B-2.2 Rainfall Analysis

(1)Design Rainfall

The design rainfall will be determined by examining the following items in order:

- Rainfall Probability;
- Correlation among the Stations; and
- Estimates of Areal Average Rainfall.
- Pattern of Hyetograph

(a)Rainfall Probability

The probability analysis for rainfalls have been made by Iwai method to calculate the probability of exceedance in the logarithm normal distribution, as follows:

Table B-2.3 Rainfalls Probable for Each Return Period

【YEN PHONG Station】 Period : 1960～1992 (Data missing in 1982)

	Return Period (year)									
Consecutive D	2	3	5	10	15	20	30	40	50	100
Daily Max. R.	118.3	136.4	157.6	185.4	201.7	213.3	229.9	241.8	251.1	280.8
2-day Conse.R	154.6	179.9	208.4	244.5	265.1	279.6	299.9	314.4	325.6	360.8
3-day Conse.R	164.4	190.3	219.9	257.7	279.3	294.6	316.2	331.6	343.6	381.2
4-day Conse.R	177.6	205.6	237.7	279.0	302.7	319.5	343.3	360.4	373.6	415.4
5-day Conse.R	191.1	219.7	252.9	296.2	321.3	339.2	364.7	383.0	397.2	442.6

【DONG ANH Station】 Period : 1962～1992 (Data missing in 1965～1969)

	Return Period (year)									
Consecutive D	2	3	5	10	15	20	30	40	50	100
Daily Max. R.	114.3	136.5	164.5	204.2	228.8	246.9	273.5	293.2	308.9	360.7
2-day Conse.R	147.9	176.4	213.9	269.5	305.1	331.8	371.8	401.9	426.1	507.6
3-day Conse.R	167.2	199.6	239.9	296.3	330.9	356.3	393.4	420.8	442.5	513.7
4-day Conse.R	182.1	219.7	264.1	323.0	357.7	382.5	418.1	443.8	463.9	528.4
5-day Conse.R	196.0	233.9	279.8	342.4	379.9	407.1	446.5	475.3	497.9	571.3

Table B-2.3 Continued

【YEN VIEN Station】 Period : 1962～1992 (Data missing in1990)

	Return Period (year)									
Consecutive D	2	3	5	10	15	20	30	40	50	100
Daily Max. R.	129.3	151.0	176.6	210.8	230.9	245.3	266.0	281.0	292.7	330.4
2-day Conse.R	161.3	194.5	235.3	291.8	326.0	351.0	387.3	413.9	435.0	503.7
3-day Conse.R	175.6	211.8	255.6	315.4	351.4	377.4	415.1	442.7	464.3	534.7
4-day Conse.R	191.7	228.5	272.2	330.4	364.8	389.6	425.0	450.7	470.8	535.5
5-day Conse.R	208.9	249.9	297.5	359.4	395.3	420.9	457.2	483.4	503.7	568.3

【BAC NINH Station】 Period : 1960～1992

	Return Preiod (year)									
Consecutive D	2	3	5	10	15	20	30	40	50	100
Daily Max. R.	119.4	136.5	155.4	178.7	191.7	200.8	213.4	222.3	229.1	250.4
2-day Conse.R	151.4	175.1	201.1	233.0	250.7	263.1	280.2	292.2	301.4	330.1
3-day Conse.R	165.9	189.6	215.0	246.0	262.3	273.9	289.8	300.9	309.3	335.4
4-day Conse.R	179.1	204.5	230.8	261.2	277.4	288.3	303.1	313.3	321.0	344.3
5-day Conse.R	194.0	222.3	252.0	286.9	305.6	318.4	335.8	347.9	357.0	384.8

【QUE VO station】 Period : 1960～1992

	Retun Period (year)									
Consecutive D	2	3	5	10	15	20	30	40	50	100
Daily Max. R.	124.1	143.3	165.2	193.2	209.2	220.6	236.6	248.0	256.8	284.8
2-day Conse.R	151.6	176.2	203.3	236.8	255.5	268.5	286.6	299.3	309.1	339.6
3-day Conse.R	163.3	190.1	219.2	254.5	274.0	287.4	306.0	319.0	329.0	359.7
4-day Conse.R	175.4	202.9	232.2	267.3	286.4	299.5	317.6	330.1	339.7	369.1
5-day Conse.R	192.0	221.4	251.8	286.9	305.5	318.1	335.2	347.0	355.9	382.7

Table B-2.3 Continued

【TU SON Station】 Period : 1960～1981

	Return Period (year)									
Consecutive D	2	3	5	10	15	20	30	40	50	100
Daily Max. R.	120.5	135.9	152.1	171.5	182.0	189.1	199.0	205.8	211.0	226.9
2-day Conse.R	151.4	170.3	190.3	214.0	226.9	235.6	247.6	255.9	262.2	281.5
3-day Conse.R	164.5	184.8	206.3	231.8	245.6	255.1	268.0	277.0	283.8	304.6
4-day Conse.R	174.3	195.8	218.0	243.8	257.5	266.8	279.4	288.1	294.7	314.6
5-day Conse.R	186.7	209.0	231.6	257.3	270.7	279.7	291.8	300.1	306.3	325.0

(b)Rainfalls Correlation Among Stations

The rainfalls are poorly correlated among the rainfalls observed at the respective stations, as disclosed in Table B-2.4 The correlation coefficient was 0.60 in the highest.

Table B-2.4 Correlation Coefficient Among the Stations

Daily Rainfall

2 Days Consecutive Rainfall

Sta. / Sta.	YEN PHONG	DONG ANH	YEN VIEN	BAC NINH	QUE VO	TU SON
YEN PHONG		0.684	0.626	0.536	0.341	0.686
DONG ANH	0.606		0.706	0.452	0.355	0.399
YEN VIEN	0.599	0.774		0.548	0.281	0.481
BAC NINH	0.462	0.453	0.618		0.623	0.331
QUE VO	0.412	0.445	0.313	0.620		0.278
TU SON	0.738	0.514	0.666	0.393	0.391	

Table B-2.4 Continued

3 Days Consecutive Rainfall

4 Days Consecutive Rainfall

Sta. / Sta.	YEN PHONG	DONG ANH	YEN VIEN	BAC NINH	QUE VO	TU SON
YEN PHONG		0.614	0.584	0.567	0.443	0.717
DONG ANH	0.644		0.779	0.452	0.455	0.543
YEN VIEN	0.643	0.770		0.615	0.408	0.605
BAC NINH	0.598	0.471	0.606		0.619	0.429
QUE VO	0.525	0.518	0.420	0.645		0.389
TU SON	0.769	0.566	0.605	0.374	0.376	

5 Days Consecutive Rainfall

Sta. / Sta.	YEN PHONG	DONG ANH	YEN VIEN	BAC NINH	QUE VO	TU SON
YEN PHONG		0.626	0.627	0.645	0.456	0.724
DONG ANH			0.738	0.469	0.510	0.624
YEN VIEN				0.511	0.346	0.552
BAC NINH					0.627	0.517
QUE VO						0.474
TU SON						

(c)Estimates of Areal Average Rainfall

Thiessen method has been selected to estimate the areal average rainfall among the various method, such as Thiessen method, Isohyetal method, Representative rainfall method, etc., because of nearly flat topography in the study area and poor correlation of rainfalls among the stations.

Thiessen polygon has been drawn up, as shown in Figure B-2.3 and Thiessen coefficient for each station are calculated as follows:

Table B-2.5 Thiessen Coefficient for Each Station

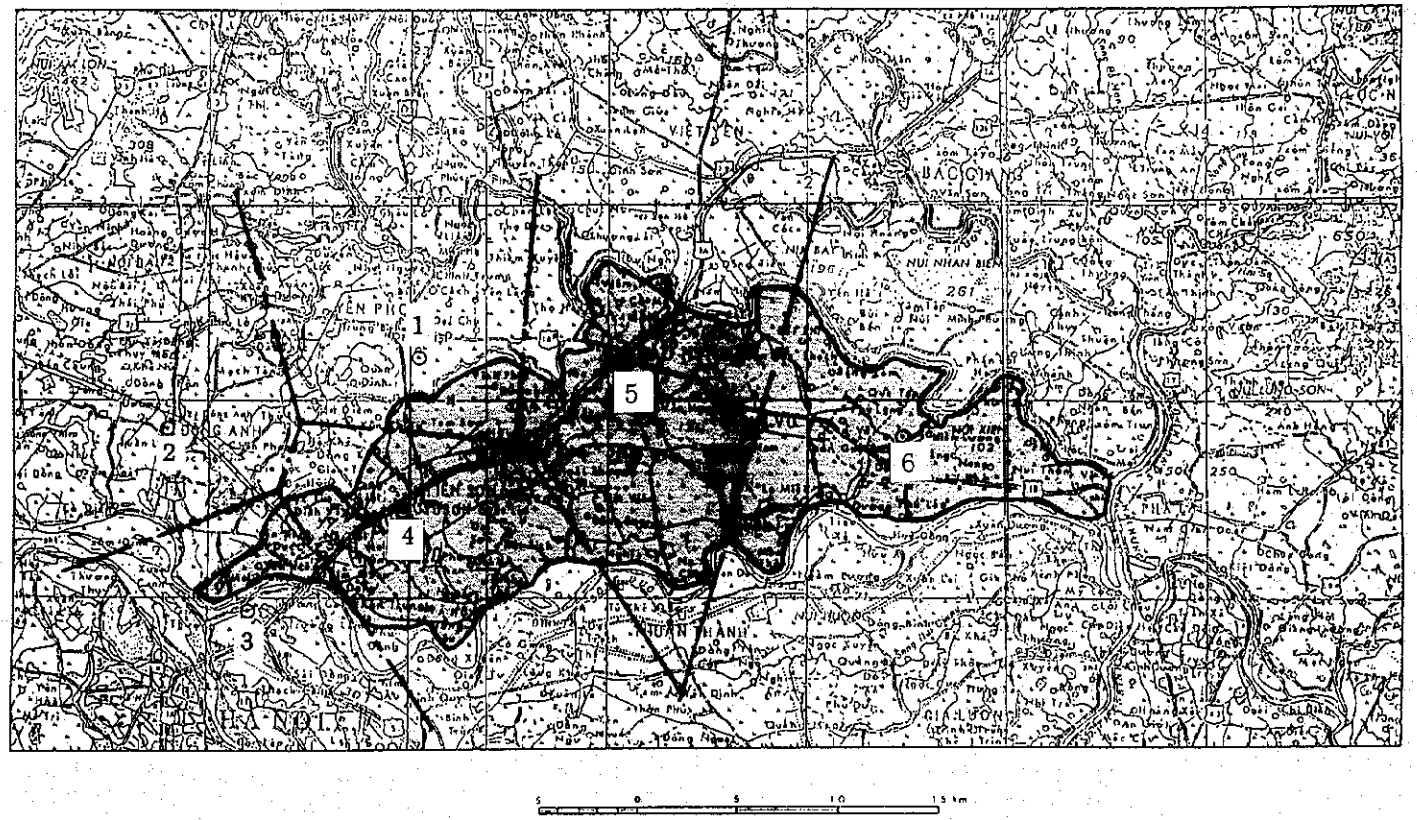
Rainfall Station	YEN PHONG	DONG ANH	YEN VIEN	BAC NINH	QUE VO	TU SON
Thiessen C	0.0559	0.0000	0.0390	0.3112	0.3175	0.2764

By applying the above coefficients to the rainfalls for each station, the areal average rainfalls for the study area have been computed as tabulated in Table B-2.6

Table B-2.6 Areal Average Rainfalls

Consecutive Rainfall Days	Return Period (year)									
	2	3	5	10	15	20	30	40	50	100
Daily Max. R.	121.5	139.1	158.5	182.9	196.7	206.3	219.8	229.3	236.6	259.6
2-day Conse. R	152.0	175.1	200.6	231.9	249.4	261.6	278.5	290.4	299.6	328.2
3-day Conse. R	165.0	189.3	215.8	248.1	265.8	278.2	295.3	307.3	316.5	344.9
4-day Conse. R	177.0	202.6	229.7	262.0	279.6	291.6	308.2	319.7	328.5	355.4
5-day Conse. R	191.8	219.3	248.1	282.1	300.3	312.8	329.8	341.6	350.6	378.0

Figure B-2.6 Thiessen Polygon Map



(d)Pattern of Hyetograph

The consecutive days for the design rainfall applies 3 days on condition that any rainfall losses would not be claimed in the runoff analysis. As for the hyetograph daily pattern, three (3) type in the location of the peak/biggest rainfall, the first day, middle day and last day, has been worked out and looked of the actual rainfall pattern. The frequency of each pattern are tabulated as follows:

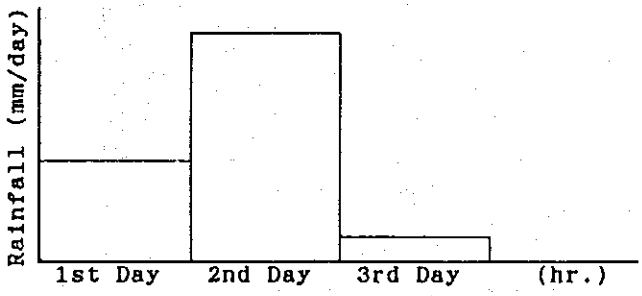
Table B-2.7 Frequency of Hyetograph Daily Pattern

	Peak in First Day		Peak in Middle Day		Peak in Last Day	
Station	1-2-3	1-3-2	2-1-3	3-1-2	2-3-1	3-2-1
YEN PHONG	2	4	4	11	0	11
DONG ANH	3	2	7	4	3	7
YEN VIEN	3	1	4	7	1	14
BAC NINH	2	5	6	7	4	9
QUE VO	2	3	7	9	1	11
TU SON	4	1	3	6	3	5
TOTAL	16	16	31	44	12	57

Note : 1-2-3 express the biggest, second and third intensity of rainfall among consecutive rainfall for 3-day

As shown in the above table, the daily pattern of hyetograph has been applied to the middle in peak type (2-1-3) which is of frequent occurrence and the same hyetograph pattern brought about the heavy flood damages in 1985, as follows:

Figure B-2.7 Design Daily pattern of Hyetograph



where: First day rainfall = probable consecutive 2 days rainfall - Probable daily max. rainfall;
Second day rainfall = Probable daily rainfall;
Third day rainfall = Probable consecutive 3 days rainfall - Probable consecutive 2 days rainfall.

The hyetograph of hourly rainfall is hardly concluded based on the actual records because of data unavailable. As the rainfalls in the study area are general-rainfalls are computed by applying Sherman type, as expressed below:

$$Rt = \left(\frac{R24}{24}\right) \cdot \left(\frac{24}{t}\right)^{n}$$

where: rt = Hourly average rainfall intensity (mm/hr)
R24 = 24 hour rainfall (mm)
n = Factor (1/2 - 2/3)

Table B-2.8 shows the computed hourly rainfall by applying n = 0.6.

Table B-2.8 Computed Hourly Rainfall Hyetograph

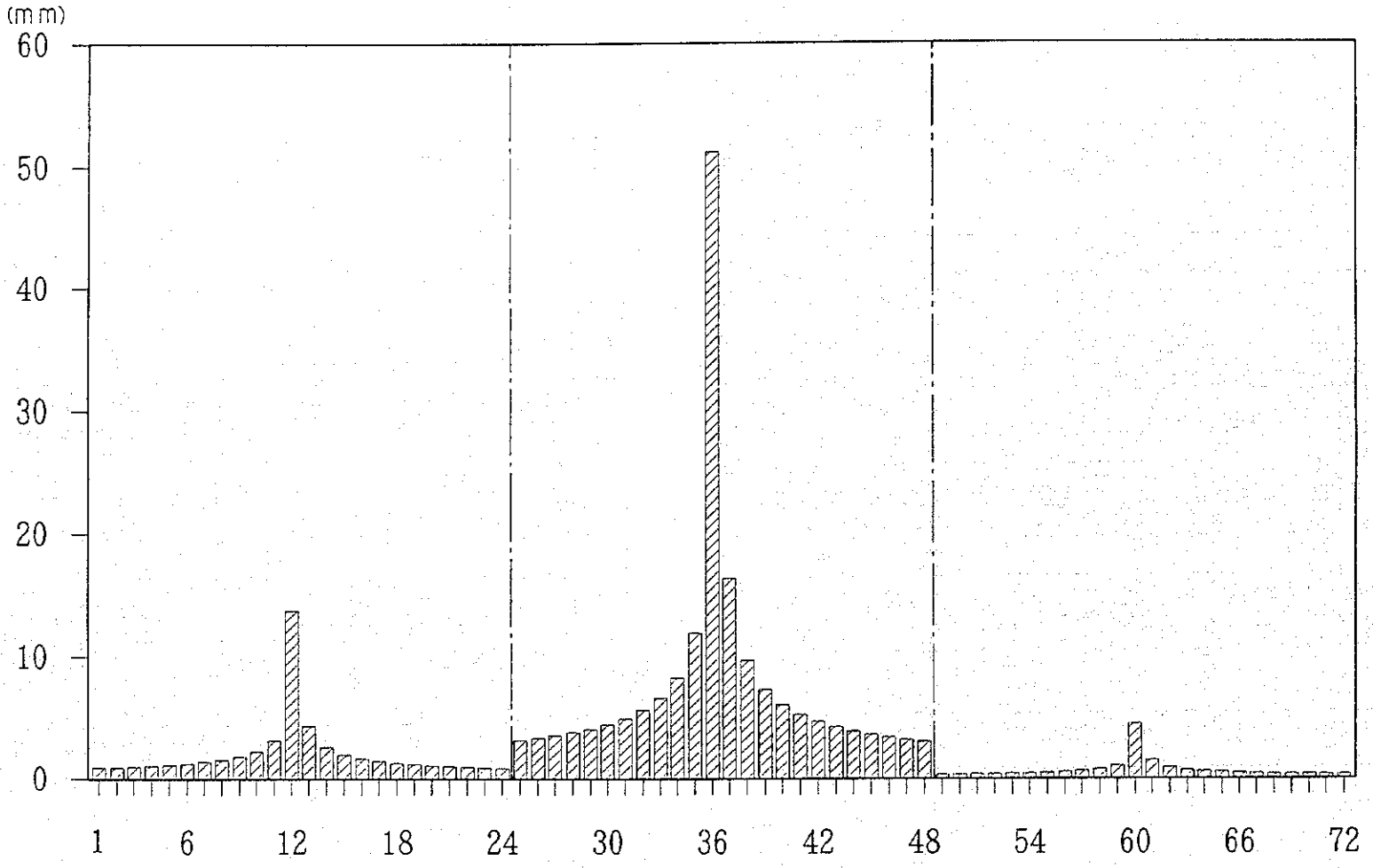
t	For First Day				
	(24/t)**0.6	r t	r t*t	R	r
1	6.7317	13.744	13.744	13.7	0.8
2	4.4413	9.068	18.135	4.4	0.9
3	3.4822	7.109	21.328	3.2	1.0
4	2.9302	5.982	23.930	2.6	1.0
5	2.5630	5.233	26.164	2.2	1.1
6	2.2974	4.691	28.143	2.0	1.2
7	2.0944	4.276	29.933	1.8	1.3
8	1.9332	3.947	31.575	1.6	1.5
9	1.8013	3.678	33.099	1.5	1.8
10	1.6909	3.452	34.523	1.4	2.2
11	1.5969	3.260	35.865	1.3	3.2
12	1.5157	3.095	37.135	1.3	13.7
13	1.4446	2.949	38.343	1.2	4.4
14	1.3818	2.821	39.497	1.2	2.6
15	1.3258	2.707	40.602	1.1	2.0
16	1.2754	2.604	41.664	1.1	1.6
17	1.2299	2.511	42.687	1.0	1.4
18	1.1884	2.426	43.674	1.0	1.3
19	1.1505	2.349	44.629	1.0	1.2
20	1.1156	2.278	45.554	0.9	1.1
21	1.0834	2.212	46.451	0.9	1.0
22	1.0536	2.151	47.324	0.9	0.9
23	1.0259	2.094	48.173	0.8	0.9
24	1.0000	2.042	49.000	0.8	0.8
Total				49.0	49.0

Table B-2.8 Continued

	For Second Day				
t	(24/t)**0.6	r t	r t*t	R	r
1	6.7317	51.301	51.301	51.3	3.2
2	4.4413	33.846	67.693	16.4	3.4
3	3.4822	26.537	79.612	11.9	3.6
4	2.9302	22.330	89.321	9.7	3.8
5	2.5630	19.532	97.660	8.3	4.1
6	2.2974	17.508	105.048	7.4	4.5
7	2.0944	15.961	111.730	6.7	5.0
8	1.9332	14.732	117.860	6.1	5.7
9	1.8013	13.727	123.545	5.7	6.7
10	1.6909	12.886	128.863	5.3	8.3
11	1.5969	12.170	133.871	5.0	11.9
12	1.5157	11.551	138.612	4.7	51.3
13	1.4446	11.009	143.122	4.5	16.4
14	1.3818	10.531	147.428	4.3	9.7
15	1.3258	10.104	151.553	4.1	7.4
16	1.2754	9.720	155.517	4.0	6.1
17	1.2299	9.373	159.334	3.8	5.3
18	1.1884	9.057	163.019	3.7	4.7
19	1.1505	8.768	166.583	3.6	4.3
20	1.1156	8.502	170.036	3.5	4.0
21	1.0834	8.257	173.387	3.4	3.7
22	1.0536	8.029	176.644	3.3	3.5
23	1.0259	7.818	179.813	3.2	3.3
24	1.0000	7.621	182.900	3.1	3.1
Total				182.9	182.9

	For Third Day				
t	(24/t)**0.6	r t	r t*t	R	r
1	6.7317	4.544	4.544	4.5	0.3
2	4.4413	2.998	5.996	1.5	0.3
3	3.4822	2.350	7.051	1.1	0.3
4	2.9302	1.978	7.911	0.9	0.3
5	2.5630	1.730	8.650	0.7	0.4
6	2.2974	1.551	9.304	0.7	0.4
7	2.0944	1.414	9.896	0.6	0.4
8	1.9332	1.305	10.439	0.5	0.5
9	1.8013	1.216	10.943	0.5	0.6
10	1.6909	1.141	11.414	0.5	0.7
11	1.5969	1.078	11.857	0.4	1.1
12	1.5157	1.023	12.277	0.4	4.5
13	1.4446	0.975	12.677	0.4	1.5
14	1.3818	0.933	13.058	0.4	0.9
15	1.3258	0.895	13.424	0.4	0.7
16	1.2754	0.861	13.775	0.4	0.5
17	1.2299	0.830	14.113	0.3	0.5
18	1.1884	0.802	14.439	0.3	0.4
19	1.1505	0.777	14.755	0.3	0.4
20	1.1156	0.753	15.061	0.3	0.4
21	1.0834	0.731	15.357	0.3	0.3
22	1.0536	0.711	15.646	0.3	0.3
23	1.0259	0.692	15.927	0.3	0.3
24	1.0000	0.675	16.200	0.3	0.3
Total				16.2	16.2

FIGURE B-2.8 Hourly Rainfall (1/10)



B-2.3 Runoff Analysis

(1) Runoff Model

The conceptual runoff models may be categorized to the lumped model, such as unit hydrograph method, runoff function method, series tank model, storage function method, etc., and the rainwater flow method. In either way, every methods are possible precisely to reproduce the flood events, when the actual observation records/data are available. However, application of the lumped model may be unreliable and difficult in determination of the factors/coefficients to be applied, because the discharge records/data actually observed and hydraulic data/information on the flood events are scarcely available within the area. Hereby, the rainwater flow method would be applied for the runoff analysis in the Study Area, which is complicated in calculation but be the most applicable method corresponding with the various physical conditions. (For detail explanation, See B-3 (1))

(2) Design Rainfall

The design rainfall for the runoff analysis in the Study Area would be applied with 3-day consecutive areal average rainfall of 284.1 mm and the middle day in peak type in the pattern of hyetograph. (See B-2.2)

(3) Base Flow and Rainfall Losses

The base flow may consist of wasted-water of irrigation and domestic water, while the rainfall losses may be involved in the initial losses, seepage losses and retention in the area. Considering that the drainage problems are taken place only in the rainy season, and that the antecedent rainfall to the 3-day consecutive rainfall is expected to be substituted for the initial losses, it assumes that the base flows are negligibly small and rainfall losses ignore.

(4) Characteristics of Drainage Area

(a) Equivalent Roughness

The equivalent roughness, which is equivalent to roughness coefficient of Manning formula applied to the flow on the saturated land, have been determined to be 0.6 for mountainous land, 1.0 for paddy field, 0.4 for upland field and 0.025 for residential area.

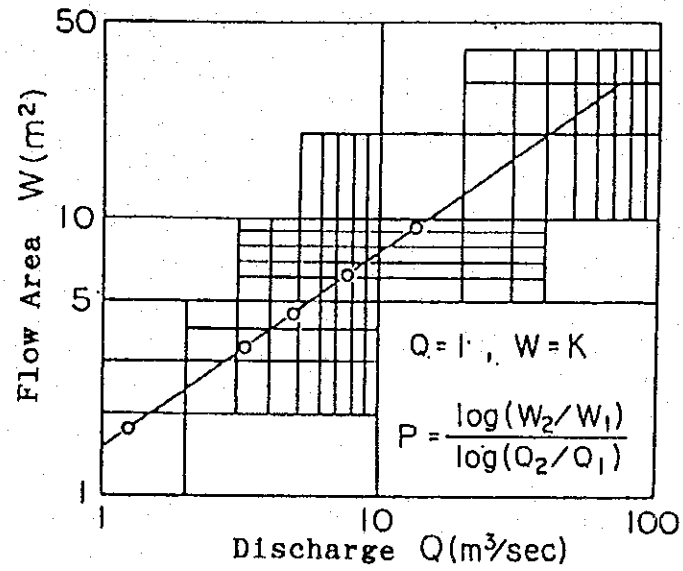
(b) River Gradient and Land Slope

The gradient of rivers/creeks/channels and slope of land have been decided based on the 1/50,000 or 1/10,000 topographical maps.

(c) River Flow Factors (K,P value) Estimate

For the runoff analysis by applying the kinematic wave model to the rainwater flow method, the river flow factors (K & P values) for each creek and drainage channels have been estimated by plotting the correlation between flow area (W) and water discharge (Q) in the logarithm scale coordinates, as shown in Figure B-2.9.

Figure B-2.9 Estimation of River Flow Factors



(5) Hydraulic Factors for Runoff Analysis

(a) Topography

Seeing that the water logging area depends on the topography of land, the land slope have been evaluated, based on the topographical maps with a scale of 1/50,000 or 1/10,000 indicating every 1.0 meter contour line. An area and volume every 1.0 meter in an elevation have been computed for drainage analysis, which would be regarded as an area and volume of flooded water.

(b) Land Category

For estimation of runoff discharge from the various land categories, such as regional area, paddy field, upland field, etc., The land categories for each drainage block area estimated based on the present land use maps (Figure C-1.5).

(c) Average Equivalent Roughness

The average equivalent roughness, as mentioned previously, have been calculated for each drainage block as a weighted average of each land category and equivalent roughness as tabulated in Table B-2.9.

(d) Hydraulic Factors for Land

The diagrammatic land area and land slope have been computed for runoff analysis, based on the said topographical maps, as show in Table B-2.10.

(e) Waterway Characteristics

The river flow factors (K & P values) of the waterway for each drainage blocks have been computed based on the surveyed data as shown in Table B-2.10.

Table B-2.9 Average Equivalent Roughness

Name of Drainage Block	HillyLand 0.600	Paddy F. 1.000	Upland 0.400	ResidentA. 0.025	Drain. A ha	Average N
HIEN LUONG D/S		3005.8		816.2	3822.0	0.792
HIEN LUONG U/S		2083.0	56.0	524.0	2663.0	0.796
HAN QUANG		1761.2		300.8	2062.0	0.858
TAN CHI	169.0	4660.7	55.7	1643.6	6529.0	0.739
KIM DOI D/S	58.0	3121.6	31.0	1244.4	4455.0	0.718
KIM DOI M/S	8.5	219.3	67.0	174.2	469.0	0.545
KIM DOI U/S		1262.3		567.7	1830.0	0.698
LAIDA		1470.3		314.7	1785.0	0.828
GIALAM		2054.3		588.7	2643.0	0.783
TRI PHUONG		1073.5		320.5	1394.0	0.776
TRINH XA AREA		3237.8	101.0	723.2	4062.0	0.811
XUAN VIEN		1292.8	0.9	616.3	1910.0	0.685
CHAU CAU	104.0	984.0	75.8	308.2	1472.0	0.737
VIET THONG		864.3	17.0	255.7	1137.0	0.772
QUE TAN		386.9		136.1	523.0	0.746
PHA LAI	96.0	1678.2	115.0	315.8	2205.0	0.812

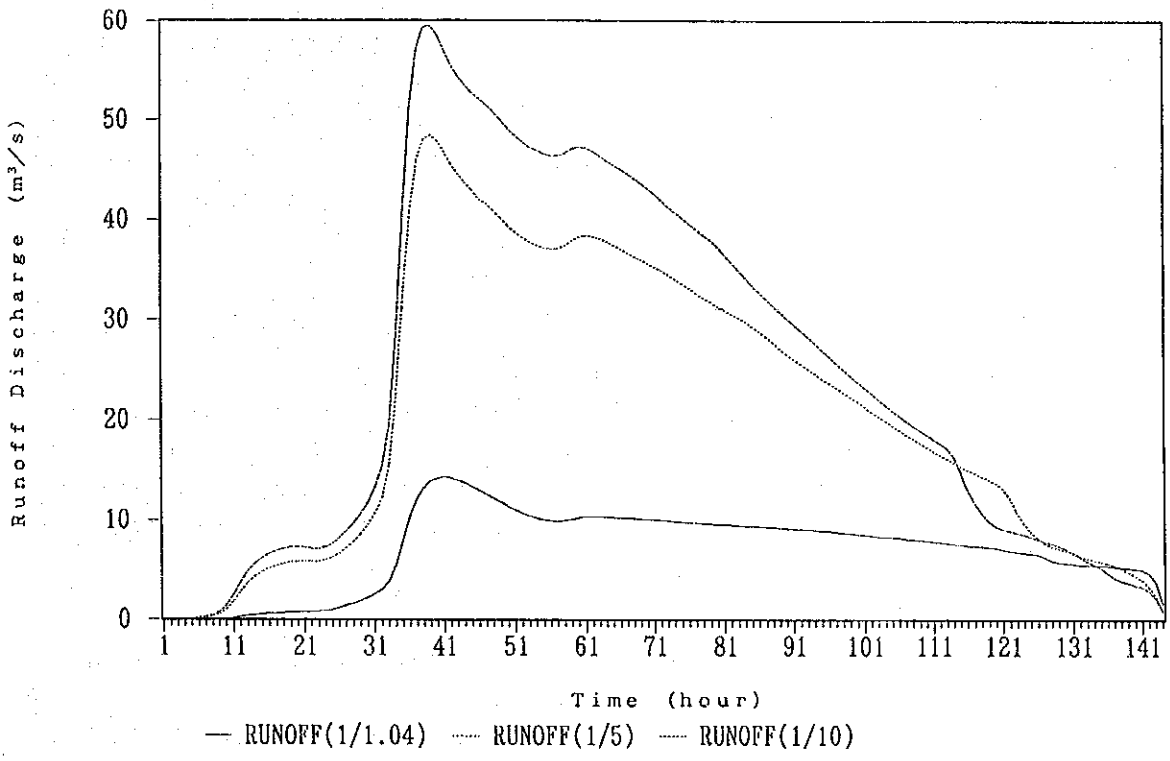
Table B-2.10 Hydraulic Factors for Land and Waterway

Name of Drainage Block		Drinage A (ha)	Sloped Land				Waterway				
			Slope L. L(m)	Slope S.	Equ.Rough.	Slope B. B(m)	River L. L(m)	River S.	Manning's n	K Value	P Value
HIEN LUONG D/S	Left B.	3030	3367	0.000225	0.792	9000	9000	0.0000526	0.045	1.10	0.838
	Right B.	1080	1200	0.000600							
HIEN LUONG U/S	Left B.	1990	3980	0.000370	0.796	5000	5000	0.0000526	0.045	1.10	0.838
	Right B.	880	1760	0.000560							
HAN QUANG	Left B.	1320	3771	0.000171	0.858	3500	3500	0.0000526	0.045	1.10	0.838
	Right B.	800	2286	0.000333							
TAN TRI	Left B.	4860	3738	0.000067	0.739	13000	13000	0.0000526	0.045	1.10	0.838
	Right B.	1400	1077	0.000400							
KIM DOI D/S	Left B.	1260	1938	0.000833	0.718	6500	6500	0.0000540	0.045	1.22	0.795
	Right B.	2700	4154	0.000320							
KIM DOI M/S	Left B.	220	880	0.000500	0.545	2500	2500	0.0000540	0.033	1.22	0.795
	Right B.	310	1240	0.002101							
KIM DOI U/S	Left B.	1090	1557	0.000467	0.698	7000	7000	0.0000540	0.033	1.22	0.800
	Right B.	750	1557	0.000500							
LAIDA	Left B.	895	1071	0.000979	0.828	7300	2000	0.0005400	0.033	1.20	0.800
	Right B.	895	1226	0.000979							
GIALAM	Left B.	1310	1226	0.001071	0.783	11700	11700	0.3000000	0.033	1.20	0.800
	Right B.	1310	1120	0.001071							
TRI PHUONG	Left B.	685	1120	0.001051	0.776	6000	6000	0.0001667	0.033	1.20	0.800
	Right B.	685	1142	0.001051							
TRINH XA AREA	Left B.	880	1100	0.000909	0.881	8000	8000	0.0003638	0.033	1.20	0.800
	Right B.	3180	3975	0.000909							
XUAN VIEN	Left B.	960	1352	0.000592	0.685	7100	71000	0.0002222	0.033	1.20	0.800
	Right B.	960	1352	0.000592							
CHAU CAU	Left B.	1100	2200	0.001000	0.737	5000	5000	0.0001400	0.033	1.20	0.800
	Right B.	580	1160	0.000517							
VIET THONG	Left B.	380	760	0.001000	0.746	5000	5000	0.0001000	0.033	1.20	0.800
	Right B.	890	1780	0.001000							
QUE TAN	Left B.	300	857	0.001050	0.746	3500	3500	0.0001714	0.033	1.20	0.800
	Right B.	300	857	0.001050							
PHA LAI	Left B.	1930	4289	0.000220	0.812	4500	4500	0.0001556	0.033	1.20	0.800
	Right B.	410	911	0.000220							

(5) Runoff Analysis

Taking into account the hydraulic factors for runoff analysis mentioned above, runoff analysis have been carried out in the Study Area. Concerning the Tan Chi Area, the total runoff is shown in Figure B-2.10.

Figure B-2.10 Total Runoff on Tan Chi Case



B-2.4 River Water Levels

(1) Design River Water Levels

The Study Area is the polder surrounded by the three rivers, Duong, Cau and Ngu Huyen Khe rivers. The drainage in the area is able to drain the excess water by gravity through the drainage sluices in the dry season, while the pumping drainage is imperative in the rainy season due to the higher water level in the rivers. Along the Duong river, Chau Cau, Thai Hoa, Tan Tri, Tri Phuong, Thinh Lien, Phu ong and Duong Ha pumping stations are located from the downstream in order. The major drainage stations along the Cau river are Xuan Vien, Huu Chap, Kim Doi, Vien thong, Que Tan, and Hien Luong stations located from the upstream in order. Along the Ngu Huyen Khe river, Dan Xa, Phu Lam and Trinh Xa pumping stations are constructed.

The design river water levels for each pumping station are generally estimated by the rating curve and/or the river cross-section and profile base on the respective water discharges. However, the design water levels have been calculated by proportioning to the distance from the related gauging stations, since the data necessary for the estimate of water discharges were not available.

In order to evaluate the design river water levels which have a hydrography corresponding to the 3-day consecutive rainfall in a probability of 1/10 year and more, the rainfall data have been evaluated as listed below:

Table B-2.11 3-day Consecutive Rainfall With a probability of 1/10 Year & More for Each Rainfall Station

	3-day Rainfall		1/10 yr. Rain (3-d. Consecu. R. Equivalent)	1/20 yr. Rain (3-d. Consecu. R. Equivalent)	1/20 yr. Rain (3-d. Consecutive R. more
	1/10	1/20			
YEN PHONG	257.7	294.6	1975:246.4 mm	1983:285.8 mm	1984:326.9 mm 1/40yr. Equiv. 1985:336.2 mm 1/40yr. more
DONG ANH	296.3	356.3	1980:304.5 mm 1985:315.3 mm	1986:354.5 mm	1984:466.6 mm 1/50yr. more
YEN VIEN	315.4	377.4	1967:339.0 mm 1980:332.9 mm 1989:332.0 mm	1985:390.9 mm	1984:420.9 mm 1/30yr. more
BAC NINH	246.0	273.9	1975:257.2 mm 1990:257.0 mm	1986:261.3 mm	1985:346.3 mm 1/100yr. more
QUE VO	254.5	287.4	1972:267.1 mm 1975:249.5 mm	1971:271.7 mm 1980:277.0 mm 1985:287.5 mm 1986:295.6 mm	
TU SON	231.8	255.1	1965:243.0 mm	1968:269.3 mm	
Over All Area	248.1	278.2			

In addition to the above rainfall at each station, the 3-day consecutive rainfall in regard to the areal average rainfall have also been evaluated. As shown in Table B-2.12, the 3-day consecutive areal rainfall with an exceedance probability of 1/10 year or equivalent are occurred in 23-25/July, 1965 and 26-28/July, 1975. The rainfall exceeded a probability of 1/10 year is taken place only on 11-13/September, 1985. Taking into account pattern of hyetograph in 1985 and allowance of pump operation capacity, The water levels recorded on 11-13/September, 1985 would be applied as the design river water levels.

Table B-2.12 Hyetograph Pattern of 3-day Consecutive Areal Rainfall

Year	Month/day	Areal Rain	Rain Pattern	Probability
1965	7/23- 7/25	225.9	Mid.D. Peak	1/10yr.below
1967	6/ 8- 6/10	158.3	1st D. Peak	1/2yr. below
1968	10/ 9-10/11	179.4	Mid.D. Peak	1/3yr. below
1971	7/12- 7/14	194.1	3rd D. Peak	1/3yr. below
1972	8/28- 8/30	174.2	Mid.D. Peak	1/3yr. below
1975	8/26- 8/28	238.5	1st D. Peak	1/10yr.below
1980	7/23- 7/25	217.1	Mid.D. Peak	1/5yr.Equiv.
1980	8/19- 8/21	169.5	Mid.D. Peak	1/2yr.Equiv.
1983	8/ 1- 8/ 3	144.1	1st D. Peak	1/2yr. below
1984	11/ 8-11/10	178.7	3rd D. Peak	1/3yr. below
1985	9/11- 9/13	331.0	Mid.D. Peak	1/50yr. more
1986	5/25- 5/27	188.6	3rd D. Peak	1/3yr.equiv.
1986	6/17- 6/19	203.3	Mid.D. Peak	1/5yr. below
1989	6/10- 6/12	118.9	3rd D. Peak	1/2yr. below
1990	9/19- 9/21	174.7	Mid.D. Peak	1/3yr. below

Table B-2.13 Selected Hydrograph at Each Pumping Station

Date	Station	THUONG CAT Station	BEN HO Station	DUONG HA Pump Sta.	PHU DONG Pump Sta.	THINH LIEN Pump Sta.	TRI PHUONG Pump Sta.	TAN TRI Pump Sta.	THAI HOA Pump Sta.	CAU CAU Pump Sta.
1965	7/22	7.69	6.02	7.30	6.97	6.63	6.52	6.19	5.35	4.80
	7/23	7.48	5.56	7.03	6.65	6.26	6.14	5.75	4.79	4.15
	7/24	7.23	5.37	6.80	6.42	6.05	5.93	5.56	4.63	4.01
	7/25	7.13	5.69	6.79	6.51	6.22	6.12	5.83	5.11	4.63
	7/26	7.42	6.24	7.14	6.91	6.67	6.59	6.36	5.77	5.37
	7/27	7.47	6.16	7.16	6.90	6.64	6.55	6.29	5.64	5.20
	7/28	7.26	5.82	6.92	6.64	6.35	6.25	5.96	5.24	4.76

Date	Station	THUONG CAT Station	BEN HO Station	DUONG HA Pump Sta.	PHU DONG Pump Sta.	THINH LIEN Pump Sta.	TRI PHUONG Pump Sta.	TAN TRI Pump Sta.	THAI HOA Pump Sta.	CAU CAU Pump Sts.
1985	9/8	7.90	6.23	7.51	7.18	6.84	6.73	6.40	5.56	5.01
	9/9	8.06	6.29	7.65	7.29	6.94	6.82	6.47	5.58	4.99
	9/10	9.21	7.11	8.72	8.30	7.88	7.74	7.32	6.27	5.57
	9/11	10.23	7.88	9.68	9.21	8.74	8.59	8.12	6.94	6.16
	9/12	11.19	8.78	10.63	10.15	9.66	9.50	9.02	7.82	7.01
	9/13	11.57	9.29	11.04	10.58	10.13	9.97	9.52	8.38	7.62
	9/14	11.28	9.18	10.79	10.37	9.95	9.81	9.39	8.34	7.64

Date	Station	THUONG CAT Station	BEN HO Station	DUONG HA Pump Sta.	PHU DONG Pump Sta.	THINH LIEN Pump Sta.	TRI PHUONG Pump Sta.	TAN TRI Pump Sta.	THAI HOA Pump Sta.	CAU CAU Pump Sta.
1980	7/23	9.61	7.70	9.16	8.78	8.40	8.27	7.89	6.94	6.30
	7/24	10.37	8.16	9.85	9.41	8.97	8.82	8.38	7.28	6.54
	7/25	11.44	8.95	10.86	10.36	9.86	9.70	9.20	7.95	7.12
	7/26	11.25	9.06	10.74	10.30	9.86	9.72	9.28	8.18	7.45
	7/27	10.59	8.64	10.14	9.75	9.36	9.23	8.84	7.86	7.21
	7/28	10.00	8.24	9.59	9.24	8.89	8.77	8.42	7.54	6.95
	7/29	9.43	7.80	9.05	8.72	8.40	8.29	7.96	7.15	6.60

B-2.5 Water Balance Analysis

(1) Basic Approach to Drainage Improvement

The drainage system area in the study area are grouped into the followings, as stated in the Section 3.3.2. of the main text:

Ngu Huyen Khe River drainage system area(5,850ha);
Duong River and Tao Khe Creek drainage system area(21,300ha);
Drainage system areas along Cau River (12,460ha).

Among other, three drainage system mentioned above except Tao Khe creek drainage systems are composed of the independent drainage area equipped with the pumping station. The improvement scheme of these drainage areas would be able to draw up for each system. While, Tao Khe Creek areas are split into several drainage blocks by not only the topography and polder dikes but also the regulating sluices, as shown in Figure B-2.12.

The basic approach to the drainage improvement would be focused on the independent drainage areas where are frequently flooded, taking into account regional and decentralized drainage systems as well as the existing water control rules.

(2) Method of Analysis

In drainage command area, the runoff is controlled by the topographical conditions and appears in the river or drainage canal with some delay. And then, the runoff in the canal is controlled by hydraulics of the canal. In case, the canal capacity does not meet the runoff or in case, the flow is restricted due to backwater from downstream, the excess water causes inundation. Such phenomenon emerges not only in canals but also in culverts across roads, siphons, gateways, drainage pumping stations, etc. Such phenomena are commonly observed in the lowlying flat areas. In order to simulate the inundation precisely, so-called Continuous Reservoir Model method would be applied.
(For detail explanation, See B-3 (2))

(3) Hydraulic Factors for Water Balance Simulation

(a) Design Field Elevation

The lowest elevation in the Study Area ranges between +2.0 and +4.0 m. On the other hand, the land use in the lowest area is mainly swamp land and partly utilized for fish pond. Consequently,

on drainage planning the lowest elevation is not considered. Design field elevation is determined base on land use map, which is covered about 10% of the drainage area.

(b) Allowable Inundated Water depth and Duration

Assuming that the growing of paddy may be tilling to booting stage in the month of July through September, the inundated water depth and duration to be allowed are applied as follows;

* A water depth of over 0.246 m should not be lasted beyond one day; and
* A water depth of over 0.159 m should not be lasted beyond three days.
* A runoff of 3-day consecutive rainfall should be drained out within 5-day.

(c) Methodology for Determination of Pump Capacity

The pump capacity is determined based on the flow chart of drainage planning as shown in Figure B-2.11.

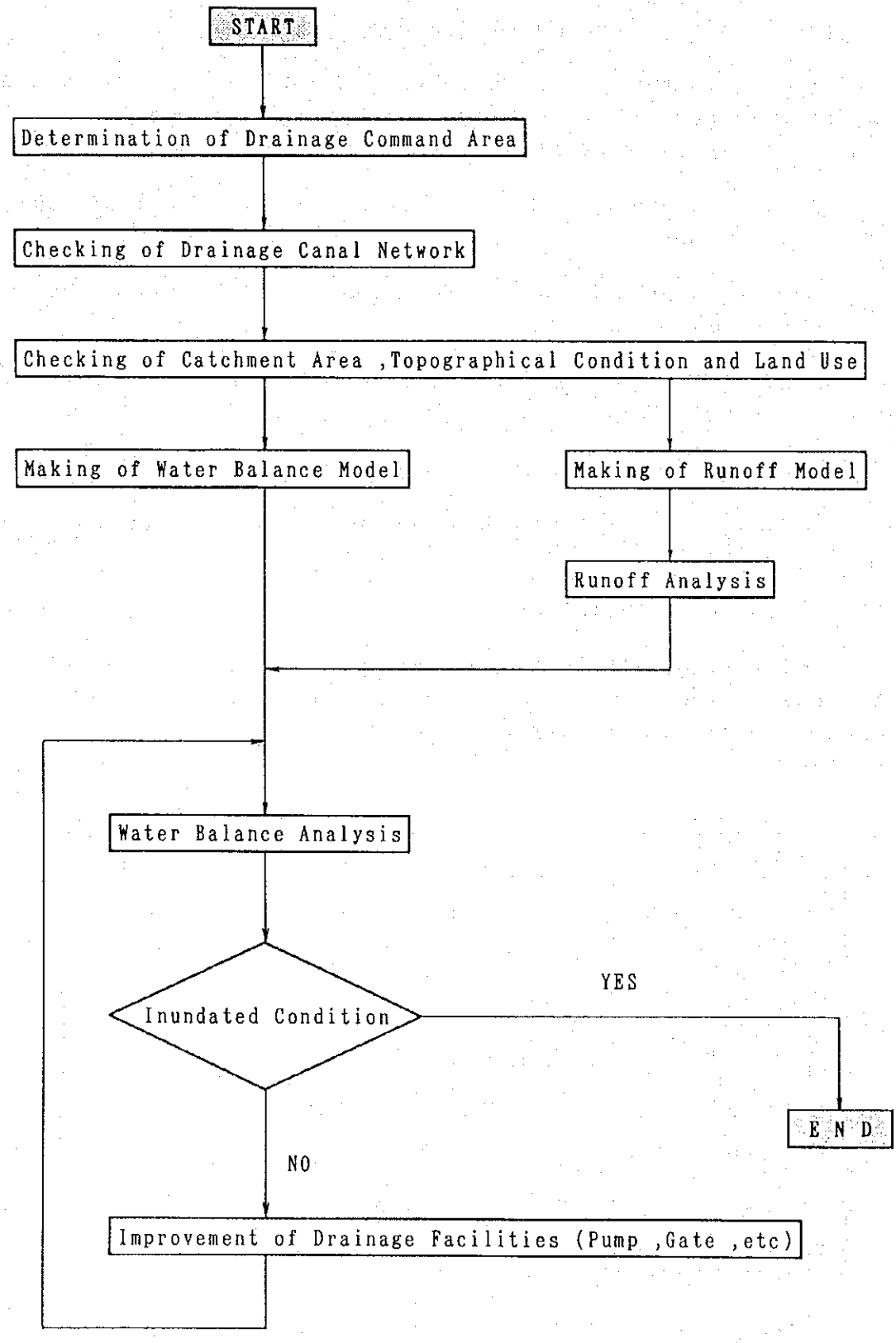
(4) Water Balance Simulation

For the study alternatives, following drainage schemes have been contemplated taking into account present water control rules, gravity drainage in the dry season and original plan of drainage improvement.

Table B-2.14 Drainage Schemes on Study Area

Name of Drainage Area	Area(ha)	Name of Drainage Area	Area(ha)
Pha Lai	2,340	Trinh Xa	4,060
Que Tan	600	Lai Da	1,790
Viet Thong	1,090	Kim Doi	6,510
Chau Cau	1,680	Hien Luong	6,980
Tri Phuong	1,480	Tan Chi	6,420
Gia Lam	2,620	Tan Chi	8,540
Xuan Vien	1,920	+ Han Quang	

FIGURE B-2.11 SCHEMATIC DIAGRAM FOR DRAINAGE PLANNING



(a) Study Area

According to the above alternative schemes, the water balance analysis have been done, the results of each drainage area are shown in Table B-2.16, B-2.17 and Figure B-2.12.

(b) Project Area

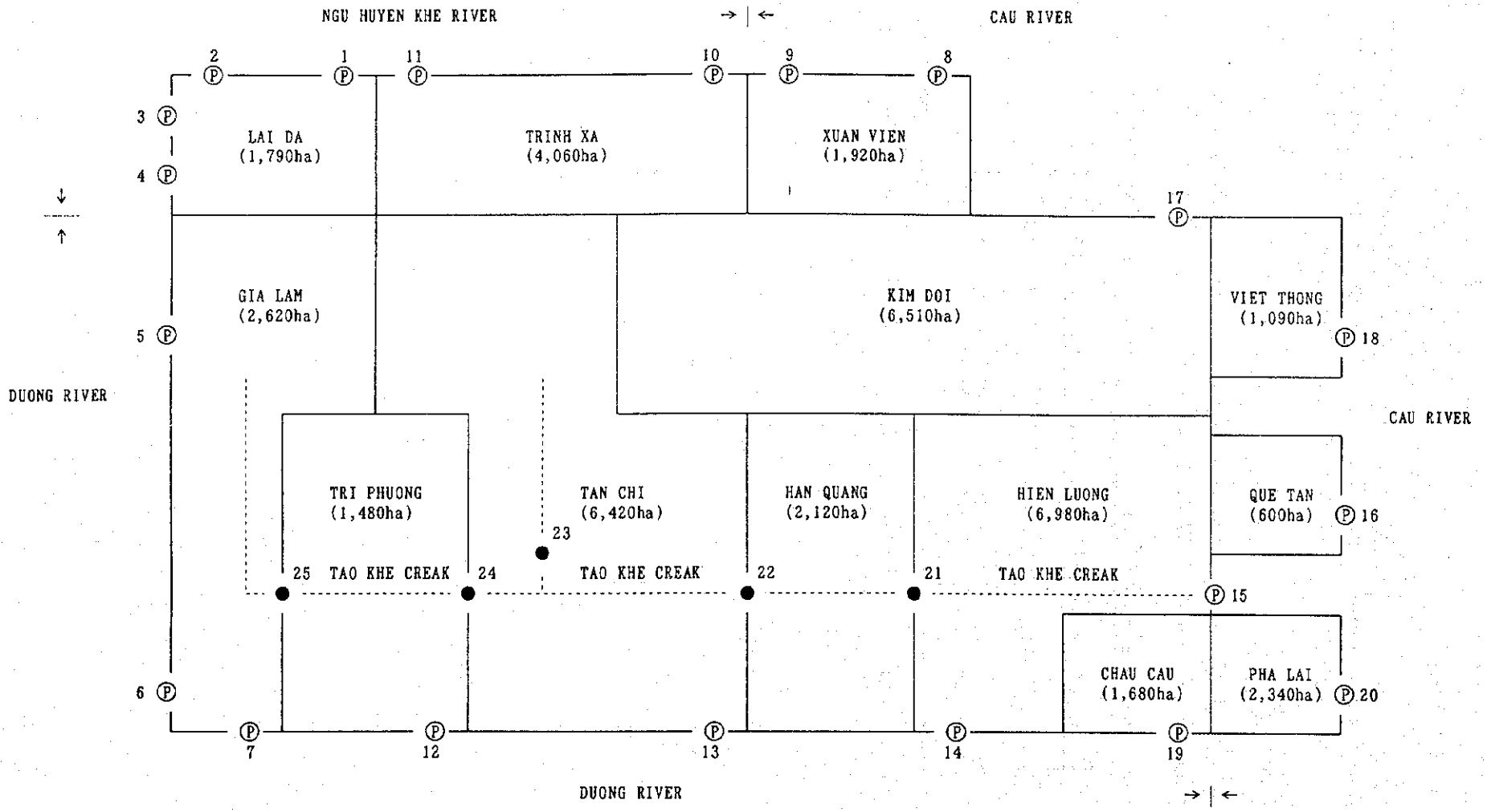
For Tan Chi area, the following 2 alternatives study have been done based on the detailed data.

Table B-2.15 Alternative Schemes on Project Area

Case	Name of Drainage Area	Area(ha)
1	Tan Chi Only	6,420
2	Tan Chi + Han Quang	8,540

According to the above alternative schemes, the water balance analysis have been done, the results of each drainage area are shown in Table B-2.18 ・・・B-2.21 and Figure B-2.13 ・・・B-2.16.

FIGURE B-2.12 WATER BALANCE SIMULATION MODEL (STUDY AREA)



No.	NAME OF STRUCTURES	No.	NAME OF STRUCTURES	No.	NAME OF STRUCTURES	No.	NAME OF STRUCTURES	No.	NAME OF STRUCTURES
1	LIEN DAM PUMP STA.	6	PHU DONG PUMP STA.	11	TRINH XA PUMP STA.	16	QUE TAN PUMP STA.	21	LA MIET SLUICE
2	DONG DA PUMP STA.	7	THINH LIEN PUMP S.	12	TRI PHUONG PUMP S.	17	KIM DOI PUMP STA.	22	TRAM BRIDGE
3	LOC HA PUMP STA.	8	HUU CHAP PUMP STA.	13	TAN CHI PUMP STA.	18	VIET THONG PUMP S.	23	BA CAY SLUICE
4	LAI DA PUMP STA.	9	XUAN VIEN PUMP ST.	14	THAI HOA PUMP STA.	19	CHAU CAU PUMP STA.	24	TRI PHUONG SLUICE
5	DUONG HA PUMP STA.	10	PHU LAM PUMP STA.	15	HIEN LUONG PUMP S.	20	PHA LAI PUMP STA.	25	THINH LIEN SLUICE

Table B-2.16 Inundated Condition at Present Status

【PRESENT】

Item	Drainage Area								
	PHA LAI	QUE TAN	VIET THONG	CHAU CAU	TRI PHUONG	GIA LAM	XUAN VIEN	TRINH XA	LAI DA
Drainage Area	2340 ha	600 ha	1090 ha	1680 ha	1480 ha	2620 ha	1920 ha	4060 ha	1790 ha
Designed Field EL.	2.050 m	2.300 m	2.500 m	2.600 m	3.500 m	4.300 m	2.100 m	3.000 m	4.500 m
Max. Water Depth	0.320 m	0.734 m	0.700 m	0.715 m	0.711 m	0.245 m	0.409 m	0.184 m	0.588 m
Max.Inundated Area	680 ha	227 ha	353 ha	502 ha	458 ha	401 ha	354 ha	682 ha	425 ha
Max.W.D.Occurred	At 137 hr.	At 92 hr.	At 106 hr.	At 105 hr.	At 106 hr.	At 93 hr.	At 113 hr.	At 87 hr.	At 112 hr.
Duration Time of inundation	Over 50 hr. (*1)95-144	Over 97 hr. (*1)48-144	Over 99 hr. (*1)46-144	Over 101 hr. (*1)44-144	Over 99 hr. (*1)46-144	43 hr. (*2)72-115	Over 68 hr. (*1)77-144	Over 31 hr. (*2)74-104	Over 85 hr. (*1)60-144
Pumping Capacity	5.00 m3/s	1.56 m3/s	3.56 m3/s	4.44 m3/s	3.11 m3/s	14.73 m3/s	6.66 m3/s	23.33 m3/s	6.39 m3/s
Drainage Duty	2.137 l/s/ha	2.600 l/s/ha	3.266 l/s/ha	2.643 l/s/ha	2.101 l/s/ha	5.622 l/s/ha	3.469 l/s/ha	5.746 l/s/ha	3.570 l/s/ha

Note : (*1) Shown the time inundated over 0.246 m in a water depth.
(*2) Shown time inundated over 0.159 m in a water depth.
Pumping Capacity : PHA LAI AREA ··· PHA LAI 5.00m3/s
QUE TAN ARE ··· QUE TAN 1.56m3/s
VIET THONG AREA ··· VIET THONG 3.56m3/s
CHAU CAU AREA ··· CHAU CAU 4.44m3/s
TRI PHUONG AREA ··· TRI PHUONG 3.11m3/s
GIALAM AREA ··· THINH LIEN 4.16m3/s ,PHU DONG 4.39m3/s ,DUONG HA 6.18m3/s
XUAN VIEN AREA ··· HUU CHAP 4.44m3/s ,XUAN VIEN 2.22m3/s
TRINH XA AREA ··· TRINH XA 20.00m3/s ,PHU LAM 3.33m3/s
LAIDA AREA ··· LIEN DAM 2.22m3/s ,LOC HA 1.17m3/s ,DONG DAU 2.00m3/s ,LAIDA 1.00m3/s

Table B-2.17 Inundated Condition after Project

【PLAN】

Item	Drainage Area								
	PHA LAI	QUE TAN	VIET THONG	CHAU CAU	TRI PHUONG	GIA LAM	XUAN VIEN	TRINH XA	LAI DA
Drainage Area	2340 ha	600 ha	1090 ha	1680 ha	1480 ha	2620 ha	1920 ha	4060 ha	1790 ha
Designed Field EL.	2.050 m	2.300 m	2.500 m	2.600 m	3.500 m	4.300 m	2.100 m	3.000 m	4.500 m
Max. Water Depth	0.231 m	0.279 m	0.283 m	0.309 m	0.285 m	0.275 m	0.226 m	0.256 m	0.289 m
Max.Inundated Area	548 ha	125 ha	186 ha	262 ha	219 ha	421 ha	236 ha	824 ha	263 ha
Max.W.D.Occurred	At 96 hr.	At 82 hr.	At 100 hr.	At 90 hr.	At 93 hr.	At 99 hr.	At 101 hr.	At 90 hr.	At 95 hr.
Duration time of Inundation	71 hr. (*2)66-136	24 hr. (*1)72-95	24 hr. (*1)89-112	24 hr. (*1)80-103	23 hr. (*1)84-106	24 hr. (*1)88-111	47 hr. (*2)80-126	21 hr. (*1)81-101	24 hr. (*1)84-107
Pumping Capacity	9.5 m3/s	2.9 m3/s	5.5 m3/s	8.7 m3/s	6.5 m3/s	14.2 m3/s	9.0 m3/s	19.0 m3/s	9.0 m3/s
Drainage Duty	4.060 l/s/ha	4.833 l/s/ha	5.046 l/s/ha	5.179 l/s/ha	4.392 l/s/ha	5.420 l/s/ha	4.688 l/s/ha	4.680 l/s/ha	5.028 l/s/ha

Note : (*1) Shown time inundated over 0.246 m in a water depth.
(*2) Shown time inundated over 0.159 m in a water depth.

Table B-2.16 Inundated Condition at Present Status

[PRESENT]

Item	Drainage Area			(*3)
	KIM DOI	HIEN LUONG	TAN CHI ONLY	HAN QUANG
Drainage Area	6510 ha	6980 ha	6420 ha	8540 ha
Designed Field EL.	2.100 m	2.100 m	2.900 m	2.500 m
Max. Water Depth	0.807 m	0.243 m	0.647 m	0.854 m
Max.Inundated Area	1537 ha	977 ha	1937 ha	2710 ha
Max.W.D.Occurred	At 143 hr.	At 109 hr.	At 144 hr.	At 144 hr.
Duration Time of inundation	Over 87 hr. (*1)58-144	Over 77 hr. (*2)68-144	Over 97 hr. (*1)48-144	Over 102 hr. (*1)43-144
Pumping Capacity	12.50 m3/s	27.17 m3/s	15.11 m3/s	15.11 m3/s
Drainage Duty	1.920 l/s/ha	3.893 l/s/ha	2.354 l/s/ha	1.769 l/s/ha

Note : (*1) Shown the time inundated over 0.246 m in a water depth.
(*2) Shown time inundated over 0.159 m in a water depth.
(*3) Shown case include TAN CHI Area
Pumping Capacity : KIM DOI AREA ··· KIM DOI 12.50m3/s
HIEN LUONG ARE ··· THAI HOA 4.67m3/s ,HIEN LUONG 26.50m3/s
TAN CHI AREA ··· TAN CHI 15.11m3/s
HAN QUANG (Inc.TAN CHI) AREA ··· TAN CHI 15.11m3/s

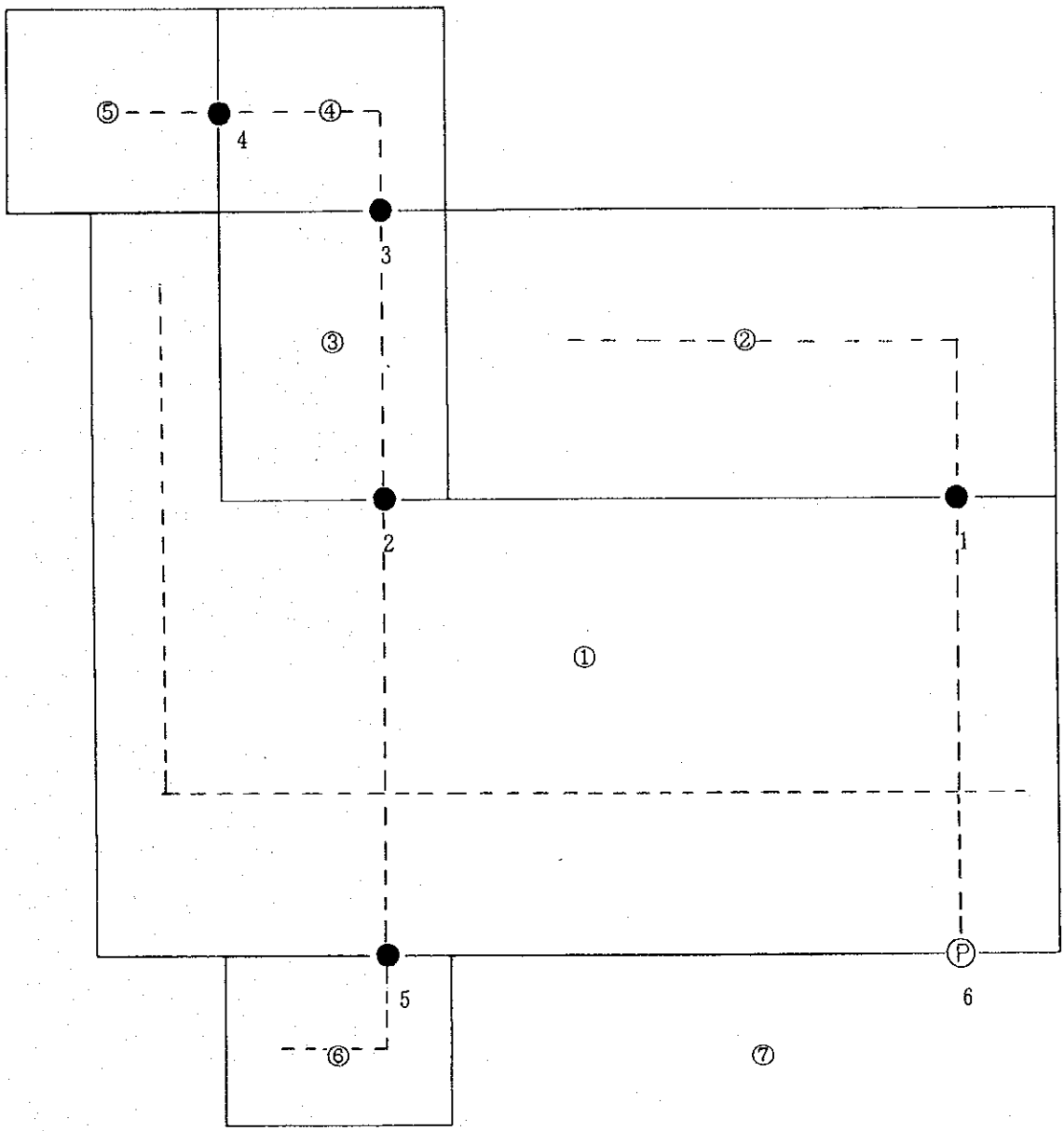
Table B-2.17 Inundated Condition after Project

[PLAN]

Item	Drainage Area			(*3)
	KIM DOI	HIEN LUONG	TAN CHI	HAN QUANG
Drainage Area	6510 ha	6980 ha	6420 ha	8540 ha
Designed Field EL.	2.100 m	2.100 m	3.060 m	2.500 m
Max. Water Depth	0.245 m	0.222 m	0.247 m	0.264 m
Max.Inundated Area	585 ha	916 ha	936 ha	1395 ha
Max.W.D.Occurred	At 84 hr.	At 100 hr.	At 93 hr.	At 107 hr.
Duration Time of inundation	62 hr. (*2)57-118	70 hr. (*1)63-132	47 hr. (*2)70-116	24 hr. (*1)95-118
Pumping Capacity	35.50 m3/s	31.17 m3/s	31.11 m3/s	41.11 m3/s
Drainage Duty	5.453 l/s/ha	4.466 l/s/ha	4.846 l/s/ha	4.814 l/s/ha

Note : (*1) Shown time inundated over 0.246 m in a water depth.
(*2) Shown time inundated over 0.159 m in a water depth.

FIGURE B-2.13 WATER BALANCE SIMULATION MODEL (TAN CHI ONLY)



No.	NAME OF STRUCTURES	No.	NAME OF STRUCTURES
1	KT CAU NAU-S GATE	6	TANCHI PUMPING STATION
2	BA CAY SLUICE		
3	LIEN MAO SYPHON		
4	CAU SAT SLUICE		
5	CANH HUNG SLUICE		

①~⑥ Drainage Command Area
⑦ Duong River

Table B-2.18 Inundated Condition at Present Status at TAN CHI Area

[PRESENT]

Item	Drainage Area					
	①	②	③	④	⑤	⑥
Drainage Area	2682 ha	1410 ha	696 ha	632 ha	730 ha	270 ha
Designed Field EL.	3.400 m	2.900 m	3.150 m	3.450 m	4.650 m	4.700 m
Max. Water Depth	0.213 m	0.647 m	0.832 m	0.556 m	0.000 m	0.013 m
Max.Inundated Area	550 ha	752 ha	289 ha	313 ha	4 ha	29 ha
Max.W.D.Occurred	At 112 hr.	At 139 hr.	At 107 hr.	At 102 hr.	At 66 hr.	At 67 hr.
Duration Time of inundation	Over 64 hr. (*2)81-144	Over 104 hr (*1)41-144	Over 110 hr (*1)35-144	Over 94 hr. (*1)51-144	0 hr.	0 hr.

Note : (*1) Shown the time inundated over 0.246 m in a water depth.
(*2) Shown time inundated over 0.159 m in a water depth.
Pumping Capacity : TAN CHI 15.11m3/s (2.354 l/s/ha)

Table B-2.19 Inundated Condition after Project at TAN CHI Area

[PLAN]

Item	Drainage Area					
	①	②	③	④	⑤	⑥
Drainage Area	2682 ha	1410 ha	696 ha	632 ha	730 ha	270 ha
Designed Field EL.	3.400 m	(*3)3.060 m	3.150 m	3.450 m	(*3)4.000 m	(*3)4.600 m
Max. Water Depth	0.000 m	0.247 m	0.204 m	0.042 m	0.375 m	0.113 m
Max.Inundated Area	191 ha	514 ha	127 ha	71 ha	5 ha	29 ha
Max.W.D.Occurred	At 89 hr.	At 93 hr.	At 82 hr.	At 70 hr.	At 60 hr.	At 67 hr.
Duration time of Inundation	0 hr.	47 hr. (*2)70-116	35 hr. (*2)65-99	0 hr.	20 hr. (*1)46-65	0 hr.

Note : (*1) Shown time inundated over 0.246 m in a water depth.
(*2) Shown time inundated over 0.159 m in a water depth.
(*3) Different designed field elevation between present and plan in Block No.②,⑤ and ⑥.
Pumping Capacity : TAN CHI 31.11m3/s (4.846 l/s/ha)

FIGURE B-2.14 Total Runoff and Pump Capacity (Tan Chi Only)

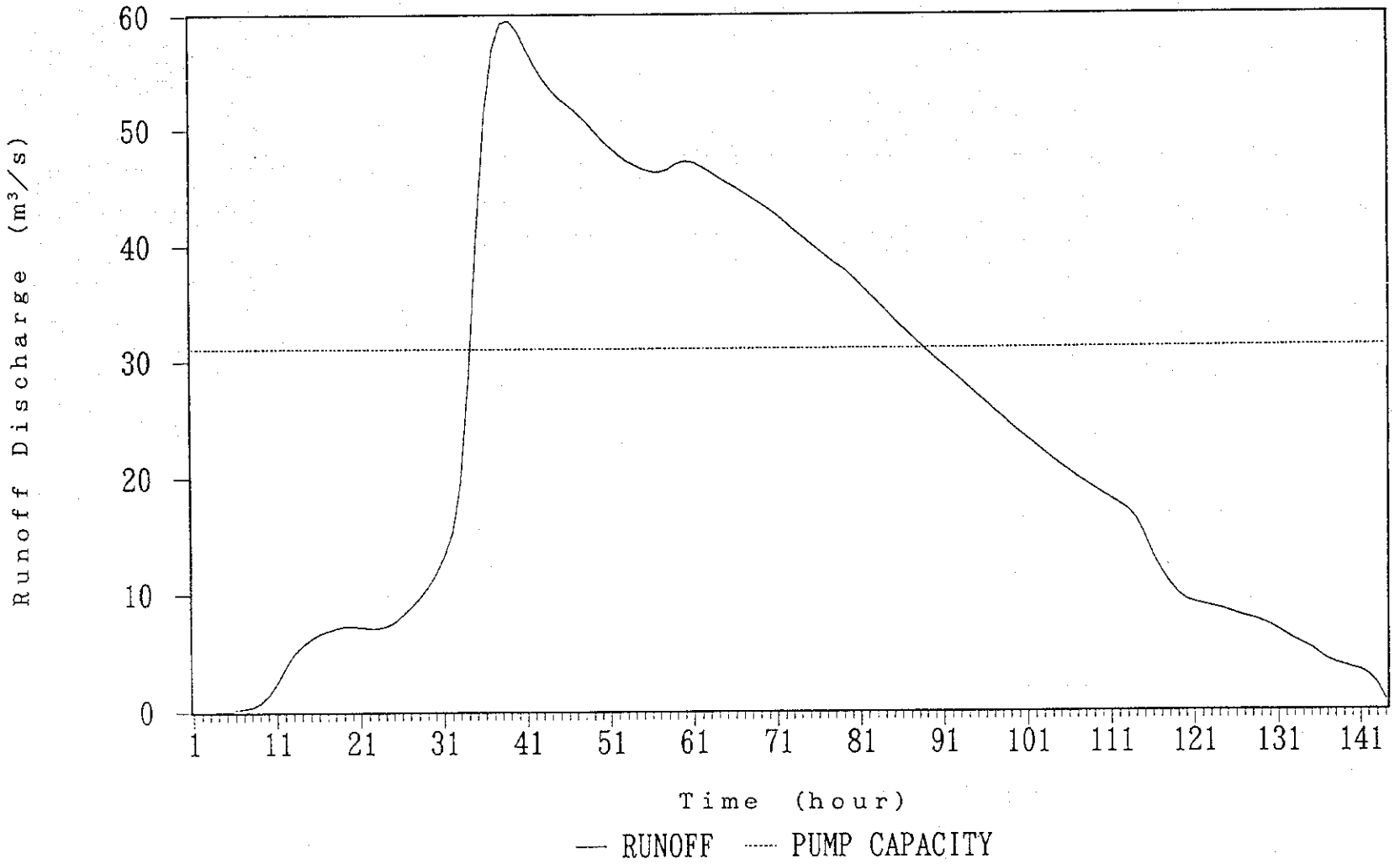
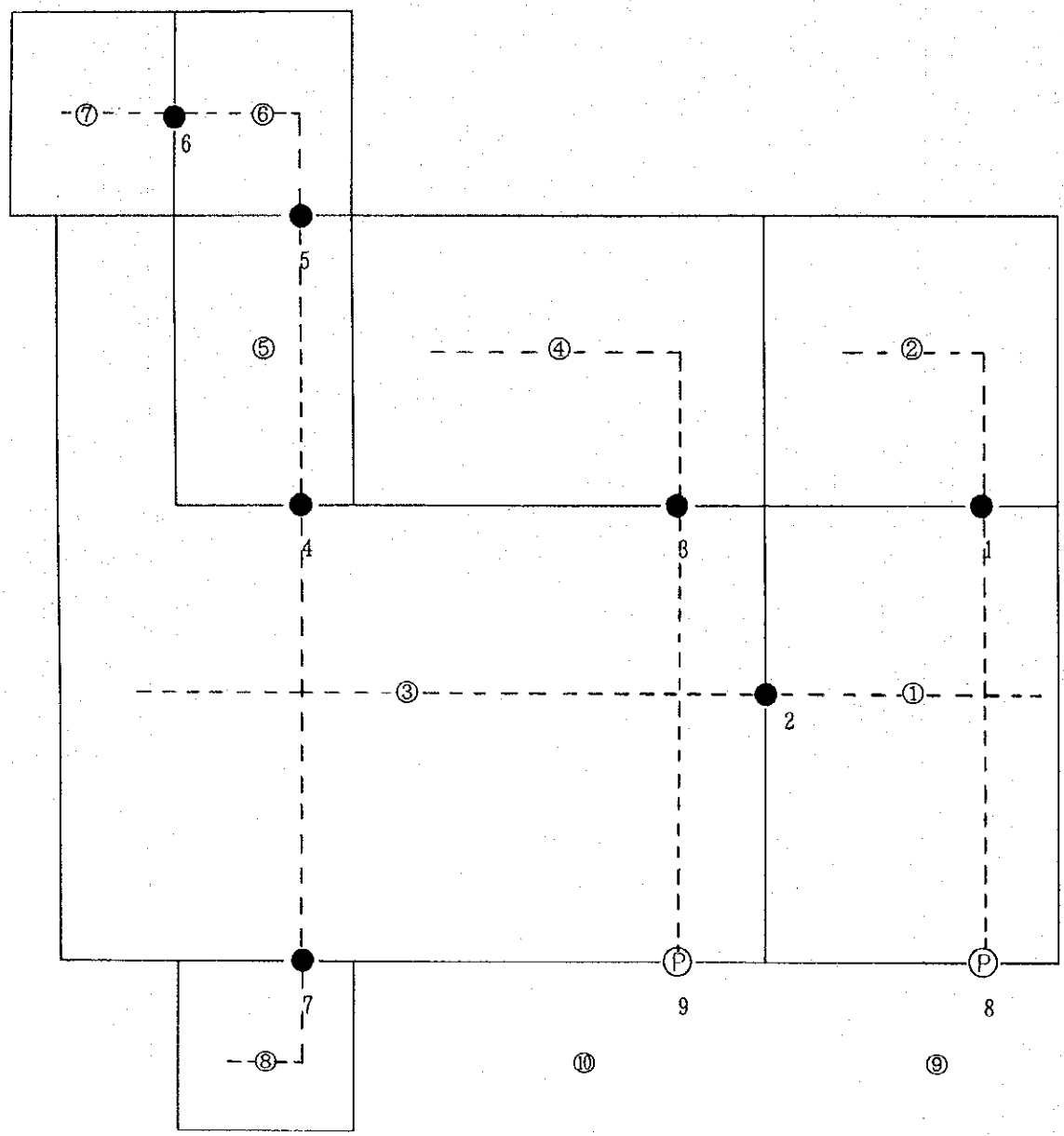


FIGURE B -2.15 WATER BALANCE SIMULATION MODEL (TAN CHI AND HAN QUANG)



No.	NAME OF STRUCTURES	No.	NAME OF STRUCTURES
1	BA CUA SLUICE	6	CAU SAT SLUICE
2	TRAM BRIDGE	7	CANH HUNG SLUICE
3	KT CAU NAU-2 GATE	8	HAN QUANG PUMPING ST.
4	BA CAY SLUICE	9	TANCHI PUMPING STATION
5	LIEN MAO SYPHON		

①～⑧ Drainage Command Area
⑨～⑩ Duong River

Table B-2.20 Inundated Condition at Present Status at TAN CHI and HAN QUANG Area

【PRESENT】

Item	Drainage Area							
	①	②	③	④	⑤	⑥	⑦	⑧
Drainage Area	1391 ha	729 ha	2682 ha	1410 ha	696 ha	632 ha	730 ha	270 ha
Designed Field EL.	2.500 m	2.600 m	3.400 m	2.900 m	3.150 m	3.450 m	4.650 m	4.700 m
Max. Water Depth	0.854 m	0.615 m	0.000 m	0.446 m	0.838 m	0.559 m	0.000 m	0.013 m
Max.Inundated Area	919 ha	372 ha	223 ha	558 ha	291 ha	314 ha	4 ha	29 ha
Max.W.D.Occurred	At 141 hr.	At 137 hr.	At 117 hr.	At 116 hr.	At 108 hr.	At 104 hr.	At 66 hr.	At 67 hr.
Duration time of Inundation	Over 102 hr. (*1)43-144	Over 90 hr. (*1)55-144	0 hr.	Over 82 hr. (*1)63-144	Over 109 hr. (*1)36-144	Over 94 hr. (*1)51-144	0 hr.	0 hr.

Note : (*1) Shown the time inundated over 0.246 m in a water depth.
(*2) Shown time inundated over 0.159 m in a water depth.
Pumping Capacity : TAN CHI 15.11m3/s (1.769 l/s/ha)

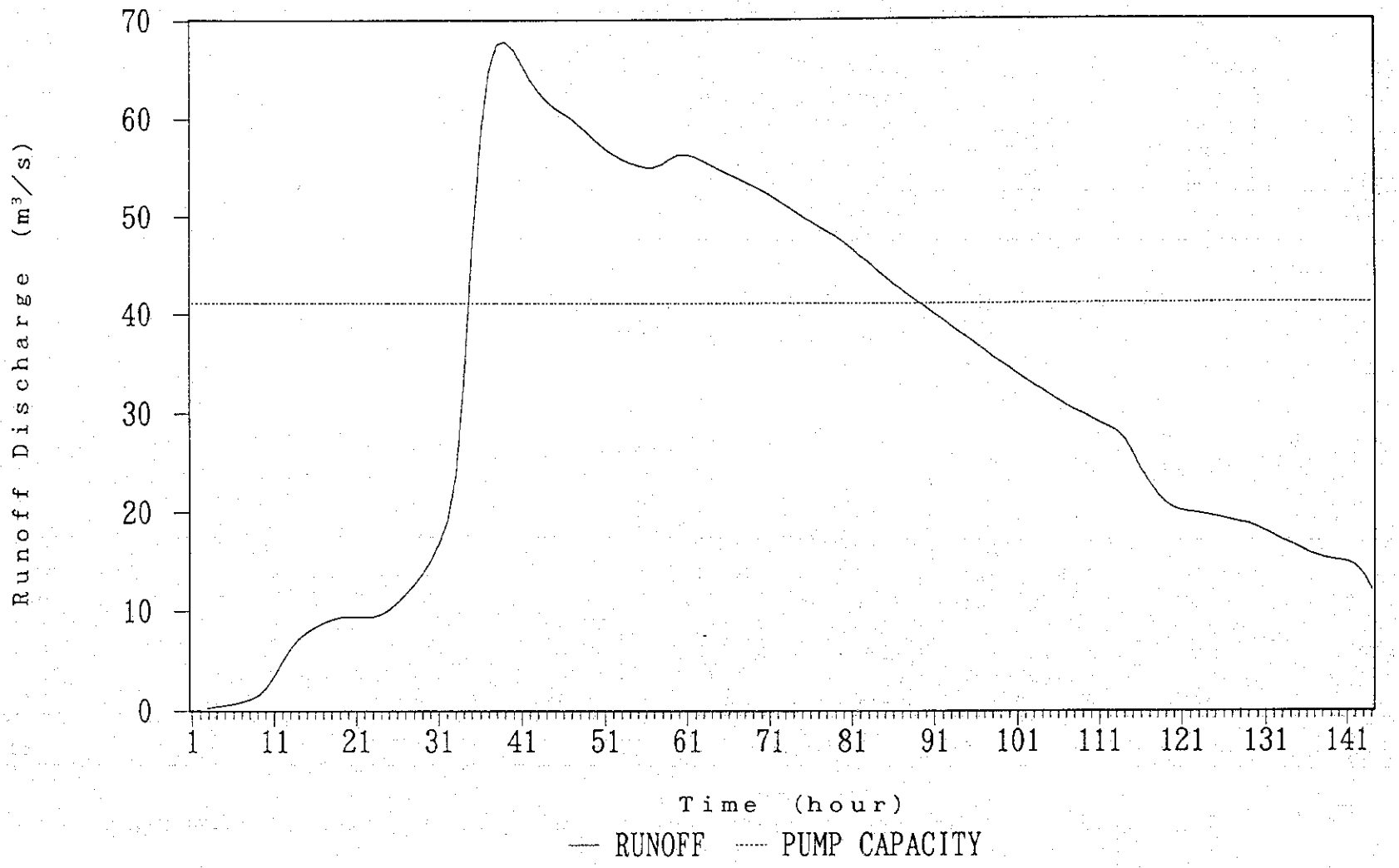
Table B-2.21 Inundated Condition after Project at TAN CHI and HAN QUANG Area

【PLAN】

Item	Drainage Area							
	①	②	③	④	⑤	⑥	⑦	⑧
Drainage Area	1391 ha	729 ha	2682 ha	1410 ha	696 ha	632 ha	730 ha	270 ha
Designed Field EL.	2.500 m	2.600 m	3.400 m	(*3)3.060 m	3.150 m	3.450 m	(*3)4.000 m	(*3)4.600 m
Max. Water Depth	0.264 m	0.194 m	0.000 m	0.182 m	0.166 m	0.025 m	0.375 m	0.113 m
Max.Inundated Area	417 ha	173 ha	144 ha	442 ha	118 ha	68 ha	5 ha	29 ha
Max.W.D.Occurred	At 107 hr.	At 108 hr.	At 83 hr.	At 87 hr.	At 75 hr.	At 67 hr.	At 60 hr.	At 67 hr.
Duration time of Inundation	24 hr. (*1)95-118	36 hr. (*2)91-126	0 hr.	24 hr. (*2)76-99	12 hr. (*1)70-81	0 hr.	20 hr. (*1)46-65	0 hr.

Note : (*1) Shown time inundated over 0.246 m in a water depth.
(*2) Shown time inundated over 0.159 m in a water depth.
(*3) Different designed field elevation between present and plan in Block No.④,⑦ and ⑧.
Pumping Capacity : TAN CHI(15.11 m3/s),HAN QUANG(26.00 m3/s),Total 41.11m3/s (4.814 l/s/ha)

FIGURE B-2.16 Total Runoff and Pump Capacity (Tan Chi & Han Quang)



(c) Drainage Coefficient

The drainage coefficient has been determined by following procedures.

Design Standard for Drainage Planning

- Allowable depth 246 mm for 24 hours
- Allowable depth 159 mm for 72 hours
- To drain the excess water of 3-day consecutive rainfall within 5-day

Item (1) and (2) will be checked by water balance simulation which are shown as follows.

Drainage Duty on Case Study

Case	Pump Capacity (m3/sec)	Drainage Duty (l/s/ha)
Tan Chi Only (6,420 ha)	31.11 (15.11+16.00)	4.814
Tan Chi + Han Quang (8,540 ha)	41.11 (15.11+26.00)	4.846

Item (3) has been checked based on following calculation.

- 3-day consecutive rainfall is 248 mm
- Evaporation(3mm) and percolation(2mm) losses for 5 day is 25 mm

$$q = \frac{248-25}{5 \times 86400} \times 10000 = 5.16 \text{ l/sec/ha}$$

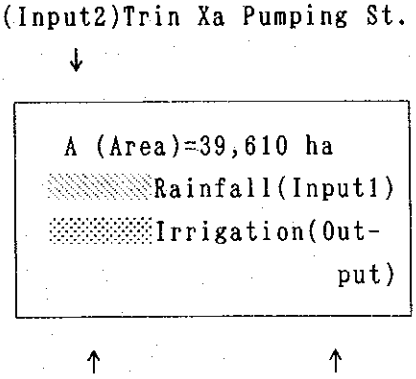
Determination of Drainage Duty

On drainage planning, drainage duty would be varied depend on the topographic conditions. Accordingly, sophisticated drainage analysis is required. On the other hand, the practical method (Item 3) mentioned above is also required to check the result briefly.

By water balance simulation, the drainage duty is about 4.8 l/s/ha, and on the other hand drainage duty by practical method is about 5.2 l/s/ha. There is not so big difference of drainage duty between two methods. The drainage duty of 4.8 l/s/ha is adopted, because water balance simulation method is more precisely in comparison with practical method.

B-2.6 Water Balance Analysis for Irrigation

(1)Water Balance Model



(2)Condition for Calculation

(a)Catchment Area A=39,610 ha

(b)Rainfall(Bac Ninh Station : 1960～1992)

- Average Anual Rainfall R=1474 mm
- 1/2 Non-Exceedance of Probable Rainfall R=1465 mm
- 1/10 Non-Exceedance of Probable Rainfall R=1106 mm

(c)Average Evaporation Ep=984 mm

(d)Runoff Coeficient

- 0.389 :Based on river discharge(Phon Day River･Quang Cu St.)

(e)Coefficient of Return Flow

- 0.65 :Based on obsereved data at lowlying area in Japan

(f)Inflow from outside of Project Area

- Trinh Xa Pumping Statiom (Ngu Huyen Khe River) Q=20.0 m3/s
- Thai Hoa Pumping Station (Duong River) Q=4.67 m3/s
- Con Thong Pumping Station (Duong River) Q=2.52 m3/s

Total Volume = 118 MCM (Nov.--Mar.)

(g)Irrigated Area and Period

(Case A)

- Winter Spring Paddy(1)	A= 5,084 ha	(Jan.--Jun)
- Summar Paddy(2)	A= 5,295 ha	(Jul.--Oct)
- Maize	A= 600 ha	(Nov.--Jan.)
- Sweet Potato	A= 600 ha	(Nov.--Jan.)
- Potato	A= 300 ha	(Jan.--Dec.)
- Ground Nut	A= 456 ha	(Feb.--Jun.)
- Soy Bean	A= 100 ha	(Sep.--Dec.)
- Vegetable(1)	A= 195 ha	(Sep.--Dec.)
- Vegetable(2)	A= 280 ha	(Jul.--Jan.)
- Others	A= 140 ha	(Jan.--Dec.)

(Case B)

- Winter Spring Paddy(1)	A= 4,000 ha	(Jan.--Jun)
- Summar Paddy(2)	A= 4,000 ha	(Jul.--Oct)
- Maize(1)	A= 600 ha	(Sep.--Dec.)
- Maize(2)	A= 400 ha	(Jan.--Apr.)
- Sweet Potato	A= 1,050 ha	(Oct.--Dec.)
- Potato	A= 800 ha	(Nov.--Feb.)
- Ground Nut	A= 900 ha	(Feb.--Jun.)
- Soy Bean	A= 700 ha	(Nov.--Jan.)
- Vegetable(1)	A= 367 ha	(Oct.--Jan.)
- Vegetable(2)	A= 450 ha	(Oct.--Mar.)
- Vegetable(3)	A= 280 ha	(Jan.--Jun.)
- Others	A= 217 ha	(Jan.--Dec.)

(h)Water requirement

- Paddy (Land Preparation)	q=1.79 l/s/ha
- (After Planting)	q=1.29 l/s/ha
- Subsidiary (Maximum)	q=1.03 l/s/ha
(Minimum)	q=0.31 l/s/ha

Table B-2.22 Water Balance Table (Uit:MCM)

	① Runoff	② Pump Input	③ Avairable Water	④ Water Req.	⑤ Balance
Average Year	227	118	659	411	+ 248
1/2 Year	225	118	566	411	+ 155
1/10 Year	170	118	475	411	+ 64

Note : ① shown the runoff in the project area
② shown the inplow from outside of project area by pump
③ shown the available water((①+②)*1.65)
④ shown the water requirement of paddy and crop
⑤ shown the balance (③-④)

Table B-2.23 Water Requirement at Study Area (Case A)

(Unit : 1000 m3)

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Paddy 1 (*1)	0	23,757	46,305	20,366	0	0	43,821	42,407	0	0	0	0	176,656
Paddy 2 (*2)	0	0	18,016	47,242	68,575	58,204	8,713	30,603	63,247	55,211	7,525	0	357,337
Maize 1	1,071	886	320	0	0	0	0	0	0	0	0	1,010	3,287
Maize 2	0	0	747	1,425	1,827	1,165	0	0	0	0	0	0	5,164
Soy Bean	900	753	213	0	0	0	0	0	0	0	0	931	2,798
Sweet Potato	5,786	4,871	2,850	0	0	0	0	0	0	0	0	4,566	18,073
Potato	670	1,163	996	475	0	0	0	0	0	0	0	0	3,304
Vegetable 1	386	332	80	0	0	0	0	0	0	0	0	403	1,200
Vegetable 2	0	0	149	270	349	225	0	0	0	0	0	0	993
Vegetable 3	2,057	1,771	797	0	0	0	0	0	1,949	3,454	2,782	1,329	14,139
Ground Nut	0	0	797	1,530	1,993	2,507	3,786	3,214	519	0	0	0	14,346
Others	1,650	1,420	1,278	1,155	1,491	1,924	2,983	2,887	3,125	2,770	2,543	2,131	25,358
Total	12,519	34,953	72,550	72,463	74,235	64,026	59,303	79,111	68,840	61,435	12,850	10,369	622,655

Note : (*1) Land Preparation
(*2) Maintenance Water

Table B-2.24 Water Requirement at Study Area (Case B)

(Unit : 1000 m3)

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Paddy 1 (*1)	0	17,899	34,888	15,345	0	0	35,798	34,643	0	0	0	0	138,573
Paddy 2 (*2)	0	0	13,573	35,594	51,667	37,705	6,564	25,000	51,667	38,538	6,148	0	266,455
Maize 1	5,357	1,179	0	0	0	0	0	0	0	0	2,959	6,864	16,359
Maize 2	0	0	100	190	244	155	0	0	0	0	0	0	689
Soy Bean 1	1,350	692	0	0	0	0	0	0	0	0	396	1,794	4,232
Soy Bean 2	0	0	0	400	1,052	1,339	1,024	0	0	0	0	0	3,815
S.Potato 1	6,943	4,950	460	0	0	0	0	0	0	0	359	8,262	20,974
S.Potato 2	0	0	0	950	2,524	3,257	4,943	2,392	0	0	0	0	14,067
Potato	2,812	2,441	989	0	0	0	0	0	0	0	0	2,826	9,069
Vegetable 1	1,029	886	531	0	0	0	0	0	0	0	0	883	3,328
Vegetable 2	0	0	498	900	1,163	750	0	0	0	0	0	0	3,311
Vegetable 3	2,700	2,325	1,046	0	0	0	0	0	2,557	4,534	4,163	1,744	19,069
Ground Nut	0	0	0	1,105	2,879	3,621	5,469	2,646	0	0	0	0	15,721
Others	1,650	1,420	1,278	1,155	1,491	1,924	2,983	2,887	3,125	2,770	2,543	2,131	25,358
Total	21,841	31,792	53,363	55,639	61,019	48,753	56,782	67,568	57,349	45,842	16,567	24,503	541,017

Note : (*1) Land Preparation
(*2) Maintenance Water

Table B -2.25 Water Requirement at Project Area (Case A)

(Unit : 1000 m3)

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Paddy 1 (*1)	0	6,067	11,824	5,201	0	0	12,637	12,229	0	0	0	0	47,957
Paddy 2 (*2)	0	0	4,378	11,863	17,512	12,780	2,225	8,825	18,238	13,604	2,242	0	91,667
Maize	804	78	0	0	0	0	0	0	0	0	550	1,030	2,461
Soy Bean	112	24	0	0	0	0	0	0	0	0	69	149	355
Sweet Potato	868	288	0	0	0	0	0	0	0	0	439	1,129	2,723
Potato	402	349	281	0	0	0	0	0	0	0	0	0	1,032
Vegetable 1	251	119	0	0	0	0	0	0	0	0	96	324	789
Vegetable 2	180	155	52	0	0	0	0	0	170	302	278	116	1,254
Ground Nut	0	0	0	194	505	635	959	464	0	0	0	0	2,757
Others	180	155	140	126	163	210	325	315	341	302	278	232	2,767
Total	2,796	7,234	16,675	17,384	18,179	13,625	16,146	21,833	18,750	14,208	3,951	2,981	153,763

Note : (*1) Land Preparation
(*2) Maintenance Water

Table B-2.26 Water Requirement at Project Area (Case B)

(Unit : 1000 m3)

	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Total
Paddy 1 (*1)	0	1,551	11,067	5,551	0	0	9,546	9,238	0	0	0	0	36,953
Paddy 2 (*2)	0	0	1,227	8,439	13,778	11,694	1,751	6,667	13,778	12,027	3,278	0	72,638
Maize 1	804	407	0	0	0	0	0	0	0	0	517	1,030	2,757
Maize 2	0	0	199	380	487	311	0	0	0	0	0	0	1,377
Soy Bean	787	564	0	0	0	0	0	0	0	0	320	1,046	2,718
S. Potato 1	868	365	71	0	0	0	0	0	0	0	126	1,129	2,559
S. Potato 2	651	548	498	112	0	0	0	0	0	0	0	741	2,551
Potato	1,071	930	289	0	0	0	0	0	0	0	0	1,289	3,580
Vegetable 1	472	406	213	0	0	0	0	0	0	0	0	472	1,563
Vegetable 2	579	498	448	304	0	0	0	0	0	0	0	467	2,296
Vegetable 3	0	0	70	126	102	184	325	157	0	0	0	0	964
Ground Nut	0	0	0	382	996	1,254	1,893	916	0	0	0	0	5,442
Others	279	240	216	195	252	325	505	488	529	468	430	360	4,289
Total	5,511	5,511	14,299	15,489	15,615	13,767	14,020	17,467	14,306	12,496	4,671	6,535	139,687

Note : (*1) Land Preparation
(*2) Maintenance Water

Figure B-2.17 Average Rainfall and Water Requirement at Project Area (Case A)

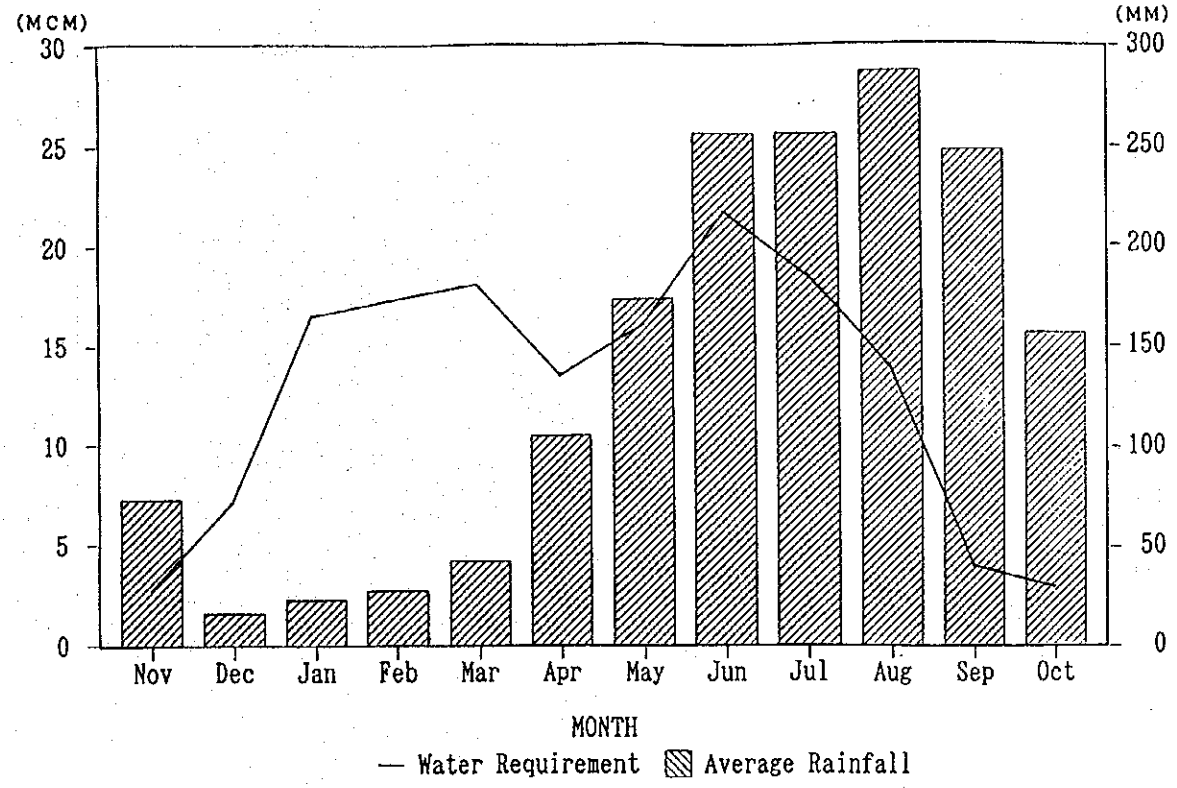


Figure B-2.18 Average Rainfall and Water Requirement at Project Area (Case B)

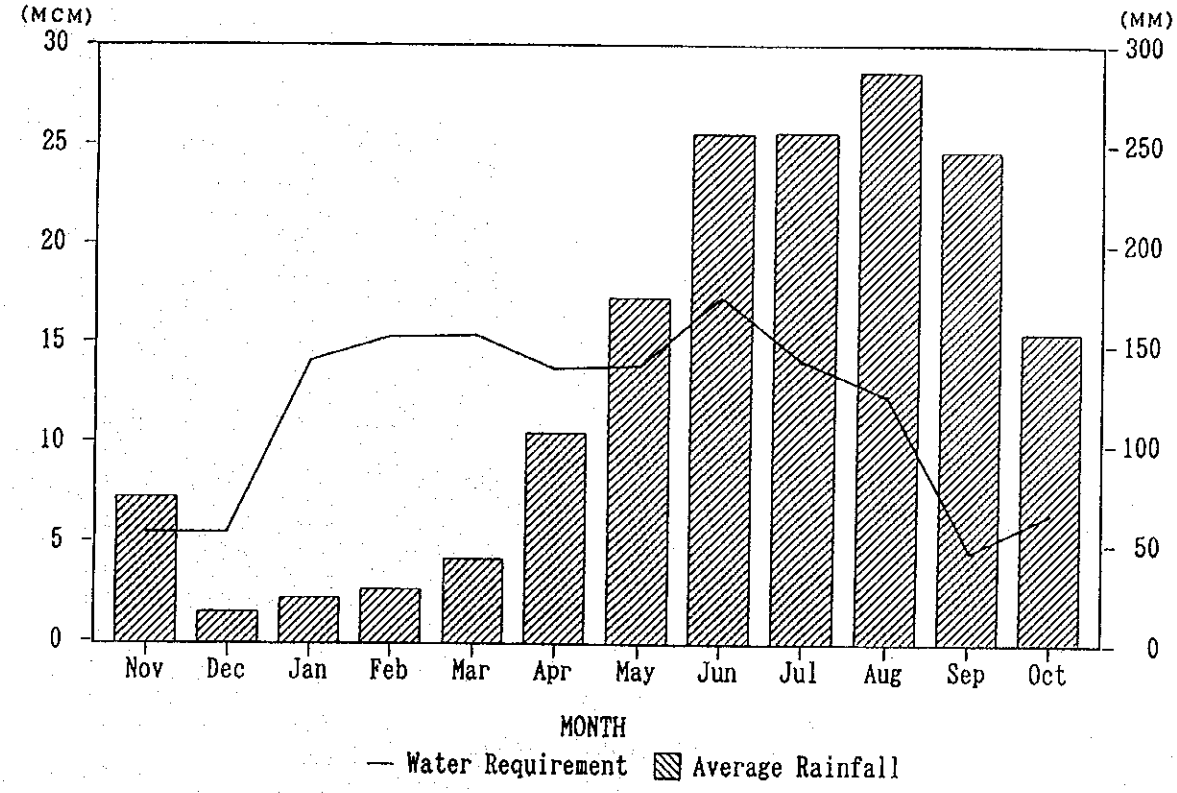


Figure B-2.19 Average Rainfall and Water Requirement at Study Area (Case A)

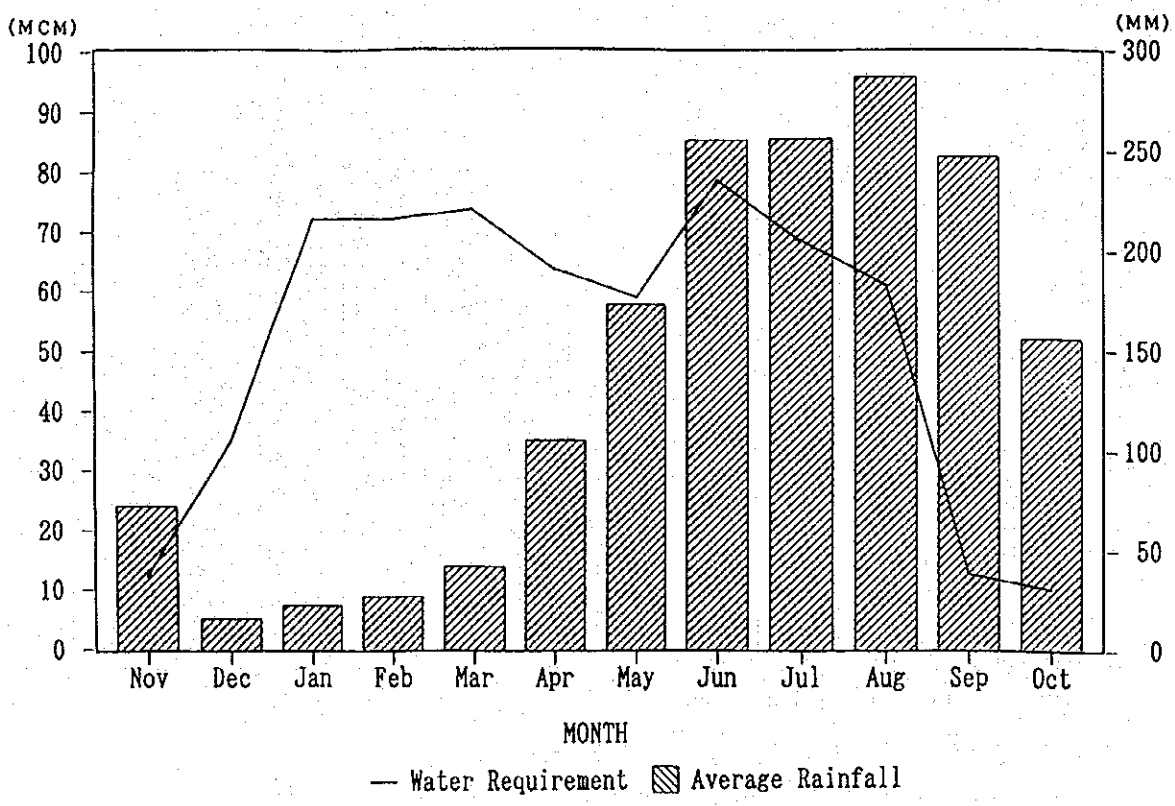


Figure B-2.20 Average Rainfall and Water Requirement at Study Area (Case B)

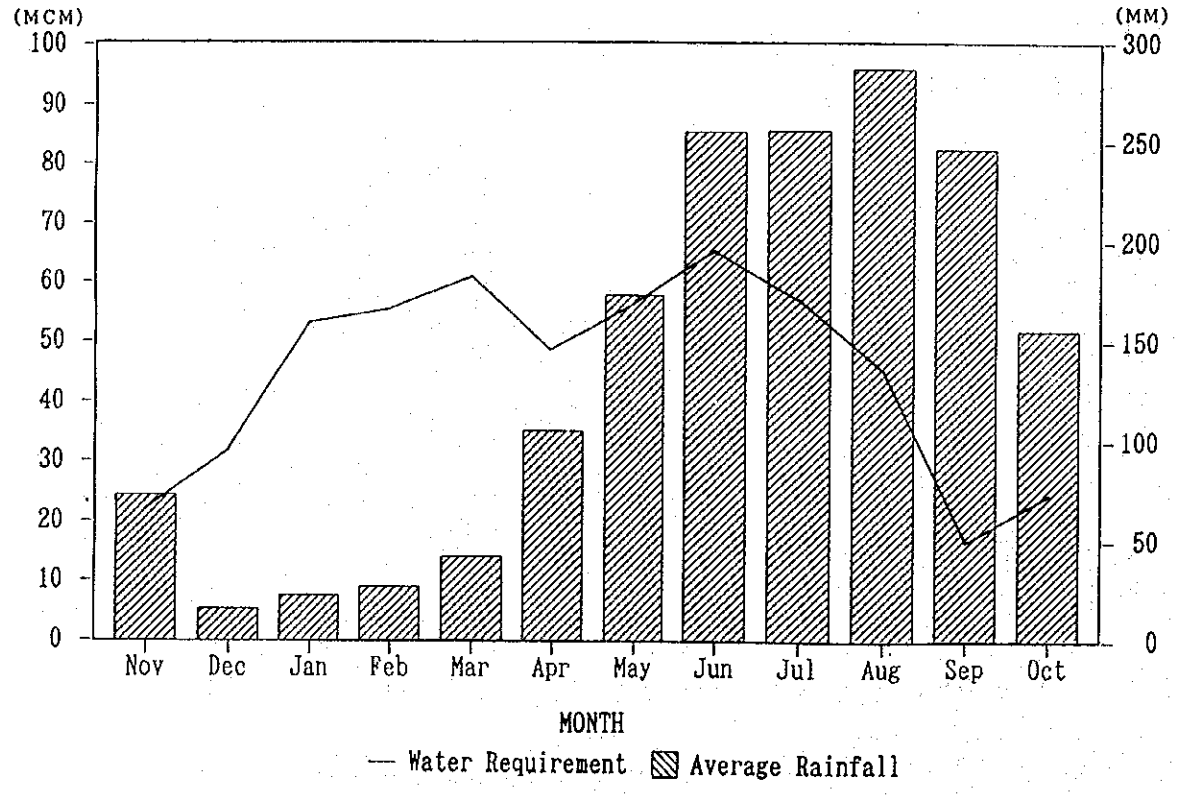


Table B-2.27 Average Monthly Discharge of Pho River at Quang Qu Station

(UNIT:M3/S) (CA:1,190km2)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	AVERAGE
1960	6.08	5.28	6.22	4.53	10.10	10.10	51.20	79.80	95.30	44.60	18.90	12.90	28.75
1961	8.77	7.62	10.80	19.50	9.93	30.80	23.60	45.40	66.90	31.70	20.70	13.40	24.09
1962	11.90	8.54	7.54	9.33	11.40	60.20	39.60	49.70	31.40	21.00	12.40	9.11	22.68
1963	6.27	6.52	6.27	5.96	14.70	15.00	46.30	58.50	36.20	18.70	27.80	12.00	21.19
1964	9.37	8.38	8.12	11.30	18.20	35.70	56.40	34.40	49.90	49.40	22.60	14.70	26.54
1965	9.21	7.94	7.06	24.80	27.50	67.00	38.10	25.10	23.00	19.10	17.00	9.09	22.91
1966	7.43	6.23	5.33	11.20	6.98	47.30	53.60	33.20	23.40	21.40	11.60	6.76	19.54
1967	5.63	6.36	5.74	8.52	14.80	17.10	16.30	30.00	45.20	13.00	8.58	6.08	14.78
1968	4.58	5.69	6.28	9.40	14.60	28.90	32.10	112.00	40.00	29.00	16.10	8.53	25.60
1969	6.76	5.40	5.66	9.72	17.50	14.50	35.90	86.20	45.30	19.80	30.10	10.10	23.91
1970	8.60	7.52	6.48	9.67	29.50	38.40	50.50	64.20	51.40	25.10	12.40	9.06	26.07
1971	7.88	7.46	7.10	7.26	24.80	26.60	95.30	126.00	46.30	34.20	16.40	12.30	34.30
1972	8.67	7.78	7.22	8.54	26.80	21.60	17.80	107.00	58.30	30.20	18.00	12.40	27.03
1973	9.81	8.60	9.59	15.40	18.50	34.50	69.10	83.60	112.00	33.50	16.80	11.60	35.25
1974	10.00	8.29	7.25	9.85	8.83	25.10	39.00	39.20	24.70	32.60	12.30	8.02	18.76
1975	9.86	6.49	7.50	21.10	53.00	89.00	26.70	38.40	47.20	20.00	11.30	8.81	28.28
1976	6.01	7.86	5.45	13.30	19.30	12.00	10.30	60.90	15.80	21.70	10.70	5.99	15.78
AVERAGE	8.05	7.17	7.04	11.73	19.20	33.75	41.28	63.15	47.78	27.35	16.69	10.05	24.44
MIN	4.58	5.28	5.33	4.53	6.98	10.10	10.30	25.10	15.80	13.00	8.58	5.99	9.63
MAX	11.90	8.60	10.80	24.80	53.00	89.00	95.30	126.00	112.00	49.40	30.10	14.70	52.13

RUNNOFF COEFFICIENT=24.44*86400*365/1000000/(1661*1190*1000/1000000)

38.9 %

ANNUAL AVERAGE RAINFALL AT HANOI STATION = 1661 mm

TABLE B-2.28 Sediment Yield at THUONG CAT Station

(Unit : kg/s)

month / year	1	2	3	4	5	6	7	8	9	10	11	12	Average	Total (mil.ton)
1958	5.3	14.0	3.0	2.3	5.2	724.0	2110.0	2200.0	1130.0	220.0	33.9	8.1	543.0	17.1
1959	7.2	5.3	19.6	26.5	224.0	795.0	1080.0	2510.0	1170.0	620.0	267.0	21.2	566.7	17.9
1960	11.7	10.5	5.5	2.5	29.0	819.0	1640.0	2370.0	1320.0	305.0	50.7	64.7	555.4	17.6
1961	47.9	39.0	33.6	63.1	86.7	2140.0	1290.0	5260.0	1540.0	909.0	341.0	160.0	1000.0	31.5
1962	97.8	12.7	16.3	38.0	114.0	1910.0	2560.0	3300.0	934.0	412.0	52.3	11.9	795.2	25.1
1963	7.1	6.6	11.0	6.0	11.0	271.0	1870.0	2610.0	858.0	600.0	1080.0	128.0	627.4	19.8
1964	22.4	7.1	5.9	16.0	166.0	1260.0	3610.0	2900.0	1480.0	808.0	151.0	48.3	879.2	27.8
1965	11.3	3.5	4.2	19.9	63.5	1210.0	2140.0	1500.0	454.0	1240.0	1380.0	257.0	695.1	21.9
1966	34.7	11.4	7.0	14.8	49.8	1710.0	5410.0	4340.0	3370.0	2120.0	188.0	38.6	1454.3	45.9
1967	20.1	15.4	12.6	27.3	103.0	382.0	1450.0	4190.0	2300.0	1020.0	309.0	107.0	835.5	26.3
1968	46.9	32.9	12.2	82.3	196.0	1100.0	4270.0	4460.0	2990.0	1810.0	559.0	57.0	1309.6	41.4
1969	9.7	2.8	3.3	7.5	67.9	636.0	1910.0	6480.0	984.0	202.0	134.0	24.0	883.6	27.9
1970	16.1	12.7	9.9	17.9	509.0	930.0	5700.0	3340.0	1550.0	587.0	111.0	581.0	1127.8	35.6
1971	52.7	37.6	19.1	73.0	318.9	1923.2	4083.3	9256.7	3519.3	724.2	340.7	24.1	1713.9	54.1
1972	25.9	19.6	10.1	13.6	103.1	903.1	3170.9	2410.4	1596.0	954.0	597.5	485.8	863.0	27.3
1973	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1974	22.0	13.8	8.9	9.6	68.3	1467.8	2665.5	3315.7	2961.0	665.7	93.8	20.2	948.2	29.9

TABLE B-2.29 Sediment Yield at THUONG CAT Station

(Unit : g/m3)

month / year	1	2	3	4	5	6	7	8	9	10	11	12	Average
1958	52.3	103.0	50.0	53.2	58.9	1170.0	1290.0	991.0	800.0	328.0	114.0	51.9	423.2
1959	60.2	58.6	123.0	148.0	507.0	657.0	710.0	1080.0	760.0	669.0	578.0	93.8	456.1
1960	66.1	70.0	54.2	42.3	189.0	930.0	882.0	1030.0	733.0	343.0	120.0	187.0	388.2
1961	241.0	203.0	158.0	172.0	391.0	1670.0	1090.0	1910.0	852.0	684.0	421.0	367.0	682.8
1962	261.0	61.0	120.0	248.0	361.0	1220.0	1250.0	1710.0	865.0	606.0	176.0	77.3	583.3
1963	59.2	67.2	112.0	72.8	104.0	669.0	1300.0	1340.0	819.0	704.0	939.0	350.0	547.7
1964	117.0	57.6	63.2	114.0	491.0	1020.0	1390.0	1420.0	908.0	553.0	216.0	120.0	541.5
1965	54.6	24.5	36.6	75.7	204.0	818.0	1020.0	909.0	504.0	1200.0	1190.0	539.0	551.2
1966	144.0	68.7	73.7	125.0	31.0	1080.0	5290.0	1850.0	1560.0	1720.0	309.0	138.0	1043.3
1967	104.0	93.9	107.0	181.0	363.0	578.0	1160.0	1900.0	1490.0	1090.0	532.0	296.0	662.1
1968	180.0	157.0	59.8	256.0	421.0	902.0	1640.0	1680.0	1410.0	1350.0	624.0	201.0	742.6
1969	62.8	27.0	44.6	86.1	320.0	896.0	1170.0	1640.0	724.0	320.0	238.0	109.0	473.3
1970	98.8	87.0	116.0	136.0	781.0	782.0	1690.0	1440.0	852.0	645.0	239.0	842.0	648.5
1971	163.7	142.7	100.4	252.8	490.9	1227.4	1401.7	1829.7	1150.5	529.7	420.1	77.1	651.8
1972	106.6	104.1	68.3	75.6	186.9	807.3	1473.0	1128.0	977.6	738.4	722.2	583.5	582.9
1973	-	-	-	-	-	-	-	-	-	-	-	-	-
1974	107.7	88.6	84.9	71.9	196.9	1157.6	1320.8	1644.9	1376.0	599.2	213.4	98.3	582.7

Water Requirement for Irrigation

[BASED ON FAO]

(1)Upland Crop

By modified penman method

(Unit:mm)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
ETO	2.1	2.2	2.6	3.4	5.1	5.1	5.4	4.8	4.5	3.7	2.9	2.4
Soy bean	1.5	1.6	1.9	2.5	3.7	3.7	3.9	3.5	3.3	2.7	2.1	1.7
S.Potato	2.0	2.0	2.4	3.2	4.7	4.7	5.0	4.5	4.2	3.4	2.7	2.2
Potato	1.8	1.9	2.3	3.0	4.5	4.5	4.7	4.2	3.9	3.2	2.5	2.1
Maize	1.8	1.9	2.2	2.9	4.3	4.3	4.6	4.1	3.8	3.1	2.5	2.0
G.Nuts	1.6	1.7	2.0	2.6	3.8	3.8	4.1	3.6	3.4	2.8	2.2	1.8
Vegetable	1.8	1.8	2.1	2.8	4.2	4.2	4.4	3.9	3.7	3.0	2.4	2.0

(2)Paddy

Based on MWR Data(See next page)

Land Soaking	120 mm
Standing water	70 mm
	190 mm

Average consumptive use	5.5 mm
Percoltion rate	1.5 mm
	7.0 mm

(3)Irrigation Efficiency

Taking consideration of well techniqued water management,
the following efficiency is adopted based on the FAO paper.

For Paddy

E=0.9(conveyance efficiency)*0.7(water application eff.)=0.63

For Upland Crop

E=0.8(conveyance efficiency)*0.7(water application eff.)=0.56

Table B-2.30 Computation of Evapo-Transpiration

* PROJECT NAME			IMPROVEMENT PROJECT OF DRAINAGE SYSTEM IN SOUTH BAC DUONG AGRICALTURAL AREA										
* METEOROLOGICAL STATION			HANOI										
* LATITUDE (-:SOUTHERN HEMISPHERE)			21.01										
* ALTITUDE		(M)	5.00										
* METHOD OF COMPUTATION			PENMAN METHOD										
			ET=C*<W*RN+(1-W)*F(U)*(EA-ED)> MM/DAY										
* HEIGHT OF WIND MEASURMENT		(M)	10.00										
CORRECTION FACTOR OF WIND-SPEED			.75										
* RATIO OF UDAY/UDAILY			1.30										
* RATIO OF UDAY/UNIGHT			1.50										
			JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
* MAXIMUM RERATIVE HUMIDITY		(%)	95.0	95.0	97.0	96.0	95.0	95.0	95.0	96.0	96.0	96.0	95.0	95.0
RADIATION AT LATITUDE		(MM/DAY)	10.9	12.5	14.3	15.5	16.3	16.4	16.4	15.8	14.7	13.1	11.3	10.4
MAXIMUM POSSIBLE SUNSHINE		(HOUR)	10.9	11.5	12.0	12.6	13.1	13.4	13.3	12.8	12.3	11.7	11.1	10.8
AVERAGE YEAR OF 1960-1992		UNIT	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
* MEAN AIR TEMPERATURE		(°C)	16.3	17.1	20.0	23.7	27.4	28.8	29.1	28.5	27.5	24.8	21.3	18.0
* ACTUAL DAY LIGHT HOURS		(HR/DAY)	2.4	1.7	1.6	2.9	6.1	5.8	6.5	5.7	6.0	5.3	4.6	4.1
* MEAN RERATIVE HUMIDTY		(%)	81.3	84.2	85.8	86.3	82.5	82.2	81.8	83.9	82.7	81.1	79.0	78.4
* MEAN WIND-SPEED		(KM/DAY)	168.0	192.0	177.0	192.0	189.0	158.0	157.0	132.0	135.0	146.0	142.0	148.0
VAPOUR PRESSUR	EA	(MBAR)	18.56	19.52	23.40	29.29	36.54	39.64	40.33	38.95	36.75	31.32	25.35	20.60
	ED	(MBAR)	15.09	16.44	20.08	25.28	30.15	32.58	32.99	32.68	30.39	25.40	20.03	16.15
WIND FUNCTION	F(U)		.61	.66	.63	.66	.65	.59	.59	.54	.54	.57	.56	.57
WEIGHTING FACTOR	W		.64	.65	.69	.73	.76	.77	.78	.77	.77	.74	.70	.66
SOLAR RADIATION	RS	(MM/DAY)	3.94	4.05	4.53	5.67	7.86	7.65	8.09	7.48	7.26	6.27	5.18	4.59
NET RADIATION	RN	(MM/DAY)	2.26	2.51	2.94	3.70	5.07	5.02	5.29	4.89	4.59	3.77	2.88	2.42
DAYTIME WIND-SPEED	UDAY	(M/SEC)	1.90	2.17	2.00	2.17	2.13	1.78	1.77	1.49	1.52	1.65	1.60	1.67
ADJUSTMENT FACTOR	C		.96	.95	.97	.99	1.05	1.05	1.06	1.06	1.05	1.02	1.00	.98
EVAPO-TRANSPIRATION	ET	(MM/DAY)	2.10	2.20	2.60	3.40	5.10	5.10	5.40	4.80	4.50	3.70	2.90	2.40

Water Requirement for Irrigation

[BASED ON M.W.R.]

The water requirement has been calculated based on the ducument of "Irrigation Coefficient in Hai Hung Province" prepared by the Ministry of Water Resources, Institute of Water Resources Planning and Management on December 1992.

1.Net Water Requirement

(1)Paddy

- Pre-planting water requirement
  1,700/86.4/20=0.984 l/s/ha
- Irrigation water requirement after planting
  400/86.4/6=0.772 l/s/ha

(2)Upland Crop

400/86.4/8=0.578 l/s/ha

2.Irrigation Efficiency

0.65--0.70 (Average:0.675)

3.Gross Water Requirement

If the value of 0.675 is adopted as irrigation efficiency, the gross water requirement is shown as follows.

- Pre-planting water =0.984/0.675=1.46 l/s/ha
- After planting =0.772/0.675=1.14 l/s/ha
- Upland Crop =0.578/0.675=0.86 l/s/ha

B-3 Supporting Data

B-3.1 Flood Runoff Method

The mechanism of surface runoff is generally classified into two parts; namely (1) the behaviour of rain water which flows down a sloping surface and pours directly into river channel and (2) the behaviour of lateral inflow which pours into such a stream. As a simplified stream condition, the behaviour of unsteady flow in an open channel with distributed lateral inflow along a channel is studied hydraulically to establish the basic relationship between the rate of inflow and runoff in a stream or on a sloping surface. Hydrographs under this simplified condition are easily computed for both laminar and turbulent flows, and the hydraulic character of hydrographs resulting from simulated inflow at a given rate are investigated. The characteristic curve method was employed to express this phenomenon. Below is a brief explantion.

On the other hand, if the law of resistance of Manning's type is used, unsteady flow in an open channel with a given rate of lateral inflow would be expressed, for the practical purposes, by the following equations:

$$A = n \times I^{-1/2} \times R^{2/3} \times Q = kQ^{p} \quad \text{and}$$

$$\frac{\partial A}{\partial t} + \frac{\partial Q}{\partial X} = q$$

To solve the above equation, the characteristic curve method (So-called kinematic run off model method) is applied and the characteristic curves are given as follows:

$$\frac{dX}{I} = \frac{dt}{dA/dQ} = \frac{dt}{pkQ^{p-1}} = \frac{dQ}{q}$$

where, A: cross-sectional area of flow (sq.m)
n: Manning's roughness coefficient
I: water surface slope of flow
R: hydraulic radius (m)
Q: discharge (cu.m/sec)
k,p: constants
t: time
X: distance along channel (m)
q: lateral inflow per unit length of channel (cu.m/sec/m)

Based on the above two equations of kinematic runoff model method, the characteristic curves can be solved by applying the following equation; as

$$dx/dt = Q^{1-p}/pk.$$

$$qdt = pkQ^{p-1} \text{ or } qt = kQ^{p} + \text{constant, and}$$

$$qdx = dQ \quad \text{or } qX = Q + \text{constant}$$

Taking the constant = 0, the flow condition is expressed for a given magnitude of lateral inflow q, as;

$$t = kQ^{p}/q \text{ and}$$

$$t = kXQ^{p-1}$$

When q = 0, the above equations is expressed on a characteristic curve method given above that A = constant and Q = constant = $(A/K)^{1/p}$. The flow condition is shown as follows.

$$X = (Q^{1-p}/pk)t.$$

Some Consideration on Effect of Storage on a Paddy Plot.

The time lag of concentration of runoff is generally recognized to be remarkable for drainage area mainly composed of low flat paddy because of storage capacity on a paddy plot. A paddy plot surrounded by levees with certain depth of flooding water can be regarded as a small reservoir and, therefore, the conception of simplified reservoir operation could be introduced to take into account the effect of rain water deposit on a paddy plot.

The storage function is introduced to calculate the specific runoff capacity from a paddy plot by the following equation:

$$\frac{dV}{dt} = I - O$$

where V denotes storage on a paddy plot; I and O denote inflow into and outflow from a paddy plot; respectively, and denotes time. The above equation can be divided by the water surface area on a plot, (A,) and then transformed as follows:

$$\frac{dH}{dt} = i - o$$

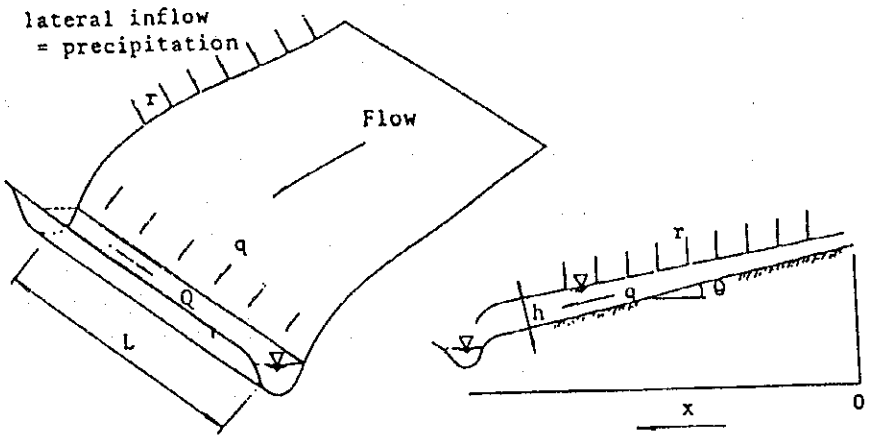
where H represents the ponding depth on a plot; i as specific inflow corresponding to effective rainfall on a plot, and o as specific outflow corresponding to the specific runoff capacity from a paddy plot. A different another type of equation is constructed to solve the above equation by a computer as follows;

$$H_{t+1} = H_t + (RE_{t,\ t+1} - \frac{o_t - o_{t+1}}{2}) \Delta t$$

where $RE_{t,\ t+1}$ represents effective rainfall between time t and t+1 and Δt represents the time interval given for computation. The specific runoff capacity from paddy fields is thus computed at corresponding time (t), which is then considered as a lateral inflow of drainade canal or stream.

Application of the Characteristic Curve Method to a Particular Case

(1) For a Slope



- In the case when $r \neq 0$

$t = kq^p / \delta r$

$t = kXq^{p-1}$

- When r = 0

$$t = pkX/q^{1-p} = 0.6q^{-0.4}(N/I^{1/2})^{0.6}X$$

where, δ : conversion rate from mm/hr to $m^3/sec = 0.2778 \times 10^{-6}$
r : effective rainfall (mm/hr)
q : discharge per unit width of slope ($m^3/sec/m$)
N : equivalent roughness coefficient of slope
I : slope = sin
X : flow distance

(2) For River or Channel : As stated previously with theoretical concept.

(3) For Paddy Field

- for ditch

$$A_m = kQ_m^p$$

$$\frac{\partial A_m}{\partial t} + \frac{\partial Q_m}{\partial X} = (2b0)\alpha, \text{ and}$$

- for lateral drainage canal

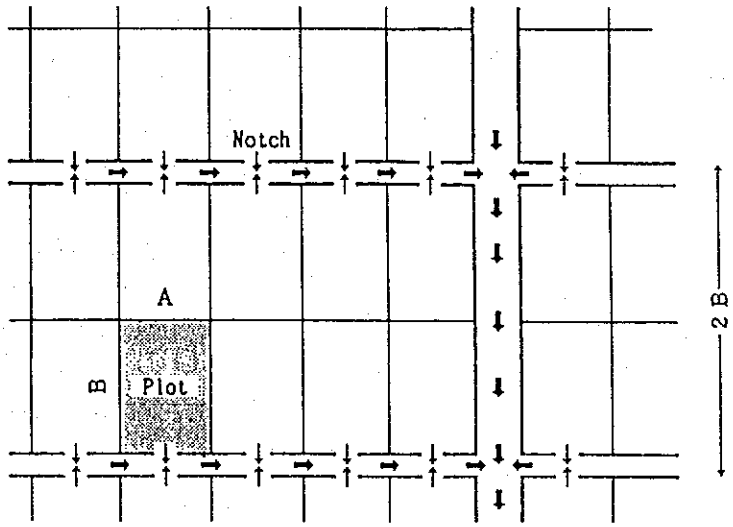
$$A_b = kQ_b^p$$

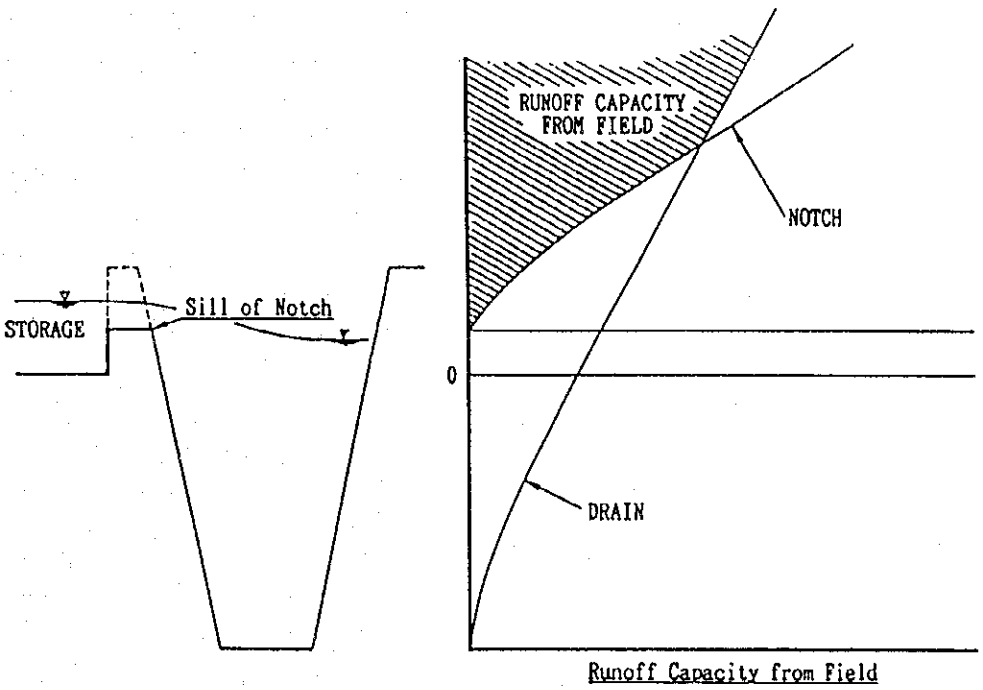
$$\frac{\partial A_b}{\partial t} + \frac{\partial Q_b}{\partial X} = \frac{Qm}{2b}$$

where, A_m, Q_m : flow area and discharge in a ditch
A_b, Q_b : flow area and discharge in a laretal canal
k,p : constants
α : = 0.2778×10^{-6}
b : see Figure
O : runoff capacity per unit area (mm/hr)

Following figure shows the concept of runoff capacity from the paddy field.

RUNOFF CAPACITY FROM PADDY FIELD





Runoff Capacity from Field

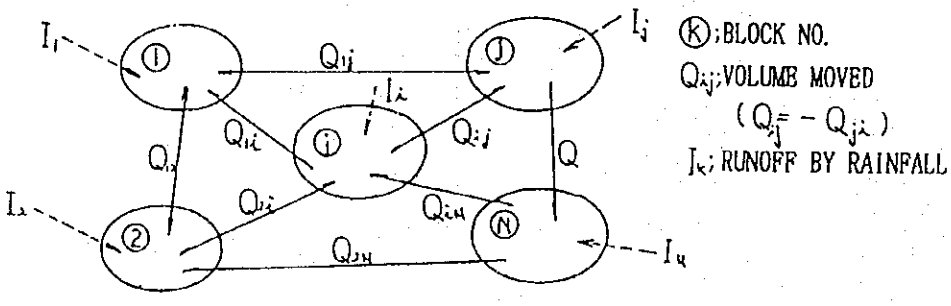
B-3.2 Continuous Reservoir Model

Method of Analysis

In a watershed, runoff caused by rainfall is governed by the topographical characteristics and appeared in the river or artificial channel with some delay in time. The runoff in the channel is then governed by the hydraulics of the channel. In case flow capacity of the channel does not meet the runoff or in case the flow in the channel is restricted due to backwater from the downstream, the runoff remained from the discharge causes inundation at the place. Such phenomenon emerges not only in channels but also in culverts across roads, siphons, gateways, drainage pumping stations, etc. Such situations are commonly observed in the low flat areas. In order to precisely simulate the phenomenon, the so-called continuous reservoir model method can be applied. The water balance study is therefore made below.

Continuous Reservoir Model

The "continuous reservoir model" assumes that each of a number of blocks divided into from a watershed is a reservoir with storage functions characterized by H-V and H-A curves. Drainage facilities such as channels, culverts, siphons, gateways, pumps, weirs, etc. are connecting the twe reservoirs. The movement of water between the two reservoir is generated by the difference in water levels and governed by the hydraulic functions and dimensions of the facilities, causes difference in stored volumes. The differences in the storage are then calibrated by the differences in the water levels to pursue further changes in the storage and water levels. The conceptual image of the model is shown below.



CONCEPTUAL IMAGE: CONTINUOUS RESERVOIR MODEL

A continuity equation for an arbitrary i'th block is given as follows:

$$\frac{dV_i}{dt} = I_i - \sum_{j=1}^{N} Q_{ij} \quad (i \neq j) \qquad \cdots\cdots\cdots\cdots\cdots\cdots \quad (1)$$

where V_i = storage volume in i'th block,
I_i = flow into I'th block; i.e. direct runoff within the block,
Q_{ij} = flow from i'th block to j'th block (reverse is negative), and
t = time

For application of the model to the blocks in a watershed, the change of water level in a unit time of calculation interval, Δt is generally infinitesimal. Accordingly, the equation below may be applied.

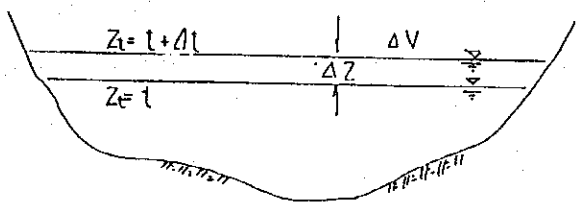


IMAGE OF CROSS-SECTION OF BLOCK RESERVOIR

$$\Delta V = A \cdot (Z_{t-\tau}) \cdot \Delta Z \qquad \cdots\cdots\cdots\cdots\cdots\cdots \quad (2)$$

where ΔV = incremental storage volume,
A = inundated areas (given by a function of Z),
ΔZ = incremental inundated water level, and
Z = inundated water level.

Substituting the equation (1) and (2), the following equation may be used then

$$\frac{dZ_i}{dt} = \frac{1}{A(Z_i)} \left(I_i - \sum_{j=1}^{N} Q_{ij} \right) \qquad \cdots\cdots\cdots\cdots \quad (3)$$

Changes in water levels may thus be calculated. In the above equation, $A(Z_i)$ and I_i are derived from the water level-storage curve and runoff analysis in each block respectively, while Q_{ij} are derived from water level differences between the reservoirs and functions and dimensions of the hydraulic facilities.

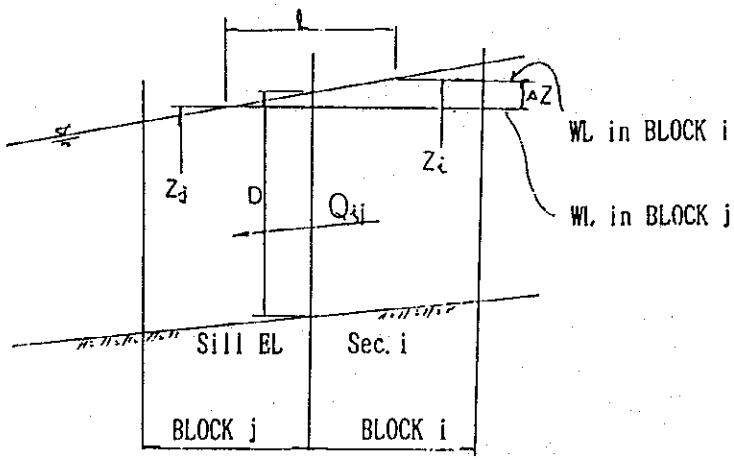
The equation (3) is formed simultaneously in each of whole N blocks, and therefore the study in changes of inundated water levels is to solve N numbers of simultaneous differential equations. Some of numerical analysis methods such as Runge-Kutter-Gill method for instance, can be employed.

Flow Condition Equation

Each reservoir block is connected by an arbitral number of drainage facilities and the flows through them are governed by water level differences. Flow condition equations are equations to calculate the flows through the various drainage facilities, and are expressed in terms of water level difference by substituting hydraulic functions and dimensions of the facilities.

The flow condition equations for various drainage facilities are given below.

i) River channel



The flow between i'th and J'th blocks is assumed to run by gravity by the water level difference ΔZ and by Manning's Formula, then

$$Q_{ij} = \frac{A_{ij}}{n} \cdot R_{ij}^{2/3} \cdot I_{ij}^{1/2}$$

$$= \frac{1}{n} \cdot A_{ij} \cdot R_{ij}^{2/3} \cdot \left(\frac{\Delta Z_{ij}}{l_{ij}}\right)^{1/2}$$

$$= \frac{1}{n\sqrt{l_{ij}}} \left(A_{ij} \cdot R_{ij}^{2/3}\right) \sqrt{\Delta Z_{ij}} \quad \cdots\cdots\cdots\cdots (1)$$

Generally in the flow channels, $AR^{2/3}$ equals aD^b (a and b are the constants while D is the water depth) and substituting this for the equation (1), then

$$Q_{ij} = \frac{1}{n\sqrt{l_{ij}}} \times a_{ij} \times D_{ij}^{b_{ij}} \times \sqrt{\Delta Z_{ij}}$$

$$= \frac{1}{n\sqrt{l_{ij}}} \times a_{ij} \times \left(\frac{Z_i + Z_j}{2} - SILL_{ij}\right)^{b_{ij}} \times \sqrt{Z_i - Z_j} \quad \cdots\cdots (2)$$

In the equation (2) above, I_{ij}, a_{ij} b_{ij} and $Sill\text{-}EL_{ij}$ are identical in each block so that Q_{ij} can directly be calculated from water levels in the blocks by giving those identical figures in the equation in advance.

In the above equations (1) and (2), Z_i and Z_j are the water levels in i'th and j'th blocks, respectively, a_{ij} and b_{ij} are the constants, n is the Manning's coefficient of roughness, ΔZ is the water level difference, 1 is the distance between the two blocks, and D_{ij} is the water depth.

B-3.3 Outputs of Water Balance Computation

(1) Tan Chi Only Case

TAN CHI ONLY

*** INUNDATION ANALYSIS BLOCK No. 1 *** CASE PLAN

TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	PONDAGE (1000*cum)	--INUNDATION-- DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 1	2	5	6
1	.00	3.338	7.910	103.75	566.1	.000	223.45	.00	.00	8.25	112.00
2	.00	3.275	7.931	103.98	462.1	.000	182.41	.00	.00	8.01	112.00
3	.00	3.214	7.951	101.21	360.9	.000	142.46	.00	3.00	7.78	112.00
4	.02	3.166	7.972	79.69	281.2	.000	111.01	.00	24.74	7.56	112.00
5	.05	3.123	7.992	72.28	209.0	.000	82.50	.00	32.91	6.81	112.00
6	.09	3.081	8.012	69.57	139.5	.000	55.08	.00	36.92	5.50	112.00
7	.18	3.044	8.033	62.09	77.6	.000	30.64	6.17	39.23	4.51	112.00
8	.33	3.017	8.053	44.45	33.4	.000	13.22	24.66	39.15	3.74	112.00
9	.57	2.896	8.074	30.05	4.0	.000	1.58	39.53	42.06	3.37	112.00
10	1.04	2.873	8.094	1.27	3.7	.000	1.49	60.47	50.02	3.37	112.00
11	1.94	2.859	8.115	2.08	3.6	.000	1.44	61.64	47.24	3.37	112.00
12	3.27	2.831	8.135	3.55	3.3	.000	1.32	63.61	38.11	3.37	112.00
13	4.77	2.902	8.155	4.06	4.0	.000	1.61	63.91	20.48	3.37	112.00
14	6.08	2.922	8.176	5.88	4.2	.000	1.69	52.53	18.98	3.37	112.00
15	6.98	2.901	8.196	7.19	4.0	.000	1.60	43.40	18.11	3.37	112.00
16	7.56	2.879	8.217	7.77	3.8	.000	1.52	41.90	16.13	3.37	112.00
17	7.93	2.861	8.237	8.12	3.6	.000	1.44	40.34	14.72	3.37	112.00
18	8.14	2.845	8.257	8.31	3.4	.000	1.38	38.74	13.73	3.37	112.00
19	8.20	2.817	8.278	8.47	3.2	.000	1.27	36.50	12.60	3.37	112.00
20	8.13	2.793	8.298	8.37	2.9	.000	1.17	33.78	11.46	3.37	112.00
21	7.98	2.771	8.319	8.20	2.7	.000	1.08	31.13	10.66	3.37	112.00
22	7.80	2.751	8.339	8.00	2.5	.000	1.00	28.55	10.09	3.37	112.00
23	7.68	2.733	8.360	7.86	2.3	.000	.93	26.03	9.72	3.37	112.00
24	7.75	2.717	8.380	7.90	2.2	.000	.87	23.59	9.58	3.37	112.00
25	8.06	2.705	8.414	8.18	2.0	.000	.82	21.28	9.72	3.37	112.00
26	8.58	2.695	8.448	8.68	2.0	.000	.78	19.17	10.11	3.37	112.00
27	9.27	2.689	8.482	9.33	1.9	.000	.75	17.31	10.70	3.37	112.00
28	10.10	2.685	8.517	10.13	1.9	.000	.74	15.75	11.45	3.37	112.00
29	11.14	2.685	8.551	11.14	1.9	.000	.74	14.54	12.34	3.37	112.00
30	12.45	2.689	8.585	12.41	1.9	.000	.76	13.70	13.39	3.37	112.00
31	14.12	2.698	8.619	14.03	2.0	.000	.79	13.24	14.65	3.37	112.00
32	16.27	2.712	8.653	16.13	2.1	.000	.85	13.18	16.23	3.37	112.00
33	19.94	2.739	8.687	19.67	2.4	.000	.96	13.54	18.51	3.38	112.00
34	27.48	2.641	8.722	28.46	1.4	.000	.56	6.52	29.26	3.52	112.00
35	39.62	2.674	8.756	39.30	1.7	.000	.69	.00	43.18	3.94	112.00
36	52.85	2.786	8.790	51.73	2.9	.000	1.14	.00	51.83	4.52	112.00
37	62.58	2.906	8.824	61.38	4.1	.000	1.62	.00	45.46	5.16	112.00
38	67.34	2.955	8.858	66.84	4.6	.000	1.82	.00	39.35	5.81	112.00
39	68.49	2.989	8.892	68.15	4.9	.000	1.96	.00	37.41	6.43	112.00
40	67.77	3.001	8.927	66.76	5.9	.000	2.36	.00	38.20	7.04	112.00
41	66.36	3.003	8.961	62.34	9.9	.000	3.94	.00	42.21	7.45	112.00
42	64.95	3.010	8.995	53.33	21.5	.000	8.53	6.20	44.93	7.53	112.00
43	63.81	3.019	9.029	48.90	36.5	.000	14.41	9.10	46.38	7.62	112.00
44	62.95	3.028	9.063	47.60	51.8	.000	20.47	9.32	47.37	7.70	112.00
45	62.44	3.037	9.097	47.12	67.1	.000	26.52	8.96	48.12	7.80	112.00
46	62.23	3.046	9.132	47.08	82.3	.000	32.50	8.31	48.70	7.90	112.00
47	62.05	3.055	9.166	47.22	97.1	.000	38.35	7.57	49.20	8.00	112.00
48	61.64	3.064	9.200	47.32	111.4	.000	44.00	6.95	49.63	8.10	112.00
49	60.99	3.072	9.203	47.25	125.2	.000	49.43	6.54	50.00	8.20	112.00
50	60.21	3.080	9.207	47.02	138.3	.000	54.63	6.36	50.31	8.30	112.00
51	59.43	3.088	9.210	46.71	151.1	.000	59.65	6.33	50.56	8.40	112.00
52	58.71	3.095	9.213	46.37	163.4	.000	64.52	6.37	50.76	8.49	112.00
53	58.07	3.103	9.217	46.04	175.4	.000	69.27	6.46	50.91	8.58	112.00
54	57.52	3.110	9.220	45.74	187.2	.000	73.93	6.56	51.02	8.68	112.00
55	57.05	3.117	9.223	45.46	198.8	.000	78.50	6.66	51.10	8.77	112.00
56	56.67	3.124	9.227	45.22	210.3	.000	83.02	6.75	51.16	8.86	112.00
57	56.49	3.130	9.230	45.04	221.7	.000	87.54	6.79	51.22	8.95	112.00
58	56.65	3.137	9.233	44.98	233.4	.000	92.15	6.70	51.28	9.04	112.00
59	57.08	3.145	9.237	45.04	245.4	.000	96.90	6.46	51.37	9.12	112.00
60	57.50	3.152	9.240	45.17	257.7	.000	101.76	6.14	51.48	9.20	112.00
61	57.70	3.160	9.243	45.28	270.2	.000	106.66	5.84	51.61	9.27	112.00
62	57.63	3.167	9.247	45.28	282.5	.000	111.54	5.67	51.72	9.32	112.00
63	57.38	3.174	9.250	45.16	294.7	.000	116.36	5.65	51.81	9.37	112.00
64	57.03	3.182	9.253	44.98	306.8	.000	121.12	5.77	51.84	9.41	112.00
65	56.67	3.189	9.257	44.79	318.7	.000	125.81	5.96	51.81	9.43	112.00
66	56.32	3.196	9.260	44.62	330.4	.000	130.42	6.22	51.71	9.45	112.00
67	55.99	3.203	9.263	44.49	341.9	.000	134.96	6.52	51.53	9.46	112.00
68	55.66	3.209	9.267	44.40	353.1	.000	139.41	6.86	51.28	9.46	112.00
69	55.35	3.216	9.270	44.36	364.1	.000	143.75	7.21	50.97	9.45	112.00
70	55.03	3.222	9.273	44.37	374.8	.000	147.96	7.58	50.61	9.44	112.00
71	54.70	3.229	9.277	44.40	385.1	.000	152.02	7.97	50.21	9.42	112.00
72	54.34	3.235	9.280	44.43	395.0	.000	155.94	8.40	49.78	9.38	112.00

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*** INUNDATION ANALYSIS BLOCK No. 1 *** CASE PLAN
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TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	PONDAGE (1000*cum)	--INUNDATION-- DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 1	2	5	6
73	53.96	3.240	9.262	44.47	404.5	.000	159.68	8.86	49.32	9.34112.00	
74	53.57	3.246	9.243	44.52	413.5	.000	163.25	9.35	48.84	9.29112.00	
75	53.20	3.251	9.225	44.60	422.1	.000	166.65	9.88	48.28	9.24112.00	
76	52.84	3.256	9.207	44.72	430.3	.000	169.85	10.45	47.66	9.17112.00	
77	52.50	3.260	9.188	44.85	437.9	.000	172.87	11.06	46.99	9.10112.00	
78	52.19	3.265	9.170	44.99	445.1	.000	175.72	11.68	46.31	9.02112.00	
79	51.89	3.269	9.152	45.14	451.9	.000	178.38	12.32	45.61	8.93112.00	
80	51.58	3.273	9.133	45.33	458.1	.000	180.84	12.94	44.89	8.84112.00	
81	51.22	3.276	9.115	45.54	463.8	.000	183.09	13.56	44.15	8.75112.00	
82	50.79	3.279	9.097	45.76	468.8	.000	185.07	14.21	43.38	8.65112.00	
83	50.30	3.282	9.078	45.98	473.1	.000	186.77	14.88	42.59	8.54112.00	
84	49.78	3.284	9.060	46.17	476.7	.000	188.20	15.60	41.79	8.44112.00	
85	49.25	3.286	9.042	46.35	479.6	.000	189.34	16.33	40.98	8.33112.00	
86	48.73	3.287	9.023	46.52	481.9	.000	190.22	17.09	40.17	8.22112.00	
87	48.21	3.288	9.005	46.67	483.4	.000	190.82	17.85	39.37	8.11112.00	
88	47.68	3.288	8.987	46.79	484.3	.000	191.18	18.62	38.59	8.00112.00	
89	47.13	3.289	8.968	46.88	484.5	.000	191.28	19.38	37.84	7.90112.00	
90	46.55	3.288	8.950	46.92	484.2	.000	191.13	20.14	37.15	7.79112.00	
91	45.91	3.288	8.932	46.91	483.2	.000	190.73	20.91	36.50	7.68112.00	
92	45.21	3.287	8.913	46.84	481.5	.000	190.09	21.68	35.91	7.57112.00	
93	44.47	3.285	8.895	46.75	479.3	.000	189.19	22.46	35.37	7.42112.00	
94	43.73	3.283	8.877	47.02	476.0	.000	187.90	23.30	34.90	6.79112.00	
95	42.99	3.281	8.858	47.14	471.8	.000	186.26	24.23	34.51	6.12112.00	
96	42.25	3.278	8.840	47.10	467.0	.000	184.34	25.18	34.15	5.57112.00	
97	41.52	3.275	8.823	46.98	461.5	.000	182.18	26.11	33.80	5.11112.00	
98	40.78	3.271	8.805	46.83	455.5	.000	179.80	27.01	33.44	4.72112.00	
99	40.06	3.267	8.788	46.65	448.9	.000	177.20	27.89	33.07	4.38112.00	
100	39.36	3.263	8.770	46.47	441.8	.000	174.39	28.74	32.70	4.09112.00	
101	38.66	3.258	8.753	46.28	434.1	.000	171.38	29.57	32.32	3.82112.00	
102	37.95	3.253	8.735	46.09	426.0	.000	168.17	30.38	31.93	3.59112.00	
103	37.24	3.248	8.718	46.36	416.9	.000	164.57	31.21	31.58	3.40112.00	
104	36.53	3.242	8.700	46.34	407.1	.000	160.70	32.14	31.32	3.37112.00	
105	35.82	3.236	8.683	45.86	397.0	.000	156.74	33.01	31.01	3.37112.00	
106	35.12	3.230	8.665	45.49	386.7	.000	152.65	33.81	30.64	3.37112.00	
107	34.44	3.223	8.648	45.17	375.9	.000	148.41	34.57	30.26	3.37112.00	
108	33.76	3.217	8.630	44.87	364.8	.000	144.03	35.29	29.89	3.37112.00	
109	33.10	3.210	8.613	44.57	353.4	.000	139.50	36.00	29.55	3.37112.00	
110	32.44	3.202	8.595	44.28	341.5	.000	134.83	36.68	29.23	3.37112.00	
111	31.79	3.195	8.578	43.98	329.3	.000	130.02	37.34	28.93	3.37112.00	
112	31.16	3.188	8.560	43.67	316.8	.000	125.08	37.97	28.66	3.37112.00	
113	30.55	3.180	8.543	43.38	304.0	.000	120.01	38.59	28.40	3.37112.00	
114	29.95	3.172	8.525	43.14	290.8	.000	114.81	39.17	28.11	3.37112.00	
115	29.35	3.164	8.508	43.12	277.0	.000	109.38	39.68	27.65	3.37112.00	
116	28.55	3.155	8.490	43.49	262.1	.000	103.48	40.16	26.85	3.37112.00	
117	27.22	3.145	8.473	44.03	245.3	.000	96.85	40.71	25.80	3.37112.00	
118	25.36	3.133	8.455	44.19	226.5	.000	89.42	41.45	24.94	3.37112.00	
119	23.56	3.121	8.438	43.81	206.2	.000	81.42	42.38	24.42	3.37112.00	
120	22.30	3.109	8.420	43.15	185.4	.000	73.19	43.38	24.13	3.37112.00	
121	21.60	3.096	8.401	42.45	164.5	.000	64.96	44.33	23.92	3.37112.00	
122	21.17	3.084	8.382	41.84	143.9	.000	56.81	45.18	23.71	3.37112.00	
123	20.82	3.071	8.362	41.34	123.3	.000	48.71	45.94	23.49	3.37112.00	
124	20.42	3.059	8.343	40.90	102.9	.000	40.63	46.63	23.27	3.37112.00	
125	19.87	3.046	8.324	40.47	82.3	.000	32.49	47.26	23.09	3.37112.00	
126	19.20	3.034	8.305	40.01	61.4	.000	24.28	47.88	22.97	3.37112.00	
127	18.60	3.021	8.286	39.52	40.5	.000	16.02	48.48	22.88	3.37112.00	
128	18.09	3.009	8.267	39.07	19.5	.000	7.74	49.05	22.80	3.37112.00	
129	17.38	2.951	8.247	32.42	4.5	.000	1.80	52.37	26.16	3.37112.00	
130	16.35	2.929	8.228	16.56	4.3	.000	1.72	60.38	34.03	3.37112.00	
131	15.07	2.855	8.209	15.81	3.6	.000	1.42	65.88	29.30	3.37112.00	
132	13.68	2.765	8.190	14.58	2.7	.000	1.06	74.72	18.46	3.37112.00	
133	12.36	2.746	8.171	12.56	2.5	.000	.98	75.03	12.12	3.37112.00	
134	11.32	2.729	8.152	11.49	2.3	.000	.92	74.85	10.11	3.37112.00	
135	10.58	2.720	8.132	10.67	2.2	.000	.88	74.25	8.67	3.37112.00	
136	10.10	2.721	8.113	10.09	2.2	.000	.88	74.59	2.01	3.37112.00	
137	9.84	2.612	8.094	10.93	1.1	.000	.45	59.64	12.97	3.37112.00	
138	9.74	2.538	8.075	10.48	.4	.000	.15	44.26	14.78	3.37112.00	
139	9.67	2.509	8.056	9.97	.1	.000	.03	41.79	12.44	3.37112.00	
140	9.53	2.500	8.037	9.62	.0	.000	.00	39.93	9.79	3.37112.00	
141	9.14	2.500	8.017	9.14	.0	.000	.00	36.60	6.16	3.37112.00	
142	7.94	2.500	7.998	7.94	.0	.000	.00	33.13	3.50	3.37112.00	
143	5.49	2.500	7.979	5.49	.0	.000	.00	29.66	2.15	3.37112.00	
144	1.99	2.500	7.960	1.99	.0	.000	.00	26.18	.91	3.37112.00	

*** INUNDATION ANALYSIS BLOCK No. 2 *** CASE PLAN

TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	--INUNDATION-- PONDAGE (1000*cum)	DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 1
1	.00	3.060	3.338	.00	699.0	.000	237.96	.00
2	.00	3.060	3.275	.00	699.0	.000	237.96	.00
3	.00	3.060	3.214	.00	699.0	.000	237.96	.00
4	.01	3.060	3.166	.00	699.0	.000	237.96	.00
5	.07	3.060	3.123	.00	699.1	.000	237.98	.00
6	.17	3.060	3.081	.00	699.3	.000	238.02	.00
7	.27	3.059	3.044	6.17	693.4	.000	236.56	6.17
8	.42	3.053	3.017	24.66	669.1	.000	230.55	24.66
9	.64	3.045	2.896	39.53	630.2	.000	220.90	39.53
10	1.12	3.032	2.873	60.47	570.9	.000	206.18	60.47
11	2.19	3.018	2.859	61.64	511.4	.000	191.44	61.64
12	3.66	3.005	2.831	63.61	451.5	.000	176.57	63.61
13	4.86	2.957	2.902	63.91	392.4	.000	156.42	63.91
14	5.60	2.903	2.922	52.53	345.5	.000	137.71	52.53
15	6.12	2.859	2.901	43.40	308.2	.000	122.85	43.40
16	6.55	2.818	2.879	41.90	272.9	.000	108.76	41.90
17	6.93	2.779	2.861	40.34	239.4	.000	95.44	40.34
18	7.29	2.742	2.845	38.74	208.0	.000	82.91	38.74
19	7.60	2.709	2.817	36.50	179.1	.000	71.39	36.50
20	7.79	2.678	2.793	33.78	153.1	.000	61.03	33.78
21	7.82	2.651	2.771	31.13	129.8	.000	51.74	31.13
22	7.72	2.627	2.751	28.55	109.0	.000	43.44	28.55
23	7.65	2.606	2.733	26.03	90.6	.000	36.11	26.03
24	7.75	2.587	2.717	23.59	74.7	.000	29.80	23.59
25	8.06	2.572	2.705	21.28	61.5	.000	24.53	21.28
26	8.56	2.559	2.695	19.17	50.9	.000	20.29	19.17
27	9.20	2.550	2.689	17.31	42.8	.000	17.06	17.31
28	9.96	2.543	2.685	15.75	37.0	.000	14.75	15.75
29	10.81	2.539	2.685	14.54	33.3	.000	13.26	14.54
30	11.81	2.537	2.689	13.70	31.4	.000	12.51	13.70
31	13.13	2.536	2.698	13.24	31.3	.000	12.47	13.24
32	15.02	2.539	2.712	13.18	33.1	.000	13.20	13.18
33	18.59	2.544	2.739	13.54	38.2	.000	15.21	13.54
34	26.76	2.568	2.641	6.52	58.4	.000	23.28	6.52
35	39.78	2.614	2.674	.00	98.2	.000	39.13	.00
36	51.40	2.674	2.786	.00	149.6	.000	59.62	.00
37	57.34	2.741	2.906	.00	206.9	.000	82.48	.00
38	59.34	2.810	2.955	.00	266.3	.000	106.13	.00
39	59.41	2.880	2.989	.00	325.7	.000	129.82	.00
40	58.22	2.947	3.001	.00	383.9	.000	153.02	.00
41	56.18	3.002	3.003	.00	440.1	.000	173.75	.00
42	53.95	3.013	3.010	6.20	487.8	.000	185.59	6.20
43	52.00	3.023	3.019	9.10	530.7	.000	196.23	9.10
44	50.28	3.032	3.028	9.32	571.7	.000	206.39	9.32
45	48.61	3.041	3.037	8.96	611.4	.000	216.22	8.96
46	47.04	3.049	3.046	8.31	650.1	.000	225.83	8.31
47	45.68	3.058	3.055	7.57	688.2	.000	235.28	7.57
48	44.37	3.066	3.064	6.95	725.6	.006	244.56	6.95
49	43.06	3.074	3.072	6.54	762.1	.014	253.61	6.54
50	41.85	3.082	3.080	6.36	797.6	.022	262.42	6.36
51	40.81	3.090	3.088	6.33	832.1	.030	270.97	6.33
52	39.96	3.097	3.095	6.37	865.7	.037	279.30	6.37
53	39.27	3.104	3.103	6.46	898.5	.044	287.44	6.46
54	38.72	3.111	3.110	6.56	930.7	.051	295.41	6.56
55	38.28	3.119	3.117	6.66	962.3	.059	303.26	6.66
56	37.94	3.125	3.124	6.75	993.5	.065	310.99	6.75
57	37.75	3.132	3.130	6.79	1024.4	.072	318.67	6.79
58	37.86	3.139	3.137	6.70	1055.6	.079	326.40	6.70
59	38.32	3.146	3.145	6.46	1087.5	.086	334.30	6.46
60	38.76	3.154	3.152	6.14	1120.1	.094	342.39	6.14
61	38.94	3.161	3.160	5.84	1153.2	.101	350.60	5.84
62	38.93	3.168	3.167	5.67	1186.4	.108	358.84	5.67
63	38.85	3.176	3.174	5.65	1219.8	.116	367.08	5.65
64	38.75	3.183	3.182	5.77	1252.6	.123	375.26	5.77
65	38.65	3.190	3.189	5.96	1285.3	.130	383.36	5.96
66	38.55	3.197	3.196	6.22	1317.6	.137	391.38	6.22
67	38.45	3.205	3.203	6.52	1349.6	.145	399.30	6.52
68	38.26	3.212	3.209	6.86	1381.0	.152	407.09	6.86
69	37.95	3.218	3.216	7.21	1411.7	.158	414.71	7.21
70	37.55	3.225	3.222	7.58	1441.7	.165	422.14	7.58
71	37.11	3.232	3.229	7.97	1470.8	.172	429.37	7.97
72	36.64	3.238	3.235	8.40	1499.1	.178	436.37	8.40

*** INUNDATION ANALYSIS BLOCK No. 2 *** CASE PLAN

TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	PONDAGE (1000*cum)	--INUNDATION-- DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 1
73	36.15	3.244	3.240	8.86	1526.3	.184	443.14	8.86
74	35.68	3.250	3.246	9.35	1552.7	.190	449.67	9.35
75	35.22	3.255	3.251	9.88	1578.0	.195	455.95	9.88
76	34.79	3.261	3.256	10.45	1602.3	.201	461.99	10.45
77	34.38	3.266	3.260	11.06	1625.7	.206	467.77	11.06
78	33.98	3.271	3.265	11.68	1647.9	.211	473.30	11.68
79	33.51	3.276	3.269	12.32	1669.1	.216	478.56	12.32
80	32.91	3.280	3.273	12.94	1689.1	.220	483.51	12.94
81	32.17	3.284	3.276	13.56	1707.7	.224	488.12	13.56
82	31.36	3.288	3.279	14.21	1724.9	.228	492.38	14.21
83	30.51	3.291	3.282	14.88	1740.5	.231	496.25	14.88
84	29.66	3.295	3.284	15.60	1754.6	.235	499.74	15.60
85	28.82	3.297	3.286	16.33	1767.1	.237	502.84	16.33
86	28.00	3.300	3.287	17.09	1778.0	.240	505.54	17.09
87	27.19	3.302	3.288	17.85	1787.3	.242	507.86	17.85
88	26.41	3.304	3.288	18.62	1795.1	.244	509.79	18.62
89	25.67	3.305	3.289	19.38	1801.4	.245	511.35	19.38
90	24.97	3.306	3.288	20.14	1806.2	.246	512.55	20.14
91	24.29	3.307	3.288	20.91	1809.6	.247	513.39	20.91
92	23.63	3.307	3.287	21.68	1811.6	.247	513.87	21.68
93	22.98	3.307	3.285	22.46	1812.1	.247	514.00	22.46
94	22.34	3.307	3.283	23.30	1811.1	.247	513.77	23.30
95	21.69	3.307	3.281	24.23	1808.6	.247	513.14	24.23
96	21.04	3.306	3.278	25.18	1804.5	.246	512.11	25.18
97	20.39	3.304	3.275	26.11	1798.7	.244	510.70	26.11
98	19.77	3.303	3.271	27.01	1791.5	.243	508.90	27.01
99	19.18	3.301	3.267	27.89	1782.8	.241	506.74	27.89
100	18.64	3.299	3.263	28.74	1772.7	.239	504.23	28.74
101	18.12	3.296	3.258	29.57	1761.2	.236	501.39	29.57
102	17.60	3.293	3.253	30.38	1748.4	.233	498.22	30.38
103	17.11	3.290	3.248	31.21	1734.3	.230	494.72	31.21
104	16.62	3.287	3.242	32.14	1718.8	.227	490.88	32.14
105	16.14	3.283	3.236	33.01	1702.0	.223	486.69	33.01
106	15.68	3.279	3.230	33.81	1683.8	.219	482.20	33.81
107	15.22	3.275	3.223	34.57	1664.5	.215	477.40	34.57
108	14.78	3.270	3.217	35.29	1644.0	.210	472.31	35.29
109	14.34	3.265	3.210	36.00	1622.3	.205	466.94	36.00
110	13.92	3.260	3.202	36.68	1599.6	.200	461.30	36.68
111	13.50	3.255	3.195	37.34	1575.7	.195	455.39	37.34
112	13.10	3.249	3.188	37.97	1550.8	.189	449.22	37.97
113	12.62	3.244	3.180	38.59	1524.9	.184	442.78	38.59
114	11.61	3.237	3.172	39.17	1497.3	.177	435.94	39.17
115	9.65	3.231	3.164	39.68	1467.3	.171	428.50	39.68
116	7.14	3.223	3.155	40.16	1434.3	.163	420.31	40.16
117	5.04	3.215	3.145	40.71	1398.6	.155	411.47	40.71
118	3.86	3.207	3.133	41.45	1361.0	.147	402.14	41.45
119	3.38	3.198	3.121	42.38	1322.0	.138	392.47	42.38
120	3.19	3.190	3.109	43.38	1281.8	.130	382.50	43.38
121	3.06	3.180	3.096	44.33	1240.6	.120	372.27	44.33
122	2.94	3.171	3.084	45.18	1198.3	.111	361.79	45.18
123	2.83	3.161	3.071	45.94	1155.2	.101	351.10	45.94
124	2.75	3.152	3.059	46.63	1111.3	.092	340.22	46.63
125	2.68	3.142	3.046	47.26	1066.8	.082	329.17	47.26
126	2.62	3.132	3.034	47.88	1021.5	.072	317.94	47.88
127	2.56	3.121	3.021	48.48	975.6	.061	306.55	48.48
128	2.50	3.111	3.009	49.05	929.0	.051	295.01	49.05
129	2.44	3.100	2.951	52.37	879.1	.040	282.63	52.37
130	2.38	3.087	2.929	60.38	821.1	.027	268.24	60.38
131	2.32	3.073	2.855	65.88	757.5	.013	252.48	65.88
132	2.26	3.057	2.765	74.72	685.1	.000	234.50	74.72
133	2.19	3.041	2.746	75.03	612.2	.000	216.44	75.03
134	2.13	3.025	2.729	74.85	539.5	.000	198.41	74.85
135	2.00	3.009	2.720	74.25	467.3	.000	180.49	74.25
136	1.69	2.960	2.721	74.59	394.4	.000	157.19	74.59
137	1.17	2.891	2.612	59.64	335.9	.000	133.88	59.64
138	.60	2.841	2.538	44.26	292.2	.000	116.48	44.26
139	.26	2.792	2.509	41.79	250.7	.000	99.93	41.79
140	.11	2.746	2.500	39.93	210.9	.000	84.06	39.93
141	.04	2.703	2.500	36.60	174.3	.000	69.48	36.60
142	.02	2.665	2.500	33.13	141.2	.000	56.29	33.13
143	.02	2.630	2.500	29.66	111.6	.000	44.47	29.66
144	.01	2.600	2.500	26.18	85.4	.000	34.04	26.18

*** INUNDATION ANALYSIS BLOCK No. 3 *** CASE PLAN

TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	PONDAGE (1000*cum)	--INUNDATION-- DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 2	3
1	.00	3.198	3.338	-48.40	288.3	.048	87.11	.00	48.40
2	.01	3.224	3.275	-26.37	314.7	.074	93.88	.00	26.37
3	.04	3.227	3.214	-2.62	317.3	.077	94.56	3.00	5.62
4	.11	3.208	3.166	19.12	298.3	.058	89.68	24.74	5.62
5	.19	3.184	3.123	24.81	273.7	.034	83.37	32.91	8.10
6	.30	3.157	3.081	27.57	246.4	.007	76.38	36.92	9.35
7	.43	3.128	3.044	29.11	217.8	.000	69.02	39.23	10.11
8	.63	3.100	3.017	28.78	189.6	.000	61.80	39.15	10.37
9	1.05	3.070	2.896	31.66	159.0	.000	53.95	42.06	10.40
10	2.06	3.034	2.873	37.53	123.5	.000	44.86	50.02	12.49
11	3.48	3.003	2.859	34.61	92.4	.000	36.87	47.24	12.63
12	4.66	2.874	2.831	30.57	66.5	.000	26.89	38.11	24.35
13	5.40	2.800	2.902	18.54	53.4	.000	21.58	20.48	43.58
14	5.90	2.738	2.922	16.81	42.5	.000	17.17	18.98	51.39
15	6.25	2.685	2.901	15.76	32.9	.000	13.33	18.11	57.71
16	6.48	2.645	2.879	13.63	25.8	.000	10.44	16.13	62.25
17	6.64	2.614	2.861	12.08	20.4	.000	8.24	14.72	65.47
18	6.71	2.591	2.845	10.96	16.1	.000	6.52	13.73	67.84
19	6.68	2.573	2.817	9.71	13.1	.000	5.29	12.60	69.60
20	6.51	2.563	2.793	8.46	11.1	.000	4.50	11.46	70.76
21	6.27	2.555	2.771	7.55	9.9	.000	3.99	10.66	71.50
22	6.04	2.551	2.751	6.87	9.0	.000	3.65	10.09	71.98
23	5.93	2.548	2.733	6.34	8.6	.000	3.49	9.72	72.27
24	5.97	2.549	2.717	5.92	8.7	.000	3.51	9.58	72.35
25	6.19	2.552	2.705	5.66	9.2	.000	3.72	9.72	72.23
26	6.56	2.557	2.695	5.59	10.2	.000	4.12	10.11	71.89
27	7.05	2.565	2.689	5.67	11.6	.000	4.67	10.70	71.35
28	7.61	2.575	2.685	5.85	13.3	.000	5.39	11.45	70.63
29	8.28	2.587	2.685	6.07	15.5	.000	6.28	12.34	69.71
30	9.19	2.603	2.689	6.34	18.4	.000	7.43	13.39	68.53
31	10.44	2.624	2.698	6.66	22.2	.000	8.96	14.65	66.95
32	12.45	2.655	2.712	7.06	27.5	.000	11.14	16.23	64.72
33	17.55	2.712	2.739	7.38	37.7	.000	15.26	18.51	60.92
34	27.64	2.791	2.641	13.62	51.7	.000	20.93	29.26	53.51
35	38.39	2.890	2.674	20.67	69.5	.000	28.09	43.18	43.71
36	44.40	2.985	2.786	27.54	86.3	.000	34.91	51.83	26.40
37	45.71	3.015	2.906	27.56	104.5	.000	39.97	45.46	17.90
38	44.38	3.042	2.955	18.01	130.8	.000	46.73	39.35	21.34
39	41.64	3.069	2.989	14.21	158.3	.000	53.77	37.41	23.20
40	38.16	3.093	3.001	13.39	183.1	.000	60.12	38.20	24.81
41	34.52	3.113	3.003	15.33	202.2	.000	65.04	42.21	26.88
42	31.28	3.128	3.010	15.72	217.8	.000	69.03	44.93	29.21
43	28.62	3.142	3.019	15.02	231.4	.000	72.52	46.38	31.37
44	26.32	3.154	3.028	14.09	243.6	.004	75.66	47.37	33.29
45	24.27	3.165	3.037	13.10	254.8	.015	78.52	48.12	35.02
46	22.57	3.175	3.046	12.12	265.3	.025	81.20	48.70	36.59
47	21.13	3.185	3.055	11.22	275.2	.035	83.75	49.20	37.98
48	19.79	3.194	3.064	10.45	284.5	.044	86.14	49.63	39.18
49	18.55	3.203	3.072	9.83	293.2	.053	88.38	50.00	40.17
50	17.45	3.211	3.080	9.34	301.3	.061	90.46	50.31	40.98
51	16.52	3.219	3.088	8.93	308.9	.069	92.40	50.56	41.63
52	15.73	3.226	3.095	8.59	316.1	.076	94.23	50.76	42.17
53	15.06	3.232	3.103	8.29	322.8	.082	95.97	50.91	42.62
54	14.49	3.239	3.110	8.02	329.3	.089	97.63	51.02	43.00
55	14.00	3.245	3.117	7.76	335.5	.095	99.23	51.10	43.34
56	13.62	3.251	3.124	7.52	341.6	.101	100.79	51.16	43.65
57	13.42	3.257	3.130	7.29	347.8	.107	102.36	51.22	43.93
58	13.42	3.264	3.137	7.06	354.1	.114	103.99	51.28	44.22
59	13.47	3.270	3.145	6.80	360.8	.120	105.71	51.37	44.58
60	13.41	3.277	3.152	6.50	367.7	.127	107.48	51.48	44.98
61	13.23	3.284	3.160	6.25	374.7	.134	109.27	51.61	45.35
62	12.99	3.291	3.167	6.12	381.6	.141	111.03	51.72	45.60
63	12.74	3.297	3.174	6.13	388.2	.147	112.72	51.81	45.68
64	12.49	3.304	3.182	6.24	394.4	.154	114.32	51.84	45.60
65	12.25	3.309	3.189	6.42	400.2	.159	115.82	51.81	45.39
66	12.04	3.315	3.196	6.63	405.6	.165	117.21	51.71	45.08
67	11.83	3.320	3.203	6.83	410.6	.170	118.49	51.53	44.70
68	11.63	3.324	3.209	7.02	415.3	.174	119.67	51.28	44.26
69	11.43	3.329	3.216	7.18	419.5	.179	120.76	50.97	43.79
70	11.23	3.332	3.222	7.30	423.4	.182	121.77	50.61	43.31
71	11.04	3.336	3.229	7.40	427.1	.186	122.70	50.21	42.82
72	10.83	3.339	3.235	7.47	430.4	.189	123.56	49.78	42.31

*** INUNDATION ANALYSIS BLOCK No. 3 *** CASE PLAN

TIME (hr)	RUNOFF DISCHARGE ($1000m^3$)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE ($1000m^3$)	PONDAGE ($1000*cum$)	--INUNDATION-- DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES ($1000m^3$) 2	3
73	10.63	3.342	3.240	7.55	433.5	.192	124.35	49.32	41.77
74	10.43	3.345	3.246	7.72	436.2	.195	125.05	48.84	41.11
75	10.25	3.347	3.251	8.06	438.4	.197	125.61	48.28	40.22
76	10.08	3.349	3.256	8.28	440.2	.199	126.07	47.66	39.38
77	9.92	3.351	3.260	8.42	441.7	.201	126.45	46.99	38.57
78	9.77	3.352	3.265	8.52	442.9	.202	126.77	46.31	37.78
79	9.63	3.353	3.269	8.62	443.9	.203	127.03	45.61	36.99
80	9.49	3.354	3.273	8.75	444.7	.204	127.22	44.89	36.13
81	9.33	3.354	3.276	8.93	445.1	.204	127.32	44.15	35.22
82	9.14	3.354	3.279	9.12	445.1	.204	127.33	43.38	34.26
83	8.94	3.354	3.282	9.30	444.7	.204	127.24	42.59	33.29
84	8.74	3.353	3.284	9.47	444.0	.203	127.05	41.79	32.32
85	8.54	3.352	3.286	9.62	442.9	.202	126.77	40.98	31.36
86	8.35	3.350	3.287	9.74	441.5	.200	126.41	40.17	30.43
87	8.17	3.349	3.288	9.83	439.9	.199	125.99	39.37	29.54
88	7.99	3.347	3.288	9.87	438.0	.197	125.51	38.59	28.71
89	7.83	3.345	3.289	9.88	436.0	.195	124.98	37.84	27.96
90	7.67	3.343	3.288	9.89	433.7	.193	124.41	37.15	27.26
91	7.52	3.340	3.288	9.91	431.3	.190	123.80	36.50	26.60
92	7.37	3.338	3.287	9.95	428.8	.188	123.14	35.91	25.96
93	7.23	3.335	3.285	10.02	426.0	.185	122.42	35.37	25.35
94	7.09	3.332	3.283	10.14	422.9	.182	121.64	34.90	24.75
95	6.95	3.329	3.281	10.35	419.5	.179	120.77	34.51	24.16
96	6.81	3.325	3.278	10.57	415.8	.175	119.81	34.15	23.59
97	6.66	3.321	3.275	10.78	411.7	.171	118.75	33.80	23.02
98	6.52	3.316	3.271	10.99	407.2	.166	117.60	33.44	22.45
99	6.39	3.312	3.267	11.19	402.4	.162	116.37	33.07	21.88
100	6.26	3.306	3.263	11.38	397.3	.156	115.06	32.70	21.32
101	6.14	3.301	3.258	11.56	391.9	.151	113.67	32.32	20.76
102	6.03	3.295	3.253	11.74	386.1	.145	112.21	31.93	20.20
103	5.92	3.289	3.248	11.94	380.1	.139	110.66	31.58	19.64
104	5.81	3.283	3.242	12.22	373.7	.133	109.02	31.32	19.11
105	5.70	3.276	3.236	12.42	367.0	.126	107.30	31.01	18.58
106	5.60	3.269	3.230	12.57	360.0	.119	105.51	30.64	18.07
107	5.50	3.262	3.223	12.69	352.9	.112	103.67	30.26	17.58
108	5.41	3.255	3.217	12.76	345.5	.105	101.78	29.89	17.13
109	5.31	3.248	3.210	12.82	338.0	.098	99.86	29.55	16.73
110	5.23	3.240	3.202	12.87	330.3	.090	97.90	29.23	16.36
111	5.14	3.232	3.195	12.93	322.6	.082	95.90	28.93	16.00
112	5.06	3.224	3.188	12.99	314.6	.074	93.86	28.66	15.66
113	4.98	3.216	3.180	13.09	306.5	.066	91.79	28.40	15.30
114	4.91	3.208	3.172	13.42	298.0	.058	89.60	28.11	14.68
115	4.83	3.198	3.164	14.39	288.4	.048	87.15	27.65	13.26
116	4.66	3.187	3.155	15.82	277.3	.037	84.29	26.85	11.03
117	4.21	3.175	3.145	16.50	265.0	.025	81.14	25.80	9.29
118	3.55	3.162	3.133	16.13	252.4	.012	77.91	24.94	8.80
119	3.04	3.150	3.121	15.75	239.7	.000	74.65	24.42	8.67
120	2.83	3.137	3.109	15.56	227.0	.000	71.38	24.13	8.58
121	2.79	3.125	3.096	15.46	214.3	.000	68.14	23.92	8.46
122	2.78	3.112	3.084	15.37	201.7	.000	64.91	23.71	8.34
123	2.77	3.100	3.071	15.28	189.2	.000	61.70	23.49	8.21
124	2.76	3.087	3.059	15.19	176.8	.000	58.51	23.27	8.08
125	2.75	3.075	3.046	15.14	164.4	.000	55.33	23.09	7.96
126	2.74	3.063	3.034	15.12	152.0	.000	52.16	22.97	7.85
127	2.73	3.050	3.021	15.12	139.6	.000	48.98	22.88	7.76
128	2.72	3.038	3.009	15.12	127.2	.000	45.80	22.80	7.68
129	2.71	3.022	2.951	18.30	111.6	.000	41.80	26.18	7.86
130	2.70	3.001	2.929	24.01	90.3	.000	36.33	34.03	10.02
131	2.69	2.895	2.855	22.63	70.4	.000	28.46	29.30	22.36
132	2.68	2.823	2.765	15.58	57.5	.000	23.24	18.46	41.12
133	2.67	2.786	2.746	9.31	50.8	.000	20.56	12.12	47.89
134	2.66	2.759	2.729	7.44	46.0	.000	18.63	10.11	51.58
135	2.65	2.737	2.720	6.48	42.2	.000	17.07	8.67	54.20
136	2.63	2.748	2.721	.76	44.1	.000	17.83	2.01	54.90
137	2.63	2.693	2.612	12.41	34.3	.000	13.87	12.97	56.87
138	2.60	2.626	2.538	14.42	22.5	.000	9.10	14.78	62.90
139	2.55	2.572	2.509	12.23	12.8	.000	5.18	12.44	68.32
140	2.48	2.531	2.500	9.73	5.6	.000	2.25	9.79	72.28
141	2.44	2.510	2.500	6.16	1.8	.000	.75	6.16	74.72
142	2.29	2.504	2.500	3.50	.6	.000	.26	3.50	75.73
143	1.74	2.501	2.500	2.15	.2	.000	.09	2.15	76.02
144	.66	2.500	2.500	.89	.0	.000	.00	.91	76.15

*** INUNDATION ANALYSIS BLOCK No. 4 *** CASE PLAN

TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	--INUNDATION-- PONDAGE (1000*cum)	DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 3	4
1	.00	3.316	3.198	48.40	114.5	.000	45.55	48.40	22.79
2	.00	3.243	3.224	26.37	88.1	.000	35.06	26.37	22.79
3	.01	3.228	3.227	5.61	82.5	.000	32.83	5.62	22.79
4	.02	3.213	3.208	5.60	77.0	.000	30.61	5.62	22.79
5	.03	3.190	3.184	8.06	68.9	.000	27.41	8.10	22.79
6	.04	3.165	3.157	9.30	59.7	.000	23.73	9.35	22.79
7	.06	3.137	3.128	10.03	49.7	.000	19.76	10.11	22.79
8	.08	3.109	3.100	10.25	39.5	.000	15.72	10.37	22.79
9	.13	3.081	3.070	10.21	29.4	.000	11.71	10.40	22.79
10	.25	3.048	3.034	12.15	17.5	.000	6.97	12.49	22.79
11	.44	3.017	3.003	11.99	6.0	.000	2.38	12.63	22.79
12	.61	3.000	2.874	6.55	.0	.000	.02	24.35	22.79
13	.71	3.000	2.800	.71	.0	.000	.02	43.58	22.79
14	.79	3.000	2.738	.78	.0	.000	.02	51.39	22.79
15	.84	3.000	2.685	.84	.1	.000	.02	57.71	22.79
16	.90	3.000	2.645	.89	.1	.000	.02	62.25	22.79
17	.94	3.000	2.614	.94	.1	.000	.02	65.47	22.79
18	.99	3.000	2.591	.99	.1	.000	.02	67.84	22.79
19	1.03	3.000	2.573	1.03	.1	.000	.03	69.60	22.79
20	1.07	3.000	2.563	1.07	.1	.000	.03	70.76	22.79
21	1.11	3.000	2.555	1.11	.1	.000	.03	71.50	22.79
22	1.15	3.000	2.551	1.14	.1	.000	.03	71.98	22.79
23	1.21	3.000	2.548	1.20	.1	.000	.03	72.27	22.79
24	1.32	3.000	2.549	1.31	.1	.000	.03	72.35	22.79
25	1.46	3.000	2.552	1.45	.1	.000	.04	72.23	22.79
26	1.63	3.000	2.557	1.62	.1	.000	.04	71.89	22.79
27	1.81	3.000	2.565	1.80	.1	.000	.05	71.35	22.79
28	2.01	3.000	2.575	2.00	.1	.000	.05	70.63	22.79
29	2.25	3.000	2.587	2.23	.1	.000	.06	69.71	22.79
30	2.53	3.000	2.603	2.51	.2	.000	.06	68.53	22.79
31	2.87	3.001	2.624	2.84	.2	.000	.07	66.95	22.79
32	3.30	3.001	2.655	3.27	.2	.000	.08	64.72	22.79
33	3.98	3.001	2.712	3.92	.3	.000	.11	60.92	22.79
34	5.77	3.001	2.791	5.64	.4	.000	.16	53.51	22.79
35	8.42	3.002	2.890	8.27	.6	.000	.22	43.71	22.79
36	10.31	3.013	2.985	6.29	4.6	.000	1.82	26.40	22.79
37	11.31	3.050	3.015	-2.36	18.2	.000	7.25	17.90	22.79
38	12.05	3.085	3.042	-.40	30.7	.000	12.21	21.34	22.79
39	12.68	3.119	3.069	.45	42.9	.000	17.07	23.20	22.82
40	13.24	3.151	3.093	1.60	54.6	.000	21.71	24.81	23.21
41	13.74	3.181	3.113	2.95	65.4	.000	26.00	26.88	23.92
42	14.21	3.207	3.128	4.46	75.1	.000	29.87	29.21	24.75
43	14.65	3.232	3.142	5.78	84.0	.000	33.40	31.37	25.59
44	15.06	3.255	3.154	6.89	92.1	.000	36.65	33.29	26.40
45	15.45	3.276	3.165	7.83	99.8	.000	39.68	35.02	27.18
46	15.80	3.295	3.175	8.66	106.9	.000	42.52	36.59	27.93
47	16.04	3.314	3.185	9.40	113.5	.000	45.17	37.98	28.59
48	16.13	3.330	3.194	10.11	119.6	.000	47.56	39.18	29.08
49	16.17	3.345	3.203	10.81	124.9	.000	49.70	40.17	29.37
50	16.20	3.358	3.211	11.44	129.7	.000	51.59	40.98	29.53
51	16.24	3.370	3.219	11.99	133.9	.000	53.28	41.63	29.64
52	16.29	3.381	3.226	12.43	137.8	.000	54.82	42.17	29.73
53	16.33	3.390	3.232	12.80	141.3	.000	56.22	42.62	29.82
54	16.39	3.400	3.239	13.10	144.6	.000	57.53	43.00	29.91
55	16.45	3.408	3.245	13.34	147.7	.000	58.77	43.34	30.00
56	16.53	3.416	3.251	13.54	150.7	.000	59.96	43.65	30.11
57	16.65	3.425	3.257	13.68	153.7	.000	61.14	43.93	30.25
58	16.91	3.433	3.264	13.75	156.9	.000	62.39	44.22	30.48
59	17.22	3.443	3.270	13.74	160.3	.000	63.78	44.58	30.84
60	17.44	3.453	3.277	13.81	164.0	.003	65.23	44.98	31.18
61	17.55	3.462	3.284	14.15	167.4	.012	66.58	45.35	31.21
62	17.63	3.470	3.291	14.70	170.3	.020	67.74	45.60	30.90
63	17.69	3.477	3.297	15.33	172.7	.027	68.68	45.68	30.35
64	17.75	3.482	3.304	15.93	174.5	.032	69.41	45.60	29.67
65	17.80	3.486	3.309	16.45	175.8	.036	69.94	45.39	28.94
66	17.84	3.488	3.315	16.88	176.8	.038	70.32	45.08	28.20
67	17.89	3.490	3.320	17.24	177.4	.040	70.58	44.70	27.46
68	17.92	3.491	3.324	17.52	177.8	.041	70.74	44.26	26.74
69	17.96	3.492	3.329	17.74	178.1	.042	70.83	43.79	26.06
70	18.00	3.492	3.332	17.90	178.2	.042	70.87	43.31	25.41
71	18.02	3.492	3.336	18.04	178.1	.042	70.86	42.82	24.77
72	18.02	3.492	3.339	18.19	178.0	.042	70.79	42.31	24.12

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*** INUNDATION ANALYSIS BLOCK No. 4 *** CASE PLAN
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TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	PONDAGE (1000*cum)	--INUNDATION-- DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 3	4
73	18.02	3.491	3.342	18.36	177.6	.041	70.66	41.77	23.41
74	18.02	3.487	3.345	19.18	176.5	.037	70.20	41.11	22.83
75	18.02	3.484	3.347	19.42	175.1	.034	69.64	40.22	22.79
76	18.02	3.480	3.349	19.39	173.7	.030	69.10	39.38	22.79
77	18.02	3.476	3.351	19.39	172.3	.026	68.55	38.57	22.79
78	17.99	3.472	3.352	19.39	170.9	.022	67.99	37.78	22.79
79	17.83	3.468	3.353	19.36	169.4	.018	67.38	36.99	22.79
80	17.53	3.463	3.354	19.26	167.7	.013	66.70	36.13	22.79
81	17.15	3.458	3.354	19.07	165.7	.008	65.93	35.22	22.79
82	16.75	3.452	3.354	18.81	163.7	.002	65.11	34.26	22.79
83	16.35	3.446	3.354	18.51	161.5	.000	64.26	33.29	22.79
84	15.97	3.440	3.353	18.17	159.3	.000	63.38	32.32	22.79
85	15.59	3.434	3.352	17.83	157.1	.000	62.49	31.36	22.79
86	15.21	3.428	3.350	17.45	154.8	.000	61.60	30.43	22.79
87	14.84	3.422	3.349	17.02	152.7	.000	60.73	29.54	22.79
88	14.49	3.416	3.347	16.58	150.6	.000	59.90	28.71	22.79
89	14.17	3.410	3.345	16.17	148.6	.000	59.10	27.96	22.79
90	13.86	3.405	3.343	15.81	146.6	.000	58.33	27.26	22.79
91	13.56	3.400	3.340	15.48	144.7	.000	57.56	26.60	22.79
92	13.26	3.394	3.338	15.19	142.8	.000	56.79	25.96	22.79
93	12.96	3.389	3.335	14.92	140.8	.000	56.01	25.35	22.79
94	12.64	3.383	3.332	14.65	138.8	.000	55.21	24.75	22.79
95	12.31	3.378	3.329	14.41	136.7	.000	54.38	24.16	22.79
96	11.97	3.372	3.325	14.17	134.5	.000	53.50	23.59	22.79
97	11.64	3.365	3.321	13.93	132.2	.000	52.59	23.02	22.79
98	11.31	3.359	3.316	13.71	129.8	.000	51.64	22.45	22.79
99	10.98	3.352	3.312	13.48	127.3	.000	50.64	21.88	22.79
100	10.66	3.345	3.306	13.25	124.7	.000	49.61	21.32	22.79
101	10.35	3.337	3.301	13.03	122.0	.000	48.55	20.76	22.79
102	10.05	3.330	3.295	12.80	119.3	.000	47.46	20.20	22.79
103	9.75	3.322	3.289	12.59	116.4	.000	46.32	19.64	22.79
104	9.46	3.314	3.283	12.39	113.5	.000	45.16	19.11	22.79
105	9.18	3.305	3.276	12.20	110.5	.000	43.96	18.58	22.79
106	8.90	3.297	3.269	11.98	107.4	.000	42.73	18.07	22.79
107	8.64	3.288	3.262	11.74	104.3	.000	41.50	17.58	22.79
108	8.38	3.280	3.255	11.48	101.2	.000	40.27	17.13	22.79
109	8.13	3.271	3.248	11.23	98.1	.000	39.03	16.73	22.79
110	7.89	3.262	3.240	11.01	95.0	.000	37.79	16.36	22.79
111	7.66	3.254	3.232	10.81	91.9	.000	36.54	16.00	22.79
112	7.44	3.245	3.224	10.62	88.7	.000	35.27	15.66	22.79
113	7.10	3.236	3.216	10.41	85.4	.000	33.96	15.30	22.79
114	6.01	3.225	3.208	9.94	81.4	.000	32.39	14.68	22.79
115	3.60	3.211	3.198	8.67	76.4	.000	30.38	13.26	22.79
116	1.04	3.196	3.187	6.59	70.8	.000	28.17	11.03	22.79
117	.00	3.182	3.175	5.00	65.8	.000	26.18	9.29	22.79
118	.00	3.169	3.162	4.64	61.2	.000	24.33	8.80	22.79
119	.00	3.156	3.150	4.63	56.5	.000	22.49	8.67	22.79
120	.00	3.143	3.137	4.63	51.9	.000	20.65	8.58	22.79
121	.00	3.131	3.125	4.62	47.3	.000	18.81	8.46	22.79
122	.00	3.118	3.112	4.60	42.7	.000	16.98	8.34	22.79
123	.00	3.105	3.100	4.57	38.1	.000	15.17	8.21	22.79
124	.00	3.093	3.087	4.54	33.6	.000	13.36	8.08	22.79
125	.00	3.080	3.075	4.52	29.1	.000	11.56	7.96	22.79
126	.00	3.068	3.063	4.50	24.6	.000	9.77	7.85	22.79
127	.00	3.055	3.050	4.50	20.1	.000	7.98	7.76	22.79
128	.00	3.043	3.038	4.50	15.6	.000	6.19	7.68	22.79
129	.00	3.030	3.022	4.76	10.8	.000	4.30	7.86	22.79
130	.00	3.011	3.001	6.99	3.8	.000	1.52	10.02	22.79
131	.00	3.000	2.895	3.72	.1	.000	.04	22.36	22.79
132	.00	3.000	2.823	.00	.1	.000	.04	41.12	22.79
133	.00	3.000	2.786	.00	.1	.000	.04	47.89	22.79
134	.00	3.000	2.759	.01	.1	.000	.03	51.58	22.79
135	.00	3.000	2.737	.03	.1	.000	.02	54.20	22.79
136	.00	3.000	2.748	.04	.0	.000	.01	54.90	22.79
137	.00	3.000	2.693	.01	.0	.000	.01	56.87	22.79
138	.00	3.000	2.626	.01	.0	.000	.00	62.90	22.79
139	.00	3.000	2.572	.01	.0	.000	.00	68.32	22.79
140	.00	3.000	2.531	.00	.0	.000	.00	72.28	22.79
141	.00	3.000	2.510	.00	.0	.000	.00	74.72	22.79
142	.00	3.000	2.504	.00	.0	.000	.00	75.73	22.79
143	.00	3.000	2.501	.00	.0	.000	.00	76.02	22.79
144	.00	3.000	2.500	.00	.0	.000	.00	76.15	22.79

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*** INUNDATION ANALYSIS BLOCK No. 5 *** CASE PLAN
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TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	PONDAGE (1000*cum)	--INUNDATION-- DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 4
1	.00	4.000	3.316	.00	.0	.000	.00	22.79
2	.00	4.000	3.243	.00	.0	.000	.00	22.79
3	.01	4.000	3.228	.01	.0	.000	.00	22.79
4	.02	4.000	3.213	.02	.0	.000	.00	22.79
5	.03	4.000	3.190	.03	.0	.000	.00	22.79
6	.06	4.000	3.165	.06	.0	.000	.00	22.79
7	.08	4.000	3.137	.08	.0	.000	.00	22.79
8	.12	4.000	3.109	.12	.0	.000	.00	22.79
9	.19	4.000	3.081	.19	.0	.000	.00	22.79
10	.34	4.000	3.048	.34	.0	.000	.00	22.79
11	.64	4.000	3.017	.64	.0	.000	.00	22.79
12	.99	4.000	3.000	.99	.0	.000	.00	22.79
13	1.24	4.000	3.000	1.24	.0	.000	.00	22.79
14	1.39	4.000	3.000	1.39	.0	.000	.00	22.79
15	1.51	4.000	3.000	1.51	.0	.000	.00	22.79
16	1.61	4.000	3.000	1.61	.0	.000	.00	22.79
17	1.70	4.000	3.000	1.70	.0	.000	.00	22.79
18	1.79	4.000	3.000	1.79	.0	.000	.00	22.79
19	1.87	4.000	3.000	1.87	.0	.000	.00	22.79
20	1.94	4.000	3.000	1.94	.0	.000	.00	22.79
21	2.01	4.000	3.000	2.01	.0	.000	.00	22.79
22	2.08	4.000	3.000	2.08	.0	.000	.00	22.79
23	2.18	4.000	3.000	2.18	.0	.000	.00	22.79
24	2.35	4.000	3.000	2.35	.0	.000	.00	22.79
25	2.60	4.000	3.000	2.60	.0	.000	.00	22.79
26	2.90	4.000	3.000	2.90	.0	.000	.00	22.79
27	3.24	4.000	3.000	3.24	.0	.000	.00	22.79
28	3.61	4.000	3.000	3.61	.0	.000	.00	22.79
29	4.04	4.000	3.000	4.04	.0	.000	.00	22.79
30	4.54	4.000	3.000	4.54	.0	.000	.00	22.79
31	5.14	4.000	3.001	5.14	.0	.000	.00	22.79
32	5.91	4.000	3.001	5.91	.0	.000	.00	22.79
33	7.21	4.000	3.001	7.21	.0	.000	.00	22.79
34	10.00	4.000	3.001	10.00	.0	.000	.00	22.79
35	14.25	4.000	3.002	14.25	.0	.000	.00	22.79
36	18.00	4.000	3.013	18.00	.0	.000	.00	22.79
37	20.26	4.000	3.050	20.26	.0	.000	.00	22.79
38	21.74	4.000	3.085	21.74	.0	.000	.00	22.79
39	22.95	4.007	3.119	22.75	.2	.007	.09	22.82
40	24.00	4.035	3.151	23.21	1.0	.035	.42	23.21
41	24.95	4.072	3.181	23.92	2.0	.072	.86	23.92
42	25.82	4.110	3.207	24.75	3.1	.110	1.32	24.75
43	26.63	4.147	3.232	25.59	4.1	.147	1.77	25.59
44	27.40	4.183	3.255	26.40	5.1	.183	2.20	26.40
45	28.13	4.217	3.276	27.18	6.1	.217	2.60	27.18
46	28.80	4.248	3.295	27.93	6.9	.248	2.98	27.93
47	29.30	4.273	3.314	28.59	7.7	.273	3.28	28.59
48	29.54	4.290	3.330	29.08	8.1	.290	3.48	29.08
49	29.62	4.299	3.345	29.37	8.4	.299	3.59	29.37
50	29.69	4.304	3.358	29.53	8.5	.304	3.65	29.53
51	29.76	4.309	3.370	29.64	8.6	.309	3.70	29.64
52	29.84	4.312	3.381	29.73	8.7	.312	3.75	29.73
53	29.92	4.316	3.390	29.82	8.8	.316	3.79	29.82
54	30.01	4.320	3.400	29.91	9.0	.320	3.84	29.91
55	30.12	4.324	3.408	30.00	9.1	.324	3.89	30.00
56	30.25	4.329	3.416	30.11	9.2	.329	3.95	30.11
57	30.45	4.336	3.425	30.25	9.4	.336	4.04	30.25
58	30.84	4.349	3.433	30.48	9.8	.349	4.19	30.48
59	31.31	4.366	3.443	30.84	10.3	.366	4.40	30.84
60	31.42	4.375	3.453	31.18	10.5	.375	4.50	31.18
61	31.02	4.368	3.462	31.21	10.3	.368	4.42	31.21
62	30.36	4.349	3.470	30.90	9.8	.349	4.19	30.90
63	29.60	4.322	3.477	30.35	9.0	.322	3.87	30.35
64	28.82	4.292	3.482	29.67	8.2	.292	3.50	29.67
65	28.04	4.260	3.486	28.94	7.3	.260	3.12	28.94
66	27.28	4.227	3.488	28.20	6.4	.227	2.73	28.20
67	26.55	4.195	3.490	27.46	5.5	.195	2.34	27.46
68	25.87	4.164	3.491	26.74	4.6	.164	1.97	26.74
69	25.23	4.134	3.492	26.06	3.8	.134	1.61	26.06
70	24.60	4.105	3.492	25.41	3.0	.105	1.27	25.41
71	23.95	4.076	3.492	24.77	2.1	.076	.92	24.77
72	23.24	4.045	3.492	24.12	1.3	.045	.54	24.12

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*** INUNDATION ANALYSIS BLOCK No. 5 *** CASE PLAN
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TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	PONDAGE (1000*cum)	--INUNDATION-- DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 4
73	22.45	4.011	3.491	23.41	.3	.011	.13	23.41
74	21.63	4.000	3.487	21.93	.0	.000	.00	22.83
75	20.80	4.000	3.484	20.80	.0	.000	.00	22.79
76	19.98	4.000	3.480	19.98	.0	.000	.00	22.79
77	19.18	4.000	3.476	19.18	.0	.000	.00	22.79
78	18.39	4.000	3.472	18.39	.0	.000	.00	22.79
79	17.62	4.000	3.468	17.62	.0	.000	.00	22.79
80	16.88	4.000	3.463	16.88	.0	.000	.00	22.79
81	16.15	4.000	3.458	16.15	.0	.000	.00	22.79
82	15.45	4.000	3.452	15.45	.0	.000	.00	22.79
83	14.78	4.000	3.446	14.78	.0	.000	.00	22.79
84	14.14	4.000	3.440	14.14	.0	.000	.00	22.79
85	13.54	4.000	3.434	13.54	.0	.000	.00	22.79
86	12.98	4.000	3.428	12.98	.0	.000	.00	22.79
87	12.52	4.000	3.422	12.52	.0	.000	.00	22.79
88	12.13	4.000	3.416	12.13	.0	.000	.00	22.79
89	11.79	4.000	3.410	11.79	.0	.000	.00	22.79
90	11.45	4.000	3.405	11.45	.0	.000	.00	22.79
91	11.11	4.000	3.400	11.11	.0	.000	.00	22.79
92	10.77	4.000	3.394	10.77	.0	.000	.00	22.79
93	10.43	4.000	3.389	10.43	.0	.000	.00	22.79
94	10.10	4.000	3.383	10.10	.0	.000	.00	22.79
95	9.76	4.000	3.378	9.76	.0	.000	.00	22.79
96	9.42	4.000	3.372	9.42	.0	.000	.00	22.79
97	9.08	4.000	3.365	9.08	.0	.000	.00	22.79
98	8.74	4.000	3.359	8.74	.0	.000	.00	22.79
99	8.41	4.000	3.352	8.41	.0	.000	.00	22.79
100	8.07	4.000	3.345	8.07	.0	.000	.00	22.79
101	7.73	4.000	3.337	7.73	.0	.000	.00	22.79
102	7.39	4.000	3.330	7.39	.0	.000	.00	22.79
103	7.06	4.000	3.322	7.06	.0	.000	.00	22.79
104	6.72	4.000	3.314	6.72	.0	.000	.00	22.79
105	6.39	4.000	3.305	6.39	.0	.000	.00	22.79
106	6.08	4.000	3.297	6.08	.0	.000	.00	22.79
107	5.84	4.000	3.288	5.84	.0	.000	.00	22.79
108	5.66	4.000	3.280	5.66	.0	.000	.00	22.79
109	5.50	4.000	3.271	5.50	.0	.000	.00	22.79
110	5.35	4.000	3.262	5.35	.0	.000	.00	22.79
111	5.19	4.000	3.254	5.19	.0	.000	.00	22.79
112	5.04	4.000	3.245	5.04	.0	.000	.00	22.79
113	4.89	4.000	3.236	4.89	.0	.000	.00	22.79
114	4.74	4.000	3.225	4.74	.0	.000	.00	22.79
115	4.59	4.000	3.211	4.59	.0	.000	.00	22.79
116	4.44	4.000	3.196	4.44	.0	.000	.00	22.79
117	4.29	4.000	3.182	4.29	.0	.000	.00	22.79
118	4.16	4.000	3.169	4.16	.0	.000	.00	22.79
119	4.05	4.000	3.156	4.05	.0	.000	.00	22.79
120	3.94	4.000	3.143	3.94	.0	.000	.00	22.79
121	3.84	4.000	3.131	3.84	.0	.000	.00	22.79
122	3.74	4.000	3.118	3.74	.0	.000	.00	22.79
123	3.64	4.000	3.105	3.64	.0	.000	.00	22.79
124	3.54	4.000	3.093	3.54	.0	.000	.00	22.79
125	3.44	4.000	3.080	3.44	.0	.000	.00	22.79
126	3.35	4.000	3.068	3.35	.0	.000	.00	22.79
127	3.26	4.000	3.055	3.26	.0	.000	.00	22.79
128	3.18	4.000	3.043	3.18	.0	.000	.00	22.79
129	3.10	4.000	3.030	3.10	.0	.000	.00	22.79
130	3.03	4.000	3.011	3.03	.0	.000	.00	22.79
131	2.95	4.000	3.000	2.95	.0	.000	.00	22.79
132	2.88	4.000	3.000	2.88	.0	.000	.00	22.79
133	2.81	4.000	3.000	2.81	.0	.000	.00	22.79
134	2.66	4.000	3.000	2.66	.0	.000	.00	22.79
135	2.16	4.000	3.000	2.16	.0	.000	.00	22.79
136	1.21	4.000	3.000	1.21	.0	.000	.00	22.79
137	.55	4.000	3.000	.55	.0	.000	.00	22.79
138	.36	4.000	3.000	.36	.0	.000	.00	22.79
139	.20	4.000	3.000	.20	.0	.000	.00	22.79
140	.06	4.000	3.000	.06	.0	.000	.00	22.79
141	.00	4.000	3.000	.00	.0	.000	.00	22.79
142	.00	4.000	3.000	.00	.0	.000	.00	22.79
143	.00	4.000	3.000	.00	.0	.000	.00	22.79
144	.00	4.000	3.000	.00	.0	.000	.00	22.79

*** INUNDATION ANALYSIS BLOCK No. 6 *** CASE PLAN

TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	--INUNDATION-- PONDAGE (1000*cum)	DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 5
1	.00	4.574	3.338	8.25	44.0	.000	15.29	8.25
2	.00	4.550	3.275	8.01	35.9	.000	12.85	8.01
3	.01	4.525	3.214	7.78	28.2	.000	10.49	7.78
4	.01	4.502	3.166	7.56	20.6	.000	8.19	7.56
5	.02	4.346	3.123	6.81	13.8	.000	5.53	6.81
6	.03	4.209	3.081	5.50	8.4	.000	3.35	5.50
7	.05	4.098	3.044	4.51	3.9	.000	1.56	4.51
8	.07	4.006	3.017	3.74	.2	.000	.09	3.74
9	.12	4.000	2.896	.35	.0	.000	.00	3.37
10	.24	4.000	2.873	.24	.0	.000	.00	3.37
11	.38	4.000	2.859	.38	.0	.000	.00	3.37
12	.48	4.000	2.831	.48	.0	.000	.00	3.37
13	.54	4.000	2.902	.54	.0	.000	.00	3.37
14	.58	4.000	2.922	.58	.0	.000	.00	3.37
15	.62	4.000	2.901	.62	.0	.000	.00	3.37
16	.66	4.000	2.879	.66	.0	.000	.00	3.37
17	.69	4.000	2.861	.69	.0	.000	.00	3.37
18	.72	4.000	2.845	.72	.0	.000	.00	3.37
19	.75	4.000	2.817	.75	.0	.000	.00	3.37
20	.78	4.000	2.793	.78	.0	.000	.00	3.37
21	.81	4.000	2.771	.81	.0	.000	.00	3.37
22	.84	4.000	2.751	.84	.0	.000	.00	3.37
23	.90	4.000	2.733	.90	.0	.000	.00	3.37
24	1.00	4.000	2.717	1.00	.0	.000	.00	3.37
25	1.11	4.000	2.705	1.11	.0	.000	.00	3.37
26	1.24	4.000	2.695	1.24	.0	.000	.00	3.37
27	1.38	4.000	2.689	1.38	.0	.000	.00	3.37
28	1.54	4.000	2.685	1.54	.0	.000	.00	3.37
29	1.73	4.000	2.685	1.73	.0	.000	.00	3.37
30	1.95	4.000	2.689	1.95	.0	.000	.00	3.37
31	2.22	4.000	2.698	2.22	.0	.000	.00	3.37
32	2.59	4.000	2.712	2.59	.0	.000	.00	3.37
33	3.48	4.006	2.739	3.26	.2	.000	.09	3.38
34	5.15	4.046	2.641	3.52	1.8	.000	.74	3.52
35	6.77	4.117	2.674	3.94	4.7	.000	1.87	3.94
36	7.74	4.197	2.786	4.52	7.9	.000	3.16	4.52
37	8.35	4.277	2.906	5.16	11.1	.000	4.44	5.16
38	8.84	4.353	2.955	5.81	14.1	.000	5.65	5.81
39	9.26	4.424	2.989	6.43	17.0	.000	6.78	6.43
40	9.64	4.489	3.001	7.04	19.6	.000	7.82	7.04
41	9.99	4.507	3.003	7.45	22.1	.000	8.64	7.45
42	10.31	4.515	3.010	7.53	24.9	.000	9.48	7.53
43	10.61	4.524	3.019	7.62	27.9	.000	10.40	7.62
44	10.90	4.534	3.028	7.70	31.1	.000	11.37	7.70
45	11.18	4.545	3.037	7.80	34.5	.000	12.40	7.80
46	11.40	4.556	3.046	7.90	37.9	.000	13.46	7.90
47	11.51	4.567	3.055	8.00	41.5	.000	14.53	8.00
48	11.55	4.577	3.064	8.10	44.9	.000	15.58	8.10
49	11.58	4.588	3.072	8.20	48.3	.000	16.61	8.20
50	11.60	4.598	3.080	8.30	51.6	.000	17.61	8.30
51	11.63	4.608	3.088	8.40	54.8	.008	18.60	8.40
52	11.66	4.618	3.095	8.49	58.0	.018	19.56	8.49
53	11.70	4.628	3.103	8.58	61.1	.028	20.51	8.58
54	11.74	4.637	3.110	8.68	64.2	.037	21.44	8.68
55	11.79	4.647	3.117	8.77	67.2	.047	22.36	8.77
56	11.85	4.656	3.124	8.86	70.2	.056	23.27	8.86
57	11.91	4.665	3.130	8.95	73.1	.065	24.17	8.95
58	11.93	4.674	3.137	9.04	76.0	.074	25.05	9.04
59	11.82	4.682	3.145	9.12	78.7	.082	25.87	9.12
60	11.58	4.690	3.152	9.20	81.1	.090	26.60	9.20
61	11.29	4.696	3.160	9.27	83.1	.096	27.22	9.27
62	11.00	4.701	3.167	9.32	84.8	.101	27.73	9.32
63	10.70	4.705	3.174	9.37	86.1	.105	28.13	9.37
64	10.41	4.709	3.182	9.41	87.1	.109	28.43	9.41
65	10.13	4.711	3.189	9.43	87.8	.111	28.65	9.43
66	9.88	4.712	3.196	9.45	88.3	.112	28.78	9.45
67	9.63	4.713	3.203	9.46	88.4	.113	28.83	9.46
68	9.39	4.712	3.209	9.46	88.4	.112	28.81	9.46
69	9.12	4.711	3.216	9.45	88.0	.111	28.71	9.45
70	8.83	4.709	3.222	9.44	87.4	.109	28.52	9.44
71	8.51	4.707	3.229	9.42	86.5	.107	28.25	9.42
72	8.18	4.703	3.235	9.38	85.3	.103	27.88	9.38

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*** INUNDATION ANALYSIS BLOCK No. 6 *** CASE PLAN
****

TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	PONDAGE (1000*cum)	--INUNDATION-- DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 5
73	7.85	4.698	3.240	9.34	83.8	.098	27.43	9.34
74	7.52	4.693	3.246	9.29	82.1	.093	26.89	9.29
75	7.20	4.686	3.251	9.24	80.0	.086	26.27	9.24
76	6.89	4.679	3.256	9.17	77.7	.079	25.57	9.17
77	6.59	4.672	3.260	9.10	75.2	.072	24.81	9.10
78	6.29	4.663	3.265	9.02	72.5	.063	23.98	9.02
79	6.01	4.654	3.269	8.93	69.6	.054	23.09	8.93
80	5.73	4.644	3.273	8.84	66.5	.044	22.14	8.84
81	5.48	4.634	3.276	8.75	63.2	.034	21.15	8.75
82	5.23	4.624	3.279	8.65	59.8	.024	20.11	8.65
83	5.01	4.613	3.282	8.54	56.2	.013	19.03	8.54
84	4.83	4.601	3.284	8.44	52.6	.001	17.93	8.44
85	4.68	4.590	3.286	8.33	49.0	.000	16.82	8.33
86	4.55	4.579	3.287	8.22	45.3	.000	15.70	8.22
87	4.41	4.567	3.288	8.11	41.6	.000	14.58	8.11
88	4.27	4.556	3.288	8.00	37.9	.000	13.44	8.00
89	4.13	4.544	3.289	7.90	34.1	.000	12.29	7.90
90	3.99	4.532	3.288	7.79	30.3	.000	11.14	7.79
91	3.85	4.520	3.288	7.68	26.5	.000	9.97	7.68
92	3.71	4.508	3.287	7.57	22.6	.000	8.80	7.57
93	3.58	4.470	3.285	7.42	18.8	.000	7.52	7.42
94	3.44	4.386	3.283	6.79	15.4	.000	6.18	6.79
95	3.30	4.316	3.281	6.12	12.6	.000	5.05	6.12
96	3.16	4.255	3.278	5.57	10.2	.000	4.09	5.57
97	3.02	4.203	3.275	5.11	8.1	.000	3.25	5.11
98	2.88	4.158	3.271	4.72	6.3	.000	2.52	4.72
99	2.75	4.117	3.267	4.38	4.7	.000	1.87	4.38
100	2.61	4.080	3.263	4.09	3.2	.000	1.27	4.09
101	2.47	4.046	3.258	3.82	1.8	.000	.73	3.82
102	2.35	4.015	3.253	3.59	.6	.000	.24	3.59
103	2.25	4.000	3.248	2.85	.0	.000	.00	3.40
104	2.19	4.000	3.242	2.19	.0	.000	.00	3.37
105	2.12	4.000	3.236	2.12	.0	.000	.00	3.37
106	2.06	4.000	3.230	2.06	.0	.000	.00	3.37
107	2.00	4.000	3.223	2.00	.0	.000	.00	3.37
108	1.94	4.000	3.217	1.94	.0	.000	.00	3.37
109	1.88	4.000	3.210	1.88	.0	.000	.00	3.37
110	1.81	4.000	3.202	1.81	.0	.000	.00	3.37
111	1.75	4.000	3.195	1.75	.0	.000	.00	3.37
112	1.69	4.000	3.188	1.69	.0	.000	.00	3.37
113	1.64	4.000	3.180	1.64	.0	.000	.00	3.37
114	1.59	4.000	3.172	1.59	.0	.000	.00	3.37
115	1.54	4.000	3.164	1.54	.0	.000	.00	3.37
116	1.50	4.000	3.155	1.50	.0	.000	.00	3.37
117	1.46	4.000	3.145	1.46	.0	.000	.00	3.37
118	1.42	4.000	3.133	1.42	.0	.000	.00	3.37
119	1.38	4.000	3.121	1.38	.0	.000	.00	3.37
120	1.34	4.000	3.109	1.34	.0	.000	.00	3.37
121	1.30	4.000	3.096	1.30	.0	.000	.00	3.37
122	1.26	4.000	3.084	1.26	.0	.000	.00	3.37
123	1.23	4.000	3.071	1.23	.0	.000	.00	3.37
124	1.20	4.000	3.059	1.20	.0	.000	.00	3.37
125	1.17	4.000	3.046	1.17	.0	.000	.00	3.37
126	1.14	4.000	3.034	1.14	.0	.000	.00	3.37
127	1.11	4.000	3.021	1.11	.0	.000	.00	3.37
128	1.08	4.000	3.009	1.08	.0	.000	.00	3.37
129	1.05	4.000	2.951	1.05	.0	.000	.00	3.37
130	1.02	4.000	2.929	1.02	.0	.000	.00	3.37
131	1.00	4.000	2.855	1.00	.0	.000	.00	3.37
132	.98	4.000	2.765	.98	.0	.000	.00	3.37
133	.95	4.000	2.746	.95	.0	.000	.00	3.37
134	.93	4.000	2.729	.93	.0	.000	.00	3.37
135	.91	4.000	2.720	.91	.0	.000	.00	3.37
136	.89	4.000	2.721	.89	.0	.000	.00	3.37
137	.80	4.000	2.612	.80	.0	.000	.00	3.37
138	.56	4.000	2.538	.56	.0	.000	.00	3.37
139	.25	4.000	2.509	.25	.0	.000	.00	3.37
140	.05	4.000	2.500	.05	.0	.000	.00	3.37
141	.00	4.000	2.500	.00	.0	.000	.00	3.37
142	.00	4.000	2.500	.00	.0	.000	.00	3.37
143	.00	4.000	2.500	.00	.0	.000	.00	3.37
144	.00	4.000	2.500	.00	.0	.000	.00	3.37

(2) Tan Chi and Han Quang Case

TAN CHI & HAN QUANG

*** INUNDATION ANALYSIS BLOCK No. 1 *** CASE PLAN

TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	PONDAGE (1000*cum)	--INUNDATION-- DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 1	2	8
1	.00	2.501	7.719	-4.42	170.4	.001	67.47	14.61	83.40	93.60
2	.01	2.501	7.738	2.19	168.2	.001	66.75	13.83	77.59	93.60
3	.02	2.483	7.757	7.79	160.5	.000	63.80	13.49	72.32	93.60
4	.04	2.451	7.777	10.75	149.8	.000	59.54	14.57	68.28	93.60
5	.06	2.413	7.796	12.82	137.0	.000	54.47	15.90	64.89	93.60
6	.09	2.369	7.815	14.61	122.5	.000	48.70	17.17	61.82	93.60
7	.14	2.322	7.834	15.84	106.8	.000	42.46	18.29	59.47	93.60
8	.20	2.271	7.853	16.97	90.0	.000	35.78	19.19	57.44	93.60
9	.30	2.202	7.872	23.25	67.1	.000	26.66	19.24	51.12	93.60
10	.61	2.078	7.892	41.86	25.8	.000	10.26	18.65	49.86	93.60
11	1.09	2.005	7.911	25.31	1.6	.000	.63	18.65	48.47	93.60
12	1.48	2.004	7.930	1.62	1.4	.000	.57	18.65	44.48	93.60
13	1.70	2.004	7.949	1.83	1.3	.000	.52	18.65	40.36	93.60
14	1.86	2.004	7.968	1.97	1.2	.000	.48	18.65	36.92	93.60
15	2.00	2.003	7.987	2.09	1.1	.000	.45	18.65	33.95	93.60
16	2.12	2.003	8.007	2.23	1.0	.000	.40	18.65	31.30	93.60
17	2.23	2.003	8.026	2.12	1.1	.000	.44	18.65	30.08	93.60
18	2.34	2.003	8.045	2.48	1.0	.000	.39	18.65	29.01	93.60
19	2.43	2.002	8.064	2.90	.5	.000	.21	18.65	27.92	93.60
20	2.53	2.001	8.083	2.73	.3	.000	.12	18.65	26.82	93.60
21	2.61	2.001	8.102	2.62	.3	.000	.12	18.65	26.75	93.60
22	2.70	2.001	8.122	2.71	.3	.000	.12	18.65	26.75	93.60
23	2.86	2.001	8.141	2.86	.3	.000	.12	18.65	26.75	93.60
24	3.14	2.001	8.160	3.13	.3	.000	.13	18.65	26.75	93.60
25	3.50	2.001	8.193	3.48	.3	.000	.13	18.65	26.75	93.60
26	3.90	2.001	8.226	3.87	.4	.000	.15	18.65	26.75	93.60
27	4.35	2.001	8.259	4.31	.4	.000	.16	18.65	26.75	93.60
28	4.85	2.001	8.292	4.81	.4	.000	.17	18.65	26.75	93.60
29	5.43	2.001	8.325	5.39	.5	.000	.19	18.65	26.75	93.60
30	6.12	2.002	8.358	6.06	.5	.000	.22	18.65	26.75	93.60
31	6.96	2.002	8.390	6.89	.6	.000	.25	18.65	26.75	93.60
32	8.06	2.002	8.423	7.96	.7	.000	.29	18.65	26.75	93.60
33	10.26	2.003	8.456	10.05	.9	.000	.37	18.65	26.75	93.60
34	15.07	2.004	8.489	14.75	1.3	.000	.51	18.65	26.98	93.60
35	20.90	2.005	8.522	20.65	1.5	.000	.60	18.65	29.82	93.60
36	24.75	2.006	8.555	24.26	2.0	.000	.80	18.65	40.70	93.60
37	26.94	2.007	8.588	26.67	2.3	.000	.91	18.65	50.88	93.60
38	28.63	2.017	8.621	25.23	5.7	.000	2.26	18.65	54.04	93.60
39	30.06	2.040	8.654	22.44	13.3	.000	5.29	18.65	56.12	93.60
40	31.33	2.072	8.687	20.80	23.9	.000	9.48	18.65	57.12	93.60
41	32.49	2.109	8.720	20.06	36.3	.000	14.43	18.65	57.28	93.60
42	33.57	2.152	8.753	19.29	50.6	.000	20.10	18.65	57.51	93.60
43	34.59	2.201	8.785	18.49	66.7	.000	26.50	18.65	57.81	93.60
44	35.54	2.255	8.818	17.49	84.7	.000	33.68	19.02	58.33	93.60
45	36.45	2.315	8.851	16.54	104.6	.000	41.60	18.66	58.93	93.60
46	37.23	2.375	8.884	17.41	124.5	.000	49.48	16.66	59.53	93.60
47	37.70	2.430	8.917	19.49	142.7	.000	56.72	13.99	60.12	93.60
48	37.87	2.477	8.950	22.31	158.2	.000	62.91	10.60	60.69	93.60
49	37.96	2.501	8.955	25.54	170.6	.001	67.55	6.83	61.24	93.60
50	38.04	2.504	8.959	25.12	183.6	.004	71.86	6.72	61.75	93.60
51	38.14	2.508	8.964	23.86	197.8	.008	76.62	7.49	62.25	93.60
52	38.24	2.512	8.968	22.79	213.3	.012	81.78	8.09	62.72	93.60
53	38.36	2.516	8.973	21.86	229.8	.016	87.28	8.57	63.17	93.60
54	38.48	2.520	8.977	21.03	247.2	.020	93.11	8.97	63.60	93.60
55	38.64	2.525	8.982	20.27	265.6	.025	99.23	9.30	64.02	93.60
56	38.82	2.530	8.987	19.58	284.8	.030	105.65	9.58	64.44	93.60
57	39.19	2.535	8.991	18.94	305.1	.035	112.41	9.82	64.84	93.60
58	39.85	2.540	8.996	18.32	326.6	.040	119.59	10.03	65.25	93.60
59	40.55	2.546	9.000	17.72	349.4	.046	127.21	10.21	65.67	93.60
60	40.96	2.552	9.005	17.13	373.3	.052	135.16	10.37	66.10	93.60
61	41.11	2.558	9.010	16.56	397.8	.058	143.35	10.50	66.54	93.60
62	41.07	2.565	9.014	16.01	422.9	.065	151.71	10.62	66.97	93.60
63	40.91	2.571	9.019	15.49	448.3	.071	160.19	10.72	67.40	93.60
64	40.69	2.577	9.023	15.00	474.0	.077	168.77	10.79	67.81	93.60
65	40.46	2.584	9.028	14.56	499.9	.084	177.41	10.83	68.21	93.60
66	40.22	2.590	9.033	14.15	526.0	.090	186.11	10.86	68.59	93.60
67	39.98	2.597	9.037	13.78	552.2	.097	194.85	10.85	68.97	93.60
68	39.75	2.604	9.042	13.44	578.5	.104	203.63	10.83	69.33	93.60
69	39.52	2.610	9.046	13.14	604.9	.110	212.43	10.79	69.68	93.60
70	39.31	2.617	9.051	12.86	631.3	.117	221.25	10.73	70.01	93.60
71	39.07	2.624	9.055	12.63	657.7	.124	230.08	10.65	70.32	93.60
72	38.78	2.630	9.060	12.42	684.1	.130	238.87	10.56	70.61	93.60

*** INUNDATION ANALYSIS BLOCK No. 1 *** CASE PLAN

TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	PONDAGE (1000*cum)	--INUNDATION-- DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 1	2	8
73	38.39	2.637	9.043	12.24	710.2	.137	247.60	10.47	70.89	93.60
74	37.94	2.643	9.025	12.09	736.1	.143	256.22	10.37	71.14	93.60
75	37.44	2.650	9.008	11.97	761.6	.150	264.72	10.26	71.37	93.60
76	36.93	2.656	8.990	11.87	786.6	.156	273.08	10.16	71.58	93.60
77	36.43	2.662	8.973	11.79	811.3	.162	281.30	10.05	71.77	93.60
78	35.93	2.668	8.956	11.73	835.5	.168	289.38	9.94	71.93	93.60
79	35.45	2.674	8.938	11.70	859.2	.174	297.30	9.82	72.07	93.60
80	34.97	2.680	8.920	11.69	882.5	.180	305.07	9.71	72.20	93.60
81	34.51	2.686	8.903	11.71	905.3	.186	312.68	9.60	72.29	93.60
82	34.07	2.691	8.885	11.75	927.6	.191	320.13	9.49	72.37	93.60
83	33.65	2.697	8.868	11.81	949.5	.197	327.41	9.38	72.41	93.60
84	33.22	2.702	8.850	11.91	970.8	.202	334.53	9.27	72.42	93.60
85	32.72	2.707	8.833	12.02	991.5	.207	341.43	9.17	72.40	93.60
86	32.09	2.712	8.815	12.16	1011.4	.212	348.09	9.08	72.36	93.60
87	31.34	2.717	8.798	12.30	1030.4	.217	354.44	9.01	72.28	93.60
88	30.54	2.722	8.780	12.45	1048.5	.222	360.47	8.97	72.18	93.60
89	29.75	2.726	8.763	12.61	1065.7	.226	366.19	8.94	72.05	93.60
90	29.02	2.730	8.745	12.77	1081.9	.230	371.61	8.93	71.90	93.60
91	28.30	2.734	8.728	12.94	1097.3	.234	376.74	8.94	71.72	93.60
92	27.60	2.738	8.710	13.11	1111.8	.238	381.57	8.97	71.52	93.60
93	26.91	2.741	8.693	13.30	1125.4	.241	386.12	9.01	71.29	93.60
94	26.24	2.744	8.675	13.51	1138.1	.244	390.36	9.06	71.04	93.60
95	25.58	2.747	8.658	13.76	1149.9	.247	394.31	9.10	70.74	93.60
96	24.94	2.750	8.640	14.04	1160.8	.250	397.95	9.15	70.41	93.60
97	24.33	2.752	8.623	14.35	1170.8	.252	401.28	9.19	70.06	93.60
98	23.73	2.755	8.607	14.67	1179.9	.255	404.30	9.24	69.69	93.60
99	23.15	2.757	8.590	15.02	1188.0	.257	407.01	9.28	69.30	93.60
100	22.56	2.759	8.573	15.39	1195.2	.259	409.40	9.32	68.90	93.60
101	21.98	2.760	8.557	15.76	1201.4	.260	411.48	9.36	68.48	93.60
102	21.39	2.761	8.540	16.15	1206.6	.261	413.22	9.40	68.04	93.60
103	20.79	2.763	8.523	16.56	1210.9	.263	414.63	9.45	67.59	93.60
104	20.19	2.763	8.507	17.00	1214.0	.263	415.70	9.50	67.10	93.60
105	19.61	2.764	8.490	17.45	1216.2	.264	416.42	9.55	66.60	93.60
106	19.05	2.764	8.473	17.89	1217.4	.264	416.81	9.61	66.10	93.60
107	18.51	2.764	8.457	18.33	1217.5	.264	416.87	9.68	65.59	93.60
108	17.98	2.764	8.440	18.78	1216.7	.264	416.60	9.75	65.07	93.60
109	17.47	2.764	8.423	19.23	1215.0	.264	416.01	9.82	64.55	93.60
110	16.98	2.763	8.407	19.69	1212.3	.263	415.11	9.89	64.02	93.60
111	16.53	2.762	8.390	20.16	1208.6	.262	413.90	9.96	63.48	93.60
112	16.10	2.761	8.373	20.63	1204.1	.261	412.39	10.03	62.94	93.60
113	15.68	2.759	8.357	21.11	1198.7	.259	410.57	10.10	62.39	93.60
114	15.27	2.758	8.340	21.59	1192.4	.258	408.46	10.17	61.84	93.60
115	14.86	2.756	8.323	22.08	1185.1	.256	406.05	10.24	61.28	93.60
116	14.46	2.754	8.307	22.59	1177.0	.254	403.34	10.32	60.69	93.60
117	14.07	2.752	8.290	23.15	1167.9	.252	400.31	10.40	60.05	93.60
118	13.69	2.749	8.273	23.77	1157.8	.249	396.95	10.48	59.34	93.60
119	13.32	2.745	8.257	24.45	1146.7	.245	393.23	10.58	58.57	93.60
120	12.95	2.743	8.240	25.15	1134.5	.243	389.17	10.68	57.78	93.60
121	12.60	2.740	8.222	26.12	1121.0	.240	384.66	10.78	56.69	93.60
122	12.13	2.736	8.203	27.30	1105.8	.236	379.59	10.91	55.38	93.60
123	11.18	2.731	8.185	31.39	1085.6	.231	372.85	11.09	51.11	93.60
124	9.53	2.724	8.167	36.59	1058.6	.224	363.82	11.45	45.55	93.60
125	7.10	2.716	8.148	38.54	1027.1	.216	353.33	11.91	43.15	93.60
126	4.58	2.707	8.130	39.90	991.8	.207	341.54	12.40	41.30	93.60
127	3.30	2.698	8.112	40.67	954.4	.198	329.07	12.90	40.03	93.60
128	3.07	2.688	8.093	42.96	914.5	.188	315.76	13.37	37.27	93.60
129	2.97	2.676	8.075	50.81	866.7	.176	299.80	13.88	28.92	93.60
130	2.87	2.663	8.057	55.62	813.9	.163	282.20	14.48	23.50	93.60
131	2.70	2.649	8.038	58.45	758.2	.149	263.59	15.06	20.09	93.60
132	2.30	2.634	8.020	61.36	699.1	.134	243.89	15.62	16.62	93.60
133	1.74	2.618	8.002	64.51	636.4	.118	222.94	16.16	12.93	93.60
134	1.33	2.601	7.983	68.40	569.3	.101	200.56	16.68	8.52	93.60
135	1.19	2.583	7.965	75.66	494.8	.083	175.72	17.20	.74	93.60
136	1.17	2.564	7.947	75.98	420.0	.064	150.75	17.62	.00	93.60
137	1.14	2.545	7.928	75.69	345.4	.045	125.88	17.91	.00	93.60
138	1.11	2.526	7.910	75.49	271.1	.026	101.06	18.11	.00	93.60
139	1.04	2.508	7.892	75.32	196.8	.008	76.27	18.28	.00	93.60
140	.74	2.388	7.873	68.80	128.7	.000	51.18	19.54	10.71	93.60
141	.29	2.199	7.855	62.83	66.2	.000	26.32	21.63	26.89	93.60
142	.05	2.005	7.837	64.55	1.7	.000	.67	21.11	26.75	93.60
143	.00	2.002	7.818	.86	.8	.000	.33	20.82	26.75	93.60
144	.00	2.002	7.800	.14	.7	.000	.27	20.53	26.75	93.60

*** INUNDATION ANALYSIS BLOCK No. 2 *** CASE PLAN

TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	PONDAGE (1000*cum)	--INUNDATION-- DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 1
1	.00	2.590	2.501	14.61	132.8	.000	53.15	14.61
2	.00	2.581	2.501	13.83	119.0	.000	47.62	13.83
3	.01	2.572	2.483	13.49	105.5	.000	42.22	13.49
4	.02	2.562	2.451	14.57	90.9	.000	36.40	14.57
5	.03	2.551	2.413	15.90	75.1	.000	30.05	15.90
6	.05	2.539	2.369	17.17	58.0	.000	23.20	17.17
7	.07	2.527	2.322	18.29	39.7	.000	15.91	18.29
8	.10	2.514	2.271	19.19	20.7	.000	8.27	19.19
9	.16	2.501	2.202	19.24	1.6	.000	.63	19.24
10	.30	2.500	2.078	1.87	.0	.000	.00	18.65
11	.54	2.500	2.005	.54	.0	.000	.00	18.65
12	.74	2.500	2.004	.74	.0	.000	.00	18.65
13	.85	2.500	2.004	.85	.0	.000	.00	18.65
14	.93	2.500	2.004	.93	.0	.000	.00	18.65
15	1.00	2.500	2.003	1.00	.0	.000	.00	18.65
16	1.06	2.500	2.003	1.06	.0	.000	.00	18.65
17	1.12	2.500	2.003	1.12	.0	.000	.00	18.65
18	1.17	2.500	2.003	1.17	.0	.000	.00	18.65
19	1.22	2.500	2.002	1.22	.0	.000	.00	18.65
20	1.26	2.500	2.001	1.26	.0	.000	.00	18.65
21	1.31	2.500	2.001	1.31	.0	.000	.00	18.65
22	1.35	2.500	2.001	1.35	.0	.000	.00	18.65
23	1.44	2.500	2.001	1.44	.0	.000	.00	18.65
24	1.58	2.500	2.001	1.58	.0	.000	.00	18.65
25	1.76	2.500	2.001	1.76	.0	.000	.00	18.65
26	1.96	2.500	2.001	1.96	.0	.000	.00	18.65
27	2.18	2.500	2.001	2.18	.0	.000	.00	18.65
28	2.43	2.500	2.001	2.43	.0	.000	.00	18.65
29	2.73	2.500	2.001	2.73	.0	.000	.00	18.65
30	3.07	2.500	2.002	3.07	.0	.000	.00	18.65
31	3.50	2.500	2.002	3.50	.0	.000	.00	18.65
32	4.05	2.500	2.002	4.05	.0	.000	.00	18.65
33	5.19	2.500	2.003	5.19	.0	.000	.00	18.65
34	7.63	2.500	2.004	7.63	.0	.000	.00	18.65
35	10.51	2.500	2.005	10.51	.0	.000	.00	18.65
36	12.41	2.500	2.006	12.41	.0	.000	.00	18.65
37	13.49	2.500	2.007	13.49	.0	.000	.00	18.65
38	14.33	2.500	2.017	14.33	.0	.000	.00	18.65
39	15.05	2.500	2.040	15.05	.0	.000	.00	18.65
40	15.68	2.500	2.072	15.68	.0	.000	.00	18.65
41	16.26	2.500	2.109	16.26	.0	.000	.00	18.65
42	16.80	2.500	2.152	16.80	.0	.000	.00	18.65
43	17.30	2.500	2.201	17.30	.0	.000	.00	18.65
44	17.78	2.500	2.255	17.78	.0	.000	.00	19.02
45	18.24	2.500	2.315	18.14	.1	.000	.04	18.66
46	18.62	2.501	2.375	16.66	2.1	.000	.82	16.66
47	18.85	2.505	2.430	13.99	6.9	.000	2.77	13.99
48	18.94	2.510	2.477	10.60	15.3	.000	6.11	10.60
49	18.98	2.519	2.501	6.83	27.4	.000	10.97	6.83
50	19.02	2.527	2.504	6.72	39.7	.000	15.89	6.72
51	19.07	2.535	2.508	7.49	51.3	.000	20.53	7.49
52	19.12	2.542	2.512	8.09	62.3	.000	24.94	8.09
53	19.18	2.549	2.516	8.57	72.9	.000	29.19	8.57
54	19.24	2.556	2.520	8.97	83.2	.000	33.30	8.97
55	19.32	2.563	2.525	9.30	93.2	.000	37.31	9.30
56	19.41	2.570	2.530	9.58	103.0	.000	41.24	9.58
57	19.60	2.577	2.535	9.82	112.8	.000	45.16	9.82
58	19.93	2.583	2.540	10.03	122.7	.000	49.12	10.03
59	20.28	2.590	2.546	10.21	132.8	.000	53.15	10.21
60	20.49	2.597	2.552	10.37	142.9	.000	57.20	10.37
61	20.61	2.604	2.558	10.50	153.0	.004	61.25	10.50
62	20.66	2.611	2.565	10.62	163.1	.011	65.27	10.62
63	20.61	2.617	2.571	10.72	173.0	.017	69.23	10.72
64	20.45	2.624	2.577	10.79	182.6	.024	73.10	10.79
65	20.24	2.630	2.584	10.83	192.0	.030	76.86	10.83
66	20.02	2.636	2.590	10.86	201.2	.036	80.53	10.86
67	19.80	2.643	2.597	10.85	210.1	.043	84.11	10.85
68	19.58	2.648	2.604	10.83	218.9	.048	87.61	10.83
69	19.36	2.654	2.610	10.79	227.5	.054	91.04	10.79
70	19.14	2.660	2.617	10.73	235.9	.060	94.41	10.73
71	18.93	2.666	2.624	10.65	244.1	.066	97.72	10.65
72	18.71	2.671	2.630	10.56	252.3	.071	100.98	10.56

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*** INUNDATION ANALYSIS BLOCK No. 2 *** CASE PLAN
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TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	PONDAGE (1000*cum)	--INUNDATION-- DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 1
73	18.50	2.677	2.637	10.47	260.3	.077	104.20	10.47
74	18.29	2.682	2.643	10.37	268.2	.082	107.37	10.37
75	18.07	2.687	2.650	10.26	276.1	.087	110.50	10.26
76	17.84	2.692	2.656	10.16	283.7	.092	113.57	10.16
77	17.59	2.698	2.662	10.05	291.3	.098	116.59	10.05
78	17.34	2.703	2.668	9.94	298.7	.103	119.56	9.94
79	17.09	2.708	2.674	9.82	306.0	.108	122.46	9.82
80	16.85	2.712	2.680	9.71	313.1	.112	125.32	9.71
81	16.61	2.717	2.686	9.60	320.1	.117	128.13	9.60
82	16.37	2.722	2.691	9.49	327.0	.122	130.88	9.49
83	16.14	2.726	2.697	9.38	333.7	.126	133.59	9.38
84	15.92	2.731	2.702	9.27	340.4	.131	136.25	9.27
85	15.71	2.735	2.707	9.17	346.9	.135	138.87	9.17
86	15.50	2.740	2.712	9.08	353.4	.140	141.44	9.08
87	15.30	2.744	2.717	9.01	359.6	.144	143.95	9.01
88	15.11	2.748	2.722	8.97	365.8	.148	146.41	8.97
89	14.93	2.752	2.726	8.94	371.8	.152	148.81	8.94
90	14.76	2.756	2.730	8.93	377.6	.156	151.15	8.93
91	14.61	2.760	2.734	8.94	383.3	.160	153.42	8.94
92	14.48	2.764	2.738	8.97	388.8	.164	155.62	8.97
93	14.29	2.767	2.741	9.01	394.1	.167	157.74	9.01
94	14.03	2.771	2.744	9.06	399.1	.171	159.73	9.06
95	13.74	2.774	2.747	9.10	403.7	.174	161.58	9.10
96	13.44	2.777	2.750	9.15	408.0	.177	163.30	9.15
97	13.13	2.779	2.752	9.19	411.9	.179	164.88	9.19
98	12.83	2.782	2.755	9.24	415.5	.182	166.32	9.24
99	12.53	2.784	2.757	9.28	418.8	.184	167.62	9.28
100	12.24	2.786	2.759	9.32	421.7	.186	168.79	9.32
101	11.95	2.788	2.760	9.36	424.3	.188	169.83	9.36
102	11.66	2.789	2.761	9.40	426.5	.189	170.74	9.40
103	11.38	2.791	2.763	9.45	428.5	.191	171.51	9.45
104	11.11	2.792	2.763	9.50	430.1	.192	172.15	9.50
105	10.85	2.793	2.764	9.55	431.4	.193	172.67	9.55
106	10.59	2.793	2.764	9.61	432.4	.193	173.06	9.61
107	10.34	2.794	2.764	9.68	433.0	.194	173.32	9.68
108	10.08	2.794	2.764	9.75	433.4	.194	173.46	9.75
109	9.83	2.794	2.764	9.82	433.4	.194	173.46	9.82
110	9.57	2.794	2.763	9.89	433.1	.194	173.34	9.89
111	9.31	2.793	2.762	9.96	432.4	.193	173.08	9.96
112	9.05	2.793	2.761	10.03	431.4	.193	172.69	10.03
113	8.81	2.792	2.759	10.10	430.1	.192	172.17	10.10
114	8.59	2.791	2.758	10.17	428.6	.191	171.54	10.17
115	8.39	2.789	2.756	10.24	426.7	.189	170.80	10.24
116	8.18	2.788	2.754	10.32	424.6	.188	169.95	10.32
117	7.98	2.786	2.752	10.40	422.2	.186	168.98	10.40
118	7.79	2.785	2.749	10.48	419.5	.185	167.90	10.48
119	7.59	2.783	2.746	10.58	416.5	.183	166.71	10.58
120	7.40	2.780	2.743	10.68	413.2	.180	165.40	10.68
121	7.21	2.778	2.740	10.78	409.6	.178	163.97	10.78
122	7.03	2.775	2.736	10.91	405.8	.175	162.41	10.91
123	6.85	2.772	2.731	11.09	401.5	.172	160.72	11.09
124	6.67	2.769	2.724	11.45	396.7	.169	158.80	11.45
125	6.51	2.765	2.716	11.91	391.3	.165	156.64	11.91
126	6.35	2.761	2.707	12.40	385.3	.161	154.22	12.40
127	6.20	2.757	2.698	12.90	378.6	.157	151.53	12.90
128	6.05	2.752	2.688	13.37	371.3	.152	148.60	13.37
129	5.90	2.746	2.676	13.88	363.3	.146	145.41	13.88
130	5.76	2.741	2.663	14.48	354.6	.141	141.92	14.48
131	5.62	2.734	2.649	15.06	345.1	.134	138.14	15.06
132	5.49	2.727	2.634	15.62	335.0	.127	134.09	15.62
133	5.34	2.720	2.618	16.16	324.2	.120	129.75	16.16
134	4.88	2.712	2.601	16.68	312.4	.112	125.03	16.68
135	3.62	2.703	2.583	17.20	298.8	.103	119.60	17.20
136	1.76	2.692	2.564	17.62	282.9	.092	113.25	17.62
137	.40	2.680	2.545	17.91	265.4	.080	106.24	17.91
138	.00	2.668	2.526	18.11	247.3	.068	98.99	18.11
139	.00	2.655	2.508	18.28	229.0	.055	91.67	18.28
140	.00	2.642	2.388	19.54	209.5	.042	83.85	19.54
141	.00	2.627	2.199	21.63	187.9	.027	75.19	21.63
142	.00	2.613	2.005	21.11	166.7	.013	66.74	21.11
143	.00	2.599	2.002	20.82	145.9	.000	58.41	20.82
144	.00	2.585	2.002	20.53	125.4	.000	50.19	20.53

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*** INUNDATION ANALYSIS BLOCK No. 3 *** CASE PLAN
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TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	--INUNDATION-- PONDAGE (1000*cum)	DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 2	3	4	7	9
1	.00	3.322	2.501	129.55	540.3	.000	213.27	83.40	.00	.00	8.25	54.40
2	.00	3.247	2.501	123.97	416.3	.000	164.33	77.59	.00	.00	8.01	54.40
3	.00	3.184	2.483	104.91	311.4	.000	122.93	72.32	.00	14.03	7.78	54.40
4	.02	3.134	2.451	83.29	228.1	.000	90.06	68.28	.00	31.82	7.56	54.40
5	.05	3.089	2.413	75.13	153.0	.000	60.42	64.89	.00	37.35	6.81	54.40
6	.09	3.049	2.369	67.33	85.8	.000	33.89	61.82	3.28	40.11	5.50	54.40
7	.18	3.021	2.322	46.18	39.8	.000	15.73	59.47	22.86	40.31	4.51	54.40
8	.33	2.927	2.271	35.83	4.3	.000	1.71	57.44	32.63	39.63	3.74	54.40
9	.57	2.900	2.202	.85	4.0	.000	1.60	51.12	55.78	48.53	3.37	54.40
10	1.04	2.882	2.078	1.21	3.8	.000	1.53	49.86	57.21	45.60	3.37	54.40
11	1.94	2.841	2.005	2.36	3.4	.000	1.36	48.47	59.05	41.07	3.37	54.40
12	3.27	2.771	2.004	3.96	2.7	.000	1.08	44.48	67.84	26.59	3.37	54.40
13	4.77	2.708	2.004	5.40	2.1	.000	.83	40.36	69.02	19.79	3.37	54.40
14	6.08	2.655	2.004	6.61	1.6	.000	.62	36.92	66.34	17.77	3.37	54.40
15	6.98	2.606	2.003	7.48	1.1	.000	.42	33.95	63.13	17.11	3.37	54.40
16	7.56	2.556	2.003	8.06	.6	.000	.22	31.30	59.75	16.66	3.37	54.40
17	7.93	2.500	2.003	11.89	.0	.000	.00	30.08	50.63	12.62	3.37	54.40
18	8.14	2.500	2.003	17.40	.0	.000	.00	29.01	44.29	11.52	3.37	54.40
19	8.20	2.500	2.002	15.03	.0	.000	.00	27.92	39.61	13.78	3.37	54.40
20	8.13	2.500	2.001	13.05	.0	.000	.00	26.82	35.49	13.62	3.37	54.40
21	7.98	2.500	2.001	25.82	.0	.000	.00	26.75	25.62	10.13	3.37	54.40
22	7.80	2.500	2.001	35.06	.0	.000	.00	26.75	16.92	9.38	3.37	54.40
23	7.68	2.500	2.001	40.91	.0	.000	.00	26.75	10.99	9.28	3.37	54.40
24	7.75	2.500	2.001	43.22	.0	.000	.00	26.75	8.45	9.48	3.37	54.40
25	8.06	2.500	2.001	43.36	.0	.000	.00	26.75	8.02	9.97	3.37	54.40
26	8.58	2.500	2.001	42.76	.0	.000	.00	26.75	8.30	10.68	3.37	54.40
27	9.27	2.500	2.001	41.90	.0	.000	.00	26.75	8.82	11.57	3.37	54.40
28	10.10	2.500	2.001	40.90	.0	.000	.00	26.75	9.47	12.59	3.37	54.40
29	11.14	2.500	2.001	39.83	.0	.000	.00	26.75	10.22	13.75	3.37	54.40
30	12.45	2.500	2.002	38.68	.0	.000	.00	26.75	11.07	15.15	3.37	54.40
31	14.12	2.500	2.002	37.29	.0	.000	.00	26.75	12.10	16.90	3.37	54.40
32	16.27	2.500	2.002	35.42	.0	.000	.00	26.75	13.46	19.20	3.37	54.40
33	19.94	2.500	2.003	32.58	.0	.000	.00	26.75	15.52	22.99	3.38	54.40
34	27.48	2.500	2.004	30.37	.0	.000	.00	26.98	16.71	29.84	3.52	54.40
35	39.62	2.635	2.005	38.29	1.3	.000	.54	29.82	4.23	37.75	3.94	54.40
36	52.85	2.859	2.006	50.61	3.6	.000	1.43	40.70	.00	39.96	4.52	54.40
37	62.58	2.937	2.007	61.79	4.4	.000	1.75	50.88	.00	38.32	5.16	54.40
38	67.34	2.973	2.017	66.98	4.7	.000	1.89	54.04	.00	35.65	5.81	54.40
39	68.49	2.999	2.040	68.23	5.0	.000	1.99	56.12	.00	35.85	6.43	54.40
40	67.77	3.001	2.072	65.63	7.1	.000	2.84	57.12	.00	38.85	7.04	54.40
41	66.36	3.004	2.109	61.31	12.2	.000	4.83	57.28	.00	42.91	7.45	54.40
42	64.95	3.008	2.152	58.74	18.4	.000	7.28	57.51	.00	45.63	7.53	54.40
43	63.81	3.014	2.201	53.97	28.2	.000	11.16	57.81	3.08	47.53	7.62	54.40
44	62.95	3.023	2.255	48.72	42.4	.000	16.78	58.33	7.74	48.56	7.70	54.40
45	62.44	3.031	2.315	47.87	57.0	.000	22.53	58.93	8.44	49.22	7.80	54.40
46	62.23	3.040	2.375	47.83	71.4	.000	28.21	59.53	8.47	49.72	7.90	54.40
47	62.05	3.048	2.430	48.06	85.4	.000	33.74	60.12	8.30	50.16	8.00	54.40
48	61.64	3.056	2.477	48.25	98.8	.000	39.02	60.69	8.19	50.54	8.10	54.40
49	60.99	3.064	2.501	48.30	111.5	.000	44.04	61.24	8.25	50.89	8.20	54.40
50	60.21	3.071	2.504	48.21	123.5	.000	48.77	61.75	8.46	51.19	8.30	54.40
51	59.43	3.078	2.508	48.03	134.9	.000	53.27	62.25	8.77	51.44	8.40	54.40
52	58.71	3.085	2.512	47.83	145.8	.000	57.57	62.72	9.14	51.65	8.49	54.40
53	58.07	3.091	2.516	47.62	156.3	.000	61.70	63.17	9.54	51.83	8.58	54.40
54	57.52	3.097	2.520	47.42	166.3	.000	65.68	63.60	9.93	51.97	8.68	54.40
55	57.05	3.103	2.525	47.25	176.1	.000	69.55	64.02	10.31	52.09	8.77	54.40
56	56.67	3.109	2.530	47.11	185.7	.000	73.32	64.44	10.67	52.19	8.86	54.40
57	56.49	3.114	2.535	47.02	195.2	.000	77.07	64.84	10.98	52.29	8.95	54.40
58	56.65	3.120	2.540	47.02	204.8	.000	80.87	65.25	11.19	52.41	9.04	54.40
59	57.08	3.126	2.546	47.13	214.8	.000	84.80	65.67	11.27	52.54	9.12	54.40
60	57.50	3.132	2.552	47.33	224.9	.000	88.81	66.10	11.27	52.70	9.20	54.40
61	57.70	3.138	2.558	47.53	235.1	.000	92.83	66.54	11.27	52.87	9.27	54.40
62	57.63	3.144	2.565	47.66	245.1	.000	96.76	66.97	11.35	53.03	9.32	54.40
63	57.38	3.150	2.571	47.70	254.8	.000	100.58	67.40	11.54	53.18	9.37	54.40
64	57.03	3.156	2.577	47.67	264.1	.000	104.28	67.81	11.84	53.29	9.41	54.40
65	56.67	3.161	2.584	47.61	273.2	.000	107.85	68.21	12.22	53.34	9.43	54.40
66	56.32	3.167	2.590	47.57	281.9	.000	111.31	68.59	12.66	53.32	9.45	54.40
67	55.99	3.172	2.597	47.54	290.4	.000	114.64	68.97	13.13	53.23	9.46	54.40
68	55.66	3.177	2.604	47.55	298.5	.000	117.84	69.33	13.64	53.08	9.46	54.40
69	55.35	3.181	2.610	47.60	306.2	.000	120.90	69.68	14.16	52.86	9.45	54.40
70	55.03	3.186	2.617	47.68	313.6	.000	123.81	70.01	14.68	52.60	9.44	54.40
71	54.70	3.190	2.624	47.78	320.5	.000	126.54	70.32	15.22	52.30	9.42	54.40
72	54.34	3.194	2.630	47.88	327.0	.000	129.09	70.61	15.78	51.97	9.38	54.40

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*** INUNDATION ANALYSIS BLOCK No. 3 *** CASE PLAN
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TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	--INUNDATION-- PONDAGE (1000*cum)	DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 2	3	4	7	9
73	53.96	3.197	2.637	47.99	332.9	.000	131.44	70.89	16.35	51.60	9.34	54.40
74	53.57	3.201	2.643	48.09	338.4	.000	133.61	71.14	16.95	51.21	9.29	54.40
75	53.20	3.204	2.650	48.22	343.4	.000	135.57	71.37	17.56	50.75	9.24	54.40
76	52.84	3.206	2.656	48.38	347.9	.000	137.33	71.58	18.20	50.22	9.17	54.40
77	52.50	3.209	2.662	48.55	351.8	.000	138.89	71.77	18.87	49.65	9.10	54.40
78	52.19	3.211	2.668	48.71	355.3	.000	140.26	71.93	19.54	49.05	9.02	54.40
79	51.89	3.213	2.674	48.88	358.3	.000	141.45	72.07	20.22	48.43	8.93	54.40
80	51.58	3.214	2.680	49.07	360.8	.000	142.44	72.20	20.89	47.79	8.84	54.40
81	51.22	3.215	2.686	49.28	362.8	.000	143.21	72.29	21.55	47.12	8.75	54.40
82	50.79	3.216	2.691	49.49	364.1	.000	143.72	72.37	22.21	46.42	8.65	54.40
83	50.30	3.216	2.697	49.68	364.7	.000	143.96	72.41	22.89	45.69	8.54	54.40
84	49.78	3.216	2.702	49.86	364.6	.000	143.93	72.42	23.58	44.94	8.44	54.40
85	49.25	3.216	2.707	50.00	363.8	.000	143.64	72.40	24.29	44.18	8.33	54.40
86	48.73	3.215	2.712	50.13	362.4	.000	143.08	72.36	25.01	43.40	8.22	54.40
87	48.21	3.214	2.717	50.23	360.4	.000	142.29	72.28	25.72	42.62	8.11	54.40
88	47.68	3.212	2.722	50.30	357.8	.000	141.25	72.18	26.43	41.84	8.00	54.40
89	47.13	3.210	2.726	50.32	354.6	.000	139.99	72.05	27.13	41.10	7.90	54.40
90	46.55	3.208	2.730	50.30	350.9	.000	138.51	71.90	27.83	40.38	7.79	54.40
91	45.91	3.206	2.734	50.22	346.5	.000	136.81	71.72	28.52	39.70	7.68	54.40
92	45.21	3.203	2.738	50.07	341.7	.000	134.89	71.52	29.21	39.07	7.57	54.40
93	44.47	3.199	2.741	49.91	336.3	.000	132.75	71.29	29.89	38.47	7.42	54.40
94	43.73	3.195	2.744	50.10	329.9	.000	130.23	71.04	30.62	37.93	6.79	54.40
95	42.99	3.191	2.747	50.14	322.7	.000	127.41	70.74	31.42	37.46	6.12	54.40
96	42.25	3.187	2.750	50.00	315.0	.000	124.35	70.41	32.22	37.02	5.57	54.40
97	41.52	3.182	2.752	49.76	306.7	.000	121.10	70.06	33.01	36.58	5.11	54.40
98	40.78	3.176	2.755	49.47	298.1	.000	117.67	69.69	33.78	36.12	4.72	54.40
99	40.06	3.171	2.757	49.15	289.0	.000	114.08	69.30	34.50	35.66	4.38	54.40
100	39.36	3.165	2.759	48.82	279.5	.000	110.35	68.90	35.20	35.19	4.09	54.40
101	38.66	3.159	2.760	48.48	269.7	.000	106.47	68.48	35.86	34.71	3.82	54.40
102	37.95	3.153	2.761	48.13	259.5	.000	102.45	68.04	36.50	34.22	3.59	54.40
103	37.24	3.146	2.763	48.26	248.5	.000	98.10	67.59	37.14	33.74	3.40	54.40
104	36.53	3.140	2.763	48.08	236.9	.000	93.54	67.10	37.87	33.35	3.37	54.40
105	35.82	3.133	2.764	47.43	225.3	.000	88.96	66.60	38.53	32.91	3.37	54.40
106	35.12	3.125	2.764	46.88	213.5	.000	84.31	66.10	39.12	32.43	3.37	54.40
107	34.44	3.118	2.764	46.39	201.6	.000	79.60	65.59	39.67	31.93	3.37	54.40
108	33.76	3.111	2.764	45.92	189.4	.000	74.80	65.07	40.18	31.43	3.37	54.40
109	33.10	3.104	2.764	45.46	177.1	.000	69.92	64.55	40.66	30.95	3.37	54.40
110	32.44	3.096	2.763	45.00	164.5	.000	64.96	64.02	41.11	30.49	3.37	54.40
111	31.79	3.088	2.762	44.54	151.8	.000	59.93	63.48	41.54	30.05	3.37	54.40
112	31.16	3.081	2.761	44.07	138.8	.000	54.83	62.94	41.94	29.63	3.37	54.40
113	30.55	3.073	2.759	43.61	125.8	.000	49.67	62.39	42.31	29.23	3.37	54.40
114	29.95	3.065	2.758	43.20	112.5	.000	44.44	61.84	42.64	28.81	3.37	54.40
115	29.35	3.056	2.756	42.99	98.9	.000	39.06	61.28	42.90	28.23	3.37	54.40
116	28.55	3.048	2.754	43.13	84.3	.000	33.31	60.69	43.12	27.34	3.37	54.40
117	27.22	3.038	2.752	43.41	68.1	.000	26.92	60.05	43.38	26.20	3.37	54.40
118	25.36	3.027	2.749	43.33	50.2	.000	19.83	59.34	43.80	25.19	3.37	54.40
119	23.56	3.016	2.746	42.73	31.0	.000	12.26	58.57	44.40	24.47	3.37	54.40
120	22.30	3.004	2.743	41.83	11.5	.000	4.55	57.78	45.05	23.95	3.37	54.40
121	21.60	2.954	2.740	28.53	4.5	.000	1.82	56.69	51.42	29.85	3.37	54.40
122	21.17	2.939	2.736	21.32	4.4	.000	1.76	55.38	55.19	32.00	3.37	54.40
123	20.82	2.964	2.731	20.57	4.6	.000	1.86	51.11	59.16	24.55	3.37	54.40
124	20.42	2.918	2.724	20.88	4.2	.000	1.67	45.55	62.53	15.34	3.37	54.40
125	19.87	2.885	2.716	20.20	3.8	.000	1.54	43.15	64.96	11.22	3.37	54.40
126	19.20	2.864	2.707	19.40	3.6	.000	1.46	41.30	65.97	9.18	3.37	54.40
127	18.60	2.849	2.698	18.75	3.5	.000	1.39	40.03	66.13	8.43	3.37	54.40
128	18.09	2.847	2.688	18.10	3.5	.000	1.39	37.27	62.02	10.47	3.37	54.40
129	17.38	2.870	2.676	17.15	3.7	.000	1.48	28.92	50.27	14.84	3.37	54.40
130	16.35	2.812	2.663	16.93	3.1	.000	1.25	23.50	45.45	14.49	3.37	54.40
131	15.07	2.758	2.649	15.61	2.6	.000	1.03	20.09	45.35	12.52	3.37	54.40
132	13.68	2.707	2.634	14.19	2.1	.000	.83	16.62	44.33	11.53	3.37	54.40
133	12.36	2.659	2.618	12.85	1.6	.000	.64	12.93	42.74	10.79	3.37	54.40
134	11.32	2.610	2.601	11.80	1.1	.000	.44	8.52	40.44	9.74	3.37	54.40
135	10.58	2.574	2.583	10.95	.7	.000	.29	.74	37.15	6.13	3.37	54.40
136	10.10	2.523	2.564	12.42	.2	.000	.09	.00	33.29	7.80	3.37	54.40
137	9.84	2.500	2.545	17.22	.0	.000	.00	.00	29.90	6.48	3.37	54.40
138	9.74	2.500	2.526	33.47	.0	.000	.00	.00	17.32	3.04	3.37	54.40
139	9.67	2.500	2.508	47.28	.0	.000	.00	.00	4.08	2.78	3.37	54.40
140	9.53	2.500	2.388	56.92	.0	.000	.00	10.71	.14	2.57	3.37	54.40
141	9.14	2.500	2.199	61.06	.0	.000	.00	26.89	.05	2.45	3.37	54.40
142	7.94	2.500	2.005	59.98	.0	.000	.00	26.75	.05	2.32	3.37	54.40
143	5.49	2.500	2.002	58.07	.0	.000	.00	26.75	.03	1.80	3.37	54.40
144	1.99	2.500	2.002	55.67	.0	.000	.00	26.75	.02	.72	3.37	54.40

*** INUNDATION ANALYSIS BLOCK No. 4 *** CASE PLAN

TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	PONDAGE (1000*cum)	--INUNDATION-- DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 3
1	.00	3.060	3.322	.00	699.0	.000	237.96	.00
2	.00	3.060	3.247	.00	699.0	.000	237.96	.00
3	.00	3.060	3.184	.00	699.0	.000	237.96	.00
4	.01	3.060	3.134	.00	699.0	.000	237.96	.00
5	.07	3.060	3.089	.00	699.1	.000	237.98	.00
6	.17	3.059	3.049	3.28	696.0	.000	237.21	3.28
7	.27	3.054	3.021	22.86	673.4	.000	231.61	22.86
8	.42	3.047	2.927	32.63	641.2	.000	223.62	32.63
9	.64	3.035	2.900	55.78	586.0	.000	209.94	55.78
10	1.12	3.022	2.882	57.21	529.9	.000	196.03	57.21
11	2.19	3.010	2.841	59.05	473.1	.000	181.93	59.05
12	3.66	2.977	2.771	67.84	408.9	.000	162.98	67.84
13	4.86	2.902	2.708	69.02	344.7	.000	137.41	69.02
14	5.60	2.831	2.655	66.34	284.0	.000	113.19	66.34
15	6.12	2.765	2.606	63.13	227.0	.000	90.47	63.13
16	6.55	2.703	2.556	59.75	173.8	.000	69.27	59.75
17	6.93	2.652	2.500	50.63	130.1	.000	51.85	50.63
18	7.29	2.608	2.500	44.29	93.1	.000	37.10	44.29
19	7.60	2.571	2.500	39.61	61.1	.000	24.34	39.61
20	7.79	2.539	2.500	35.49	33.4	.000	13.30	35.49
21	7.82	2.518	2.500	25.62	15.6	.000	6.21	25.62
22	7.72	2.507	2.500	16.92	6.4	.000	2.54	16.92
23	7.65	2.504	2.500	10.99	3.0	.000	1.21	10.99
24	7.75	2.503	2.500	8.45	2.3	.000	.93	8.45
25	8.06	2.503	2.500	8.02	2.4	.000	.95	8.02
26	8.56	2.503	2.500	8.30	2.6	.000	1.05	8.30
27	9.20	2.504	2.500	8.82	3.0	.000	1.20	8.82
28	9.96	2.504	2.500	9.47	3.5	.000	1.39	9.47
29	10.81	2.505	2.500	10.22	4.1	.000	1.63	10.22
30	11.81	2.506	2.500	11.07	4.8	.000	1.92	11.07
31	13.13	2.507	2.500	12.10	5.8	.000	2.33	12.10
32	15.02	2.509	2.500	13.46	7.4	.000	2.95	13.46
33	18.59	2.512	2.500	15.52	10.6	.000	4.18	15.52
34	26.76	2.524	2.500	16.71	20.5	.000	8.18	16.71
35	39.78	2.565	2.635	4.23	56.1	.000	22.35	4.23
36	51.40	2.625	2.859	.00	107.5	.000	42.84	.00
37	57.34	2.692	2.937	.00	164.8	.000	65.70	.00
38	59.34	2.761	2.973	.00	224.2	.000	89.35	.00
39	59.41	2.831	2.999	.00	283.6	.000	113.03	.00
40	58.22	2.898	3.001	.00	341.8	.000	136.24	.00
41	56.18	2.964	3.004	.00	398.0	.000	158.63	.00
42	53.95	3.005	3.008	.00	451.9	.000	176.68	.00
43	52.00	3.016	3.014	3.08	500.8	.000	188.82	3.08
44	50.28	3.025	3.023	7.74	543.4	.000	199.37	7.74
45	48.61	3.034	3.031	8.44	583.6	.000	209.33	8.44
46	47.04	3.043	3.040	8.47	622.1	.000	218.90	8.47
47	45.68	3.051	3.048	8.30	659.5	.000	228.16	8.30
48	44.37	3.059	3.056	8.19	695.7	.000	237.14	8.19
49	43.06	3.067	3.064	8.25	730.5	.007	245.77	8.25
50	41.85	3.074	3.071	8.46	763.9	.014	254.05	8.46
51	40.81	3.082	3.078	8.77	795.9	.022	262.00	8.77
52	39.96	3.088	3.085	9.14	826.7	.028	269.64	9.14
53	39.27	3.095	3.091	9.54	856.5	.035	277.01	9.54
54	38.72	3.101	3.097	9.93	885.3	.041	284.16	9.93
55	38.28	3.108	3.103	10.31	913.2	.048	291.09	10.31
56	37.94	3.114	3.109	10.67	940.5	.054	297.86	10.67
57	37.75	3.120	3.114	10.98	967.3	.060	304.50	10.98
58	37.86	3.126	3.120	11.19	994.0	.066	311.11	11.19
59	38.32	3.132	3.126	11.27	1021.0	.072	317.82	11.27
60	38.76	3.138	3.132	11.27	1048.5	.078	324.64	11.27
61	38.94	3.144	3.138	11.27	1076.2	.084	331.50	11.27
62	38.93	3.150	3.144	11.35	1103.8	.090	338.34	11.35
63	38.85	3.156	3.150	11.54	1131.1	.096	345.11	11.54
64	38.75	3.162	3.156	11.84	1158.0	.102	351.79	11.84
65	38.65	3.168	3.161	12.22	1184.4	.108	358.34	12.22
66	38.55	3.174	3.167	12.66	1210.3	.114	364.76	12.66
67	38.45	3.179	3.172	13.13	1235.6	.119	371.04	13.13
68	38.26	3.185	3.177	13.64	1260.2	.125	377.15	13.64
69	37.95	3.190	3.181	14.16	1284.0	.130	383.05	14.16
70	37.55	3.195	3.186	14.68	1306.9	.135	388.72	14.68
71	37.11	3.200	3.190	15.22	1328.8	.140	394.15	15.22
72	36.64	3.205	3.194	15.78	1349.7	.145	399.32	15.78

*** INUNDATION ANALYSIS BLOCK No. 4 *** CASE PLAN

TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	--INUNDATION-- PONDAGE (1000*cum)	DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 3
73	36.15	3.209	3.197	16.35	1369.5	.149	404.23	16.35
74	35.68	3.213	3.201	16.95	1388.2	.153	408.88	16.95
75	35.22	3.217	3.204	17.56	1405.8	.157	413.26	17.56
76	34.79	3.221	3.206	18.20	1422.4	.161	417.37	18.20
77	34.38	3.224	3.209	18.87	1437.9	.164	421.21	18.87
78	33.98	3.227	3.211	19.54	1452.4	.167	424.79	19.54
79	33.51	3.230	3.213	20.22	1465.7	.170	428.09	20.22
80	32.91	3.233	3.214	20.89	1477.7	.173	431.07	20.89
81	32.17	3.235	3.215	21.55	1488.3	.175	433.71	21.55
82	31.36	3.237	3.216	22.21	1497.5	.177	435.98	22.21
83	30.51	3.239	3.216	22.89	1505.1	.179	437.87	22.89
84	29.66	3.240	3.216	23.58	1511.2	.180	439.38	23.58
85	28.82	3.241	3.216	24.29	1515.7	.181	440.50	24.29
86	28.00	3.242	3.215	25.01	1518.7	.182	441.24	25.01
87	27.19	3.242	3.214	25.72	1520.2	.182	441.61	25.72
88	26.41	3.242	3.212	26.43	1520.1	.182	441.60	26.43
89	25.67	3.242	3.210	27.13	1518.7	.182	441.24	27.13
90	24.97	3.242	3.208	27.83	1515.8	.182	440.53	27.83
91	24.29	3.241	3.206	28.52	1511.6	.181	439.48	28.52
92	23.63	3.239	3.203	29.21	1506.0	.179	438.10	29.21
93	22.98	3.238	3.199	29.89	1499.1	.178	436.38	29.89
94	22.34	3.236	3.195	30.62	1490.8	.176	434.33	30.62
95	21.69	3.234	3.191	31.42	1481.1	.174	431.92	31.42
96	21.04	3.231	3.187	32.22	1469.9	.171	429.15	32.22
97	20.39	3.229	3.182	33.01	1457.3	.169	426.02	33.01
98	19.77	3.225	3.176	33.78	1443.3	.165	422.54	33.78
99	19.18	3.222	3.171	34.50	1428.0	.162	418.74	34.50
100	18.64	3.218	3.165	35.20	1411.4	.158	414.64	35.20
101	18.12	3.214	3.159	35.86	1393.7	.154	410.23	35.86
102	17.60	3.210	3.153	36.50	1374.8	.150	405.55	36.50
103	17.11	3.206	3.146	37.14	1354.7	.146	400.58	37.14
104	16.62	3.201	3.140	37.87	1333.5	.141	395.31	37.87
105	16.14	3.196	3.133	38.53	1311.1	.136	389.76	38.53
106	15.68	3.191	3.125	39.12	1287.6	.131	383.94	39.12
107	15.22	3.185	3.118	39.67	1263.2	.125	377.88	39.67
108	14.78	3.180	3.111	40.18	1237.8	.120	371.58	40.18
109	14.34	3.174	3.104	40.66	1211.5	.114	365.05	40.66
110	13.92	3.168	3.096	41.11	1184.3	.108	358.31	41.11
111	13.50	3.162	3.088	41.54	1156.2	.102	351.36	41.54
112	13.10	3.155	3.081	41.94	1127.4	.095	344.21	41.94
113	12.62	3.149	3.073	42.31	1097.7	.089	336.84	42.31
114	11.61	3.142	3.065	42.64	1066.7	.082	329.15	42.64
115	9.65	3.134	3.056	42.90	1033.4	.074	320.90	42.90
116	7.14	3.126	3.048	43.12	997.5	.066	311.98	43.12
117	5.04	3.118	3.038	43.38	959.1	.058	302.48	43.38
118	3.86	3.109	3.027	43.80	919.2	.049	292.57	43.80
119	3.38	3.100	3.016	44.40	878.2	.040	282.40	44.40
120	3.19	3.091	3.004	45.05	836.3	.031	272.01	45.05
121	3.06	3.080	2.954	51.42	788.0	.020	260.02	51.42
122	2.94	3.068	2.939	55.19	735.7	.008	247.06	55.19
123	2.83	3.056	2.964	59.16	679.4	.000	233.10	59.16
124	2.75	3.042	2.918	62.53	619.6	.000	218.27	62.53
125	2.68	3.029	2.885	64.96	557.3	.000	202.83	64.96
126	2.62	3.014	2.864	65.97	494.0	.000	187.12	65.97
127	2.56	3.000	2.849	66.13	430.4	.000	171.35	66.13
128	2.50	2.932	2.847	62.02	370.9	.000	147.84	62.02
129	2.44	2.877	2.870	50.27	323.1	.000	128.77	50.27
130	2.38	2.826	2.812	45.45	280.0	.000	111.60	45.45
131	2.32	2.776	2.758	45.35	236.9	.000	94.45	45.35
132	2.26	2.727	2.707	44.33	194.9	.000	77.68	44.33
133	2.19	2.680	2.659	42.74	154.3	.000	61.52	42.74
134	2.13	2.635	2.610	40.44	116.0	.000	46.24	40.44
135	2.00	2.594	2.574	37.15	80.9	.000	32.23	37.15
136	1.69	2.557	2.523	33.29	49.3	.000	19.64	33.29
137	1.17	2.524	2.500	29.90	20.5	.000	8.19	29.90
138	.60	2.504	2.500	17.32	3.8	.000	1.52	17.32
139	.26	2.500	2.500	4.08	.0	.000	.00	4.08
140	.11	2.500	2.500	.11	.0	.000	.00	.14
141	.04	2.500	2.500	.03	.0	.000	.00	.05
142	.02	2.500	2.500	.03	.0	.000	.00	.05
143	.02	2.500	2.500	.02	.0	.000	.00	.03
144	.01	2.500	2.500	.01	.0	.000	.00	.02

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*** INUNDATION ANALYSIS BLOCK No. 5 *** CASE PLAN
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TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	PONDAGE (1000*cum)	--INUNDATION-- DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 4	5
1	.00	3.198	3.322	-48.40	288.3	.048	87.11	.00	48.40
2	.01	3.224	3.247	-26.37	314.7	.074	93.88	.00	26.37
3	.04	3.218	3.184	6.15	308.6	.068	92.31	14.03	7.88
4	.11	3.194	3.134	24.21	284.5	.044	86.13	31.82	7.61
5	.19	3.167	3.089	28.00	256.7	.017	79.00	37.35	9.35
6	.30	3.137	3.049	29.82	227.1	.000	71.43	40.11	10.29
7	.43	3.108	3.021	29.66	197.9	.000	63.93	40.31	10.65
8	.63	3.080	2.927	29.18	169.4	.000	56.61	39.63	10.45
9	1.05	3.045	2.900	36.65	133.8	.000	47.48	48.53	11.88
10	2.06	3.013	2.882	33.39	102.4	.000	39.45	45.60	12.21
11	3.48	2.922	2.841	30.75	75.2	.000	30.41	41.07	16.26
12	4.66	2.808	2.771	25.00	54.8	.000	22.18	26.59	39.96
13	5.40	2.738	2.708	17.84	42.4	.000	17.15	19.79	51.36
14	5.90	2.684	2.655	15.60	32.7	.000	13.23	17.77	57.91
15	6.25	2.636	2.606	14.76	24.2	.000	9.78	17.11	62.80
16	6.48	2.593	2.556	14.16	16.5	.000	6.68	16.66	66.92
17	6.64	2.574	2.500	9.98	13.2	.000	5.33	12.62	69.67
18	6.71	2.563	2.500	8.74	11.1	.000	4.51	11.52	70.92
19	6.68	2.539	2.500	10.89	6.9	.000	2.80	13.78	72.07
20	6.51	2.516	2.500	10.61	2.8	.000	1.14	13.62	74.23
21	6.27	2.512	2.500	7.02	2.1	.000	.84	10.13	75.19
22	6.04	2.511	2.500	6.16	2.0	.000	.79	9.38	75.34
23	5.93	2.511	2.500	5.90	2.0	.000	.80	9.28	75.36
24	5.97	2.512	2.500	5.82	2.1	.000	.87	9.48	75.32
25	6.19	2.514	2.500	5.91	2.4	.000	.98	9.97	75.23
26	6.56	2.516	2.500	6.16	2.8	.000	1.14	10.68	75.08
27	7.05	2.519	2.500	6.54	3.3	.000	1.35	11.57	74.89
28	7.61	2.522	2.500	6.98	4.0	.000	1.60	12.59	74.65
29	8.28	2.527	2.500	7.49	4.8	.000	1.92	13.75	74.34
30	9.19	2.533	2.500	8.10	5.8	.000	2.36	15.15	73.94
31	10.44	2.541	2.500	8.91	7.4	.000	2.98	16.90	73.37
32	12.45	2.555	2.500	10.03	9.8	.000	3.96	19.20	72.53
33	17.55	2.587	2.500	11.85	15.5	.000	6.26	22.99	70.85
34	27.64	2.662	2.500	14.20	28.9	.000	11.70	29.84	66.63
35	38.39	2.793	2.635	15.24	52.1	.000	21.06	37.75	56.89
36	44.40	2.970	2.859	12.84	83.6	.000	33.83	39.96	37.02
37	45.71	3.018	2.937	22.12	107.2	.000	40.67	38.32	16.20
38	44.38	3.047	2.973	15.74	135.9	.000	48.02	35.65	19.91
39	41.64	3.075	2.999	13.50	164.0	.000	55.23	35.85	22.34
40	38.16	3.098	3.001	14.40	187.8	.000	61.33	38.85	24.45
41	34.52	3.117	3.004	16.05	206.2	.000	66.07	42.91	26.86
42	31.28	3.131	3.008	16.34	221.2	.000	69.90	45.63	29.29
43	28.62	3.144	3.014	16.00	233.8	.000	73.13	47.53	31.53
44	26.32	3.155	3.023	15.04	245.1	.005	76.02	48.56	33.52
45	24.27	3.165	3.031	13.94	255.4	.015	78.67	49.22	35.27
46	22.57	3.175	3.040	12.88	265.1	.025	81.16	49.72	36.84
47	21.13	3.184	3.048	11.92	274.3	.034	83.52	50.16	38.23
48	19.79	3.193	3.056	11.12	283.0	.043	85.75	50.54	39.43
49	18.55	3.201	3.064	10.48	291.0	.051	87.81	50.89	40.41
50	17.45	3.208	3.071	9.98	298.5	.058	89.73	51.19	41.21
51	16.52	3.215	3.078	9.58	305.4	.065	91.51	51.44	41.86
52	15.73	3.222	3.085	9.25	311.9	.072	93.17	51.65	42.40
53	15.06	3.228	3.091	8.98	318.0	.078	94.73	51.83	42.85
54	14.49	3.233	3.097	8.73	323.8	.083	96.21	51.97	43.24
55	14.00	3.239	3.103	8.51	329.3	.089	97.62	52.09	43.58
56	13.62	3.244	3.109	8.30	334.6	.094	98.98	52.19	43.90
57	13.42	3.249	3.114	8.10	339.9	.099	100.34	52.29	44.19
58	13.42	3.255	3.120	7.91	345.4	.105	101.76	52.41	44.49
59	13.47	3.261	3.126	7.68	351.2	.111	103.24	52.54	44.86
60	13.41	3.267	3.132	7.42	357.2	.117	104.77	52.70	45.28
61	13.23	3.273	3.138	7.21	363.2	.123	106.32	52.87	45.66
62	12.99	3.278	3.144	7.12	369.1	.128	107.82	53.03	45.91
63	12.74	3.284	3.150	7.18	374.6	.134	109.25	53.18	46.01
64	12.49	3.289	3.156	7.34	379.8	.139	110.57	53.29	45.95
65	12.25	3.294	3.161	7.58	384.4	.144	111.77	53.34	45.76
66	12.04	3.298	3.167	7.85	388.6	.148	112.84	53.32	45.47
67	11.83	3.302	3.172	8.12	392.3	.152	113.79	53.23	45.11
68	11.63	3.305	3.177	8.38	395.6	.155	114.63	53.08	44.69
69	11.43	3.308	3.181	8.61	398.4	.158	115.35	52.86	44.25
70	11.23	3.310	3.186	8.81	400.8	.160	115.97	52.60	43.79
71	11.04	3.312	3.190	8.97	402.9	.162	116.50	52.30	43.33
72	10.83	3.314	3.194	9.12	404.6	.164	116.94	51.97	42.84

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*** INUNDATION ANALYSIS BLOCK No. 5 *** CASE PLAN
****

TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	PONDAGE (1000*cum)	--INUNDATION-- DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 4	5
73	10.63	3.315	3.197	9.27	406.0	.165	117.29	51.60	42.33
74	10.43	3.316	3.201	9.50	406.9	.166	117.53	51.21	41.71
75	10.25	3.316	3.204	9.90	407.2	.166	117.62	50.75	40.84
76	10.08	3.316	3.206	10.19	407.1	.166	117.59	50.22	40.03
77	9.92	3.316	3.209	10.40	406.6	.166	117.46	49.65	39.25
78	9.77	3.315	3.211	10.56	405.8	.165	117.26	49.05	38.49
79	9.63	3.314	3.213	10.72	404.8	.164	116.98	48.43	37.72
80	9.49	3.312	3.214	10.90	403.3	.162	116.62	47.79	36.89
81	9.33	3.311	3.215	11.12	401.5	.161	116.16	47.12	36.00
82	9.14	3.308	3.216	11.35	399.3	.158	115.59	46.42	35.07
83	8.94	3.306	3.216	11.58	396.7	.156	114.91	45.69	34.12
84	8.74	3.303	3.216	11.78	393.7	.153	114.13	44.94	33.16
85	8.54	3.299	3.216	11.95	390.3	.149	113.26	44.18	32.22
86	8.35	3.296	3.215	12.09	386.5	.146	112.30	43.40	31.30
87	8.17	3.292	3.214	12.19	382.5	.142	111.27	42.62	30.42
88	7.99	3.288	3.212	12.24	378.2	.138	110.18	41.84	29.60
89	7.83	3.283	3.210	12.25	373.8	.133	109.04	41.10	28.85
90	7.67	3.279	3.208	12.23	369.3	.129	107.87	40.38	28.15
91	7.52	3.274	3.206	12.22	364.5	.124	106.67	39.70	27.48
92	7.37	3.269	3.203	12.23	359.7	.119	105.42	39.07	26.84
93	7.23	3.264	3.199	12.26	354.7	.114	104.13	38.47	26.21
94	7.09	3.259	3.195	12.33	349.4	.109	102.79	37.93	25.60
95	6.95	3.253	3.191	12.47	343.9	.103	101.37	37.46	24.99
96	6.81	3.248	3.187	12.63	338.1	.098	99.88	37.02	24.39
97	6.66	3.242	3.182	12.78	332.0	.092	98.31	36.58	23.80
98	6.52	3.235	3.176	12.92	325.6	.085	96.67	36.12	23.21
99	6.39	3.229	3.171	13.05	318.9	.079	94.96	35.66	22.62
100	6.26	3.222	3.165	13.16	312.0	.072	93.19	35.19	22.02
101	6.14	3.215	3.159	13.27	304.9	.065	91.37	34.71	21.43
102	6.03	3.207	3.153	13.37	297.5	.057	89.48	34.22	20.85
103	5.92	3.200	3.146	13.48	290.0	.050	87.54	33.74	20.26
104	5.81	3.192	3.140	13.66	282.1	.042	85.53	33.35	19.69
105	5.70	3.184	3.133	13.78	274.1	.034	83.46	32.91	19.13
106	5.60	3.176	3.125	13.84	265.8	.026	81.35	32.43	18.58
107	5.50	3.167	3.118	13.87	257.4	.017	79.20	31.93	18.06
108	5.41	3.159	3.111	13.85	249.0	.009	77.03	31.43	17.58
109	5.31	3.151	3.104	13.81	240.5	.001	74.85	30.95	17.14
110	5.23	3.142	3.096	13.76	232.0	.000	72.67	30.49	16.73
111	5.14	3.134	3.088	13.72	223.4	.000	70.47	30.05	16.33
112	5.06	3.125	3.081	13.68	214.8	.000	68.26	29.63	15.96
113	4.98	3.116	3.073	13.67	206.1	.000	66.03	29.23	15.56
114	4.91	3.107	3.065	13.90	197.1	.000	63.72	28.81	14.90
115	4.83	3.098	3.056	14.79	187.1	.000	61.17	28.23	13.45
116	4.66	3.086	3.048	16.15	175.6	.000	58.22	27.34	11.19
117	4.21	3.074	3.038	16.78	163.1	.000	55.00	26.20	9.42
118	3.55	3.061	3.027	16.30	150.3	.000	51.73	25.19	8.89
119	3.04	3.048	3.016	15.76	137.6	.000	48.46	24.47	8.71
120	2.83	3.036	3.004	15.40	125.0	.000	45.24	23.95	8.55
121	2.79	3.018	2.954	20.66	107.2	.000	40.66	29.85	9.19
122	2.78	2.997	2.939	21.55	88.4	.000	35.76	32.00	10.45
123	2.77	2.912	2.964	17.88	73.3	.000	29.64	24.55	22.32
124	2.76	2.861	2.918	11.79	64.3	.000	25.99	15.34	36.29
125	2.75	2.833	2.885	7.77	59.2	.000	23.96	11.22	42.17
126	2.74	2.815	2.864	5.83	56.1	.000	22.70	9.18	45.15
127	2.73	2.802	2.849	5.17	53.7	.000	21.72	8.43	47.08
128	2.72	2.776	2.847	7.29	49.1	.000	19.87	10.47	49.15
129	2.71	2.725	2.870	11.73	40.1	.000	16.21	14.84	53.27
130	2.70	2.676	2.812	11.46	31.3	.000	12.67	14.49	58.88
131	2.69	2.637	2.758	9.56	24.5	.000	9.89	12.52	63.03
132	2.68	2.604	2.707	8.64	18.5	.000	7.48	11.53	66.27
133	2.67	2.574	2.659	7.98	13.2	.000	5.33	10.79	68.99
134	2.66	2.549	2.610	7.07	8.8	.000	3.55	9.74	71.29
135	2.65	2.542	2.574	3.94	7.5	.000	3.03	6.13	72.42
136	2.63	2.520	2.523	6.55	3.6	.000	1.44	7.80	73.76
137	2.63	2.501	2.500	5.93	.3	.000	.11	6.48	75.50
138	2.60	2.501	2.500	2.68	.2	.000	.08	3.04	76.10
139	2.55	2.501	2.500	2.58	.2	.000	.07	2.78	76.11
140	2.48	2.501	2.500	2.51	.1	.000	.06	2.57	76.12
141	2.44	2.501	2.500	2.45	.1	.000	.05	2.45	76.13
142	2.29	2.501	2.500	2.32	.1	.000	.04	2.32	76.13
143	1.74	2.500	2.500	1.80	.0	.000	.02	1.80	76.15
144	.66	2.500	2.500	.70	.0	.000	.00	.72	76.18

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*** INUNDATION ANALYSIS BLOCK No. 6 *** CASE PLAN
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TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	PONDAGE (1000*cum)	--INUNDATION-- DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 5	6
1	.00	3.316	3.198	48.40	114.5	.000	45.55	48.40	22.79
2	.00	3.243	3.224	26.37	88.1	.000	35.06	26.37	22.79
3	.01	3.222	3.218	7.87	80.3	.000	31.93	7.88	22.79
4	.02	3.201	3.194	7.59	72.7	.000	28.92	7.61	22.79
5	.03	3.175	3.167	9.32	63.4	.000	25.22	9.35	22.79
6	.04	3.147	3.137	10.23	53.2	.000	21.17	10.29	22.79
7	.06	3.118	3.108	10.56	42.7	.000	16.99	10.65	22.79
8	.08	3.090	3.080	10.33	32.5	.000	12.91	10.45	22.79
9	.13	3.058	3.045	11.69	20.9	.000	8.31	11.88	22.79
10	.25	3.026	3.013	11.87	9.3	.000	3.69	12.21	22.79
11	.44	3.000	2.922	9.68	.0	.000	.01	16.26	22.79
12	.61	3.000	2.808	.60	.0	.000	.02	39.96	22.79
13	.71	3.000	2.738	.71	.0	.000	.02	51.36	22.79
14	.79	3.000	2.684	.78	.0	.000	.02	57.91	22.79
15	.84	3.000	2.636	.84	.1	.000	.02	62.80	22.79
16	.90	3.000	2.593	.89	.1	.000	.02	66.92	22.79
17	.94	3.000	2.574	.94	.1	.000	.02	69.67	22.79
18	.99	3.000	2.563	.99	.1	.000	.02	70.92	22.79
19	1.03	3.000	2.539	1.03	.1	.000	.03	72.07	22.79
20	1.07	3.000	2.516	1.07	.1	.000	.03	74.23	22.79
21	1.11	3.000	2.512	1.11	.1	.000	.03	75.19	22.79
22	1.15	3.000	2.511	1.14	.1	.000	.03	75.34	22.79
23	1.21	3.000	2.511	1.20	.1	.000	.03	75.36	22.79
24	1.32	3.000	2.512	1.31	.1	.000	.03	75.32	22.79
25	1.46	3.000	2.514	1.45	.1	.000	.04	75.23	22.79
26	1.63	3.000	2.516	1.62	.1	.000	.04	75.08	22.79
27	1.81	3.000	2.519	1.80	.1	.000	.05	74.89	22.79
28	2.01	3.000	2.522	2.00	.1	.000	.05	74.65	22.79
29	2.25	3.000	2.527	2.23	.1	.000	.06	74.34	22.79
30	2.53	3.000	2.533	2.51	.2	.000	.06	73.94	22.79
31	2.87	3.001	2.541	2.84	.2	.000	.07	73.37	22.79
32	3.30	3.001	2.555	3.27	.2	.000	.08	72.53	22.79
33	3.98	3.001	2.587	3.92	.3	.000	.11	70.85	22.79
34	5.77	3.001	2.662	5.64	.4	.000	.16	66.63	22.79
35	8.42	3.002	2.793	8.27	.6	.000	.22	56.89	22.79
36	10.31	3.005	2.970	9.12	1.7	.000	.69	37.02	22.79
37	11.31	3.047	3.018	-4.05	17.1	.000	6.80	16.20	22.79
38	12.05	3.086	3.047	-1.83	31.0	.000	12.32	19.91	22.79
39	12.68	3.122	3.075	-.41	44.1	.000	17.53	22.34	22.82
40	13.24	3.155	3.098	1.24	56.1	.000	22.31	24.45	23.21
41	13.74	3.185	3.117	2.94	66.9	.000	26.60	26.86	23.92
42	14.21	3.211	3.131	4.55	76.5	.000	30.45	29.29	24.75
43	14.65	3.235	3.144	5.95	85.2	.000	33.91	31.53	25.59
44	15.06	3.257	3.155	7.12	93.2	.000	37.07	33.52	26.40
45	15.45	3.278	3.165	8.09	100.5	.000	40.00	35.27	27.18
46	15.80	3.297	3.175	8.92	107.4	.000	42.74	36.84	27.93
47	16.04	3.314	3.184	9.65	113.8	.000	45.28	38.23	28.59
48	16.13	3.330	3.193	10.35	119.6	.000	47.58	39.43	29.08
49	16.17	3.345	3.201	11.04	124.7	.000	49.62	40.41	29.37
50	16.20	3.357	3.208	11.67	129.3	.000	51.42	41.21	29.53
51	16.24	3.368	3.215	12.22	133.3	.000	53.02	41.86	29.64
52	16.29	3.378	3.222	12.66	136.9	.000	54.46	42.40	29.73
53	16.33	3.387	3.228	13.03	140.2	.000	55.78	42.85	29.82
54	16.39	3.396	3.233	13.33	143.3	.000	56.99	43.24	29.91
55	16.45	3.404	3.239	13.58	146.1	.000	58.13	43.58	30.00
56	16.53	3.411	3.244	13.79	148.9	.000	59.22	43.90	30.11
57	16.65	3.419	3.249	13.94	151.6	.000	60.30	44.19	30.26
58	16.91	3.427	3.255	14.02	154.5	.000	61.45	44.49	30.48
59	17.22	3.436	3.261	14.02	157.7	.000	62.73	44.86	30.84
60	17.44	3.445	3.267	14.10	161.0	.000	64.05	45.28	31.18
61	17.55	3.453	3.273	14.45	164.1	.003	65.29	45.66	31.21
62	17.63	3.461	3.278	15.02	166.7	.011	66.32	45.91	30.90
63	17.69	3.466	3.284	15.66	168.8	.016	67.13	46.01	30.35
64	17.75	3.470	3.289	16.27	170.2	.020	67.72	45.95	29.67
65	17.80	3.473	3.294	16.81	171.2	.023	68.11	45.76	28.94
66	17.84	3.475	3.298	17.27	171.8	.025	68.33	45.47	28.20
67	17.89	3.475	3.302	17.65	172.0	.025	68.43	45.11	27.46
68	17.92	3.475	3.305	17.96	172.0	.025	68.42	44.69	26.74
69	17.96	3.474	3.308	18.19	171.8	.024	68.32	44.25	26.06
70	18.00	3.473	3.310	18.39	171.4	.023	68.17	43.79	25.41
71	18.02	3.472	3.312	18.56	170.8	.022	67.95	43.33	24.77
72	18.02	3.470	3.314	18.73	170.1	.020	67.67	42.84	24.12

*** INUNDATION ANALYSIS BLOCK No. 6 *** CASE PLAN

TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	--INUNDATION-- PONDAGE (1000*cum)	DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 5	6
73	18.02	3.467	3.315	18.93	169.2	.017	67.31	42.33	23.41
74	18.02	3.463	3.316	19.77	167.5	.013	66.62	41.71	22.83
75	18.02	3.457	3.316	20.04	165.4	.007	65.81	40.84	22.79
76	18.02	3.451	3.316	20.04	163.4	.001	65.01	40.03	22.79
77	18.02	3.446	3.316	20.07	161.4	.000	64.20	39.25	22.79
78	17.99	3.440	3.315	20.10	159.3	.000	63.36	38.49	22.79
79	17.83	3.434	3.314	20.09	157.0	.000	62.46	37.72	22.79
80	17.53	3.427	3.312	20.02	154.5	.000	61.47	36.89	22.79
81	17.15	3.419	3.311	19.85	151.8	.000	60.39	36.00	22.79
82	16.75	3.411	3.308	19.61	149.0	.000	59.25	35.07	22.79
83	16.35	3.403	3.306	19.33	146.0	.000	58.07	34.12	22.79
84	15.97	3.395	3.303	19.02	142.9	.000	56.85	33.16	22.79
85	15.59	3.386	3.299	18.69	139.8	.000	55.62	32.22	22.79
86	15.21	3.378	3.296	18.32	136.7	.000	54.38	31.30	22.79
87	14.84	3.369	3.292	17.91	133.7	.000	53.16	30.42	22.79
88	14.49	3.361	3.288	17.47	130.7	.000	51.98	29.60	22.79
89	14.17	3.353	3.283	17.06	127.8	.000	50.83	28.85	22.79
90	13.86	3.345	3.279	16.70	124.9	.000	49.70	28.15	22.79
91	13.56	3.337	3.274	16.37	122.1	.000	48.58	27.48	22.79
92	13.26	3.330	3.269	16.06	119.3	.000	47.47	26.84	22.79
93	12.96	3.322	3.264	15.78	116.5	.000	46.34	26.21	22.79
94	12.64	3.314	3.259	15.50	113.6	.000	45.21	25.60	22.79
95	12.31	3.306	3.253	15.23	110.7	.000	44.04	24.99	22.79
96	11.97	3.298	3.248	14.97	107.7	.000	42.85	24.39	22.79
97	11.64	3.289	3.242	14.72	104.6	.000	41.62	23.80	22.79
98	11.31	3.280	3.235	14.46	101.5	.000	40.37	23.21	22.79
99	10.98	3.271	3.229	14.21	98.3	.000	39.08	22.62	22.79
100	10.66	3.262	3.222	13.96	95.0	.000	37.77	22.02	22.79
101	10.35	3.253	3.215	13.70	91.6	.000	36.44	21.43	22.79
102	10.05	3.244	3.207	13.45	88.2	.000	35.09	20.85	22.79
103	9.75	3.234	3.200	13.20	84.7	.000	33.71	20.26	22.79
104	9.46	3.224	3.192	12.97	81.2	.000	32.31	19.69	22.79
105	9.18	3.215	3.184	12.75	77.7	.000	30.89	19.13	22.79
106	8.90	3.205	3.176	12.50	74.1	.000	29.46	18.58	22.79
107	8.64	3.195	3.167	12.22	70.5	.000	28.04	18.06	22.79
108	8.38	3.185	3.159	11.92	67.0	.000	26.63	17.58	22.79
109	8.13	3.175	3.151	11.64	63.4	.000	25.24	17.14	22.79
110	7.89	3.166	3.142	11.38	60.0	.000	23.85	16.73	22.79
111	7.66	3.156	3.134	11.14	56.5	.000	22.47	16.33	22.79
112	7.44	3.146	3.125	10.91	53.0	.000	21.09	15.96	22.79
113	7.10	3.137	3.116	10.66	49.4	.000	19.67	15.56	22.79
114	6.01	3.125	3.107	10.16	45.3	.000	18.02	14.90	22.79
115	3.60	3.111	3.098	8.86	40.0	.000	15.93	13.45	22.79
116	1.04	3.095	3.086	6.75	34.3	.000	13.65	11.19	22.79
117	.00	3.081	3.074	5.13	29.2	.000	11.62	9.42	22.79
118	.00	3.068	3.061	4.73	24.5	.000	9.73	8.89	22.79
119	.00	3.055	3.048	4.66	19.8	.000	7.88	8.71	22.79
120	.00	3.042	3.036	4.61	15.2	.000	6.06	8.55	22.79
121	.00	3.027	3.018	5.34	9.9	.000	3.92	9.19	22.79
122	.00	3.009	2.997	6.71	3.2	.000	1.25	10.45	22.79
123	.00	3.000	2.912	3.03	.1	.000	.05	22.32	22.79
124	.00	3.000	2.861	.00	.1	.000	.05	36.29	22.79
125	.00	3.000	2.833	.00	.1	.000	.05	42.17	22.79
126	.00	3.000	2.815	.00	.1	.000	.04	45.15	22.79
127	.00	3.000	2.802	.00	.1	.000	.04	47.08	22.79
128	.00	3.000	2.776	.00	.1	.000	.04	49.15	22.79
129	.00	3.000	2.725	.00	.1	.000	.04	53.27	22.79
130	.00	3.000	2.676	.00	.1	.000	.04	58.88	22.79
131	.00	3.000	2.637	.00	.1	.000	.04	63.03	22.79
132	.00	3.000	2.604	.00	.1	.000	.04	66.27	22.79
133	.00	3.000	2.574	.00	.1	.000	.04	68.99	22.79
134	.00	3.000	2.549	.01	.1	.000	.03	71.29	22.79
135	.00	3.000	2.542	.03	.1	.000	.02	72.42	22.79
136	.00	3.000	2.520	.04	.0	.000	.01	73.76	22.79
137	.00	3.000	2.501	.01	.0	.000	.01	75.50	22.79
138	.00	3.000	2.501	.01	.0	.000	.00	76.10	22.79
139	.00	3.000	2.501	.01	.0	.000	.00	76.11	22.79
140	.00	3.000	2.501	.00	.0	.000	.00	76.12	22.79
141	.00	3.000	2.501	.00	.0	.000	.00	76.13	22.79
142	.00	3.000	2.501	.00	.0	.000	.00	76.13	22.79
143	.00	3.000	2.500	.00	.0	.000	.00	76.15	22.79
144	.00	3.000	2.500	.00	.0	.000	.00	76.18	22.79

*** INUNDATION ANALYSIS BLOCK No. 7 *** CASE PLAN

TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	--INUNDATION-- PONDAGE (1000*cum)	DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 6
1	.00	4.000	3.316	.00	.0	.000	.00	22.79
2	.00	4.000	3.243	.00	.0	.000	.00	22.79
3	.01	4.000	3.222	.01	.0	.000	.00	22.79
4	.02	4.000	3.201	.02	.0	.000	.00	22.79
5	.03	4.000	3.175	.03	.0	.000	.00	22.79
6	.06	4.000	3.147	.06	.0	.000	.00	22.79
7	.08	4.000	3.118	.08	.0	.000	.00	22.79
8	.12	4.000	3.090	.12	.0	.000	.00	22.79
9	.19	4.000	3.058	.19	.0	.000	.00	22.79
10	.34	4.000	3.026	.34	.0	.000	.00	22.79
11	.64	4.000	3.000	.64	.0	.000	.00	22.79
12	.99	4.000	3.000	.99	.0	.000	.00	22.79
13	1.24	4.000	3.000	1.24	.0	.000	.00	22.79
14	1.39	4.000	3.000	1.39	.0	.000	.00	22.79
15	1.51	4.000	3.000	1.51	.0	.000	.00	22.79
16	1.61	4.000	3.000	1.61	.0	.000	.00	22.79
17	1.70	4.000	3.000	1.70	.0	.000	.00	22.79
18	1.79	4.000	3.000	1.79	.0	.000	.00	22.79
19	1.87	4.000	3.000	1.87	.0	.000	.00	22.79
20	1.94	4.000	3.000	1.94	.0	.000	.00	22.79
21	2.01	4.000	3.000	2.01	.0	.000	.00	22.79
22	2.08	4.000	3.000	2.08	.0	.000	.00	22.79
23	2.18	4.000	3.000	2.18	.0	.000	.00	22.79
24	2.35	4.000	3.000	2.35	.0	.000	.00	22.79
25	2.60	4.000	3.000	2.60	.0	.000	.00	22.79
26	2.90	4.000	3.000	2.90	.0	.000	.00	22.79
27	3.24	4.000	3.000	3.24	.0	.000	.00	22.79
28	3.61	4.000	3.000	3.61	.0	.000	.00	22.79
29	4.04	4.000	3.000	4.04	.0	.000	.00	22.79
30	4.54	4.000	3.000	4.54	.0	.000	.00	22.79
31	5.14	4.000	3.001	5.14	.0	.000	.00	22.79
32	5.91	4.000	3.001	5.91	.0	.000	.00	22.79
33	7.21	4.000	3.001	7.21	.0	.000	.00	22.79
34	10.00	4.000	3.001	10.00	.0	.000	.00	22.79
35	14.25	4.000	3.002	14.25	.0	.000	.00	22.79
36	18.00	4.000	3.005	18.00	.0	.000	.00	22.79
37	20.26	4.000	3.047	20.26	.0	.000	.00	22.79
38	21.74	4.000	3.086	21.74	.0	.000	.00	22.79
39	22.95	4.007	3.122	22.75	.2	.007	.09	22.82
40	24.00	4.035	3.155	23.21	1.0	.035	.42	23.21
41	24.95	4.072	3.185	23.92	2.0	.072	.86	23.92
42	25.82	4.110	3.211	24.75	3.1	.110	1.32	24.75
43	26.63	4.147	3.235	25.59	4.1	.147	1.77	25.59
44	27.40	4.183	3.257	26.40	5.1	.183	2.20	26.40
45	28.13	4.217	3.278	27.18	6.1	.217	2.60	27.18
46	28.80	4.248	3.297	27.93	6.9	.248	2.98	27.93
47	29.30	4.273	3.314	28.59	7.7	.273	3.28	28.59
48	29.54	4.290	3.330	29.08	8.1	.290	3.48	29.08
49	29.62	4.299	3.345	29.37	8.4	.299	3.59	29.37
50	29.69	4.304	3.357	29.53	8.5	.304	3.65	29.53
51	29.76	4.309	3.368	29.64	8.6	.309	3.70	29.64
52	29.84	4.312	3.378	29.73	8.7	.312	3.75	29.73
53	29.92	4.316	3.387	29.82	8.8	.316	3.79	29.82
54	30.01	4.320	3.396	29.91	9.0	.320	3.84	29.91
55	30.12	4.324	3.404	30.00	9.1	.324	3.89	30.00
56	30.25	4.329	3.411	30.11	9.2	.329	3.95	30.11
57	30.45	4.336	3.419	30.25	9.4	.336	4.04	30.25
58	30.84	4.349	3.427	30.48	9.8	.349	4.19	30.48
59	31.31	4.366	3.436	30.84	10.3	.366	4.40	30.84
60	31.42	4.375	3.445	31.18	10.5	.375	4.50	31.18
61	31.02	4.368	3.453	31.21	10.3	.368	4.42	31.21
62	30.36	4.349	3.461	30.90	9.8	.349	4.19	30.90
63	29.60	4.322	3.466	30.35	9.0	.322	3.87	30.35
64	28.82	4.292	3.470	29.67	8.2	.292	3.50	29.67
65	28.04	4.260	3.473	28.94	7.3	.260	3.12	28.94
66	27.28	4.227	3.475	28.20	6.4	.227	2.73	28.20
67	26.55	4.195	3.475	27.46	5.5	.195	2.34	27.46
68	25.87	4.164	3.475	26.74	4.6	.164	1.97	26.74
69	25.23	4.134	3.474	26.06	3.8	.134	1.61	26.06
70	24.60	4.105	3.473	25.41	3.0	.105	1.27	25.41
71	23.95	4.076	3.472	24.77	2.1	.076	.92	24.77
72	23.24	4.045	3.470	24.12	1.3	.045	.54	24.12

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*** INUNDATION ANALYSIS BLOCK No. 7 *** CASE PLAN
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TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	--INUNDATION-- PONDAGE (1000*cum)	DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 6
73	22.45	4.011	3.467	23.41	.3	.011	.13	23.41
74	21.63	4.000	3.463	21.93	.0	.000	.00	22.83
75	20.80	4.000	3.457	20.80	.0	.000	.00	22.79
76	19.98	4.000	3.451	19.98	.0	.000	.00	22.79
77	19.18	4.000	3.446	19.18	.0	.000	.00	22.79
78	18.39	4.000	3.440	18.39	.0	.000	.00	22.79
79	17.62	4.000	3.434	17.62	.0	.000	.00	22.79
80	16.88	4.000	3.427	16.88	.0	.000	.00	22.79
81	16.15	4.000	3.419	16.15	.0	.000	.00	22.79
82	15.45	4.000	3.411	15.45	.0	.000	.00	22.79
83	14.78	4.000	3.403	14.78	.0	.000	.00	22.79
84	14.14	4.000	3.395	14.14	.0	.000	.00	22.79
85	13.54	4.000	3.386	13.54	.0	.000	.00	22.79
86	12.98	4.000	3.378	12.98	.0	.000	.00	22.79
87	12.52	4.000	3.369	12.52	.0	.000	.00	22.79
88	12.13	4.000	3.361	12.13	.0	.000	.00	22.79
89	11.79	4.000	3.353	11.79	.0	.000	.00	22.79
90	11.45	4.000	3.345	11.45	.0	.000	.00	22.79
91	11.11	4.000	3.337	11.11	.0	.000	.00	22.79
92	10.77	4.000	3.330	10.77	.0	.000	.00	22.79
93	10.43	4.000	3.322	10.43	.0	.000	.00	22.79
94	10.10	4.000	3.314	10.10	.0	.000	.00	22.79
95	9.76	4.000	3.306	9.76	.0	.000	.00	22.79
96	9.42	4.000	3.298	9.42	.0	.000	.00	22.79
97	9.08	4.000	3.289	9.08	.0	.000	.00	22.79
98	8.74	4.000	3.280	8.74	.0	.000	.00	22.79
99	8.41	4.000	3.271	8.41	.0	.000	.00	22.79
100	8.07	4.000	3.262	8.07	.0	.000	.00	22.79
101	7.73	4.000	3.253	7.73	.0	.000	.00	22.79
102	7.39	4.000	3.244	7.39	.0	.000	.00	22.79
103	7.06	4.000	3.234	7.06	.0	.000	.00	22.79
104	6.72	4.000	3.224	6.72	.0	.000	.00	22.79
105	6.39	4.000	3.215	6.39	.0	.000	.00	22.79
106	6.08	4.000	3.205	6.08	.0	.000	.00	22.79
107	5.84	4.000	3.195	5.84	.0	.000	.00	22.79
108	5.66	4.000	3.185	5.66	.0	.000	.00	22.79
109	5.50	4.000	3.175	5.50	.0	.000	.00	22.79
110	5.35	4.000	3.166	5.35	.0	.000	.00	22.79
111	5.19	4.000	3.156	5.19	.0	.000	.00	22.79
112	5.04	4.000	3.146	5.04	.0	.000	.00	22.79
113	4.89	4.000	3.137	4.89	.0	.000	.00	22.79
114	4.74	4.000	3.125	4.74	.0	.000	.00	22.79
115	4.59	4.000	3.111	4.59	.0	.000	.00	22.79
116	4.44	4.000	3.095	4.44	.0	.000	.00	22.79
117	4.29	4.000	3.081	4.29	.0	.000	.00	22.79
118	4.16	4.000	3.068	4.16	.0	.000	.00	22.79
119	4.05	4.000	3.055	4.05	.0	.000	.00	22.79
120	3.94	4.000	3.042	3.94	.0	.000	.00	22.79
121	3.84	4.000	3.027	3.84	.0	.000	.00	22.79
122	3.74	4.000	3.009	3.74	.0	.000	.00	22.79
123	3.64	4.000	3.000	3.64	.0	.000	.00	22.79
124	3.54	4.000	3.000	3.54	.0	.000	.00	22.79
125	3.44	4.000	3.000	3.44	.0	.000	.00	22.79
126	3.35	4.000	3.000	3.35	.0	.000	.00	22.79
127	3.26	4.000	3.000	3.26	.0	.000	.00	22.79
128	3.18	4.000	3.000	3.18	.0	.000	.00	22.79
129	3.10	4.000	3.000	3.10	.0	.000	.00	22.79
130	3.03	4.000	3.000	3.03	.0	.000	.00	22.79
131	2.95	4.000	3.000	2.95	.0	.000	.00	22.79
132	2.88	4.000	3.000	2.88	.0	.000	.00	22.79
133	2.81	4.000	3.000	2.81	.0	.000	.00	22.79
134	2.66	4.000	3.000	2.66	.0	.000	.00	22.79
135	2.16	4.000	3.000	2.16	.0	.000	.00	22.79
136	1.21	4.000	3.000	1.21	.0	.000	.00	22.79
137	.55	4.000	3.000	.55	.0	.000	.00	22.79
138	.36	4.000	3.000	.36	.0	.000	.00	22.79
139	.20	4.000	3.000	.20	.0	.000	.00	22.79
140	.06	4.000	3.000	.06	.0	.000	.00	22.79
141	.00	4.000	3.000	.00	.0	.000	.00	22.79
142	.00	4.000	3.000	.00	.0	.000	.00	22.79
143	.00	4.000	3.000	.00	.0	.000	.00	22.79
144	.00	4.000	3.000	.00	.0	.000	.00	22.79

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*** INUNDATION ANALYSIS BLOCK No. 8 *** CASE PLAN
****

TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	--INUNDATION-- PONDAGE (1000*cum)	DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 7
1	.00	4.574	3.322	8.25	44.0	.000	15.29	8.25
2	.00	4.550	3.247	8.01	35.9	.000	12.85	8.01
3	.01	4.525	3.184	7.78	28.2	.000	10.49	7.78
4	.01	4.502	3.134	7.56	20.6	.000	8.19	7.56
5	.02	4.346	3.089	6.81	13.8	.000	5.53	6.81
6	.03	4.209	3.049	5.50	8.4	.000	3.35	5.50
7	.05	4.098	3.021	4.51	3.9	.000	1.56	4.51
8	.07	4.006	2.927	3.74	.2	.000	.09	3.74
9	.12	4.000	2.900	.35	.0	.000	.00	3.37
10	.24	4.000	2.882	.24	.0	.000	.00	3.37
11	.38	4.000	2.841	.38	.0	.000	.00	3.37
12	.48	4.000	2.771	.48	.0	.000	.00	3.37
13	.54	4.000	2.708	.54	.0	.000	.00	3.37
14	.58	4.000	2.655	.58	.0	.000	.00	3.37
15	.62	4.000	2.606	.62	.0	.000	.00	3.37
16	.66	4.000	2.556	.66	.0	.000	.00	3.37
17	.69	4.000	2.500	.69	.0	.000	.00	3.37
18	.72	4.000	2.500	.72	.0	.000	.00	3.37
19	.75	4.000	2.500	.75	.0	.000	.00	3.37
20	.78	4.000	2.500	.78	.0	.000	.00	3.37
21	.81	4.000	2.500	.81	.0	.000	.00	3.37
22	.84	4.000	2.500	.84	.0	.000	.00	3.37
23	.90	4.000	2.500	.90	.0	.000	.00	3.37
24	1.00	4.000	2.500	1.00	.0	.000	.00	3.37
25	1.11	4.000	2.500	1.11	.0	.000	.00	3.37
26	1.24	4.000	2.500	1.24	.0	.000	.00	3.37
27	1.38	4.000	2.500	1.38	.0	.000	.00	3.37
28	1.54	4.000	2.500	1.54	.0	.000	.00	3.37
29	1.73	4.000	2.500	1.73	.0	.000	.00	3.37
30	1.95	4.000	2.500	1.95	.0	.000	.00	3.37
31	2.22	4.000	2.500	2.22	.0	.000	.00	3.37
32	2.59	4.000	2.500	2.59	.0	.000	.00	3.37
33	3.48	4.006	2.500	3.26	.2	.000	.09	3.38
34	5.15	4.046	2.500	3.52	1.8	.000	.74	3.52
35	6.77	4.117	2.635	3.94	4.7	.000	1.87	3.94
36	7.74	4.197	2.859	4.52	7.9	.000	3.16	4.52
37	8.35	4.277	2.937	5.16	11.1	.000	4.44	5.16
38	8.84	4.353	2.973	5.81	14.1	.000	5.65	5.81
39	9.26	4.424	2.999	6.43	17.0	.000	6.78	6.43
40	9.64	4.489	3.001	7.04	19.6	.000	7.82	7.04
41	9.99	4.507	3.004	7.45	22.1	.000	8.64	7.45
42	10.31	4.515	3.008	7.53	24.9	.000	9.48	7.53
43	10.61	4.524	3.014	7.62	27.9	.000	10.40	7.62
44	10.90	4.534	3.023	7.70	31.1	.000	11.37	7.70
45	11.18	4.545	3.031	7.80	34.5	.000	12.40	7.80
46	11.40	4.556	3.040	7.90	37.9	.000	13.46	7.90
47	11.51	4.567	3.048	8.00	41.5	.000	14.53	8.00
48	11.55	4.577	3.056	8.10	44.9	.000	15.58	8.10
49	11.58	4.588	3.064	8.20	48.3	.000	16.61	8.20
50	11.60	4.598	3.071	8.30	51.6	.000	17.61	8.30
51	11.63	4.608	3.078	8.40	54.8	.008	18.60	8.40
52	11.66	4.618	3.085	8.49	58.0	.018	19.56	8.49
53	11.70	4.628	3.091	8.58	61.1	.028	20.51	8.58
54	11.74	4.637	3.097	8.68	64.2	.037	21.44	8.68
55	11.79	4.647	3.103	8.77	67.2	.047	22.36	8.77
56	11.85	4.656	3.109	8.86	70.2	.056	23.27	8.86
57	11.91	4.665	3.114	8.95	73.1	.065	24.17	8.95
58	11.93	4.674	3.120	9.04	76.0	.074	25.05	9.04
59	11.82	4.682	3.126	9.12	78.7	.082	25.87	9.12
60	11.58	4.690	3.132	9.20	81.1	.090	26.60	9.20
61	11.29	4.696	3.138	9.27	83.1	.096	27.22	9.27
62	11.00	4.701	3.144	9.32	84.8	.101	27.73	9.32
63	10.70	4.705	3.150	9.37	86.1	.105	28.13	9.37
64	10.41	4.709	3.156	9.41	87.1	.109	28.43	9.41
65	10.13	4.711	3.161	9.43	87.8	.111	28.65	9.43
66	9.88	4.712	3.167	9.45	88.3	.112	28.78	9.45
67	9.63	4.713	3.172	9.46	88.4	.113	28.83	9.46
68	9.39	4.712	3.177	9.46	88.4	.112	28.81	9.46
69	9.12	4.711	3.181	9.45	88.0	.111	28.71	9.45
70	8.83	4.709	3.186	9.44	87.4	.109	28.52	9.44
71	8.51	4.707	3.190	9.42	86.5	.107	28.25	9.42
72	8.18	4.703	3.194	9.38	85.3	.103	27.88	9.38

***** INUNDATION ANALYSIS BLOCK No. 8 ***** CASE PLAN

TIME (hr)	RUNOFF DISCHARGE (1000m³)	INSIDE W.L. (EL.m)	OUTSIDE W.L. (EL.m)	DRAINAGE DISCHARGE (1000m³)	PONDAGE (1000*cum)	--INUNDATION-- DEPTH (m)	AREA (ha)	DRAINAGE DISCHARGE of FACILITIES (1000m³) 7
73	7.85	4.698	3.197	9.34	83.8	.098	27.43	9.34
74	7.52	4.693	3.201	9.29	82.1	.093	26.89	9.29
75	7.20	4.686	3.204	9.24	80.0	.086	26.27	9.24
76	6.89	4.679	3.206	9.17	77.7	.079	25.57	9.17
77	6.59	4.672	3.209	9.10	75.2	.072	24.81	9.10
78	6.29	4.663	3.211	9.02	72.5	.063	23.98	9.02
79	6.01	4.654	3.213	8.93	69.6	.054	23.09	8.93
80	5.73	4.644	3.214	8.84	66.5	.044	22.14	8.84
81	5.48	4.634	3.215	8.75	63.2	.034	21.15	8.75
82	5.23	4.624	3.216	8.65	59.8	.024	20.11	8.65
83	5.01	4.613	3.216	8.54	56.2	.013	19.03	8.54
84	4.83	4.601	3.216	8.44	52.6	.001	17.93	8.44
85	4.68	4.590	3.216	8.33	49.0	.000	16.82	8.33
86	4.55	4.579	3.215	8.22	45.3	.000	15.70	8.22
87	4.41	4.567	3.214	8.11	41.6	.000	14.58	8.11
88	4.27	4.556	3.212	8.00	37.9	.000	13.44	8.00
89	4.13	4.544	3.210	7.90	34.1	.000	12.29	7.90
90	3.99	4.532	3.208	7.79	30.3	.000	11.14	7.79
91	3.85	4.520	3.206	7.68	26.5	.000	9.97	7.68
92	3.71	4.508	3.203	7.57	22.6	.000	8.80	7.57
93	3.58	4.470	3.199	7.42	18.8	.000	7.52	7.42
94	3.44	4.386	3.195	6.79	15.4	.000	6.18	6.79
95	3.30	4.316	3.191	6.12	12.6	.000	5.05	6.12
96	3.16	4.255	3.187	5.57	10.2	.000	4.09	5.57
97	3.02	4.203	3.182	5.11	8.1	.000	3.25	5.11
98	2.88	4.158	3.176	4.72	6.3	.000	2.52	4.72
99	2.75	4.117	3.171	4.38	4.7	.000	1.87	4.38
100	2.61	4.080	3.165	4.09	3.2	.000	1.27	4.09
101	2.47	4.046	3.159	3.82	1.8	.000	.73	3.82
102	2.35	4.015	3.153	3.59	.6	.000	.24	3.59
103	2.25	4.000	3.146	2.85	.0	.000	.00	3.40
104	2.19	4.000	3.140	2.19	.0	.000	.00	3.37
105	2.12	4.000	3.133	2.12	.0	.000	.00	3.37
106	2.06	4.000	3.125	2.06	.0	.000	.00	3.37
107	2.00	4.000	3.118	2.00	.0	.000	.00	3.37
108	1.94	4.000	3.111	1.94	.0	.000	.00	3.37
109	1.88	4.000	3.104	1.88	.0	.000	.00	3.37
110	1.81	4.000	3.096	1.81	.0	.000	.00	3.37
111	1.75	4.000	3.088	1.75	.0	.000	.00	3.37
112	1.69	4.000	3.081	1.69	.0	.000	.00	3.37
113	1.64	4.000	3.073	1.64	.0	.000	.00	3.37
114	1.59	4.000	3.065	1.59	.0	.000	.00	3.37
115	1.54	4.000	3.056	1.54	.0	.000	.00	3.37
116	1.50	4.000	3.048	1.50	.0	.000	.00	3.37
117	1.46	4.000	3.038	1.46	.0	.000	.00	3.37
118	1.42	4.000	3.027	1.42	.0	.000	.00	3.37
119	1.38	4.000	3.016	1.38	.0	.000	.00	3.37
120	1.34	4.000	3.004	1.34	.0	.000	.00	3.37
121	1.30	4.000	2.954	1.30	.0	.000	.00	3.37
122	1.26	4.000	2.939	1.26	.0	.000	.00	3.37
123	1.23	4.000	2.964	1.23	.0	.000	.00	3.37
124	1.20	4.000	2.918	1.20	.0	.000	.00	3.37
125	1.17	4.000	2.885	1.17	.0	.000	.00	3.37
126	1.14	4.000	2.864	1.14	.0	.000	.00	3.37
127	1.11	4.000	2.849	1.11	.0	.000	.00	3.37
128	1.08	4.000	2.847	1.08	.0	.000	.00	3.37
129	1.05	4.000	2.870	1.05	.0	.000	.00	3.37
130	1.02	4.000	2.812	1.02	.0	.000	.00	3.37
131	1.00	4.000	2.758	1.00	.0	.000	.00	3.37
132	.98	4.000	2.707	.98	.0	.000	.00	3.37
133	.95	4.000	2.659	.95	.0	.000	.00	3.37
134	.93	4.000	2.610	.93	.0	.000	.00	3.37
135	.91	4.000	2.574	.91	.0	.000	.00	3.37
136	.89	4.000	2.523	.89	.0	.000	.00	3.37
137	.80	4.000	2.500	.80	.0	.000	.00	3.37
138	.56	4.000	2.500	.56	.0	.000	.00	3.37
139	.25	4.000	2.500	.25	.0	.000	.00	3.37
140	.05	4.000	2.500	.05	.0	.000	.00	3.37
141	.00	4.000	2.500	.00	.0	.000	.00	3.37
142	.00	4.000	2.500	.00	.0	.000	.00	3.37
143	.00	4.000	2.500	.00	.0	.000	.00	3.37
144	.00	4.000	2.500	.00	.0	.000	.00	3.37

APPENDIX C

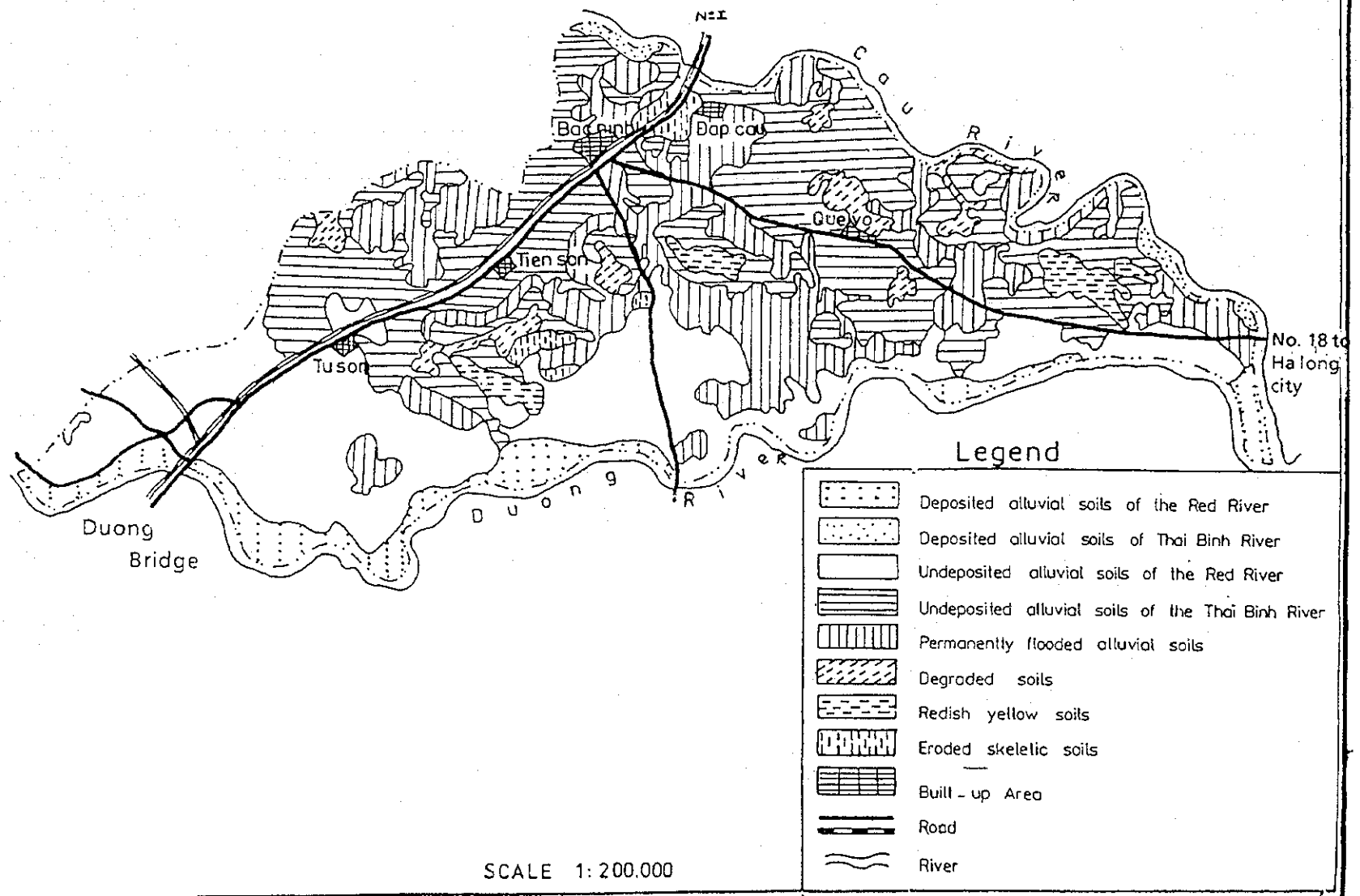
SOIL AND LAND USE

APPENDIX C

SOIL AND LAND USE

CONTENTS

C-1.1 Soil Map of the Study Area



C-1.2 Major Soil Unit in the Study Area

(Source : NIAPP, Hanoi)

Soil Units	Area (ha)	Ha Bac				Hanoi	
		Tien Son	Que Vo	Bac Ninh	Yen Phong	Gia Lam	Dong Anh
Fluvisols	7,126	2,920	1,096	398	209	1,848	655
Gleysols	13,710	5,158	6,567	754	465	686	80
Cambisols	5,998	1,380	3,978	420	220	–	–
Plinthosols	2,291	1,204	870	67	150	–	–
Acrisols	930	–	930	–	–	–	–
Leptosols	816	678	12	126	–	–	–
Sub-total	30,871	11,340	13,453	1,765	1,044	2,534	735
Residential area +Specialized uses	9,149	3,510	3,227	775	376	1,036	225
Total	40,020	14,850	16,680	2,540	1,420	3,570	960

C-1.3 Characteristics of Soil in the Study Area

(Source : NIAPP - HANOI)

Soil units	Depth (cm)	pH KCL	Organic matter (%)	Total (%)			Available mg/100g soil)		Exchangeable Cation (meq/100 g soil)			CEC (meq/100 g soil)
				N	P2O5	K2O	P2O5	K2O	Ca++	Mg++	H+	
- **Deposited alluvial soils of the Red river (Gia lam district)**	0 - 18	7,1	1,2	0,12	0,1	1,86	29,2	35,1	14	8	0,05	23
	18 - 53	7,6	0,6	0,09	0,09	1,98	24,5	17,4	13	4	0,1	19
	53 - 85	7,8	0,4	0,06	0,09	2,07	22,7	15,7	18	4	0,1	26
	85 - 110	7,8	0,4	0,04	0,08	1,91	22,5	10	18	2	0,1	23
- Undeposited **alluvial soils of the Red river (Gia lam district)**	0 - 19	7,5	1*	0,13	0,12	1,54	38,2	18,1	18	10	0,1	31
	19 - 40	7,7	0,8	0,09	0,12	1,59	35,2	18,4	18	10	0,05	30
	40 - 51	7,7	0,6	0,06	0,1	1,86	32,7	10,9	18	11	0,16	30
	51 - 120	7,8	0,3	0,04	0,09	1,82	28,8	10,9	19	11	0,1	32
- **Gleyic** undeposited **alluvial soils of the Red river (Gia lam district)**	0 - 20	4,7	2,7	0,2	0,06	2,24	18,8	8	7	0,18	0,15	12
	20 - 30	6,3	2	0,17	0,04	2,26	18,8	8,5	11	0,47	0,1	13
	30 - 80	5,7	1,4	0,13	0,03	2,31	4,8	11,5	10	1,23	0,1	13
	80 - 120	5,8	1	0,11	0,03	2,37	4,6	10,4	11	1,62	0,1	15
- Undeposited **alluvial soils of the Red river (Dong anh district)**	0 - 20	4,8	1,1	0,12	0,03*	0,67	3,4*	13,2	2	0,96	0,16	6
	20 - 37	5,4	0,2	0,03	0,02	0,64	1,2	6,1	3	1,34	0,16	7
	37 - 105	3,4	0,1	0,03	0,02	1,42	0,9	5,7	3	1,44	6,05	19
- **Permanently flooded alluvial soils of the Red river (Que vo district)**	0 - 20	6,5	1,9	0,19	0,06	1,4	trace *	10	9	2,6	0,56	
	20 - 37	6,5	1,7	0,19	0,05	1,35	trace	10	10	1,2	0,56	
	37 - 100	4	1,7	0,25	0,03	0,67	trace	10	4	1	3,5	
- Undeposited **alluvial soils of the Red river (Viet doan commune, Tien son district)**	0 - 20	4,6	1,6	0,16			15,9	17,6				
- Undeposited **alluvial soils of the Thái binh river (Dai xuan commune, Que vo district)**	0 - 20	4,3	2,4	0,21			7,5*	6,8				

Note * : Very poor