

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF SETTLEMENT AND REGIONAL DEVELOPMENT
THE REPUBLIC OF INDONESIA

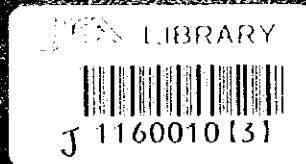
**THE DETAILED DESIGN
OF
FLOOD CONTROL, URBAN DRAINAGE AND
WATER RESOURCES DEVELOPMENT IN
SEMARANG IN THE REPUBLIC OF INDONESIA**

FINAL REPORT

COMPONENT C:
URBAN DRAINAGE SYSTEM IMPROVEMENT

BIDDING DOCUMENTS

SUPPLEMENTARY INFORMATION



AUGUST 2000

CTI ENGINEERING INTERNATIONAL CO., LTD.

IN ASSOCIATION WITH

PACIFIC CONSULTANTS INTERNATIONAL

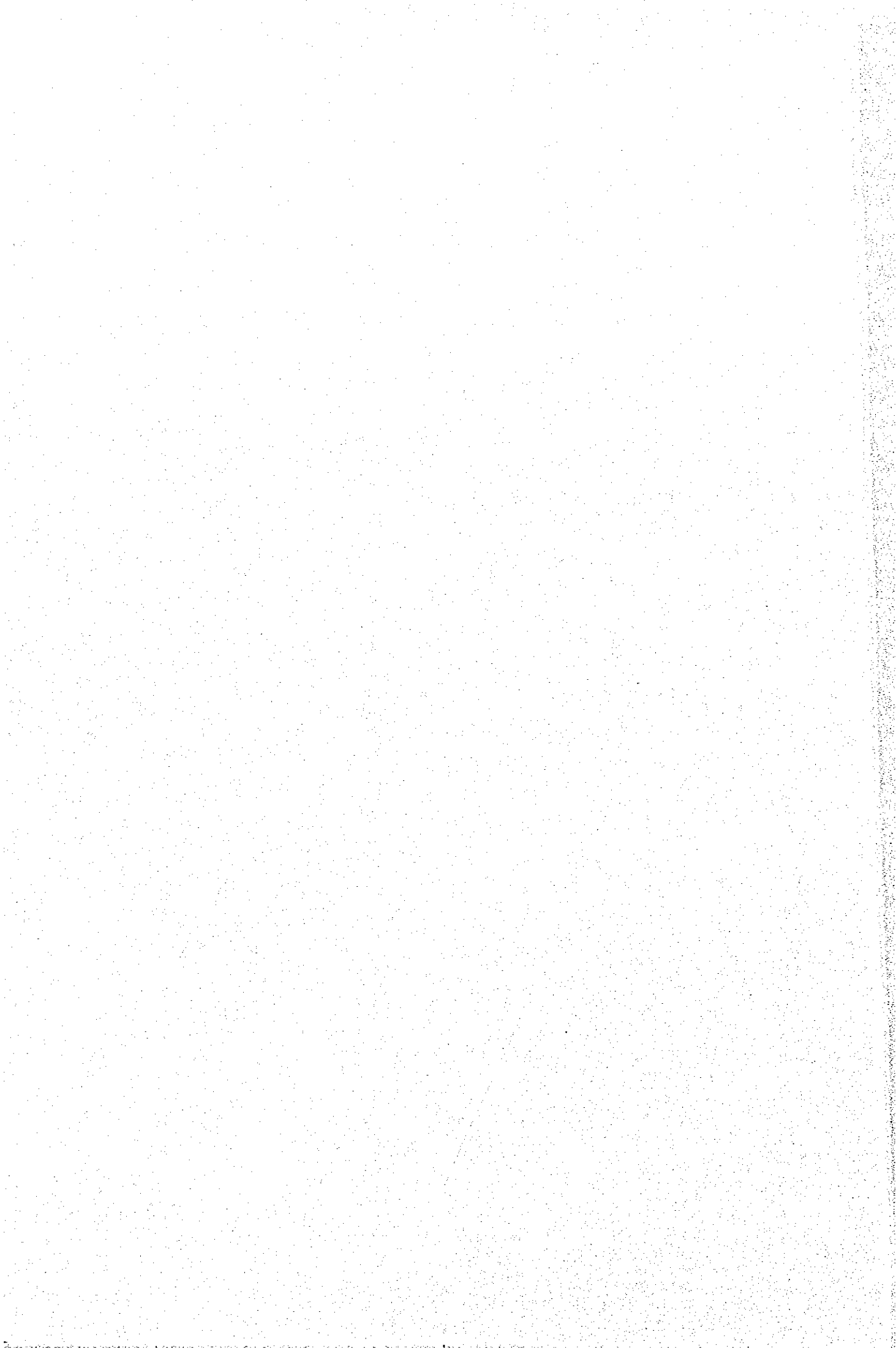
AND

PASCO INTERNATIONAL INC.

SSS

JR

00-105



**MINISTRY OF SETTLEMENT AND REGIONAL DEVELOPMENT
THE REPUBLIC OF INDONESIA**

**FLOOD CONTROL, URBAN DRAINAGE AND
WATER RESOURCES DEVELOPMENT IN SEMARANG**

**COMPONENT C:
URBAN DRAINAGE SYSTEM IMPROVEMENT**

BIDDING DOCUMENTS

SUPPLEMENTARY INFORMATION

AUGUST 2000



1160010(3)

NOTE

The documents contained in this volume of supplementary information do not form part of the bid or contract documents and the information contained in them is made available on the express condition that it is not binding on the Employer, the Bidder or the Contractor.

DOCUMENTS ENCLOSED

The following documents are enclosed for the information of bidders:

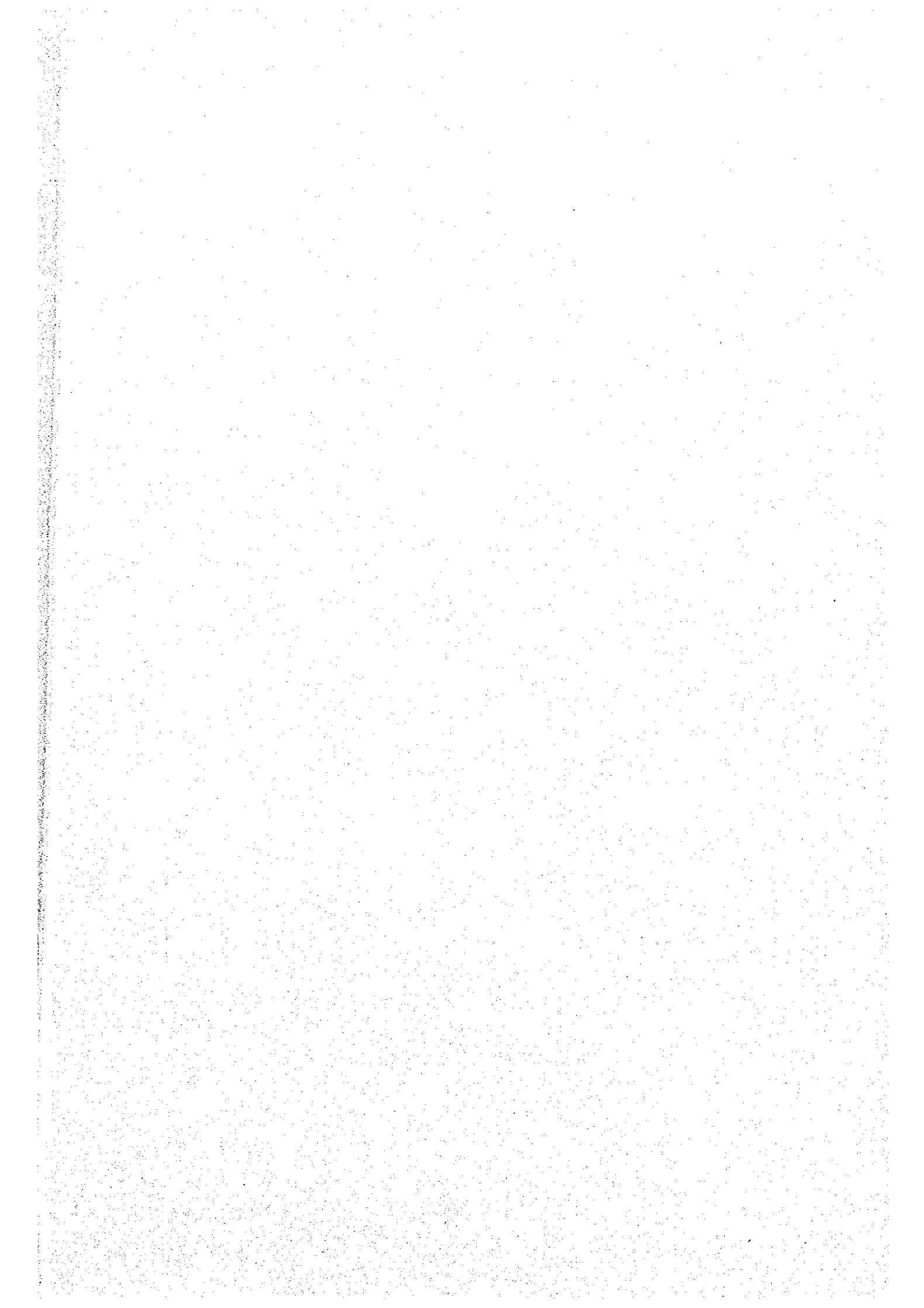
Mr Miura to complete list here and to attach documents

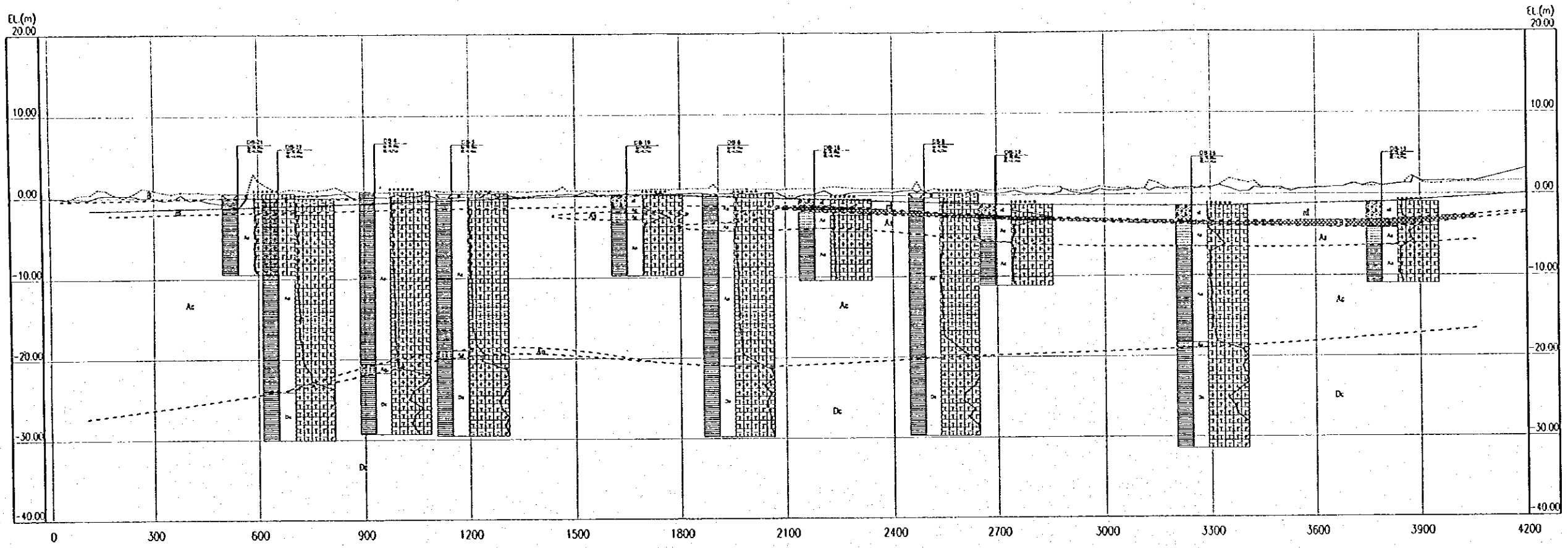
MONTHLY RAINFALL FOR 30 YEARS AT SUMURJURANG STATION (No.65c)

Unit : mm

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1967	394.0	566.4	383.0	487.0	91.0	0.0	0.0	0.0	0.0	17.0	116.0	450.0	2504.4
1968	664.0	369.7	369.0	404.0	262.0	297.0	211.0	144.0	99.0	52.0	259.0	361.4	3492.1
1969	456.0	719.0	754.0	766.0	28.0	90.0	57.0	0.0	16.0	172.0	224.0	443.0	3725.0
1970	454.0	308.0	444.0	367.0	248.0	186.0	160.0	0.0	124.0	119.0	379.0	778.0	3567.0
1971	786.0	518.0	462.0	439.0	226.0	309.0	28.0	0.0	56.0	272.0	326.0	300.3	3722.3
1972	668.0	336.0	545.0	74.0	154.0	18.0	0.0	0.0	0.0	0.0	180.0	242.0	2217.0
1973	524.0	222.0	326.5	226.0	204.0	108.7	144.0	22.0	144.0	319.8	387.2	323.0	2951.2
1974	549.0	259.0	671.0	318.0	154.0	16.0	44.0	72.0	96.0	373.0	214.0	439.0	3205.0
1975	373.0	259.0	569.0	362.0	223.0	51.3	0.0	25.0	270.0	255.0	439.0	278.7	3105.0
1976	952.0	442.0	668.0	67.0	18.0	33.0	3.0	16.0	0.0	57.0	269.0	228.0	2753.0
1977	433.0	323.0	633.0	210.0	161.0	117.0	0.0	0.0	0.0	0.0	150.0	470.0	2497.0
1978	764.0	462.0	443.0	88.0	102.0	129.0	83.0	37.0	212.0	159.0	143.0	254.0	2856.0
1979	608.0	633.0	440.0	477.0	266.0	131.0	41.0	20.0	105.0	110.0	216.0	159.0	3206.0
1980	734.0	315.0	331.0	399.0	254.0	0.0	71.0	126.0	36.0	176.0	379.0	566.0	3387.0
1981	402.0	378.0	98.0	0.0	201.5	112.4	203.4	0.0	0.0	0.0	64.0	412.0	1871.3
1982	364.0	263.0	626.0	525.0	0.0	0.0	0.0	0.0	0.0	0.0	124.0	250.0	2152.0
1983	436.0	217.0	191.0	301.0	355.0	19.0	0.0	0.0	0.0	363.0	296.0	87.0	2265.0
1984	228.0	516.0	243.0	111.0	56.0	70.0	87.0	51.0	426.0	84.0	232.0	391.0	2495.0
1985	63.0	245.0	152.0	218.0	35.0	0.0	94.8	79.0	114.6	215.2	260.8	306.4	1783.8
1986	592.6	245.0	568.0	209.0	72.0	223.0	44.0	101.0	119.0	94.0	147.0	199.0	2613.6
1987	765.0	660.0	291.0	55.0	116.0	45.0	73.0	0.0	0.0	6.0	301.0	745.0	3057.0
1988	566.0	589.0	442.0	345.0	190.0	31.0	33.0	20.0	26.0	220.0	192.0	884.0	3538.0
1989	374.0	750.0	513.0	347.0	244.0	218.0	118.0	12.0	48.0	150.0	329.0	558.0	3441.0
1990	760.0	237.0	287.0	157.0	93.0	168.0	56.0	74.0	46.0	49.0	182.0	604.0	2713.0
1991	840.0	415.0	176.0	353.0	150.3	5.0	13.1	0.0	0.0	12.1	273.9	335.9	2574.3
1992	382.0	281.0	405.0	367.0	250.0	141.0	7.0	253.0	180.0	254.0	120.0	410.0	3050.0
1993	755.0	384.0	252.0	307.0	61.0	165.0	52.0	32.0	64.0	23.0	145.0	228.0	2468.0
1994	640.0	300.0	575.0	211.0	53.0	3.0	2.0	14.0	0.0	103.0	306.0	435.0	2642.0
1995	397.0	356.0	457.0	75.0	171.0	215.0	0.0	0.0	65.4	76.0	380.0	531.0	2723.4
1996	319.0	726.0	350.0	72.0	95.0	28.0	30.0	87.0	83.0	213.0	259.0	527.0	2789.0
Average	541.4	409.1	422.2	277.9	151.1	97.6	55.2	39.5	77.7	130.8	243.1	399.9	2845.5

Note : After supplementation of missing data



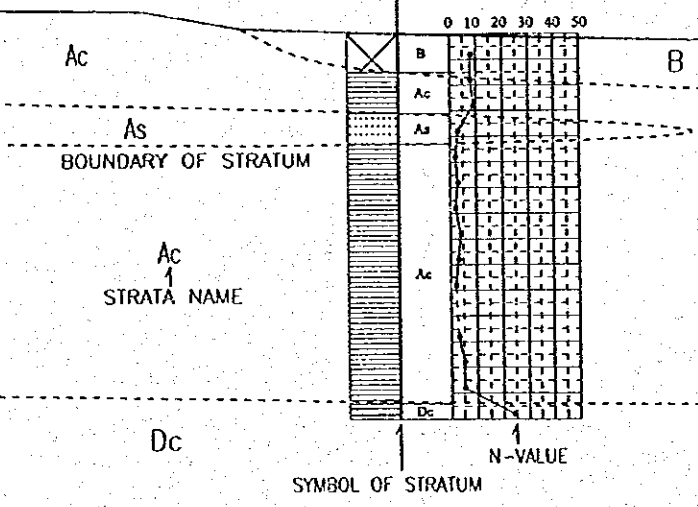


LEGEND

(Geological Strata)			
Age	Formation and Strata Name	Symbol	Description
Quaternary	Holocene	B	It consists of embankment, filled soil and refuse, and composed of clay, silt, sand and gravel.
		rd	It consists of sand and gravel mainly of the upstream area of Smongang Weir. But it consists of sand and clay mainly of the downstream area.
	Aterium	Ac	It consists of clay and sandy clay, and shows gray. The sediments are very soft, and contain fragments of shell.
		As	It consists of fine grain sand and middle grain sand mainly, and contains the intercalated clay and silt generally. At the downstream area of Smongang Weir, it contains organic materials and fragments of shell.
Tertiary-Quaternary Pliocene-Pleistocene	Dumai	Ao	It consists of organic clay and organic fine grain sand mainly, but continuity as a stratum is poor.
		Dc	It consists of hard clay, and contains coral limestone partly. The surface part of this stratum is oxidized characteristically, and shows dark brown.
		Ds	It consists of sand mainly, and grain size of sand is from fine to coarse. And it contains many gravel, but diameter of gravel is smaller than 3cm generally.
	Sedimentary Rock Unit	Dg	It consists of gravel and clay. The quality of clay is same as Dc stratum, and diameter of gravel is smaller than 20cm.
		Do	It consists of alternation of conglomerate, sandstone and siltstone mainly, and contains mafic tuff partly. Sandstone and siltstone have tuffaceous quality, and the change of grain size of sandstone is big. The matrix of conglomerate consists of some material of sandstone. The gravel of conglomerate consists of andesite and pumice, and diameter of gravel is smaller than 20cm.
		Dp	It consists of volcanic breccia and mafic tuff mainly, and alternation is forming. The volcanic breccia contains fragments of andesite and pumice, and matrix consists of mafic tuff.

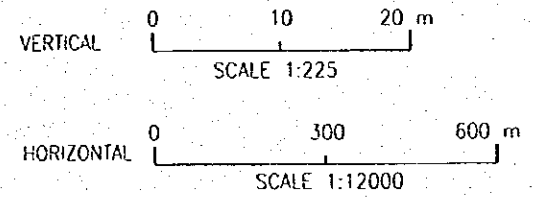
(DESCRIPTION ON THE DRAWING)

HOLE NUMBER
TOTAL DEPTH
GROUND ELEVATION



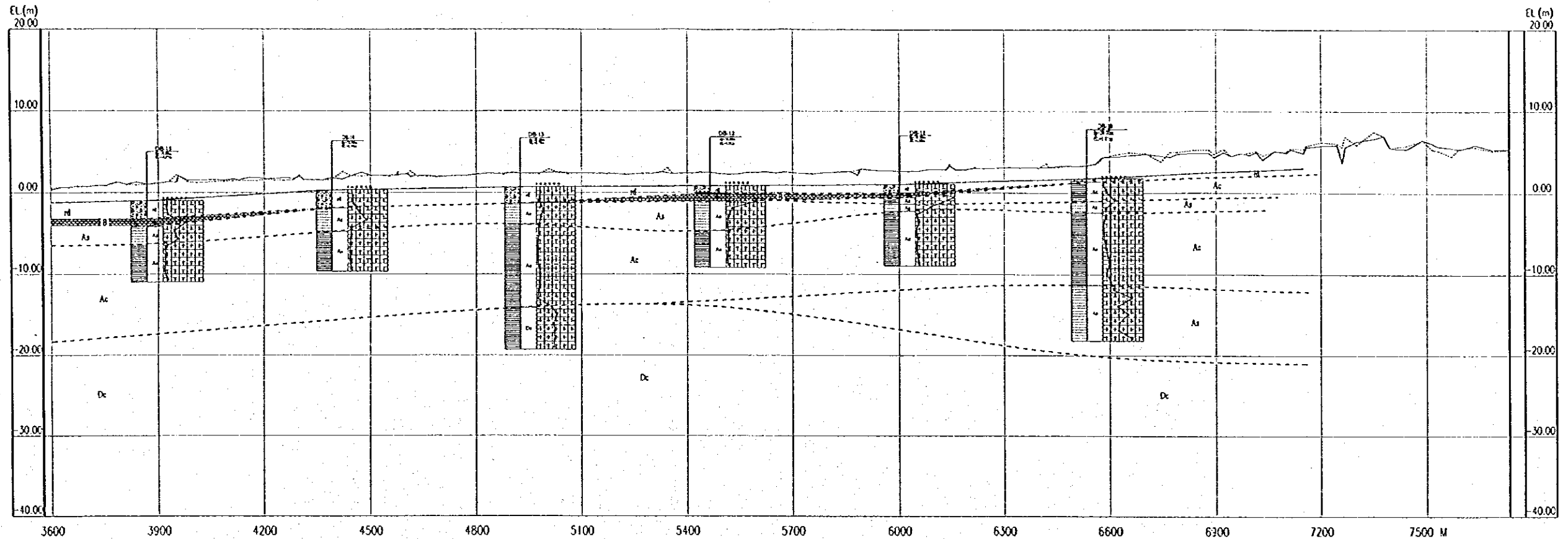
(SYMBOLS OF SOILS AND ROCKS AT CORE)

[Symbol]	B	Embankment
[Symbol]	rd	River Deposit
[Symbol]	Ac	Clay
[Symbol]	As	Sand
[Symbol]	Ao	Organic Clay
[Symbol]	Dc	Hard Clay
[Symbol]	Ds	Sand
[Symbol]	Dg	Gravel
[Symbol]	Do	Sedimentary Rock
[Symbol]	Dp	Pyroclastic Rock



THE REPUBLIC OF INDONESIA MINISTRY OF PUBLIC WORKS DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT AND DIRECTORATE GENERAL OF HUMAN SETTLEMENT		PROVINCE: CENTRAL JAVA PROJECT NAME: FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT OF SEMARANG IN THE REPUBLIC OF INDONESIA
IRATUNSELUNA FLOOD CONTROL PROJECT COMPONENT: URBAN DRAINAGE SYSTEM IMPROVEMENT		DISTRICT: SEMARANG CITY
GEOLOGICAL PROFILE ALONG SEMARANG RIVER (1/2)		DRAWING NO. _____
JAPAN INTERNATIONAL COOPERATION AGENCY LTD. ENGINEERING CO. LTD. 15-15, 15-16, 15-17 5/F, MARUIC BUILDING INTERNATIONAL AND PARK 2, SHIBUYA-KU, TOKYO, JAPAN		DATE: _____
DESIGNED: _____ CHECKED: _____	APPROVED: _____ CHIEF OF PLANNING AND DESIGN PROJECT MANAGER	CONTRACT NO. _____

NO.	DATE	REVISIONS	DESIGNED	CHECKED	APPROVED



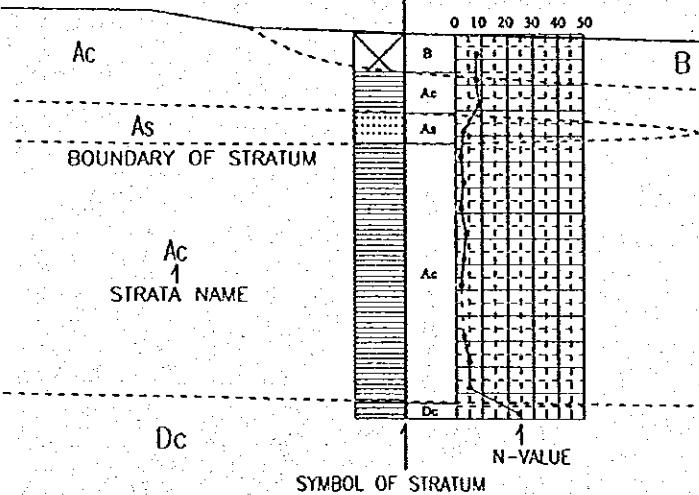
LEGEND

(Geological Strata)

Age	Formation and Strata Name	Symbol	Description	
Quaternary	Holocene	Embankment	B	It consists of embankment, filled soil and refuse, and composed of clay, silt, sand and gravel.
		Riverbed deposit	rd	It consists of sand and gravel mainly at the upstream area of Simongang Weir. But it consists of sand and clay mainly at the downstream area.
	Alluvium	Ac	It consists of clay and sandy clay, and shows gray. The sediments are very soft, and contain fragments of shell.	
		As	It consists of fine grain sand and middle grain sand mainly, and contains the intercalated clay and silt generally. At the downstream area of Simongang Weir, it contains organic materials and fragments of shell.	
Pleistocene	Diluvium	Ao	It consists of organic clay and organic fine grain sand mainly, but continuity as a stratum is poor.	
		Dc	It consists of hard clay, and contains coral limestone partly. The surface part of this stratum is oxidized characteristically, and shows dark brown.	
	Diluvium	Ds	It consists of sand mainly, and grain size of sand is from fine to coarse. And it contains many gravel, but diameter of gravel is smaller than 3cm generally.	
		Dg	It consists of gravel and clay. The quality of clay is same as Dc stratum, and diameter of gravel is smaller than 20cm.	
Tertiary-Quaternary	Damar	Da	It consists of alternation of conglomerate, sandstone and siltstone mainly, and contains mafic tuff partly. Sandstone and siltstone have tuffaceous quality, and the change of grain size of sandstone is big. The matrix of conglomerate consists of same material of sandstone. The gravel of conglomerate consists of andesite and pumice, and diameter of gravel is smaller than 20cm.	
		Dp	It consists of volcanic breccia and mafic tuff mainly, and alternation is forming. The volcanic breccia contains fragments of andesite and pumice, and matrix consists of mafic tuff.	

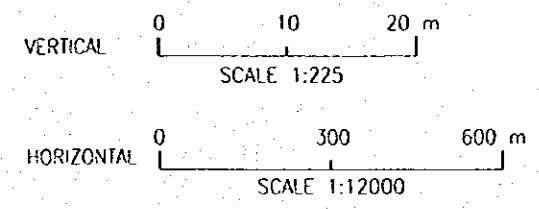
(DESCRIPTION ON THE DRAWING)

HOLE NUMBER
TOTAL DEPTH
GROUND ELEVATION



(SYMBOLS OF SOILS AND ROCKS AT CORE)

	B	Embankment
	rd	River Deposit
	Ac	Clay
	As	Sand
	Ao	Organic Clay
	Dc	Hard Clay
	Ds	Sand
	Dg	Gravel
	Da	Sedimentary Rock
	Dp	Pyroclastic Rock



NO.	DATE	REVISIONS	DESIGNED	CHECKED	APPROVED

THE REPUBLIC OF INDONESIA
MINISTRY OF PUBLIC WORKS
DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT
AND DIRECTORATE GENERAL OF HUMAN SETTLEMENT

JRATUNSELUNA FLOOD CONTROL PROJECT
COMPONENT : URBAN DRAINAGE SYSTEM IMPROVEMENT

GEOLOGICAL PROFILE ALONG SEMARANO RIVER (2/2)

PROVINCE : CENTRAL JAVA
PROJECT NAME : FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA
DISTRICT : SEMARANG CITY
DRAWING NO. :
SHEET NO. :
DATE :
CONTRACT NO. :

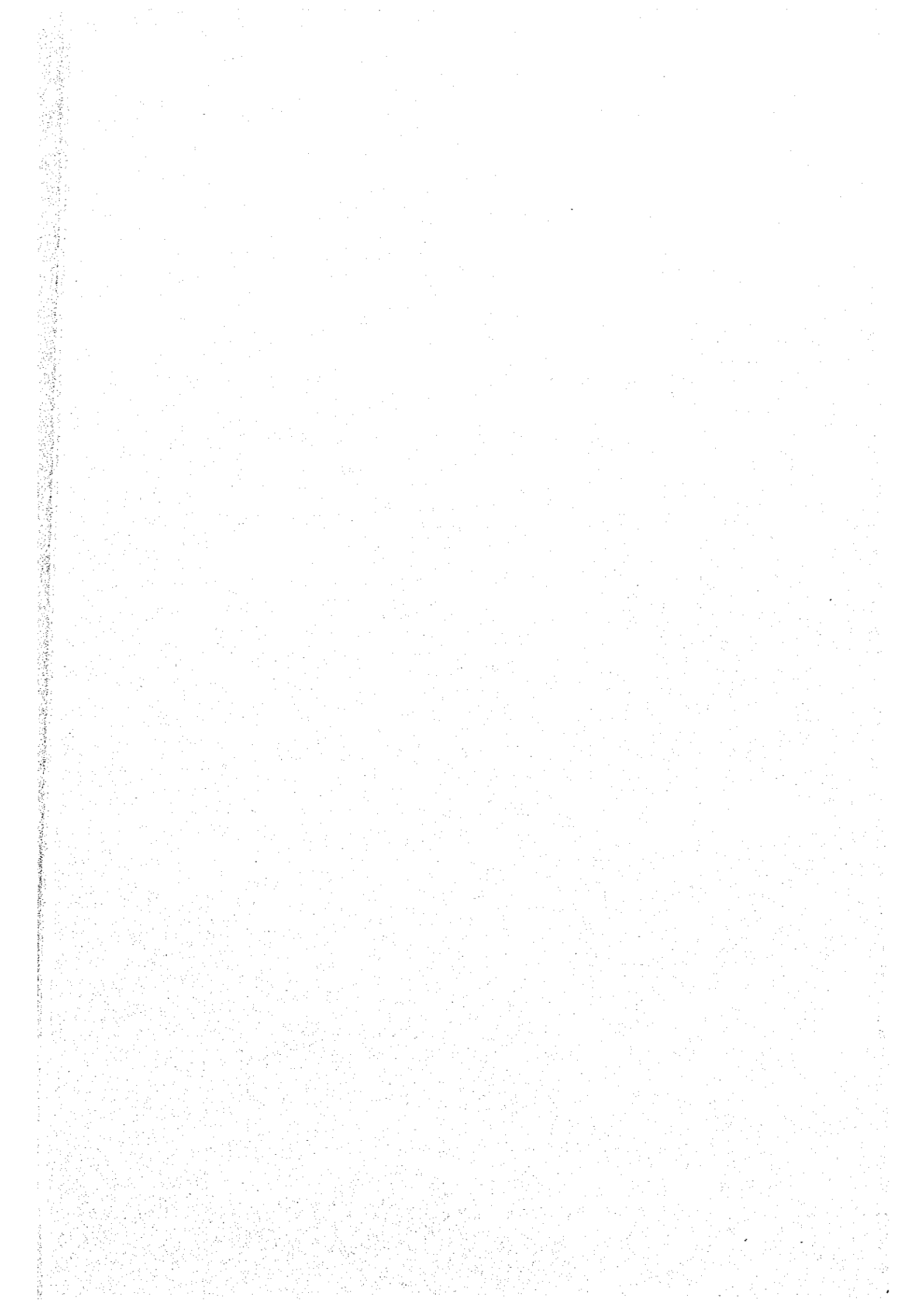
TAJIK INTERNATIONAL COOPERATION AGENCY
CIVIL ENGINEERING CO., LTD. IN PARTNERSHIP WITH
PACIFIC CONSULTANTS INTERNATIONAL
AND JAKAD INTERNATIONAL INC.

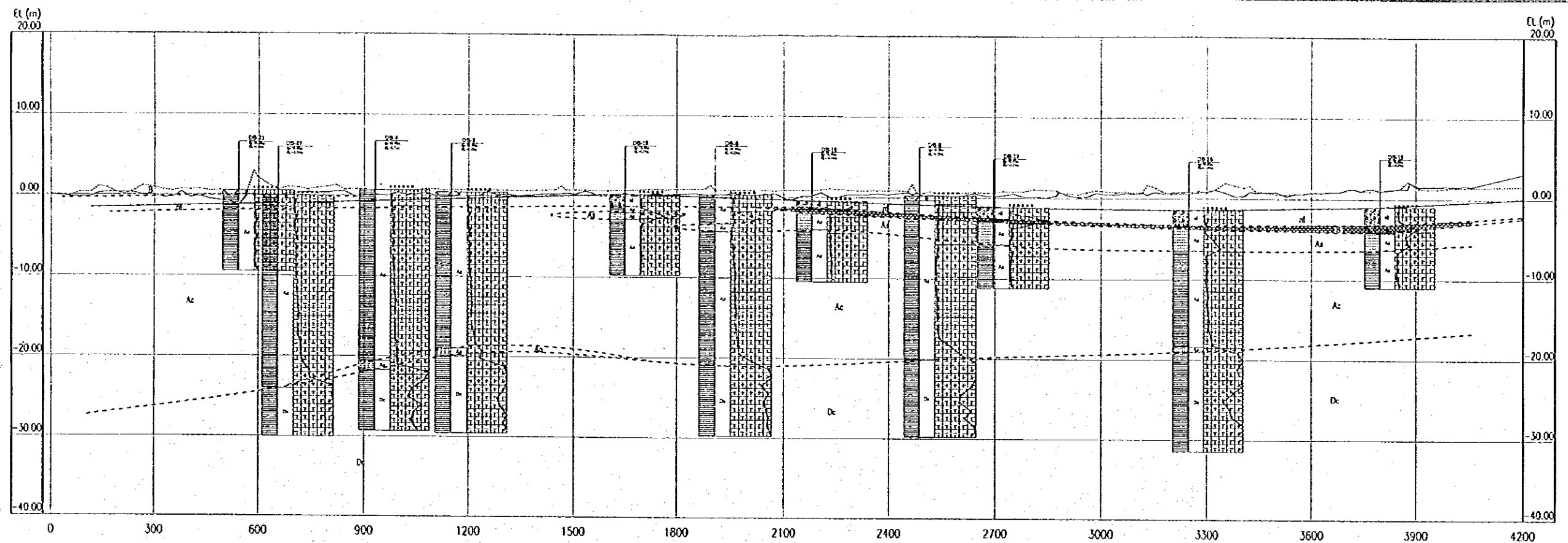
DESIGNED :
CHECKED :
CHIEF OF PLANNING AND DESIGN :
PROJECT MANAGER :

MONTHLY RAINFALL FOR 30 YEARS AT SUMURJURANG STATION (No.65c)

Year	Unit : mm												Total
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1967	394.0	566.4	383.0	487.0	91.0	0.0	0.0	0.0	0.0	17.0	116.0	450.0	2504.4
1968	664.0	369.7	369.0	404.0	262.0	297.0	211.0	144.0	99.0	52.0	259.0	361.4	3492.1
1969	456.0	719.0	754.0	766.0	28.0	90.0	57.0	0.0	16.0	172.0	224.0	443.0	3725.0
1970	454.0	308.0	444.0	367.0	248.0	186.0	160.0	0.0	124.0	119.0	379.0	778.0	3567.0
1971	786.0	518.0	462.0	439.0	226.0	309.0	28.0	0.0	56.0	272.0	326.0	300.3	3722.3
1972	668.0	336.0	545.0	74.0	154.0	18.0	0.0	0.0	0.0	0.0	180.0	242.0	2217.0
1973	524.0	222.0	326.5	226.0	204.0	108.7	144.0	22.0	144.0	319.8	387.2	323.0	2951.2
1974	549.0	259.0	671.0	318.0	154.0	16.0	44.0	72.0	96.0	373.0	214.0	439.0	3205.0
1975	373.0	259.0	569.0	362.0	223.0	51.3	0.0	25.0	270.0	255.0	439.0	278.7	3105.0
1976	952.0	442.0	668.0	67.0	18.0	33.0	3.0	16.0	0.0	57.0	269.0	228.0	2753.0
1977	433.0	323.0	633.0	210.0	161.0	117.0	0.0	0.0	0.0	0.0	150.0	470.0	2497.0
1978	764.0	462.0	443.0	88.0	102.0	129.0	83.0	37.0	212.0	139.0	143.0	254.0	2856.0
1979	608.0	633.0	440.0	477.0	266.0	131.0	41.0	20.0	105.0	110.0	216.0	159.0	3206.0
1980	734.0	315.0	331.0	399.0	254.0	0.0	71.0	126.0	36.0	176.0	379.0	566.0	3387.0
1981	402.0	378.0	98.0	0.0	201.5	112.4	203.4	0.0	0.0	0.0	64.0	412.0	1871.3
1982	364.0	263.0	626.0	525.0	0.0	0.0	0.0	0.0	0.0	0.0	124.0	250.0	2152.0
1983	436.0	217.0	191.0	301.0	355.0	19.0	0.0	0.0	0.0	363.0	296.0	87.0	2265.0
1984	228.0	516.0	243.0	111.0	56.0	70.0	87.0	51.0	426.0	84.0	232.0	391.0	2495.0
1985	63.0	245.0	152.0	218.0	35.0	0.0	94.8	79.0	114.6	215.2	260.8	306.4	1783.8
1986	592.6	245.0	568.0	209.0	72.0	223.0	44.0	101.0	119.0	94.0	147.0	199.0	2613.6
1987	765.0	660.0	291.0	55.0	116.0	45.0	73.0	0.0	0.0	6.0	301.0	745.0	3037.0
1988	566.0	589.0	442.0	345.0	190.0	31.0	33.0	20.0	26.0	220.0	192.0	884.0	3538.0
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1990	760.0	237.0	287.0	157.0	93.0	168.0	56.0	74.0	46.0	49.0	182.0	604.0	2713.0
1991	840.0	415.0	176.0	353.0	150.3	5.0	13.1	0.0	0.0	12.1	273.9	335.9	2574.3
1992	382.0	281.0	405.0	367.0	250.0	141.0	7.0	253.0	180.0	254.0	120.0	410.0	3050.0
1993	755.0	384.0	252.0	307.0	61.0	165.0	52.0	32.0	64.0	23.0	145.0	228.0	2468.0
1994	640.0	300.0	575.0	211.0	53.0	3.0	2.0	14.0	0.0	103.0	306.0	455.0	2642.0
1995	397.0	356.0	457.0	75.0	171.0	215.0	0.0	0.0	65.4	76.0	380.0	531.0	2723.4
1996	319.0	726.0	350.0	72.0	95.0	28.0	30.0	87.0	83.0	213.0	239.0	527.0	2789.0
Average	541.4	409.1	422.2	277.9	151.1	97.6	55.2	39.5	77.7	130.8	243.1	399.9	2845.5

Note : After supplementation of missing data



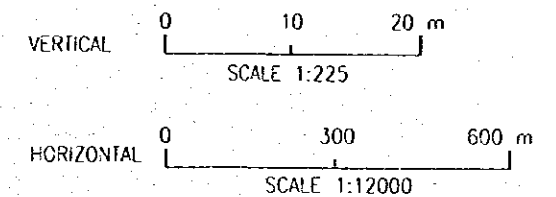
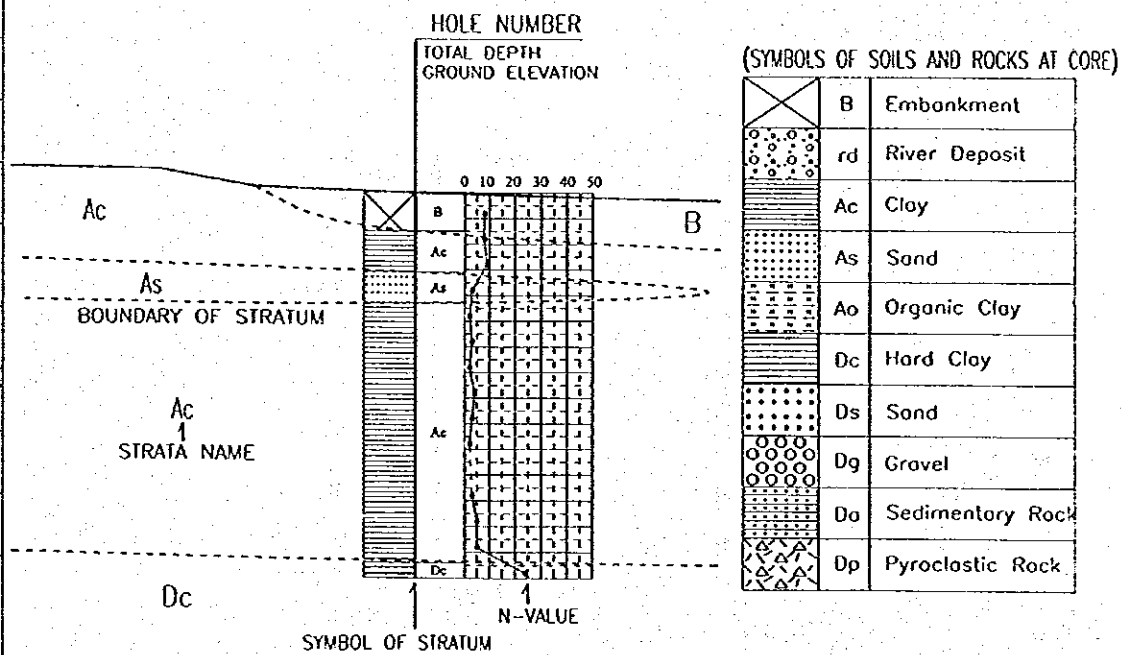


LEGEND

(Geological Strata)

Age	Formation and Strata Name	Symbol	Description
Holocene	Embankment	B	It consists of embankment, filled soil and refuse, and composed of clay, silt, sand and gravel.
	River deposit	rd	It consists of sand and gravel mainly at the upstream area of Simongan Weir. But it consists of sand and clay mainly at the downstream area.
Quaternary	Alluvium	Ac	It consists of clay and sandy clay, and shows gray. The sediments are very soft, and contain fragments of shell.
		As	It consists of fine grain sand and middle grain sand mainly, and contains the intercalated clay and silt generally. At the downstream area of Simongan Weir, it contains organic materials and fragments of shell.
		Ao	It consists of organic clay and organic fine grain sand mainly, but continuity as a stratum is poor.
Pliocene	Diatum	Dc	It consists of hard clay, and contains coral limestone partly. The surface part of this stratum is oxidized characteristically, and shows dark brown.
		Ds	It consists of sand mainly, and grain size of sand is from fine to coarse. And it contains many gravel, but diameter of gravel is smaller than 3cm generally.
		Dg	It consists of gravel and clay. The quality of clay is same as Dc stratum, and diameter of gravel is smaller than 20cm.
Tertiary-Quaternary	Damar	Dp	It consists of alternation of conglomerate, sandstone and siltstone mainly, and contains mafic tuff partly. Sandstone and siltstone have lufaceous quality, and the change of grain size of sandstone is big. The matrix of conglomerate consists of same material of sandstone. The gravel of conglomerate consists of andesite and pumice, and diameter of gravel is smaller than 20cm.
			It consists of volcanic breccia and mafic tuff mainly, and alternation is forming. The volcanic breccia contains fragments of andesite and pumice, and matrix consists of mafic tuff.

(DESCRIPTION ON THE DRAWING)



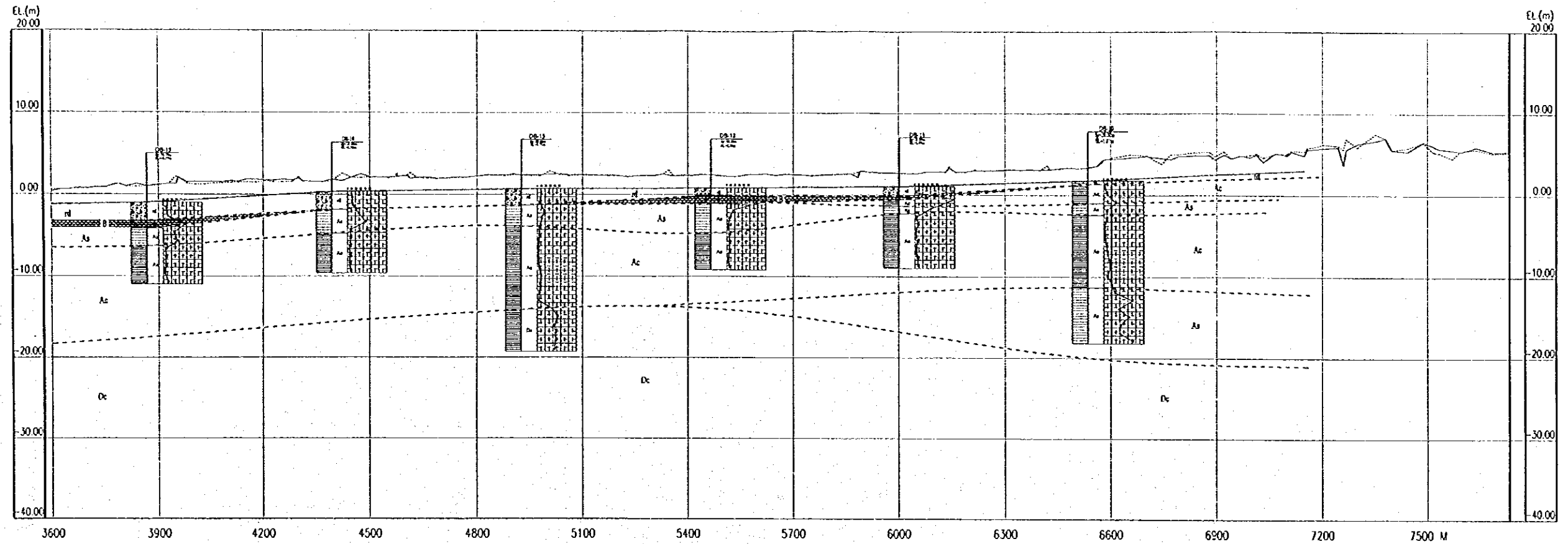
NO	DATE	REVISIONS	ORIGINATED	DESIGNED	APPROVED

THE REPUBLIC OF INDONESIA
 MINISTRY OF PUBLIC WORKS
 DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT
 AND DIRECTORATE GENERAL OF HUMAN SETTLEMENT
 JATUNUSALUNA FLOOD CONTROL PROJECT
 COMPONENT: URBAN DRAINAGE SYSTEM IMPROVEMENT
GEOLOGICAL PROFILE ALONG SEMARANO RIVER (1/2)

PROVINCE: CENTRAL JAVA
 PROJECT NAME: FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA
 DISTRICT: SEMARANG CITY
 DRAWING NO.:
 SHEET NO.:
 DATE: CONTRACT NO.:

JAPAN INTERNATIONAL COOPERATION AGENCY
 CHE. ENGINEERING CO. LTD. IN JOINT VENTURE WITH
 PACIFIC CONSULTANTS INTERNATIONAL
 AND CANAL INTERNATIONAL INC.

DESIGNED: _____
 CHECKED: _____
 CHIEF OF PLANNING AND DESIGN: _____
 PROJECT MANAGER: _____

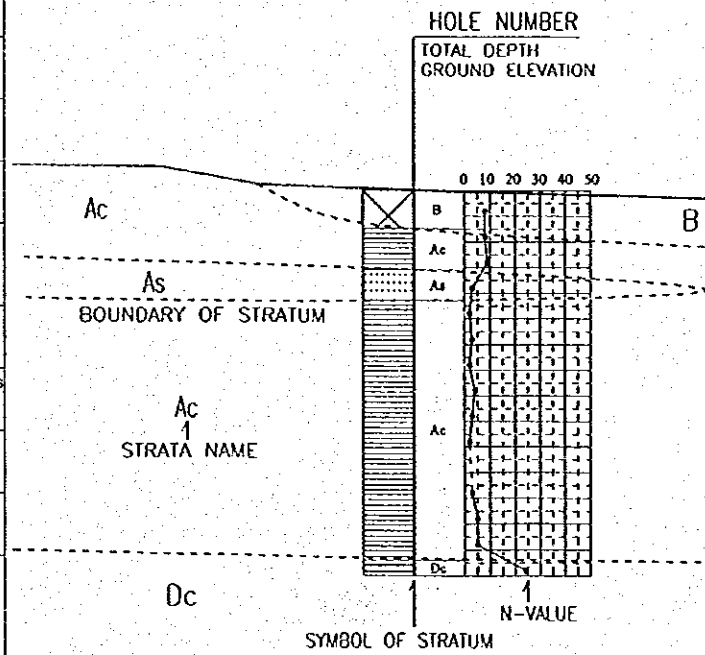


LEGEND

(Geological Strata)

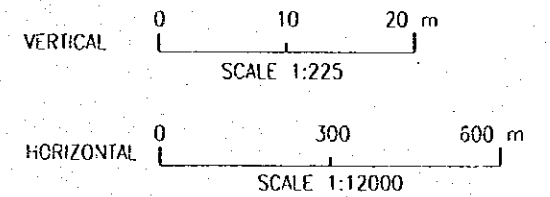
Age	Formation and Strata Name	Symbol	Description
Quaternary	Holocene	B	It consists of embankment, filled soil and refuse, and composed of clay, silt, sand and gravel.
		rd	It consists of sand and gravel mainly at the upstream area of Simongang Weir. But it consists of sand and clay mainly at the downstream area.
	Alluvium	Aa	It consists of clay and sandy clay, and shows gray. The sediments are very soft, and contain fragments of shell.
		Ao	It consists of fine grain sand and middle grain sand mainly, and contains the intercalated clay and silt generally. At the downstream area of Simongang Weir, it contains organic materials and fragments of shell.
Pleistocene	Diluvium	Dc	It consists of hard clay, and contains coral limestone partly. The surface part of this stratum is oxidized characteristically, and shows dark brown.
		Ds	It consists of sand mainly, and grain size of sand is from fine to coarse. And it contains many gravel, but diameter of gravel is smaller than 3cm generally.
	Doluvium	Dg	It consists of gravel and clay. The quality of clay is same as Dc stratum, and diameter of gravel is smaller than 20cm.
		Do	It consists of alternation of conglomerate, sandstone and siltstone mainly, and contains mafic tuff partly. Sandstone and siltstone have tuffaceous quality, and the change of grain size of sandstone is big. The matrix of conglomerate consists of some material of sandstone. The gravel of conglomerate consists of andesite and pumice, and diameter of gravel is smaller than 20cm.
Tertiary-Quaternary Pliocene-Pleistocene Damar	Sedimentary Rock Unit		
	Pyroclastic Rock Unit	Dp	It consists of volcanic breccia and mafic tuff mainly, and alternation is forming. The volcanic breccia contains fragments of andesite and pumice, and matrix consists of mafic tuff.

(DESCRIPTION ON THE DRAWING)



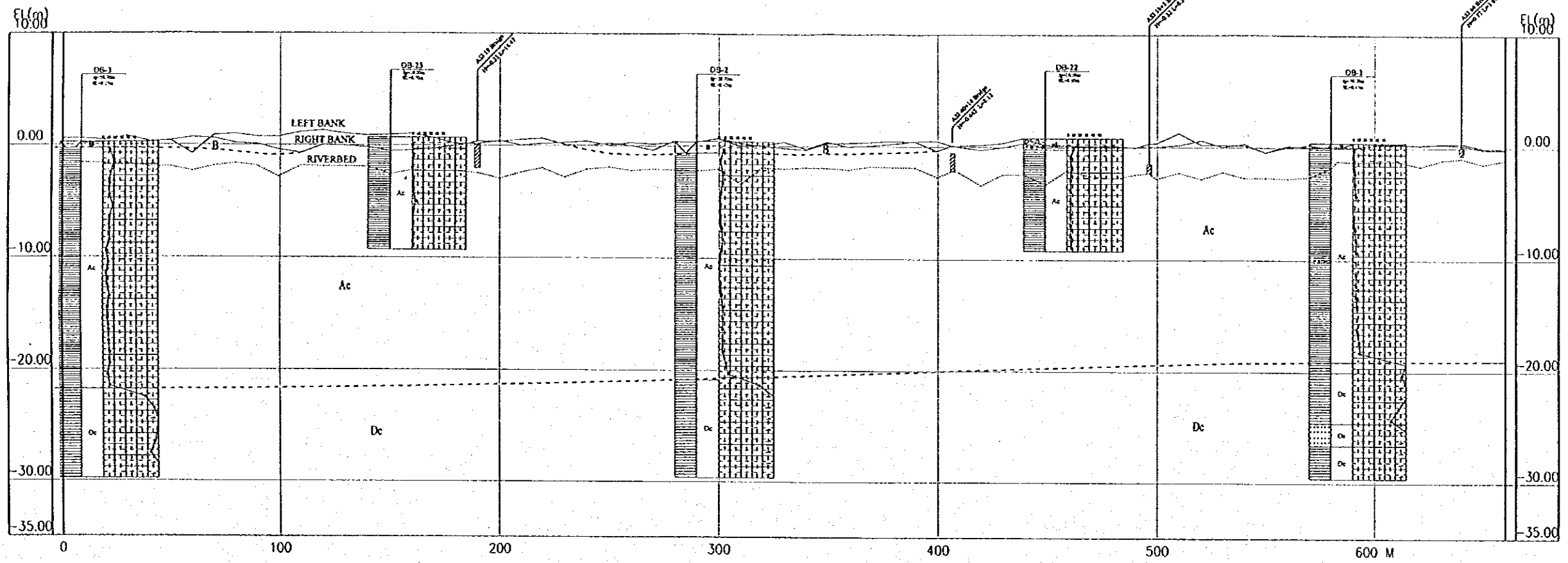
(SYMBOLS OF SOILS AND ROCKS AT CORE)

	B	Embankment
	rd	River Deposit
	Ac	Clay
	As	Sand
	Ao	Organic Clay
	Dc	Hard Clay
	Ds	Sand
	Dg	Gravel
	Do	Sedimentary Rock
	Dp	Pyroclastic Rock



NO.	DATE	REVISIONS	ORIGINATED	DESIGNED	APPROVED

THE REPUBLIC OF INDONESIA MINISTRY OF PUBLIC WORKS DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT AND DIRECTORATE GENERAL OF HUMAN SETTLEMENT		PROVINCE CENTRAL JAVA
PRATUNSELUNA FLOOD CONTROL PROJECT COMPONENT : URBAN DRAINAGE SYSTEM IMPROVEMENT		PROJECT NAME FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT OF SEMARANG IN THE REPUBLIC OF INDONESIA
GEOLOGICAL PROFILE ALONG SEMARANG RIVER (2/2)		DISTRICT SEMARANG CITY
DESIGNED CHECKED		DRAWING NO. SHEET NO.
APPROVED CHIEF OF PLANNING AND DESIGN PROJECT MANAGER		DATE CONTRACT NO.

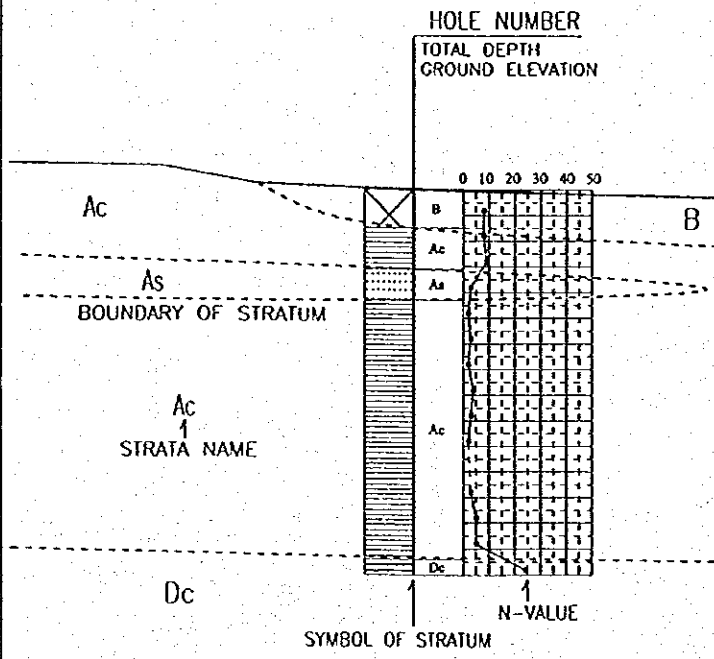


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(Geological Strata)

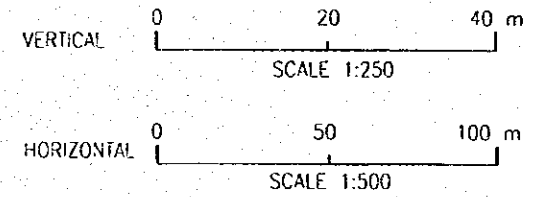
Age	Formation and Strata Name	Symbol	Description
Quaternary	Holocene	B	It consists of embankment, filled soil and refuse, and composed of clay, silt, sand and gravel.
		rd	It consists of sand and gravel mainly at the upstream area of Simangang Weir. But it consists of sand and clay mainly at the downstream area.
	Alluvium	Ac	It consists of clay and sandy clay, and shows gray. The sediments are very soft, and contain fragments of shell.
		As	It consists of fine grain sand and middle grain sand mainly, and contains the interlocked clay and silt generally. At the downstream area of Simangang Weir, it contains organic materials and fragments of shell.
Pleistocene	Duvium	Ao	It consists of organic clay and organic fine grain sand mainly, but continuity as a stratum is poor.
		Dc	It consists of hard clay, and contains coral limestone partly. The surface part of this stratum is oxidized characteristically, and shows dark brown.
	Duvium	Ds	It consists of sand mainly, and grain size of sand is from fine to coarse. And it contains many gravel, but diameter of gravel is smaller than 3cm generally.
		Dg	It consists of gravel and clay. The quality of clay is same as Dc stratum, and diameter of gravel is smaller than 20cm.
Tertiary-Quaternary Pliocene-Pleistocene Damar	Sedimentary Rock Unit	Ds	It consists of alternation of conglomerate, sandstone and siltstone mainly, and contains mafic tuff partly. Sandstone and siltstone have lullaceous quality, and the change of grain size of sandstone is big. The matrix of conglomerate consists of some material of sandstone. The gravel of conglomerate consists of andesite and pumice, and diameter of gravel is smaller than 20cm.
	Pyroclastic Rock Unit	Dp	It consists of volcanic breccia and mafic tuff mainly, and alternation is forming. The volcanic breccia contains fragments of andesite and pumice, and matrix consists of mafic tuff.

(DESCRIPTION ON THE DRAWING)



(SYMBOLS OF SOILS AND ROCKS AT CORE)

B	Embankment
rd	River Deposit
Ac	Clay
As	Sand
Ao	Organic Clay
Dc	Hard Clay
Ds	Sand
Dg	Gravel
Da	Sedimentary Rock
Dp	Pyroclastic Rock



NO.	DATE	REVISIONS	ORIGINATED	DESIGNED	APPROVED

THE REPUBLIC OF INDONESIA
 MINISTRY OF PUBLIC WORKS
 DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT
 AND DIRECTORATE GENERAL OF HUMAN SETTLEMENT
 PRATUNSELUNA FLOOD CONTROL PROJECT
 COMPONENT: URBAN DRAINAGE SYSTEM IMPROVEMENT
 GEOLOGICAL PROFILE ALONG ASIN RIVER

PROVINCE: CENTRAL JAVA
 PROJECT NAME: FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT OF SEMARANG IN THE REPUBLIC OF INDONESIA
 DISTRICT: SEMARANG CITY
 DRAWING NO.:
 SHEET NO.:
 DATE: CONTRACT NO.:

JAPAN INTERNATIONAL COOPERATION AGENCY
 CHE ENGINEERING CO., LTD. # 1000-1000
 PACIFIC CONSULTANTS INTERNATIONAL
 AND PARTNERSHIP ASSOCIATES, INC.

DESIGNED: _____
 CHECKED: _____
 CHIEF OF PLANNING AND DESIGN
 PROJECT MANAGER

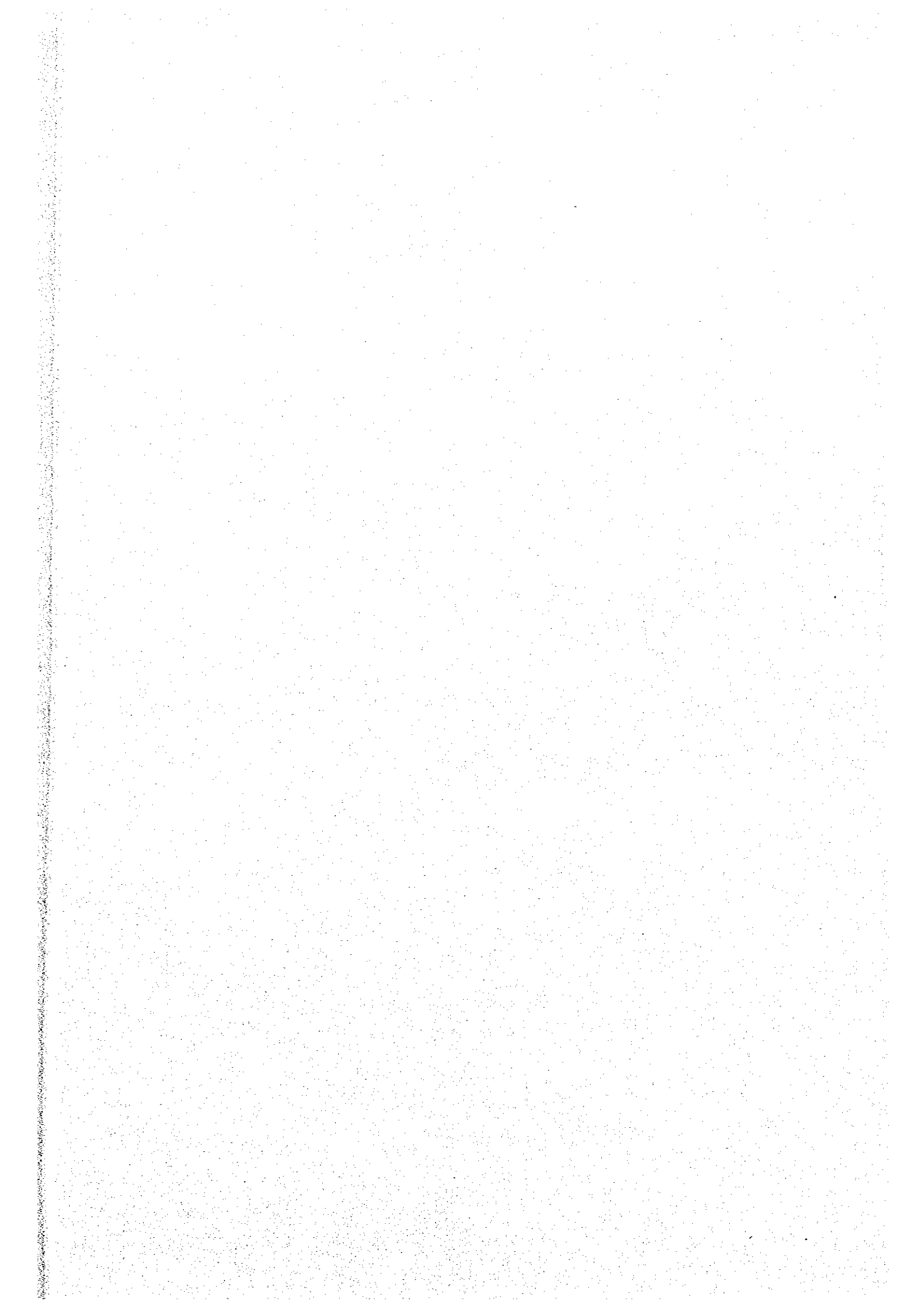
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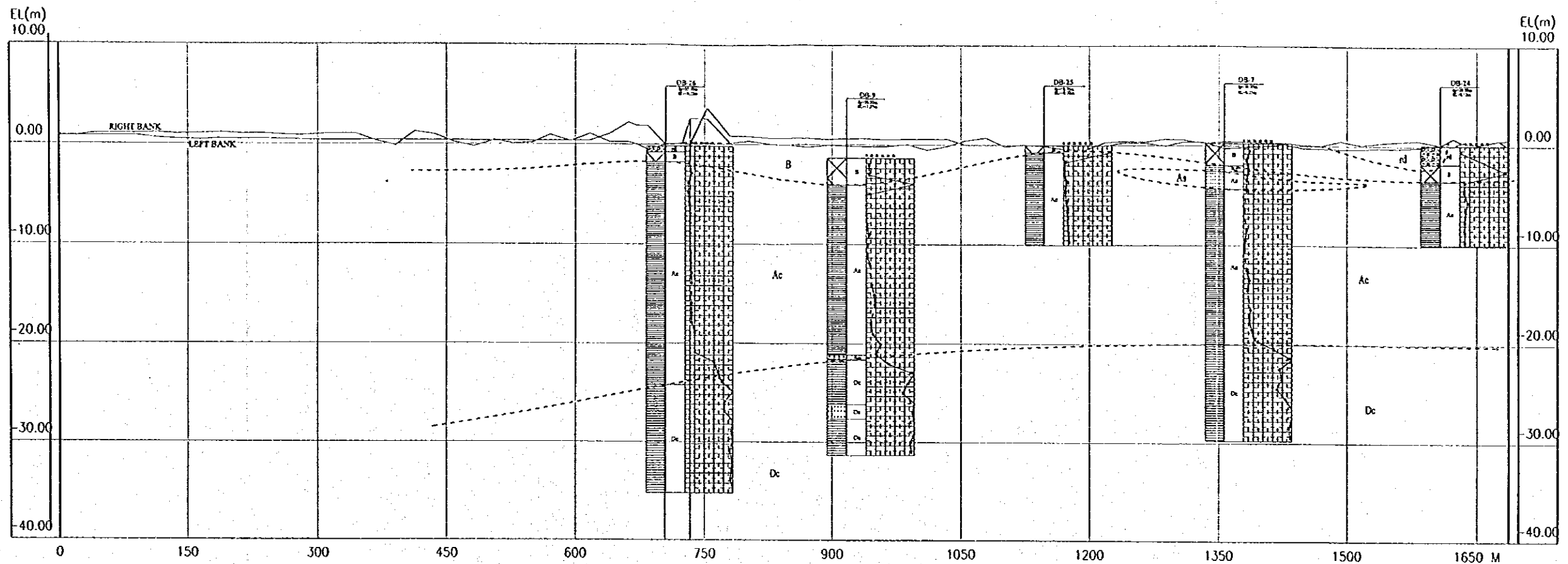
MONTHLY RAINFALL FOR 30 YEARS AT SUMURJURANG STATION (No.65c)

Unit : mm

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1967	394.0	566.4	383.0	487.0	91.0	0.0	0.0	0.0	0.0	17.0	116.0	450.0	2504.4
1968	664.0	369.7	369.0	404.0	262.0	297.0	211.0	144.0	99.0	52.0	259.0	361.4	3492.1
1969	456.0	719.0	754.0	766.0	28.0	90.0	57.0	0.0	16.0	172.0	224.0	443.0	3725.0
1970	454.0	308.0	444.0	367.0	248.0	186.0	160.0	0.0	124.0	119.0	379.0	778.0	3567.0
1971	786.0	518.0	462.0	439.0	226.0	309.0	28.0	0.0	56.0	272.0	326.0	300.3	3722.3
1972	668.0	336.0	545.0	74.0	154.0	18.0	0.0	0.0	0.0	0.0	180.0	242.0	2217.0
1973	524.0	222.0	326.5	226.0	204.0	108.7	144.0	22.0	144.0	319.8	387.2	323.0	2951.2
1974	549.0	259.0	671.0	318.0	154.0	16.0	44.0	72.0	96.0	373.0	214.0	439.0	3205.0
1975	373.0	259.0	569.0	362.0	223.0	51.3	0.0	25.0	270.0	255.0	459.0	278.7	3105.0
1976	952.0	442.0	668.0	67.0	18.0	33.0	3.0	16.0	0.0	57.0	269.0	228.0	2753.0
1977	433.0	323.0	633.0	210.0	161.0	117.0	0.0	0.0	0.0	0.0	150.0	470.0	2497.0
1978	764.0	462.0	443.0	88.0	102.0	129.0	83.0	37.0	212.0	139.0	143.0	254.0	2856.0
1979	608.0	633.0	440.0	477.0	266.0	131.0	41.0	20.0	105.0	110.0	216.0	159.0	3206.0
1980	734.0	315.0	331.0	399.0	254.0	0.0	71.0	126.0	36.0	176.0	379.0	566.0	3387.0
1981	402.0	378.0	98.0	0.0	201.5	112.4	203.4	0.0	0.0	0.0	64.0	412.0	1871.3
1982	364.0	263.0	626.0	525.0	0.0	0.0	0.0	0.0	0.0	0.0	124.0	250.0	2152.0
1983	436.0	217.0	191.0	301.0	355.0	19.0	0.0	0.0	0.0	363.0	296.0	87.0	2265.0
1984	228.0	516.0	243.0	111.0	56.0	70.0	87.0	51.0	426.0	84.0	232.0	391.0	2495.0
1985	63.0	245.0	152.0	218.0	35.0	0.0	94.8	79.0	114.6	215.2	260.8	306.4	1783.8
1986	592.6	245.0	568.0	209.0	72.0	223.0	44.0	101.0	119.0	94.0	147.0	199.0	2613.6
1987	765.0	660.0	291.0	55.0	116.0	45.0	73.0	0.0	0.0	6.0	301.0	745.0	3057.0
1988	566.0	589.0	442.0	345.0	190.0	31.0	33.0	20.0	26.0	220.0	192.0	884.0	3538.0
1989	574.0	730.0	513.0	347.0	244.0	218.0	118.0	12.0	48.0	150.0	329.0	358.0	3441.0
1990	760.0	237.0	287.0	157.0	93.0	168.0	56.0	74.0	46.0	49.0	182.0	604.0	2713.0
1991	840.0	415.0	176.0	353.0	150.3	5.0	13.1	0.0	0.0	12.1	273.9	335.9	2574.3
1992	382.0	281.0	405.0	367.0	250.0	141.0	7.0	253.0	180.0	254.0	120.0	410.0	3050.0
1993	755.0	384.0	252.0	307.0	61.0	165.0	52.0	32.0	64.0	23.0	145.0	228.0	2468.0
1994	640.0	300.0	575.0	211.0	53.0	3.0	2.0	14.0	0.0	103.0	306.0	435.0	2642.0
1995	397.0	356.0	457.0	75.0	171.0	215.0	0.0	0.0	65.4	76.0	380.0	531.0	2723.4
1996	319.0	726.0	350.0	72.0	95.0	28.0	30.0	87.0	83.0	213.0	259.0	527.0	2789.0
Average	541.4	409.1	422.2	277.9	151.1	97.6	55.2	39.5	77.7	130.8	243.1	399.9	2845.5

Note : After supplementation of missing data



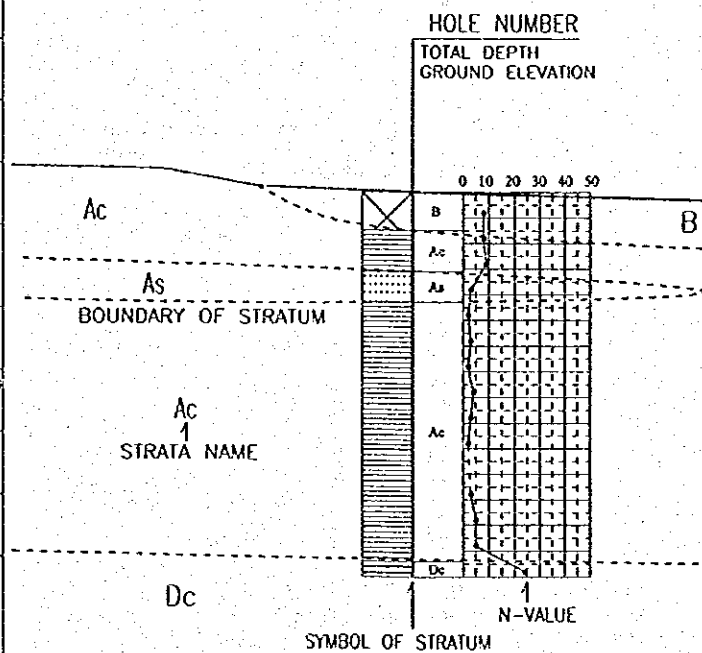


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(Geological Strata)

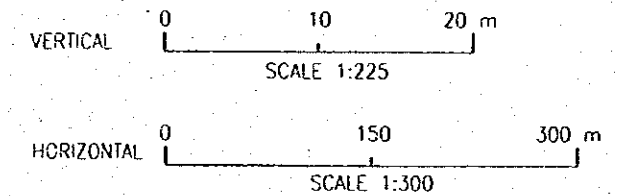
Age	Formation and Strata Name	Symbol	Description
Quaternary	Holocene	B	It consists of embankment, filled soil and refuse, and composed of clay, silt, sand and gravel.
		rd	It consists of sand and gravel mainly of the upstream area of Simangang Weir. But it consists of sand and clay mainly at the downstream area.
	Alluvium	Ac	It consists of clay and sandy clay, and shows gray. The sediments are very soft, and contain fragments of shell.
		As	It consists of fine grain sand and middle grain sand mainly, and contains the intercalated clay and silt generally. At the downstream area of Simangang Weir, it contains organic materials and fragments of shell.
Tertiary-Quaternary	Pleistocene	Ao	It consists of organic clay and organic fine grain sand mainly, but continuity as a stratum is poor.
		Dc	It consists of hard clay, and contains coral limestone partly. The surface part of this stratum is oxidized characteristically, and shows dark brown.
	Dauvium	Ds	It consists of sand mainly, and grain size of sand is from fine to coarse. And it contains many gravel, but diameter of gravel is smaller than 3cm generally.
		Dg	It consists of gravel and clay. The quality of clay is same as Dc stratum, and diameter of gravel is smaller than 20cm.
Pliocene-Pleistocene	Demar	Ds	It consists of alternation of conglomerate, sandstone and siltstone mainly, and contains mafic tuff partly. Sandstone and siltstone have tuffaceous quality, and the change of grain size of sandstone is big. The matrix of conglomerate consists of some material of sandstone. The gravel of conglomerate consists of andesite and pumice, and diameter of gravel is smaller than 20cm.
		Dp	It consists of volcanic breccia and mafic tuff mainly, and alternation is forming. The volcanic breccia contains fragments of andesite and pumice, and matrix consists of mafic tuff.

(DESCRIPTION ON THE DRAWING)



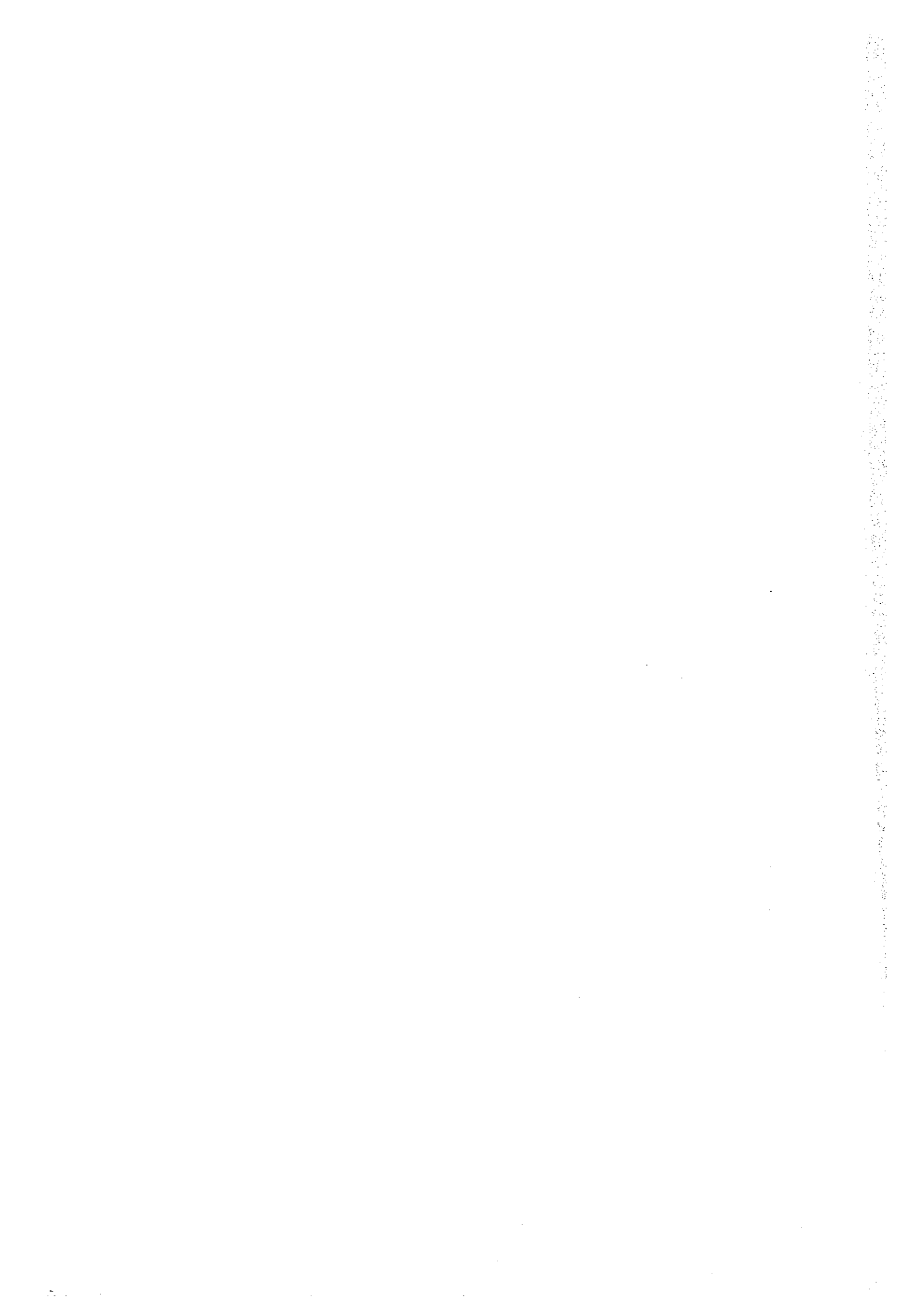
(SYMBOLS OF SOILS AND ROCKS AT CORE)

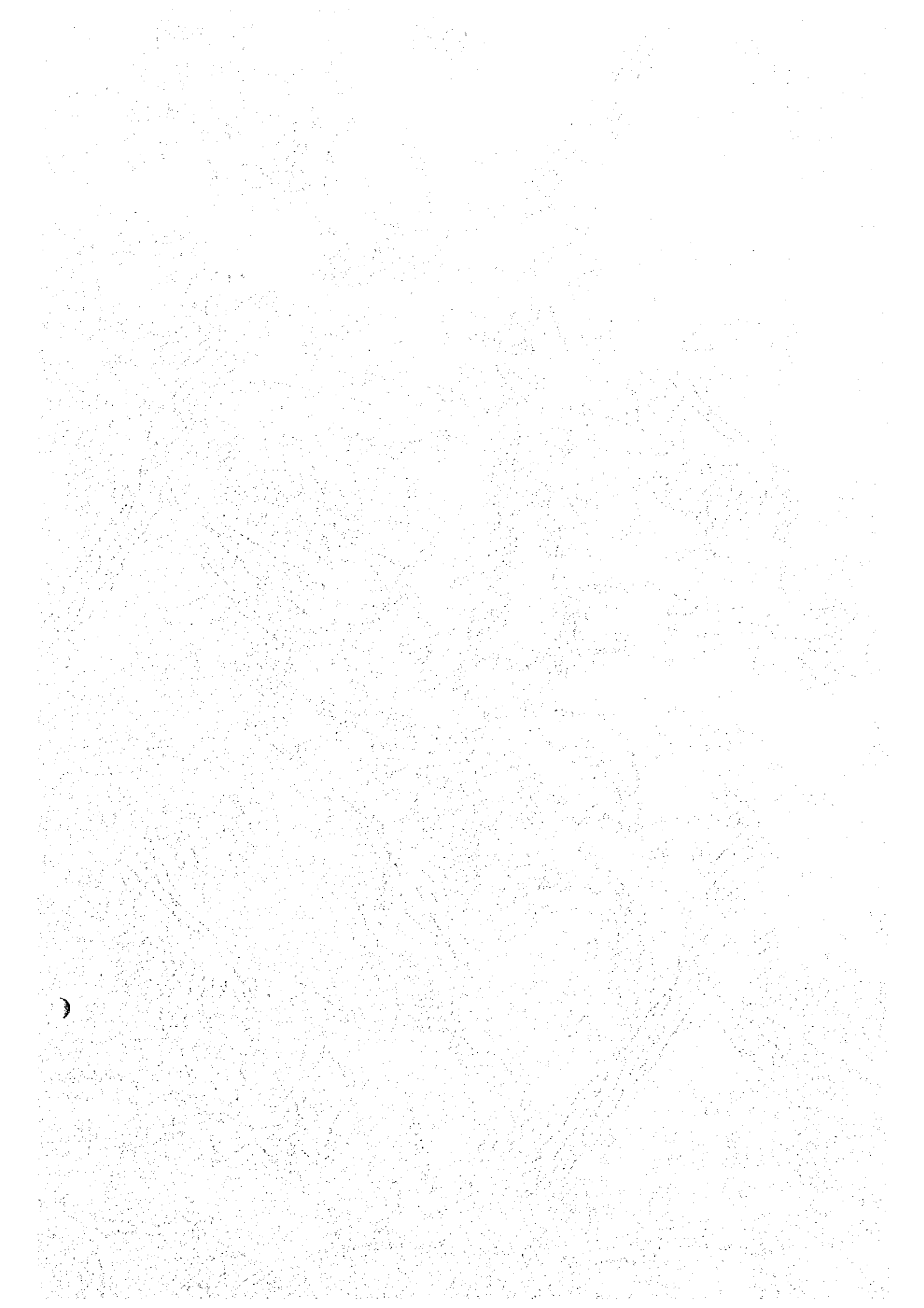
	B	Embankment
	rd	River Deposit
	Ac	Clay
	As	Sand
	Ao	Organic Clay
	Dc	Hard Clay
	Ds	Sand
	Dg	Gravel
	Da	Sedimentary Rock
	Dp	Pyroclastic Rock

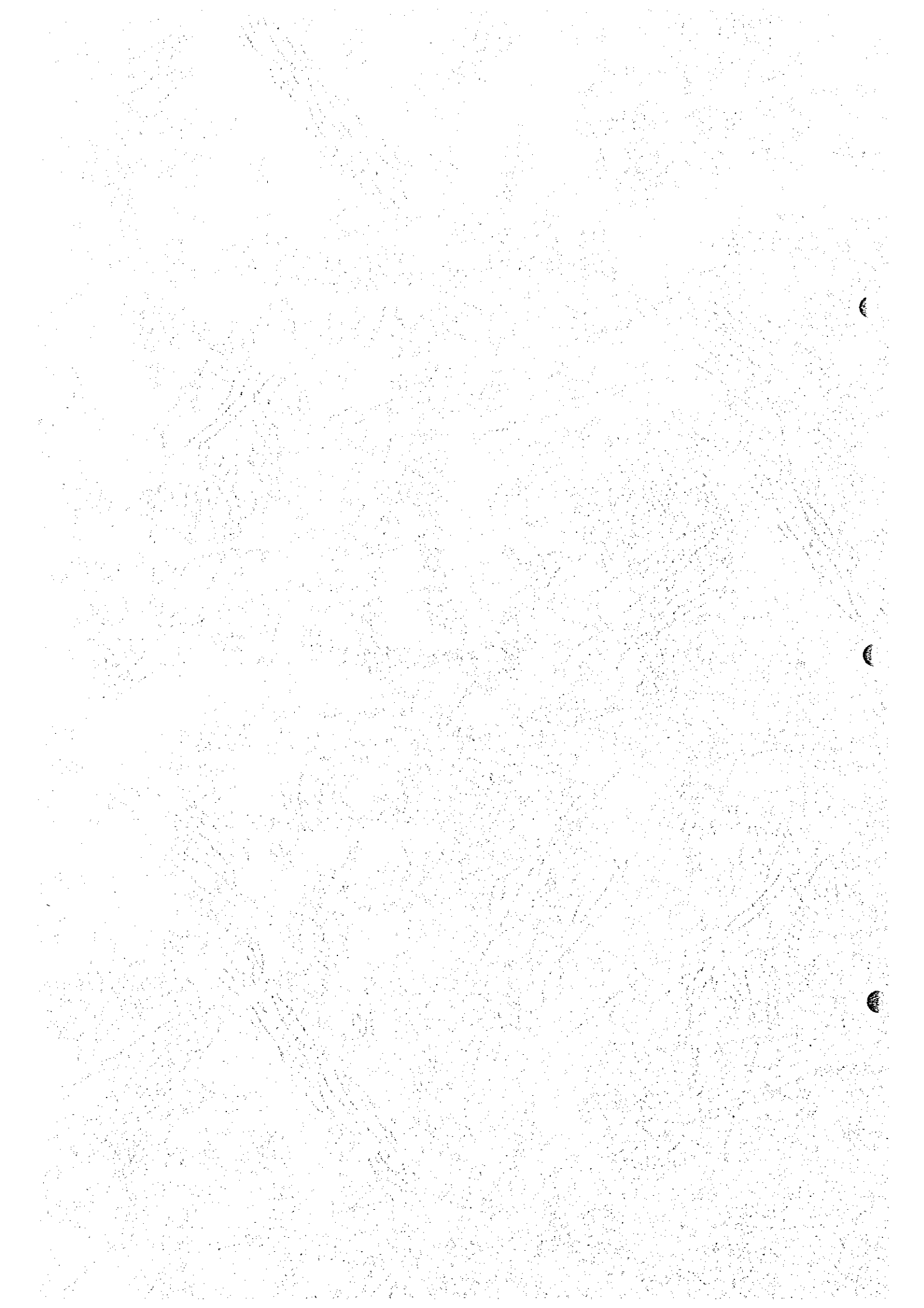


NO.	DATE	REVISIONS	CONCEPTED	DESIGNED	APPROVED

<p>THE REPUBLIC OF INDONESIA MINISTRY OF PUBLIC WORKS DIRECTORATE GENERAL OF WATER RESOURCES DEVELOPMENT AND DIRECTORATE GENERAL OF HUMAN SETTLEMENT</p>	PROVINCE	CENTRAL JAVA
	PROJECT NAME	FLOOD CONTROL, URBAN DRAINAGE AND WATER RESOURCES DEVELOPMENT IN SEMARANG IN THE REPUBLIC OF INDONESIA
	COMPONENT	URBAN DRAINAGE SYSTEM IMPROVEMENT
	PROJECT LOCATION	SEMARANG CITY
DWAR INTERNATIONAL COOPERATION AGENCY CITY ENGINEERING CO. LTD. IN ASSOCIATION WITH PACIFIC CONSULTANTS INTERNATIONAL AND PAKO STRAUMER INC.	DESIGNED	
	CHECKED	
	CHEF OF PLANNING AND DESIGN	
	PROJECT MANAGER	
	DATE	CONTRACT NO.







JICA