CITY OF PORT ISABEL

COMPREHENSIVE PLAN

PLANNING PERIOD 2005-2015

APRIL, 2005

G. STORM DRAINAGE

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The data, information, analysis, and recommendations presented herein are exclusively for planning and budgeting purposes and do not constitute engineering analysis or detailed cost estimates. Engineering for each of the recommended tasks are beyond the scope of these studies and should be performed in the customary fashion as projects are defined and implemented.

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G.1 INTRODUCTION

The ability to quickly remove rainwater from populated areas is another vital characteristic of a property developed community. This characteristic is paramount in minimizing property damage from flooding during periods of intense rainfall. The expedient evacuation of storm water also prevents adverse health consequences caused by infestation of mosquitoes and other insects. Residents of developed areas have come to expect protection from high water through a community drainage system. The addition of street and road improvements, new subdivision developments and new home construction in older areas of town all directly affect surface storm drainage immediately adjacent to homes and/or business structures. Storm drainage systems typically include inlets, storm sewers, culverts, bridges, concrete lined channels, natural drainage channels, overflow swales, creeks, rivers, retention ponds and detention ponds.

Drainage in the City is provided by a network of underground storm sewers and open drain ditches. The topography of City is essentially flat and level terrain therefore drainage must be controlled through careful elevation adjustments. Considering the proximity to the coast, flooding is not a major problem in the City. However, localized flooding has been experienced due to disruptions in drainage flow caused by obstructions of culverts and drainage ditches.

The intent of the Storm Drainage System Study is to review all available information on storm drainage in the City, make an analysis of the existing system, establish a database to be used to prepare a plan, and make recommendations with a cost estimate of improvements to the existing system.

G.1.1 Existing Storm Drainage Studies.

Based on the information obtained from City staff, no storm drainage studies have been prepared for the City of Port Isabel. It does not appear that an extreme storm drainage study is necessary, but it was the opinion of this author that an analysis of the physical storm infrastructures is necessary. This report does not attempt to arrive at an engineering conclusion on the adequacy of the existing system.

G. 2. STORM DRAINAGE SYSTEM INVENTORY

This section of this Chapter addresses the drainage system inventory that is currently in place in the City. This includes major drain ditches and the City's curbed and guttered streets, which consist of underground pipelines with box inlets, as well as the side ditches and culvert systems that are areas not yet served by curb and gutter. As mention above and according to City staff, no previous engineering storm drainage studies or plans have been prepared for the City. The following **Table G.2.1**, shows the City's storm drainage inventory.

TABLE G-2-1
Storm Sewer Inventory

Planning Zone No.	Location from City Center	Inventory
A	Northwest	1. Drainage ditch immediately west of High School draining into the bay. 2. 28 Type "A" drainage inlets. 3. 0 Grated inlets. 18"x 24" 4. 2 Grated Inlets 24" x 60"
B	Northeast	1. No drain ditches exist except for a few shallow bar ditches running parallel to some streets. 2. 11 Type "A" drainage inlets. 3. 19 Grated inlets. 18"x 24" 4. 0 Grated Inlets 24" x 60"
C	Southwest	1. No drain ditches exist except for a few shallow bar ditches running parallel to some streets. 2. 23 Type "A" drainage inlets. 3. 0 Grated inlets. 18"x 24" 4. 3 Grated Inlets 24" x 60"
D	Southeast	1. No drain ditches exist except for a few shallow bar ditches running parallel to some streets. 2. 25 Type "A" drainage inlets. 3. 23 Grated inlets. 18"x 24" 4. 7 Grated Inlets 24" x 60"
E	North Padre Island	N/A or None
F	South Padre Island	None

A storm drainage map entitled **Storm Drainage Map G**., shows the existing facilities in relation to topographic features.

G. 3. FLOOD INSURANCE RATE MAP (FIRM) CLASSIFICATION AND DELINEATIONS

The City is currently listed in the FEMA data base under Community Panel Number 480109-0001 B. The most recent revision is dated June 1, 1983. Most of the old town site area, from South Shore Drive to North Shore Drive, from the bay to Port Isabel Side Channel is located within Zone B, with a few small areas in Zone C. All of the "Fingers" area is located in Zone A6. Most of the "Derry" area is located in Zone B except for the northernmost part and the area just north of the present Wal-Mart site which is in Zone A6. The largest area with a Zone C designation is the area south of the Fingers towards the Navigation District. The rest of the City is currently not zoned.

The explanation of Zone Designations found in Port Isabel are as follows:

Flood Zone A:	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
Flood Zone B:	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood.
Flood Zone C:	Areas of undetermined, but possible, flood hazards.
Flood Zone A1-A30:	Areas of 100-year flood; base flood elevations and flood hazard factors determined.

Areas within the community where flooding has local occurred are depicted in **Map G.1.(a).**

G. 4. STORM DRAIN ANALYSIS

The analysis presented is based on observations and on the information obtained through interviews with staff, local residents, and other professionals. Problems identified, and recommendations of improvements are also a direct result of these contacts. The City has taken several steps to decrease the possibility of flooding and the

resulting damage by putting in place additional drainage capacity during is street improvements program. The following are identified problems listed in rank of priority.

RANKING	PROBLEM
1	City's physical location and proximity to coast.
2	Lack of adequate planning during the initial development the City, resulting in,
3	Inferior sizing of storm drainage lines.
4	Insufficient financial resources for addressing drainage problems, resulting in,
5	Lack of storm drainage maintenance department, resulting in,
6	Poor maintenance of the existing system.

Analysis of the existing drainage system indicates present drainage structures and natural drainage conditions are poor. The pipelines and ditches do not appear to meet the design criteria to provide satisfactory drainage, such possibly causing surface flooding in the lower areas. Some areas do not appear to have drainage pipelines at all. Some areas have pipes that are too small in diameter to carry the runoff.

Areas that have experienced flooding and might require possible improvements are identified in the next paragraph.

Planning Area A:

a) Intersection of Illinois Street and 2nd Street
b) Intersection of Illinois Street and 3rd Street

Planning Area B:

a) At the end (north part) of Basin Street
b) East end of North Shore at Longoria Street
c) Yturria at Gomez & Davis
d) Gomez at Dairy Queen on Hwy. 100
e) Maxan at Yturria
f) Maxan at Musina
g) Maxan at Manautou

Planning Area C:

a) South Shore at Leal Street
b) Monroe at intersection with Yturria
c) Musina at South Shore Drive
d) Manautou at South Shore Drive
e) Tarnava at South Shore Drive at Garcia
f) East Garcia at intersection with Hwy. 100 (at the Cone)

Planning Area D:

a) At the west end of Ash (Housing Project)
b) At the southwest end of Hockaday Drive

Planning Area E—There are no areas developed in this area and therefore no existing flooding problems exist.

Planning Area F—There are no areas developed in this area and therefore no existing flooding problems exist.

As mentioned in a previous paragraph, areas within the community where flooding has local occurred are depicted in **Map G.1.(a)**

The design criteria used in the analysis of the existing and proposed drainage facilities is as follows:

a. Design frequency—The selection of the design frequency is the key element in determining the drainage system design. The design frequency used will accommodate the runoff from a two-year frequency storm. This two-year frequency storm design criteria is common in these areas due to flat characteristics of the land and also due to the excessive cost of a longer period frequency storm.

b. Secondary pipelines and ditches should be designed using a five-year frequency storm. These structures will be carrying runoff generated by several smaller areas and should be sized to accommodate this runoff.

c. There are no primary channels to receive runoff in the City. The bay and the various bay channels all receive this runoff.

d. To determine the peak design flow rates the Regional Method will be used and is shown by the following equation:

$$Q = C\ I\ A$$

where Q = Peak flow rate in cubic feet per second

C = Coefficient of runoff

I = Rainfall intensity in inches per hour

A = Drainage area in acres.

This equation is used to calculate runoff for areas of less than 500 acres. The runoff coefficients should be based used by the State Department of Transportation (TxDOT) for this area. Time of concentration should be computed to determine the rainfall intensity by using Duration Frequency Curves derived by

the National Weather Bureau. These drainage criteria should be used to determine any proposed drainage system structures improvements necessary to adequately and satisfactorily provide drainage for the City for a design frequency of a two year storm. A two year storm means the worst rain that will occur on a two year period. This rain may occur once or more than once on any two year period.

G. 5. STORM DRAINAGE GOALS AND OBJECTIVES

With the intention of maintaining a proven drainage system in optimum performance levels, the City has identified a list of goals and objectives. They are listed below:

G.5.1. GOAL 1: Create a Storm Drainage Department

1) Create a storm drainage department as a stand-alone department or as a sub-department of existing Public Works Department.

2) Budget sufficient funds for the adequate administration and provide sufficient funds for a maintenance program.

G.5.2. GOAL 2: Operate the City's Storm Drainage System in an Efficient Manner

1) Develop a documented ditch and lateral inspection plan and use it to maintain and/or report maintenance requests to the Drainage Department. Include logging of all complaints and observations of drainage system operations.

2) Develop and implement ordinances for the inclusion of drainage systems in any new development.

G.5.3. GOAL 3: Provide Consistent Storm Water Collection and Drainage

1) Add curb and gutter to all streets which are currently devoid of them.

2) Implement a formal storm drainage system flow model for use in evaluating the impact of new developments and of Plan implementation.

G.5.4. GOAL 4: Provide Sufficient Collection and Discharge Capacity

1) Implement a comprehensive master plan storm drainage program and construct oversize drainage lines in anticipation of projected growth needs.

2) Implement a formal storm drainage system flow model for use in evaluating the impact of new development and of Plan implementation.

G. 6. STORM DRAINAGE PLAN

The following recommendations are designed to improve existing and future system conditions:

TABLE G-6-2
Storm Drainage System Plan

YEAR	TASK	DESCRIPTION	COST EST. (in $1,000's)
YEARS 1-2	1	Hold Public Forums to inform Public of Plan and plan funding sources. Create Drainage Department within the City's Public Works Department and prepare drainage maintenance schedule. Immediate clean all grates and inlets.	20
	2	Investigate and analysis areas of potential flooding by commissioning an engineering drainage study and creating a storm drainage department.	75
	3	Prioritize and schedule proposed storm drainage improvements in three phases, 1) Immediate threat 2) Secondary threats & 3) long-term and future improvements.	5
YEARS 3-5	1	Hold Public Forums to inform Public of Plan and its progress.	1
	2	Start construction improvements on Phase I.	500
	3	Finalize construction plans for Phase 2.	50
YEARS 6-10	1	Hold Public Forums to inform public of Plan and its progress.	1
	2	Start construction improvements on Phase 2.	500
	3	Finalize plans for Phase 3.	50

G. 7. STORM DRAINAGE FUNDING SOURCES

Sources for possible funding of the above tasks are listed below. The funding may be through grants/or loans:

1) Office of Rural Community Affairs (ORCA)
2) Federal Emergency Management Agency (FEMA)
3) Texas Water Development Board (TWDB)
4) Economically Distressed Assistance Program (EDAP)
5) Texas Commission on Environmental Quality (TCEQ)
6) North American Development Bank (NADBank)