

Table 4.5 - RUNOFF DISCHARGE SUMMARY TABLE (I of 2)
DRAINAGE MAINS

NORTH MANILA						
MAIN CODE	NAME	MANHOLE NO.	CALC. POINT	DRAINAGE AREA, ha.	DISCHARGE, Q (m ³ /s)	
					2-YR FLOOD	10-YR FLOOD
DM01	BLUMENIRIT INTERCEPTOR	II15C3371	7	72.52	11.31	15.50
		II15C2009	8	239.75	30.86	42.52
		II15B2142	9	259.68	30.74	42.46
		II15B2236	10	275.88	28.34	39.32
DM02	SOLIS-TECSON	II15B2007	13	42.21	7.36	10.05
		II15B2011	14	66.45	10.03	13.75
		II15B2016	15	92.38	12.31	16.95
DM04	LAKANDULA	Lualhati St	38	20.53	3.23	4.42
		II15A4099	39	31.81	4.56	6.26
DM05	FUGOSO	II15B4175	34	61.35	11.47	15.62
		II15B4258	35	76.29	12.33	16.87
DM06	SEVERINO REYES	II15C4027	36	97.33	12.04	16.61
		II15C4157	37	99.02	11.54	15.95
DM07	JOSEFINA-LEPANTO	II15C3275	28	92.87	13.70	18.80
		II15C3297	29	125.12	15.49	21.37
		END	27	129.23	15.37	21.23
DM08	ECONOMIA	II15C3285	25	12.51	2.79	3.78
		II15C3296	26	47.30	8.88	12.10
		END	27	63.89	10.76	14.70
DM09	P MARGAL	II15C3284	24	9.27	1.97	2.67
DM10	VISAYAS	III11A4068	32	85.73	13.34	18.28
		III11A4193	33	105.13	14.73	20.25
DM25	ZARAGOSA SUB-MAIN	III11A4101	40	44.90	9.13	12.40
DM26	PAMPANGA-EARNSHAW	II15B2040	16	15.39	3.27	4.43
		II15A2101	17	133.77	21.88	29.93
DM27	BUENDIA	II15A2053	12	8.23	2.00	2.70
		II15B2243	11	33.60	7.32	9.92
DM28	SOUTH ANTIPOLLO	II15C3282	19	19.70	3.59	4.90
		II15C3352	20	31.11	5.12	7.00
		Box Culvert	21	98.28	11.86	16.38
DM29	TAYUMAN	II15B3061	22	38.45	6.81	9.30
		II15B3204	23	96.99	13.38	18.40
DM30	LEPANTO-GOV. FORBES	II15C3092	27	193.13	22.76	31.44
		II15C4101	30	202.73	22.25	30.81
		II15C4178	31	253.38	25.40	35.26

Note: See Fig.4.2 for runoff discharge calculation points.

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Table 4.6 - RUNOFF DISCHARGE SUMMARY TABLE
OPEN CHANNELS

NORTH MANILA						
CHANNEL CODE	NAME	LOCATION	CALC. POINT	DRAINAGE AREA, ha.	DISCHARGE, Q (m ³ /s)	
					2-YR FLOOD	10-YR FLOOD
EST01	CASILI CREEK	1 + 400	47	245.44	24.09	33.47
		0 + 000	47	344.22	29.44	41.07
EST02	ESTERO DE MAYPAJO (EAST)	DM01	4	324.69	31.57	43.88
	ESTERO DE MAYPAJO (WEST)	END	6	624.84	57.59	80.15
EST03	ESTERO SUNOG APOG	END	18	951.07	72.28	101.19
EST06A	UPPER ESTERO DE MAGDALENA	END	21	14.52	2.99	4.06
EST06B	LOWER ESTERO DE MAGDALENA	1 + 050	42	17.72	3.14	4.28
		0 + 770	43	26.39	4.24	5.80
		0 + 000	44	44.48	5.91	8.13
EST07	ESTERO DE SAN LAZARO		45	14.18	2.84	3.86
			46	37.05	5.33	7.31
SOUTH MANILA						
CHANNEL CODE	NAME	LOCATION	CALC. POINT	DRAINAGE AREA, ha.	DISCHARGE, Q (m ³ /s)	
					2-YR FLOOD	10-YR FLOOD
EST27	UPPER CALATAGAN CREEK	Exist Weir	35	234.23	28.19	38.92
		END	1	76.05	13.19	18.01
EST29	MAKATI DIVERSION CHANNEL II	END	3	186.83	21.03	29.10
EST28	UPPER MAKATI DIV. CHANNEL I	END	4	155.69	19.67	27.12
EST28	LOWER MAKATI DIV. CHANNEL I	END	6	502.53	50.93	70.68
EST25	LOWER TRIPA DE GALLINA	END	11	1767.54	147.60	206.04
EST30 - EST27	PNR OPEN CANAL (South) - LOWER CALATAGAN CREEK		32	24.85	4.54	6.18
			14	67.32	10.01	13.74
			15	115.04	16.61	22.81
			16	164.59	20.28	27.99
EST27	CALATAGAN CREEK (East)		13	47.72	7.95	10.87
EST30	PNR OPEN CANAL (North)		33	23.99	4.17	5.70
			34	45.29	6.62	9.09
EST31	MARICABAN CREEK	END	9	1032.25	80.08	112.04

Note: See Figures 4.2 & 4.3 for runoff discharge calculation points.

LIST OF FLOOD-PRONE AREAS AND SUGGESTED MEASURES

NO.	CHANNEL	
	Code	Name
1	DM01	BLUMENTRITT INTERCEPTOR
	NL041	AMORANTO/MAYON/CALAMBA-RIGHT SIDE
2	DM01	BLUMENTRITT INTERCEPTOR
	NL039	ANDRES BONIFACIO (WACAT-BLUMENTRITT-DM01)
3	DM01	BLUMENTRITT INTERCEPTOR
	NL043	MAYON/M CUENCO (DAPITAN-M CUENCO-BLUMENTRITT-DM01)
4	DM06	N. REYES - SEVERINO
	NL031	LAONGLAAN/GOV FORBES/ESPANA (ANDALUCIA-GOV FORBES-ESPANA-P CAMPA)
5	DM06	N. REYES - SEVERINO
	NL032	DIMASALANG/GOV FORBES/ESPANA (CONSTANCIA-LAONGLAAN-ESPANA-N REYES)
6	DM07	JOSEFINA - LEPANTO
	NL036	ESPANA-RIGHT SIDE (QUEZON CITY CIRCLE-CRAIG-DM07)
7	DM08	ECONOMIA
	NL034	ESPANA-RIGHT SIDE (KUNDIMAN-VICENTE CRUZ-DM08)
8	NL035	ESPANA-LEFT SIDE (CRAIG-VICENTE CRUZ-DM08)
	NL032	DIMASALANG/GOV FORBES/ESPANA (CONSTANCIA-LAONGLAAN-ESPANA-N REYES)
9	NL033	M EARNSHAW/ESPANA (SULUCAN-GOV FORBES-ESPANA)
	NL029	M V DELOS SANTOS-RIGHT SIDE (C TORTUOSA-LEGARDA)
10	NL030	M V DELOS SANTOS-LEFT SIDE (C TORTUOSA-LEGARDA)
	DM28	SOUTH ANTIPOLLO
11	NL055	F HUERTAS (BATANGAS-ANTIPOLLO-EST10)
	DM02	SOLIS - TECSON
12	NL016	JOSE ABAD SANTOS-RIGHT SIDE (ANTIPOLLO-SOLIS-DM02)
	NL017	JOSE ABAD SANTOS-LEFT SIDE (RIZAL AVE EXT-SOLIS-DM02)
13	DM29	TAYUMAN
	NL025	OROQUIETA (ANTIPOLLO-TAYUMAN-DM29)
14	EST06	ESTERO DE MAGDALENA
	EST04	ESTERO DE VITAS
15	DM29	TAYUMAN
	NL018	S HERRERA (SEVERINO REYES-EST06)
16	NL019	TAYABAS (T MAPUA-EST06)
	DM10	VISAYAS
17	EST16	ESTERO DE VALENCIA
	NL049	LUZON/NEGROS (BOHOL-NEGROS-VISAYAN AVE-DM10)
18	EST05	ESTERO DELA REINA
	NL010	C M RECTO -LEFT SIDE (STO CRISTO-EST05)
19	DM05	FUGOSO
	NL026	P GUEVARRA (TAYUMAN-FUGOSO-DM05)
20	DM04	LAKANDULA
	NL004	MORIONES/NOLASCO/MORGA (MASINOP-NOLASCO-MORGA-ASUNCION-DM04)
21	EST09	NORTH ANTIPOLLO CREEK
	NL020	IPIL (T BUGALLON-ANTIPOLLO-EST09)
22	DM07	JOSEFINA - LEPANTO
	NL044	CORDILLERA/QUEZON AVE/D TUAZON/DATA/MATIMYAS
23	EST15	ESTERO DE SAN MIGUEL
	NL028	CARLOS PALANCA/PADILLA/NEPOMUCENO (ELIZONDO-P CASAL EXT-J NEPOMUCENO-EST15)
24	EST16	ESTERO DE VALENCIA
	NL054	OLD STA MESA/ALBINA/ALTURA EXT/R MAGSAYSAY/HIPODROMO/ANONAS
25	DM07	JOSEFINA - LEPANTO
	NL045	MATIMYAS-RIGHT SIDE (T ALFONSO-JOSEFINA III-DM07)
26	NL046	MATIMYAS-LEFT SIDE (ALEX-JOSEFINA III-DM07)
	DM23	ZOBEL ROXAS
27	SL001	PRIMO DE RIVERA-A
	SL002	VITO CRUZ EXTENSION
28	SL022	MAYAPIS
	EST25	ESTERO DE TRIPA DE GALLINA
29	SL032	SEN. GIL PUYAT-DIAN-DM22
	SL033	FINLANDIA-EDISON-MORSE-EST 25
30	EST29	MAKATI DIVERSION CHANNEL II
	SL037	HEN. A. RICARTE
31	EST25	ESTERO DE TRIPA DE GALLINA
	SL039	CABRERRA-PROTACIO EXT.
32	EST27	ESTERO DE TRIPA DE GALLINA
	SL031	DAYAP/DIAN/CALATAGAN CREEK
33	SL030	DIAN (OUTFALL)

LIST OF FLOOD-PRONE AREAS AND SUGGESTED MEASURES

NO.	CHANNEL	
	Code	Name
28	EST27	CALATAGAN CREEK
	DM33	PASONG TAMO
29	EST27	CALATAGAN CREEK
	SL055	LUMBAYAO & ST. PAUL
30	DM23	ZOBEL ROXAS
	SL022	MAYAPIS
31	EST25	ESTERO DE TRIPA DE GALLINA
	DM23	ZOBEL ROXAS
32	EST30	PNR OPEN CANAL
	SL020	DAGONOY
33	EST30	PNR OPEN CANAL
	SL021	ESTRADA
34	SL054	ESTRADA-B
	EST21	ESTERO DE CONCORDIA
35	SL010	PAZ MENDOZA GUANZON - B
	EST25	ESTERO DE TRIPA DE GALLINA
36	SL035	ROCKEFELLER-FORD-ESTERO DE TRIPA DE GALINA
	EST31	MARICABAN CREEK
37	SL047	VICTORIA
	DM14	VITO CRUZ
38	SL041	DONADA-DM14
	EST25	ESTERO DE TRIPA DE GALLINA
39	SL045	RODRIGUEZ/APELO CRUZ/C. JOSE/DILAIN CREEK
	DM11	PADRE FAURA
40	SL008	T.M. KALAW - TAFT AVE.
	EST18	ESTERO DE BALETE
41	SL009	SAN MARCELINO
	EST25	ESTERO DE TRIPA DE GALLINA
42	SL032	SEN. GIL PUYAT-DIAN-DM22
	SL033	FINLANDIA-EDISON-MORSE-EST 25
43	EST29	MAKATI DIVERSION CHANNEL II
	SL029	HERERRA
44	EST26	ESTERO DE STA. CLARA
	SL019	E. PASCUA
45	EST25	ESTERO DE TRIPA DE GALLINA
	SL014	ROAD 6
46	EST25	ESTERO DE TRIPA DE GALLINA
	SL015	ROAD 16-PEDRO GIL

Table 6.1
List of Flood-Prone Areas and Suggested Measures (1 of 45)

Location			
Area	Along Calamba Creek	City	Quezon
#1215 (Calamba cor. Iriga)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.5	Location	Calamba cor. Iriga
Max. Duration (hr)	1	Location	
Ave. Depth (m)		Ave. Duration (hr)	
Overflow water runs on Calamba Street and flows down to the low-lying Sampaloc area.			
REGIONAL FLOODING (NORTH EAST MANILA)			
Major Drainage System			
Drains to Blumentritt Interceptor (DM01) through Calamba (NL041).			
Causes			
<p>Poor capacity of Calamba creek.</p> <p>Originally, this creek has insufficient cross section compared with the runoff discharge from its drainage area.</p> <p>In addition, flow capacity is decreased due to several obstacles in this creek.</p> <p>Photo 2 is a pipe thrown into the creeks.</p> <p>Photo 3 is silt taken just after a flood by inhabitants prepared for the next flood.</p> <p>These silts come from the construction places shown in Photo 4 since this drainage area has steep slope and sand/silt is easily transported to the creek.</p>			
Measures			
<p>Develop solid waste control plan including construction materials management.</p> <p>Develop alternative scheme to increase drainage main/lateral capacity or to reduce runoff peak.</p> <p>As this involved other drainage areas, this has to be included in the overall master planning.</p>			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (2 of 45)

Location			
Area	Sta. Mesa Heights	City	Quezon
# 766 Calavite cor. Blumentritt Ext.			
Flooding Condition in 1999 September			
Max. Depth (m)	0.5	Location	
Max. Duration (hr)	12	Location	
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (NORTH EAST MANILA)			
Major Drainage System			
Drains to Blumentritt Interceptor (DM01) through drainage lateral A. Bonifacio (NL039).			
Causes			
<p>The lateral does not have enough flow capacity.</p> <p>Receiving drainage main (DM01) has very small flow capacity.</p> <p>50% deposit at sag position (manhole ii15C2019).</p> <p>The steep slope of the laterals may produce shooting velocity and flow will over shoot the drainage main (DM01).</p>			
Measures			
<p>Declog manhole ii15C2019.</p> <p>Reinforce or upgrade drainage lateral using proper drainage planning process.</p> <p>Declog/dredge drainage main (DM01).</p> <p>As a contributor into large scale flooding of the Sampaloc, this should be included in the overall master planning study. Possible diversion channel can be considered in the master planning.</p>			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (3 of 45)

Location			
Area	Sta. Mesa Heights	City	Quezon
Piy. Margal cor. Halcon (#883)			
Flooding Condition in 1999 September			
Max. Depth (m)	1	Location	
Max. Duration (hr)	1	Location	
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (NORTH EAST MANILA)			
Major Drainage System			
Drains to Blumentritt Interceptor (DM01) through the drainage lateral under Piy Margal (NL043).			
Causes			
<p>Drainage line NL043 does have adequate capacity.</p> <p>Runoff overflows and is conveyed along the streets. Flow along the steep road overshoots the drainage mains. Runoff cascades down and transfers to Sampaloc area (Photo 5).</p> <p>Receiving drainage main (DM01) has limited capacity thus, flooding appears.</p>			
Measures			
<p>As the flooding problem encompasses large flooded area and interaction of several drainage areas, alternative plans to increase drainage lateral/main/estero capacity should be study.</p> <p>Develop other flood mitigation measures -- structural or non-structural.</p> <p>In so doing, a comprehensive study should be undertaken thru a master planning.</p>			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (4 of 45)

Location			
Area	Sampaloc	City	Manila
R. Papa St. cor. Nicanor Reyes (#1297)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.6 m	Location	R. Papa cor. N. Reyes
Max. Duration (hr)	72	Location	
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (NORTH EAST MANILA)			
Major Drainage System			
Drains to N. Reyes Severino Drainage Main (DM06) through drainage lateral under Laong-Laan/Gov. Forbes/España (NL031).			
Causes			
<p>Drainage lateral does not have adequate capacity. Excess runoff will appear as flood.</p> <p>NL031 has small outlet, hence a choking condition occurs.</p> <p>Receiving drainage main (DM06) has limited capacity. This induces further swelling of flood.</p> <p>Additionally, the floodwater coming from northern Sampaloc spills to España.</p>			
Measures			
<p>Develop alternative flood mitigation measures – (to increase flow capacity, to reduce flood peak, to provide storage).</p> <p>As this involved a number of interdependent drainage basin as well as the drainage basin lies in a low-lying area, a comprehensive drainage planning should be undertaken.</p> <p>Develop guidelines to improve drainage planning, design, construction, operation and maintenance in particular to tackle issues of bed slope profile.</p>			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (5 of 45)

Location			
Area	Sampaloc	City	Manila
Gov. Forbes cor. España (#845)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.6 m	Location	Gov. Forbes cor. España
Max. Duration (hr)	24	Location	
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (NORTH EAST MANILA)			
Major Drainage System			
Drains to N. Reyes Severino Drainage Main (DM06) through drainage lateral under Dimasalang-Gov. Forbes-España (NL032).			
Causes			
<p>Drainage lateral has inadequate capacity.</p> <p>Excess runoff from Sta. Mesa Heights and Quezon City spills along Calamba and Maria Clara but drainage main (DM06) has limited capacity. Thus, flooding the Sampaloc area on large scale.</p> <p>Drainage lateral has saw-tooth drainage profile, producing clogged manhole especially at place with abrupt slope directions.</p>			
Measures			
<p>Clean/declog NL032.</p> <p>As this part of the large scale flooding of the Sampaloc, this should be included in the overall master planning study.</p> <p>Develop proper drainage planning, design, construction, and operation guidelines so as to put more emphasis on the hydraulic aspect of the problem.</p>			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (6 of 45)

Location			
Area		City	
Josefina cor. Espana (#804)			
Flooding Condition in 1999 September			
Max. Depth (m)	NF	Location	
Max. Duration (hr)		Location	
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (NORTH EAST MANILA)			
Major Drainage System			
Drains to Josefina-Lepanto Main (DM07) through drainage lateral España (right side) NL036.			
Causes			
<p>Drainage lateral does not have adequate flow capacity.</p> <p>Drainage profile has saw-tooth shape, providing potential location for sediment to settle.</p> <p>Excess runoff from neighboring drainage blocks spill over to flooded area.</p> <p>Receiving drainage main (DM07) has poor capacity.</p>			
Measures			
<p>As this involved a number of interdependent drainage basin as well as the drainage basin lies in a low-lying area, a comprehensive drainage planning should be undertaken.</p> <p>Develop proper drainage planning, design, construction, and operation guidelines so as to put more emphasis on the hydraulic aspect of the problem.</p>			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (7 of 45)

Location			
Area		City	
España cor. San Diego St. (#805)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.5	Location	
Max. Duration (hr)	12	Location	
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (NORTH EAST MANILA)			
Major Drainage System			
Drains to Economia Main (DM08) through España under drainage lateral (NL035) left side and (NL034).			
Causes			
NL035 has an adequate flow capacity while NL034 does not have one. Floodwater from surrounding area over run the drainage lateral area.			
Measures			
As this involved a number of interdependent drainage basin as well as the drainage basin lies in a low-lying area, a comprehensive drainage planning should be undertaken. Due consideration should be given especially that the drainage main (DM08), drainage lateral (NL035) and (NL034) are in the interior of a large basin.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (8 of 45)

Location			
Area	Sampaloc	City	Manila
Extramadura cor. España (#848)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.5	Location	
Max. Duration (hr)	12	Location	
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (NORTH EAST MANILA)			
Major Drainage System			
Drains to drainage lateral NL032 through M. Earnshaw/España (NL033).			
Causes			
Lateral has inadequate capacity. Clogged outlet (ii15C4064) and manhole # ii15C4152. Choke at ii15C4075. Floodwater spills over the Estero de Calubcub and overland runoff along España.			
Measures			
Clean clogged manholes from ii15C4064 to ii15C4071. Enlarge drainage size at manhole ii15C4075 but conducting drainage planning of estimating runoff, delineating drainage area, design of lateral and proper installation of laterals. Again as this part of the large scale flooding of the Sampaloc, this should be included in the overall master planning study.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (9 of 45)

Location			
Area	Sampaloc	City	Manila
Aranga cor. Reten (#957)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.9	Location	Aranga cor. Reten
Max. Duration (hr)		Location	
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (NORTH EAST MANILA)			
Major Drainage System			
Drains to Estero de San Miguel through drainage lateral under:			
- M.V. delos Santos (left side) NL030			
- M.V. delos Santos (right side) NL029			
Causes			
Very small capacity.			
Drainage lateral has 50 to 100 % sand/silt deposition.			
Manhole ii15C4086 and ii15C4051 clogged.			
It is part of the low-lying Sampaloc area (southern portion).			
Floodwater from upper Sampaloc spills toward M.V. delos Santos.			
Measures			
Study the possibility of upgrading the very small size of lateral using proper drainage planning.			
As this involved a number of interdependent drainage basin as well as the drainage basin lies in a low-lying area, a comprehensive drainage planning should be undertaken.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (10 of 45)

Location			
Area	Sta. Cruz	City	Manila
F. Huertas cor. Batangas (#862)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.6	Location	
Max. Duration (hr)	24	Location	F. Huertas cor. Batangas
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (NORTH STA. CRUZ)			
Major Drainage System			
Drains to South Antipolo Main (DM28) through drainage laterals under: - F. Huertas (NL055).			
Causes			
Flow capacity of drainage laterals is not adequate. Receiving drainage main (DM28) lacks capacity. Runoff spills between drainage mains. The area serve by the lateral is low-lying.			
Measures			
Dredge South Antipolo Main. Drainage improvement study may be confined within small drainage area of the north Sta.Cruz.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (11 of 45)

Location			
Area	Tondo	City	Manila
Solis cor. J. Abad Santos (#533)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.6	Location	Solis cor. J. Abad Santos
Max. Duration (hr)	24	Location	Solis cor. J. Abad Santos
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (NORTH STA. CRUZ)			
Major Drainage System			
Drains directly by Solis-Tecson Drainage Main (DM02) through drainage lateral under J. Abad Santos (NL016 & NL017).			
Causes			
<p>Poor capacity of drainage laterals.</p> <p>Both ends of NL016 have 50% deposit.</p> <p>NL017 has 70% uniform deposition and manhole ii 15B2209 is clogged.</p> <p>Receiving drainage main (DM02) has small carrying capacity.</p> <p>The laterals lie in a low-lying area where flood can persists long. The laterals are located at the upstream end of DM02 so flood takes longer to subside.</p>			
Measures			
<p>Declog NL016 & NL017.</p> <p>Study on upgrading drainage lateral by proper drainage planning process.</p> <p>Improve carrying capacity of DM02, including in the study improvement of drainage laterals for small drainage area.</p>			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (12 of 45)

Location			
Area	Sta. Cruz	City	Manila
Oroquieta cor. Batangas (#858)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.6	Location	
Max. Duration (hr)	24	Location	Oroquieta cor. Batangas
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (NORTH STA. CRUZ)			
Major Drainage System			
Drains to Tayuman Drainage Main and then to Estero de Vitas through the drainage laterals under Oroquieta (NL025).			
Causes			
Drainage lateral has inadequate flow capacity. Drainage profile is saw-tooth. Manhole ii15B3180 clogged. Sediment deposits on sag point. Receiving drainage main (DM29) has limited capacity Possible, runoff spills between drainage mains The area serve by lateral is low-lying.			
Measures			
Declog manhole. Dredge Tayuman Main. Drainage improvement may be included in the small basin wide study (say North Sta. Cruz area).			

Table 6.1

List of Flood-Prone Areas and Suggested Measures (13 of 45)

Location			
Area	Sta. Cruz	City	Manila
Severino Reyes cor. Herrera (#371) and Ipil cor. F. Yuseco (#364)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.6	Location	Ipil cor. F. Yuseco
Max. Duration (hr)	3 (0.6 m)	Location	Ipil cor. F. Yuseco
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (NORTH STA. CRUZ)			
Major Drainage System			
Drains to Estero de Magdalena, Tayuman main and Estero de Vitas, through the drainage laterals under:			
- Tayabas (F. Yuseco) for Ipil cor. F. Yuseco (NL019) and			
- S. Herrera for Severino Reyes cor. Herrera (NL018)			
Causes			
Drainage laterals have poor capacity.			
Estero de Magdalena (upper reach) has insufficient capacity.			
The area is a low-lying area where flood can stand still easily.			
Photo 6 shows a section of Estero de Magdalena downstream of Batangas. Take note of the water and clearance of access bridge.			
Measures			
For immediate impact, declog/dredge Estero de Magdalena.			
For long range planning, conduct a drainage improvement study of Estero de Magdalena from South Antipolo to Tayuman. It may include the improvement of the drainage laterals under a small basin wide study.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (14 of 45)

Location			
Area	Sampaloc	City	Manila
Maria Luisa cor. Luzon (#466)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.6	Location	
Max. Duration (hr)	3	Location	
Ave. Depth (m)		Ave. Duration (hr)	
LOCAL FLOODING			
Major Drainage System			
Drains to Visayas Drainage Main and then to Estero de Valencia through the drainage laterals under the street of Ma. Luisa (NL049).			
Adequate capacity at outlet			
Causes			
Steep slope followed by adverse slope forms a saddle part (potential siltation site). 70% clogged at saddle (manhole iii11A4197). Incoming lateral from Luzon may have inlet problem, such that flooding occurs.			
Measures			
Declog manhole iii11A4197. Improve slope of lateral and check inlet to NL049 from Luzon. Proper drainage planning (provide smooth channel profile). Develop proper drainage planning, design, construction, and operation guidelines so as to put more emphasis on the hydraulic aspect of the problem.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (15 of 45)

Location			
Area	San Nicolas	City	Manila
St. Mary cor. C.M. Recto (#333)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.6	Location	
Max. Duration (hr)	3	Location	
Ave. Depth (m)		Ave. Duration (hr)	
LOCAL FLOODING			
Major Drainage System			
Drains to Estero de la Reina through drainage lateral (NL010).			
Causes			
Drainage lateral has inadequate capacity. Upstream end of lateral may be small.			
Measures			
Reinforce drainage lateral to carry additional runoff through proper planning process.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (16 of 45)

Location			
Area	Sta. Cruz	City	Manila
Mayhaligue cor. P. Guevarra cor. (I/908) and Oroquieta (I/685)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.6	Location	P. Guevarra and Oroquieta
Max. Duration (hr)	24	Location	P. Guevarra and Oroquieta
Ave. Depth (m)		Ave. Duration (hr)	
LOCAL FLOODING			
Major Drainage System			
Drains to Fugoso Drainage Main (DM05) through drainage laterals under: - Mayhaligue and P. Guevarra (NL026)			
Causes			
Not adequate flow capacity. Undulating drainage profile – hydraulic behavior changes. Clog manhole at sag (ii15C3326) and at upstream manhole (ii15C3322).			
Measures			
Declog drainage lateral (NL026). Improve drainage profile by have proper drainage planning includes survey works (horizontal and vertical control), delineate drainage area, estimate runoff discharge, layout of drainage laterals, construction/workmanship requirement. Develop proper drainage planning, design, construction, and operation guidelines so as to put more emphasis on the hydraulic aspect of the problem.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (17 of 45)

Location			
Area	Tondo	City	Manila
Lakandula cor. Ylaya (#428)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.5	Location	
Max. Duration (hr)	3	Location	
Ave. Depth (m)		Ave. Duration (hr)	
LOCAL FLOODING			
Major Drainage System			
Drains to Lakandula Drainage Main (DM04) through the drainage lateral under Lakandula (NL004).			
Causes			
Drainage lateral has inadequate flow capacity. Drainage profile has a saw-tooth shape; clogged manhole ii15A4037 (sag point). Lateral behaves hydraulically different due saw-tooth profile. Drainage lateral has 80% deposit over its length.			
Measures			
Declog drainage lateral NL004. Study upgrading the drainage lateral thru proper drainage planning.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (18 of 45)

Location			
Area	Tondo	City	Manila
Tindalo cor. Tecson (#1468)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.70	Location	Tindalo cor. Tecson
Max. Duration (hr)	12	Location	
Ave. Depth (m)		Ave. Duration (hr)	
LOCAL FLOODING			
Major Drainage System			
Drains to North Antipolo Creek through drainage lateral under Ipil (NL020).			
Causes			
Outlet manhole (ii15B3194) is clogged. Whole length of NL020 has 50% sand/silt deposit. Drainage profile is conducive for silt to deposit. North Antipolo Creek has poor capacity. Possible spilling of runoff from upstream of Solis-Tecson Main.			
Measures			
Declog/clean NL020. Improve downstream of drainage laterals. Improve North Antipolo Creek. Drainage improvement study may be confined within small drainage area of the north Sta.Cruz. Thus this may be included in the small basin wide study.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (19 of 45)

Location			
Area	Sampaloc	City	Manila
Fajardo Ext. cor. Batanes St. (#1134)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.5	Location	Fajardo cor. Batanes
Max. Duration (hr)	1	Location	
Ave. Depth (m)		Ave. Duration (hr)	
LOCAL FLOODING			
Major Drainage System			
Drains to Josefina-Lepanto Main (DM07) through drainage lateral under Cordillera-Quezon Avenue-D. Tuazon-Data Matimyas (NL044).			
Adequate at outlet/inadequate at midsection			
Causes			
Constricted drainage pipe at manhole iii11A3186.			
Size changes from 76 cm to 46 cm back to 76 cm.			
Choking condition.			
Profile undulating.			
Measures			
Study the possibility of replacing drainage lateral from iii11A3186 to iii11A3121 to get rid of the choke.			
Smoothen drainage profile as well.			
Proper drainage planning (provide smooth channel profile and check flow capacity with new drainage pipe).			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (20 of 45)

Location			
Area	Quiapo	City	Manila
Padilla cor. P. Casal (#24)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.5	Location	
Max. Duration (hr)	3	Location	
Ave. Depth (m)		Ave. Duration (hr)	
LOCAL FLOODING			
Major Drainage System			
Drains to Estero de San Miguel and then to Estero de Sampaloc through the drainage laterals under:			
- Padilla, and (NL028)			
- Tanduay.			
Causes			
Not adequate flow capacity.			
Adverse bed slope near outlet/hydraulic behavior changes.			
Deposition at saddle portion.			
Clogging of manhole #20C1025.			
Measures			
Declog manhole # ii20C1025.			
Improve drainage profile through proper drainage planning includes survey works (horizontal and vertical control), delineate drainage area, estimate runoff discharge, layout of drainage laterals, construction/workmanship requirement.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (21 of 45)

Location			
Area	Sta. Cruz	City	Manila
Pureza cor. P. Santos (#474)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.6	Location	
Max. Duration (hr)	20	Location	Pureza cor. P. Santos
Ave. Depth (m)		Ave. Duration (hr)	
LOCAL FLOODING			
Major Drainage System			
Drains to Estero de Valencia (EST 16) through drainage laterals under Old Sta. Mesa/Albina/Altura Ext./R. Magsaysay/Hipodromo/Anonas (NL054).			
Causes			
The lateral has limited flow capacity.			
Presence of two choking points.			
Hydraulic behavior changes rapidly due to abrupt change in section area and due to incomplete siphon.			
Clogged manhole due to choking.			
Measures			
Declog manhole.			
Revise drainage profile through proper drainage planning.			
Develop proper drainage planning, design, construction, and operation guidelines so as to put more emphasis on the hydraulic aspect of the problem.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (22 of 45)

Location			
Area	Sampaloc	City	Manila
Blumentritt cor. Fajardo Ext. and Matimyas (#1134)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.5	Location	
Max. Duration (hr)	1	Location	
Ave. Depth (m)		Ave. Duration (hr)	
LOCAL FLOODING			
Major Drainage System			
Drains to Josefina-Lepanto Drainage Main through drainage lateral under:			
- Matimyas NL045 (right)			
- NL046 (left) – good profile adequate			
Causes			
NL045 does not have adequate capacity.			
NL045 drainage lateral has 50% deposition at iii11A3209.			
Measures			
Declog NL045.			
Improve or reinforce drainage lateral through proper drainage planning from planning, design, construction, and operation stages.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (23 of 45)

Location			
Area	San Antonio Village	City	Makati
Flooding Condition in 1999 September			
Max. Depth (m)	1.0	Location	Dita cor. Santol
Max. Duration (hr)	48.0 (0.6m)	Location	Calantas cor. Santol
Ave. Depth (m)	0.52	Ave. Duration (hr)	4.6
REGIONAL FLOODING (SOUTH MANILA)			
Major Drainage System			
Major Laterals: those under the streets of Primo de Rivera (SL 001), Vito Cruz Ext. (SL 002) and Mayapis (SL 022). Lateral (SL 001) joins (SL 002). Laterals (SL 002) and (SL 022) join to Zobel-Roxas Drainage Main (DM 023), which flow into Estero Tripa de Gallina			
Causes			
Adverse, slope from 0 to 450 and from 580 to 700 of SL001. Surface runoff from headwaters to Tejeron spills over towards areas served by SL001 and SL002 (P. de Rivera and Pasong Tamo, respectively). The general area of San Antonio Village is flat and low-lying bounded by main streets and the existing railroad track which is relatively higher than the natural ground. This results in ponding during heavy rains coupled with clogged and/or inadequate drain capacity due to improper construction.			
Measures			
Re-design SL001 and rectify longitudinal slope. Constant slope must be maintained throughout the whole length. Verify availability of head from upper end of line to junction with SL044 (Vito Cruz), to DM 23 (Zobel Roxas) and ultimately at Tripa de Gallina. Do the same for SL003 (kamagong), SL004 (upper segment of Pasong Tamo) and SL002 (North segment of Mayapis). Improved channel capacity of Calatagan Creek and Tripa de Gallina. Provide auxillary pump at the Tripa de Gallina inlet of Vito Cruz outfall (DM 14). Forced pumping is necessary. Another alternative is to completely redesign/reconstruct the drainage system of San Antonio Village. Compartmentalize the area by providing floodgates on Tripa de Gallina at Vito Cruz and Libertad to prevent external flows. This will ensure a definite influence area for the Libertad Pumping Station plus a new auxiliary force pump which should be provided at the inlet of Vito Cruz outfall. Undertake master plan.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (24 of 45)

Location			
Area	San Isidro	City	Makati
Flooding Condition in 1999 September			
Max. Depth (m)	0.9	Location	cor. Aragon
Max. Duration (hr)	12 (0.9 m)	Location	cor. Aragon
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (SOUTH MANILA)			
Major Drainage System			
Drainage laterals under Finlandia (SL032 & SL033) joins Estero Tripa de Gallina.			
Causes			
The drainage laterals have inadequate flow capacity.			
Drainage profile has saddle portion.			
Chances of sediment filling the saddle are high and fast.			
Estero Tripa de Gallina overflowed.			
Measures			
Improve drainage profile if possible using sound drainage planning and design			
As the flooding problem encompasses several drainage inter-related and interconnected in flat area, a comprehensive master planning should be undertaken considering the tributaries of Estero Tripa de Gallina. The master planning should cover the area from San Antonio Subdivision down to the Estero Tripa de Gallina Pumping station.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (25 of 45)

Location			
Area	Bangkal	City	Makati
Along P. Binay near Estero Tripa de Gallina P. Binay cor. Dallas (#1010), Mascardo (#1383) and Estrella (#1004)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.5	Location	
Max. Duration (hr)	2	Location	
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (SOUTH MANILA)			
Major Drainage System			
Open channel (SL037) installed along P. Binay, which joins to the Makati Diversion Channel, just upstream of the confluence of Estero Tripa de Gallina.			
Causes			
<p>The drainage lateral does not have adequate flow capacity.</p> <p>Drainage size changes along the length, the outlet has small size.</p> <p>Drainage profile is uneven.</p> <p>Uniform flow condition fails because of adverse slope.</p> <p>Due to adverse slope, siltation thickens as flow goes downstream.</p> <p>A 40% sediment deposit is developed.</p> <p>Estero Tripa de Gallina overflowed.</p>			
Measures			
<p>Declog/clean drainage lateral.</p> <p>Plan and design lateral with sound drainage planning methodology</p> <p>Develop drainage manual of the above to upgrade capability of government engineer.</p> <p>As the flooding problem encompasses several drainage inter-related and interconnected in flat area, a comprehensive master planning should be undertaken considering the tributaries to Estero Tripa de Gallina. The master planning should cover the area from San Antonio Subdivision down to the Estero Tripa de Gallina Pumping station.</p>			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (26 of 45)

Location			
Area		City	Pasay
Cabrera cor. M. de Jesus (II/435)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.5	Location	
Max. Duration (hr)	3	Location	
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (SOUTH MANILA)			
Major Drainage System			
Drains to Estero Tripa de Gallina through drainage lateral under Cabrera Protacio Ext. (SL039).			
Causes			
<p>The drainage lateral has insufficient flow capacity.</p> <p>An uneven drainage profile is exhibited.</p> <p>Clogged manhole at upstream end (iii21A1042).</p> <p>Overtopping of Estero Tripa de Gallina.</p>			
Measures			
<p>Reconstruct pipe sections to gradual slope.</p> <p>Declog/clean manhole iii21A1042 and downstream sections.</p>			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (27 of 45)

Location			
Area	Palanan	City	Makati
Catalagan cor. Dian (#60) and Dian cor Emilia (#213 & #1016)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.7	Location	
Max. Duration (hr)	3	Location	
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (SOUTH MANILA)			
Major Drainage System			
Drains to Calatagan creek through drainage lateral under Dayap-Dian (SL031) and (SL030).			
Causes			
Inadequate discharge capacity of drainage lateral Receiving creek with limited capacity Swelling of flood over Pio del Pilar Overtopping estero Tripa de Gallina			
Measures			
Improve the Calatagan Creek. Develop other flood mitigating measures The area being part of wide spread flooding, it should be considered in the overall master planning at San Antonio down to Estero Tripa de Gallina pumping station.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (28 of 45)

Location			
Area	Palanan	City	Makati
Ampere cor. Dian (#41)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.6	Location	Ampere cor. Dian
Max. Duration (hr)	3	Location	
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (SOUTH MANILA)			
Major Drainage System			
Pasong Tamo main (DM33) drains to Calatagan creek.			
Causes			
<p>Inadequate flow capacity of drainage main.</p> <p>Calatagan does not have enough discharge capacity.</p> <p>Flood water spreads out because of limited capacity of neighboring drainage laterals.</p> <p>Upstream section is silted up to 60% of depth.</p>			
Measures			
<p>Desilt the drainage main</p> <p>Improve Calatagan creek.</p> <p>Develop alternative scheme to reduce flooding the San Antonio down to Pio del Pilar.</p> <p>A comprehensive master planning should be undertaken as it covers a widespread flooding affecting number of drainage areas.</p>			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (29 of 45)

Location			
Area	San Antonio Village	City	Makati
along St. Paul (#222 & 223) and Lumbayan (#1761)			
Flooding Condition in 1999 September			
Max. Depth (m)	1.0	Location	Lumbayan cor. Cacho
Max. Duration (hr)	12 (0.6 m)	Location	St. Paul cor. Mayapis
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (SOUTH MANILA)			
Major Drainage System			
Drains to Calatagan Creek through the drainage lateral under Lumbayao & ST. Paul (SL 055).			
Causes			
Inadequate capacity. Flat area with slow movement of surface run off.			
Measures			
Refer to suggested measures for the whole San Antonio Village. See Sheet 23			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (30 of 45)

Location			
Area		City	Makati
# 171 Mayapis cor. Catmon			
Flooding Condition in 1999 September			
Max. Depth (m)	0.7	Location	
Max. Duration (hr)	1	Location	
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (SOUTH MANILA)			
Major Drainage System			
Drains to Zobel Roxas main through drainage lateral Mayapis (SL022).			
Causes			
Inadequate flow capacity Drainage lateral is clogged for 350 meters. The drainage area for lateral is flat.			
Measures			
Declog whole length of drainage lateral Include in the master planning of the San Antonio down to Estero Tripa de Gallina pumping station.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (31 of 45)

Location			
Area	Metropolitan Subd.	City	Makati
ABC cor. Zobel-Roxas (#182)			
Flooding Condition in 1999 September			
Max. Depth (m)	1.2	Location	
Max. Duration (hr)	1	Location	
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (SOUTH MANILA)			
Major Drainage System			
Drainage main Zobel-Roxas (DM23) joins Estero Tripa de Gallina.			
Causes			
<p>The flow capacity almost satisfies the 10-year flood except for the upstream end.</p> <p>Not enough provision of drainage lateral inlet to main.</p> <p>Receiving Estero Tripa de Gallina overtopped.</p> <p>The drainage area is bowl like shape and low-lying.</p>			
Measures			
<p>Evaluate other drainage and flood mitigation measure for its pro and cons. The affected area of flooding is large and may spill to nearby drainage, thus a master plan study is required considering all factors coming into play of the drainage laterals. The study area would involve those from San Antonio down Estero Tripa de Gallina pumping station</p>			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (32 of 45)

Location			
Area	San Andres Bukid	City	Manila
Esmeralda St. cor. Estrada (# 144) & Coral St. cor. Florentino Torres (# 158)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.8 / 0.6	Location	
Max. Duration (hr)	2 / 3	Location	
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (SAN ANDRES BUKID)			
Major Drainage System			
Drains to PNR open canal north through drainage under Dagonoy (SL020).			
Causes			
<p>The lateral has limited flow capacity.</p> <p>The outlet of the lateral is constricted.</p> <p>Drainage profile is uneven. Sand and silt deposit settled at the saddle section reduces the flow.</p> <p>Clogged manhole (iii16A3158).</p> <p>The receiving PNR Open Canal has limited capacity.</p>			
Measures			
<p>Clear manhole iii16A3158 of sediment deposit.</p> <p>Dredge PNR Open Canal.</p> <p>The area north of Zobel-Roxas main has scattered flood-prone place. Considering the scatter of the flood-prone place it is modest to evaluate measures of reducing flood duration. A small basin wide drainage study is an open option to undertake.</p>			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (33 of 45)

Location			
Area	San Andres	City	Manila
Estrada cor. South Super Highway (#135) & Coral cor. Zobel Roxas (# 147)			
Flooding Condition in 1999 September			
Max. Depth (m)	1.2 / 0.5	Location	
Max. Duration (hr)	3 / 8	Location	
Ave. Depth (m)		Ave. Duration (hr)	
REGIONAL FLOODING (SAN ANDRES BUKID)			
Major Drainage System			
Drains to PNR open canal through drainage lateral Estrada (SL021) and Estrada Left (SL054).			
Causes			
<p>Discharge capacity of both drainage laterals is not adequate.</p> <p>SL021 is clogged at manhole iii16A3171 and rest of lateral length has 50 to 75% sand/silt deposition.</p> <p>SL054 has a 50% sand deposition over its length.</p> <p>PNR open receiving capacity is very small, thus some flooding occur at the entry or PNR open canal is overtopped.</p>			
Measures			
<p>Declog PNR open canal, declog/clean the drainage laterals as well.</p> <p>The improvement of the drainage laterals for San Andres Bukid can be studied in detail using a small basin wide approach.</p>			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (34 of 45)

Location			
Area	Paco	City	Manila
P.M. Guanzon cor. Mendiola Ext. and Acropolis Drive (#610)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.8	Location	
Max. Duration (hr)	12	Location	
Ave. Depth (m)		Ave. Duration (hr)	
LOCAL FLOODING			
Major Drainage System			
Drains to Estero de Concordia through the drainage lateral under P. Mendoza Guanzon (SL 010).			
Causes			
Faulty construction of drainage line with excessive sag at 380. The erratic slope greatly reduces flow capacity. Drain size is not consistent (larger at the upper end and smaller at the lower end).			
Measures			
Reconstruct drain line and rectify slope. Verify size of drain line. The flatness of the existing terrain may require closer spacing of street/curb inlets. Drain size must be smaller at the upper end and progressively become larger at the lower end.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (35 of 45)

Location			
Area	San Isidro	City	Makati
Rockefeller cor. Galvani (#55)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.8	Location	
Max. Duration (hr)	6	Location	
Ave. Depth (m)		Ave. Duration (hr)	
LOCAL FLOODING			
Major Drainage System			
Drainage laterals under Rockefeller and Ford (SL035) drains to Estero Tripa de Gallina.			
Causes			
<p>The drainage lateral has barely enough flow capacity.</p> <p>The area serve by the lateral lies on a flat area and chances of flooding is high.</p> <p>The possibility of clogged road inlets is high, inlets are not provided.</p> <p>This may be simply a case of local flooding.</p>			
Measures			
<p>Declog manhole inlets.</p> <p>Additional curb inlets if necessary.</p> <p>Clean existing line.</p>			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (36 of 45)

Location			
Area	Magallanes Village	City	Makati
EDSA (#51)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.8	Location	
Max. Duration (hr)	2	Location	
Ave. Depth (m)		Ave. Duration (hr)	
LOCAL FLOODING			
Major Drainage System			
Storm water is drained to Maricaban Creek (1+575) via drainage lateral installed under Victoria (SL 047).			
Causes			
Outfall is submerged by Maricaban Creek during floods. Faulty design and construction of segment 0 to 491.			
Measures			
Redesign and reconstruct segment 0 to 893 for a steeper slope.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (37 of 45)

Location			
Area	San Isidro	City	Pasay
Menlo cor. Canada (#585)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.6	Location	
Max. Duration (hr)	1	Location	
Ave. Depth (m)		Ave. Duration (hr)	
LOCAL FLOODING			
Major Drainage System			
Through the laterals (SL 041) along Canada or PNR, storm water is drained to Vito Cruz Drainage Main and Manila Bay.			
Causes			
Inadequate capacity. Undersized drain. Segment 176 to 289 does not conform with minimum requirement of DPWH.			
Measures			
Clean existing drain. Redesign whole segment and replace with larger RCPs.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (38 of 45)

Location			
Area	Malibay	City	Pasay
Apelo Cruz cor. Dominguez and (#5)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.6	Location	
Max. Duration (hr)	3	Location	
Ave. Depth (m)		Ave. Duration (hr)	
Very low area with elevation of 12.02 m.			
LOCAL FLOODING			
Major Drainage System			
Drains to Estero Tripa de Gallina through drainage laterals under Apelo Cruz, Dominguez, F. Cruz, Rodriguez and EDSA (SL045).			
Causes			
<p>The drainage lateral has inadequate flow capacity.</p> <p>The upstream of the lateral is on high ground and inlets to manhole are not adequate.</p> <p>The drainage lateral is 25% filled with sediment deposit.</p> <p>A saddle point is present at upper reach of lateral, hydraulic behavior changes abruptly.</p>			
Measures			
<p>Clean inlets. If necessary, provide additional inlets.</p> <p>Desilt/declog the whole pipe system.</p>			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (39 of 45)

Location			
Area	Ermita	City	Manila
Taft Ave. cor. T.M. Kalaw (#85)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.8	Location	
Max. Duration (hr)	3	Location	
Ave. Depth (m)		Ave. Duration (hr)	
LOCAL FLOODING			
Major Drainage System			
Drains to Padre Faura Drainage Main through the drainage lateral under Taft Avenue (SL 008).			
Causes			
Curb inlets are clogged with garbage. Undersized drain. Size of drain from 317 to 500 is below DPWH standard. Adverse slope from 0 to 103.			
Measures			
Clean inlets. Recalculate to determine proper drain size. Replace existing line or provide additional parallel drain lines if space is available. Rectify longitudinal slope from 0 to 103.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (40 of 45)

Location			
Area	Intramuros	City	Manila
Sylvia cor. Ayala (#90)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.7	Location	
Max. Duration (hr)	3	Location	
Ave. Depth (m)		Ave. Duration (hr)	
LOCAL FLOODING			
Major Drainage System			
Drains to Estero de Balete through the drainage lateral under San Marcelino SL 009).			
Causes			
High water level at Estero de Balete outfall. The lateral is affected by high water level of Pasig River.			
Measures			
Provide flap gate or check gate at outfall.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (41 of 45)

Location			
Area	San Isidro	City	Makati
Finlandia cor. Newton (#1102) and Aragon (#1101)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.6 / 9	Location	
Max. Duration (hr)	6 / 12	Location	
Ave. Depth (m)		Ave. Duration (hr)	
LOCAL FLOODING			
Major Drainage System			
Drainage lateral under Finlandia (SL032 & SL033) joins Estero Tripa de Gallina.			
Causes			
Manholes are filled with sediment deposits. The drainage lateral has uneven slopes (see-saw tooth) Uniform flow condition fails, because of adverse slopes.			
Measures			
Improvement of drainage in accordance with sound drainage planning, design, construction, and operation. Develop drainage manual of the above-mentioned subject.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (42 of 45)

Location			
Area	Pio del Pilar, Legaspi	City	Makati
Pasong Tamo cor. Fernando (#256)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.9	Location	
Max. Duration (hr)	3	Location	
Ave. Depth (m)		Ave. Duration (hr)	
LOCAL FLOODING			
Major Drainage System			
Drains to Makati Diversion Channel through the drainage lateral under Herrera.			
Causes			
Inadequate discharge capacity			
Clogged outlet			
Measures			
Clean/clear of sediment deposit the whole length of drainage lateral			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (43 of 45)

Location			
Area	Sta. Ana	City	Manila
M. Roxas cor. Del Pilar (#1362)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.5	Location	
Max. Duration (hr)	3	Location	
Ave. Depth (m)		Ave. Duration (hr)	
LOCAL FLOODING			
Major Drainage System			
Drains to Estero de Santa Clara through the drainage lateral under M. Roxas E. Pascua (sl 019).			
Causes			
Inadequate flow capacity, clogged at outlet. Affected by tide which causes backwater and reduces flow capacity.			
Measures			
Redesign and reconstruct SL019 from 0 to 167. Raise outfall invert to EL. 11.50.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (44 of 45)

Location			
Area	Pandacan	City	Manila
Road 7 cor. Road 5 (#477)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.5	Location	
Max. Duration (hr)	3	Location	
Ave. Depth (m)		Ave. Duration (hr)	
Major Drainage System			
Drains to Tripa de Gallina through the drainage lateral under Road 6 (SL 014).			
Causes			
The outfall is affected by high water level at Tripa de Gallina.			
Measures			
Reconstruct segment from 0 to 50 and raise outfall invert to Elev. 12.			
Increase channel capacity of Tripa de Gallina.			

Table 6.1
List of Flood-Prone Areas and Suggested Measures (45 of 45)

Location			
Area	Sta. Ana	City	Manila
Road 16 (#1352)			
Flooding Condition in 1999 September			
Max. Depth (m)	0.5	Location	
Max. Duration (hr)	3	Location	
Ave. Depth (m)		Ave. Duration (hr)	
LOCAL FLOODING			
Major Drainage System			
Drains to Tripa de Gallina through the drainage laterals under Road 16, 13, 14 and 9 (SL 015).			
Causes			
The drain size at segment 0 to 50 is a bottleneck. Outfall invert is too low. There is an assortment of conduit sizes which have been installed inconsistently.			
Measures			
Redesign and reconstruct segment from 0 to 328. Rectify longitudinal slope. The drain size must progressively become larger as it approaches the lower end. Increase channel capacity of Tripa de Gallina.			