

## SECTION VII - CAPITAL IMPROVEMENT PLAN

As part of the City of Harlingen’s Master Drainage Plan, a Capital Improvement Plan (CIP) was developed. The purpose of the CIP is to give the City a tool to plan future capital improvement expenditures for drainage systems within the City. To do this, each CIP identifies the general characteristics of proposed drainage modifications or improvements required for drainage systems that are currently considered to be inadequate relative to the City’s drainage criteria, detailed hydraulic analysis, and historical flooding complaints.

The recommended CIP projects include drainage ditches improvements, stream crossing structures (bridges and culverts) replacements, storm sewer systems enlargements, and detention basins. The CIP projects were prioritized according to the prioritization criteria system as discussed in *Section II – Project Approach* and shown in **Table 6**. The following presents costs and relative priority value calculated for each CIP project.

### DRAINAGE DITCHES

There were total nine drainage ditch systems analyzed within the study area. Seven of the nine systems were identified with flooding problems related to overbank flooding and backwater effect on storm sewer systems as discussed in detail in *Section V – Drainage Ditches*. Each proposed improvement was prioritized as shown in **Table 19**. Cost estimates were made for the proposed improvements as summarized in **Table 20**.

**TABLE 19. CIP PROJECT PRIORITY – DRAINAGE DITCHES**

System	Drainage Ditch	Improvement Type	Prioritization Criterion			Priority Value	Priority Ranking
			1	2	3		
SYSTEM A	3rd Street Ditch	Channel Impr/Culvert	Y	Y	N	5	7
SYSTEM A	13th Street Ditch	Channel Impr/Culvert	Y	Y	N	5	8
SYSTEM A	T-Street Ditch	Detention	Y	Y	Y	6	6
SYSTEM C	Dixieland Ditch	Channel Impr/Culvert	Y	Y	Y	6	5
SYSTEM F	Peter Pipe-Jefferson	Channel Impr/Culvert	Y	Y	Y	6	1
SYSTEM G	Airport CCDD5 Ditch	Culvert	Y	N	Y	3	10
SYSTEM H	Rio Hondo Road Ditch	Culvert	Y	N	Y	3	9
SYSTEM P	Lipscomb Drain	Culvert	Y	Y	Y	6	3
SYSTEM P	Cantu Lateral	Channel Impr/Culvert	Y	Y	Y	6	2
SYSTEM S	Diversion Ditch	Channel Impr/Culvert	Y	Y	Y	6	4

**TABLE 20. SUMMARY OF DRAINAGE DITCH IMPROVEMENTS**

IMPROVEMENT TYPE	IMPROVEMENT DESCRIPTION	ITEM DESCRIPTION	UNIT	UNIT COST	QUANTITY	ITEM COST
<b>SYSTEM A – 3RD STREET DITCH</b>						
EARTHEN CHANNEL IMPR	10' BW, 3:1 SS, @ 0.05%	EXCAVATION (CHANNEL)	CY	\$3	45,000	\$135,000
ADDED CULVERT BOX	1- 8' X 7' RCB	CONC BOX CULV (8 FT X 7 FT)	LF	\$812	172	\$139,664
ADDED CULVERT HEADWALL		WINGWALL (FW-0)(HW=8 FT)	EA	\$16,190	2	\$32,380
					<b>SUBTOTAL</b>	<b>\$307,044</b>
<b>SYSTEM A – 13TH STREET DITCH</b>						
EARTHEN CHANNEL IMPR	10' BW, 3:1 SS, @ 0.05%	EXCAVATION (CHANNEL)	CY	\$3	39,000	\$117,000
ADDED CULVERT BOX	1- 7' X 7' RCB	CONC BOX CULV (7 FT X 7 FT)	LF	\$712	73	\$51,976
ADDED CULVERT HEADWALL		WINGWALL (FW-0)(HW=8 FT)	EA	\$16,190	2	\$32,380
					<b>SUBTOTAL</b>	<b>\$201,356</b>
<b>SYSTEM A – T-STREET DITCH</b>						
DETENTION	BASIN EXCAVATION	EXCAVATION (CHANNEL)	CY	\$3	70,000	\$210,000
BACKFLOW RESTRICTOR			EA	\$10,000	1	\$10,000
INFLOW/ OUTFLOW PIPES	48" RCP	RC PIPE (CL III)(48 IN)(SPL)	LF	\$300	1,200	\$360,000
WEIR STRUCTURE	CONC. WEIR	RIPRAP (CONC)(5 IN)	CY	\$513	50	\$25,650
					<b>SUBTOTAL</b>	<b>\$605,650</b>
<b>SYSTEM C – DIXIELAND MAIN</b>						
EARTHEN CHANNEL IMPR	10' BW, 2:1 SS, @ 0.05%	EXCAVATION (CHANNEL)	CY	\$3	140,000	\$420,000
CULVERT REPLACEMENT	2- 6' X 6' RCB	CONC BOX CULV (6 FT X 6 FT)	LF	\$686	130	\$89,180
CULVERT REPLACEMENT	1- 8' X 6' RCB	CONC BOX CULV (8 FT X 6 FT)	LF	\$740	110	\$81,400
CULVERT REPLACEMENT	1- 8' X 6' RCB	CONC BOX CULV (8 FT X 6 FT)	LF	\$740	122	\$90,280
CULVERT REPLACEMENT	1- 8' X 6' RCB	CONC BOX CULV (8 FT X 6 FT)	LF	\$740	120	\$88,800
CULVERT HEADWALLS		WINGWALL (FW-0)(HW=7 FT)	EA	\$13,988	8	\$111,904
					<b>SUBTOTAL</b>	<b>\$881,564</b>

**TABLE 20 (CONT). SUMMARY OF DRAINAGE DITCH IMPROVEMENTS**

IMPROVEMENT TYPE	IMPROVEMENT DESCRIPTION	ITEM DESCRIPTION	UNIT	UNIT COST	QUANTITY	ITEM COST
<b>SYSTEM F – PETER PIPE-JEFFERSON</b>						
CONCRETE CHANNEL IMPR	10' BW, 2:1 SS, @ 0.10%	RIPRAP (CONC)(5 IN)	CY	\$513	1,454	\$745,902
CONCRETE CHANNEL IMPR	10' BW, 2:1 SS, @ 0.10%	RIPRAP (CONC)(5 IN)	CY	\$513	1,418	\$727,434
CHANNEL EXCAVATION	EXCAVATION	EXCAVATION (CHANNEL)	CY	\$3	14,600	\$43,800
CHANNEL EXCAVATION	EXCAVATION	EXCAVATION (CHANNEL)	CY	\$3	13,000	\$39,000
CULVERT REPLACEMENT	1- 10' X 10' RCB	CONC BOX CULV (10 FT X 10 FT)	LF	\$1,009	98	\$98,882
CULVERT REPLACEMENT	1- 10' X 10' RCB	CONC BOX CULV (10 FT X 10 FT)	LF	\$1,009	248	\$250,232
CULVERT REPLACEMENT	1- 8' X 8' RCB	CONC BOX CULV (8 FT X 8 FT)	LF	\$670	84	\$56,280
CULVERT HEADWALLS		WINGWALL (FW-0)(HW=9 FT)	EA	\$21,615	2	\$43,230
CULVERT HEADWALLS		WINGWALL (FW-0)(HW=11 FT)	EA	\$19,929	4	\$79,716
					<b>SUBTOTAL</b>	<b>\$2,084,476</b>
<b>SYSTEM G - AIRPORT DRAINAGE SYSTEM - CCDD5 DITCH</b>						
CULVERT REPLACEMENT	2- 10' X 10' RCB	CONC BOX CULV (10 FT X 10 FT)	LF	\$1,009	80	\$80,720
CULVERT HEADWALLS		WINGWALL (FW-0)(HW=11 FT)	EA	\$19,929	2	\$39,858
					<b>SUBTOTAL</b>	<b>\$120,578</b>
<b>SYSTEM H – RIO HONDO ROAD (FM 1595) DITCH - TxDOT DITCH</b>						
CULVERT REPLACEMENT	2- 10' X 6' RCB	CONC BOX CULV (10 FT X 6 FT)	LF	\$1,016	116	\$117,856
CULVERT REPLACEMENT	1- 10' X 5' RCB	CONC BOX CULV (10 FT X 5 FT)	LF	\$832	20	\$16,640
CULVERT REPLACEMENT	1- 8' X 6' RCB	CONC BOX CULV (8 FT X 6 FT)	LF	\$740	72	\$53,280
CULVERT REPLACEMENT	1- 8' X 6' RCB	CONC BOX CULV (8 FT X 6 FT)	LF	\$740	580	\$429,200
CULVERT HEADWALLS		WINGWALL (FW-0)(HW=6 FT)	EA	\$10,228	2	\$20,456
CULVERT HEADWALLS		WINGWALL (FW-0)(HW=7 FT)	EA	\$13,988	6	\$83,928
					<b>SUBTOTAL</b>	<b>\$721,360</b>

**TABLE 20 (CONT). SUMMARY OF DRAINAGE DITCH IMPROVEMENTS**

IMPROVEMENT TYPE	IMPROVEMENT DESCRIPTION	ITEM DESCRIPTION	UNIT	UNIT COST	QUANTITY	ITEM COST
<b>SYSTEM P - LIPSCOMB DITCH</b>						
CULVERT REPLACEMENT	1- 8' X 6' RCB	CONC BOX CULV (8 FT X 6 FT)	LF	\$740	42	\$31,080
CULVERT HEADWALLS		WINGWALL (FW-0)(HW=7 FT)	EA	\$13,988	2	\$27,976
CHANNEL IMPROVEMENT	EARTHEN TRAP SECTION	EXCAVATION (CHANNEL)	CY	\$3	100,000	\$300,000
CULVERT REPLACEMENT	1- 10' X 8' RCB	CONC BOX CULV (10 FT X 8 FT)	LF	\$900	40	\$36,000
CULVERT HEADWALLS		WINGWALL (FW-0)(HW=9 FT)	EA	\$21,615	2	\$43,230
CULVERT REPLACEMENT	1- 6' X 6' RCB	CONC BOX CULV (6 FT X 6 FT)	LF	\$686	40	\$27,440
CULVERT HEADWALLS		WINGWALL (FW-0)(HW=7 FT)	EA	\$13,988	2	\$27,976
					<b>SUBTOTAL</b>	<b>\$493,702</b>
<b>SYSTEM S – AGID_19 DITCH</b>						
<i>ALTERNATIVE ONE</i>						
CHANNEL IMPROVEMENT	EARTHEN TRAP SECTION	EXCAVATION (CHANNEL)	CY	\$3	449,000	\$1,347,000
STRUCTURE IMPROVEMENTS	VARIOUS LOCATIONS	CONC BOX CULV	EA	\$80,000	20	\$1,600,000
					<b>SUBTOTAL</b>	<b>\$2,947,000</b>
<i>ALTERNATIVE TWO</i>						
DETENTION	BASIN EXCAVATION	EXCAVATION (DETENTION)	CY	\$3	70,000	\$210,000
LEVEE	EARTHEN COMPACTION		CY	\$3	10,000	\$30,000
BACKFLOW RESTRICTOR			EA	\$10,000	1	\$10,000
PUMP STATION			EA	\$50,000	1	\$50,000
					<b>SUBTOTAL</b>	<b>\$350,000</b>
<i>ALTERNATIVE THREE - RECOMMENDED</i>						
CHANNEL IMPROVEMENT	EARTHEN TRAP SECTION	EXCAVATION (CHANNEL)	CY	\$3	644,500	\$1,933,500
CROSSINGS – SMALL	PALIS DR, CANAL	CONC BOX CULV	EA	\$178,000	2	\$356,000
CROSSINGS – LARGE	BS 83, US 83	CONC BOX CULV	EA	\$478,000	2	\$956,000
CHANNEL DROP STRUCTURE		SHEET PILE DROP STRUCTURE	EA	\$90,000	1	\$90,000
					<b>SUBTOTAL</b>	<b>\$3,335,500</b>
<b>SYSTEM Z - GLASSCOCK DITCH</b>						
DESILT MAINTENANCE	EARTHEN TRAP SECTION	EXCAVATION (CHANNEL)	CY	\$3	2,400	\$7,200
					<b>SUBTOTAL</b>	<b>\$7,200</b>

## STORM SEWERS

As previously referenced, proposed storm sewer modifications for existing storm sewer systems were determined using the 5-year storm event. As discussed in *Section VI – Storm Sewers*, a total 59 storm systems identified to have inadequate storm pipe segments. The costs for these systems were estimated and summarized in **Table 21**. Also provided in **Table 21** are the prioritization criteria and calculated prioritization value for each system. The System ID's listed within the table are storm sewer identification number as shown on the individual storm sewer map provided in *Storm Sewer Maps*.

**TABLE 21. CIP PROJECT COSTS AND PRIORITY - STORM SEWER SYSTEMS**

System ID	Cost	Prioritization Criteria			Priority Value	Priority Ranking
		1	2	3		
001	\$207,975	Y	N	Y	3	34
002	\$1,947,030	Y	Y	N	5	29
004	\$883,298	Y	N	Y	3	40
005	\$1,496,513	Y	Y	N	5	28
007	\$1,008,255	Y	Y	Y	6	17
008	\$646,245	Y	N	N	2	56
011	\$2,472,135	Y	N	N	2	59
012	\$129,938	Y	Y	Y	6	5
013	\$141,030	Y	N	N	2	47
017	\$68,940	Y	N	Y	3	32
021	\$1,368,473	Y	Y	Y	6	22
022	\$121,500	Y	Y	Y	6	4
023	\$633,803	Y	N	Y	3	38
027	\$1,197,675	Y	Y	Y	6	19
100	\$2,385,075	Y	Y	N	5	30
102	\$425,250	Y	N	N	2	54
103	\$223,538	Y	Y	Y	6	7
105	\$1,078,763	Y	Y	Y	6	18
112	\$215,370	Y	N	N	2	49
113	\$108,900	Y	N	N	2	44
115	\$654,638	Y	N	N	2	57
118	\$1,366,538	Y	Y	Y	6	21
122	\$109,553	Y	Y	N	5	24
123	\$80,888	Y	Y	Y	6	3
124	\$1,877,535	Y	Y	Y	6	23
127	\$124,133	Y	Y	N	5	25
132	\$394,493	Y	N	N	2	52
135	\$546,825	Y	Y	Y	6	13
139	\$1,866,428	Y	N	Y	3	41
141	\$1,280,115	Y	Y	Y	6	20
142	\$754,223	Y	N	Y	3	39
145	\$272,025	Y	N	N	2	51
148	\$221,153	Y	N	N	2	50

**TABLE 21 (CONT). CIP PROJECT COSTS AND PRIORITY - STORM SEWER SYSTEMS**

System ID	Cost	Prioritization Criteria			Priority Value	Priority Ranking
		1	2	3		
149	\$208,890	Y	Y	N	5	27
153	\$659,947	Y	Y	Y	6	14
154	\$91,890	Y	N	Y	3	33
157	\$21,000	Y	N	N	2	42
158	\$421,358	Y	N	N	2	53
159	\$139,688	Y	N	N	2	46
161	\$156,600	Y	Y	Y	6	6
200	\$163,035	Y	N	N	2	48
204	\$382,515	Y	N	Y	3	37
206	\$135,585	Y	Y	N	5	26
207	\$63,450	Y	N	N	2	43
216	\$453,105	Y	N	N	2	55
224	\$224,775	Y	Y	Y	6	8
225	\$495,585	Y	Y	Y	6	11
227	\$42,323	Y	N	Y	3	31
229	\$2,454,225	Y	N	N	2	58
230	\$223,493	Y	N	Y	3	35
233	\$305,010	Y	N	Y	3	36
234	\$113,355	Y	N	N	2	45
237	\$54,878	Y	Y	Y	6	2
244	\$257,220	Y	Y	Y	6	10
245	\$33,267	Y	Y	Y	6	1
247	\$528,517	Y	Y	Y	6	12
248	\$715,267	Y	Y	Y	6	16
251	\$659,947	Y	Y	Y	6	15
252	\$246,240	Y	Y	Y	6	9
Total	\$35,559,418					

**COST SUMMARY**

The following table summarizes the total cost of improvements for the Capital Improvement Plan. The CIP costs include construction of the proposed drainage ditch and detention, proposed storm sewer systems, and a 20-percent contingency.

**TABLE 22. CIP PROJECT COST SUMMARY**

IMPROVEMENT TYPE	IMPROVEMENT COST
Drainage Ditch & Detention	\$8,758,430
Storm Sewer	\$35,559,418
20% Contingency	\$8,863,570
Total CIP Proposed Cost	\$53,181,418