយឲ្យស្របតាមខ្លឹមសារនៃ Minutes of Discussions ដែលអង្គការដ្ឋានទឹកខេត្តកំពតនឹងទទួលបាននូវសមិទ្ធិផលថ្មី សម្រាប់ធានានូវការផ្គត់ផ្គង់ទឹកស្អាតជូនប្រជាពលរដ្ឋនៅក្រុងកំពតទាំងមូល បន្ទាប់ពីការអនុវត្តគម្រោងត្រូវបានបញ្ចប់។ ដូច្នេះខ្ញុំសូមប្រើប្រាស់ចំរើការរបស់អង្គការដ្ឋានទឹកខេត្តកំពតតាមទំហំដីដាក់ស្នែងគឺ $87.5 \times 110 \text{ m} = 9625 \text{ m}^2 = 154,000$ ដុល្លារអាមេរិក (មួយរយហាសិបបួនពាន់ ដុល្លារអាមេរិកគត់)។

អាស្រ័យហេតុនេះ សូម **ឯកឧត្តមរដ្ឋមន្ត្រី** មេត្តាពិនិត្យ និងសម្រេច តាមការគូរ។
សូម **ឯកឧត្តមរដ្ឋមន្ត្រី** ទទួលនូវការគោរពបំផុតដ៏ជ្រាលជ្រៅ ពីខ្ញុំ។

ទេសរដ្ឋមន្ត្រី
រដ្ឋមន្ត្រីក្រសួងឧស្សាហកម្ម និងសិប្បកម្ម

បឋម ប្រសិទ្ធិ

ក្រសួងឧស្សាហកម្ម និងសិប្បកម្ម
៤៥ មហាវិថីព្រះនរោត្តម
សង្កាត់ផ្សារថ្មី ៣ ខណ្ឌដូនពេញ
ភ្នំពេញ ១២២០៥ ៖ ព្រះរាជាណាចក្រកម្ពុជា

ទូរស័ព្ទលេខ: ៨៥៥ ២៣ ២១១ ៧៧៧
ទូរសារលេខ: ៨៥៥ ២៣ ៤២៨ ២៦៣
អ៊ីមែល: mih.smcabinet@gmail.com

Kingdom of Cambodia
Nation Religion King

Ministry of Industry and Handicraft
No. 1615 MIH/2014

Phnom Penh, 30th September 2014

To
Minister of Ministry of Economic and Finance

Objective: Request to use the budgeted in Kampot Water Work with US\$ 154,000 (in word: US dollar One hundred fifty four thousand only) for buying land to build the Water Treatment Plant of Kampot Water Work under Grant from Japan.

Reference: - Minute of Discussion between MIH and Jica Project Survey Team dated on 10 June 2014.

- Prokas No. 514 MIH/2014 dated August 22, 2014 of MIH.

Replying to the above objective and reference, I would like to tell H.E Minister that: Inter-ministries Evaluation Committee for Project for Expansion and Improvement of Water Supply System in Kampot had already held the meeting two times for evaluating the price of land bought for building the new Water Treatment Plant. The meeting had the representative from Inter-ministries and all relevant parties as in list of attendant attached. In order to discuss and negotiate for other solutions for land price; as the result the meeting agreed, with the some expressions such as: this land is able to do the land title and the price of this land is US\$16/m², to submit to leader of MIH and MEF for seen and approved.

I have already seen and approved due to two meetings as in the minute of meeting. As this means, I would like to send you these two minutes of meetings which Inter-ministries Evaluation Committee had held the meeting in Kampot so far. In order to complete the project plan on time as in Minute of Discussion that Kampot Water Work will get the new facilities to ensure the clean water for supplying people in whole Kampot after completed the project implementation. So, I would like to use the budgeted of Kampot Water Work due to the real size of land: 87.5 m x 110m=9625m²=US\$154,000 (in word: US dollar One hundred fifty four thousand only).

As above reason, please **H.E Minister** sees and approves.
Please **H.E Minister** gets my respectful.

Senior Minister
Minister of MIH

Chom Proset



ព្រះរាជាណាចក្រកម្ពុជា
ជាតិ សាសនា ព្រះមហាក្សត្រ

ក្រសួងសេដ្ឋកិច្ច និង ហិរញ្ញវត្ថុ

លេខ ១១៤.២២២.៧៧១.៧៧១

រាជធានីភ្នំពេញ, ថ្ងៃទី ១៦ ខែ កញ្ញា ឆ្នាំ ២០១៤

គោរពជូន

ឯកឧត្តមទេសរដ្ឋមន្ត្រី រដ្ឋមន្ត្រីក្រសួងឧស្សាហកម្ម និងសិប្បកម្ម

កម្មវត្ថុ: ករណីសំណើសុំប្រើប្រាស់ថវិការបស់អង្គការរដ្ឋាករទឹកខេត្តកំពតចំនួន ១៥៤.០០០ ដុល្លារអាមេរិកសម្រាប់ ទិញដីសាងសង់រោងចក្រផលិតទឹកស្អាតរបស់អង្គការរដ្ឋាករទឹកខេត្តកំពត ក្រោមជំនួយឥតសំណងរបស់ រាជរដ្ឋាភិបាលជប៉ុន ។

យោង : -លិខិតលេខ ១៦១៥ MIH/2014 ចុះថ្ងៃទី៣០ ខែកញ្ញា ឆ្នាំ២០១៤ របស់ក្រសួងឧស្សាហកម្ម និងសិប្បកម្ម
-កំណត់ហេតុ ចុះថ្ងៃទី០៣ និងទី១៦ ខែកញ្ញា ឆ្នាំ២០១៤ ស្តីពីកិច្ចប្រជុំវាយតម្លៃទិញដីសម្រាប់សាងសង់រោងចក្រ ផលិតទឹកស្អាតរបស់អង្គការរដ្ឋាករទឹកខេត្តកំពត ក្រោមជំនួយឥតសំណងរបស់រាជរដ្ឋាភិបាលជប៉ុន ។

សេចក្តីដូចមានចែងក្នុងកម្មវត្ថុ និងយោងខាងលើ ខ្ញុំសូមគោរពជម្រាបជូនឯកឧត្តមទេសរដ្ឋមន្ត្រីមេត្តាជ្រាបថា ក្រសួងសេដ្ឋកិច្ច និងហិរញ្ញវត្ថុ សូមឯកភាពតាមសំណើរបស់ក្រសួងឧស្សាហកម្ម និងសិប្បកម្ម ក្នុងការប្រើប្រាស់ថវិកាផ្ទាល់ របស់អង្គការរដ្ឋាករទឹកខេត្តកំពត ក្នុងការទិញដីតាមទំហំដីដាក់ស្តែង ៨៧.៥ម x ១១០ម = ៩៦២៥ម^២ ក្នុងតម្លៃ ១៥៤.០០០ (មួយរយហាសិបបួនពាន់) ដុល្លារអាមេរិក ដើម្បីបំពេញផែនការអនុវត្តគម្រោងឲ្យទាន់ពេលវេលារបស់ប្រទេសម្ចាស់ជំនួយ ស្របតាមខ្លឹមសារនៃ Minutes of Discussions ដែលឯកឧត្តមបានចុះហត្ថលេខានាថ្ងៃទី១០ ខែមិថុនា ឆ្នាំ២០១៤ ក្នុងគោល ដៅធ្វើឲ្យអង្គការរដ្ឋាករទឹកខេត្តកំពតនឹងទទួលបាននូវសមិទ្ធផលថ្មី សម្រាប់ធានានូវការផ្គត់ផ្គង់ទឹកស្អាតជូនប្រជាពលរដ្ឋ នៅក្រុងកំពតទាំងមូល ។

សូមឯកឧត្តមទេសរដ្ឋមន្ត្រីមេត្តាជ្រាប និងទទួលចាត់ចែងអនុវត្ត តាមការគូរ ។
សូមឯកឧត្តមទេសរដ្ឋមន្ត្រី មេត្តាទទួលនូវការគោរពដ៏ខ្ពង់ខ្ពស់ ពីខ្ញុំ *[Signature]*

- ឧប្បន្ទ:**
- ទីស្តីការគណៈរដ្ឋមន្ត្រី
 - ឧទ្ធរណ៍យសរដ្ឋមន្ត្រីហិរញ្ញវត្ថុនិងសេដ្ឋកិច្ច
 - ឯកសារ-កាលប្បវត្តិ

រដ្ឋមន្ត្រី
ក្រសួងសេដ្ឋកិច្ច និង ហិរញ្ញវត្ថុ
[Signature]
បណ្ឌិត អូន ណឿន

Kingdom of Cambodia
Nation Religion King

Ministry of Economic and Finance
No. 7887 SHV-ATC

Phnom Penh, 16 October 2014

To
Senior Minister, Minister of Ministry of Industry and Handicraft

Objective: Request to use the budgeted in Kampot Water Work with US\$ 154,000 for buying land to build the Water Treatment Plant of Kampot Water Work under Grant from Japan.

Reference: - Letter from Ministry of Industry and Handicraft No. 1615 MIH/2014 dated 30th September 2014.
-Minute of meeting on 3 and 16 September 2014 for evaluating the price of land bought for building the new Water Treatment Plant of Kampot Water Work under Grant from Japan.

As meaning in the above objective and reference, I would like to tell senior minister that ministry of economic and finance agreed with request from Ministry of Industry and Handicraft to use budgeted in Kampot Water Work to buy 87.5 mx110m=9625m² with total cost US\$154,000 (in word: US dollar One hundred fifty four thousand only) in order to complete the project plan on time for Country of Grant as in Minute of Discussion that H.E signed on 10 June 2014 in order Kampot Water Work gets the new facilities to ensure the clean water for supplying people in whole Kampot.

Please **H.E Senior Minister** absorbs and implement.
Please **H.E Senior Minister** gets my respectful.

Senior Minister
Miniter of MEF

Dr. Orn Porumunyroath

資料 7.8 浄水場発電機容量概略計算

Capacity of Generator (WTP)

Plant Mechanical load for generator shall be selected below, to meet the daily average demand even at emergency.

Name of Equipment	Motor Output kW	Nos	kW
Distribution Pump	75	2	150
Distribution Pump Discharge Valve	0.2	2	0.4
Distribution Pressure Control Valve	0.2	1	0.2
Distribution By-pass return	0.04	1	0.04
Transmission Pump	7.5	1	7.5
Transmission Pump Discharge Valve	0.2	1	0.2
Transmission Flow Control Valve	0.2	1	0.2
Pump Station Sump Pump	1.5	1	1.5
Chlorine Water Booster Pump	2.2	1	2.2
Chlorine Gas Neutralization System	20.5	1	20.5
Alum solution mixing blower	0.4	1	0.4
Lime feeder	1.1	1	1.1
Building Lighting and other miscellaneous load	20	30%	6
Total [kW]			190.24

The capacity of generator is determined using following formulas.

a) PG1 is the capacity necessary for all load operation.

$$PG_1 = \frac{\sum P_0}{\eta_L \times \varphi_L} \times \alpha \times S_f \quad [\text{kVA}]$$

Where,

$\sum P_0$: sum of the load	190.24 [kW]
η_L	: total load efficiency	0.85
φ_L	: total power factor	0.8
α	: demand factor	1.0
S_f	: the increase coefficient of electric current by unbalanced load	

$$S_f = 1 + 0.6 \times \frac{\Delta P}{\Sigma P_0} = 1 + 0.6 \times \frac{6}{190.24} = 1.019$$

Δp : Sum of unbalance element by single phase load

$$= \frac{190.24}{0.85 \times 0.8} \times 1.0 \times 1.019$$

$$= \mathbf{285 \text{ [kVA]}}$$

b) PG2 is the capacity necessary against voltage drop

$$PG_2 = P_m \times \beta \times C \times X_d' \times \frac{1 - \Delta E}{\Delta E} \quad [\text{kVA}]$$

Where,

P_m	: maximum motor capacity	75 [kW]
β	: starting kVA per 1kW of maximum motor capacity	1.2
C	: coefficient by starter	1
X_d'	: generator's constant	0.25
ΔE	: allowable voltage drop rate	0.25

$$= 75 \times 1.2 \times 0.25 \times \frac{1 - 0.25}{0.25}$$

$$= \mathbf{67 \text{ [kVA]}}$$

c) PG3 is the capacity necessary for starting maximum motor lastly

$$PG_3 = \frac{f_{v1}}{\gamma_G} \left\{ (\Sigma P_0 - P_m) \times \frac{\alpha}{\eta_L \times \phi_L} + P_m \times \beta \times C \right\} \quad [\text{kVA}]$$

Where,

f_{v1}	: decrease coefficient of loading	1.0
ΣP_0	: sum of the load	190.24 [kW]
η_L	: total load efficiency	0.85
α	: demand factor	1.0

P_m	: maximum motor capacity	75 [kW]
β	: starting kVA per 1kW of maximum motor capacity	1.2
C	: coefficient by starter	1
γ_G	: generator strength against momentary overload	1.5

$$= \frac{1}{1.5} \left\{ (190.24 - 75) \times \frac{1.0}{0.85 \times 0.8} + 75 \times 1.2 \right\}$$

$$= \mathbf{172 \text{ [kVA]}}$$

d) Generator capacity

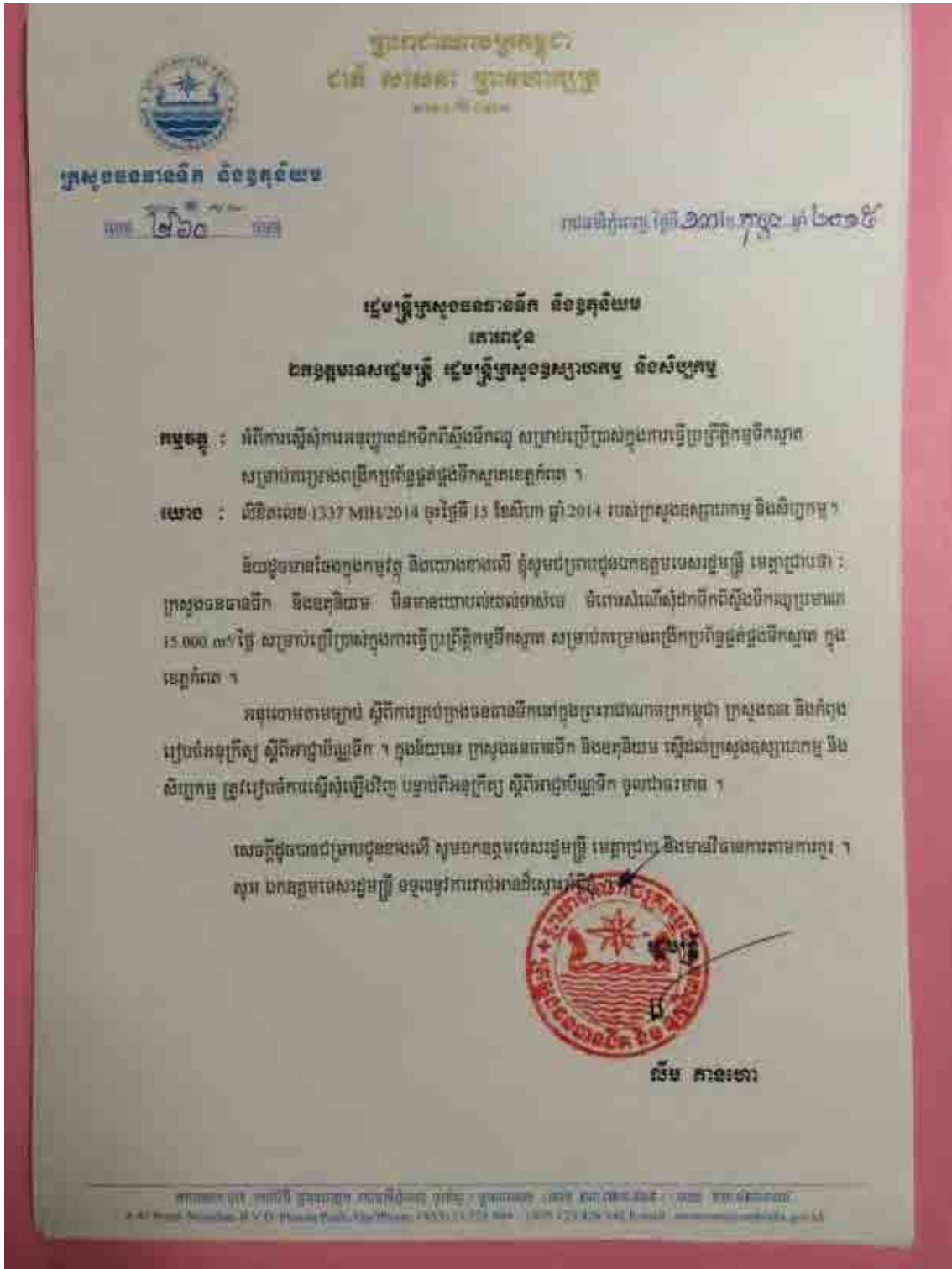
$$PG1 = 285 \text{ (MAXIMUM)}$$

$$PG2 = 67$$

$$PG3 = 172$$

Therefore, **300 [kVA]** is selected.

資料 7.9 河川からの取水許可に関する資料



Kingdom of Cambodia
Nation, Religion, King

MoWRAM
No. 260

Phnom Penh, 13th February 2015

Minister of MoWRAM
to
H.E. Senior Minister, Minister of MIH

Objective: relevant to approval to water intake from Toek Chhou River for Clean Water Treatment for Project for Expansion of Water Supply in Kampot.
Reference: Letter no. 13337 MIH/2014 dated 15th Aug 2014 of MIH

With above objective and reference, I'd like to inform H.E. Senior Minister that MoWRAM has no any objection to the request for water intake from Toek Chhou river of about 15,000 m³/day for clean water treatment for the Project.

Regarding regulation for water resources management in Kingdom of Cambodia, MoWRAM has been preparing sub-decree for water licensing. Thus, MoWRAM would like to request MIH to renew the request after sub-decree for water licensing is valid.

Please H.E. Senior Minister be informed and act accordingly.

Yours Sincerely,

Minister

(Signature)

LIM Keanhor