

**SECTION C**

**JAMES ISLAND AREA**

INDEX  
JAMES ISLAND AREA WATERSHEDS

<u>WATERSHED</u>	<u>PAGE</u>
Battery Brown	128
Belevedere	142
Bradham	132
Camp Road West	132
Castle Pinckney Drive	137
County Club	142
Cross Creek	144
Dills Bluff	131
East James Island	138
Folly Road	141
Fort Johnson	133
Harbor Towne	133
Harrill Court	134
Held Circle North	134
Held Circle South	134
Inverness	142
Martello	141
Municipal	145
Oyster Point	136
Pageland	145
Peashill	130
Peregrine	128
Riverland North	132
Riverland South	131
Riverland West	132
River Point	134
Stills Bee	128
Sumter Drive	137
Turkey Pen	132
Vardell Street	128
Wambaw	140
White Point	137
Winborn	133

## EXPLANATION OF HYDRAULIC DATA TABLES

The Hydraulic Data Tables contain information, by watershed areas, for each of the drainage facilities within the respective area. The data listed in each column is as follows:

Column 1: Location of the system to be analyzed, listing upstream manhole number and downstream manhole number.

Column 2: Drainage Area to system to be analyzed in acres.

Column 3: Runoff coefficient for the area listed in Column 2. (See Table 1)

Column 4: Total CA is the sum of Column 2 times Column 3 plus CA for areas upstream of the point of analysis.

Column 5: Travel time is the time required for runoff to reach the point of analysis from the most remote point within in the watershed.

Column 6: Discharge (Q) equals CIA where CA is the total found in Column 4 times the rainfall intensity (I) in inches per hour from Figure No. 3 using the travel time in Column 5.

Column 7: Existing system description.

Column 8: Length of existing system.

Column 9: Slope of existing system. Both the physical slope (actual slope of system) and the hydraulic slope (water surface profile) are listed for each system. The hydraulic slope is placed in parenthesis and is used to compute the capacity of the existing system.

Column 10: Capacity of existing system in cubic feet per second computed from Manning's equation.

Column 11: Velocity of existing system in feet per second. Discharge divided by flow area.

Column 12 & 13: Recommended Improvements. List improvements required (Column 12) and associated cost (Column 13).

Column 14: Comments

The James Island area is dominated by residential development with commercial development confined primarily to Folly Road and Maybank Highway. The area is drained by numerous drainage basins, the majority of which provide service to both City and County residents. Any major projects to improve drainage facilities on James Island should be approached as a cooperative effort between the City of Charleston and Charleston County.

The existing drainage facilities consist mainly of open channels with culverts crossing driveways and streets. There are some pipe conduit systems along Folly Road and Maybank Highway. The major portion of the existing systems are inadequate and will require improvement for protection of flooding at design limits. A discussion of the drainage facilities within each watershed along with recommended improvements and associated costs is contained hereafter.

TABLE 70

HYDRAULIC ANALYSIS FOR JAMES ISLAND AREA													
LOCATION	DRAINAGE AREA (ACRES)	RUNOFF COEFFICIENT	TOTAL (CA)	TRAVEL TIME (MIN.)	DISCHARGE (C.F.S.)	EXISTING SYSTEM	LENGTH	SLOPE (FT./FT.)	CAPACITY (C.F.S.)	VELOCITY (FPS)	RECOMMENDED IMPROVEMENTS		COMMENTS
											STORMWATER CONDUIT	COST (DOLLARS)	
<b>STILLS BEE (E-6)</b>													
E6.41 to E6.40	9.2	.45	4.14	10	25	30" CMP	375'	(.0032) .0028	13	2.7	375 L.F. 36" RCP	46,950	Replace existing pipe
E6.40 to E6.39	5.7	.45	6.71	13	37	27" x 43" CMP	40'	(.0116) .0018	41	5.7		Adequate	
E6.39 to E6.38	1.4	.45	7.34	14	39	36" CMP	140'	(.0116) .0029	41	5.7		Adequate	
E6.38 to E6.37	1.1	.45	7.84	15	41	36" CMP	40'	(.0116) .0045	41	5.7		Adequate	
												46,950	SUBTOTAL
												9,400	UPSTREAM IMPROVEMENTS
												56,350	TOTAL
<b>BATTERY BROWN (E-6)</b>													
E6.35 to E6.36	3.5	.45	1.58	9	10	18" x 29" CMP	130'	(.015) .0041	16	5.0		Adequate	
<b>VARDELL STREET (E-6)</b>													
E6.1 to E6.2	18.70	0.35	6.55	17	32	24" RCP	65'	-0.0046	14	4.5	65' - 36" RCP	8,800	Parallel system
												8,800	SUBTOTAL
												1,800	UPSTREAM IMPROVEMENTS
												10,600	TOTAL
<b>PEREGRINE (E-6, F-6)</b>													
E6.6B to E6.6A	9.7	0.45	4.37	5	32	36" CMP	230'	(0.0093)	36	5.1		Adequate	

Stills Bee

The Stills Bee watershed drains 17.4 acres of residential development located between Putnam Drive on the east and Stills Bee Avenue on the west. Existing drainage facilities consist of a pipe conduit system which extends from Stills Bee Avenue eastward across Putnam Drive and discharges into the Clark Sound marsh. The existing facilities are adequate with the exception of the segment between Stills Bee Avenue and Putnam Drive which provides approximately 50 percent of the recommended capacity. A 36" RCP to replace the existing 30" CMP is recommended.

Battery Brown

The Battery Brown watershed drains 3.5 acres of residential development along Battery Brown Court located in the James Island portion of the study area. The existing drainage facilities consist of a 18"x29" CMP with conveys the runoff to the Clark Sound marsh and is adequate.

Vardell Street

The Vardell Street watershed is located along the western side of Sessionville Road and drains approximately 19 acres of residential development. The existing drainage facility consist of a 24" RCP which crosses under Sessionville Road and outlets into Clark Sound. The existing system is inadequate and a parallel 36" RCP culvert is recommended.

Peregrine

The Peregrine watershed drains approximately 10 acres of residential development located along both sides of Peregrine Drive. The existing drainage facility is a 36" CMP which discharges into Clark Sound and is adequate.

TABLE 71

HYDRAULIC ANALYSIS FOR JAMES ISLAND AREA													
LOCATION	DRAINAGE AREA (ACRES)	RUNOFF COEFFICIENT	TOTAL (CA)	TRAVEL TIME (MIN.)	DISCHARGE (C.F.S.)	EXISTING SYSTEM	LENGTH	SLOPE (FT./FT.)	CAPACITY (C.F.S.)	VELOCITY (FPS)	RECOMMENDED IMPROVEMENTS		COMMENTS
											STORMWATER CONDUIT	COST (DOLLARS)	
<b>PEASHILL (E - 6, E-7)</b>													
E7.28 to E7.29	4.6	.45	2.07	8	13	36" RCP	30'	(0.0009) -0.02	32	4.5		Adequate	
E7.29 to E7.17	18.9	.45	10.58	9	66	6' F.B. Channel	650'	(0.0009) 0.0024	70	2.4		Adequate	
E7.17 to E7.16					66	40"x65" CMP	50'	(0.0026) 0.002	48	3.4	50' - 30" RCP	5,350	Parallel pipe
E7.16 to E7.14	.95	.45	11.01	15	66	7' F.B. Channel	150'	(0.0026) -0.0011	106	3.7		Adequate	
E7.20 to E7.18	17.9	.45	8.06	14	43	Dual 18"x 29" CMP	40'	(0.0012) 0.0088	17	3.0	40' - Dual 30" RCP	7,700	Replace existing
E7.18 to E7.15	3.5	.45	9.64	15	50	5' F.B. Channel	590'	(0.0012) 0.0011	25	2.0	590' - 6' F.B. Channel	1,800	
E7.15 to E7.14					50	36" RCP	30'	(0.0012) 0.034	32	4.5	30' - 30" RCP	3,200	Parallel pipe
E7.14 to E7.12	1.0	.45	21.09	20	100	7' F.B. Channel	120'	(0.0026) 0.0074	116	3.7		Adequate	
E7.12 to E7.13					100	40"x65" CMP	40'	(0.0008) -0.01	48	3.4	40' - 42" RCP	6,350	Parallel pipe
E7.13 to B	2.1	.45	22.04	22	101	6' F.B. Channel	310'	(0.0008) --	60	2.1	310' - 11' F.B. Channel	1,450	
E6.24 to E6.26	8.4	.45	3.78	19	18	22"x36" CMP	440'	(0.0004) 0.0006	5	1.0	980' - 36" RCP	125,050	Replace existing system
E6.26 to E7.45	1.5	.45	4.46	22	21	22"x36" CMP	400'	(0.0004) 0.0004	5	1.0			Replace existing system
E7.45 to E7.46	2.2	.45	5.45	25	24	22"x36" CMP	140'	(0.0004) --	5	1.0			Replace existing system
E7.46 to E7.47	4.4	.45	7.43	26	32	30" RCP	45'	(0.0004) --	7	1.4	295' - 42" RCP	44,600	Replace existing system
E7.47 to E7.48	3.7	.45	9.1	27	39	30" RCP	250'	(0.0004) 0.0015	7	1.4			Replace existing system
E7.48 to B	.9	.45	9.52	29	40	4' F.B. Channel	340'	(0.0004) --	44	1.5		Adequate	
B to E6.15	8.8	.45	35.52	31	142	5' F.B. Channel	540'	(0.0008) --	65	2.1	540' - 7' F.B. Channel	3,600	
E6.15 to E6.16					142	36"x54" CMP	40'	(0.0043) 0.0025	36	3.2	40' - 4'x8' Box	15,450	Replace existing pipe

(CONTINUED)

10

TABLE 71

HYDRAULIC ANALYSIS FOR JAMES ISLAND AREA													
LOCATION	DRAINAGE AREA (ACRES)	RUNOFF COEFFICIENT	TOTAL (CA)	TRAVEL TIME (MIN.)	DISCHARGE (C.F.S.)	EXISTING SYSTEM	LENGTH	SLOPE (FT./FT.)	CAPACITY (C.F.S.)	VELOCITY (FPS)	RECOMMENDED IMPROVEMENTS		COMMENTS
											STORMWATER CONDUIT	COST (DOLLARS)	
PEASHILL (CONTINUED)													
E6.16 to E6.13	4.0	.45	37.32	36	142	5' F.B. Channel	335'	(0.0043) 0.004	43	3.4	335' - 7' F.B. Channel	2,700	
E7.40 to E7.43	27.7	.45	12.47	25	55	30" RCP	140'	(0.0015) -0.0051	20	4.2	140' - 42" RCP	21,950	Parallel system
E7.43 to E7.11	38.6	.45	29.84	26	131	3' F.B. Channel	1020'	(0.0015) 0.0018	24	2.1	10' F.B. Channel	13,000	
E7.11 to E7.10					131	24" RCP	40'	(0.003) 0.003	14	4.5	40' - 4'x8' Box	15,250	Replace existing
E7.10 to E7.9	24.4	.45	40.82	33	159	4' F.B. Channel	535'	(0.0024) 0.0033	39	3.0	13' F.B. Channel	9,000	
E7.9 to E7.49					159	31"x50" CMP	275'	(0.002) 0.0036	25	2.6	1085' - 4'x8' Box	394,550	Replace existing system
E7.49 to E6.18	8.1	.45	44.47	35	169	31"x50" CMP	475'	(0.002) -0.0036	25	2.6			Replace existing system
E6.18 to E6.14	2.2	.45	45.46	38	169	31"x50" CMP	185'	(0.002) 0.0031	25	2.6			Replace existing system
E6.14 to E6.13	12.2	.45	50.95	39	181	31"x50" CMP	150'	(0.002) 0.0031	25	2.6			Replace existing system
E6.13 to E6.12	2.9	.45	89.58	40	314	5' F.B. Channel	290'	(0.0043) 0.005	105	4.7	290' - 18' F.B. Channel	8,650	
F6.12 to E6.11					314	36" RCP	60'	(0.001) 0.0067	32	4.5	60' - Dual 6'x6' Box	61,450	Replace existing pipe
E6.11 to E6.51	.3	.45	89.72	43	314	11' F.B. Channel	100'	(0.001) -0.0167	89	2.3	100' - 18' F.B. Channel	2,550	
E6.47 to E6.51	7.5	.45	3.38	10	20	30" RCP	150'	(0.0033) 0.0033	20	4.2			Adequate
E6.51 to A	1.8	.45	93.91	44	315	11' F.B. Channel	390'	(0.0010) --	89	23	390' - 18' F.B. Channel	3,250	
E6.44 to E6.43	2.0	.45	.9	5	7	24" RCP	180'	(0.0007) 0.0025	5	1.7			Adequate
E6.43 to A	4.5	.45	2.93	6	21	9' F.B. Channel	540'	(0.0007) --	40	1.7			Adequate
A to E6.7	5.0	.45	99.99	47	320	13' F.B. Channel	420'	(0.001) --	148	2.9	420' 19' F.B. Channel	6,500	
E6.7 to E6.3					320	Dual 42" RCP - Dual 27"x43" CMP	80'	(0.001) -0.0021	250	7.8	80' - Dual 36" RCP	23,250	Parallel pipes
												776,650	SUBTOTAL
												155,350	UPSTREAM IMPROVEMENTS
												932,000	TOTAL

Peashill

The Peashill watershed is a predominately residential area of approximately 220 acres which includes the Westchester Subdivision. Existing drainage facilities consist of an open channel which extends westward from the discharge point into Clark Sound to Folly Road, with pipe culverts located at roadway crossings. In addition to the major drainage channel there are two pipe conduit systems which serve portions of the Westchester Subdivision and discharge into the main drainage channel. The majority of the existing drainage facilities are inadequate, providing less than 50 percent of the required capacity. Recommended improvements include additional culverts at Peashill Road, Secessionville Road, Woodview Lane and Westwood Drive and widening the existing channel to a 18 foot flat bottom width. Other improvements include replacing the existing 22"x36" CMP from E6.24 to E7.46 with a 36" RCP, replacing the existing 30" RCP from E7.46 to E7.48 with a 42" RCP, and replacing the existing 31"x50" CMP from E7.9 to E6.13 with a 4'x8' box section. This work will require additional easement acquisition, and will probably require a South Carolina Coastal Council permit to provide a free outfall into Clark Sound.

TABLE 72

HYDRAULIC ANALYSIS FOR JAMES ISLAND AREA													
LOCATION	DRAINAGE AREA (ACRES)	RUNOFF COEFFICIENT	TOTAL (CA)	TRAVEL TIME (MIN.)	DISCHARGE (C.F.S.)	EXISTING SYSTEM	LENGTH	SLOPE (FT./FT.)	CAPACITY (C.F.S.)	VELOCITY (FPS)	RECOMMENDED IMPROVEMENTS		COMMENTS
											STORM WATER CONDUIT	COST (DOLLARS)	
<b>DILLS BLUFF (E-6, E-7, F-5, F-6, F-7)</b>													
F6.15 to F6.14	5.9	0.35	2.07	11	12	24" RCP	135'	(0.0009) 0.0034	6	1.9	135' - 24" RCP	10,350	Parallel system
F6.14 to F6.13						Lake							
F6.13 to F6.10	49.9	0.35	19.54	33	76	18"x29" CMP	140'	(0.0007) -0.0016	3	1.1	140' - 30" RCP	12,450	Parallel system. Available storage in lake
F6.10 to F6.6	77.2	0.35	46.56	35	177	6.5' F.B. Channel	980'	(0.0007) (0.0016)	54	1.2	15' F.B. Channel	31,700	
F6.6 to F6.3					177	24" RCP & 30" RCP	350'	(0.0005) 0.0025	12	1.6	350' - Triple 48" RCP	177,600	Replace 24" & 30" RCP
F6.3 to F6.1	34.3	0.35	58.57	43	205	42" RCP	70'	(0.0005) 0.0071	19	2.0	70' - Dual 48" RCP & 54" RCP	39,550	Replace 42" RCP
F6.1 to F6.2	21.1	0.35	65.96	44	221	7' F.B. Channel	300'	(0.0002) -0.0031	115	1.5	13' F.B. Channel	20,550	
F6.17 to F6.2	9.7	0.45	4.37	11	25	30" CMP	140'	(0.0003)	4	0.8	140' - 42" RCP	22,000	Parallel system
F6.2 to F6.29	66.5	0.35	93.61	46	304	9.5' F.B. Channel	1920'	(0.0002) 0.0002	137	1.6	13' F.B. Channel	74,550	
F6.29 to F6.28					304	36" RCP	80'	(0.0063) 0.0024	53	7.5	80' - Dual 5'x8' Box	72,000	Parallel system
F6.28 to F6.31	22.6	0.35	101.52	57	304	9.5' F.B. Channel	360'	(0.0002) 0.0061	42	1.1	20' F.B. Channel	24,150	
F6.31 to F6.30					304	48" RCP	60'	(0.0083) 0.0015	55	4.4	60' - Triple 60" RCP	45,400	Parallel system
F6.30 to F6.32	58.6	0.35	122.03	59	336	7' F.B. Channel	2150'	(0.0002) 0.0012	156	1.6	30' F.B. Channel	163,800	Excavation in marsh required
F6.32 to F6.34	102.1	0.35	155.77	71	387	36" CMP & 36" RCP	110'	(0.0045) 0.0004	42	3.5	110' - Triple 5'x8' Box	147,900	Replace 36" CMP & 36" RCP
											842,000	SUBTOTAL	
											168,400	UPSTREAM IMPROVEMENTS	
											1,010,400	TOTAL	
<b>RIVERLAND SOUTH (E-7, E-8, F-7, F-8)</b>													
E7.1 to E7.3	110.6	0.35	38.71	37	139	30" RCP	135'	-0.0027	24	4.9	135' - Dual 48" RCP	44,350	Parallel system
E7.3 to E8.1	388.1	0.35	174.55	71	419	12' F.B. Channel	5150'	(0.0002) 0.0009	131	1.54	36' F.B. Channel	312,500	
E8.1 to E8.3					419	48" RCP	50'	0.0038	55	4.4	50' - Dual 6'x8' Box	41,550	Parallel system
											398,400	SUBTOTAL	
											79,700	UPSTREAM IMPROVEMENTS	
											478,100	TOTAL	

Dills Bluff

The Dills Bluff watershed drains approximately 448 acres of residential development and lies between Dills Bluff Road on the east and Pauline Drive on the west. Of the 448 acres, approximately 50 percent lies outside the City of Charleston.

The existing drainage facilities consist of a channel and culvert system which commences east of Pauline Drive and outlets under Dills Bluff Road into a tributary of James Island Creek. All of the existing drainage systems are inadequate and require improvement. Recommended improvements include the replacement of the existing outlet structures under Dills Bluff Road (36" RCP and 36" CMP) with three 5'x8' box culverts, widening the existing 7' flat bottom channel between Dills Bluff Road and Camp Road to a twenty (20) foot width, placing three 60" RCP culverts parallel to the 48" RCP culvert under Camp Road and various other improvements to the upstream drainage facilities.

Riverland South

The Riverland South watershed contains approximately 500 acres of farm land which lies between Riverland Road on the west and Folly Road on the east. Existing drainage facilities consist of a channel and culvert system which commences east of Folly Road and outlets to the Stono River. If this area develops to a residential community as anticipated the existing facilities will require improvement as noted on the hydraulic analysis table. Recommended improvements include the placement of dual 6'x8' box culverts under Riverland Drive and a 36' flat bottom channel between Riverland Drive and Folly Road.

TABLE 73

HYDRAULIC ANALYSIS FOR JAMES ISLAND AREA													
LOCATION	DRAINAGE AREA (ACRES)	RUNOFF COEFFICIENT	TOTAL (CA)	TRAVEL TIME (MIN.)	DISCHARGE (C.F.S.)	EXISTING SYSTEM	LENGTH	SLOPE (FT./ FT.)	CAPACITY (C.F.S.)	VELOCITY (F.P.S.)	RECOMMENDED IMPROVEMENTS		COMMENTS
											STORMWATER CONDUIT	COST (DOLLARS)	
<b>TURKEY PEN (E-8, F-8)</b>													
FB.1 to FB.2	50.5	0.35	17.68	35	67	36" RCP	50'	(0.0050)	30	4.2	50' - 42" RCP	8,050	Parallel system
												8,050	SUBTOTAL
												1,650	UPSTREAM IMPROVEMENTS
												9,700	TOTAL
<b>RIVERLAND NORTH (F-7, F-8)</b>													
FB.3 to FB.4	115.1	0.35	40.29	37	147	24" RCP	60'	-0.0117	15	4.8	60' - Dual 48" RCP	20,600	Parallel system
												20,600	SUBTOTAL
												4,150	UPSTREAM IMPROVEMENTS
												24,750	TOTAL
<b>RIVERLAND WEST (F-8, G-8)</b>													
FB.7 to FB.8	55.6 18.5	0.45 0.15	27.80	31	111	36" RCP	60'	(0.0167) -0.0023	40	5.7	60' - 48" RCP	10,600	Parallel system
												10,600	SUBTOTAL
												2,150	UPSTREAM IMPROVEMENTS
												12,750	TOTAL
<b>CAMP ROAD WEST (F-8)</b>													
FB.9 to FB.10	23.9	0.35	8.37	17	42	36" RCP	60'	(0.0083) -0.0023	68	9.6			Adequate
<b>BRADHAM (G-8, G-9)</b>													
GB.27 to GB.28	78.2	0.45	35.19	51	106	18"x29" CMP	100'	(0.005) 0.0001	16	9.1	100' - Dual 48" RCP	38,900	Parallel system
												38,900	SUBTOTAL
												7,800	UPSTREAM IMPROVEMENTS
												46,700	TOTAL

Turkey Pen

The Turkey Pen watershed is located on the east side of Riverland Drive and north of Turkey Pen Road. The watershed drains 50.5 acres of farmland which can be expected to be developed for residential use in the future. The existing drainage system consists of a 36" RCP across Riverland Drive which outlets into the Stono River. The system is inadequate and a parallel 42" RCP culvert will be required upon development of this area.

Riverland North

The Riverland North watershed drains approximately 115 acres of which approximately 30 percent has been developed for residential use. The remaining 70 percent is farm land which can be expected to be developed for residential use in the future. An existing 24" RCP under Riverland Drive provides the drainage for the area along with a series of ditches which extend up into the watershed. The outlet for the 24 inch culvert is through a series of ditches to the Stono River. The culvert and the existing outfall are inadequate and should be improved by placing two parallel 48" RCP culverts under Riverland Drive with improvements to the outfall channel. The recommended improvements to the outfall channel will require acquisition of additional easements, and a South Carolina Coastal Council permit.

Riverland West

The Riverland West drainage basin is located on the west side of Riverland Drive and north of James Island Creek. The basin drains 74.1 acres of presently undeveloped land, of which, 75 percent is expected to be developed for residential use. The existing 36" RCP culvert under Riverland Drive is inadequate and should be improved by the placement of a 48" RCP culvert parallel to the existing culvert.

Camp Road West

The Camp Road West watershed drains 23.9 acres which is presently undeveloped, but can be expected to be developed for residential use in the future. The existing drainage facility is a 36" RCP culvert under Camp Road with outlets into James Island Creek. The 36 inch culvert is adequate if future development is limited to residential.

Bradham

The Bradham watershed drains 78.2 acres of farm land which can be expected to be developed for residential use in the future. The existing 18"x29" CMP outfall under Riverland Drive into James Island Creek is inadequate and should be improved by the placement of dual 48" RCP culverts parallel to the existing culvert upon development of the area.

TABLE 74

HYDRAULIC ANALYSIS FOR JAMES ISLAND AREA													
LOCATION	DRAINAGE AREA (ACRES)	RUNOFF COEFFICIENT	TOTAL (CA)	TRAVEL TIME (MIN.)	DISCHARGE (C.F.S.)	EXISTING SYSTEM	LENGTH	SLOPE (FT./ FT.)	CAPACITY (C.F.S.)	VELOCITY (FPS)	RECOMMENDED IMPROVEMENTS		COMMENTS
											STORMWATER CONDUIT	COST (DOLLARS)	
<b>FORT JOHNSON (F-5)</b>													
F5.1 to F5.4	1.0 0.9	0.25 0.9	1.06	5	8	24" RCP	290'	(0.0032)	11	3.5		Adequate	
F5.4 to F5.5	1.0 0.6	0.9 0.25	2.11	7	14	24" RCP	130'	(0.0032) 0.0018	11	3.5		Adequate	Available head
F5.5 to F5.8	0.8	0.9	2.83	8	18	30" RCP	485'	(0.0032) 0.0033	20	4.1		Adequate	
F5.8 to F5.9	2.0 2.1	0.9 0.5	5.16	11	30	30" RCP	295'	(0.0032) 0.0035	20	4.1	295'-24" RCP	21,300	Parallel system
F5.13 to F5.12	1.8 1.0	0.9 0.25	1.87	9	12	24" RCP	325'	(0.0048) 0.0038	14	4.3		Adequate	
F5.12 to F5.9	2.5 7.6	0.9 0.25	6.02	11	35	24" RCP	150'	(0.0048) 0.0076	14	4.3		Adequate	
F5.9 to F5.10	1.8	0.9	12.80	13	70	31"x50" CMP	235'	(0.0058) 0.0047	43	4.5	235'-36" RCP	28,700	Parallel system
F5.10 to F5.11	3.5	0.25	13.68	14	73	31"x50" CMP	400'	(0.0058) 0.0018	43	4.5	400'-36" RCP	44,350	Parallel system
												94,350	SUBTOTAL
												18,900	UPSTREAM IMPROVEMENTS
												113,250	TOTAL
<b>HARBOR TOWNE (F-5, F-6, G-5, G-6)</b>													
F5.11 to G6.12	281.4	0.45	140.31	42	484	10' F.B. Channel	2900'	(0.0002)	57	1.2	34' F.B. Channel	249,850	Total CA includes area from Fort Johnson Watershed
G6.12 to G6.11					484	30" RCP	80'	-	55	11.2	80' - Dual 41'x10' Box	96,000	Parallel system
												345,850	SUBTOTAL
												69,200	UPSTREAM IMPROVEMENTS
												415,050	TOTAL
<b>WINBORN (G-6)</b>													
G6.13	6.7	0.45	3.02	16	15	18" RCP	60'	(0.044)	19	10.8		Adequate	

Fort Johnson

The Fort Johnson watershed drains 26.6 acres around Fort Johnson High School located on Fort Johnson Road. The existing drainage facilities consist of a series of pipe conduits which outlet into the major channel of the Harbor Towne watershed (see Harbor Towne discussion for recommended channel improvements). Three segments of the existing Fort Johnson drainage facilities require improvement. Recommended improvements include placing a 24" RCP parallel to the existing 30" RCP from F5.8 to F5.9, and placing a 36" RCP parallel to the existing 31"x50" CMP from F5.9 to F5.11.

Harbor Towne

The Harbor Towne watershed drains a total of 281.4 acres of residential and undeveloped land, of which approximately 80 percent lies outside the City of Charleston. The existing drainage facilities consist of a 30" RCP culvert under Dills Bluff Road and a 10' flat bottom channel which runs southeast from this point to Three Trees Road. All of the existing systems are undersized and require improvement. Recommended improvements include a parallel dual 4½'x10' box culvert at Dills Bluff Road and increasing the existing channel to a 50' flat bottom width from Dills Bluff Road to the point where the Fort Johnson watershed discharges into the channel.

Winborn

The Winborn watershed drains 6.7 acres which lies outside the City of Charleston. The existing 18" RCP outfall to James Island Creek is adequate.

TABLE 75

HYDRAULIC ANALYSIS FOR JAMES ISLAND AREA													
LOCATION	DRAINAGE AREA (ACRES)	RUNOFF COEFFICIENT	TOTAL (CA)	TRAVEL TIME (MIN)	DISCHARGE (C.F.S.)	EXISTING SYSTEM	LENGTH	SLOPE (FT./FT.)	CAPACITY (C.F.S.)	VELOCITY (FPS)	RECOMMENDED IMPROVEMENTS		COMMENTS
											STORMWATER CONDUIT	COST (DOLLARS)	
<b>HARRILL COURT (F-6)</b>													
F6.20 to F6.21	6.7	0.35	2.35	7	16	30" CMP	460'	(0.0052) 0.0012	17	3.4		Adequate	
<b>HELD CIRCLE NORTH (G-6)</b>													
G6.2 to G6.1	7.1	0.45	3.20	9	20	18"x29" CMP	170'	(0.0118) 0.0064	14	4.4		Adequate	Available head
<b>HELD CIRCLE SOUTH (F-6, G-6)</b>													
G6.7 to G6.5	3.1	0.45	1.40	8	9	18"x29" CMP	240'	(0.0164) 0.0099	16	5.2		Adequate	
G6.5 to G6.4	3.1	0.45	2.80	9	17	18"x29" CMP	160'	(0.0164) 0.0099	16	5.2		Adequate	Available head
<b>RIVER POINT (G-7)</b>													
G7.9 to G7.8	8.0 33.4	1.0 0.35	19.69	19	95	36" CMP	145'	(0.0069) 0.0027	45	6.4		Adequate	Available storage in pond

Harrill Court

The Harrill Court watershed drains 6.7 acres of the Creek Point subdivision. Existing drainage facilities consist of a 30" CMP which outlets to a tributary of James Island Creek and is adequate.

Held Circle North

The Held Circle North watershed also serves a portion of the Creek Point subdivision, draining a total of 7.1 acres. The existing drainage facility is a 18"x29" CMP which discharges into James Island Creek and is adequate.

Held Circle South

The Held Circle South watershed drains 6.2 acres of the Creek Point subdivision and is located along the east and west sides of Held Circle, north of Anderson Avenue. The existing 18"x29" CMP outfall into James Island Creek is adequate.

River Point

The River Point watershed drains 41.4 acres of the River Point subdivision. The major drainage facility of the watershed is a lake which functions as a detention facility prior to discharge into James Island Creek. Upstream drainage facilities are dependent upon the water surface elevation in the lake to operate properly. The existing lake outfall is a 36" CMP which is adequate due to the available storage volume in the lake.

TABLE 76

HYDRAULIC ANALYSIS FOR JAMES ISLAND AREA													
LOCATION	DRAINAGE AREA (ACRES)	RUNOFF COEFFICIENT	TOTAL (CA)	TRAVEL TIME (MIN.)	DISCHARGE (C.F.S.)	EXISTING SYSTEM	LENGTH	SLOPE (FT./ FT.)	CAPACITY (C.F.S.)	VELOCITY (FPS)	RECOMMENDED IMPROVEMENTS		COMMENTS
											STORMWATER CONDUIT	COST (DOLLARS)	
<b>OYSTER POINT (F-6, F-7, G-6, G-7)</b>													
G7.23 to F7.29	2.6	0.6	1.56	3	12	24" RCP	180'	(0.0020) 0.0244	9	2.8	180' - 18" RCP	12,500	Parallel system
G7.21 to G7.22	1.3	0.6	0.78	3	6	24" RCP	190'	(0.0015) 0.0011	8	2.4			Adequate
G7.22 to F7.29	1.2	0.6	1.50	4	11	24" RCP	150'	(0.0015) 0.0019	8	2.4	150' - 18" RCP	9,200	Parallel system
F7.29 to F7.31	1.3	0.6	3.84	5	28	30" RCP	180'	(0.0115) 0.0009	38	7.8			Adequate
G7.20 to G7.18	1.2	0.6	0.72	3	5	24" RCP	160'	(0.005) 0.0054	14	4.4			Adequate
G7.18 to G7.17						Lake							
G7.17 to G7.16	2.5 2.7	0.45 0.6	3.47	4	26	24" RCP	140'	(0.005) -0.0001	14	4.4			Adequate Available storage in lake
G7.16 to G7.15					26	30" RCP	50'	(0.005) -0.0001	25	5.1			Adequate
G7.15 to F7.31					26	9' F.B. Channel	120'	(0.005)	107	1.9			Adequate
F7.31 to F7.32	4.2	0.45	9.70	6	64	9' F.B. Channel	80'	(0.0001)	48	0.9	80' - Dual 36" RCP	23,550	Fill in channel
F7.32 to F7.27					64	24" RCP	200'	(0.0097) 0.0045	19	6.1	200' - 42" RCP	35,200	Parallel system
F7.27 to F7.28	1.6	0.6	10.16	7	67	24" RCP	30'	(0.0097) 0.0045	19	6.1	30' - 42" RCP	4,450	Parallel system
F7.28 to F7.21	9.8 15.0	0.6 0.45	22.79	12	128	5.5' F.B. Channel	670'	(0.0002) 0.0042	27	1.0	12' F.B. Channel	20,900	
F7.21 to F7.22					128	36" RCP	110'	(0.0004) 0.0022	28	4.0	110' - Dual 48" RCP	44,550	Parallel system

(CONTINUED)

TABLE 76

HYDRAULIC ANALYSIS FOR JAMES ISLAND AREA													
LOCATION	DRAINAGE AREA (ACRES)	RUNOFF COEFFICIENT	TOTAL (CA)	TRAVEL TIME (MIN.)	DISCHARGE (C.F.S.)	EXISTING SYSTEM	LENGTH	SLOPE (FT./FT.)	CAPACITY (C.F.S.)	VELOCITY (F.P.S.)	RECOMMENDED IMPROVEMENTS		COMMENTS
											STORMWATER CONDUIT	COST (DOLLARS)	
<b>OYSTER POINT (CONTINUED)</b>													
F7.14 to F7.13	34.2	0.35	11.97	18	59	54" RCP	100'	(0.0018) -0.0009	100	6.3		Adequate	
F7.13 to F7.16	2.2 4.1	0.9 0.25	14.98	20	71	11' F.B. Channel	260'	(0.0002) -0.0026	134	1.6		Adequate	
F7.16 to F7.18	7.4 17.4	0.6 0.35	25.51	21	120	48" RCP	60'	(0.0043) -0.0030	82	6.5	60' - 42" RCP	14,600	Parallel system
F7.18 to F7.22	3.0	0.6	27.31	22	126	11' F.B. Channel	50'	(0.0002) -0.0028	75	1.3	11' F.B. Channel	1,200	Increase sideslope to 2 horizontal to 1 vertical
F7.22 to F7.24	4.8 7.8	0.6 0.35	55.71	25	245	11' F.B. Channel	460'	(0.0002) -0.0028	75	1.3	20' F.B. Channel	30,250	
F7.23 to F7.24	5.3	0.6	3.18	4	24	24" RCP	475'	(0.0035)	12	3.7	475' - 24" RCP	30,800	Parallel system
F7.24 to F7.6	6.0 14.1	0.6 0.35	67.43	29	280	11' F.B.	580'	(0.0002) 0.0048	75	1.3	24" F.B. Channel	23,800	
F7.6 to F7.1					280	Dual 60" RCP	170'	(0.0049)	316	8.0			Adequate
F7.11 to F7.10	7.4 66.1 1.5	0.25 0.35 0.6	25.89	16	132	42" RCP	575'	(0.0052)	63	6.5	575' - 48" RCP	98,400	Parallel system
												349,400	SUBTOTAL
												69,900	UPSTREAM IMPROVEMENTS
												419,300	TOTAL

Oyster Point

The Oyster Point watershed drains portions of the Rivers Point and Creek Point subdivisions. Of the total 230 acres drained by the watershed, approximately 30 percent lies in the City of Charleston.

The existing drainage facilities consist of stormwater drainage conduits and culverts within the Rivers Point and Creek Point subdivisions. These systems outlet into a tidal channel and culvert system which then crosses Anderson Avenue into James Island Creek.

The majority of the existing systems within the Rivers Point subdivision are adequate. However, approximately 80 percent of the system between Rivers Point subdivision and Anderson Avenue requires improvements. The majority of improvements consist of widening the existing channel and will require the acquisition of additional easements. The channel improvements will also require excavation within the marsh and will require a South Carolina Coastal Council permit prior to construction.

TABLE 77

HYDRAULIC ANALYSIS FOR JAMES ISLAND AREA													
LOCATION	DRAINAGE AREA (ACRES)	RUNOFF COEFFICIENT	TOTAL (CA)	TRAVEL TIME (MIN.)	DISCHARGE (C.F.S.)	EXISTING SYSTEM	LENGTH	SLOPE (FT./FT.)	CAPACITY (C.F.S.)	VELOCITY (FPS.)	RECOMMENDED IMPROVEMENTS		COMMENTS
											STORM WATER CONDUIT	COST (DOLLARS)	
<b>CASTLE PINCKNEY DRIVE (H-5)</b>													
H5.14 to H5.13	5.2	0.45	2.34	11	14	24" RCP	180'		24	7.6		Adequate	
<b>WHITE POINT (H-5)</b>													
H5.8 to H5.7	9.0	0.35	3.15	14	17	30" RCP	195'	(0.0084)	33	6.6		Adequate	
<b>SUMTER DRIVE (H-5)</b>													
H5.4 to H5.3	5.4	0.45	2.43	12	14	24" RCP	175'	(0.0094)	19	6.0		Adequate	

Castle Pinckney Drive

The Castle Pinckney Drive watershed is located in the East James Island section of the City of Charleston at the intersection of Castle Pinckney Drive and Paul Revere Drive. The existing 24" RCP outlets into a lake prior to discharge into the Ashley River and is adequate.

White Point

The White Point drainage basin drains 9.0 acres of the Lawton Bluff residential section of James Island. The existing 30" RCP culvert under White Point Boulevard discharges to the Ashley River and is adequate.

Sumter Drive

The Sumter Drive drainage basin is located in the Lawton Bluff section of James Island and drains a total of 5.4 acres of residential development. The existing 24" RCP outfall located at the intersection of Sumter Drive and Carmel Drive discharges to the Ashley River and is adequate.

TABLE 78

HYDRAULIC ANALYSIS FOR JAMES ISLAND AREA													
LOCATION	DRAINAGE AREA (ACRES)	RUNOFF COEFFICIENT	TOTAL (CA)	TRAVEL TIME (MIN.)	DISCHARGE (CFS)	EXISTING SYSTEM	LENGTH	SLOPE (FT./ FT.)	CAPACITY (CFS)	VELOCITY (FPS)	RECOMMENDED IMPROVEMENTS		COMMENTS
											STORMWATER CONDUIT	COST (DOLLARS)	
<b>EAST JAMES ISLAND (G-5, G-6, H-5)</b>													
G5.21 to G5.20	50.0	0.35	17.50	17	88	Dual 42" CMP	200'	(0.0012) -0.0029	40	2.0	200' - 42" RCP	31,800	Parallel system
G5.20 to G5.17	3.5	0.60	19.60	18	96	Dual 42" CMP	200'	(0.0012) 0.0067	40	2.0	200' - 48" RCP	35,050	Parallel system
G5.16 to G5.15	2.9 11.7	0.9 0.35	6.71	18	33	24" RCP	200'	(0.0045) -0.0004	13	4.2	200' - 36" RCP	29,800	Parallel system
G5.17 to G5.14	2.3	0.9	28.38	19	136	4' F.B. Channel	230'	(0.0002) 0.0020	13	0.8	260' - Dual 48" RCP	85,800	Fill in existing channel
G5.14 to G5.13					136	30" RCP	90'	(0.0045) 0.0079	18	3.7	90' - 48" RCP	29,250	Parallel system
G5.12 to G5.9	74.9 10.4	0.35 0.90	35.58	38	125	Dual 30" RCP	110'	(0.0045) -0.0004	36	3.7		Adequate	Available storage
G5.7 to G5.5	1.3 25.9	0.9 0.35	10.24	20	49	24" RCP & 30" RCP	120'	(0.0042) 0.0053	29	3.7		Adequate	
G5.9 to G5.1	33.8 128.8	1.0 0.35	153.08	66	398	Lake							
G5.1 to G5.3					398	18" RCP & 36" RCP	90'	(0.0159) 0.0088	67	8.5		Adequate	Available storage in pond
												211,700	SUBTOTAL
												42,350	UPSTREAM IMPROVEMENTS
												254,050	TOTAL

East James Island

The East James Island watershed is located along both sides of Harbor View Road and west of Castle Pinckney Drive. The watershed contains portions of the residential subdivisions of East James Island and Lawton Bluff. The predominant drainage features of this watershed are three large lakes which provide a storage area for runoff from the area prior to discharge into the Charleston Harbor. Due to the presence of the lake system and the amount of detention volume provided by each, the existing drainage facilities within the basin are adequate with the exception of the existing systems along the east and north sides of the Harbor View Shopping Center. Improvements include placing a 42" RCP adjacent to the existing dual 42" CMP from G5.21 to G5.20, a 48" RCP parallel to the existing dual 42" CMP from G5.20 to G5.17, a 36" RCP parallel to the existing 24" CMP from G5.16 to G5.15, dual 48" RCP's parallel to the existing 30" RCP and filling in 230' of channel from G5.17 to G5.13

TABLE 79

HYDRAULIC ANALYSIS FOR JAMES ISLAND AREA													
LOCATION	DRAINAGE AREA (ACRES)	RUNOFF COEFFICIENT	TOTAL (CA)	TRAVEL TIME (MIN.)	DISCHARGE (C.F.S.)	EXISTING SYSTEM	LENGTH	SLOPE (FT./FT.)	CAPACITY (C.F.S.)	VELOCITY (FPS)	RECOMMENDED IMPROVEMENTS		COMMENTS
											STORMWATER CONDUIT	COST (DOLLARS)	
<b>WAMBAW (G-7, G-8, H-7, H-8)</b>													
HB.14 to HB.15	5.9	0.45	2.66	12	15	24" RCP	120'	(0.0025) -0.0011	10	3.1	120' - 24" RCP	10,700	Parallel system
HB.16 to HB.19	2.3	0.45	1.04	6	7	16"x25" CMP	200'	(0.0025) -0.0008	4	1.7	200' - 18" RCP	12,900	Parallel system
HB.15 to HB.13	14.7	0.45	10.32	18	51	4' F.B. Channel	1000'	(0.0002) 0.0026	37	1.1	5' F.B. Channel	5,600	
HB.13 to HB.13A					51	18" RCP	120'	0.0026	10	5.7	120' - Dual 36" RCP	29,700	Remove 18" RCP
HB.13A to HB.4	28.4	0.45	23.10	24	102	2' F.B. Channel	1100'	(0.0002) 0.0026	10	0.8	280' - Dual 48" RCP & 320' - 12" F.B. Channel	121,100	Fill 280' of channel
HB.10 to HB.7	6.0	0.45	2.70	10	16	24" RCP	340'	(0.0021) 0.0052	9	2.9	340' - 24" RCP	22,200	Parallel system
HB.7 to HB.3	2.7	0.45	3.92	12	22	24" RCP	300'	(0.0021) 0.0052	9	2.9	300' - 30" RCP	26,650	Parallel system
HB.12 to HB.11	12.5	0.45	5.63	8	36	24" RCP	260'	(0.0012) -	7	2.2	260' - 36" RCP	31,450	Parallel system
HB.8 to HB.3	2.8	0.45	6.89	9	43	30" RCP	250'	(0.0012) 0.0052	12	2.5	250' - 36" RCP	37,300	Parallel system
HB.3 to HB.4	3.7	0.45	12.48	13	69	36" RCP	120'	(0.0012) 0.0079	20	2.8	120' - 42" RCP	19,700	Parallel system
HB.4 to HB.2	8.2	0.45	39.27	28	161	11' F.B. Channel	800'	(0.0002) -0.0006	216	1.8	12' F.B. Channel	13,350	
HB.1 to HB.2	20.6	0.45	9.27	18	45	30" RCP	150'	(0.0025) 0.0043	18	3.6	150' - 36" RCP	20,000	Parallel system
G8.29 to G8.30	7.1	0.45	3.20	12	18	24" RCP	100'	0.0018	15	4.8		Adequate	

(CONTINUED)

TABLE 79

HYDRAULIC ANALYSIS FOR JAMES ISLAND AREA													
LOCATION	DRAINAGE AREA (ACRES)	RUNOFF COEFFICIENT	TOTAL (CA)	TRAVEL TIME (MIN.)	DISCHARGE (C.F.S.)	EXISTING SYSTEM	LENGTH	SLOPE (FT./FT.)	CAPACITY (C.F.S.)	VELOCITY (FPS)	RECOMMENDED IMPROVEMENTS		COMMENTS
											STORMWATER CONDUIT	COST (DOLLARS)	
<b>WAMBAW (CONTINUED)</b>													
HB.2 to G8.1	64.1	0.45	80.59	33	314	11' F.B. Channel	900'	(0.0002) 0.0018	216	1.8	22' F.B. Channel	38,050	
G8.1 to G8.5					314	42" RCP & 36" RCP	220'	0.0013	32	2.0	220' - Dual 4.5'x8' Box	175,000	Replace 42" RCP and 36" RCP
G8.5 to G8.7	3.5	0.45	82.17	34	314	12' F.B. Channel	60'	(0.0002) 0.0060	270	1.8	22' F.B. Channel	1,800	
G8.7 to G8.9					314	Dual 42" RCP	80'	0.0048	80	4.2	80' - Dual 4.5'x8' Box	75,850	Replace dual 42" RCP
G8.9 to G8.11	1.1	0.45	82.67	35	314	12' F.B. Channel	40'	(0.0003) 0.0030	261	2.1	22' F.B. Channel	1,450	
G8.11 to G8.13					314	Dual 42" RCP	60'	(0.0005) 0.0063	39	2.0	110' - Dual 4.5'x8' Box	97,100	Relief system
G8.13 to G8.15	14.0 14.9	0.45 0.6	97.91	36	352	42" RCP & 48" RCP	120'	(0.0005) -0.0007	47	2.2			Relief system
G8.19 to G8.22	9.6	0.45	4.32	14	23	30" RCP & 48" RCP	100'	0.0049	120	6.2			Adequate
G8.15 to G8.25	10.1	0.45	106.78	40	374	15.5' F.B. Channel	800'	(0.0002) 0.0020	228	1.7	34' F.B. Channel	50,400	
G8.25 to G8.23					374	Dual 48" RCP	100'	-0.0036	105	4.1	100' - Dual 4.5'x8' Box	73,750	Parallel system
												864,050	SUBTOTAL
												172,800	UPSTREAM IMPROVEMENTS
												1,036,850	TOTAL

Wambaw

The Wambaw watershed is located between Folly Road on the east and Fleming Road on the west and drains a total of 232.2 acres including the Marlborough subdivision and a portion of the Cross Creek subdivision. The existing drainage system consist of a channel which runs from Houghton Drive south to the discharge into James Island Creek at Riley Road, plus several pipe systems which tie into the channel. The channel provides approximately 60 percent of the recommended capacity with the culverts at roadways providing significantly less capacity.

Recommended improvements include placing dual 4½'x8' box culverts parallel to the existing dual 48" RCP culverts under Riley Road and increasing the width of the existing channel from G8.25 to G8.15 to a 34 foot flat bottom width. These improvements will require a South Carolina Coastal Council permit since they will involve excavation in the marsh and the acquisition of additional easements. Other improvements to the existing system are described on the hydraulic analysis table for Wambaw.

TABLE 80

HYDRAULIC ANALYSIS FOR JAMES ISLAND AREA													
LOCATION	DRAINAGE AREA (ACRES)	RUNOFF COEFFICIENT	TOTAL (CA)	TRAVEL TIME (MIN)	DISCHARGE (C.F.S.)	EXISTING SYSTEM	LENGTH	SLOPE (FT./FT.)	CAPACITY (C.F.S.)	VELOCITY (F.P.S.)	RECOMMENDED IMPROVEMENTS		COMMENTS
											STORMWATER CONDUIT	COST (DOLLARS)	
<b>FOLLY ROAD (G-7, H-7)</b>													
H7.15 to H7.17	7.3	0.45	3.29	8	21	24" RCP	350'	(0.0016) 0.0019	8	2.5	350' - 30" RCP	46,150	Parallel system
H7.17 to H7.19	4.6	0.45	5.36	10	32	24" RCP	750'	(0.0016) 0.0011	8	2.5	750' - 42" RCP	147,000	Parallel system
H7.19 to G7.27	1.3 3.9	0.9 0.45	8.29	15	43	30" RCP	1350'	(0.0016) 0.0015	14	2.9	1350' - 42" RCP	271,200	Parallel system
G7.30 to G7.27	6.8	0.70	4.76	12	27	24" RCP	150'	(0.0072) 0.0055	17	5.3	150' - 24" RCP	75,600	Parallel system
G7.27 to G7.28	7.4	0.70	18.23	24	81	36" RCP	70'	(0.0072) 0.0016	49	6.9	70' - 42" RCP	9,700	Parallel system
												549,650 109,950 659,600	Parallel system SUBTOTAL UPSTREAM IMPROVEMENTS TOTAL
<b>MARTELLO (H-7)</b>													
H7.28 to H7.27	17.0	0.35	5.95	19	29	24" RCP	190'	(0.0046) 0.0094	13	4.2	100' - 36" RCP	22,400	Relief system H7.28 to H7.29
H7.27 to H7.29	14.5	0.35	11.03	20	52	36" RCP	220'	(0.0046) 0.0008	39	5.5			Adequate with relief
H7.29 to H7.30	3.5	0.35	12.26	21	58	2' F.B. Channel	410'	(0.0002) 0.0024	13	0.9	6' F.B. Channel	6,150	
H7.30 to H7.31					58	36" RCP	85'	0.0007	37	5.2	85' - 36" RCP	10,400	Parallel system
												38,950 7,800 46,750	SUBTOTAL UPSTREAM IMPROVEMENTS TOTAL

Folly Road

The Folly Road watershed consist of the area drained by the existing stormwater drainage facilities located along the western edge of Folly Road, and extending from Houghton Road southward toward James Island Creek. The existing system is inadequate and provides only approximately 35 percent of the recommended capacity. A parallel system of 30" RCP and 42" RCP is recommended to provide the design capacity. The outlet into Wappoo Creek should be cleaned and will require a South Carolina Coastal Council permit.

Martello

The Martello watershed drains the area along the east side of Folly Road. Of the 35 acres drained by the watershed, approximately 10 percent is in the City of Charleston.

The existing drainage facilities provide approximately 50 percent of the design capacity. A 36" RCP relief system is proposed for the system at Folly Road and Harbor View Road. The system will be constructed along the back property line of the parcel on the southeast corner of Folly Road and Harbor View Road and will require a drainage easement.

TABLE 81

HYDRAULIC ANALYSIS FOR JAMES ISLAND AREA													
LOCATION	DRAINAGE AREA (ACRES)	RUNOFF COEFFICIENT	TOTAL (CA)	TRAVEL TIME (MIN.)	DISCHARGE (C.F.S.)	EXISTING SYSTEM	LENGTH	SLOPE (FT./FT.)	CAPACITY (C.F.S.)	VELOCITY (FPS.)	RECOMMENDED IMPROVEMENTS		COMMENTS
											STORMWATER CONDUIT	COST (DOLLARS)	
<b>BELVEDERE (H-7, I-7)</b>													
17.2A to H7.59	55.2	0.25	13.80	37	50	24" VCP	390'	(0.0029)	11	3.4	390' - Dual 36" RCP	86,200	Replace 24" VCP
H7.59 to H7.47	9.1	0.25	16.08	38	58	3' F.B. Channel	90'	(0.0002) 0.0097	49	1.2	6' F.B. Channel	1,200	
H7.47 to H7.48					58	24" RCP	100'	(0.005) 0.0019	14	4.5	100' - Dual 36" RCP	22,800	Replace 24" RCP
												110,200 22,050 132,250	SUBTOTAL UPSTREAM IMPROVEMENTS TOTAL
<b>COUNTRY CLUB (H-7, I-7)</b>													
H7.52 to H7.51	98.4	0.25	24.60	40	86	30" CMP	130'	0.0216	11	2.2	130' - Dual 36" RCP	30,900	Available storage Replace 30" CMP
H7.51 to H7.49	23.1	0.25	30.38	2	103	5' F.B. Channel	230'	(0.0002) 0.0021	43	1.2	5' F.B. Channel	1,300	Adjust side slope
H7.49 to H7.50					103	24" CMP	150'	0.0006	6	1.9	150' - Triple - 36" RCP	53,500	Available storage. Replace 24" CMP
												85,700 17,150 102,850	SUBTOTAL UPSTREAM IMPROVEMENTS TOTAL
<b>INVERNESS (H-7)</b>													
H7.38 to H7.37	19.3	0.45	8.69	21	41	24" RCP	80'	(0.0113) 0.0021	12	3.9	80' - 36" RCP	14,550	Remove 24" RCP
H7.32 to H7.37	19.2	0.45	8.64	21	41	24" RCP	210'	(0.0043) 0.0008	13	4.1	210' - 36" RCP	29,400	Parallel system
H7.37 to H7.40			17.33	22	80	24" RCP, Dual 18" RCP	80'	(0.0043) 0.0025	25	4.1	80' - Triple - 36" RCP	29,200	Replace 24" RCP and Dual 18" RCP
H7.34 to H7.40	14.7	0.45	6.62	14	35	24" RCP	200'	(0.0033) -0.0011	11	3.6	200' - Dual 30" RCP	44,200	Replace 24" RCP
H7.40 to H7.41			23.95	23	108	Dual 24" RCP	100'	(0.0033) 0.0006	22	3.6	100' - Triple - 36" RCP	33,450	Replace dual 24" RCP
H7.41 to H7.43	2.7	0.45	25.17	26	108	4' F.B. Channel	940'	(0.0002) 0.0019	7	0.8	9' F.B. Channel	28,800	
H7.43 to H7.44					108	42" RCP	90'	0.0001	55	5.7	90' - 42" RCP	12,300	Parallel system
												191,900 38,400 230,300	SUBTOTAL UPSTREAM IMPROVEMENTS TOTAL

Belvedere

The Belvedere watershed drains 64 acres including the residential areas around Belvedere Road and a portion of the Country Club of Charleston golf course. Existing drainage facilities consist of a culvert and ditch system which discharges into the marshes of Dill Creek. The existing system provides approximately 22 percent of the design capacity. Recommended improvements consist of replacing the existing system with dual 36" culverts and channel improvements.

Country Club

The Country Club drainage basin serves the major portion of the Country Club of Charleston golf course and the northern section of the Country Club II residential area. Existing drainage facilities consist of a series of culverts and ditches which traverse across the golf course and discharge into Dill Creek. This system provides approximately 30 percent of the design capacity and improvements to the existing culverts and ditches are recommended. Improvements include replacing the existing 24" CMP from H7.49 to H7.50 with triple 36" RCP culverts.

Inverness

The Inverness watershed drains the southern part of the Country Club II Subdivision. Existing drainage facilities consist of a series of culverts and ditches which discharge eastward along the north side of Harbor View Road into Dill Creek. The existing systems provide less than 20 percent of the design capacity.

New stormwater drainage facilities are required to ungrade the existing systems within the area. Recommended improvements include replacing the existing 18" RCP and 24" RCP culverts under Fairway Drive with three (3) 36" RCP culverts, increasing the channel along side Harbor View Road to a 9 foot flat bottom width and placing a 42" RCP culvert parallel to the existing 42" RCP culvert from H7.43 to H7.44. The improvements will require the acquisition of an additional easement and a South Carolina Coastal Council permit.

TABLE 82

HYDRAULIC ANALYSIS FOR JAMES ISLAND AREA													
LOCATION	DRAINAGE AREA (ACRES)	RUNOFF COEFFICIENT	TOTAL (CA)	TRAVEL TIME (MIN.)	DISCHARGE (C.F.S.)	EXISTING SYSTEM	LENGTH	SLOPE (FT./FT.)	CAPACITY (C.F.S.)	VELOCITY (FPS.)	RECOMMENDED IMPROVEMENTS		COMMENTS
											STORMWATER CONDUIT	COST (DOLLARS)	
<b>CROSS CREEK (H-7, H-8)</b>													
HB.28 to HB.27	12	0.45	5.4	17	27	18"x24" CMP	100'	(0.0009) 0.0044	4	1.2	100' - 36" RCP	16,950	Parallel system
HB.27 to HB.25	6	0.45	8.1	18	40	22"x36" CMP	215'	(0.0009) 0.0025	7	1.4	215' - Dual 36" RCP	50,000	Remove existing 22"x36" CMP
HB.25 to HB.24	0.85	0.45	8.5	20	40	27"x43" CMP	110'	(0.0009) -0.0015	11	1.6	110' - Dual 36" RCP	24,550	Remove existing 27"x43" CMP
HB.24 to HB.23	3.8	0.45	10.2	21	48	4.5' F.B. Channel	210'	(0.0009) 0.0026	102	2.5		Adequate	
HB.23 to HB.20					48	18"x29" CMP	135'	(0.0009) 0.0033	10	3.6	135' - 36" RCP	23,300	Parallel system
HB.35 to HB.33	8.6	0.45	3.9	10	23	22"x36" CMP	280'	(0.0017) 0.0025	10	1.9	280' - 30" RCP	28,750	Parallel system
HB.33 to HB.32	3.0	0.45	5.3	12	30	36" RCP	90'	(0.0017) 0.0031	24	3.4	90' - 30" RCP	9,400	Parallel system
HB.32 to HB.30	4.1	0.45	7.1	13	39	27"x43" CMP	170'	(0.0017) 0.0026	16	2.2	170' - 36" RCP	26,250	Parallel system
HB.30 to HB.29	0.95	0.45	7.5	14	39	31"x50" CMP	130'	(0.0017) 0.0012	23	2.4	130' - 36" RCP	14,700	Parallel system
HB.20 to HB.37	4.7	0.45	19.8	24	89	6.5' F.B. Channel	100'	(0.0007)	164	2.6		Adequate	
HB.48 to HB.47	1.4	0.9	1.26	2	10	24" CMP	190'	(0.0015) 0.0027	5	1.6	190' - 24" RCP	14,300	Parallel system
HB.47 to HB.46	1.4	0.9	1.26	2	10	3' F.B. Channel	90'	(0.0015) -0.0042	60	2.7		Adequate	
HB.46 to HB.45	5.5	0.6	4.56	8	29	22"x36" CMP	130'	(0.0015) 0.0035	9	1.8	130' - 36" RCP	18,000	Parallel system
HB.45 to HB.42	1.4	0.6	5.40	9	33	31"x50" CMP	370'	(0.0015) 0.0025	22	2.3	370' - 36" RCP	34,000	Parallel system
HB.42 to HB.41	3.0	0.6	7.20	11	42	3' F.B. Channel	30'	(0.0015) 0.0307	78	3.0	30' - Dual 36" RCP	12,600	Fill in channel
HB.41 to HB.40					42	36" RCP	95'	(0.0015) -0.0043	22	3.2	95' - 36" RCP	14,350	Parallel system
HB.40 to HB.38	2.5	0.6	8.70	12	49	31"x50" CMP	140'	(0.0015) 0.0140	22	2.3	140' - 36" RCP	20,200	Parallel system
H7.13 to H7.10	7.8	0.6	4.68	7	31	31"x50" CMP	165'	(0.0013) 0.0009	20	2.1	165' - 30" RCP	26,650	Parallel system

(CONTINUED)

TABLE 82

HYDRAULIC ANALYSIS FOR JAMES ISLAND AREA													
LOCATION	DRAINAGE AREA (ACRES)	RUNOFF COEFFICIENT	TOTAL (CA)	TRAVEL TIME (MIN)	DISCHARGE (CFS)	EXISTING SYSTEM	LENGTH	SLOPE (FT./FT.)	CAPACITY (C.F.S.)	VELOCITY (FPS)	RECOMMENDED IMPROVEMENTS		COMMENTS
											STORMWATER CONDUIT	COST (DOLLARS)	
<b>CROSS CREEK (CONTINUED)</b>													
H7.10 to H7.8	3.9	0.9	8.19	9	51	7' F.B. Channel	165'	(0.0013) 0.0028	244	3.6		Adequate	
H7.8 to H7.4					51	Dual 27"x43" CMP	85'	(0.0013) -0.0079	28	1.9	85' - Dual 48" RCP	30,000	Replace dual system 27"x43" CMP
H7.4 to H8.50	2.7	0.9	10.62	11	62	10' F.B. Channel	320'	(0.0013) 0.0027	305	3.8		Adequate	
H8.50 to H8.54					62	Dual 31"x50" CMP	335'	(0.0013) 0.0020	41	2.1	335' - 36" RCP	52,800	Parallel system
H8.54 to H8.55	3.4	0.6	12.66	13	70	Dual 31"x50" CMP	110'	(0.0013) 0.0034	41	2.1	110' - 42" RCP	14,400	Parallel system
H8.38 to H8.59	39.4 21.5	0.45 0.6	71.7	45	237	Retention Pond	1600'	(0.0005)	630	3.3			Discharge is reduced to 76 CFS due to retention pond
H8.61 to H8.59	2.7	0.9	2.43	3	18	30" RCP	250'	(0.0046) 0.0054	24	4.9		Adequate	
H8.59 to H8.62	2.6	0.9	76.5	47	86	11' F.B. Channel	280'	0.0049	630	3.3		Adequate	
H8.62 to H8.63					86	48" RCP	110'	(0.0007) 0.0007	33	2.6	110' - 36" RCP	165,500	Parallel system
H7.3 to H8.63	9.4	0.9	8.46	12	47	24" RCP	660'	(0.0037) 0.0022	12	3.8	660' - 36" RCP	125,200	Parallel system
H8.63 to H8.69	3.8	0.9	88.4	48	109	48" RCP	510'	0.0048	86	6.9	510' - 36" RCP	95,350	Discharge reduced by available storage parallel system
H8.66 to H8.69	0.4	0.9	0.36	2	3	24" RCP	250'	0.0106	20	6.4		Adequate	
H8.69 to H8.72	6.0 6.1	0.45 0.9	97	51	124	54" RCP	230'	0.0048	118	7.4	230' - 36" RCP	79,900	Outfall ditch needs improvement; parallel system
												748,150	SUBTOTAL
												149,650	UPSTREAM IMPROVEMENTS
												897,800	TOTAL

Cross Creek

The Cross Creek watershed is located on James Island at the intersection of Folly Road and Maybank Highway and drains the Cross Creek and James Island subdivisions. The existing drainage facilities consist of a series of culverts, pipe conduits, and open channels in the Cross Creek subdivision, all of which discharge into a detention pond. The detention pond discharges to Wappoo Creek through a pipe conduit system which parallels Folly Road through the Wappoo Creek business park section. The existing systems provide less than 50 percent of the design capacity.

The existing systems which discharge into the detention pond should be improved by either replacement or parallel systems. The outfall of the detention pond also requires improvement through a parallel 36" RCP from the head of the system at the intersection of Folly Road and Tatum Street to the discharge point in Wappoo Creek. The discharge channel must also be cleaned if the system is to function properly. This will require a South Carolina Coastal Council permit for excavation in the marsh.

TABLE 83

HYDRAULIC ANALYSIS FOR JAMES ISLAND AREA													
LOCATION	DRAINAGE AREA (ACRES)	RUNOFF COEFFICIENT	TOTAL (CA)	TRAVEL TIME (MIN.)	DISCHARGE (C.F.S.)	EXISTING SYSTEM	LENGTH	SLOPE (FT./FT.)	CAPACITY (C.F.S.)	VELOCITY (FPS)	RECOMMENDED IMPROVEMENTS		COMMENTS
											STORM WATER CONDUIT	COST (DOLLARS)	
<b>MUNICIPAL (G-9, H-8, H-9)</b>													
H8.80 to H8.79	15.3	0.35	5.36	12	30	36" RCP	32'	(0.0092) -0.0044	30	4.2		Adequate	
H8.79 to H8.78	0.1	0.35	5.40	12	30	4' F.B. Channel	40'	(0.0092) 0.004	141	6.7		Adequate	
H8.78 to H8.77					30	36" RCP	32'	(0.0024) 0.0013	30	4.2		Adequate	
H8.77 to H9.8	20.1 40.3	0.25 0.35	24.54	27	104	4' F.B. Channel	390'	(0.0024) 0.0037	97	3.7	5' F.B. Channel	2,700	
H9.8 to H9.6					104	36" RCP & 42" RCP	50'	(0.0009) 0.006	72	4.2	42" RCP	6,550	Parallel system
H9.6 to H9.4	17.7	0.25	28.97	30	119	8' F.B. Channel	355'	(0.0009) 0.0002	103	2.6	9' F.B. Channel	2,550	
H9.4 to H9.2					119	36" RCP & 42" RCP	200'	(0.0005) 0.0011	72	4.2	48" RCP	30,000	Parallel system
H9.2 to H9.18	4.9	0.25	30.20	31	121	10' F.B. Channel	50'	(0.0005) 0.0007	98	2.0	11' F.B. Channel	7,200	
H9.18					121	26' W. Bridge	26'	(0.0005) 0.0007	216	2.2		Adequate	
H9.18 to H9.19	46.6	0.35	46.51	40	165	10' F.B. Channel	1390'	(0.0005) 0.0007	105	2.0	15' F.B. Channel	51,150	
H9.19					165	16.5' W. Bridge	30'	(0.0005) 0.0007	167	2.3		Adequate	
H9.19 to H9.20	4.5	0.35	48.09	41	168	12' F.B. Channel	140'	(0.0005) 0.0007	133	2.1	15' F.B. Channel	1,300	
H9.20					168	16.5' W. Bridge	35'	(0.0005) 0.0007	167	2.3		Adequate	
												101,450	SUBTOTAL
												20,300	UPSTREAM IMPROVEMENTS
												121,750	TOTAL
<b>PAGELAND (H-8, H-9)</b>													
H9.18 to H9.16	31.1	0.35	10.89	40	39	24" RCP	740'	(0.0015) --	8	2.4	740' - 42" RCP	112,000	Replace existing 24" RCP
H9.16 to H9.17	5.3	0.35	12.75	44	43	24" RCP	230'	(0.0015) 0.0026	8	2.4	230' - 42" RCP	38,050	Replace existing 24" RCP
H9.17 to H9.15	1.5 52.6	0.25 0.35	31.54	45	104	30" RCP	730'	(0.0015) 0.0026	14	2.8	730' - 54" RCP	163,400	Parallel system
H9.15 to H9.14	1.4	0.9	32.80	49	104	30" RCP	200'	(0.0015) 0.0086	14	2.8	200' - 54" RCP	48,750	Parallel system
H9.14 to H9.13	0.3	0.9	33.07	50	104	30" RCP	180'	(0.0015) 0.005	14	2.5	180' - 54" RCP	44,550	Parallel system
H9.13 to H9.10	0.6	0.9	33.61	51	104	36" RCP	260'	(0.0015) -0.0013	22	3.2	260' - 54" RCP	61,350	Parallel system
H9.10 to H9.12	0.2	0.9	33.79	52	104	36" RCP	170'	(0.0015)	22	3.2	170' - 54" RCP	57,650	Parallel system
												525,750	SUBTOTAL
												105,150	UPSTREAM IMPROVEMENTS
												630,900	TOTAL

Municipal

The Municipal watershed drains the area surrounding a portion of the Municipal Golf Course. The watershed is bounded by Woodland Shores Road on the east, Maybank Highway on the north and Riverland Drive on the west. Of the 149.5 acres drained by the watershed approximately 75 percent lies outside the City boundaries. Those areas which are within the City consist mainly of the Municipal Golf Course.

The existing drainage facilities consist of an open channel with pipe culverts and bridges at roadway crossings, and extends eastward from the discharge point into the Stono River at Canal Street to Pawpaw Drive. The existing bridges located along Canal Street and the bridge on Riverland Drive are adequate. The remainder of the system is inadequate and requires improvement. Recommended improvements consist of widening the existing channel to a 15 foot flat bottom width from the discharge point to Riverland Drive. Also required are improvements to the existing system upstream of Riverland Drive. The improvements recommended for the system upstream of the Riverland Drive bridge will provide the most benefit for those areas outside the City of Charleston.

Pageland

The Pageland watershed drains the area north of Maybank Highway and is bounded by Plymouth Avenue on the east, Medway Road on the north, and Riverland Drive on the west. The 93 acre watershed consist of medium density residential development. Approximately 90 percent of the area lies outside the present City boundaries.

The existing drainage facilities consist of a pipe conduit system which runs along the north side of Maybank Highway and extends westward from Plymouth Avenue to the discharge point into the Stono River located approximately 350 feet west of Riverland Drive. The existing system is inadequate and a parallel system of 54" RCP from Manhole Number H9.17 to H9.12 is recommended to provide the design capacity. Also recommended is the replacement of the existing 24" RCP from H9.18 to H9.17 with a 42" RCP.

**SECTION D**

**JOHNS ISLAND AREA**

INDEX  
JOHNS ISLAND AREA WATERSHEDS

<u>WATERSHED</u>	<u>PAGE</u>
Fenwick	150
Maybank	150
Murray Wood	150

## EXPLANATION OF HYDRAULIC DATA TABLES

The Hydraulic Data Tables contain information, by watershed areas, for each of the drainage facilities within the respective area. The data listed in each column is as follows:

Column 1: Location of the system to be analyzed, listing upstream manhole number and downstream manhole number.

Column 2: Drainage Area to system to be analyzed in acres.

Column 3: Runoff coefficient for the area listed in Column 2. (See Table 1)

Column 4: Total CA is the sum of Column 2 times Column 3 plus CA for areas upstream of the point of analysis.

Column 5: Travel time is the time required for runoff to reach the point of analysis from the most remote point within in the watershed.

Column 6: Discharge (Q) equals CIA where CA is the total found in Column 4 times the rainfall intensity (I) in inches per hour from Figure No. 3 using the travel time in Column 5.

Column 7: Existing system description.

Column 8: Length of existing system.

Column 9: Slope of existing system. Both the physical slope (actual slope of system) and the hydraulic slope (water surface profile) are listed for each system. The hydraulic slope is placed in parenthesis and is used to compute the capacity of the existing system.

Column 10: Capacity of existing system in cubic feet per second computed from Manning's equation.

Column 11: Velocity of existing system in feet per second. Discharge divided by flow area.

Column 12 & 13: Recommended Improvements. List improvements required (Column 12) and associated cost (Column 13).

Column 14: Comments

The Johns Island portion of the study area is predominately undeveloped with some single family residences located within the City boundaries. The area is drained by three drainage basins; two which outlet to the Stono River and one which outlets to Church Creek and provide service to both City and County residents. Any major efforts to improve drainage facilities on Johns Island should be approached jointly between the City of Charleston and Charleston County.

The existing drainage facilities consist of open channels with culverts at roadway and driveway crossings. The major portion of the channels and culverts are inadequate and require improvement for protection of flooding at design limits prior to development of the area. A discussion of the drainage facilities within each watershed along with recommended improvements and associated costs is contained in the following paragraphs.

TABLE 84

HYDRAULIC ANALYSIS FOR JOHNS ISLAND AREA													
LOCATION	DRAINAGE AREA (ACRES)	RUNOFF COEFFICIENT	TOTAL (CA)	TRAVEL TIME (MIN.)	DISCHARGE (C.F.S.)	EXISTING SYSTEM	LENGTH	SLOPE (FT./FT.)	CAPACITY (C.F.S.)	VELOCITY (FPS.)	RECOMMENDED IMPROVEMENTS		COMMENTS
											STORM WATER CONDUIT	COST (DOLLARS)	
<b>MAYBANK (A-3, A-4)</b>													
A to A4.1	239.9 240.0	0.25 0.35	143.98	58	403	4' F.B. Channel	800'	(0.001)	99	2.7	3800' - 24' F.B. Channel	219,600	
A14.1					403	14' W. Bridge						Adequate	
												219,600	SUBTOTAL
												43,950	UPSTREAM IMPROVEMENTS
												263,550	TOTAL
<b>MURRAY WOOD (A-4)</b>													
A4.8 to A4.7	104.2	0.35	36.47	31	146	30" RCP	60'	(0.0083) 0.0065	20	4.1	Dual 48" RCP	20,050	Parallel culverts
A4.7 to A4.6	97.1 90.0	0.25 0.35	92.25	58	258	3' F.B. Channel	4000'	(0.001) 0.001	33	2.0	14' F.B. Channel	226,800	
A4.6 to A4.5					258	24" RCP	60'	(0.0083) -0.0022	12	3.8	Dual 4'x6' Box	58,600	Replace existing culvert
												305,450	SUBTOTAL
												61,100	UPSTREAM IMPROVEMENTS
												366,550	TOTAL
<b>FENWICK (A-1, A-2, A-4)</b>													
A1.4 to A1.3	320.1	0.35	112.04	49	353	18" CMP	50'	(0.0052) 0.0052	5	2.8	Dual 4'x9' Box	52,100	Replace existing pipe
A1.3 to A1.2	139.7	0.35	160.94	57	451	4' F.B. Channel	1100'	(0.0018) 0.0018	77	3.0	26' F.B. Channel	126,000	
A1.2 to A1.1					451	36" RCP	50'	0.0074	30	4.2	Dual 4.5'x8' Box	63,000	Parallel system
A1.1 to A2.2	479.3	0.35	328.70	103	592	5' F.B. Channel	6500'	(0.0016)	114	3.2	28' F.B. Channel	596,200	
A2.2					592	45' W. Bridge	27'	(0.0016)	1110	10.3		Adequate	
A2.2 to A2.1	93.9	0.35	361.57	114	592	10' F.B. Channel	1550'	(0.0016)	187	3.5	28' F.B. Channel	179,300	
A2.1					592	45' W. Bridge	28'	(0.0016)	1240	11.1		Adequate	
												1,016,600	SUBTOTAL
												203,350	UPSTREAM IMPROVEMENTS
												1,219,950	TOTAL

Maybank

The Maybank watershed is located in the Johns Island area and is bounded on the east by River Road and on the south by Maybank Highway. The 480 acre watershed is presently undeveloped with the exception of several single family residences along River Road. Future development is expected to consist of low to medium density residential within this area.

The existing drainage facilities consist of a 14 foot wide bridge on River Road and a channel extending from this point to the upper reaches of the watershed. The channel is undersized and has a very heavy growth of vegetation which restricts the capacity. Prior to development of this area the existing channel should be improved to a 24 foot flat bottom width.

Murray Wood

The Murray Wood watershed is located north of the Maybank watershed and drains a total of 291 acres. The watershed is presently undeveloped and approximately 80 percent lies outside the City of Charleston boundaries. Those areas which are within the City boundaries are expected to be developed for low to medium density residential use. Prior to development the existing drainage facilities should be improved. Recommended improvements consist of replacing the existing 24" RCP culvert under River Road with a dual 4'x6' box culvert, widening the channel between River Road and Murray Wood Road to a 14 foot flat bottom width, and placing dual 48" RCP culverts parallel to the existing 30" RCP culvert under Murray Wood Road.

Fenwick

The Fenwick watershed is located in the Johns Island area and drains a total of 1,033 acres, of which approximately 75 percent lies outside the City boundaries. Those areas within the city boundaries are presently undeveloped. Development of the area is expected to consist of low to medium density residential.

Existing drainage facilities consist of a channel which runs eastward from Main Road to Castlewick Avenue with bridges at the Main Road and Brownswood Road crossings, and culverts at the Castlewick Avenue crossing. The culvert at the Castlewick Avenue crossing and the existing channel are inadequate and will require improvement prior to development. Recommended improvements consist of dual 4.5'x8' box culverts at Castlewick Avenue and a 28 foot flat bottom channel from Castlewick Avenue to the discharge point into Church Creek.