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# Hurricane Relocation Planning for Brazoria, Galveston, Harris, Fort Bend, and Chambers Counties

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Center for Strategic Technology
Texas Engineering Experiment Station

TAMU-SG-81-604
June 1981

Texas A&M University Sea Grant College Program

# HURRICANE RELOCATION PLANNING

# FOR

# BRAZORIA, GALVESTON, HARRIS, FORT BEND, AND CHAMBERS COUNTIES

by

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Study Prepared by the
Center for Strategic Technology
Texas Engineering Experiment Station
The Texas A&M University System

June 1981

TAMU-SG-81-604

Partially Supported through Institutional Grant NA79AA-D-00127
to Texas A&M University by the
National Oceanic and Atmospheric Administration
Office of Sea Grant
Department of Commerce
and by a grant from the
Office of Coastal Zone Management
National Oceanic and Atmospheric Administration
Department of Commerce
through the
Texas Energy and Natural Resources Council

This study is to be used as a planning tool or handbook for government officials. It is not a policy document. As such, when properly consulted, it may serve as a guide for providing officials with "worst case" situations so that they may determine when and how protective and/or evacuation measures should begin. It is designed for no other purpose.

$5.00

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## USERS' GUIDE

This report has been prepared for use by individuals or groups responsible for making decisions about evacuation of Texas coastal areas. It is designed to help you decide approximately when to evacuate an area. It is suggested that you study the data in this report and plan, in advance, the requirements for evacuation of your area. To avoid delays when a hurricane threatens, each person or group responsible for evacuation decisions should have an agreed-upon operational procedure. Simply put, if a hurricane in the Gulf of Mexico has certain characteristics (wind speed, movement speed, location, and direction), then a certain response is necessary. Once you have formulated your plan, it should be coordinated with other decision makers in areas which might be affected by the form of evacuation you recommend.

Items to assist in making these decisions include:

- Estimated possible storm surge penetration by storms with different wind speeds (see Figures 2-1 thru 2-4). These are given in greater detail for the Freeport levee system (Table 2-1 and Figure 2-5), the Texas City levee system (Table 2-2 and Figure 2-6), and Galveston Island (Table 2-3 and Figure 2-7).

- Estimated road cutoff times by various types of hurricanes by both wind speed and storm surge. To obtain this information, you find the data points in your area (Figures 2-8 thru 2-11) and then locate them in Appendix B. You will also be able to find the estimated high tide surge penetration for each data point.

- Estimated hourly surge depth for key data points. The points are before the Freeport levee, before the Texas City levee, before the Galveston Seawall, the Galveston Causeway, the Baytown Tunnel, and the entrance to the Houston Ship Channel. These values are given on an hourly basis 24 hours before estimated time of hurricane landfall and 12 hours after (Appendix C).

- A description of areas where storm surge produced by hurricanes with winds of 130 MPH or less could penetrate. These are labeled "evacuation zones." A description is then given of those areas where storm surge produced by hurricanes with winds in excess of 130 MPH could penetrate. These are labeled "contingency zones." (Figures 3-1 thru 3-4)

- Estimates, by county, of the number of hours it would take for the evacuation of both "evacuation" and "contingency" zones (Table 5-1).

- A method to estimate when to begin evacuating (Table 5-4), along with an example of how this table can be used (pages 5-3 and 5-4).

Also, this study contains information on shelter needs, a section on use by mass media of the information in this report, and a suggested brochure format (Appendix D).

Additional items to keep in mind when considering evacuation:

- Houston traffic, especially at peak times, can render the city almost impenetrable to vehicles.

- Evacuation should take place during daylight hours, if possible.

- As a hurricane heads for the coast, it can rapidly increase or decrease in intensity, vary in movement speed, and change direction.

- It is entirely possible that a hurricane warning could be posted for an area as little as ten hours before the hurricane eye makes landfall.

- In some areas, certain types of hurricanes can cut off evacuation routes before there is adequate time for evacuation, unless the evacuation takes place before the hurricane warning is posted for that area.

- To facilitate traffic control, the Texas Department of Public Safety regional office needs to know when an evacuation is going to be recommended.

ACKNOWLEDGEMENTS

This report represents the combined efforts of many persons. In addition to the support and advice of the three advisory groups named in the Introduction, certain persons deserve special mention. The support and concern of Cecil Palmer, the meteorologist in charge of the Houston area of the National Weather Service, was always available. He accompanied the author to Silver Springs, Maryland, to meet with Dr. Chester Jelesnianski to better understand the SLOSH (Sea, Lake, and Overland Surges from Hurricanes) storm surge model he had prepared for the Galveston Bay-Freeport area. At that time, we selected the data points which would be used to supply more detailed information for certain critical areas in the five-county study region (Brazoria, Galveston, Harris, Fort Bend, and Chambers). He also accompanied the author to the National Hurricane Center in Miami to choose the types of hurricanes to be simulated in the SLOSH model. Dr. Brian R. Jarvinen, research meteorologist at the National Hurricane Center, prepared the computer runs for SLOSH and provided much of the technical data in the SLOSH methodology section. He was also extremely helpful in the SLOSH interpretative data used in this report.

Mari Ward wrote the survey data computer program, while Dr. Iraj Navid wrote the program for the SLOSH data point interpretations. The American Red Cross provided the personnel to conduct the surveys. To supplement some of the survey data, George Kramig of the Dow Chemical

Company in Freeport made available the raw data of a similar survey he had conducted. The traffic analysis was done by Thomas Urbanik II of the Texas Transportation Institute. Donna Graves drew the graphics. Laura Colunga, Head and Editor of Marine Resources Information of the Texas A&M Sea Grant Program, did the final editing. I am grateful for the work done by these people.

Mention must be made of the hospitality of the Pasadena Civil Defense organization in hosting the meetings of the municipal and county advisory persons. Billie Fife of the Pasadena Civil Defense helped gather representatives of industries located on the Houston Ship Channel, while George Stapleton of the Texas City Civil Defense gathered representatives of industries in the Texas City-Galveston-Freeport area, to comment on the study. Thanks are also due Fletcher Hickerson of the Baytown Civil Defense for gathering together representatives of television, radio, and newspapers to develop media guidelines. There are others, too numerous to include in this brief acknowledgement, to whom I owe a debt for their advice and assistance.

Finally, my special thanks go to Philip Berke who worked approximately four months in the preparation of this report. His chief efforts were on survey data interpretation and zone delineations. Especially appreciated were the extra hours he worked with the author during vacation periods. This contributed greatly to the timely completion of this report. Special mention should be made of the tireless hours Susan Gregory worked preparing data for the data computer runs, and the assistance of Samuel Ximenes. I also want to thank Laura Jean Foster, Sherie Holder, Dorothy Irwin, and Peggy Jonas for typing this report.

Carlton Ruch
Principal Investigator
June 1981

# INTRODUCTION

The NOAA Coastal Hazards Program[1] envisions the development of evacuation plans for the entire Gulf of Mexico, the Atlantic Coast, and selected portions of the Pacific Coast. The key aspect of most of these plans[2] will be the utilization of a storm surge model called SLOSH (Sea, Lake, and Overland Surges from Hurricanes). One purpose of this study is to develop methodologies which can be used in other coastal areas. A similar study has been done for the Tampa Bay area of Florida.

The need for this study was expressed in 1979 when the Texas State Legislature passed a resolution encouraging the development of such a plan. The resolution stated the lack of staffing and financing on the part of the Governor's Division of Disaster Emergency Services as one reason a plan was needed; another was the lack of county and community coordination:

> WHEREAS, the responsibility for formulation and coordination of local emergency plans rests with local governments with the assistance of the Governor's Division of Disaster Emergency Services (DDES); but local governments frequently lack the technical and financial resources and the State DDES presently lacks the manpower and finances to undertake such necessary detailed coordination; and
>
> WHEREAS, good coordination of emergency evacuation plans among coastal counties and communities is at best scarce and at worst non-existent . . . ; now, therefore, be it

---

[1]This program was formulated by the Coastal Hazards Program section of National Ocean Survey, National Oceanic and Atmospheric Administration, U.S. Department of Commerce. Work done in this study was coordinated with the NOAA Coastal Hazards Program.

[2]The Pacific Ocean hazard programs will be developed differently.

RESOLVED, By the Senate of the State of Texas, the House of Representatives of the State of Texas concurring that a cooperative effort be undertaken to develop a model hurricane evacuation plan for selected high population areas of the Gulf Coast; . . .

Funding for this study was provided by Texas A&M University's Sea Grant College Program and by the federal Office of Coastal Zone Management through the Texas Energy and Natural Resources Advisory Council.

In order to insure that the results of the study would be acceptable to the users, three advisory groups were established to guide the study.

State and Subnational Advisory Committee

Walter Anderson, Executive Officer
National Weather Service, Southern Regional Headquarters

Charles Branton, Executive Director
Texas Coastal and Marine Council

Robert Lansford, Coordinator
Governor's Division of Disaster Emergency Services

Regional Advisory Committee

Richard J. Kabat, P.E.
State Department of Highways and Public Transportation
District 12

Phil Mitchell, Director, Disaster Services
Houston Chapter of The American Red Cross

Cecil M. Palmer, Meteorologist in Charge
Houston Area, National Weather Service

Thomas Ryan, Region #2
Governor's Division of Disaster Emergency Services

Captain William P. Thompson, Region #2A
Texas Department of Public Safety

Municipal and County Advisory Committee

William Brady
Galveston County Civil Defense

John Caswell
Houston-Harris County Civil Defense

Jack Chambliss
Chambers County Civil Defense

Joseph Crawford
Galveston Civil Defense

Doris Davis
Houston-Galveston Area Council

Billie Fife
Pasadena Civil Defense

Doug Harris
Nassau Bay Civil Defense

Fletcher Hickerson
Baytown Civil Defense

Steve Howerton, City Manager
City of La Marque

Jack McCann
Brazoria County Civil Defense

Frank R. Patryn
Fort Bend County Civil Defense

George Stapleton
Texas City Civil Defense

Ann Wood, Regional Planner
Houston-Galveston Area Council

The study area consists of five counties (Brazoria, Fort Bend, Galveston, Harris, and Chambers) with an area of more than 5,000 square miles containing a population of about three million.

A history of hurricane activity in the four coastal counties is illustrated in Table I-1. It can be seen that hurricane frequency is somewhat erratic. There was only one hurricane (1932) from 1921 through 1940, while there were six from 1941 through 1949. From 1962 through 1980, hurricane activity has been minimal. In this century, one or more coastal counties in the study area have experienced the following direct hits: four in Category 1,[1] three in Category 2, two in Category 3, and

[1]For a detailed description of the relative-increasing strength of Categories 1 through 5 of the Saffir-Simpson Scale, see Appendix A.

four in Category 4. Although we have no record of a Category 5 hitting the area, there is no theoretical reason why a Category 5 could not hit the region.

Some of the specific problems in the study area include the following:

- Galveston Island seawall protection and egress routes
- Levee systems in Texas City and Freeport
- Subsidence[1] in the area
- Few evacuation roads that do not go through Houston and the resultant evacuation problems created by Houston traffic congestion

The purpose of the study is to provide data for decision making leading to regional coordination. The data can also be used in preparing more specific county and municipal plans. A chart on pages I-6 and I-7 describes the uses of this data in pre-hurricane preparedness and in hurricane response.

The data to assist in decision making consists of the following key information:

- Possible surge penetration for hurricanes of varying intensities. (Pages 2-4 through 2-7)
- Critical places in the study region to indicate road cutoff times by hurricane type for both surge penetration and wind intensity. This will be given in hours plus or minus anticipated time of storm center landfall. (Pages B-1 through B-70)
- Hurricane-prone areas which probably should evacuate for most storms. These areas are divided into evacuation zones by county. (Pages 3-2 through 3-5)
- Areas subject to surge intrusion only in extremely severe hurricanes. These areas are divided into contingency zones by county. (Pages 3-2 through 3-5)
- The number of hours it would take to evacuate the persons residing in evacuation zones, indicating they would evacuate if advised to do so, and the number of

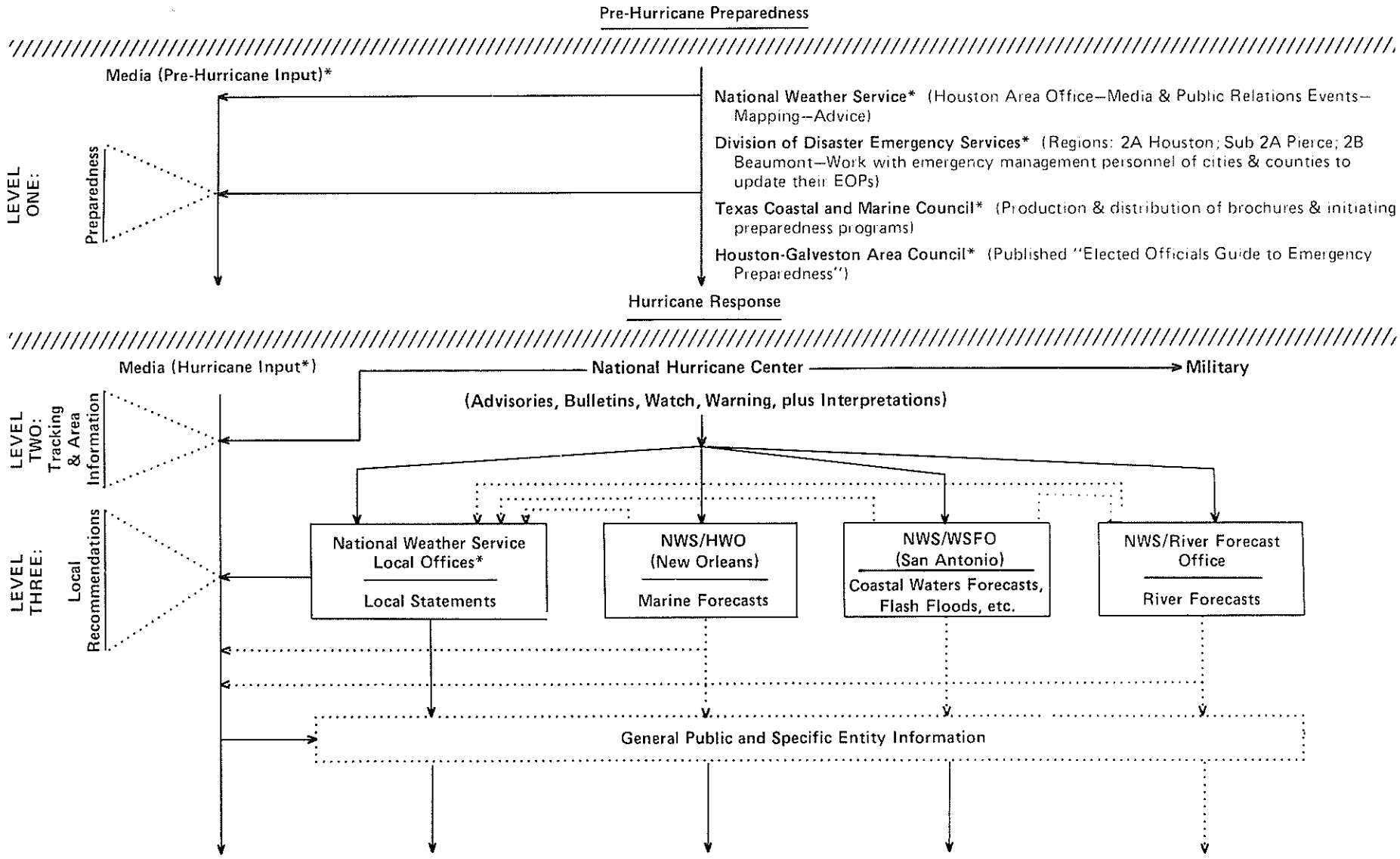
---

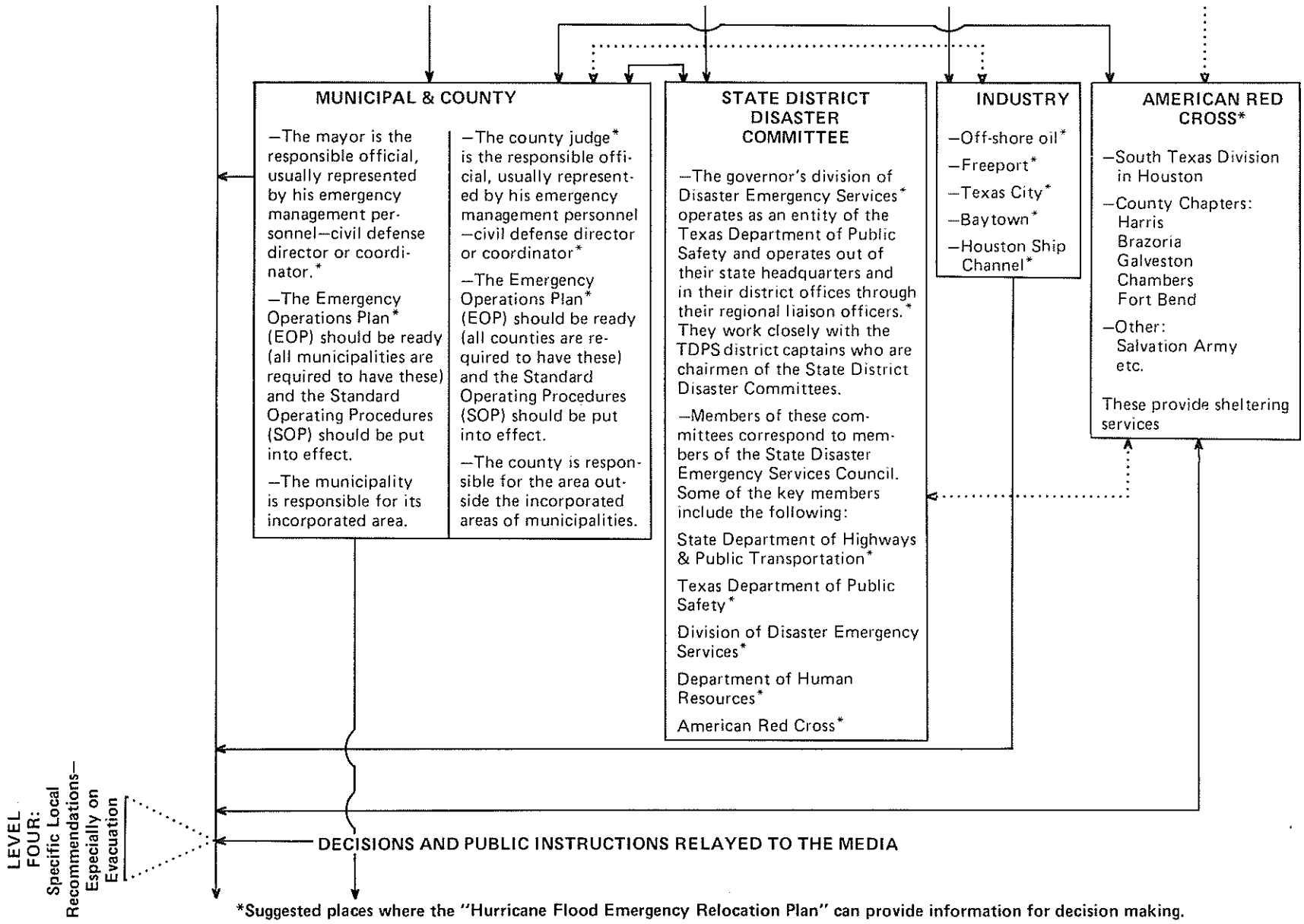
[1]Sinking ground caused by higher aquifer withdrawal rates than recharge rates.

> hours it would take to evacuate all persons from evacuation and contingency zones in the event of a hurricane with winds in excess of 130 MPH. (Page 5-6)

Additional data is supplied for the Freeport and Texas City levee systems and for Galveston Island. Also, data on shelter needs is provided. All of this data is designed to allow approximate estimates of how soon evacuation must begin in certain areas to safely evacuate residents before routes are cut off by wind or storm surge.

HURRICANE RESPONSE AND "THE MODEL
HURRICANE FLOOD EMERGENCY RELOCATION PLAN"






*Suggested places where the "Hurricane Flood Emergency Relocation Plan" can provide information for decision making.

TABLE I-1

HISTORY OF HURRICANE ACTIVITY BY CATEGORY[1] IN THE STUDY REGION: 1900 THROUGH 1980

| Year | County | | | | Name (After 1950 Only) |
|---|---|---|---|---|---|
| | Brazoria | Galveston | Harris | Chambers | |
| 1900 | 4 | 4 | 4 | 4 | |
| 1909 | 3 | 3 | (3) | (3) | |
| 1915 | 4 | 4 | 4 | 4 | |
| 1920 | (2) | (2) | (2) | | |
| 1932 | 4 | (4) | (4) | | |
| 1941 | 3 | 3 | 3 | 3 | |
| 1942 | (3) | 1 | 1 | 1 | |
| 1943 | (2) | 2 | 2 | 2 | |
| 1945 | (2) | (2) | (2) | | |
| 1947 | 1 | 1 | 1 | 1 | |
| 1949 | 2 | 2 | 2 | 2 | |
| 1959 | 1 | 1 | 1 | 1 | Debra |
| 1961 | 4 | (4) | (4) | (4) | Carla |
| 1963 | | 1 | (1) | (1) | Cindy |
| 1971 | (1) | | | | Fern |
| 1980 | (3) | (3) | (3) | (3) | Allen |

Plain Number = Direct Hit

( ) = Indirect Hit

[1]For a detailed description of the Saffir-Simpson Scale, see Appendix A.

SOURCE: Paul J. Hebert and Glenn Taylor, Hurricane Experience Levels of Coastal Populations from Texas to Maine. National Hurricane Center, Miami, 1975; Charles Newman, George Cry, Edwardo Caso, and Brian Jarvinen, Tropical Cyclones of the North Atlantic Ocean, 1871-1977, National Climatic Center, Asheville, North Carolina, 1978; and Miles Lawrence and Joe Pelissier, "Atlantic Hurricane Season of 1980," Monthly Weather Riview, June 1980.

## SECTION ONE: METHODOLOGY

Three main methodologies are used in this study. First, the SLOSH model and how it operates to produce simulated wind speeds and storm surge will be discussed (Part A). Then, the survey used to develop estimates of persons and vehicles leaving certain areas for particular destinations and estimates of shelter needs will be described (Part B). Finally, the methods of determining evacuation times are discussed (Part C).

## *PART A: SLOSH*

SLOSH, so called because it projects sea, lake, and overland surges from hurricanes, was developed for the Galveston Bay-Freeport region of Texas in 1979. It is a computer model designed to project (output) from given information (input data) the flow of surges over seas, lakes, and land (taking into consideration water depths, land elevation, and man-made constraints such as roads and levees).

The input to the model consists of:

- Initial meteorological conditions that define a hurricane in terms of time, storm location (latitude and longitude), storm intensity in millibars (ambient less central pressure of storm), and storm radius in statute miles (distance from storm center to maximum winds).

- Future storm conditions (at six-hour intervals out to 72 hours[1]) that provide information on location, intensity, and size. Implicit in the storm track is the storm location for landfall, and the speed and direction of storm movement.[2]

- Initial water heights for Galveston Bay and the Gulf of Mexico. These levels are relative to mean sea level. An initial height of one foot above mean sea level was used for the simulated hurricane runs.

---

[1] A 36-hour mode is also possible.

[2] Additional technical details of the storm model are contained in Jelesnianski and Taylor, 1973: A Preliminary View of Storm Surges Before and After Storm Modifications. NOAA Technical Memorandum, ERL WMPO-3, Washington, D.C.

Based on this input, the SLOSH model numerically solves certain equations of motion to compute surge.[1] This surge is calculated on a computational polar grid (see Figure 1-1 polar grid).[2] Strategic placement of this grid over the Galveston Bay region allows for fine spacing of grid points inside the bay region and coarse spacing over the Gulf of Mexico. The grid consists of 69 squares at the top and 59 at the side. The model contains 4,071 (59 x 69) grid squares or data points. The initial size of the grid square is .7 miles in the more critical areas and 3.4 miles at the extremities. This gives greater accuracy in the more critical areas and less accuracy in the Gulf of Mexico. Each grid point can be identified by coordinate numbers. Using X and Y coordinates, 52 grid or data points were identified as critical areas requiring more detailed data. These grid points are listed in Table 1-1.

---

[1]The model numerically solves a set of partial differential equations of motion. Except for the additional inclusion of the finite amplitude effect and horizontal viscosity, the equations are given by Jelesnianski, 1967: Numerical Computations of Storm Surges With Bottom Stress. Monthly Weather Review, 95, 740-756. Coefficients for surface drag, eddy viscosity, and bottom slip are exactly the same as used in the SPLASH (Special Program to List the Amplitudes of Surges From Hurricanes) model by Jelesnianski, 1972: I. Landfall Storms. NOAA Technical Memorandum, NWS TLD-46, Washington, D.C. There is no calibration or tuning to force agreement between observed and computed surges; that is, the coefficients are universally set as constants, once and for all, and not varied locally for a particular geographical region. The model is used in a forecast mode; there is no requirement for input boundary values during surge activity (e.g., tide gage readings or computed boundary surge values from an alternate surge model).

[2]In this study, the figures and tables will always be grouped at the end of each section or section part.

Based on the input data, SLOSH produces the following output:

- A forward projection in time of the surge envelope[1] (penetration and height) at three-hour intervals before time of landfall and in two-hour intervals after landfall[2] during the critical period (12 hours before landfall and 9 hours after).

- A composite of these surge envelopes which shows the maximum surge penetrations and heights for the entire time period.

- For each of the 52 selected data points, SLOSH projects the surge height, the wind speed, and the wind direction in 10-minute intervals for 24 hours before landfall and 12 hours after landfall.

Interpretation of the model output must be considered in view of the following constraints:

- Given accurate input data for the storm's track and meteorological parameters, the computed surges are estimated to be within plus or minus 20 percent of the observed water levels. That is, if surge is predicted to be 10 feet in a certain data point, the actual surge could range from 8 to 12 feet. With inaccurate forecasting of movement speed, direction, wind speed, and point of landfall, the error level could be greater.

- Terrain features of the Galveston Bay region were taken from storm evacuation maps prepared by the National Ocean Survey and topographical charts of the U.S. Geological Survey. The land elevations determined by the U.S. Geological Survey are based on 1973 survey data. Two interpretative adjustments of the SLOSH data updates the output to 1978 subsidence levels. First, when the average land elevation in each data point was subtracted from the surge envelope to give the surge depth and penetration, the land elevation was manually adjusted to 1978 subsidence levels. Second, the highway elevations in the 52 selected data points were based on 1978 subsidence data.

---

[1]The surge envelope is produced on nine pages of computer printouts which, when taped together, shows the surge height for each of the 3,717 usable data points (4,071 minus 354 too close to boundaries equals 3,717). The surge height for each point is then subtracted from the land elevation to give surge penetration and height.

[2]Except for the last reading, which is a three-hour interval.

- The forecast water height for each grid point represents an average condition over a grid square. Water depths above ground level for specific areas of each grid must be determined from a knowledge of the terrain heights in each specific grid square.

- The model does not consider:

  - wind-generated waves which can overtop the Galveston Seawall and levee systems as sheetflow

  - rainfall generated by the storm

  - astronomical tidal effects[1]

  - river flooding

- The wind speeds indicated in the ten-minute intervals are ten-minute sustained winds. These sustained winds can have gusts according to the following multiplier factors: over water - 1.43; over flat grass - 1.31; over woodlands and suburbs - 1.11.

A listing of simulated storms run through SLOSH can be seen in Table 1-2. Their tracks are displayed in Figure 1-2.

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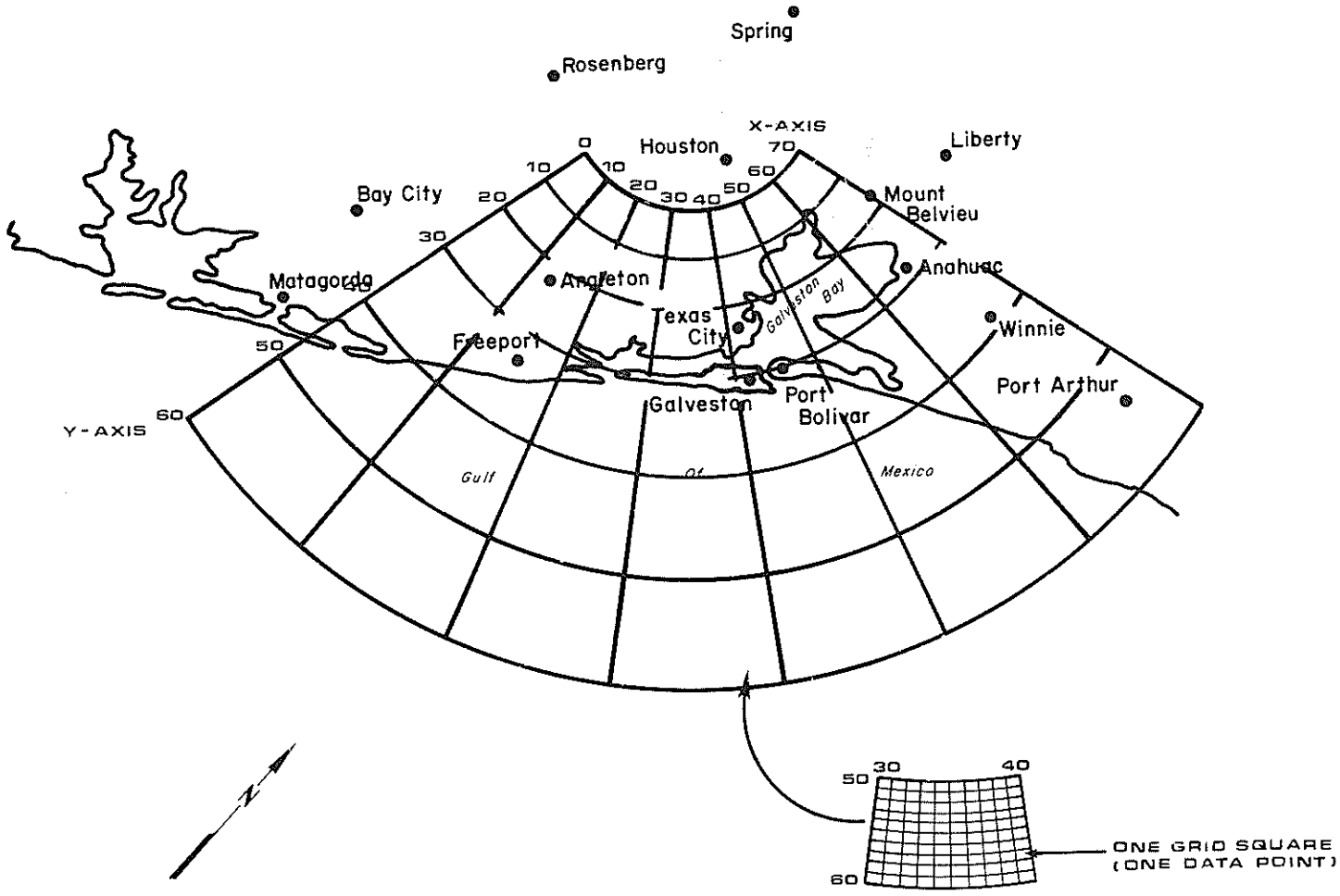
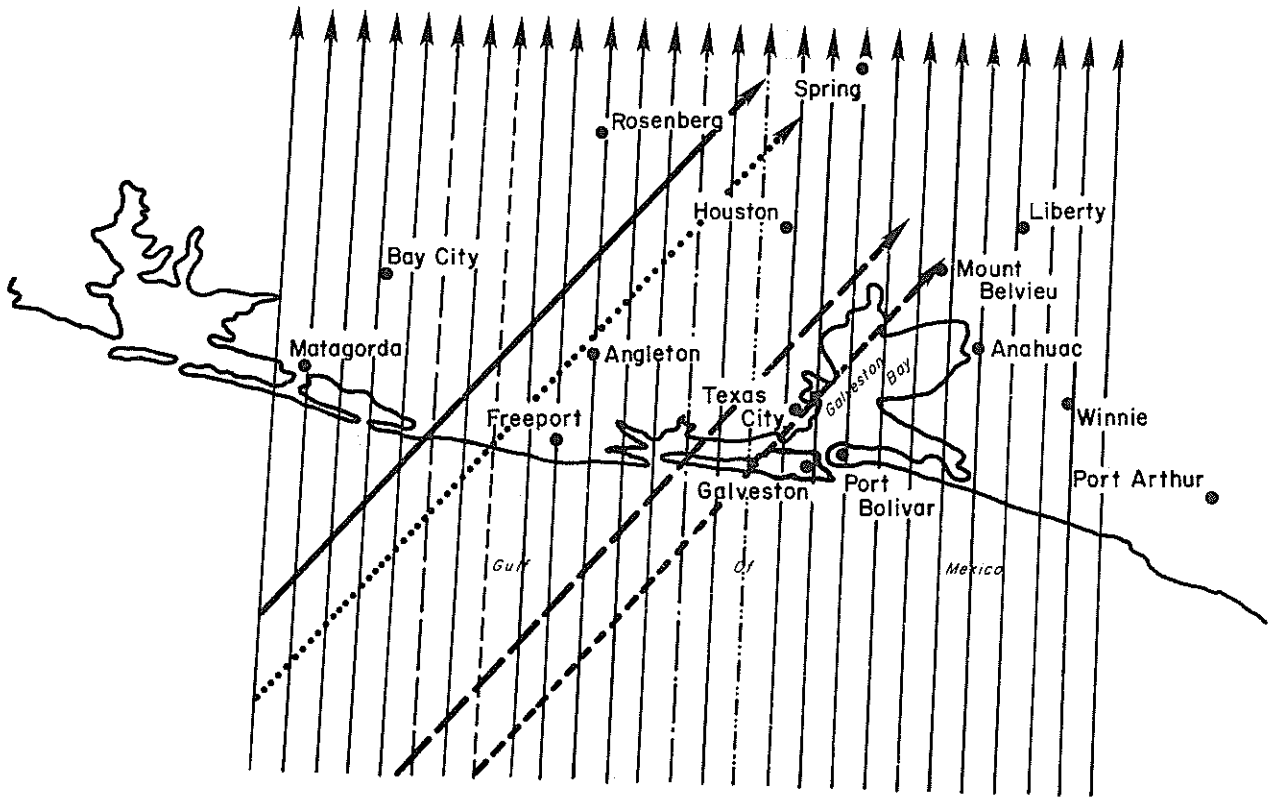
[1]Interpretive methods for levee systems, Galveston Island, and the 52 data points address the astronomical tidal effects (See pages 2-8 and 2-22).




POLAR GRID
FIGURE 1-1



| | | |
|---|---|---|
| 360° CAT. 5 | 10 MILES | LEFT OF GALVESTON |
| 360° CAT. 1 - 4 | 20 MILES | LEFT OF GALVESTON |
| 360° CAT. 5 | 10 MILES | LEFT OF FREEPORT |
| 360° CAT. 1 - 4 | 20 MILES | LEFT OF FREEPORT |
| 320° CAT. 5 | 10 MILES | LEFT OF GALVESTON |
| 320° CAT. 1 - 4 | 20 MILES | LEFT OF GALVESTON |
| 320° CAT. 5 | 10 MILES | LEFT OF FREEPORT |
| 320° CAT. 1 - 4 | 20 MILES | LEFT OF FREEPORT |
| 320° CAT. 3 | 5 MILE INTERVALS | |

SIMULATED HURRICANE TRACKS
FIGURE 1-2

TABLE 1-1

SLOSH DATA POINTS

| Point Number | Name | Y,X | Elevation[1] | Location |
|---|---|---|---|---|
| 1 | SAN BE RIV | 34, 9 | 3.0' | San Bernard River and the Intra-coastal Waterway |
| 2 | FREEPORT | 34,12 | - | Brazos River Mouth |
| 3 | WEST FRPT | 30,11 | 10.0' | Highway 36 west of Brazos River by Freeport |
| 4 | BA BI 288 | 24,11 | 14.0' | Highway 288 at Bastrop Bayou |
| 5 | BRAZORIA | 32,14 | 6.0' | FM 1495 by mouth of Brazos River at Quintana Beach |
| 6 | SURF | 33,15 | - | Mouth of Old Brazos River |
| 7 | NOR LEVEE | 28,14 | 5.0' | Highway 523 north of Protection Levee |
| 8 | BA BI 227A | 25,17 | 6.0' | Highway 227A at Bastrop Bayou |
| 9 | DRUM BAY | 30,19 | 8.0' | Highway 257 by Drum Bay |
| 10 | SAN LUBR | 28,24 | 3.0' | Highway 257 by San Luis Pass Bridge |
| 11 | CH BI 2004 | 20,23 | 9.0' | FM 2004 at Chocolate Bayou |
| 12 | SEA ISLE | 28,28 | - | Beach off Sea Isle |
| 13 | PIRATES BE | 28,33 | - | Beach off Pirates Beach |
| 14 | SEA WA END | 29,36 | - | Beach at end of Seawall |
| 15 | PLSURE PR | 30,40 | - | Beach at Pleasure Pier |
| 16 | FRT POINT | 29,43 | - | Galveston Bay entrance by Fort Point |
| 17 | ANMUN | 28,41 | 10.0' | Texas A&M Univ. on Pelican Island |
| 18 | PELICAN IS | 27,41 | - | Galveston Bay off Pelican Island |
| 19 | CAUSEWAY | 26,38 | 6.0' | Galveston Causeway |
| 20 | VIRGINIA P | 25,38 | 6.4' | I-45 near Virginia Point |

TABLE 1-1 (Cont.)

SLOSH DATA POINTS

| Point Number | Name | Y,X | Elevation[1] | Location |
|---|---|---|---|---|
| 21 | TEX CITY | 24,40 | 21.0' | Texas City Levee South |
| 22 | TEX CITY DK | 25,43 | 6.7' | Texas City Dike |
| 23 | HILAND BIO | 23,37 | 3.0' | Highway 6 by Highland Bayou |
| 24 | LAMARQ | 22,38 | 14.0' | Texas City Levee West |
| 25 | WEST LEVEE | 20,36 | 9.9' | Highway 6 at Hitchcock |
| 26 | DICK BAY | 18,44 | - | Dickinson Bay |
| 27 | D BI 146 | 17,43 | 19.0' | Highway 146 and Dickinson Bayou |
| 28 | GUM BIO | 15,42 | 7.0' | Highway 517 and Gum Bayou |
| 29 | D BI 3 | 13,40 | 11.0' | Highway 3 and Dickinson Bayou |
| 30 | D BI 45 | 12,39 | 14.2' | I-45 and Dickinson Bayou |
| 31 | W GAL BA | 14,48 | - | West Galveston Bay |
| 32 | KEMAH 146 | 11,47 | 3.6' | Highway 146 and Kemah |
| 33 | CL LAK CITY | 8,46 | - | Clear Lake |
| 34 | CL CR 3 | 8,42 | 11.7' | Highway 3 and Clear Lake Creek |
| 35 | CL CR 45 | 7,41 | 10.7' | I-45 and Clear Lake Creek |
| 36 | SHOREACRES | 10,52 | 4.5 | Bayport Road in Shoreacres |
| 37 | BAYTOWN | 10,59 | - | Tabbs Bay |
| 38 | BAY TUNN | 8,59 | 10.1' | Highway 146 north of Baytown Tunnel |
| 39 | SCOTT BAY | 6,62 | - | Scott Bay |
| 40 | LYNCHBURG | 5,64 | - | Burnett Bay and 134 north of Lynchburg Ferry Crossing |
| 41 | CEDAR B | 14,58 | 2.2' | FM 2354 north of Cedar Bayou |
| 42 | BEACH RD | 19,61 | 12.5' | FM 2354 by Trinity Bay |

TABLE 1-1 (Cont.)

SLOSH DATA POINTS

| Point Number | Name | Y,X | Elevation[1] | Location |
|---|---|---|---|---|
| 43 | WALVILL | 25,67 | 13.0' | I-10 at Wallisville |
| 44 | ANAHUAC | 26,64 | 17.0' | Bayshore Road at Anahuac |
| 45 | OAK ISL | 27,59 | 4.0' | Eagle Road at Oak Island |
| 46 | SMITH POIN | 28,56 | 4.6' | Highway 562 north of Lake Stephenson |
| 47 | WHITE RANCH | 33,59 | 7.0' | FM 1985 at Oyster Bayou |
| 48 | PORT BOLIV | 28,44 | 5.0' | Highway 87 east of Ferry |
| 49 | CRYSTAL BE | 32,50 | - | Beach east of Crystal Beach |
| 50 | GILCHRIST | 36,54 | 4.0' | Highway 87 east of Gilchrist |
| 51 | HI ISLAND | 38,57 | 4.0' | Highway 124 north of High Island |
| 52 | HI ISL S | 39,56 | 5.0' | Highway 87 in Chambers County |

[1]The elevation is of the specific location in the grid square.

SOURCE: Center for Strategic Technology, Texas A&M University System, College Station, Texas.

TABLE 1-2

SIMULATED SLOSH HURRICANES (77)

| Point of Landfall | Movement Speed (Miles per Hour) | Direction (In Degrees) | Category (Saffir-Simpson Scale) | Radius of Maximum Winds | Pressure Drop (Millibars) |
|---|---|---|---|---|---|
| 20 Miles Left of Galveston | 5 | 320° | 1 | 20 | 30 |
| 20 Miles Left of Galveston | 10 | 320° | 1 | 20 | 30 |
| 20 Miles Left of Galveston | 15 | 320° | 1 | 20 | 30 |
| 20 Miles Left of Galveston | 20 | 320° | 1 | 20 | 30 |
| 20 Miles Left of Galveston | 5 | 320° | 2 | 20 | 40 |
| 20 Miles Left of Galveston | 10 | 320° | 2 | 20 | 40 |
| 20 Miles Left of Galveston | 15 | 320° | 2 | 20 | 40 |
| 20 Miles Left of Galveston | 20 | 320° | 2 | 20 | 40 |
| 20 Miles Left of Galveston | 5 | 320° | 3 | 20 | 60 |
| 20 Miles Left of Galveston | 10 | 320° | 3 | 20 | 60 |
| 20 Miles Left of Galveston | 15 | 320° | 3 | 20 | 60 |
| 20 Miles Left of Galveston | 20 | 320° | 3 | 20 | 60 |
| 20 Miles Left of Galveston | 5 | 320° | 4 | 20 | 80 |
| 20 Miles Left of Galveston | 10 | 320° | 4 | 20 | 80 |
| 20 Miles Left of Galveston | 15 | 320° | 4 | 20 | 80 |
| 20 Miles Left of Galveston | 20 | 320° | 4 | 20 | 80 |
| 10 Miles Left of Galveston | 5 | 320° | 5 | 12 | 100 |
| 10 Miles Left of Galveston | 10 | 320° | 5 | 12 | 100 |
| 10 Miles Left of Galveston | 15 | 320° | 5 | 12 | 100 |
| 10 Miles Left of Galveston | 20 | 320° | 5 | 12 | 100 |
| 20 Miles Left of Galveston | 5 | 360° | 1 | 20 | 30 |
| 20 Miles Left of Galveston | 10 | 360° | 1 | 20 | 30 |
| 20 Miles Left of Galveston | 5 | 360° | 2 | 20 | 40 |
| 20 Miles Left of Galveston | 20 | 360° | 2 | 20 | 40 |
| 20 Miles Left of Galveston | 5 | 360° | 3 | 20 | 60 |
| 20 Miles Left of Galveston | 20 | 360° | 3 | 20 | 60 |
| 20 Miles Left of Galveston | 5 | 360° | 4 | 20 | 80 |
| 20 Miles Left of Galveston | 20 | 360° | 4 | 20 | 80 |
| 10 Miles Left of Galveston | 5 | 360° | 5 | 12 | 100 |
| 10 Miles Left of Galveston | 20 | 360° | 5 | 12 | 100 |
| 20 Miles Left of Freeport | 5 | 320° | 1 | 20 | 30 |
| 20 Miles Left of Freeport | 20 | 320° | 1 | 20 | 30 |
| 20 Miles Left of Freeport | 5 | 320° | 2 | 20 | 40 |
| 20 Miles Left of Freeport | 20 | 320° | 2 | 20 | 40 |
| 20 Miles Left of Freeport | 5 | 320° | 3 | 20 | 60 |
| 20 Miles Left of Freeport | 20 | 320° | 3 | 20 | 60 |
| 20 Miles Left of Freeport | 5 | 320° | 4 | 20 | 80 |
| 20 Miles Left of Freeport | 20 | 320° | 4 | 20 | 80 |

TABLE 1-2 (Cont.)

| Point of Landfall | Movement Speed (Miles per Hour) | Direction (In Degrees) | Category (Saffir-Simpson Scale) | Radius of Maximum Winds | Pressure Drop (Millibars) |
|---|---|---|---|---|---|
| 10 Miles Left of Freeport | 5 | $320^{o}$ | 5 | 12 | 100 |
| 10 Miles Left of Freeport | 20 | $320^{o}$ | 5 | 12 | 100 |
| 20 Miles Left of Freeport | 5 | $360^{o}$ | 1 | 20 | 30 |
| 20 Miles Left of Freeport | 20 | $360^{o}$ | 1 | 20 | 30 |
| 20 Miles Left of Freeport | 5 | $360^{o}$ | 2 | 20 | 40 |
| 20 Miles Left of Freeport | 20 | $360^{o}$ | 2 | 20 | 40 |
| 20 Miles Left of Freeport | 5 | $360^{o}$ | 3 | 20 | 60 |
| 20 Miles Left of Freeport | 20 | $360^{o}$ | 3 | 20 | 60 |
| 20 Miles Left of Freeport | 5 | $360^{o}$ | 4 | 20 | 80 |
| 20 Miles Left of Freeport | 20 | $360^{o}$ | 4 | 20 | 80 |
| 10 Miles Left of Freeport | 5 | $360^{o}$ | 5 | 12 | 100 |
| 10 Miles Left of Freeport | 20 | $360^{o}$ | 5 | 12 | 100 |
| 45 Miles Right of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 40 Miles Right of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 35 Miles Right of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 30 Miles Right of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 25 Miles Right of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 20 Miles Right of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 15 Miles Right of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 10 Miles Right of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 5 Miles Right of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 0 Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 5 Miles Left of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 10 Miles Left of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 15 Miles Left of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 20 Miles Left of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 25 Miles Left of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 30 Miles Left of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 35 Miles Left of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 40 Miles Left of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 45 Miles Left of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 50 Miles Left of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 55 Miles Left of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 60 Miles Left of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 65 Miles Left of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 70 Miles Left of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 75 Miles Left of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 80 Miles Left of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |
| 85 Miles Left of Galveston | 10 | $320^{o}$ | 3 | 20 | 60 |

SOURCE: Center for Strategic Technology, Texas A&M University System, College Station, Texas.

## *PART B: SURVEY*

A copy of the survey questionnaire is displayed in Figure 1-3 along with the directions which were printed on the reverse side of the questionnaire (Figure 1-4). The survey was designed to be conducted over the telephone using a minimum number of questions to obtain the necessary information. The questionnaire was pretested for clarity. The sample was selected through the services of Metromail.[1] Since the survey sample had to be selected before SLOSH information to determine maximum surge penetration was available, the area to be surveyed was overestimated. In areas more vulnerable to surge, it was estimated that there were 116,500 family units which had telephones. From these family units (selected using Metromail data), 5,000 names were chosen. This constituted a sample of approximately one out of every 23 families or 4.3 percent of the family units in this critical area.[2] Metromail had the capability of selecting approximately every 23rd name in this area. Information provided included names, telephone numbers, addresses, zip codes, census tract, and sub-census tract identification. In less critical areas, 2,000 names were chosen in the same manner. It was

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[1]A division of Metromedia, Inc., 11 Eisenhower Lane South, Lombard, Illinois 60148.

[2]The critical area included all of Galveston and Chambers counties along with certain zip codes in Brazoria County (77422, 77531, 77541, and 77571) and Harris County (77520, 77521, 77530, 77536, 77562, 77571, 77598, 77586, 77058, and 77062).

estimated that there were 91,500 family units in this area. The sample, therefore, consisted of about one in 46 or 2.2 percent.[1]

The telephone surveys were done by members of The American Red Cross Chapters in Galveston, Brazoria, and Harris counties. In Chambers County, they were conducted by the Tejas Del Sur Division of The American Red Cross. Training sessions were held in which the volunteers were instructed on correct telephone interviewing techniques. In order to avoid a survey bias which could be created by phoning only at certain times of the day, attempts were made to reach each household during three different time periods (morning, afternoon, evening or weekend) before they were labeled "unable to contact." Out of the 7,000 questionnaires, 3,948[2] were completed. This represented a response rate of 56.4 percent. Counting questionnaires lost through shipping (about 600), this indicates a response rate of about 66 percent.

To analyze the data, the questionnaires were sorted into their respective census tracts. The census tracts were then grouped into evacuation and contingency zones.[3]

A computer program was developed to indicate the number of vehicles evacuating each zone, their direction and destination. Also, estimates were made of the number of persons who would stay in local shelters, travel to specific cities in the study region for shelter, or travel outside the study region for shelter. To derive these estimates, ratios

---

[1]Zip codes from Brazoria (77486, 77511, 77515, 77430, 77534, 77431, 77577, 77578, 77463, 77581, 77583, and 77480) and Harris (77502 through 77506, 77547, 77015, 77017, 77034, 77089, 77532, 77044, 77049, 77059, 77587, and 77336).

[2]Only 2,638 of these were in the necessary areas. Those outside these areas were used for estimates of evacuation potential in the transportation study and shelter components.

[3]These zones will be more adequately described later.

and percentages were calculated from the survey data for each zone and then applied to the total population and household estimates for each zone (based on census tracts in each zone). The census tract data was supplied by the Houston-Galveston Area Council and was based on studies by the Rice Center for Community Design and Research. For all areas, 1980 projections were used, with the exception of Harris County (only 1978 projections were available). Since the study has been completed, preliminary 1980 census data has become available. In comparing the 1980 census data to the data used in the analysis, it appears that the estimates were high (except for Chambers County). Assuming current population growth trends will continue, the data used in the analysis will be accurate during the 1983 to 1984 period. This means that the vehicle evacuation and shelter-need estimates in this study are somewhat high.

FIGURE 1-3

Attempts Made:

_____ Morning

_____ Afternoon

_____ Evening or Weekend

EVACUATION SURVEY

Is this (telephone number)? *If a child answers, ask for a parent.*

* * * * * * *

This is (name of person calling) from (organization or institution). We are making a survey to determine what people's intentions are regarding hurricane evacuation. This information will be used to help develop a long range evacuation plan for (name of county) County. Would you be willing to answer a few questions? *If "yes," proceed; if "no," thank them for their time and proceed to the next call.*

* * * * * * *

If the local authorities recommend that you evacuate, would you leave:

| *If "yes," ask* | *If "no," ask* |
|---|---|
| To what area would you evacuate? _____ | What would you do? _____ |
| Would you plan to stay: | _____ |
| _____ with friends | _____ |
| _____ in a motel, or | _____ |
| _____ in a shelter if available | _____ |
| What form of transportation would you use? | _____ |
| _____ | _____ |
| _____ | _____ |
| *(If by own vehicle, ask:* Would you be taking more than one vehicle? Yes _____ No_____) | _____ |

Conclude call and thank them for their time.

FIGURE 1-4

DIRECTIONS

1. Each telephone number should be called at least three times before it is placed in a no-answer category. One contact should be during a morning hour, one during an afternoon hour, and one during a night or weekend time. The order of morning, afternoon, and night or weekend can be changed to night, morning, afternoon, and so forth. If we do not follow this procedure, we will have a bias survey of people who are home at certain times of the day. Please check the forms to indicate each time contact was attempted. This will enable us to know that each non-contacted number was tried three different times.

2. The telephone number is the key to the proper source of information. Even if the name of the people at that telephone number is different, the number determines the correctness of the call.

3. The names on the questionnaires such as "Charles Black" or "John Doe" merely indicate the names as they are listed in the telephone directory. Do not ask for "Charles" or "John;" otherwise, we will find out only what the males think. Rather, talk to the person answering the phone, if possible (unless a child answers).

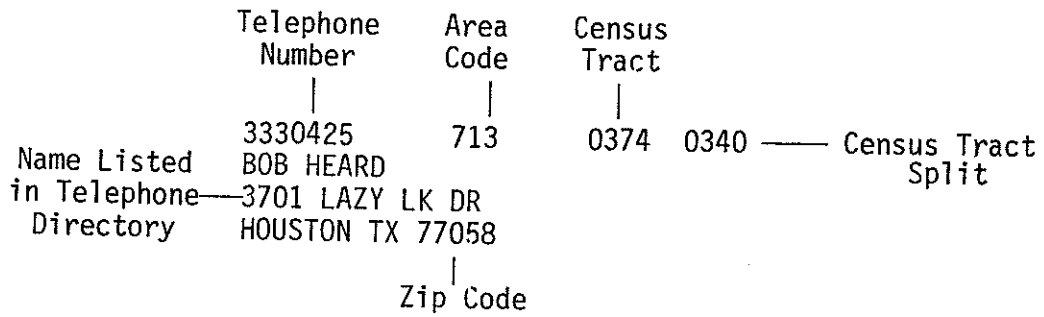
4. Try not to influence the answers people give. We are not interested in convincing them about what is right or wrong (at this point), but merely trying to discover what they think. Otherwise, the survey will will be invalid.

5. What you are to ask on the phone is in normal type; directions are in italics.

6. If the family cannot speak English and can only understand Spanish, write SPANISH on the top of the questionnaire and return it. They will later be contacted by someone fluent in Spanish.

7. In the event of a hurricane in the Gulf of Mexico, do not make phone calls to an area under a hurricane "watch" of "warning."

8. The label on the questionnaire on front is coded as follows:




On some labels, R000000 replaces Census Tract and Census Tract Splits.

## *PART C: EVACUATION TIMES*

Evacuation times were calculated using an existing computer model developed by the Texas Transportation Institute of The Texas A&M University System. This model was selected because it was already operational and could be adapted for this study at minimal cost.

The model (technically a traffic assignment algorithm) was used to do the bookkeeping involved in selecting evacuation routes and tabulating the number of evacuating vehicles using each roadway segment in the regional transportation system.

Input data for the transportation analysis was the data generated by the previously described survey.[1] The data consisted of the number of evacuating vehicles by each census tract (these census tracts were grouped into zones which are described in Section Three). Based on the desired destination, the computer program selected the minimum time path through the roadway network.[2] The minimum time path assumed no delays.

The output of the traffic assignment process was then compared with existing roadway capacities on roadway segments. Since the number of evacuating vehicles on the principal routes exceed the available hourly capacities, the minimum number of hours (of delay) required to clear the vehicles was computed.

---

[1]The data output can be seen in Part A of Section Four.

[2]Although the route selection process involved only a single routing from each zone (for a description of zones, see Section Three) to each destination, the results are reasonable because alternate routes would not provide significantly shorter evacuation times. Also, due to the numerous evacuation scenarios that are possible and the limited available data on how people might select alternate routes, it is unlikely that a better estimate could be made of evacuation times using alternate routes.

Three cautions must be made about the nature of the minimum evacuation times calculated in this manner. First, the minimum times assume the full utilization of the evacuation routes over the entire evacuation time. If the routes are not fully utilized at the beginning of the evacuation time, then the total evacuation time required will be greater. Second, the model assumes that there are no other vehicles on the roadway going in the same direction as the evacuating vehicles. Since it can be anticipated that some working persons will be returning to Houston using the same routes as the evacuating vehicles, the actual evacuation times could be greater than those predicted by the model. Third, no adjustment has been made for tourists in the study area. If the tourists do not leave before the residents begin evacuating, the additional vehicles of the tourists could increase the evacuation times.

## SECTION TWO: SLOSH DATA

SLOSH data presented in this section describes wind and storm surge threats posed by various types of hurricanes. This data should assist in decision making needed when hurricanes pose threats to the study area. This section first indicates the estimated maximum surge penetration possible for various storm intensities. Then, attention is focused on possible surge penetration according to storm type for the Freeport levee system, the Texas City levee system, and Galveston Island. Next, decision-making information available from the SLOSH runs for 52 critical data points is described. Finally, additional data is displayed for six critical data points.

## *PART A: MAXIMUM SURGE PENETRATION*

For planning purposes, it is important to know not only where surge can penetrate, but also where surge is unlikely. Figures 2-1 through 2-4 illustrate the SLOSH projected maximum surge penetration possible for hurricanes of varying intensities. Each figure represents the surge penetration of hurricanes with varying wind speeds. Wind speeds are grouped into five classifications as follows: 74-95 MPH, 96-110 MPH, 111-130 MPH, 131-155 MPH, and over 155 MPH. These wind speed classifications correspond to categories one through five of the Saffir-Simpson Scale.[1] This wind speed classification can be used to estimate the probable force of a hurricane. Caution must be used in making this estimate since hurricanes can quickly increase or decrease in intensity. For example, hurricane Celia doubled in intensity 12 hours before landfall.[2]

---

[1]See Appendix A for a further description of these categories.

[2]The same type of caution needs to be exercised in "estimating" storm track and movement speed. Those not trained in meteorology should not go beyond the general estimates needed for planning purposes, since the National Hurricane Center has other data available for more accurate "estimates." This information will be forthcoming in Advisories and Bulletins from the National Hurricane Center.

The SLOSH projected surge penetrations for each wind speed classification are based on a composite maximum surge of eight hurricanes:[1]

| Point of Landfall[2] | Movement (Speed) | Direction (In Degrees) |
|---|---|---|
| 20 Miles Left of Galveston | 5 MPH | $320^{o}$ |
| 20 Miles Left of Galveston | 20 MPH | $320^{o}$ |
| 20 Miles Lest of Galveston | 5 MPH | $360^{o}$ |
| 20 Miles Left of Galveston | 20 MPH | $360^{o}$ |
| 20 Miles Left of Freeport | 5 MPH | $320^{o}$ |
| 20 Miles Left of Freeport | 20 MPH | $320^{o}$ |
| 20 Miles Left of Freeport | 5 MPH | $360^{o}$ |
| 20 Miles Left of Freeport | 20 MPH | $360^{o}$ |

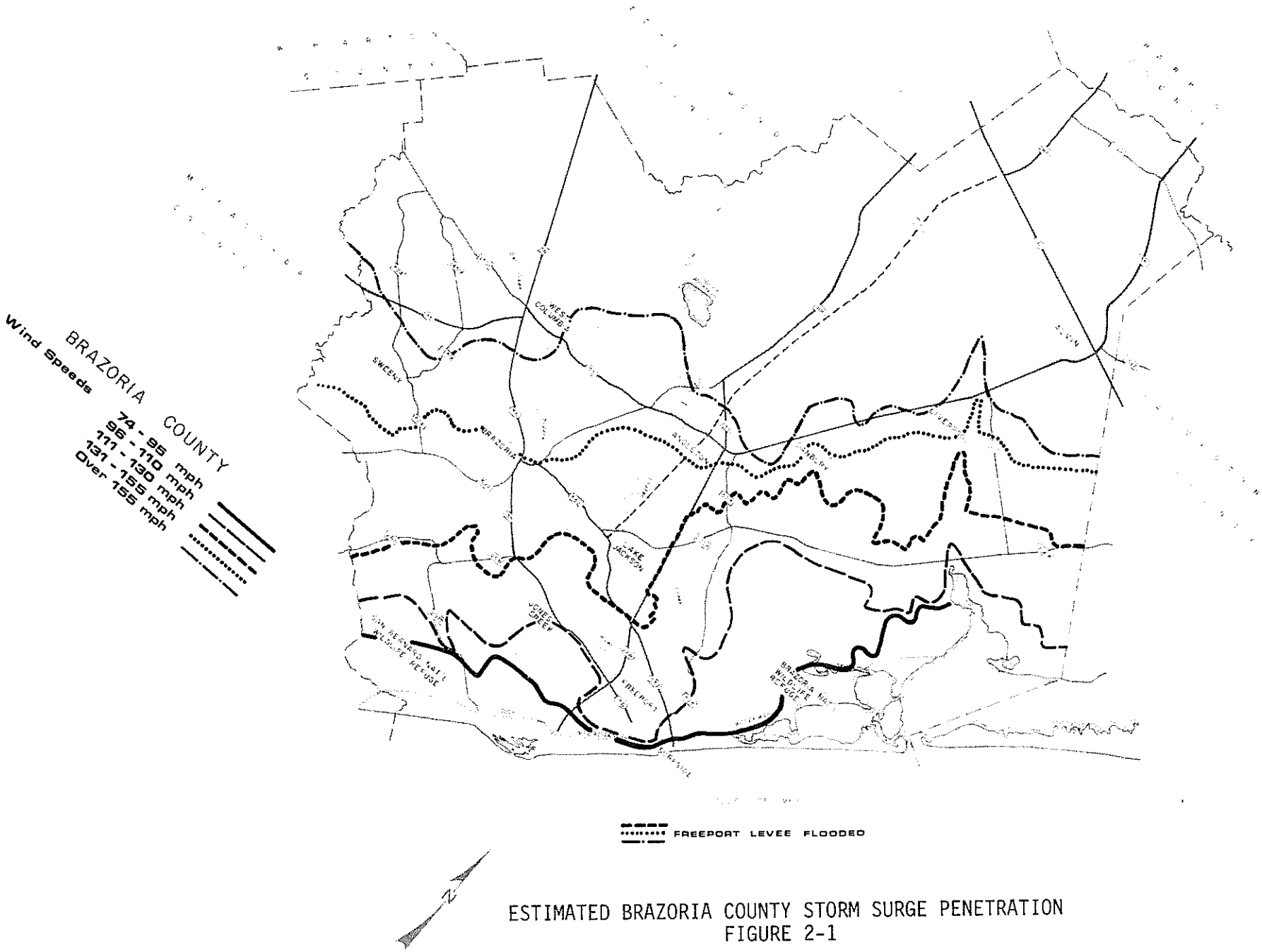
It should be noted that these surge lines are drawn from the mid-sections of SLOSH data points or grid squares. Surge penetration is shown when the average land elevation of a grid square is less than the SLOSH projected surge elevation of that grid square. Since projected surge elevation can be plus or minus 20 percent of the actual surge elevation, the surge line projections must be interpreted accordingly.

In some areas, surge penetration is indicated for areas which are not covered by usable SLOSH data points. These included primarily the southwestern portions of Brazoria County, the Houston Ship Channel, and the San Jacinto River area south of Lake Houston. The surge penetration in these areas was estimated by the depth of the storm surge at the edge of the model and the elevation of the land in that area. For the Houston Ship Channel, the surge was estimated to decrease at a sustained rate until the surge dissipated before I-610.

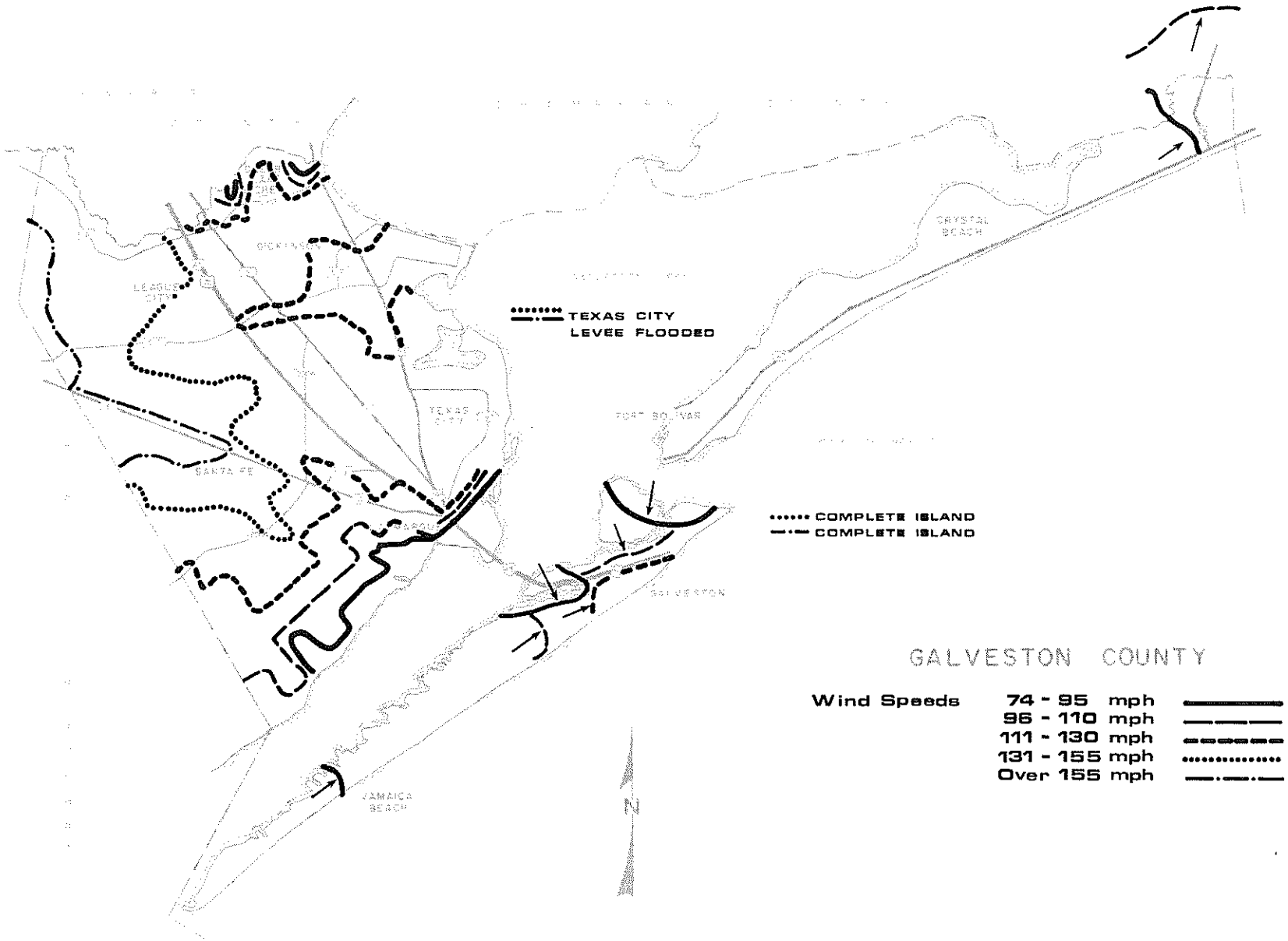
---

[1]Also, it should be noted that additional SLOSH simulated hurricane runs could in some places produce greater surge penetration than indicated in this report. This would be particularily true for Chambers County and locations midway between Galveston and Freeport.

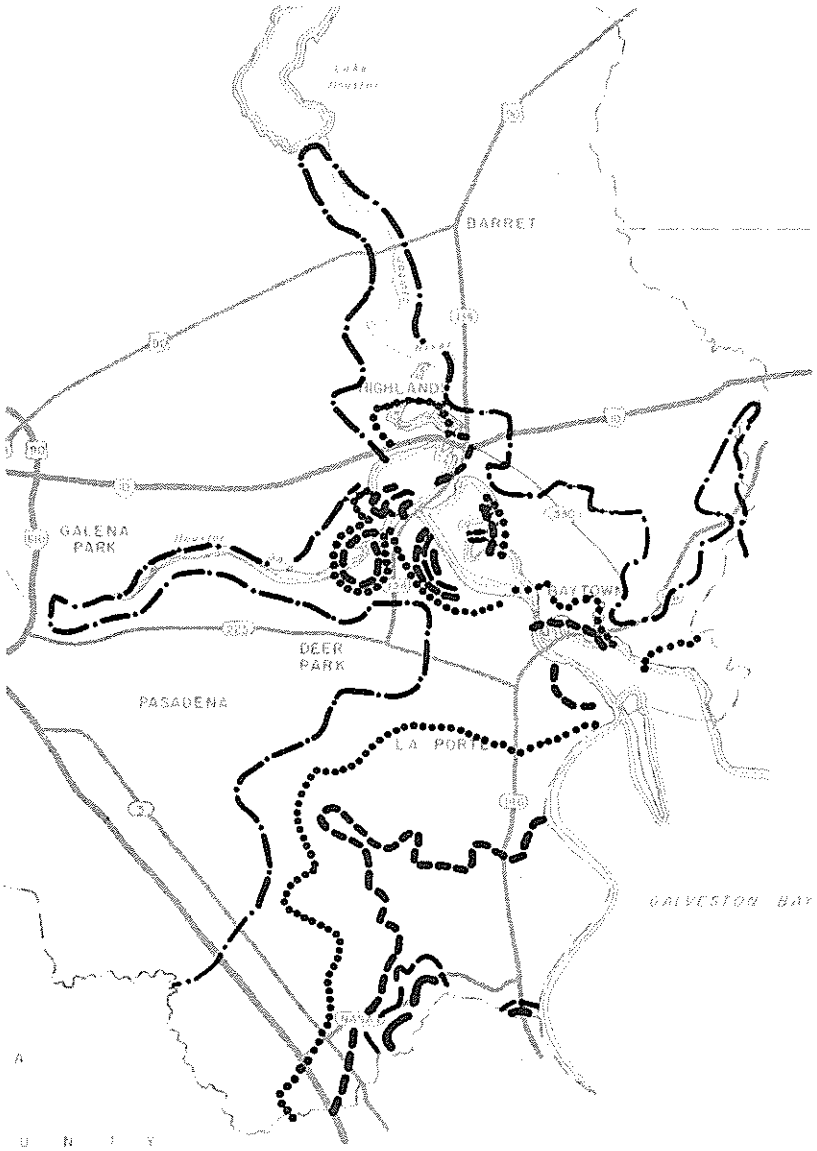
[2]Hurricanes with wind speeds of over 155 MPH had a point of landfall 10 miles left of Galveston and 10 miles left of Freeport.




ESTIMATED BRAZORIA COUNTY STORM SURGE PENETRATION
FIGURE 2-1



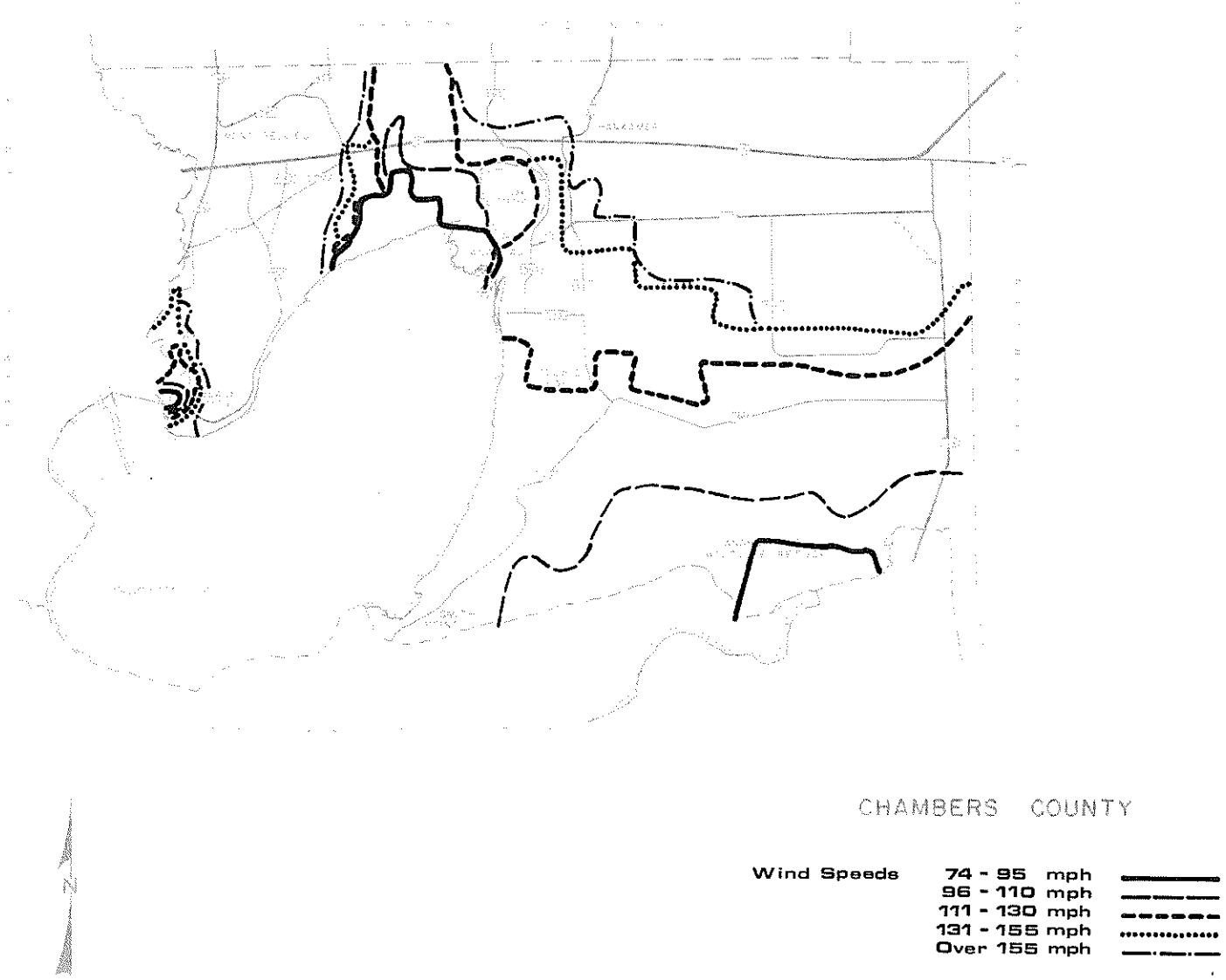

ESTIMATED GALVESTON COUNTY STORM SURGE PENETRATION
FIGURE 2-2




HARRIS COUNTY

| Wind Speeds | |
|---|---|
| 74 - 95 mph | |
| 96 - 110 mph | |
| 111 - 130 mph | |
| 131 - 155 mph | |
| Over 155 mph | |

ESTIMATED HARRIS COUNTY STORM SURGE PENETRATION
FIGURE 2-3




ESTIMATED CHAMBERS COUNTY STORM SURGE PENETRATION
FIGURE 2-4

## *PART B: AREAS OF SPECIAL CONCERN*

Three areas of special concern have been chosen because of their particular vulnerability. Surge penetration from varying types of hurricanes is described in greater detail for these three areas. The five-county study area has two major levee systems which are designed to protect residents and major industries located there. Figures 2-5 and 2-6 show SLOSH grid squares superimposed on the Freeport and Texas City levee systems. It should be noted that SLOSH can interpret levee systems (shorelines and roads, too) only in straight lines and $90^{0}$ angles. Hence, the actual locations of specific points should be adjusted accordingly. Each of these grid squares is numbered. Surge penetration from various types of hurricanes for these grid squares is then described in Tables 2-1 and 2-2. High tide surge penetration also is indicated.[1]

In interpreting the SLOSH data, the following cautions should be exercised:

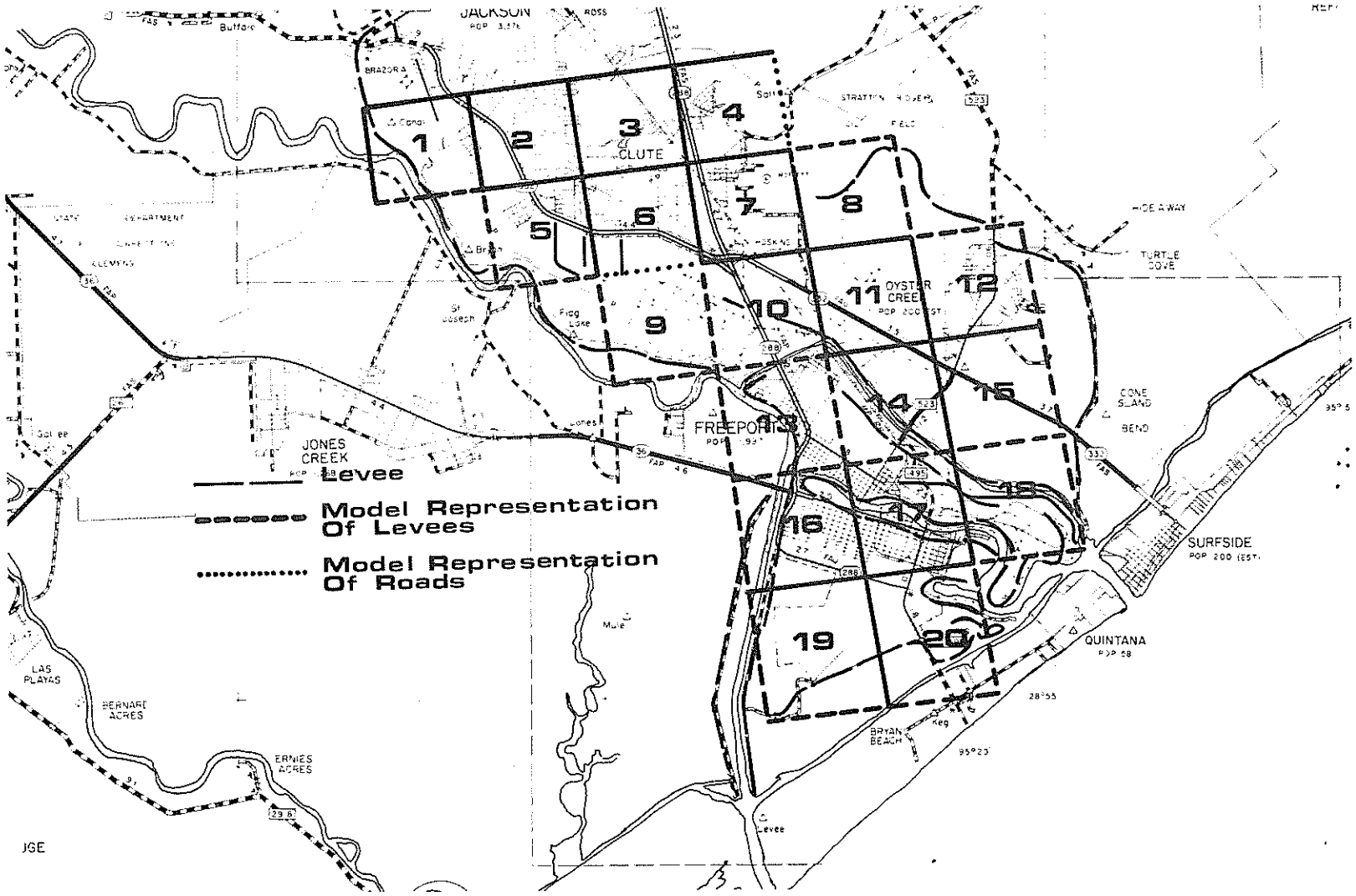
- The data assumes the integrity of the levee systems. A failure in the levee system could be disastrous.
- No adjustments have been made for possible flooding caused by hurricane-generated rainfall.
- No adjustments have been made for wave action which could send sheets of water over the levee systems.
- When considering evacuation, thought should be given to the possibility of storm-induced industrial accidents which could result in toxic materials being released inside the levee systems.

---

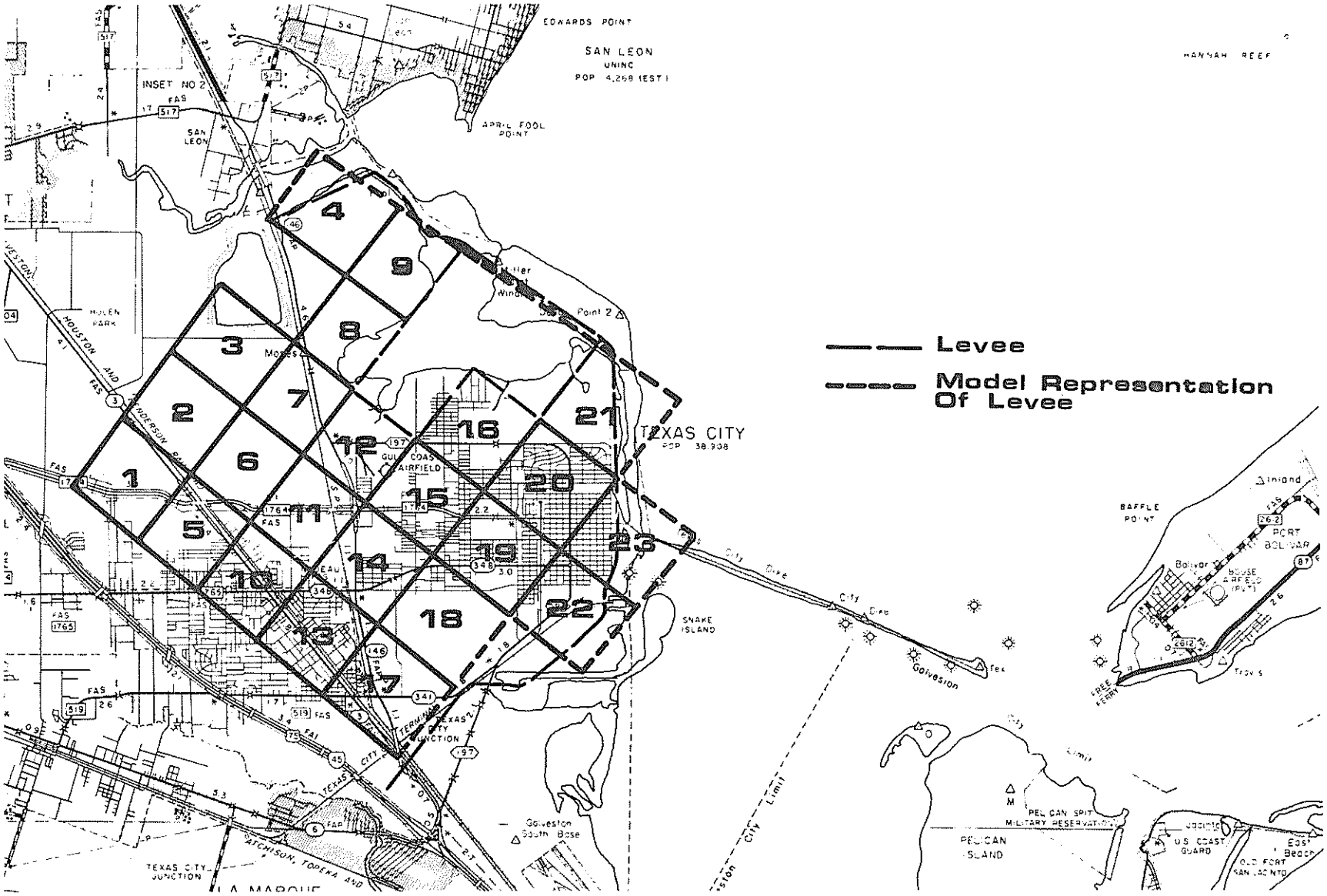
[1]High tide surge penetration was determined by adding 1.5 foot to the mean sea level height.

In Figure 2-7, a similar grid is superimposed on Galveston Island with surge penetration displayed by grid squares in Table 2-3. As with the Freeport and Texas City levee systems, certain cautions should be exercised in interpreting the information.

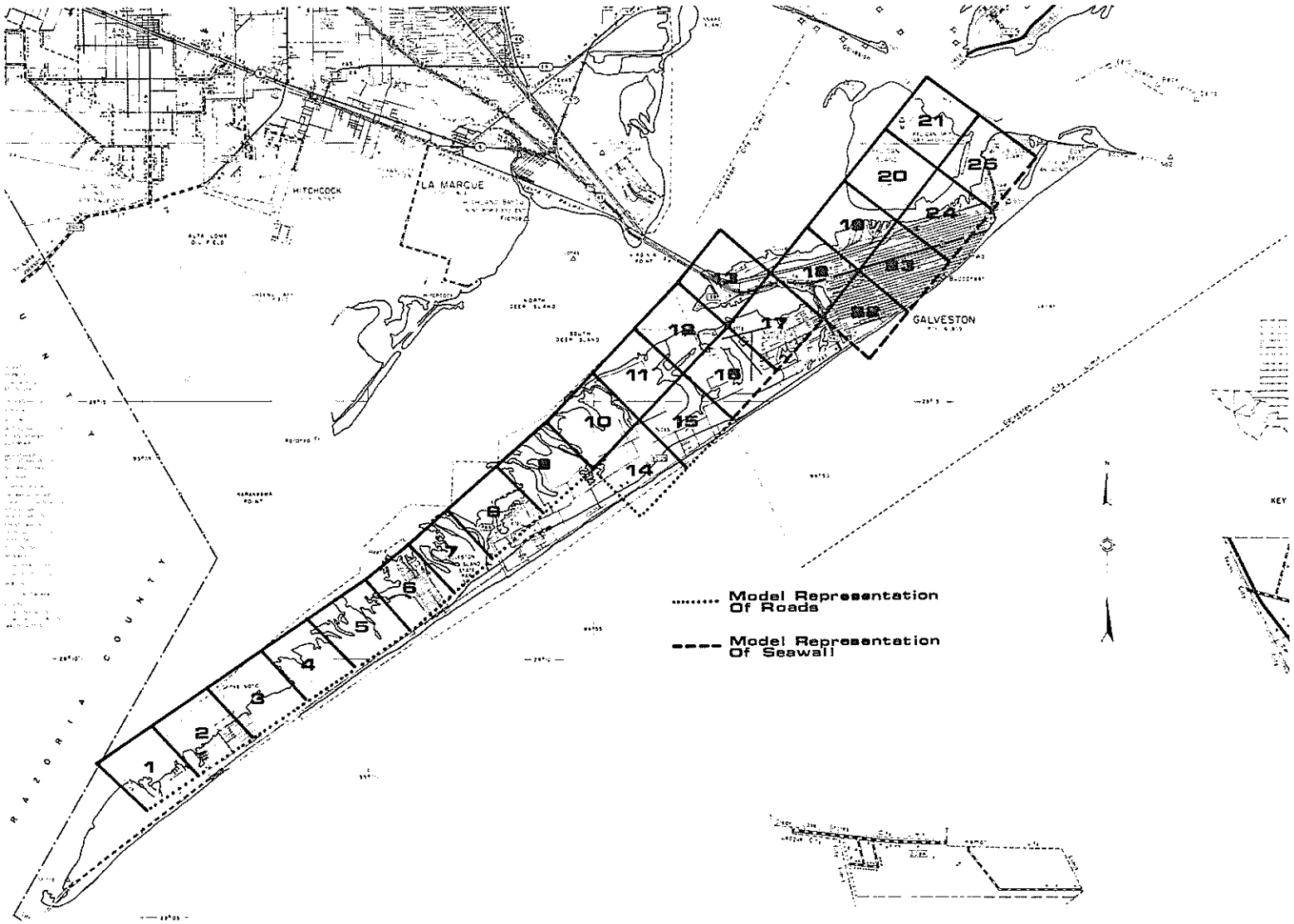
- No adjustments have been made for wave action which could send sheets of water over the Galveston Seawall.
- No adjustments have been made for possible flooding by hurricane-generated rainfall behind the Seawall.
- The data assumes the integrity of the Seawall.
- It is possible for the entire island to be flooded even if the Seawall is not overtopped because of surge from the unprotected bay side of the island.




FREEPORT LEVEE SYSTEM (See Table 2-1)
FIGURE 2-5




TEXAS CITY LEVEE SYSTEM (See Table 2-2)
FIGURE 2-6




GALVESTON ISLAND (See Table 2-3)
FIGURE 2-7

TABLE 2-1

FREEPORT LEVEE SYSTEM

| Hurricane Wind Speeds | Area Flooded | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Wind Speeds 74- 95 MPH | | | | | | | | | | | | | | | | | | | | |
| Wind Speeds 96-110 MPH | | | | | | | | | | | | | | | | | | | | |
| Wind Speeds 111-130 MPH | | | | | | | | | | | | | | | | | | | | |
| 20 Mi. Left of Free. | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | 0 | 0 | 0 | X | X | X | X | | | | 0 | | | | | | | | | |
| 320°/20MPH | | 0 | | | X | X | X | | X | 0 | X | | 0 | | 0 | 0 | | | | 0 |
| 360°/5MPH | | | | 0 | | 0 | 0 | | | | | | | | | | | | | |
| 360°/20MPH | 0 | 0 | | | X | X | X | | X | 0 | 0 | | 0 | | 0 | X | | | | 0 |
| 20 Mi. Left of Galv. | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | | | | | | | | | | | | | | | | | | | | |
| 320°/20MPH | | | | | | | | | | | | | | | | | | | | |
| 360°/5MPH | | | | | | | | | | | | | | | | | | | | |
| 360°/20MPH | | | | | | | | | | | | | | | | | | | | |
| Wind Speeds 131-155 MPH | | | | | | | | | | | | | | | | | | | | |
| 20 Mi. Left of Free. | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | X | X | X | X | X | X | X | X | X | X | X | 0 | 0 | 0 | 0 | 0 | | | | |
| 320°/20MPH | X | X | X | X | X | X | X | X | X | X | X | 0 | X | 0 | X | X | X | | X | X |
| 360°/5MPH | X | X | X | X | X | X | X | X | X | X | X | | | | | | | | | |
| 360°/20MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | | X | X |
| 20Mi. Left of Galv. | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | | | | | | | | | | | | | | | | | | | | |
| 320°/20MPH | | | | | | | | | | | | | | | | | | | | |
| 360°/5MPH | | | | | | | | | | | | | | | | | | | | |
| 360°/20MPH | | | | | | | | | | | | | | | | | | | | |
| Wind Speeds over 155 MPH | | | | | | | | | | | | | | | | | | | | |
| 10 Mi. Left of Free. | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | | | | |
| 320°/20MPH | | | 0 | X | X | X | X | X | X | 0 | 0 | X | 0 | | 0 | 0 | 0 | 0 | | 0 |
| 360°/5MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | | X | X |
| 360°/20MPH | | | | | 0 | 0 | 0 | 0 | X | 0 | X | 0 | X | | 0 | X | 0 | | 0 | 0 |

TABLE 2-1 (Cont.)

FREEPORT LEVEE SYSTEM

| Hurricane Wind Speeds | Area Flooded | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Wind Speeds over 155 MPH 10 Mi. Left of Galv. | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | | | | | | | | | | | | | | | | | | | | |
| 320°/20MPH | | | | | | | | | | | | | | | | | | | | |
| 360°/5MPH | | | | | | | | | | | | | | | | | | | | |
| 360°/20MPH | | | | | | | | | | | | | | | | | | | | |

X = Flooded

O = Flooded only at high tide

Areas with no entry means flooding not indicated.

SOURCE: Center for Strategic Technology, Texas A&M University System, College Station, Texas.

TABLE 2-2

TEXAS CITY LEVEE SYSTEM

| Hurricane Wind Speeds | Area Flooded | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| Wind Speeds 74- 95 MPH | | | | | | | | | | | | | | | | | | | | | | | |
| Wind Speeds 96-110 MPH | | | | | | | | | | | | | | | | | | | | | | | |
| Wind Speeds 111-130 MPH | | | | | | | | | | | | | | | | | | | | | | | |
| 20 Mi. Left of Free. | | | | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | | | | | | | | | | | | | | | | | | | | | | | |
| 320°/20MPH | | | | | | | | | | | | | | | | | | | | | | | |
| 360°/5MPH | | | | | | | | | | | | | | | | | | | | | | | |
| 360°/20MPH | | | | | | | | | | | | | | | | | | | | | | | |
| 20 Mi. Left of Galv. | | | | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | | | | | | | | | | | | | | | | | | | | | | | |
| 320°/20MPH | | | | | | | | | | | | | | | | | | | | | | | |
| 360°/5MPH | | | | | | | | | | | | | | | | | | | | | | | |
| 360°/20MPH | | | | | | | | | | | | | | | | | | | | | | | |
| Wind Speeds 131-155 MPH | | | | | | | | | | | | | | | | | | | | | | | |
| 20 Mi. Left of Free. | | | | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | | | | | | | | | | | | | | | | | | | | | | | |
| 320°/20MPH | | | | | | | | | | | | | | | | | | | | | | | |
| 360°/5MPH | | | | | | | | | | | | | | | | | | | | | | | |
| 360°/20MPH | | | | | | | | | | 0 | 0 | | X | 0 | | | | X | 0 | | | | |
| 20 Mi. Left of Galv. | | | | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 320°/20MPH | 0 | | | | X | 0 | X | X | 0 | X | X | X | X | X | X | X | X | X | X | 0 | 0 | | |
| 360°/5MPH | 0 | X | X | X | 0 | X | X | X | X | 0 | X | X | X | 0 | X | X | X | 0 | 0 | X | X | X | X |
| 360°/20MPH | | | | | | | | | | 0 | 0 | | X | 0 | 0 | | X | X | 0 | | | | |
| Wind Speeds over 155 MPH | | | | | | | | | | | | | | | | | | | | | | | |
| 10 Mi. Left of Free. | | | | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | | | | | | | | | | | | | | | | | | | | | | | |
| 320°/20MPH | | | | | | | | | | | | | | | | | | | | | | | |
| 360°/5MPH | | | | | | | | | | | | | | | | | | | | | | | |
| 360°/20MPH | | | | | | | | | | 0 | 0 | | X | 0 | | | | X | 0 | | | | |

TABLE 2-2 (Cont.)

TEXAS CITY LEVEE SYSTEM

| Hurricane Wind Speeds | Area Flooded | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| Wind Speeds over 155 MPH 10 Mi. Left of Galv. | | | | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 320°/20MPH | | | | | | | | | | 0 | 0 | | X | 0 | | | | X | 0 | | | | |
| 360°/5MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 360°/20MPH | | | | | | | | | | | | | | | | | | | | | | | |

X = Flooded

0 = Flooded only at high tide

Areas with no entry means flooding not indicated.

SOURCE: Center for Strategic Technology, Texas A&M University System, College Station, Texas.

TABLE 2-3

GALVESTON ISLAND

| Hurricane Wind Speeds | Area Flooded 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wind Speeds 74- 95 MPH | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 Mi. Left of Free. | | | | | | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | X | X | X | X | 0 | 0 | 0 | 0 | 0 | 0 | 0 | X | | | | | | | | | | | | | |
| 320°/20MPH | X | X | X | X | 0 | 0 | 0 | 0 | 0 | 0 | | X | X | | | | | | | 0 | 0 | | | | 0 |
| 360°/5MPH | X | X | X | X | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | 0 | | | | 0 | 0 | 0 | | | | 0 |
| 360°/20MPH | X | X | X | X | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | 0 | 0 | | | | 0 |
| 20 Mi. Left of Galv. | | | | | | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | X | X | | 0 | 0 | 0 | | 0 | 0 | X | | | | X |
| 320°/20MPH | 0 | 0 | 0 | 0 | | | | | | | | X | X | | | | | | | 0 | X | | | | X |
| 360°/5MPH | X | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | X | X | | 0 | | | | 0 | 0 | 0 | | | | 0 |
| 360°/20MPH | X | X | X | X | 0 | 0 | | | | 0 | 0 | X | X | | | | | | 0 | 0 | X | | | | X |
| Wind Speeds 96-110 MPH | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 Mi. Left of Free. | | | | | | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | X | X | X | X | 0 | 0 | 0 | 0 | 0 | 0 | 0 | X | X | | 0 | | | | 0 | 0 | 0 | | | | 0 |
| 320°/20MPH | X | X | X | X | X | X | X | X | 0 | 0 | 0 | X | X | | | | | | 0 | 0 | 0 | | | | 0 |
| 360°/5MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 | 0 | 0 | 0 | | X | 0 | X | | | | X |
| 360°/20MPH | X | X | X | X | X | X | X | 0 | 0 | 0 | X | X | X | 0 | 0 | 0 | 0 | | | 0 | 0 | | | | 0 |
| 20 Mi. Left of Galv. | | | | | | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | X | X | X | X | 0 | 0 | X | X | X | X | X | X | X | 0 | 0 | 0 | 0 | 0 | X | X | X | | | | X |
| 320°/20MPH | X | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | X | X | X | X | X | X | 0 | 0 | 0 | X | 0 | X | | | | X |
| 360°/5MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 | 0 | 0 | 0 | | X | 0 | X | | | | X |
| 360°/20MPH | X | X | X | X | X | 0 | 0 | 0 | 0 | X | X | X | X | X | X | 0 | 0 | 0 | X | 0 | X | | | | X |
| Wind Speeds 111-130MPH | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 Mi. Left of Free. | | | | | | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | | | | X |
| 320°/20MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 | X | X | X | | | | X |
| 360°/5MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | | | | X |
| 360°/20MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 | X | | | | X |
| 20 Mi. Left of Galv. | | | | | | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | | | | X |
| 320°/20MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | | | | X |
| 360°/5MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | | | | X |
| 360°/20MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | | | | X |

TABLE 2-3 (Cont.)

GALVESTON ISLAND

| Hurricane Wind Speeds | Area Flooded 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wind Speeds 131-155MPH | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20Mi. Left of Free. | | | | | | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | | | | X |
| 320°/20MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | | | | X |
| 360°/5MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 | X | X | X | | | | X |
| 360°/20MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 | 0 | 0 | X |
| 20 Mi. Left of Galv. | | | | | | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 | X | X | X |
| 320°/20MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 | 0 | X | X |
| 360°/5MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 | 0 | X | X |
| 360°/20MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Wind Speeds over 155MPH | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 Mi. Left of Free. | | | | | | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 | X | 0 | X | X | X | 0 | 0 | 0 | X |
| 320°/20MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 | 0 | 0 | X |
| 360°/5MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 | X | 0 | 0 | | | | X |
| 360°/20MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 | 0 | 0 | X |
| 10 Mi. Left of Galv. | | | | | | | | | | | | | | | | | | | | | | | | | |
| 320°/5MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 | X | X | X |
| 320°/20MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | 0 | 0 | 0 | X |
| 360°/5MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| 360°/20MPH | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |

X = Flooded

0 = Flooded only at high tide

Areas with no entry means flooding not indicated.

SOURCE: Center for Strategic Technology, Texas A&M University System, College Station, Texas.

## *PART C: DATA POINTS*

More specific information is available for 52 data points. The data point locations are displayed in Figures 2-8 through 2-11. A listing of the 52 data points expanded to 68[1] is given in Table 2-4.

For each data point, Appendix B contains one page of data which displays the decision-making information calculated for 80 different hurricanes. When a hurricane becomes a threat in the Gulf, an estimate can be made as to which of the 80 hurricane types it will most closely resemble. Then the interpretative information for that particular hurricane may be used to obtain the general estimates required for initial decision making. It should be remembered that both point of landfall and hurricane track for these 80 hurricanes were chosen to produce maximum surges for both the Galveston-Baytown and the Freeport areas. When this data is used in making decisions, it would be unwise to use points of landfall and hurricane tracks which would minimize surge activity; the unpredictability of hurricanes makes possible last-minute shifts in track and landfall which could result in maximum surge. Hence, it is best to make the initial decisions based on the maximum possibilities.

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[1]For some data points, it was possible to present interpretative information on two differing conditions. For instance, an offshore data point before the coast could be used in the interpretative data to indicate the time the storm surge would reach the coastline, while at the same time it could be used to indicate the time the storm surge would flood a shoreline road having a higher elevation than the shoreline. Of the 52 points, 16 permitted such dual usage. This expanded the 52 data points to 68.

The 80 hurricanes include 16 of each storm intensity. Storm intensity is determined by wind speed, which is grouped into five classifications, as follows:

74- 95 MPH
96-110 MPH
111-130 MPH
131-155 MPH
over 155 MPH

It should be noted that these wind speeds correspond to categories one through five of the Saffir-Simpson Scale. For each of these intensities, eight hurricanes have their point of landfall left of Galveston and eight left of Freeport. These points of landfall produce maximum surges for Galveston Bay and for Freeport. Four of the hurricanes have a track of $320^{0}$ and four a track of $360^{0}$. Each group of four is divided by different forward movement speeds (5 MPH, 10 MPH, 15 MPH, and 20 MPH).

For each hurricane, the following information is given:

- The number of hours plus or minus the anticipated time of landfall when wind gusts could reach 52 MPH. This indicates the point in time when wind gusts could tip trucks and buses.
- The direction from which the wind will be blowing at that point in time.
- Assuming the hurricane continues on the same track at the same speed, the number of hours during which those gusting conditions will continue.

Next, the same information is given for wind gusts of 65.5 MPH. This is a point beyond which it would be unwise to have any vehicles on the roads. Storm surge cutoff times are then given in hours plus or minus anticipated time of landfall under low, mean sea level, and high tide conditions. Finally, the maximum high tide surge anticipated for that data point is given in feet. To obtain the maximum surge depth overland, the land elevation must be subtracted from the maximum high tide surge.

For each sheet in Appendix B, the following interpretative information is given:

"Caution 1: Waves Action & Rainfall Not Included In Calculation. Caution 2: Errors of + or - 20 Percent Possible With Accurate Initial Data: Errors Increase With Inaccurate Initial Data. NC = Not Calculable From Data. TIME = Hours & 1/2 Hour. FTOL = From Time of Landfall In Hours (+ or -) When Wind Speed Exceeded Or Tide Exceeds Point Elevation."

At the bottom of each page, the following interpretative cautions are given:

+ OR - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320° landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320° landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

## HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

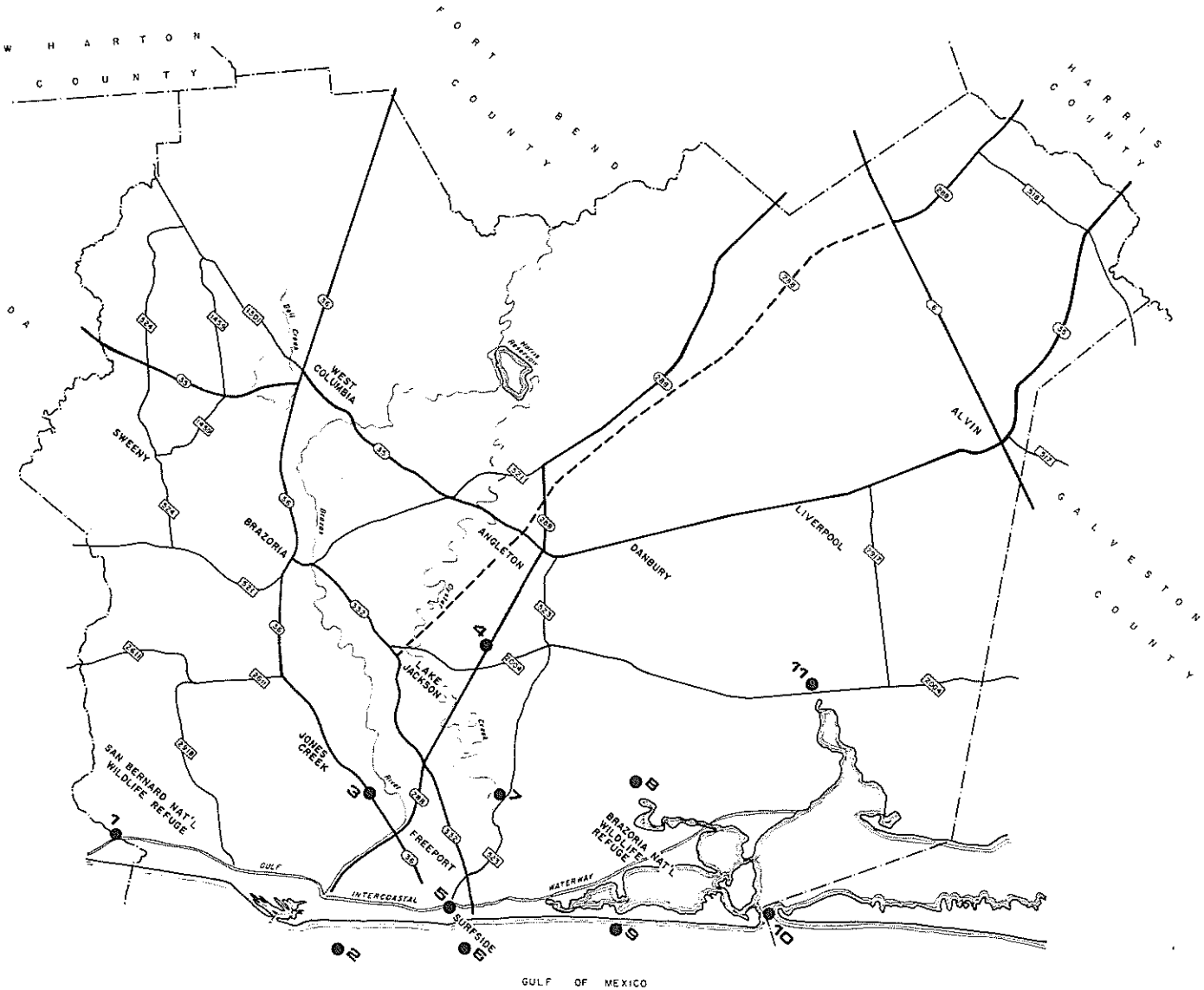
| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

## MAXIMUM HIGH TIDE SURGE INTERPRETATION

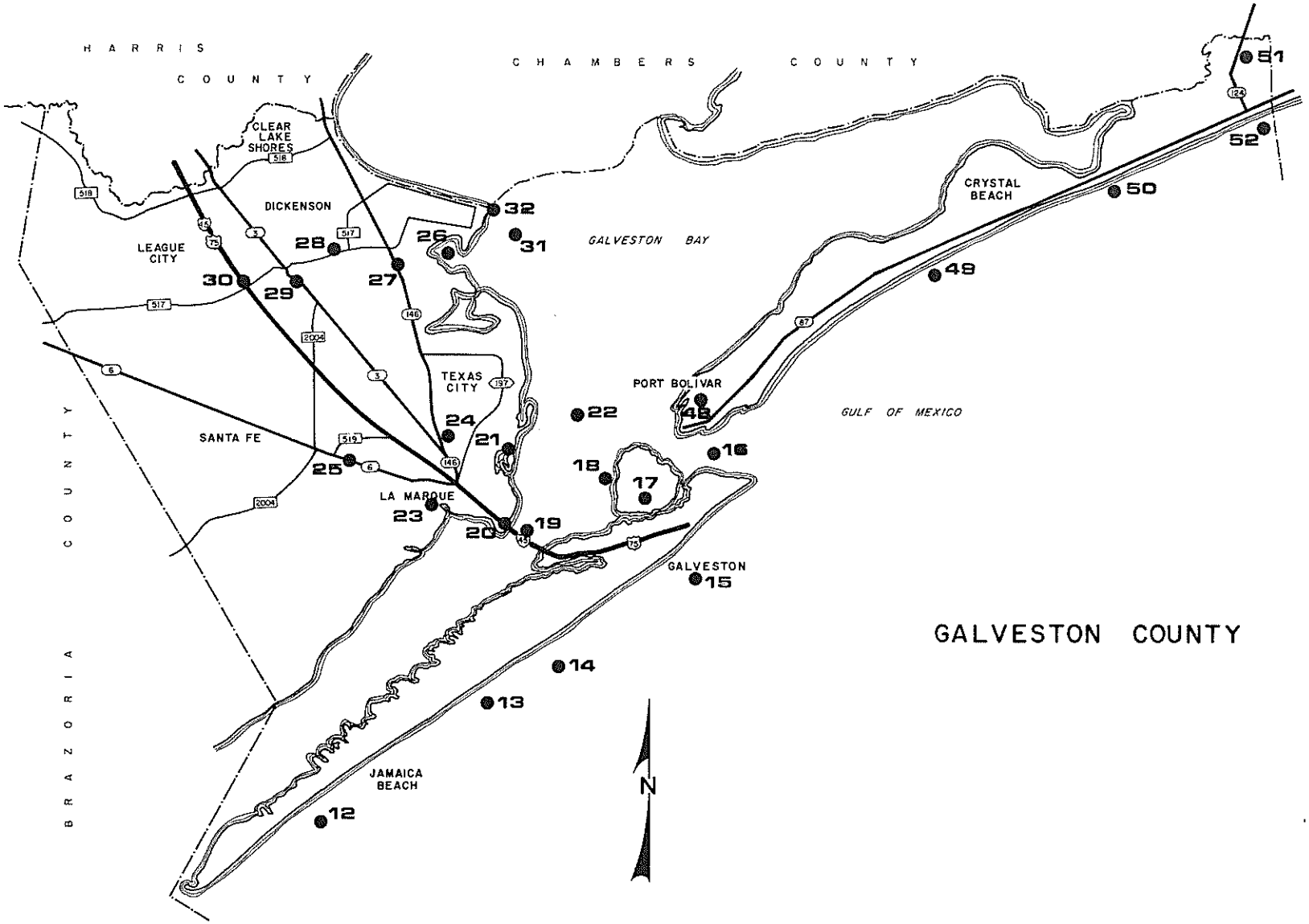
To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

The accuracy of estimates based on ratios was checked by comparing the interpretive results obtained by the use of ratios for hurricanes with wind speed of 111-130 MPH (Category 3) landfalling 20 miles to the left of Freeport at 320° to the actual SLOSH run of that hurricane which was labeled as landfalling 60 miles to the left of Galveston. This was one of the 27 hurricanes run at five-mile intervals from Galveston (see Figure 1-2 and Table 1-2). It was found that these estimates were very close to those obtained by the actual SLOSH run.

BRAZORIA COUNTY

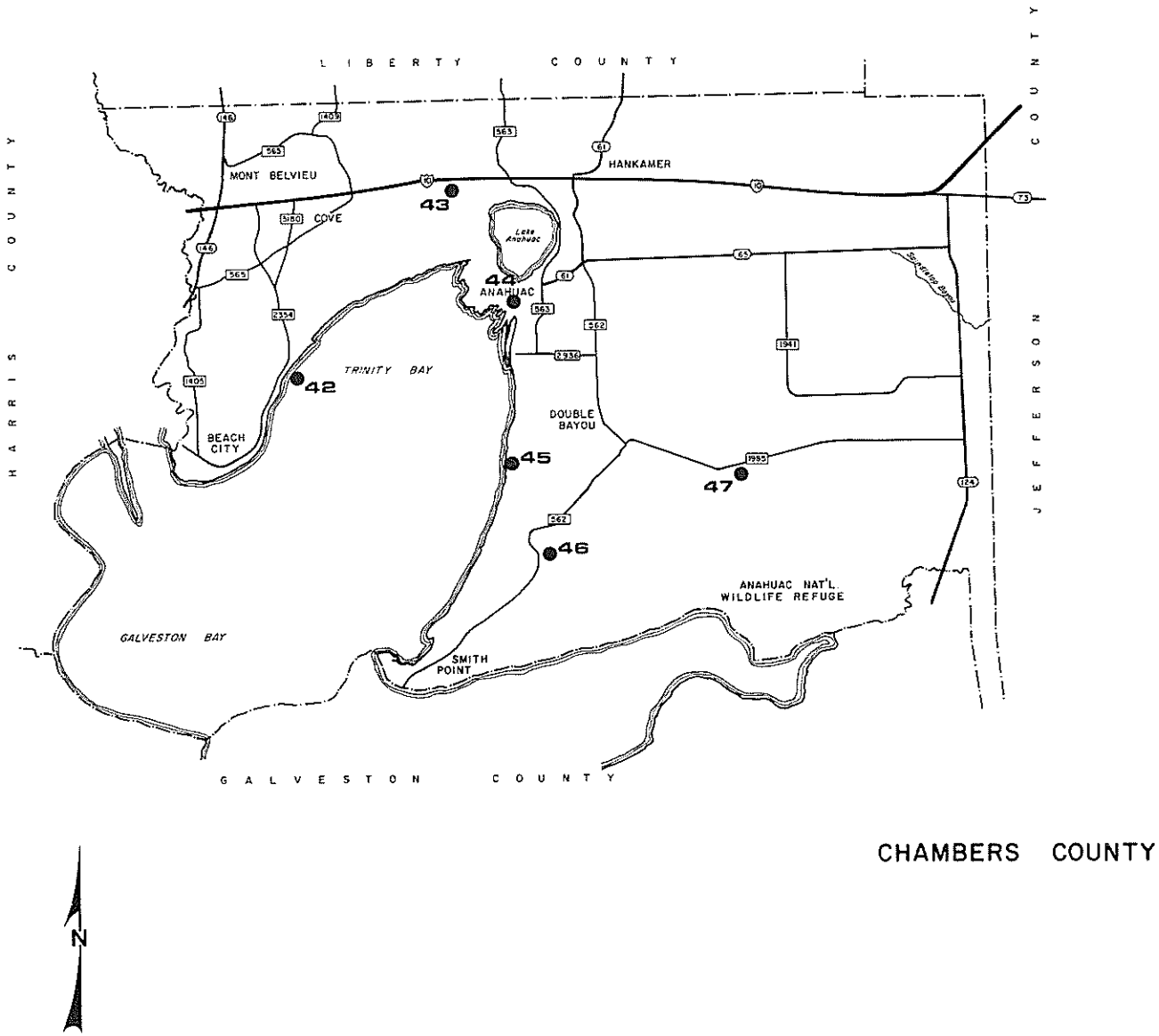



BRAZORIA COUNTY DATA POINT LOCATIONS
FIGURE 2-8 (See Table 2-4 for point identification)




GALVESTON COUNTY DATA POINT LOCATIONS
FIGURE 2-9 (See Table 2-4 for point identification)

HARRIS COUNTY DATA POINT LOCATIONS
FIGURE 2-10 (See Table 2-4 for point identification)




CHAMBERS COUNTY

CHAMBERS COUNTY DATA POINT LOCATIONS
FIGURE 2-11 (See Table 2-4 for point identification)

TABLE 2-4

SLOSH DATA POINTS (68 TOTAL)

| Point Number | Name | Y,X | Elevation[1] | Location |
|---|---|---|---|---|
| 1 | SAN BE RIV | 34, 9 | 3.0' | San Bernard River and the Intracoastal Waterway |
| 2a | FREEPORT | 34,12 | - | Brazos River Mouth |
| 2b | FREEPORT | 34,12 | 16.0' | Freeport South Levee |
| 3a | WEST FRPT | 30,11 | 10.0' | Highway 36 west of Brazos River by Freeport |
| 3b | WEST FRPT | 30,11 | 16.0' | Freeport West Levee |
| 4 | BA BI 288 | 24,11 | 14.0' | Highway 288 at Bastrop Bayou |
| 5 | BRAZORIA | 32,14 | 6.0' | FM 1495 by mouth of Brazos River at Quintana Beach |
| 6a | SURF | 33,15 | - | Mouth of Old Brazos River |
| 6b | SURF | 33,15 | 8.0' | Highway 332 and the Intracoastal Waterway |
| 7 | NOR LEVEE | 28,14 | 17.0' | Freeport North Levee |
| 8 | BA BI 227A | 25,17 | 6.0' | Highway 227A at Bastrop Bayou |
| 9 | DRUM BAY | 30,19 | 8.0' | Highway 257 by Drum Bay |
| 10 | SAN LUBR | 28,24 | 3.0' | Highway 257 by San Luis Pass Bridge |
| 11 | CH BI 2004 | 20,23 | 9.0' | FM 2004 at Chocolate Bayou |
| 12a | SEA ISLE | 28,28 | - | Beach off Sea Isle |
| 12b | SEA ISLE | 28,28 | 8.0' | FM 3005 by Sea Isle |
| 13a | PIRATES BE | 28,33 | - | Beach off Pirates Beach |
| 13b | PIRATES BE | 28,33 | 10.0' | FM 3005 by Pirates Beach |

TABLE 2-4 (Cont.)

SLOSH DATA POINTS (68 TOTAL)

| Point Number | Name | Y,X | Elevation[1] | Location |
|---|---|---|---|---|
| 14a | SEA WA END | 29,36 | - | Beach at end of Seawall |
| 14b | SEA WA END | 29,36 | 6.0' | FM 3005 at end of Seawall |
| 15a | PLSURE PR | 30,40 | - | Beach at Pleasure Pier |
| 15b | PLSURE PR | 30,40 | 14.5' | Seawall at Pleasure Pier |
| 16 | FRT POINT | 29,43 | - | Galveston Bay entrance by Fort Point |
| 17a | ANMUN | 28,41 | 10.0' | A&M University on Pelican Island |
| 17b | ANMUN | 28,41 | 4.3' | 51st Street leading to Pelican Island |
| 18 | PELICAN IS | 27,41 | - | Galveston Bay off Pelican Island |
| 19 | CAUSEWAY | 26,38 | 6.0' | Galveston Causeway |
| 20 | VIRGINIA P | 25,38 | 6.4' | I-45 near Virginia Point |
| 21 | TEX CITY | 24,40 | 21.0' | Texas City Levee South |
| 22 | TEX CITY DK | 25,43 | 6.7' | Texas City Dike |
| 23 | HILAND BIO | 23,37 | 3.0' | Highway 6 by Highland Bayou |
| 24a | LAMARQ | 22,38 | 14.0' | Texas City Levee West |
| 24b | LAMARQ | 22,38 | 5.3' | I-45 south of La Marque |
| 25 | WEST LEVEE | 20,36 | 9.9' | Highway 6 at Hitchcock |
| 26 | DICK BAY | 18,44 | - | Dickinson Bay |
| 27 | D BI 146 | 17,43 | 19.0' | Highway 146 and Dickinson Bayou |
| 28 | GUM BIO | 15,42 | 7.0' | Highway 517 and Gum Bayou |
| 29 | D BI 3 | 13,40 | 11.0' | Highway 3 and Dickinson Bayou |
| 30 | D BI 45 | 12,39 | 14.2' | I-45 and Dickinson Bayou |
| 31 | W GAL BA | 14,48 | - | West Galveston Bay |

TABLE 2-4 (Cont.)

SLOSH DATA POINTS (68 TOTAL)

| Point Number | Name | Y,X | Elevation[1] | Location |
|---|---|---|---|---|
| 32 | KEMAH 146 | 11,47 | 3.6' | Highway 146 and Kemah |
| 33a | CL LAK CITY | 8,46 | - | Clear Lake |
| 33b | CL LAK CITY | 8,46 | 5.0' | NASA 1 by shore of Clear Lake |
| 34 | CL CR 3 | 8,42 | 11.7' | Highway 3 and Clear Lake Creek |
| 35 | CL CR 45 | 7,41 | 10.7' | I-45 and Clear Lake Creek |
| 36 | SHOREACRES | 10,52 | 4.5' | Bayport Road in Shoreacres |
| 37 | BAYTOWN | 10,59 | - | Tabbs Bay |
| 38a | BAY TUNN | 8,59 | 10.1' | Highway 146 north of Baytown Tunnel |
| 38b | BAY TUNN | 8,59 | - | Baytown Tunnel Channel |
| 39a | SCOTT BAY | 6,62 | - | Scott Bay |
| 39b | SCOTT BAY | 6,62 | 6.0' | Bayway Drive by Scott Bay |
| 40a | LYNCHBURG | 5,64 | - | Burnett Bay and 134 north of Lynchburg Ferry Crossing |
| 40b | LYNCHBURG | 5,64 | 12.0' | I-10 at Lynchburg |
| 41 | CEDAR B | 14,58 | 2.2' | FM 2354 north of Cedar Bayou |
| 42 | BEACH RD | 19,61 | 12.5' | FM 2354 by Trinity Bay |
| 43 | WALVILL | 25,67 | 13.0' | I-10 at Wallisville (WALVILL) |
| 44a | ANAHUAC | 26,64 | 17.0' | Bayshore Road at Anahuac |
| 44b | ANAHUAC | 26,64 | 2.0' | Before Levee Road at Anahuac |
| 45 | OAK ISL | 27,59 | 4.0' | Eagle Road at Oak Island |
| 46 | SMITH POIN | 28,56 | 4.6' | Highway 562 north of Lake Stephenson |
| 47 | WHITE RANCH | 33,59 | 7.0' | FM 1985 at Oyster Bayou |
| 48 | PORT BOLIV | 28,44 | 5.0' | Highway 87 east of Ferry |

TABLE 2-4 (Cont.)

SLOSH DATA POINTS (68 TOTAL)

| Point Number | Name | Y,X | Elevation[1] | Location |
|---|---|---|---|---|
| 49a | CRYSTAL BE | 32,50 | - | Beach east of Crystal Beach |
| 49b | CRYSTAL BE | 32,50 | 9.0' | Highway 87 east of Crystal Beach |
| 50 | GILCHRIST | 36,54 | 4.0' | Highway 87 east of Gilchrist |
| 51 | HI ISLAND | 38,57 | 4.0' | Highway 124 north of High Island |
| 52a | HI ISL S | 39,56 | 5.0' | Highway 87 in Chambers County |
| 52b | HI ISL S | 39,56 | - | Beach by 87 in Chambers County |

[1]The elevation is of the specific location in the grid square.

SOURCE: Center for Strategic Technology, Texas A&M University System, College Station, Texas.

## *PART D: ADDITIONAL DATA ON SIX CRITICAL POINTS*

Additional information is provided for six especially critical data points. They are located:

- Before the Freeport levee system
- Before the Galveston Seawall
- On the Galveston Causeway
- Before the Texas City levee system
- At the Baytown Tunnel
- At the entrance of the Houston Ship Channel

For all the simulated hurricanes run through SLOSH, information is given on the SLOSH projected surge height 24 hours prior to, and 12 hours after, the anticipated time of landfall. This includes, in addition to the storms selected to produce maximum surge in Freeport and Galveston Bay, 27 hurricanes with forward movement speeds of 10 MPH, wind speeds of 111-130 MPH, and a track of $320^{o}$ landfalling at five-mile intervals from 85 miles southwest of Galveston to 45 miles northeast of Galveston. Careful study of these 27 hurricanes can permit general estimates of the effect the location of point of landfall can have on surge heights. This additional information for these data points is given in Appendix C.

## SECTION THREE: ZONE DELINEATIONS

A primary concern of the municipal and county level advisory group was to encourage persons outside threatened areas not to evacuate. When persons from non-threatened areas do evacuate, the egress routes become congested, making it difficult for persons in threatened areas to evacuate.

In order to indicate the threatened and the non-threatened areas graphically, it was decided to have two zone classifications. Those areas where storm surge from an average hurricane could penetrate were divided into evacuation zones. An average hurricane was defined as one having winds of 130 MPH or less, which would include Category 3 on the Saffir-Simpson Scale.[1] Further inland where surge from only an extreme hurricane with winds over 130 MPH (Categories 4 and 5 on the Saffir-Simpson Scale) could penetrate, contingency zones were delineated.

In establishing these zones, municipal and county boundaries were used whenever possible.

The use of these zone differentiations during a hurricane evacuation could allow orderly evacuation, permitting the most vulnerable and threatened areas to be evacuated first.

Figures 3-1 to 3-4 show the location of these evacuation zones by counties. A detailed description of each zone follows the figures.

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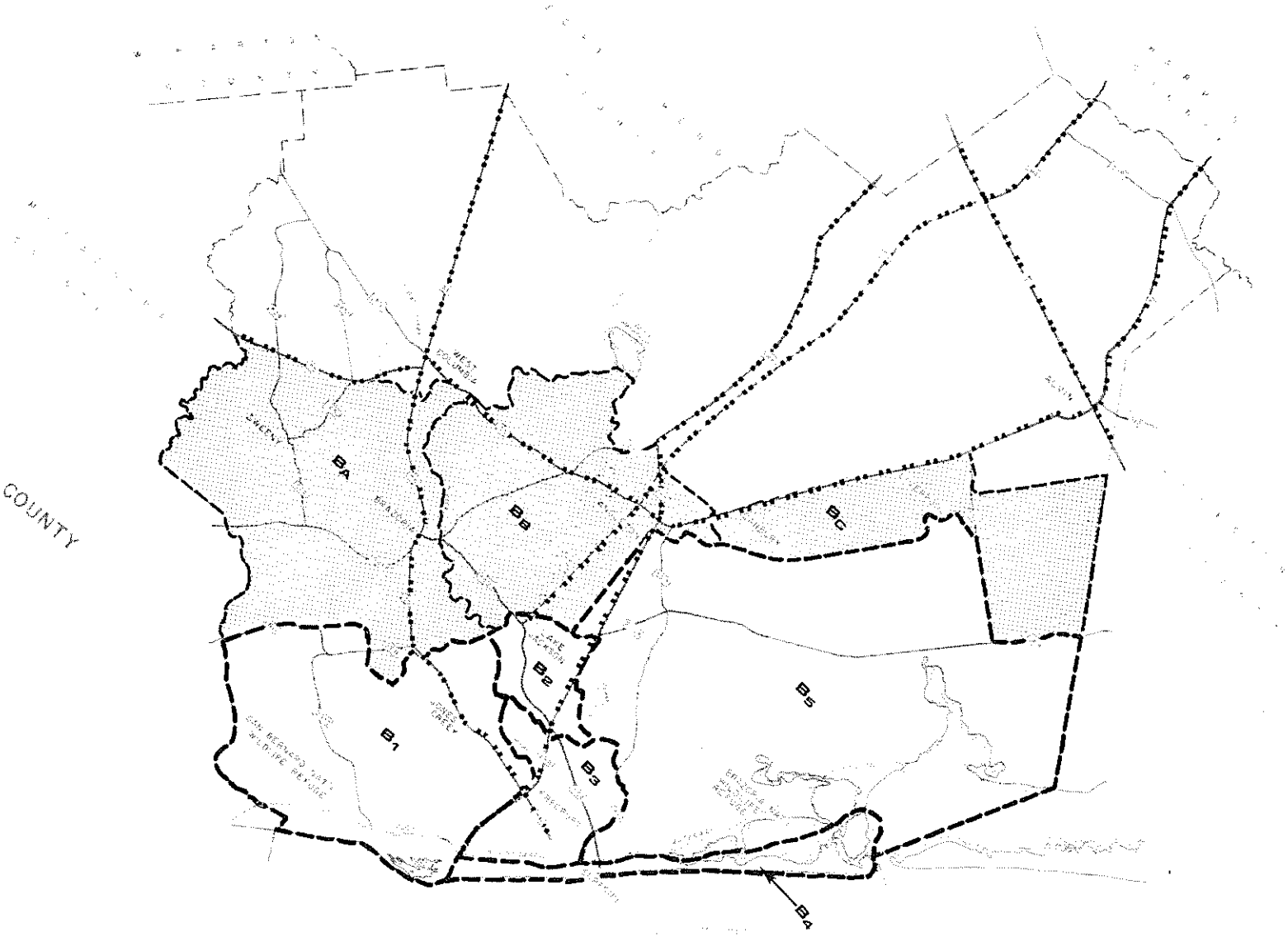
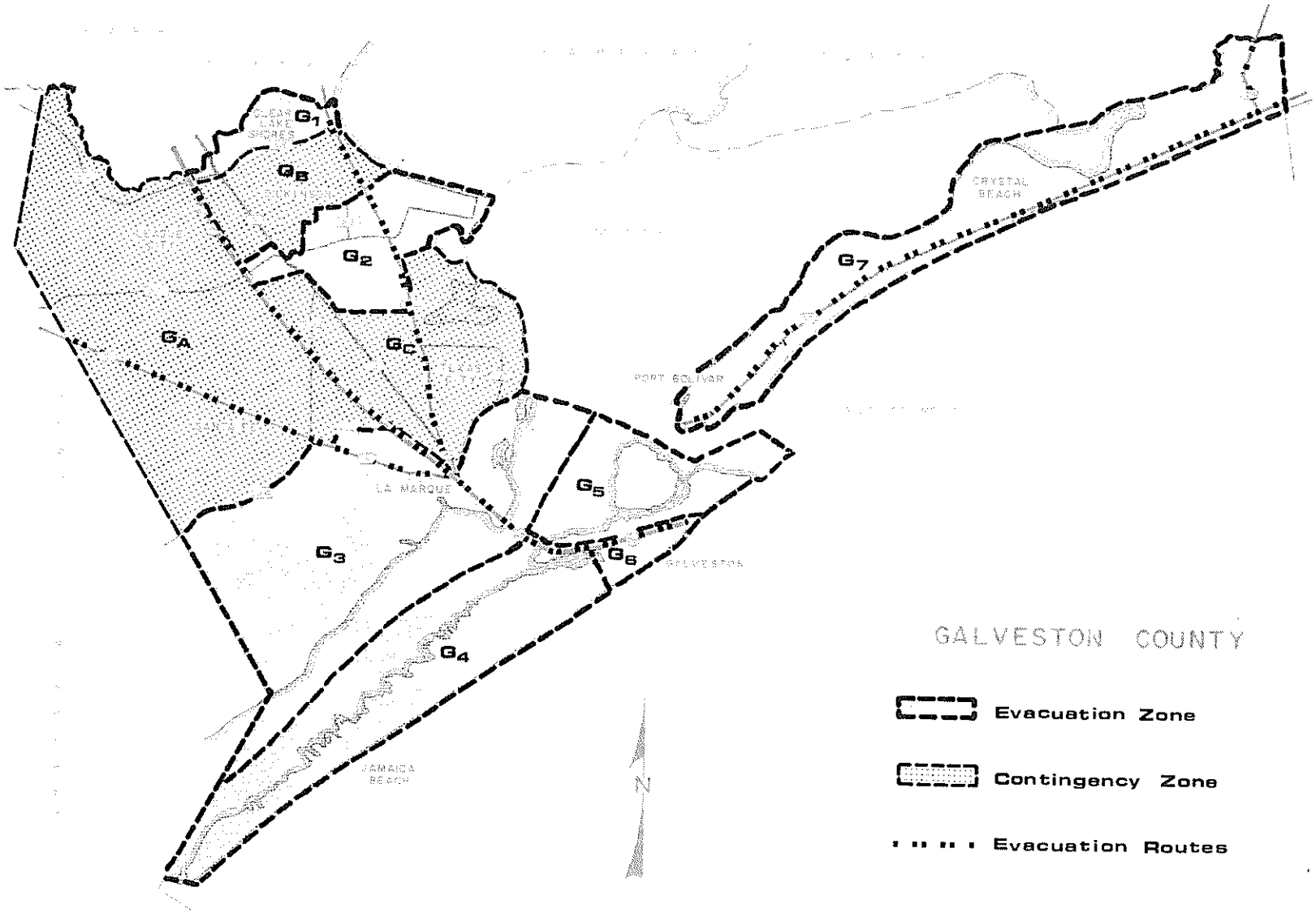
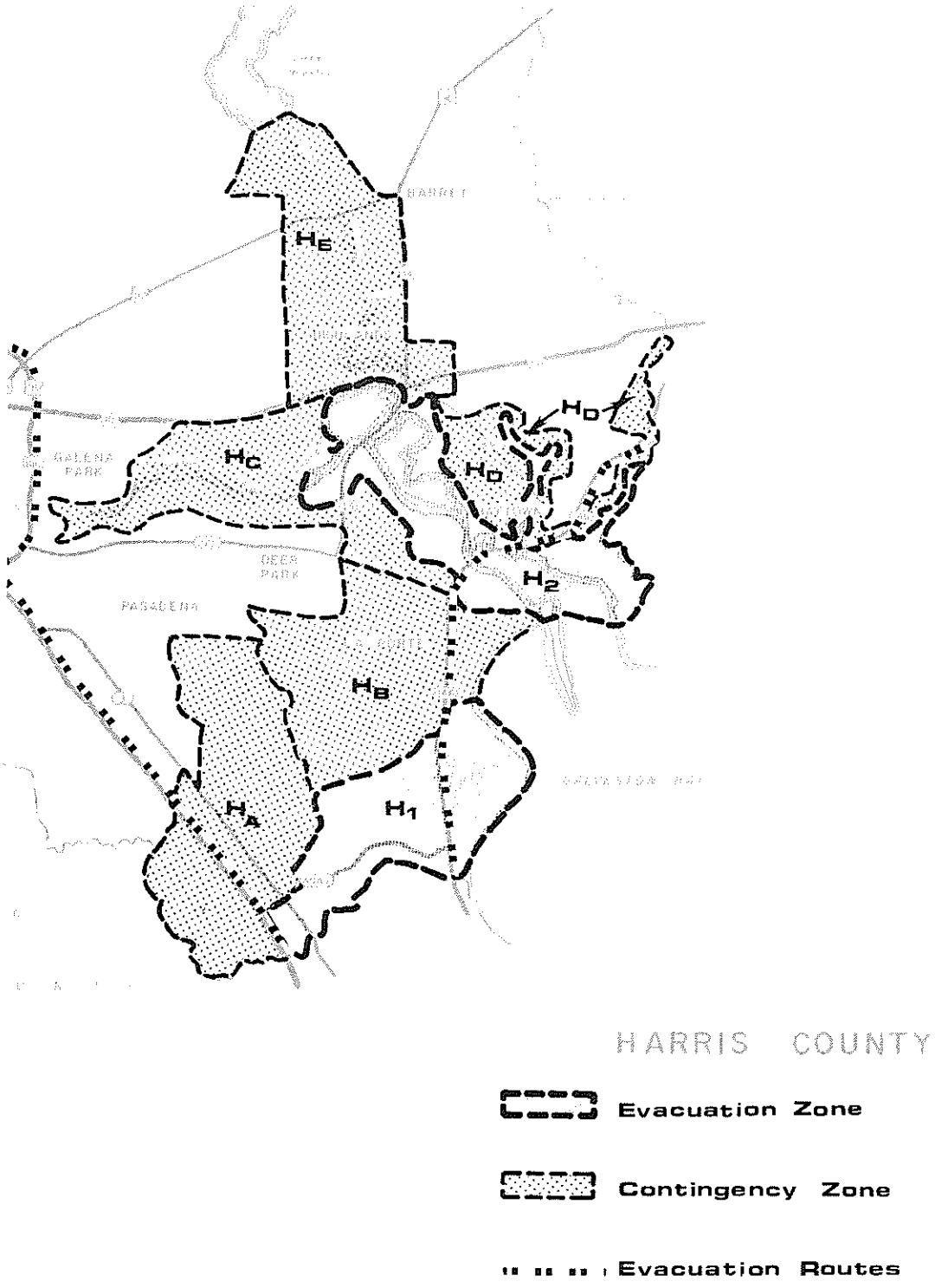
[1]See Appendix A.



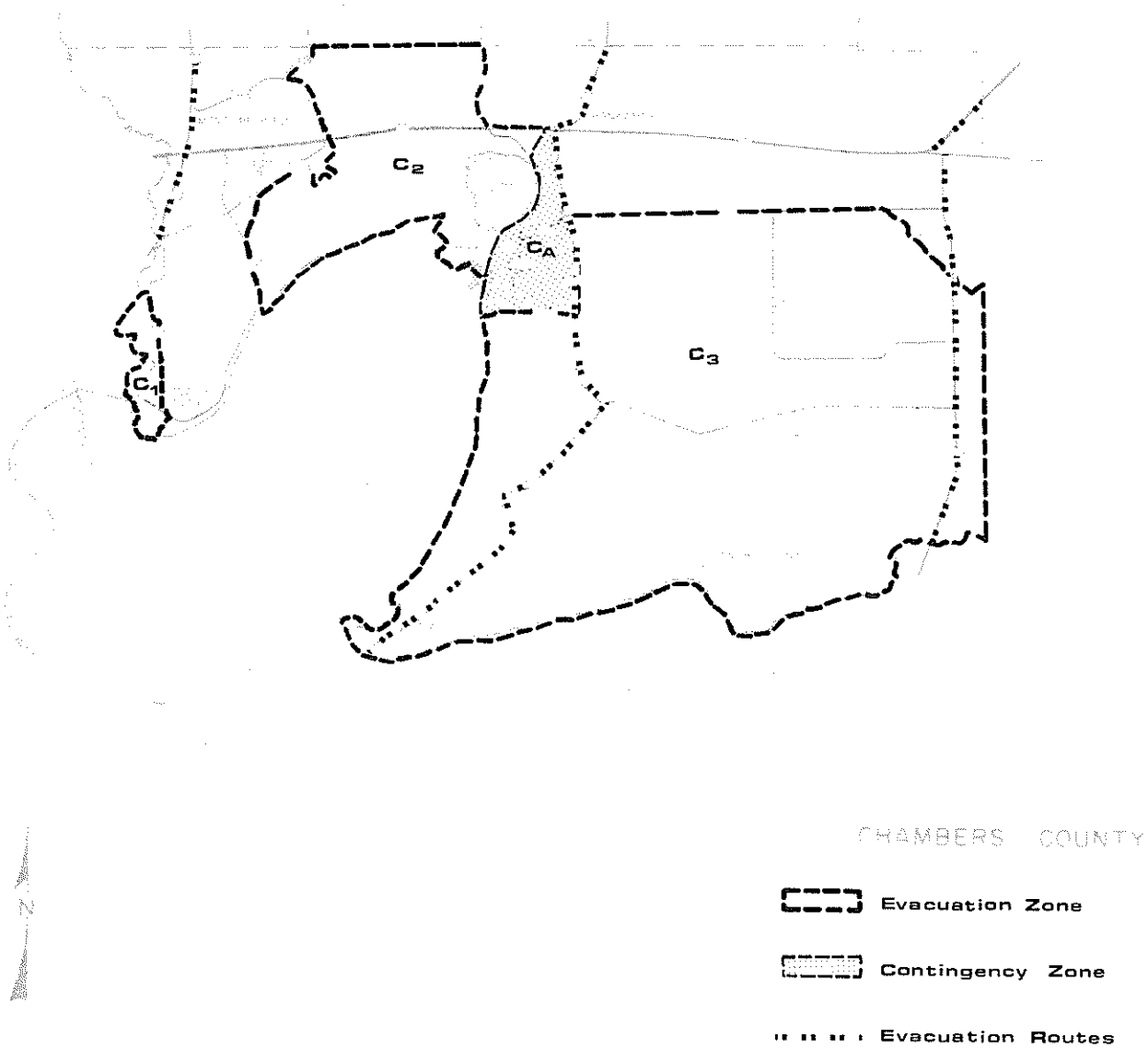

EVACUATION AND CONTINGENCY ZONES
FOR BRAZORIA COUNTY
FIGURE 3-1




EVACUATION AND CONTINGENCY ZONES
FOR GALVESTON COUNTY
FIGURE 3-2




EVACUATION AND CONTINGENCY ZONES
FOR HARRIS COUNTY
FIGURE 3-3




EVACUATION AND CONTINGENCY ZONES FOR CHAMBERS COUNTY
FIGURE 3-4

## BRAZORIA COUNTY

### Evacuation Zones

Zone $B_1$:

The northern boundard begins where the southern border of Clemens State Farm meets the Brazos River.
South along the Brazos River (adjacent to the levee) to the Gulf shoreline.
The eastern boundary begins where the Brazos River enters the Gulf.
West along the Gulf shoreline to Cedar Lake Creek.
The southern boundary begins where Cedar Creek enters the Gulf.
North along Cedar Lake Creek to Highway 2611.
The western boundary begins where Highway 2611 crosses Cedar Lake Creek.
Northeast on Highway 2611 to the San Bernard River.
East along the San Bernard River to the Town of Galilee.
East along the southern border of Clemons State Farm to the Brazos River.

Zone $B_2$:

The northeastern boundary begins where Highway 2004 intersects Highway 288.
Southeast on Highway 288 to the levee between Clute and Oyster Creek.
Southeast along the levee between Clute and Oyster Creek.
The southern boundary begins at Oyster Creek (between Round Lake and Chubb Lake).
West to the Lake Jackson-Clute Drainage Channel.
West along the Lake Jackson-Clute Drainage Channel to the Brazos River.
Northwest along the Brazos River to Clemens State Farm.
The northwestern boundary begins where Clemens State Farm meets the Brazos River.

Zone $B_3$:

The northern boundary begins at Oyster Creek between Round Lake and Chubb Lake.
East along the levee (adjacent to Oyster Creek).
South along the levee to where the Dow Barge Canal and the Intercoastal Waterway meet.
The eastern boundary begins where the Dow Barge Canal and the Intercoastal Waterway meet.
Southwest along the Intercoastal Waterway to the Brazos River.
The southern boundary begins where the Intercoastal Waterway and the Brazos River meet.
North along the levee (adjacent to the Brazos River) to the Lake Jackson-Clute Drainage Channel.
The western boundary begins where Cedar Creek Street enters the Lake Jackson-Clute Drainage Channel.
East to where the Lake Jackson-Clute Drainage Channel crosses under Highway 288.
East between Round Lake and Chubb Lake to Oyster Creek.

Zone $B_4$:

The northern boundary begins at the northermost tip of Mud Island.
Southwest of San Luis Pass.
The eastern boundary begins at San Luis Pass.
Southwest along the Gulf of Mexico shoreline to the mouth of the Brazos River.
The southern boundary begins where the Brazos River enters the Gulf of Mexico, then north to the Intercoastal Waterway.
The western boundary begins where the Intercoastal Waterway and the Brazos River meet.
Northeast along the Intercoastal Waterway out to Drum Bay, and Christmas Bay to the northernmost tip of Mud Island.

Zone $B_5$:

The northern boundary begins where Highway 2004 crosses the Galveston-Brazoria county line.
Southeast along the county line to the West Bay shoreline.
The eastern boundary begins where the Galveston-Brazoria county line meets the West Bay shoreline.
Southwest along the county line to San Luis Pass, then
northwest to the northern tip of Mud Island, then southwest across Christmas Bay and Drum Bay, then southwest along the Intercoastal Waterway to the Dow Barge Canal.
The southern boundary begins where the Dow Barge Canal and the Intercoastal Waterway meet.
North along the levee to Oyster Creek, then west along the levee (which runs adjacent to Oyster Creek), then
north on Highway 288 to Highway 2004.
West on Highway 2004 to Old Clute Road.
North on Old Clute Road to Kiber Road (County Road 213).
The western boundary begins where Old Clute Road and Kiber Road meet.
East on Kiber Road to County Road 428.
North on County Road 428 to Cedar Road (County Road 210).
East along Cedar Road to County Road 203.
Northwest on County Road 203 to Corner Bayou.
East along Corner Bayou and across Chocolate Bayou to Nolan Road.
East on Nolan Road to Highway 2917.
Southeast on Highway 2917 to Highway 2004.
Northeast on Highway 2004 to the Galveston-Brazoria county line.

### Contingency Zones

Zone $B_A$:

The northern boundary begins where Highway 35 crosses the Brazos River.
Southeast along the Brazos River to the southern border of Clemens State Farm.
The eastern boundary begins where the southern boundary of Clemens State Farm and the Brazos River meet.
South along the southern border of Clemens State Farm to the Town of Galilee, then
west across the San Bernard River to Highway 2611.
Southwest on Highway 2611 to Cedar Lake Creek (the Matagorda-Brazoria county line).
The southern boundary begins where Highway 2611 crosses Cedar Lake Creek.
Northwest along Cedar Lake Creek to the Matagorda-Brazoria county line.
Northwest along the county line to Linnville Bayou. North along Linnville Bayou (the Matagorda-Brazoria county line) to Highway 35.
The western boundary begins where Highway 35 meets the Matagorda-Brazoria County line.
East on Highway 35 to the San Bernard River, then east along the southern border of the Town of West Columbia, then east on Highway 35 to the Brazos River.

Zone $B_B$:

The northwestern boundary begins where Highway 35 crosses the Brazos River.
Northeast along the Brazos River to the south end of Harris Reservoir, then
south along Oyster Creek, then
northeast on Highway 521 to North Warren Road.
Southeast on North Warren Road to County Road 341.
East on County Road 341 to Highway 35.
The southeastern boundary begins where Highway 35 meets Brushy Bayou.
Southeast along Brushy Bayou to Cedar Road (County Road 210).
West on Cedar Road to County Road 428.
South on County Road 428 to Kiber Road.
West on Kiber Road to Old Clute Road.

Zone $B_B$ (cont.):
West on Kiber Road to Old Clute Road.
South on Old Clute Road to Highway 2004.
Southwest on Highway 2004, then
south along Camp Bayou to the Brazos River.
The southwestern boundary begins where Camp Bayou and the Brazos River meet.
Northwest along the Brazos River to Highway 35.

Zone $B_C$:
The northeastern boundary begins approximately one mile south of Highway 6 (where the MO-PAC Railroad tracks and the Galveston-Brazoria county line meet).
Southeast along the county line to Highway 2004.
The southern boundary begins where the Galveston-Brazoria county line and Highway 2004 meet.
Southwest along Highway 2004 to Highway 2917.
Northwest along Highway 2917 to Nolan Road.
West along Nolan Road and across Chocolate Bayou to Corner Bayou.
West along Corner Bayou to County Road 203.
Southeast on County Road 203 to Cedar Road (County Road 210.)
West on Cedar Road to Bushy Bayou.
Northwest along Bushy Bayou to Highway 35.
The northwestern boundary begins where Highway 35 crosses Bushy Bayou.
North along Highway 35 to Highway 2917.
Two miles south along Highway 2917 to the MO-PAC Railroad tracks.
Northeast along the MO-PAC Railroad tracks to the Galveston-Brazoria county line.

GALVESTON COUNTY

Evacuation Zones

Zone $G_1$:
The northern boundary begins where Interstate 45 crosses over Clear Creek.
East along Clear Creek (the Harris-Galveston County line) and continuing east along the Harris-Galveston line (which runs along Clear Lake) to the Galveston Bay shoreline.
The eastern boundary begins where Clear Lake enters Galveston Bay.
South along the Galveston Bay shoreline to Rice Drive.
The southern boundary begins where Rice Drive and the Galveston Bay shoreline meet.
West on Rice Drive to Highway 146.
North on Highway 146 to Highway 518 (Main Street).
West on Highway 518 (Main Street) to Interstate 45.
The western boundary begins where Interstate 45 and Highway 518 intersect.
North on I-45 to Clear Creek.

Zone $G_2$:
The northern boundary begins where Deats Road and I-45 meet.
It then proceeds east along Deats Road to Timber Drive.
South on Timber Drive to Main Street (Highway 517).
East on Main Street and East 41st Street (San Leon Drive) to California Avenue.
North on California Avenue to East 20th Street.
East on East 20th Street to California Avenue, then north to where California Avenue dead ends.
East on Highway 517 and Grand Avenue to the Galveston Bay shoreline.
The eastern boundary begins where Grand Avenue dead ends at the Galveston Bay shoreline.
South along the Galveston Bay shoreline to Eagle Point.
The southern boundary begins at the eastern tip of Eagle Point.
West along the Galveston Bay and Dickinson Bay shorelines to Dickinson Bayou.

Zone $G_2$ (cont.):
West along the levee (which is adjacent to Dickinson Bayou), then
south along Highway 146, then
west along the southern end of the Galveston County Industrial Water Reservoir, then
north on Highway 3 to Hughes Road.
West on Hughes Road to I-45.
The western boundary begins where I-45 and Hughes Road meet.
North on I-45 to Deats Road.

Zone $G_3$:
The northeastern boundary begins where Highway 2004 meets the Brazoria-Galveston county line.
East on Highway 2004 to Highway 6.
Southwest on Highway 6 to Highway 519.
West on Highway 519 to I-45.
South on I-45, then
northeast along the levee (which is adjacent to Highway 197), then
west along the Texas City Terminal railroad tracks, then
southwest along the Texas City Channel to the Galveston City limit on Galveston Bay.
The southern boundary begins where the Texas City Channel meets the Galveston city limit on Galveston Bay.
West along the Galveston city limit, then
west on West Bay, between North Deer Island and South Deer Island, to the Brazoria-Galveston county line.
The western boundary begins at the Brazoria-Galveston county line on West Bay.
North along the county line to Highway 2004.

Zone $G_4$:
The northern boundary begins at the Brazoria-Galveston county line on West Bay.
East between North Deer Island and South Deer Island on West Bay, then
west to the I-45 Causeway.
The eastern boundary begins at the I-45 Causeway.
South along I-45 to 61st Street (Highway 342).
South along 61st Street to Seawall Boulevard (Highway 3005).
The southern boundary begins where Seawall Boulevard and 61st Street meet.
West on Highway 3005 to San Luis Pass.
The western boundary begins at San Luis Pass.
North along the Brazoria-Galveston County line out to West Bay.

Zone $G_5$:
The northern boundary begins where the Texas City Channel and Galveston city limit meet on Galveston Bay.
Southwest along the Galveston city limit to the North Jetty.
The eastern boundary begins at the North Jetty.
South along the North Jetty.
The southern boundary begins at the south end of the North Jetty.
West along the East Beach on Galveston Island to the west end of Stewart Beach, then
northwest along Broadway (Highway 75) to I-45.
North along I-45 to the Galveston city limit on the I-45 Causeway.
The western boundary begins at the Galveston city limit on the I-45 Causeway.
East along the Galveston city limit on Galveston Bay to the Texas City Channel.

Zone $G_6$:
The northeastern boundary begins where 61st Street (Highway 342) and I-45 meet.
Southeast along Broadway (Highway 75) across Seawall Boulevard and Stewart Beach to the Gulf shoreline.
The southern boundary begins at the west end of Stewart Beach, continuing
west along Seawall Boulevard to 61st Street (Highway 342).

Zone $G_6$ (cont.):
The western boundary begins where 61st Street and Seawall Boulevard meet and runs north along 61st Street to Interstate 45.

Zone $G_7$:
Zone $G_7$ includes all of Bolivar Peninsula from the ferry dock at the western tip of the peninsula to the Chambers-Galveston county line to the west.

Contigency Zones

Zone $G_A$:
The northern boundary begins where the Harris-Galveston county line and Clear Creek meet.
East along Clear Creek to I-45.
The eastern boundary begins where I-45 crosses over Clear Creek.
South along I-45 to Highway 519.
The southern boundary begins where Highway 519 and I-45 meet.
West along Highway 519 to Highway 6.
Northwest along Highway 6 to Highway 2004.
West along Highway 2004 to the Brazoria-Galveston county line.
The western boundary begins where the Brazoria-Galveston county line and Highway 2004 meet.
North along the county line to Cedar Creek.

Zone $G_B$:
The northern boundary begins where Highway 518 (Main Street) and Interstate 45 meet.
East along Highway 518 to Highway 146.
South along Highway 146 to Rice Drive.
East along Rice Drive to the Galveston Bay shoreline.
The eastern boundary begins where the Galveston Bay shoreline and Rice Drive meet.
South along the Galveston Bay shoreline to where Grand Avenue (Highway 517) meets the Galveston Bay shoreline.
The southern boundary begins where Grand Avenue (Highway 518) meets the Galveston Bay shoreline.
West along Grand Avenue to Carolina Avenue.
South along Carolina Avenue to East 20th Street.
West along East 20th Street to California Avenue.
South on California Avenue to East 41st Street.
West on East 41st Street (San Leon Drive) and Main Street to Timber Drive.
North on Timber Drive to Deats Road.
West on Deats Road to I-45.
The western boundary begins where I-45 and Deats Road intersect.
North on I-45 to Highway 518 (Main Street).

Zone $G_C$:
The northern boundary begins where Hughes Road and Interstate 45 intersect.
East along Hughes Road to Highway 3.
South on Highway 3, then
east along the southern end of the Galveston County Industrial Water Reservoir, then
north on Highway 146, then
east along the levee (which is adjacent to Dickinson Bayou) to the Dickinson Bay shoreline.
The eastern boundary begins where Dickinson Bayou enters Dickinson Bay.
South along the levee (which runs adjacent to the Galveston Bay shoreline) to the Texas City Terminal Railroad track three-quarters of a mile south of the Texas City Dike.
The southern boundary begins three-quarters of a mile south of the Texas City Dike where the Texas City Terminal Railroad tracks and the Galveston Bay shoreline meet.
Southwest along the levee (adjacent to Highway 197) to I-45.
The western boundary begins where Highway 197 and I-45 intersect, then
runs north along I-45 to Hughes Road.

HARRIS COUNTY

Evacuation Zones

Zone $H_1$:
The northern boundary begins where I-45 intersects Bay Area Boulevard.
East on Bay Area Boulevard to Choate Road.
East on Choate Road to Highway 146.
North on Highway 146 to McCabe Road.
East on McCabe Road to the Galveston Bay shoreline.
The eastern boundary begins where McCabe Road meets the Galveston Bay shoreline.
East along Galveston Bay shoreline to Clear Creek (the Galveston-Harris county line).
The southern boundary begins where Clear Lake enters Galveston Bay.
West along Clear Lake to I-45.
The western boundary begins where I-45 crosses over Clear Creek.
North on I-45 to Bay Area Boulevard.

Zone $H_2$:
The northern boundary begins at the Houston Ship Channel.
North from the Houston Ship Channel to Carpenter Bayou.
West along Carpenter Bayou for one-half mile, and then
north along the San Jacinto River shoreline to I-10.
East on I-10 to Crosby-Lynchburg Road.
South on Crosby-Lynchberg Road to Lakeview.
East on Lakeview to the Burnett Bay shoreline.
East along the Burnett Bay shoreline to the Baytown city limits (about 500 feet west of North Burnett Drive).
The eastern boundary begins where the Baytown city limits meets the Burnett Bay shoreline.
Southeast on Burnett Drive to Lakewood.
Southeast on Lakewood to Market Street.
South on Market Street to Woods Avenue.
West on Woods Avenue to Steinman.
South on Steinman to Crow Road and Bayway.
East on Bayway to Arbor Drive.
North on Arbor Drive to North Street.
East on North Street to Wooster Drive.
South on Wooster Drive to Bayway.
Southeast on Bayway to Missouri.
Southeast on Missouri to Briton.
North on Briton to Kentucky.
Southeast on Kentucky to Montana.
North on Montana to Arizona and then Florida.
North on Florida to Duran Ferry.
Northwest on Duran Ferry to West Main Street.
East on West Main Street to Highway 201, then
north along Goose Creek to Pebblebrook Street.
North on Pebblebrook Street to Tamarach Drive.
Northwest on Tamarach Drive to Fairway Drive.
North on Fairway Drive to the west end of Surrey Lane.
East on Surrey Lane to Goose Creek.
Southeast along Goose Creek.
Northeast to Scenic Drive.
East on Scenic Drive, then
north on Creekbend Drive to Rollingbrook Drive and across Goose Creek.
South along Goose Creek to Decker Drive (Spur 330).
Southeast on Decker Drive to Price.
South on Price to Market Street.
Southwest on Market Street, then
south on Mayou to Thompson.
South on Thompson to Strawn.
West on Strawn to Goose Creek.
South along Goose Creek to Highway 146.
Northeast on Highway 146 to the MO-PAC Railroad.
East on the MO-PAC Railroad tracks, then
north to Southwood.
North from Southwood to Cedar.
North on Cedar to E. James.
West on E. James, then
north to Woodlawn.
East on Woodlawn, then
north on Vine to Kilgore Road.

Zone $H_2$ (cont.):
North on Kilgore Road to Jones Road.
North from Jones Road to Cedar Bayou Road.
North on Cedar Bayou Road to Cedar Crest Cemetary.
West along Cedar Crest Cemetary to Cedar Bayou.
The southern boundary runs across the San Jacinto River from Cedar Creek to the east and Morgan's Pt. to the west.
The western boundary begins at Morgan's Pt., then west along Barbours Cut to the San Jacinto Bay shoreline.
North along the San Jacinto Bay shoreline to the Baytown Tunnel (Highway 146), then northwest to State of Texas Vista Road.
South on State of Texas Vista Road, then west on Old Battle Ground Road, then north to the Houston Ship Channel.

Contingency Zones

Zone $H_A$:
The northern boundary begins where Spencer Highway and Burke Road meet.
East on Spencer Highway to Armand Bayou.
Southeast on Armand Bayou to Willow Springs Bayou.
The eastern boundary begins where Armand Bayou and Willow Springs Bayou meet.
South along the Houston-Pasadena city limits to Bay Area Boulevard.
South on Bay Area Boulevard to I-45.
South on I-45 to Clear Creek.
The southern boundary begins where I-45 crosses over Clear Creek.
Northwest along Clear Creek to Turkey Creek.
The western boundary begins where Turkey Creek enters Clear Creek.
North along Turkey Creek to Highway 1959.
North along Highway 1959 to Highway 3.
South on Highway 3 to the western border of Ellington Air Force Base.
North along the Houston-Pasadena city limit to Burke Road.
North along Burke Road to Spencer Highway.

Zone $H_B$:
The northern boundary begins where Highway 225 crosses the Pasadena-Deer Park city limits.
East on Highway 225 to the Tx. and N.O. Railroad tracks, then south on Oleander Street to E. Main Street.
East on E. Main Street to the Galveston Bay shoreline.
The eastern boundary begins where E. Main Street dead ends at the Galveston Bay shoreline.
South along the Galveston Bay shoreline to McCabe Road.
The southern boundary begins where McCabe Road meets the Galveston Bay shoreline.
West on McCabe Road to Highway 146.
South on Highway 146 to Choate Road.
West on Choate Road to Bay Area Boulevard.
West on Bay Area Boulevard to the Houston-Pasadena city limit.
The western boundary begins where Bay Area Boulevard meets the Houston-Pasadena city limits.
North along the Houston-Pasadena city limits to Highway 225.

Zone $H_C$:
The northern boundary begins at the Fidelity Avenue and Clinton Avenue intersection.
West on Clinton Drive to Federal Avenue.
North on Federal Avenue, then northwest to where Green Bayou crosses under I-10.
East on I-10 to the San Jacinto River.
The eastern boundary begins where I-10 crosses the San Jacinto River.
South along the San Jacinto River shoreline, then west along Carpenter Bayou for one-half mile, then south across Carpenter Bayou and the Houston Ship Channel, then

Zone $H_C$ (cont.):
east along Old Battle Ground Road, then northeast along State of Texas Vista Road to the San Jacinto Bay shoreline.
South along the San Jacinto Bay shoreline to the Baytown Tunnel, then east to Barbour's Cut.
The southwestern boundary begins at Barbour's Cut on Morgan's Pt.
West along East Main Street to Oleander Street.
North on Oleander Street to the Tx. and N.O. Railroad tracks.
West on the Tx. and N.O. Railroad tracks to Highway 225.
West along Highway 225 to Highway 134.
North along Highway 134 to the Port Terminal Railroad tracks.
West along the Port Terminal Railroad tracks, then north along Sims Bayou, then west along the Houston Ship Channel to Fidelity Avenue.

Zone $H_D$:
The northern boundary begins where the Baytown city limit meets the Burnett Bay shoreline (about 500 feet west of N. Burnett Drive).
North along the Baytown city limits to the intersection of Decker Drive (Spur 330) and Lynchburg-Cedar Bayou Road.
Southeast to where Pin Oak and Robin Road intersect.
South on Robin Road to Honeysuckle Drive.
East on Honeysuckle Drive to Bayway Drive, continuing east to north side of Shirley Street in Craigmont Addition, then easterly north of Quail Hollow addition to Busch Road.
South on North Main to Park Street.
West on Park Street to Memorial Drive.
South on Memorial Drive to Idlewood.
East on Idlewood to Oakmont.
South on Oakmont to Fleetwood.
From the corner of Oakmont and Fleetwood to the intersection of West James and Rolland.
South on Rolland to West Defree to the corner of Hemphill and Defree, then south on Hemphill to Gulf.
East on Gulf to Whiting.
South on Whiting to S.P.R.R.
West along S.P. R.R. to Lee Drive.
South on Lee Drive to Nazro.
East on Nazro to South Main.
South on South Main to Alexander Drive.
East and North on Alexander Drive to Highway 146.
North on Highway 146 to East Texas Avenue.
East on East Texas to Danubina.
North on Danubina to Adams.
East on Adams to Narcille.
North on Narcille to Ward Road.
East on Ward Road to Happy Valley.
North on Happy Valley to a point west of Rosille Drive.
East on Risille to Kilgore Road.
North on Kilgore Road, then Elvinta to Highway 146.
East along Highway 146 to Marvin Road.
North on Marvin Road, then continuing to the corner of Raccoon and Massey Tompkins Road.
East on Massey Tompkins Road to a point south of Canterbury (in Whispering Pines).
North from that point along Canterbury to Thompkins Drive.
West on Thompkins Drive to a point on the northeast bend of Hardin Road.
West on Hardin Road to Crosby-Cedar Bayou Road.
North on Crosby-Cedar Bayou Road to S.P. R.R.
Northeast along S.P. R.R. to I-10.
East on I-10 to Cedar Bayou.
The eastern boundary runs south along Cedar Bay to Cedar Crest Cemetary.
West along Cedar Crest Cemetary to Cedar Bayou Road.
South on Cedar Bayou Road to Jones Road.
South from the intersection of Jones Road and Kilgore Road to Vine.
South on Vine to Woodlawn.

Zone $H_D$ (cont.):
West on Woodlawn, then
southeast across East James and Southwood
to the MO-PAC Railroad tracks.
The southwestern boundary runs west on the
MO-PAC Railroad tracks to Highway 146.
Southwest on Highway 146 to Goose Creek.
North along Goose Creek to Strawn.
East on Strawn to Thompson.
North on Thompson to Mayou.
North on Mayou, then
northeast on Market Street to Price.
North on Price to Decker Drive.
Northwest on Decker Drive to Goose Creek.
North along Goose Creek to Rollingbrook Drive.
From Rollinbrook Drive south on Creekbend Drive
to Scenic Drive.
West on Scenic Drive, then
northwest along Goose Creek to Surrey Lane.
West on Surrey Lane to Fairway Drive.
South on Fairway Drive to Tamarach Drive.
Southeast on Tamarach Drive to Pebblebrook Street.
South on Pebblebrook Street, then
southeast along Goose Creek to the intersection
of Decker Drive (Spur 330), and Park Road, then
south along Goose Creek to West Main Street.
West on West Main Street to Durran Ferry.
Southeast on Durran Ferry to Florida.
South on Florida to Tennessee.
East on Tennessee to Arizona, then
south on Montana to Kentucky.
Northwest on Kentucky to Briton.
South on Briton to Missouri.
Northwest on Missouri to Bayway.
Northwest on Bayway to Wooster Drive.
North on Wooster Drive to North Street.
West on North Street to Arbor Drive.
South on Arbor Drive to Bayway.
West on Bayway to Crow Road and Steinman.
North on Steinman to Woods Avenue.
East on Woods Avenue to Market Street.
North on Market Street to Lakewood.
Northwest on Lakewood to Burnett Drive.
Northwest on Burnett Drive to where the
Baytown city limits meets the Burnett Bay
shoreline (about 500 feet west of North
Burnett Drive).

Zone $H_E$:
The northern boundary begins at the west end
of Lake Houston Dam.
Northeast along the dam, then
one-half mile east to the petroleum pipeline.
The eastern boundary begins one-half mile of
the Lake Houston Dam at the petroleum
pipeline.
Southeast along the petroleum pipeline to
Highway 90.
Northeast along Highway 90 to Crosby-
Lynchburg Road, then
south along Crosby-Lynchburg Road to Battle
Bell Road.
East on on Battle Bell Road to Thompson Road.
South on Thompson Road to Decker Drive (Spur 330).
The southern boundary begins where Decker Drive
and Thompson Road meet.
Northwest on Decker Drive to the Baytown city
limits (about 500 feet west of North Burnett
Drive).
South along the Baytown city limits to Burnett
Bay shoreline.
West along the Burnett Bay shoreline to Lakeview.
West on Lakeview to Crosby-Lynchburg Road.
North on Crosby-Lynchburg Road to I-10.
West on I-10 to Sheldon Road.
The western boundary begins where Sheldon Road
and I-10 meet.
North along Sheldon Road to Garret Road.
West on Garret Road to Aqueduct Road to the
Lake Houston Dam.

CHAMBERS COUNTY

Evacuation Zones

Zone $C_1$:
The eastern boundary begins at Gully Canal and
runs south along Highway 1405 to Highway 2354.
East along Highway 2354, then
south along the Beach City line to the Trinity
Bay shoreline.
The southern boundary begins at the Beach City
line and runs along the Trinity Bay shoreline
to the Harris-Chambers county line.
The western boundary begins where the Harris-
Chambers county line meets Galveston Bay.
North along Cedar Bayou to Gully Canal.

Zone $C_2$:
The northern boundary begins where Highway 1409,
and the Liberty-Chambers county line meet.
East along the Liberty county line to Highway 563.
South on Highway 563 to I-10.
East along I-10 to Turtle Bayou.
The eastern boundary begins where Highway I-10
meets Turtle Bayou.
South along Turtle Bayou, the eastern shore
of Lake Anahuac, and Anahuac Channel.
The southern boundary begins where Anahuac
Channel meets Trinity Bay.
Northwest along the Trinity Bay shoreline to
where Cedar Bayou Road meets Highway 2354.
The western boundary begins where Cedar Bayou
Road meets Highway 2354.
North along Highway 2354 to Highway 3180.
North along Highway 3180 to Highway 565.
Northwest along Highway 565 (excluding the town
of Cove), then
north along Highway 1409 to the Liberty-Chambers
county line.

Zone $C_3$:
The northern boundary begins where Highway 2936
meets Trinity Bay.
East on Highway 2936 to Highway 562.
North on Highway 562 to Highway 65.
East on Highway 65 to the Spindletop Bayou.
Southeast along Spindletop Bayou to the
Jefferson-Chambers county line.
The eastern boundary begins where Spindletop
Bayou crosses the Jefferson-Chambers county line.
South along the Jefferson-Chambers county line to
the Intercoastal Waterway.
The southern boundary begins where the Jefferson-
Chambers county line crosses the Intercoastal
Waterway.
West along the Intercoastal Waterway and East Bay
Bayou, then
west along the East Bay shoreline to Smith Point.
The western boundary begins at the Smith Point
shoreline.
North along the Trinity Bay shoreline to Highway
2936.

Contingency Zones

Zone $C_A$:
The northern boundary begins where Turtle Bayou
crosses I-10.
East on I-10 to Highway 61.
The eastern boundary begins where Highway I-10 meets
Highway 61.
South on Highway 61 and Highway 562 to Highway 2936.
The southern boundary begins where Highway 562 and
Highway 2936 meet, then
west along Highway 2936 to Trinity Bay.
The western boundary begins where Highway 2936 meets
Trinity Bay, then
north along Trinity Bay, Anahuac Channel, the eastern
shore of Lake Anahuac, and Turtle Bayou.

## SECTION FOUR: SURVEY RESULTS

The results of the survey described in Section One concern the potential number of vehicles evacuating (Part A) and where people will be seeking shelter (Part B).

## *PART A: POTENTIAL NUMBER OF EVACUATING VEHICLES*

The potential number of vehicles leaving from Brazoria, Galveston, Harris, and Chambers counties are displayed in Tables 4-1 through 4-4. They are categorized by evacuation and contingency zones. Evacuation rates and the number of vehicles per evacuating household are also indicated. Two sets of figures are given in the tables. The first set indicates numbers of vehicles departing if only those who indicated they would leave if advised did so, while the second set (in parentheses) indicates the number of vehicles leaving the area if 100 percent of the population evacuated.

This information was used as the basis of the transportation analysis.[1] The transportation analysis is based on two possible scenarios. The first scenario is an evacuation of those in evacuation zones who indicated they would depart if so advised. The second scenario is the case of an extremely severe hurricane in which there would be a 100 percent evacuation of both evacuation and contingency zones.

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[1]The actual data used for the transportation model were broken down further into census tracts with destination descriptions.

TABLE 4-1

POTENTIAL NUMBER OF EVACUATING VEHICLES FOR BRAZORIA COUNTY BY ZONE AS INDICATED IN SURVEY

| Evacuation Zones | Evacuation Rates | Vehicles per Household | Number of Vehicles by Route: Hwy 288 North | Hwy 332 to 36 | Hwy 36 to 521 | Hwy 35 to Houston | Totals |
|---|---|---|---|---|---|---|---|
| $B_1$ | 88% | 1.62 | 287 (325) | 861 (982) | 2016 (2329) | - - | 3164 (3636) |
| $B_2$ | 99% | 1.26 | 2364 (2387) | 3795 (3833) | 142 (144) | 787 (796) | 7088 (7160) |
| $B_3$ | 97% | 1.41 | 2150 (2217) | 3762 (3878) | 537 (554) | 269 (277) | 6718 (6926) |
| $B_4$ | 97% | 1.41 | 671 (692) | 1174 (1210) | 168 (172) | 84 (86) | 2097 (2160) |
| $B_5$ | 94% | 1.35 | 1230 (1308) | 1606 (1707) | 102 (108) | 478 (508) | 3416 (3631) |
| | | Sub Totals | 6702 (6929) | 11198 (11610) | 2965 (3307) | 1618 (1667) | 22483 (23513) |
| Contingency Zones | | | | | | | |
| $B_A$ | 93% | 1.37 | 441 (475) | 3333 (3583) | 883 (948) | 196 (213) | 4853 (5219) |
| $B_B$ | 97% | 1.41 | 1955 (2038) | 1409 (1457) | 49 (52) | 1515 (1613) | 4928 (5160) |
| $B_C$ | 85% | 1.32 | 697 (820) | 930 (1093) | - - | 161 (189) | 1788 (2102) |
| | | Sub Totals | 3093 (3333) | 5672 (6133) | 932 (1000) | 1872 (2015) | 11569 (12481) |
| | | Grand Totals | 9795 (10262) | 16870 (17743) | 3897 (4307) | 3490 (3682) | 34052 (35994) |

Parenthesis ( ) equal numbers if 100 percent evacuation is necessary.

SOURCE: Center for Strategic Technology, Texas A&M University System, College Station, Texas.

TABLE 4-2

POTENTIAL NUMBER OF EVACUATING VEHICLES FOR GALVESTON COUNTY BY ZONE AS INDICATED IN SURVEY

| Evacuation Zones | Evacuation Rates | Evacuating Vehicles per Household | Number of Evacuating Vehicles by Direction | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | North | North East | South West | West | North West | Totals |
| $G_1$ | 80% | 1.48 | 1760<br>(2200) | 220<br>(275) | 74<br>(92) | 308<br>(385) | 572<br>(715) | 2934<br>(3667) |
| $G_2$ | 80% | 1.43 | 2807<br>(3368) | 162<br>(195) | -<br>- | -<br>- | 2430<br>(2916) | 5399<br>(6479) |
| $G_3$ | 77% | 1.53 | 1399<br>(1721) | 207<br>(255) | -<br>- | 104<br>(128) | 907<br>(1116) | 2617<br>(3220) |
| $G_4$ | 87% | 1.19 | 6841<br>(7710) | 1248<br>(1410) | -<br>- | 1248<br>(1410) | 384<br>(434) | 9721<br>(10964) |
| $G_5$ | 71% | .94 | 3106<br>(4006) | -<br>- | 307<br>(395) | 730<br>(941) | 1949<br>(2514) | 6092<br>(7856) |
| $G_6$ | 69% | 1.08 | 4085<br>(5352) | 1124<br>(1473) | -<br>- | 1328<br>(1737) | 3677<br>(4817) | 10214<br>(13379) |
| $G_7$ | 90% | 1.5 | 1677<br>(1863) | -<br>- | -<br>- | -<br>- | -<br>- | 1677<br>(1863) |
| | Sub Totals | | 21675<br>(26220) | 2961<br>(3608) | 381<br>(487) | 3718<br>(4601) | 9919<br>(12512) | 38654<br>(47428) |
| Contingency Zones | | | | | | | | |
| $G_A$ | 78% | 1.47 | 6019<br>(7716) | 780<br>(998) | -<br>- | 1560<br>(2001) | 2786<br>(3571) | 11145<br>(14286) |
| $G_B$ | 90% | 1.56 | 5984<br>(6583) | 798<br>(877) | -<br>- | 1596<br>(1756) | 1596<br>(1756) | 9974<br>(10972) |
| $G_C$ | 85% | 1.31 | 11639<br>(13384) | 1287<br>(1480) | -<br>- | 1287<br>(1480) | 7989<br>(9187) | 22202<br>(25531) |
| | Sub Totals | | 23642<br>(27683) | 2865<br>(3355) | -<br>- | 4443<br>(5237) | 12371<br>(14514) | 43321<br>(50789) |
| | Grand Totals | | 45317<br>(53903) | 5826<br>(6963) | 381<br>(487) | 8161<br>(9838) | 22290<br>(27026) | 81975<br>(98217) |

Parentheses ( ) equal numbers if 100 percent evacuation is necessary.

SOURCE: Center for Strategic Technology, Texas A&M University System, College Station, Texas.

TABLE 4-3

POTENTIAL NUMBER OF EVACUATING VEHICLES FOR HARRIS COUNTY BY ZONE AS INDICATED IN SURVEY

| Evacuation Zones | Evacuation Rates | Evacuating Vehicles per Household | Number of Evacuating Vehicles by Direction | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | North | North East | East | South West | West | North West | Totals |
| $H_1$ | 86% | 1.34 | 3636<br>(4228) | 221<br>(256) | -<br>- | 221<br>(256) | 1102<br>(1281) | 5840<br>(6792) | 11020<br>(12813) |
| $H_2$ | 82% | 1.57 | 394<br>(481) | 635<br>(775) | -<br>- | -<br>- | 523<br>(640) | 635<br>(775) | 2187<br>(2671) |
| Sub Totals | | | 4030<br>(4709) | 856<br>(1031) | -<br>- | 221<br>(256) | 1625<br>(1921) | 6475<br>(7567) | 13207<br>(15484) |
| Contingency Zones | | | | | | | | | |
| $H_A$ | 78% | 1.27 | 2617<br>(3355) | 523<br>(672) | -<br>- | -<br>- | 1421<br>(1821) | 2917<br>(3743) | 7478<br>(9591) |
| $H_B$ | 74% | 1.38 | 3638<br>(4961) | 1711<br>(2314) | -<br>- | -<br>- | 2033<br>(2748) | 3316<br>(4481) | 10698<br>(14504) |
| $H_C$ | 63% | 1.10 | 876<br>(1388) | -<br>- | -<br>- | 229<br>(365) | -<br>- | 3462<br>(5555) | 4567<br>(7308) |
| $H_D$ | 66% | 1.21 | 1290<br>(1922) | 511<br>(764) | 183<br>(273) | -<br>- | 330<br>(495) | 1353<br>(2029) | 3667<br>(5483) |
| $H_E$ | 62% | 1.29 | 1364<br>(2201) | 911<br>(1466) | -<br>- | -<br>- | 76<br>(123) | 1440<br>(2322) | 3791<br>(6112) |
| Sub Totals | | | 9785<br>(13827) | 3656<br>(5216) | 183<br>(273) | 229<br>(365) | 3860<br>(5187) | 12488<br>(18130) | 30201<br>(42998) |
| Grand Totals | | | 13815<br>(18536) | 4512<br>(6247) | 183<br>(273) | 450<br>(621) | 5485<br>(7108) | 18963<br>(25697) | 43408<br>(58482) |

Parentheses ( ) equal numbers if 100 percent evacuation is necessary.

SOURCE: Center for Strategic Technology, Texas A&M University System, College Station, Texas.

TABLE 4-4

POTENTIAL NUMBER OF EVACUATING VEHICLES FOR CHAMBERS COUNTY BY ZONE AS INDICATED IN SURVEY

| Evacuation Zones | Evacuation Rates | Evacuating Vehicles per Household | Number of Evacuating Vehicles by Direction | | | | | Total |
|---|---|---|---|---|---|---|---|---|
| | | | North | North East | East | West | North West | |
| $C_1$ | 88% | 1.30 | 34<br>(39) | -<br>- | 195<br>(222) | -<br>- | -<br>- | 229<br>(261) |
| $C_2$[1] | 78% | 1.40 | 1329<br>(1704) | -<br>- | 316<br>(405) | 147<br>(189) | -<br>- | 1792<br>(2298) |
| $C_3$ | 80% | 1.40 | 290<br>(362) | 94<br>(118) | 18<br>(22) | 94<br>(118) | 14<br>(18) | 510<br>(638) |
| | | Totals | 1653<br>(2105) | 94<br>(118) | 529<br>(649) | 241<br>(307) | 14<br>(18) | 2531<br>(3197) |

Parentheses ( ) equal numbers if 100 percent evacuation is necessary.

[1]Zone $C_2$ as enumerated here also includes contingency zone $C_A$.

SOURCE: Center for Strategic Technology, Texas A&M University System, College Station, Texas.

## *PART B: SHELTER DATA*

The data resulting from the survey can be used by The American Red Cross and other groups to anticipate shelter needs and to plan accordingly. These data for each county can be found in Tables 4-5 through 4-9. Table 4-10 is a composite of the various counties.

In most of the study region, the general policy of The American Red Cross is not to indicate shelter locations in advance of hurricanes, but to make that information available during an evacuation. They feel the shelter information can be adequately relayed via the mass media in time for use by persons planning to evacuate. By this procedure, they are able to more efficiently use their personnel, staffing only those shelters that are actually utilized. This policy also reflects the fact that vandalism has taken place in the past when some impatient evacuees have opened "designated" shelters themselves. Further, they feel pre-publicized shelter locations could cause some people to remain in the area instead of evacuating.

The data here merely indicate, on the basis of the survey, where people stated they would look for shelters regardless of either the availability of shelter or the advisability of staying in these areas. The availability of shelters, along with the dissemination of that information, will determine, to a great extent, where people will actually go.

Four cautions should be exercised in regard to interpreting the shelter data:

| | |
|---|---|
| Caution One | Shelter in cities or portions of cities located outside the evacuation and contingency zones does not include local people who may seek shelter. |

| | |
|---|---|
| Caution Two | The shelter data is based on the intentions of persons living in evacuation and contingency zones. As these persons evacuate through certain areas outside the zones, some persons in those areas will evacuate even if they are not advised to do so. The effect of this snowballing evacuation phenomenon is difficult to judge. However, a 25 to 50 percent increase in shelter needs for some areas caused by this snowball effect would not be unreasonable. |
| Caution Three | In the event of an extremely severe hurricane (winds over 130 MPH) requiring the total evacuation of both evacuation and contingency zones, the shelter demands outside the evacuation and contingency zones would be greatly increased. |
| Caution Four | There is no way to indicate the shelter demands which might be caused by rain-induced flooding and the consequent evacuation of these areas. |

For example, the composite shelter requirements given for cities in Harris County in Table 4-7 could be interpreted as follows to obtain an estimate of possible shelter demand under the most adverse conditions: the 69,759 persons could be increased by perhaps 50,000 to include people who reside outside an evacuation or contingency zone (Caution One) but are seeking local shelters. The resulting figure of 119,759 could be increased by 25 to 50 percent because of the snowball factor (Caution Two). In the event of a severe hurricane (Caution Three), the 149,699 (1.25 x 119,759) to 179,639 (1.50 x 119,759) could easily top 200,000. Adding to this unusually severe rain-induced flooding (Caution Four) could lead to potential shelter needs for Harris County of 200,000 to 300,000 persons.

TABLE 4-5

EVACUATION RATES AND SHELTER DEMAND
FOR BRAZORIA COUNTY

| Evacuation Zones | Percent Evacuating | Number of Persons Seeking Local Shelters[1] | Number of Persons Seeking Shelter in Cities in Study Area[2] | Number of Persons Seeking Shelter Outside Study Area[2] |
|---|---|---|---|---|
| $B_1$ | 88% | - | 200 | 4,004 |
| $B_2$ | 99% | 267 | 5,644 | 22,063 |
| $B_3$ | 97% | 152 | 1,899 | 10,913 |
| $B_4$ | 97% | - | 584 | 3,356 |
| $B_5$ | 94% | - | 1,156 | 6,474 |
| | Subtotals | 419 | 9,483 | 46,810 |
| Contingency Zones | | | | |
| $B_A$ | 93% | 144 | 255 | 8,228 |
| $B_B$ | 94% | 156 | 755 | 8,675 |
| $B_C$ | 85% | 272 | 272 | 2,903 |
| | Subtotals | 572 | 1,282 | 19,806 |
| | Grand Totals | 991 | 10,765 | 66,616 |

| Key City Shelter Requirements | Number of Local Persons[3] | Number of Persons from Evacuation Zones | Number of Persons from Contingency Zones | Total Shelter Requirements |
|---|---|---|---|---|
| Alvin | - | 74 | 188 | 262 |
| Angleton | 156 | 333 | - | 489 |
| Brazoria/ Sweeney | 144 | - | - | 144 |
| Danbury/ Liverpool | 272 | - | - | 272 |
| Freeport | 152 | - | - | 152 |
| Lake Jackson/ Clute | 267 | - | - | 267 |
| West Columbia | - | 602 | 29 | 631 |
| Totals | 991 | 1,009 | 217 | 2,217 |

[1]Does not include persons who indicated they would stay with friends, relatives, or in commercial accommodations.
[2]The study area includes Brazoria, Galveston, Harris, Fort Bend, and Chambers counties.
[3]Local persons were counted only for cities or portions of cities in evacuation or contingency zones.

SOURCE: Center for Strategic Technology, Texas A&M University System, College Station, Texas.

TABLE 4-6

EVACUATION RATES AND SHELTER DEMAND
FOR GALVESTON COUNTY

| Evacuation Zones | Percent Evacuating | Number of Persons Seeking Local Shelters[1] | Number of Persons Seeking Shelter in Cities in Study Area[2] | Number of Persons Seeking Shelter Outside Study Area[2] |
|---|---|---|---|---|
| $G_1$ | 80% | 650 | 819 | 1,781 |
| $G_2$ | 80% | 522 | 2,348 | 4,695 |
| $G_3$ | 77% | 635 | 2,224 | 2,383 |
| $G_4$ | 87% | 732 | 6,952 | 12,806 |
| $G_5$ | 71% | 861 | 1,507 | 7,321 |
| $G_6$ | 69% | 2,669 | 6,672 | 8,856 |
| $G_7$ | 90% | - | - | 2,681 |
| | Subtotals | 6,069 | 20,522 | 40,523 |
| Contingency Zones | | | | |
| $G_A$ | 73% | 866 | 5,772 | 13,276 |
| $G_B$ | 90% | 977 | 3,916 | 9,789 |
| $G_C$ | 85% | 1,450 | 6,962 | 35,096 |
| | Subtotals | 3,293 | 16,650 | 58,161 |
| | Grand Totals | 9,362 | 37,172 | 98,684 |

| Key City Shelter Requirements | Number of Local Persons[3] | Number of Persons From Evacuation Zones | Number of Persons From Contingency Zones | Total Shelter Requirements |
|---|---|---|---|---|
| Dickinson | 977 | - | - | 977 |
| Friendswood | 866 | - | - | 866 |
| Galveston | 4,262 | - | - | 4,262 |
| Kemah | 322 | - | - | 322 |
| La Marque | 635 | - | - | 635 |
| League City | 650 | - | - | 650 |
| Texas City | 1,450 | - | - | 1,450 |
| Totals | 9,162 | - | - | 9,162 |

[1]Does not include persons who indicated they would stay with friends, relatives, or in commercial accommodations.
[2]The study area includes Brazoria, Galveston, Harris, Fort Bend and Chambers counties.
[3]Local persons were counted only for cities or portions of cities in evacuation or contingency zones.

SOURCE: Center for Strategic Technology, Texas A&M University System, College Station, Texas.

TABLE 4-7

EVACUATION RATES AND SHELTER DEMAND
FOR HARRIS COUNTY

| Evacuation Zones | Percent Evacuating | Number of Persons Seeking Local Shelters[1] | Number of Persons Seeking Shelter in Cities in Study Area[2] | Number of Persons Seeking Shelter Outside Study Area[2] |
|---|---|---|---|---|
| $H_1$ | 86% | 762 | 1,905 | 3,144 |
| $H_2$ | 89% | 546 | 243 | 2,122 |
| | Subtotals | 1,308 | 2,148 | 5,266 |
| Contingency Zones | | | | |
| $H_A$ | 78% | 2,160 | 1,260 | 13,319 |
| $H_B$ | 74% | 5,650 | 983 | 19,162 |
| $H_C$ | 63% | 3,685 | 1,228 | 4,913 |
| $H_D$ | 66% | 2,365 | 296 | 4,731 |
| $H_E$ | 62% | 2,237 | 681 | 4,572 |
| | Subtotals | 16,097 | 4,448 | 46,697 |
| | Grand Totals | 17,405 | 6,596 | 51,963 |

| Key City Shelter Requirements | Number of Local Persons[3] | Number of Persons from Evacuation Zones | Number of Persons from Contingency Zones | Total Shelter Requirements |
|---|---|---|---|---|
| Baytown | 2,365 | - | - | 2,365 |
| Clear Lake | 1,842 | - | - | 1,842 |
| Cypress | - | 57 | - | 57 |
| Deer Park | 3,755 | - | - | 3,755 |
| Houston | 5,922 | 28,575 | 19,032 | 53,529 |
| Katy | - | 468 | 487 | 955 |
| La Porte | 1,595 | - | - | 1,595 |
| Nassau Bay | 112 | - | - | 112 |
| Pasadena | 1,527 | 72 | 553 | 2,154 |
| Seabrook | 62 | - | - | 62 |
| Spring | - | 1,517 | 1,204 | 2,721 |
| Taylor Lake | 75 | - | - | 75 |
| Tomball | - | - | 387 | 387 |
| Webster | 150 | - | - | 150 |
| Totals | 17,405 | 30,689 | 21,663 | 69,759 |

[1]Does not include persons who indicated they would stay with friends, relatives, or in commercial accommodations.
[2]The study area includes Brazoria, Galveston, Harris, Fort Bend, and Chambers counties.
[3]Local persons were counted only for cities or portions of cities in evacuation or contingency zones.

SOURCE: Center for Strategic Technology, Texas A&M University System, College Station, Texas.

TABLE 4-8

SHELTER DEMAND FOR FORT BEND COUNTY
FROM EVACUATION AND CONTINGENCY ZONES

| City | Number of Persons from Evacuation Zones | Number of Persons from Contingency Zones | Total Shelter Requirements |
|---|---|---|---|
| Rosenberg | 745 | 210 | 955 |

SOURCE: Center for Strategic Technology, Texas A&M University System, College Station, Texas.

TABLE 4-9

EVACUATION RATES AND SHELTER DEMAND
FOR CHAMBERS COUNTY

| Evacuation Zones | Percent Evacuating | Number of Persons Seeking Local Shelters[1] | Number of Persons Seeking Shelter in Cities in Study Area[2] | Number of Persons Seeking Shelter Outside Study Area[2] |
|---|---|---|---|---|
| $C_1$ | 88% | - | 100 | 455 |
| $C_2$[3] | 89% | 450 | 172 | 3,798 |
| $C_3$ | 80% | - | 172 | 949 |
| Totals | | 450 | 444 | 5,202 |

| Key City Shelter Requirements | Number of Local Persons[4] | Number of Persons from Evacuation Zones | Number of Persons from Contingency Zones | Total Shelter Requirements |
|---|---|---|---|---|
| Anahuac | 450 | 172 | - | 622 |
| Mt. Belvieu | - | 100 | - | 100[5] |
| Winnie | - | 172 | - | 172[5] |
| Totals | 450 | 444 | - | 894 |

[1]Does not include persons who indicated they would stay with friends, relatives, or in commercial accommodations.

[2]The study area includes Brazoria, Galveston, Harris, Fort Bend, and Chambers counties.

[3]Zone $C_2$ as enumerated here also includes contingency zone $C_A$.

[4]Local persons were counted only for cities or portions of cities in evacuation or contingency zones.

[5]With traffic on State Highway 146, Mt. Belvieu could easily reach maximum capacity and with traffic on I-10 being blocked by surge or wind, Winnie could also reach maximum capacity.

SOURCE: Center for Strategic Technology, Texas A&M University System, College Station, Texas.

TABLE 4-10

COMPOSITE SHELTER DEMAND
FOR FIVE-COUNTY STUDY AREA

| County | Number of Persons Seeking Local Shelters | | Number of Persons Seeking Shelter in Cities in Study Area | | Number of Persons Seeking Shelter Outside Study Area | |
|---|---|---|---|---|---|---|
| Brazoria | | | | | | |
| Evacuation Zones | 419 | | 9,483 | | 46,810 | |
| Contingency Zones | 572 | | 1,282 | | 19,806 | |
| Totals | | 991 | | 10,765 | | 66,616 |
| Galveston | | | | | | |
| Evacuation Zones | 6,069 | | 20,522 | | 40,523 | |
| Contingency Zones | 3,293 | | 16,650 | | 58,161 | |
| Totals | | 9,362 | | 37,172 | | 98,684 |
| Harris | | | | | | |
| Evacuation Zones | 1,308 | | 2,148 | | 5,266 | |
| Contingency Zones | 16,097 | | 4,448 | | 46,697 | |
| Totals | | 17,405 | | 6,596 | | 51,963 |
| Chambers | | | | | | |
| Evacuation Zones | 450 | | 444 | | 5,202 | |
| Contingency Zones[1] | - | | - | | - | |
| Totals | | 450 | | 450 | | 5,202 |
| Total Area | | | | | | |
| Evacuation Zones | 8,246 | | 32,597 | | 97,801 | |
| Contingency Zones | 19,962 | | 22,977 | | 124,646 | |
| Totals | | 28,208 | | 54,977 | | 222,465 |

[1]See Table 4-9 note 3.

SOURCE: Center for Strategic Technology, Texas A&M University System, College Station, Texas.

## SECTION FIVE: EVACUATION TIMES

Three items regarding the evacuation time estimates given in this section should be discussed first:

- The estimates are based on a 20 percent reduction in road capacity caused by the weather conditions associated with hurricanes.

- Estimated evacuation times are not based on the time it will take vehicles to leave particular zones, but upon the time it will take them to clear the evacuation and contingency zones. That is, the time it will take to reach a "safe" area. For instance, the time it would take for a partial evacuation of Galveston Island (where only those who indicated they would evacuate if so advised were included) would be nine hours. However, because of longer delays they would experience as they approached the Houston area, the realistic estimate for a partial evacuation of Galveston Island would be 14 hours.

- There is no way of accurately estimating the traffic delays in Houston resulting from the additional evacuation vehicles being added to an already-overloaded transportation network.

Table 5-1 displays the estimated evacuation times by county for a partial evacuation of evacuation zones and for a total evacuation of both evacuation and contingency zones. The National Hurricane Center normally can provide 16 to 24 hours of warning before a hurricane makes landfall, but for storms which develop close to shore or change paths abrubtly, as little as ten hours warning can occur. Since many of the estimated evacuation times are greater than ten hours, this means some decisions regarding evacuation may be required <u>before</u> sufficient information is available about the time and point of landfall and the resultant hurricane threat.

A further complicating factor is illustrated in Table 5-2. The time estimates given in Table 5-1 must be adjusted by three hours for delays which are necessary for warning the residents, permitting them to prepare to evacuate, and establishing a monitoring system. (It is estimated that it will take about one hour to warn the people to evacuate, another hour before they are prepared to evacuate, and about another hour to establish a monitoring system which will permit maximum utilization of the evacuation routes.) The monitoring system must relay by radio or television the delays that may be anticipated waiting to gain access to the evacuation routes. The monitoring system must also indicate when more vehicles are needed to utilize the evacuation route so that total evacuation time will not be extended. Less than full utilization of an evacuation route can lead to longer evacuation times.

There is a difference between evacuation time and the amount of time it may take an evacuating vehicle to evacuate. Table 5-3 illustrates how the estimates of the anticipated time per evacuating vehicle can be made. For instance, the estimated evacuation time of 26 hours could mean that an evacuating vehicle could be on the evacuation route as little as three hours but as long as 26 hours. The table also illustrates the need for properly phased evacuation and the advantage of evacuating before there are substantial traffic delays.

As an illustration, Table 5-4 indicates how to estimate the time to begin an evacuation. First, the estimated evacuation time for the evacuation zone or zones should be located in Table 5-1. Next, the time must be adjusted for anticipated delays for warning, preparation, and monitoring. Following this, the number of hours plus or minus the anticipated time of landfall the evacuation route may be blocked must be ascertained. This can be done by locating the data points for a given area and

consulting Appendix B to find the cutoff times for those data points. Cutoff times are given by storm type indicating the time wind gusts will reach 52 MPH and 65.5 MPH. The cutoff times are also given for storm surge penetration for low, mean sea level, and high tide conditions. The time to begin evacuation has to be sufficient to permit its completion (using the adjusted time estimate) prior to the anticipated time the evacuation route will be blocked. Once this time is established, the final adjustments must consider the Houston traffic problem, the desirability of evacuation during daylight hours, the unpredictability of the hurricane intensifying or weakening, varying forward movement speed, changing direction, and evacuation route blockage by unexpected rainfall.

An example of how this estimate may be made for Galveston Island (Zones $G_4$, $G_5$, $G_6$) using the procedure outlined in Table 5-4 follows: Assume there is a hurricane in the Gulf of Mexico apparently heading for Galveston Island. The National Hurricane Center has issued a hurricane watch for the Texas and Louisiana coasts from Port O'Connor, Texas, to Grand Isle, Louisiana. The hurricane is heading due north ($360^{o}$) at about 5 MPH with wind speeds of 120 MPH. The present location is 250 miles south of Galveston Island. With this information in mind, we know that the present wind speed, being 130 MPH or less, will not cause storm surge to penetrate areas outside the evacuation zones. Checking Table 5-1, we find that under these conditions it would take about 14 hours to evacuate Galveston Island. Then three hours are added to this for the estimated time required for warning, preparation, and monitoring. This is added to the 14 hours, providing the adjusted time estimate of 17 hours. Then the Galveston Causeway Data Point information is located in Appendix B (page B-29). For this type of storm, the wind will reach 52 MPH gusts 17.5 hours before landfall, and 65.5 MPH gusts 13.5 hours before landfall.

Also, we find that if the storm makes landfall during high tide, the causeway will be flooded 7.5 hours before landfall. We also note the maximum flooding will be 4.2 feet above the causeway. Since the storm surge does not account for overlapping waves which could block the causeway earlier, we know that it will be blocked before 7.5 hours. However, this becomes irrelevant since wind gusting will close the causeway before surge penetration. Since cars can still evacuate with wind gusts up to 65.5 MPH, the road blockage time is estimated at 13.5 hours before landfall. Since evacuation must be accomplished before the evacuation route is cut off, there is a need for 13.5 hours (cutoff time) plus the adjusted time estimate of 17 hours for evacuation before the anticipated time of landfall.

This provides an approximate estimate which indicates that evacuation for this type of hurricane would have to begin 30.5 hours before the time of landfall. Since the hurricane is 250 miles from Galveston Island and moving at 5 MPH, we could estimate the arrival time in 50 hours (250 miles divided by the forward movement speed of 5 MPH). This means that there would be 19.5 hours (50 minus 30.5) before it would be necessary to recommend evacuation. However, at this time the final adjustment factors must be considered. These include Houston traffic problems (especially at peak hours), the desirability of evacuation during daylight hours, the unpredectability of hurricane intensification or weakening, varying forward movement speed,[1] changing direction, and evacuation route blockage by unexpected rainfall.

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[1]If the speed increases to 10 miles per hour, there would be only 25 hours before landfall. This could indicate that not everyone could evacuate, since 30.5 hours would be needed; however, this is not the case since a forward movement speed of 10 MPH means that the route cutoff time would be six hours less and there would be just adequate time for evacuation.

Because of the many hazards associated with evacuating people over a congested highway system from areas where hurricanes can threaten lives, it is strongly recommended that persons residing in "safe" areas not be encouraged to evacuate and further congest traffic, unless they do so before the traffic conditions become critical.

TABLE 5-1

ESTIMATED EVACUATION TIMES BY COUNTY

| County | Partial Evacuation of Evacuation Zones[1] | Total Evacuation of Both Contingency and Evacuation Zones |
|---|---|---|
| Brazoria | 14 Hours ($B_1$, $B_2$, $B_3$, $B_4$, $B_5$) | 20 Hours ($B_1$, $B_2$, $B_3$, $B_4$, $B_5$, $B_A$, $B_B$, $B_C$) |
| Galveston | 14 Hours ($G_1$, $G_2$, $G_3$, $G_4$, $G_5$, $G_6$) | 26 Hours ($G_1$, $G_2$, $G_3$, $G_4$, $G_5$, $G_6$, $G_A$, $G_B$, $G_C$) |
| | 3 Hours ($G_7$) | 4 Hours ($G_7$) |
| Harris | 14 Hours ($H_1$) | 26 Hours ($H_1$, $H_A$) |
| | 3 Hours ($H_2$) | 4 Hours ($H_2$, $H_B$, $H_C$, $H_D$, $H_E$) |
| Chambers | 3 Hours ($C_2$, $C_3$) | 4 Hours ($C_2$, $C_3$, $C_A$) |
| | 2 Hours ($C_1$) | 3 Hours ($C_1$) |

[1]Times were computed only for persons who indicated they would evacuate if so advised.

SOURCE: Center for Strategic Technology, Texas A&M University System, College Station, Texas.

TABLE 5-2

ADJUSTED EVACUATION TIMES

| Estimated Evacuation Times (Table 5-1) | Estimated Hours Lost Because of Warning, Preparation, and Monitoring[1] | Adjusted Time Estimates |
|---|---|---|
| 26 Hours | 3 Hours | 29 Hours |
| 20 Hours | 3 Hours | 23 Hours |
| 14 Hours | 3 Hours | 17 Hours |
| 4 Hours | 3 Hours | 7 Hours |
| 3 Hours | 3 Hours | 6 Hours |
| 2 Hours | 3 Hours | 5 Hours |

[1]It is estimated that it will take about one hour to warn the people to evacuate, another hour for them to prepare to evacuate, and approximately another hour to establish a monitoring system which will permit maximum utilization of the evacuation routes. The monitoring system must relay by radio or television the delays that may be anticipated waiting to gain access to the evacuation routes. It must also indicate when more vehicles are needed to utilize the evacuation route so that total evacuation time will not be extended. Less than full utilization of an evacuation route can lead to longer evacuation times.

SOURCE: Center for Strategic Technology, Texas A&M University System, College Station, Texas.

TABLE 5-3

ESTIMATES OF ANTICIPATED EVACUATION TIME PER EVACUATING VEHICLE

| Estimated Evacuation Times (Table 5-1) | For Vehicles Phased into Evacuation Routes Without Creating Congestion[1] | For Vehicles at End of Line of All Evacuating Vehicles Trying to Gain Access to the Evacuation Route at the Same Time |
|---|---|---|
| 26 Hours | 3 | 26 |
| 20 Hours | 3 | 20 |
| 14 Hours | 2 | 14 |
| 4 Hours | 1 | 4 |
| 3 Hours | 1 | 3 |
| 2 Hours | 1 | 2 |

[1]These estimates are to be regarded as the best possible times if there were controlled access to all evacuation routes (an almost impossible situation), or the evacuating vehicle would be among the first to evacuate before traffic congestion began.

SOURCE: Center for Strategic Technology, Texas A&M University System, College Station, Texas.

TABLE 5-4

ESTIMATING THE TIME TO BEGIN THE EVACUATION

| Estimated Evacuation Time (Table 5-1) | Adjusted Time Estimate (Table 5-2) | Evacuation Route Cut-off Time + or - Anticipated Time of Landfall | Time to Begin Evacuation | Final Adjustments Factors |
|---|---|---|---|---|
| 26 Hours | 26 + A[1]=B[2] | C[3] | B before C[3]=D[4] | D modified by E[5]=Time To Begin Evacuating |
| 20 Hours | 20 + A =B | C | B before C =D | D modified by E =Time to Begin Evacuating |
| 14 Hours | 14 + A =B | C | B before C =D | D modified by E =Time to Begin Evacuating |
| 4 Hours | 4 + A =B | C | B before C =D | D modified by E =Time to Begin Evacuating |
| 3 Hours | 3 + A =B | C | B before C =D | D modified by E =Time to Begin Evacuating |
| 2 Hours | 2 + A =B | C | B before C =D | D modified by E =Time to Begin Evacuating |

[1]"A" represents an estimation of the number of hours which may be lost because of warning, preparation, and monitoring.

[2]"B" represents the adjusted time estimate.

[3]"C" represents the evacuation route cut-off time which is given in hours plus or minus time the eye of the hurricane makes landfall for previously identified data points. This information is in Appendix B and gives cut-off times by wind speed (gusts up to 52 MPH and gusts up to 65.5 MPH) and storm penetration (low tide, mean tide, and high tide).

[4]"D" represents the time to begin the evacuation.

[5]"E" represents the final adjustment factors which should include Houston traffic problems (especially at peak hours), the desirability of evacuating during daylight hours, the unpredictability of hurricane intensification or weakening, varying forward movement speed, changing direction, and evacuation route blockage by unexpected rainfall.

SOURCE: Center for Strategic Technology, Texas A&M University System, College Station, Texas.

## SECTION SIX: MEDIA INFORMATION AND SUGGESTED CAUTIONS

The media needs to be aware of the content of the disclaimer at the beginning of this study, which reads:

> This study is to be used as a planning tool or handbook for government officials. It is not a policy document. As such, when properly consulted, it may serve as a guide for providing officials with "worst case" situations so that they may determine when and how protective and/or evacuation measures should begin. It is designed for no other purpose.

Any statement imputing absolute values to the various storm surge penetrations should be avoided since the surge penetration is based on predictions which could have errors of plus or minus 20 percent of the actual with accurate initial forecast input. With inaccurate forecast data, the error factor could be greater. It should also be noted that each surge line represents a composite of the maximum surge penetration of eight different simulated hurricanes. These maps are contained in Figures 3-1 through 3-4 of this report.[1] To properly understand surges produced by these storm intensities, a history of hurricane activity in the study region is provided in Table I-1. In indicating an area's vulnerability, zones should be used rather than possible storm surge penetrations because zones are less confusing. In reports to the public, intensities of hurricanes should not be stated in categories of the Saffir-Simpson Scale, but by the wind speeds these categories represent. This will avoid the problem some feel could develop if a Category 1 hurricane hits the region. That is, people may have the impression that a Category 1 is not a "bad" hurricane. In fact, all hurricanes are bad hurricanes.

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[1] A composite map is also included in this report.

The hurricane-vulnerable areas of the five-county (Brazoria, Galveston, Fort Bend, Harris, and Chambers) region are divided into evacuation zones and contingency zones. The areas which could be penetrated by storm surge of hurricanes with winds of 130 MPH or less are designated evacuation zones. During an actual hurricane, it is hoped that phased evacuation could take place using these zones. That is, those in the most vulnerable zones would be evacuated before those in the less vulnerable zones. For areas which could be penetrated by storm surge from hurricanes with winds in excess of 130 MPH, contingency zones are designated. The extent to which the evacuation and contingency zones are used during an actual hurricane depends on those persons who are in decision-making positions. An indication of whom these decision-makers are in your area can be found in the chart at the end of the introduction, which describes the decision-making process. The evacuation and contingency zones are displayed in Figures 3-1 to 3-4 of this report.[1]

Two evacuation scenarios are presented: the first indicates the number of hours, by county, which would be anticipated for evacuation if only persons in evacuation zones who indicated they would evacuate if so advised, did evacuate (Table 5-1). The second indicates the evacuation times, by county, which could be expected if an extremely severe hurricane called for total evacuation of persons from both evacuation and contingency zones (Table 5-1).

In light of these factors, the media can aid evacuation by stressing two themes. First, if people do not want to be trapped in long hours of traffic, they should leave long before hurricane conditions could ever indicate the need to evacuate. Second, the fewer persons who evacuate

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[1]A composite map is also included in this report.

from non-threatened areas (unless they do so before traffic conditions become critical), the more likely those persons who are in extremely vulnerable areas will be able to evacuate in time. It should be noted that highway blockage conditions are often not as serious in the hurricane vulnerable areas as they are in the areas outside the evacuation and contingency zones. The media can also help in traffic monitoring (see page 5-2).

Another area in which the media can be helpful is in the dissemination of shelter information. Regular contact should be made with The American Red Cross and other groups offering shelter in order that persons considering evacuation, but uncertain about shelter availability and locations, will have the necessary information. Also, a listing of what they should bring to the shelters and what they are forbidden to bring should be indicated. It should be remembered that the people who need this information are those in the areas where evacuation is being considered. For instance, information about shelters in Houston and areas further inland should be relayed to radio and television stations that are heard and watched by persons in the vulnerable areas. Special provisions should be made so that persons evacuating in vehicles on I-45 can be informed by radio of available shelter in Houston and cities further inland. They should also be informed of the best routes to Houston shelters and the best routes through Houston. For persons evacuating on I-45 and intending to proceed north of Houston, it is recommended that they take I-610 East to I-59 and I-45.

Two composite maps of the five-county region, one indicating storm surge penetration, and the other zone delineations with evacuation routes and evacuation times, are included in this report. Additional media information may be found in Appendix D which contains brochure suggestions.

## APPENDIX A

## HURRICANE CATEGORIES[1]

FORCE ONE--Winds of 74 to 95 miles per hour. Damage primarily to shrubbery, trees, foliage, unanchored mobile homes and, possibly, poorly constructed signs.

OR--Storm surge four to five feet above normal. Low-lying coastal roads inundated, minor pier damage, some small craft in exposed anchorages torn from moorings.

FORCE TWO--Winds of 96 to 110 miles per hour. Considerable damage to shrubbery and tree foliage, some trees blown down. Major damage to exposed mobile homes and poorly constructed signs. Some damage to roofs, windows, and doors. No major damage to buildings.

OR--Storm surge six to eight feet above normal. Coastal roads and low-lying escape routes cut by rising water two to four hours before arrival of hurricane center. Considerable damage to piers. Marinas flooded and small craft in unprotected anchorages torn from moorings. Evacuation of some shoreline residences and low-lying island areas required.

FORCE THREE--Winds of 111 to 130 miles per hour. Foliage torn from trees, large trees blown down. Practically all poorly constructed

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[1]Developed by Herbert Saffir, Dade County, Florida, consulting engineer, and Dr. Robert H. Simpson, former National Hurricane Center director.

signs blown down and mobile homes destroyed. Some damage to roofs, windows, and doors and some structural damage to small buildings.

OR--Storm surge nine to twelve feet above normal. Serious flooding at coast and many smaller structures near coast destroyed. Larger structures battered by waves and floating debris. Low-lying escape routes cut by rising water three to five hours before hurricane center arrives. Flat terrain five feet or less above sea level flooded eight miles inland or more. Evacuation of low-lying residences within several blocks of shoreline possibly required.

FORCE FOUR--Winds of 131 to 155 miles per hour. Shrubs and trees blown down, all signs down. Extensive damage to roofs, windows, and doors. Complete destruction of mobile homes.

OR--Storm surge 13 to 18 feet above normal. Flat terrain ten feet or less above sea level flooded as far as six miles inland. Major damage to lower floors of structures near shore due to flooding and battering by waves and floating debris. Low-lying escape routes cut by rising water three to five hours before hurricane center arrives. Major erosion of beaches. Massive evacuation of all residences within 500 yards of shore possibly required, and of single-story residences on low ground within two miles of shore.

FORCE FIVE--Winds greater than 155 miles per hour. Shrubs and trees blown down and complete destruction of mobile homes. Extensive shattering of glass in windows and doors and complete failure of roofs on many residences and industrial buildings. Small buildings overturned or blown away.

OR--Storm surge greater than 18 feet above normal. Major damage to lower floors of all structures less than 15 feet above sea level within 500 yards of shore. Low-lying escape routes cut by rising water three to five hours before hurricane center arrives. Massive evacuation of low-lying residential areas within five to ten miles of shore possibly required.

# APPENDIX B

## SIXTY-EIGHT DATA POINTS BY HURRICANE TYPE

Caution: For information on how these data points are to be interpreted, read *PART C: DATA POINTS* of SECTION TWO: SLOSH DATA of this report. The data points follow the order described in Table 2-4. It should be noted that when the point elevation is 0.0, flooding indicates the number of hours (plus or minus the time of landfall) when the mean sea level is exceeded, while the maximum high tide surge indicates the estimated maximum surge depth above mean sea level.

SAN BERNARD RIVER AND THE INTRACOASTAL WATERWAY

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

SAN BERNARD RIVER AND THE INTERACOASTAL WATERWAY — ELEVATION: 3.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.0 | -4.0 | -2.5 | -1.0 | -15.5 | -7.0 | -5.0 | -3.5 | -9.5 | -4.0 | -3.0 | -2.5 | -17.0 | -7.0 | -5.5 | -4.0 |
| DIRECTION OF WIND | N | N | N | N W | N E | N E | N E | N E | N E | N E | N E | N E | E | E | E | E |
| DURATION IN HOURS | 16.5 | 7.5 | 5.0 | 3.0 | 17.0 | 8.0 | 5.5 | 4.5 | 17.0 | 8.0 | 6.0 | 4.5 | 15.5 | 7.5 | 5.5 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -2.5 | -1.5 | . | . | -12.0 | N C | N C | -1.5 | -6.5 | N C | N C | -1.5 | -14.0 | N C | N C | -3.5 |
| DIRECTION OF WIND | N W | N | . | . | N | N C | N C | N W | N E | N C | N C | N E | E | N C | N C | E |
| DURATION IN HOURS | 6.0 | 2.0 | . | . | 10.5 | N C | N C | 1.0 | 11.0 | N C | N C | 3.5 | 7.0 | N C | N C | 3.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | 0.0 | . | . | . | -2.0 |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | -9.0 | N C | N C | -1.0 | -16.0 | N C | N C | -3.0 |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | N C | N C | N C | 0.0 | N C | N C | N C | -4.0 |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | 6.0 | N C | N C | 9.6 | 6.0 | N C | N C | 9.7 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -3.5 | -2.0 | -19.0 | -10.0 | -7.0 | -4.5 | -12.0 | -6.5 | -4.5 | -3.0 | -19.5 | -10.5 | -7.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | N | N E | N E | N E | N E | N E | N E | N E | N E | E | E | E | E |
| DURATION IN HOURS | 17.5 | 10.0 | 6.5 | 4.0 | 21.5 | 12.0 | 8.0 | 4.5 | 20.0 | 11.5 | 8.0 | 5.5 | 19.5 | 11.0 | 8.0 | 5.5 |
| 65.5 MPH WIND GUSTS FTOL | -6.0 | -3.5 | -2.0 | -1.0 | -14.5 | -8.5 | -6.0 | -3.5 | -8.5 | -5.0 | -3.5 | -2.0 | -16.0 | -9.5 | -6.5 | -4.0 |
| DIRECTION OF WIND | N | N | N | N W | N E | N E | N E | N E | N E | N E | N E | N E | E | E | E | E |
| DURATION IN HOURS | 11.5 | 6.0 | 4.0 | 2.5 | 14.5 | 8.0 | 5.5 | 3.5 | 15.0 | 8.5 | 6.0 | 4.0 | 13.0 | 7.5 | 5.5 | 4.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | -5.0 | N C | N C | -0.5 | -13.5 | N C | N C | -2.5 |
| M.S.L. FLOODING FTOL | . | . | . | . | -16.0 | N C | N C | -2.5 | -11.5 | N C | N C | -1.5 | -19.0 | N C | N C | -3.5 |
| HIGH TIDE FLOODING FTOL | . | . | . | . | N C | N C | N C | N C | -18.0 | N C | N C | -2.5 | -24.5 | N C | N C | -4.5 |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | 5.6 | N C | N C | 4.5 | 7.7 | N C | N C | 10.6 | 7.6 | N C | N C | 11.1 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -14.0 | -7.5 | -5.0 | -3.5 | -22.5 | -12.0 | -8.0 | -5.5 | -15.5 | -8.5 | -6.0 | -4.0 | -23.0 | -12.5 | -8.0 | -5.5 |
| DIRECTION OF WIND | N | N | N | N | N E | N E | N E | N E | N E | N E | N C | N E | N E | N E | N C | E |
| DURATION IN HOURS | 24.5 | 13.5 | 9.5 | 6.0 | 26.5 | 14.5 | 10.0 | 6.5 | 26.5 | 15.0 | 10.5 | 7.5 | 26.0 | 14.5 | 10.0 | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -9.5 | -5.5 | -3.5 | -2.0 | -18.0 | -10.0 | -7.0 | -4.5 | -11.5 | -6.5 | -4.5 | -3.0 | -19.5 | -11.0 | -7.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | N | N E | N E | N F | N E | N E | N E | N E | N E | N E | E | E | E |
| DURATION IN HOURS | 17.0 | 9.5 | 6.5 | 4.0 | 20.5 | 11.5 | 8.0 | 5.0 | 20.0 | 11.5 | 8.0 | 5.5 | 19.5 | 11.0 | 8.0 | 5.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | -14.5 | . | . | . | -9.5 | N C | N C | -1.0 | -17.5 | N C | N C | -3.0 |
| M.S.L. FLOODING FTOL | . | . | . | . | -19.0 | N C | N C | -3.5 | -15.0 | N C | N C | -2.0 | -24.0 | N C | N C | -4.0 |
| HIGH TIDE FLOODING FTOL | . | . | . | . | -23.5 | N C | N C | N C | -20.0 | N C | N C | -3.0 | -30.5 | N C | N C | -5.0 |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | 6.1 | N C | N C | 4.9 | 10.2 | N C | N C | 14.9 | 10.0 | N C | N C | 14.4 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -17.0 | -9.0 | -6.0 | -4.0 | N C | N C | N C | -6.0 | -18.5 | -10.0 | -6.5 | -4.5 | -26.5 | -14.5 | -9.0 | -6.5 |
| DIRECTION OF WIND | N | N | N | N | N C | N C | N C | N E | N C | N C | N C | N E | N C | N C | N C | N E |
| DURATION IN HOURS | 28.0 | 15.0 | 10.5 | 7.5 | N C | N C | N C | 8.0 | 30.5 | 16.5 | 11.5 | 8.5 | 30.0 | 16.5 | 12.0 | 8.5 |
| 65.5 MPH WIND GUSTS FTOL | -12.5 | -7.0 | -4.5 | -3.0 | -21.0 | -11.5 | -7.5 | -5.0 | -14.5 | -8.0 | -5.0 | -3.5 | -22.0 | -12.0 | -8.0 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | N E | N E | N E | N E | N C | N C | N C | N E | N C | N C | N C | N E |
| DURATION IN HOURS | 20.5 | 11.5 | 8.0 | 5.5 | 24.0 | 13.5 | 9.5 | 6.5 | 23.5 | 13.5 | 9.5 | 6.5 | 23.0 | 13.0 | 9.0 | 6.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | -15.0 | . | . | . | -11.5 | N C | N C | -1.5 | -20.0 | N C | N C | 3.5 |
| M.S.L. FLOODING FTOL | . | . | . | . | -19.0 | . | . | . | -17.5 | N C | N C | -2.0 | -27.5 | N C | N C | -4.0 |
| HIGH TIDE FLOODING FTOL | . | . | . | . | -23.0 | . | . | . | -23.5 | N C | N C | -3.0 | -35.0 | N C | N C | -12.0 |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | 7.5 | . | . | . | 13.5 | N C | N C | 19.1 | 12.8 | N C | N C | 18.6 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -16.0 | -8.0 | -5.5 | -3.5 | N C | N C | N C | -5.0 | -17.5 | -9.0 | -6.0 | -4.5 | -25.0 | -13.0 | -8.5 | -6.5 |
| DIRECTION OF WIND | N | N | N | N | N C | N C | N C | N E | N C | N C | N C | N E | N E | N E | N E | N E |
| DURATION IN HOURS | 24.5 | 13.5 | 9.5 | 6.5 | N C | N C | N C | 7.0 | N C | N C | N C | 7.5 | 29.0 | 16.0 | 11.0 | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -11.5 | -5.5 | -3.5 | -2.5 | N C | N C | N C | -4.0 | 13.5 | 5.0 | 1.5 | -3.5 | -21.0 | -10.5 | -7.0 | -5.5 |
| DIRECTION OF WIND | N | N | N | N | N C | N C | N C | N E | N C | N C | N C | N E | N E | N E | N E | N E |
| DURATION IN HOURS | 17.0 | 10.0 | 6.5 | 4.5 | N C | N C | N C | 5.0 | -3.5 | 0.0 | 2.0 | 6.0 | 22.0 | 10.0 | 5.0 | 6.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | -9.0 | N C | N C | -0.5 | -18.5 | N C | N C | -3.5 |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | -14.5 | N C | N C | N C | -24.5 | N C | N C | N C |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | -20.0 | N C | N C | N C | -30.5 | N C | N C | N C |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | 11.4 | N C | N C | 13.9 | 11.7 | N C | N C | 16.7 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

BRAZOS RIVER MOUTH (FREEPORT) — ELEVATION: 0.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.0 | -4.5 | -3.0 | -1.5 | -16.0 | -9.5 | -6.0 | -3.5 | -10.0 | -6.0 | -4.0 | -2.5 | -17.0 | -10.0 | -6.5 | -4.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 14.5 | 8.0 | 5.0 | 3.0 | 17.5 | 10.0 | 6.5 | 4.5 | 17.0 | 10.0 | 6.5 | 4.5 | 15.5 | 9.0 | 6.0 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -4.0 | -2.5 | -1.5 | 0.5 | -12.5 | -8.5 | -6.0 | -2.5 | -6.5 | -5.0 | -3.5 | -1.5 | -13.5 | -9.5 | -6.5 | -3.0 |
| DIRECTION OF WIND | NW | NW | N | W | NE | E | SW | W | NE | NE | NE | NE | SW | S | SE | E |
| DURATION IN HOURS | 8.0 | 4.0 | 2.5 | 0.5 | 11.5 | 6.5 | 4.5 | 2.0 | 11.5 | 7.0 | 5.0 | 3.5 | 9.0 | 5.0 | 4.0 | 3.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | -19.5 | NC | NC | -4.0 | -14.0 | NC | NC | -2.5 | -20.5 | NC | NC | -4.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 3.9 | 3.6 | 3.6 | 3.6 | 5.0 | 4.9 | 4.9 | 5.1 | 6.6 | 6.6 | 7.0 | 7.5 | 6.1 | 6.6 | 7.5 | 8.6 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.5 | -6.0 | -4.0 | -2.5 | -18.5 | -10.5 | -7.5 | -4.5 | -12.0 | -7.0 | -5.0 | -3.0 | -19.0 | -10.5 | -7.5 | -4.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 18.0 | 10.5 | 7.0 | 4.5 | 21.5 | 12.0 | 8.5 | 5.0 | 20.5 | 12.0 | 8.5 | 5.5 | 19.5 | 11.0 | 8.0 | 5.5 |
| 65.5 MPH WIND GUSTS FTOL | -7.0 | -4.0 | -2.5 | -1.5 | -15.0 | -9.0 | -6.0 | -3.5 | -9.0 | -5.5 | -4.0 | -2.5 | -16.0 | -10.0 | -7.0 | -3.5 |
| DIRECTION OF WIND | N | N | N | NW | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 12.5 | 7.0 | 4.5 | 2.5 | 15.5 | 9.0 | 6.0 | 4.0 | 15.0 | 8.5 | 6.0 | 4.5 | 13.5 | 7.5 | 5.5 | 4.0 |
| LOW TIDE FLOODING FTOL | -12.5 | . | . | . | -20.0 | NC | NC | -4.5 | -16.5 | NC | NC | -3.0 | -23.5 | NC | NC | -5.0 |
| M.S.L. FLOODING FTOL | -26.0 | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 4.3 | 3.9 | 3.9 | 3.8 | 5.7 | 5.5 | 5.7 | 5.9 | 8.1 | 8.4 | 9.3 | 10.3 | 7.4 | 8.0 | 9.3 | 10.6 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -14.5 | -8.0 | -5.0 | -3.5 | -22.5 | -12.0 | -8.0 | -5.5 | -16.0 | -8.5 | -6.0 | -4.0 | -23.0 | -12.0 | -8.0 | -5.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | E |
| DURATION IN HOURS | 24.5 | 13.0 | 9.5 | 6.5 | 27.0 | 14.0 | 10.0 | 7.0 | 26.5 | 14.0 | 10.5 | 7.5 | 26.0 | 13.5 | 10.0 | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -10.5 | -6.0 | -4.0 | -2.5 | -18.5 | -10.0 | -7.0 | -4.5 | -12.0 | -6.5 | -4.5 | -3.0 | -19.0 | -10.5 | -7.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | NW | NE | NE | NE | NE | NC | NE | NE | NE | NE | E | E | E |
| DURATION IN HOURS | 18.0 | 10.0 | 7.0 | 4.5 | 21.0 | 12.0 | 8.0 | 5.0 | 20.0 | 11.0 | 8.0 | 5.5 | 19.5 | 11.0 | 8.0 | 5.5 |
| LOW TIDE FLOODING FTOL | -16.0 | -6.0 | -3.0 | -1.5 | -20.5 | -8.0 | -5.0 | -5.5 | -20.5 | -8.0 | -4.0 | -3.5 | -28.5 | -11.0 | -5.5 | -4.0 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | -6.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | . | . | . | NC |
| MAXIMUM HIGH TIDE SURGE | 5.2 | 4.6 | 3.6 | 4.3 | 7.5 | 7.2 | 6.0 | 7.8 | 10.7 | 10.9 | 9.8 | 13.4 | 9.8 | 10.4 | 9.6 | 13.6 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -18.0 | -9.5 | -6.5 | -4.5 | NC | NC | NC | -6.5 | -19.0 | -10.0 | -7.0 | -5.0 | -26.0 | -13.5 | -9.0 | -6.5 |
| DIRECTION OF WIND | N | N | N | N | NC | NC | NC | NE | NE | N | N | NE | NE | N | NE | E |
| DURATION IN HOURS | 29.0 | 15.5 | 11.5 | 7.5 | NC | NC | NC | 8.5 | 30.5 | 16.5 | 12.5 | 8.5 | 29.5 | 16.0 | 12.0 | 8.5 |
| 65.5 MPH WIND GUSTS FTOL | -13.5 | -7.0 | -5.0 | -3.0 | -21.5 | -11.5 | -8.0 | -5.0 | -14.5 | -8.0 | -5.5 | -4.0 | -21.5 | -11.5 | -8.0 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E |
| DURATION IN HOURS | 21.5 | 12.0 | 9.0 | 6.0 | 24.5 | 14.0 | 10.5 | 6.5 | 23.0 | 13.0 | 10.0 | 6.5 | 23.0 | 13.0 | 10.5 | 7.0 |
| LOW TIDE FLOODING FTOL | -18.0 | -12.0 | -3.0 | -1.5 | -21.0 | -15.0 | -5.0 | -6.0 | -24.0 | -16.5 | -5.0 | -4.0 | -33.5 | -23.5 | -7.0 | -7.0 |
| M.S.L. FLOODING FTOL | -30.0 | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | . | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 6.0 | 5.3 | 4.9 | 4.6 | 9.2 | 8.8 | 8.8 | 9.2 | 13.4 | 13.8 | 15.0 | 16.7 | 12.4 | 13.5 | 15.2 | 17.6 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -17.0 | -8.5 | -5.5 | -4.0 | NC | NC | NC | -5.0 | -17.0 | -9.0 | -6.0 | -4.5 | -25.0 | -12.5 | -8.0 | -6.5 |
| DIRECTION OF WIND | N | N | N | N | NC | NC | NC | NE | N | NE | NE | NE | NE | NE | NE | NE |
| DURATION IN HOURS | 25.0 | 13.5 | 9.5 | 6.5 | NC | NC | NC | 7.0 | 29.5 | 16.0 | 11.0 | 8.0 | 29.0 | 16.0 | 11.0 | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -12.5 | -6.0 | -4.0 | -3.0 | NC | NC | NC | -4.0 | -14.0 | -7.0 | -4.5 | -3.5 | -21.0 | -12.0 | -7.0 | -5.5 |
| DIRECTION OF WIND | N | N | N | N | NC | NC | NC | NE | NE | NE | NE | NE | NE | NE | NE | NE |
| DURATION IN HOURS | 18.5 | 10.5 | 7.0 | 4.5 | NC | NC | NC | 5.5 | 23.5 | 13.0 | 9.0 | 6.0 | 22.5 | 13.5 | 11.0 | 9.5 |
| LOW TIDE FLOODING FTOL | . | . | . | 3.5 | NC | NC | NC | -4.0 | -20.5 | NC | NC | -3.0 | -29.5 | NC | NC | -6.0 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 3.7 | 3.9 | 3.7 | 4.8 | 6.7 | 6.5 | 5.8 | 6.8 | 11.5 | 12.4 | 12.1 | 15.6 | 12.9 | 13.9 | 13.6 | 17.5 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

BRAZOS RIVER MOUTH 2a

# FREEPORT SOUTH LEVEE 2b

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

FREEPORT SOUTH LEVEE (FREEPORT) — ELEVATION: 16.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.0 | -4.5 | -3.0 | -1.5 | -16.0 | -9.5 | -6.0 | -3.5 | -10.0 | -6.0 | -4.0 | -2.5 | -17.0 | -10.0 | -7.0 | -4.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 14.5 | 8.0 | 5.0 | 3.0 | 17.5 | 10.0 | 6.5 | 4.5 | 17.0 | 10.0 | 6.5 | 4.5 | 15.5 | 9.0 | 6.0 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -4.0 | -2.5 | -1.5 | 0.5 | -12.5 | -8.5 | -8.0 | -2.5 | -6.5 | -5.0 | -5.0 | -1.5 | -13.5 | -9.5 | -6.5 | -3.0 |
| DIRECTION OF WIND | NW | NW | N | W | NE | NE | N | N | NE | NE | NE | NE | SW | S | SE | E |
| DURATION IN HOURS | 8.0 | 4.0 | 2.5 | 0.5 | 11.5 | 6.5 | 4.5 | 2.0 | 11.5 | 7.0 | 5.0 | 3.5 | 9.0 | 5.0 | 4.0 | 3.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.5 | -6.0 | -4.0 | -2.0 | -18.5 | -10.5 | -7.5 | -5.0 | -12.0 | -7.0 | -5.0 | -3.0 | -19.0 | -11.0 | -7.5 | -4.5 |
| DIRECTION OF WIND | N | N | NW | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 18.0 | 10.5 | 7.0 | 4.0 | 21.5 | 12.5 | 9.0 | 5.5 | 20.5 | 12.0 | 8.5 | 5.5 | 19.5 | 11.5 | 8.0 | 5.5 |
| 65.5 MPH WIND GUSTS FTOL | -7.0 | -4.0 | -2.5 | -1.5 | -15.0 | -8.5 | -5.5 | -3.5 | -9.0 | -5.0 | -3.5 | -2.5 | -16.0 | -10.0 | -7.0 | -3.5 |
| DIRECTION OF WIND | N | N | N | NW | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 12.5 | 7.0 | 4.5 | 3.0 | 15.5 | 8.5 | 6.0 | 4.0 | 15.0 | 8.5 | 6.0 | 4.5 | 13.5 | 7.5 | 5.5 | 4.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -14.5 | -8.0 | -5.0 | -3.5 | -22.5 | -12.0 | -9.0 | -5.5 | -16.0 | -8.5 | -6.0 | -4.0 | -23.0 | -12.0 | -8.0 | -5.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | E |
| DURATION IN HOURS | 24.5 | 13.0 | 9.5 | 6.5 | 27.0 | 14.0 | 10.0 | 7.0 | 26.5 | 14.0 | 10.5 | 7.5 | 26.0 | 13.5 | 10.0 | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -10.5 | -6.0 | -4.0 | -2.5 | -18.5 | -10.0 | -7.0 | -4.5 | -12.0 | -6.5 | -4.5 | -3.0 | -19.0 | -10.5 | -7.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | NW | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E |
| DURATION IN HOURS | 18.0 | 10.0 | 7.0 | 4.5 | 21.0 | 12.0 | 8.0 | 5.0 | 20.0 | 11.0 | 8.0 | 5.5 | 19.5 | 11.0 | 8.0 | 5.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -18.0 | -9.5 | -6.5 | -4.5 | NC | NC | NC | -6.5 | -19.0 | -10.0 | -7.0 | -5.0 | -26.0 | -13.5 | -9.0 | -6.5 |
| DIRECTION OF WIND | N | N | N | N | NC | NC | NC | NE | NE | NE | NE | NE | NE | NE | NE | E |
| DURATION IN HOURS | 29.0 | 15.5 | 11.5 | 7.5 | NC | NC | NC | 8.5 | 30.5 | 16.5 | 12.5 | 8.5 | 29.5 | 16.0 | 12.0 | 8.5 |
| 65.5 MPH WIND GUSTS FTOL | -13.5 | -7.0 | -5.0 | -3.0 | -21.5 | -11.5 | -8.0 | -5.0 | -14.5 | -8.0 | -5.5 | -4.0 | -21.5 | -11.5 | -8.0 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E |
| DURATION IN HOURS | 21.5 | 12.0 | 9.0 | 6.0 | 24.5 | 14.0 | 10.5 | 6.5 | 23.0 | 13.0 | 10.0 | 6.5 | 23.0 | 13.0 | 10.0 | 6.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 1.5 |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | NC | . | . | . | NC |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | 16.7 | . | . | . | 17.5 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -17.0 | -8.5 | -5.5 | -4.0 | NC | NC | NC | -5.0 | -17.0 | -8.5 | -6.0 | -4.5 | -25.0 | -12.5 | -8.0 | -6.5 |
| DIRECTION OF WIND | N | N | N | N | NC | NC | NC | NE | N | NE | NE | NE | NE | NE | NE | NE |
| DURATION IN HOURS | 25.0 | 13.5 | 9.5 | 6.5 | NC | NC | NC | 7.0 | 29.0 | 16.0 | 11.0 | 7.5 | 29.0 | 16.0 | 11.0 | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -12.5 | -6.0 | -4.0 | -3.0 | NC | NC | NC | -4.0 | -14.0 | -7.0 | -4.5 | -3.5 | -21.0 | -10.5 | -7.0 | -5.5 |
| DIRECTION OF WIND | N | N | N | N | NC | NC | NC | NE | NE | NE | NE | NE | NE | NE | NE | NE |
| DURATION IN HOURS | 18.5 | 10.5 | 7.0 | 4.5 | NC | NC | NC | 5.5 | 23.5 | 13.0 | 9.0 | 6.0 | 22.5 | 13.5 | 10.5 | 9.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | -2.0 |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | NC |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | 17.5 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

# HIGHWAY 36 WEST OF BRAZOS RIVER BY FREEPORT 3a

HIGHWAY 36 WEST OF BRAZOS RIVER BY FREEPORT (WEST FRPT) — ELEVATION: 10.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -7.0 | -4.0 | -2.5 | -1.5 | -14.5 | -9.0 | -6.0 | -3.5 | -8.5 | -5.0 | -3.5 | -2.0 | -15.5 | -9.0 | -6.0 | -3.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 14.0 | 8.0 | 5.5 | 3.0 | 16.5 | 9.5 | 6.5 | 4.0 | 16.0 | 9.5 | 6.5 | 4.5 | 13.5 | 8.0 | 6.0 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -3.5 | -2.0 | -1.5 | 0.5 | -11.0 | -8.0 | -6.0 | -1.5 | -5.0 | -4.0 | -3.0 | -1.5 | -12.5 | -9.0 | -6.5 | -3.0 |
| DIRECTION OF WIND | N | N | N | W | NE | SE | W | NW | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 7.5 | 4.5 | 3.0 | 1.0 | 10.5 | 6.0 | 4.0 | 1.5 | 10.5 | 6.5 | 5.0 | 3.0 | 6.5 | 4.5 | 4.0 | 3.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -3.5 | -2.0 | -17.0 | -9.5 | -6.5 | -4.0 | -11.0 | -6.0 | -4.0 | -3.0 | -18.0 | -10.0 | -7.0 | -4.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 18.0 | 10.5 | 7.0 | 4.5 | 20.5 | 12.0 | 8.0 | 5.0 | 19.5 | 11.5 | 8.0 | 5.5 | 18.0 | 11.0 | 8.0 | 5.5 |
| 65.5 MPH WIND GUSTS FTOL | -6.0 | -3.5 | -2.5 | -1.0 | -13.5 | -8.0 | -6.0 | -3.0 | -7.5 | -4.5 | -3.5 | -2.0 | -14.5 | -9.0 | -6.5 | -3.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 11.0 | 7.0 | 5.0 | 3.0 | 14.5 | 9.0 | 6.5 | 3.5 | 14.0 | 9.0 | 6.5 | 4.0 | 10.0 | 7.0 | 5.5 | 4.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | NC | . | . | . | NC |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | 10.9 | . | . | . | 10.9 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -13.5 | -7.5 | -5.0 | -3.0 | -21.0 | -11.5 | -7.5 | -5.0 | -14.5 | -8.0 | -5.0 | -3.5 | -21.5 | -11.5 | -8.0 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E |
| DURATION IN HOURS | 24.0 | 13.5 | 9.5 | 6.5 | 26.5 | 15.0 | 10.0 | 6.5 | 26.0 | 15.0 | 10.5 | 7.0 | 25.0 | 14.0 | 10.0 | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -9.5 | -5.5 | -3.5 | -2.0 | -17.0 | -9.5 | -6.5 | -4.0 | -10.5 | -6.0 | -4.0 | -3.0 | -18.0 | -10.0 | -6.5 | -4.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 18.0 | 10.5 | 7.0 | 4.5 | 20.5 | 12.0 | 8.0 | 5.0 | 19.5 | 11.5 | 6.0 | 5.5 | 18.5 | 11.0 | 7.5 | 5.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | 3.0 | NC | NC | 1.0 | 3.5 | NC | NC | -1.0 |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | 2.5 | NC | NC | 1.0 | 4.5 | NC | NC | -1.5 |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | 2.0 | NC | NC | 1.0 | 5.5 | NC | NC | -1.5 |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | 14.1 | NC | NC | 18.9 | 13.9 | NC | NC | 20.3 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -17.0 | -9.0 | -6.0 | -4.0 | -24.5 | -13.0 | -8.5 | -6.0 | -18.0 | -9.5 | -6.0 | -3.5 | -24.5 | -13.0 | -9.0 | -6.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | NE |
| DURATION IN HOURS | 28.5 | 15.5 | 11.0 | 8.0 | 30.5 | 16.0 | 11.5 | 8.0 | 29.5 | 16.0 | 11.0 | 7.5 | 29.0 | 15.5 | 11.5 | 8.5 |
| 65.5 MPH WIND GUSTS FTOL | -12.5 | -6.5 | -4.5 | -3.0 | -20.0 | -11.0 | -7.0 | -5.0 | -13.5 | -7.0 | -4.5 | -2.5 | -20.5 | -11.0 | -7.5 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | NE | N | N | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 21.5 | 12.0 | 8.5 | 6.0 | 23.5 | 13.0 | 9.0 | 6.0 | 23.0 | 13.0 | 9.0 | 5.5 | 22.5 | 12.5 | 9.0 | 6.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | 2.0 | NC | NC | 1.0 | -7.0 | NC | NC | -1.5 |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | 1.5 | NC | NC | 0.5 | -7.5 | NC | NC | -1.5 |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | 1.0 | NC | NC | 0.5 | -8.5 | NC | NC | -1.5 |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | 17.8 | NC | NC | 22.5 | 15.9 | NC | NC | 23.8 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -16.0 | -8.0 | -5.0 | -3.5 | NC | NC | NC | -5.0 | -16.5 | -8.0 | -5.5 | -4.0 | -23.5 | -12.0 | -8.0 | -6.0 |
| DIRECTION OF WIND | N | N | N | N | NC | NC | NC | NE | NC | NC | NC | NE | E | E | NE | NE |
| DURATION IN HOURS | 26.5 | 13.5 | 9.5 | 6.5 | NC | NC | NC | 7.0 | 28.5 | 14.5 | 10.5 | 7.5 | 28.5 | 15.0 | 10.5 | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -11.5 | -5.5 | -4.0 | -2.5 | -18.5 | -9.0 | -6.0 | -4.0 | -12.5 | -6.0 | -4.5 | -3.0 | -20.0 | -10.0 | -7.0 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NE | NE | NE | NE |
| DURATION IN HOURS | 18.0 | 10.5 | 7.5 | 5.0 | 21.0 | 12.0 | 8.0 | 5.0 | 23.0 | 13.0 | 9.0 | 6.0 | 22.5 | 13.0 | 9.0 | 6.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | 0.0 | NC | NC | 1.0 | -5.5 | NC | NC | -1.0 |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | 0.0 | NC | NC | 1.0 | -6.0 | NC | NC | -1.5 |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | -0.5 | NC | NC | 1.0 | -6.0 | NC | NC | -1.5 |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | 20.1 | NC | NC | 19.3 | 19.9 | NC | NC | 22.6 |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

# FREEPORT WEST LEVEE 3b

FREEPORT WEST LEVEE (WEST FRPT) — ELEVATION: 16.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -7.0 | -4.0 | -2.5 | -1.5 | -14.5 | -9.0 | -6.0 | -3.5 | -8.5 | -5.0 | -3.5 | -2.0 | -15.5 | -9.0 | -6.0 | -3.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 14.0 | 8.0 | 5.5 | 3.0 | 16.5 | 9.5 | 6.5 | 4.0 | 16.0 | 9.5 | 6.5 | 4.5 | 13.5 | 8.0 | 6.0 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -3.5 | -2.0 | -1.5 | 0.5 | -11.0 | -8.0 | -6.0 | -1.5 | -5.0 | -4.0 | -3.0 | -1.5 | -12.5 | -9.0 | -6.5 | -3.0 |
| DIRECTION OF WIND | N | N | N | W | NE | SE | W | NW | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 7.5 | 4.5 | 3.0 | 1.0 | 10.5 | 6.0 | 4.0 | 1.5 | 10.5 | 6.5 | 5.0 | 3.0 | 6.5 | 4.5 | 4.0 | 3.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -3.5 | -2.0 | -17.0 | -9.5 | -6.5 | -4.0 | -11.0 | -6.0 | -4.0 | -3.0 | -18.0 | -10.0 | -7.0 | -4.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 18.0 | 10.5 | 7.0 | 4.5 | 20.5 | 12.0 | 8.0 | 5.0 | 19.5 | 11.5 | 8.0 | 5.5 | 18.0 | 11.0 | 8.0 | 5.5 |
| 65.5 MPH WIND GUSTS FTOL | -6.0 | -3.5 | -2.5 | -1.0 | -13.5 | -8.0 | -6.0 | -3.0 | -7.5 | -4.5 | -3.5 | -2.0 | -14.5 | -9.0 | -6.5 | -3.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 11.0 | 7.0 | 5.0 | 3.0 | 14.5 | 9.0 | 6.5 | 3.5 | 14.0 | 9.0 | 6.5 | 4.0 | 10.0 | 7.0 | 5.5 | 4.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -13.5 | -7.5 | -5.0 | -3.0 | -21.0 | -11.5 | -7.5 | -5.0 | -14.5 | -8.0 | -5.0 | -3.5 | -21.5 | -11.5 | -8.0 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E |
| DURATION IN HOURS | 24.0 | 13.5 | 9.5 | 6.5 | 26.5 | 15.0 | 10.0 | 6.5 | 26.0 | 14.5 | 10.5 | 7.0 | 25.0 | 14.0 | 10.0 | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -9.5 | -5.5 | -3.5 | -2.0 | -17.0 | -9.5 | -6.5 | -4.0 | -10.5 | -6.0 | -4.0 | -3.0 | -18.0 | -10.0 | -6.5 | -4.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 18.0 | 10.5 | 7.0 | 4.5 | 20.5 | 12.0 | 8.0 | 5.0 | 19.5 | 11.5 | 8.0 | 5.5 | 18.5 | 11.0 | 7.5 | 5.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | -0.5 |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | 1.5 | . | . | . | -0.5 |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | NC | . | . | . | 0.0 |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | 18.9 | . | . | . | 20.3 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -17.0 | -9.0 | -6.0 | -4.0 | -24.5 | -13.0 | -8.5 | -6.0 | -18.0 | -9.5 | -6.0 | -3.5 | -24.5 | -13.0 | -9.0 | -6.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | NE |
| DURATION IN HOURS | 28.5 | 15.5 | 11.0 | 8.0 | 30.5 | 16.0 | 11.5 | 8.0 | 29.5 | 16.0 | 11.0 | 7.5 | 29.0 | 15.5 | 11.5 | 8.5 |
| 65.5 MPH WIND GUSTS FTOL | -12.5 | -6.5 | -4.5 | -3.0 | -20.0 | -11.0 | -7.0 | -5.0 | -13.5 | -7.0 | -4.5 | -2.5 | -20.5 | -11.0 | -7.5 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | NE | N | N | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 21.5 | 12.0 | 8.5 | 6.0 | 23.5 | 12.0 | 9.0 | 6.0 | 22.5 | 12.5 | 9.0 | 5.5 | 22.5 | 12.5 | 9.0 | 6.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | 1.0 | . | . | . | -1.0 |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | -2.5 | NC | NC | 1.0 | . | . | . | -1.0 |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | NC | NC | NC | 1.0 | . | . | . | -1.0 |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | 17.8 | NC | NC | 22.4 | . | . | . | 23.7 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -16.0 | -8.0 | -5.0 | -3.5 | NC | NC | NC | -5.0 | -16.5 | -8.0 | -5.5 | -4.0 | -23.5 | -12.0 | -8.0 | -6.0 |
| DIRECTION OF WIND | N | N | N | N | NC | NC | NC | NE | NC | NC | NC | NE | E | E | NE | NE |
| DURATION IN HOURS | 26.5 | 13.5 | 9.5 | 6.5 | NC | NC | NC | 7.0 | 28.5 | 15.0 | 10.5 | 7.5 | 28.5 | 15.0 | 10.5 | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -11.5 | -5.5 | -4.0 | -2.5 | -18.5 | -9.0 | -6.0 | -4.0 | -12.5 | -6.0 | -4.5 | -3.0 | -20.0 | -10.0 | -7.0 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NE | NE | NE | NE |
| DURATION IN HOURS | 18.0 | 10.5 | 7.5 | 5.0 | 21.0 | 12.0 | 8.0 | 5.0 | 23.0 | 13.0 | 9.0 | 6.0 | 22.5 | 13.0 | 9.0 | 6.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | 0.5 | NC | NC | 1.5 | -5.0 | NC | NC | -1.0 |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | 0.5 | NC | NC | 1.0 | -5.0 | NC | NC | -1.0 |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | 0.0 | NC | NC | 1.0 | -5.5 | NC | NC | -1.0 |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | 20.0 | NC | NC | 19.4 | 19.8 | NC | NC | 22.5 |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

## + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

## RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

## HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

## MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

# HIGHWAY 288 AT BASTROP BAYOU 4

HIGHWAY 288 AT BASTROP BAYOU (BA RI 288) — ELEVATION: 14.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -6.5 | -3.5 | -2.5 | -1.5 | -13.0 | -7.5 | -5.0 | -3.0 | -7.0 | -3.0 | -1.0 | 2.0 | -14.0 | -8.0 | -5.5 | -3.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 13.5 | 8.5 | 6.0 | 3.5 | 15.5 | 9.5 | 6.5 | 3.5 | 10.0 | 6.0 | 3.5 | 1.0 | 10.0 | 7.0 | 5.0 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -2.5 | -2.0 | -1.5 | 0.5 | -9.0 | -7.0 | -5.0 | -1.0 | -3.5 | -3.0 | -2.0 | -1.0 | -12.0 | -8.0 | -5.5 | -2.5 |
| DIRECTION OF WIND | N | N | N | W | N | N | NW | NW | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 6.5 | 4.5 | 3.5 | 1.0 | 9.5 | 7.0 | 5.0 | 1.5 | 8.5 | 7.0 | 6.0 | 3.0 | 6.5 | 5.5 | 5.0 | 3.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.0 | -5.0 | -3.5 | -2.0 | -15.5 | -9.0 | -6.5 | -4.0 | -9.0 | -5.0 | -3.5 | -2.5 | -16.5 | -9.0 | -6.0 | -4.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 17.0 | 10.5 | 7.5 | 5.0 | 19.0 | 11.5 | 8.5 | 5.0 | 18.5 | 11.0 | 8.0 | 5.5 | 13.0 | 8.5 | 7.0 | 5.5 |
| 65.5 MPH WIND GUSTS FTOL | -5.0 | -3.0 | -2.0 | -1.0 | -12.0 | -7.5 | -5.0 | -3.0 | -5.5 | -3.5 | -2.5 | -1.5 | -13.0 | -8.0 | -6.0 | -3.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 10.5 | 7.5 | 5.0 | 3.0 | 13.5 | 9.0 | 6.5 | 3.5 | 12.5 | 9.0 | 6.0 | 4.0 | 8.5 | 6.5 | 5.0 | 4.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.5 | -7.0 | -4.5 | -3.0 | -19.5 | -10.5 | -7.0 | -4.5 | -13.0 | -7.0 | -5.0 | -3.5 | -20.0 | -11.0 | -7.0 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E |
| DURATION IN HOURS | 24.5 | 14.5 | 8.5 | 6.5 | 25.5 | 15.0 | 9.0 | 6.5 | 25.0 | 15.0 | 9.0 | 7.0 | 24.0 | 14.5 | 8.5 | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -8.5 | -5.0 | -3.0 | -2.0 | -15.5 | -8.5 | -5.5 | -3.5 | -9.0 | -5.0 | -3.5 | -2.5 | -16.0 | -9.0 | -6.0 | -4.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 18.0 | 10.5 | 6.5 | 5.0 | 19.0 | 11.0 | 7.0 | 5.0 | 18.5 | 11.0 | 7.0 | 5.5 | 17.5 | 10.5 | 7.0 | 5.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | 0.0 | . | . | . | 5.0 | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | 0.0 | NC | NC | 2.0 | 5.5 | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | -0.5 | NC | NC | NC | 5.5 | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | 21.5 | NC | NC | 16.6 | 18.5 | . | . | . |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.5 | -8.5 | -5.5 | -4.0 | -22.5 | -12.0 | -8.0 | -5.5 | -16.5 | -9.0 | -6.0 | -4.0 | -23.0 | -12.0 | -8.0 | -5.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | NE |
| DURATION IN HOURS | NC | 15.0 | 11.0 | 8.0 | 29.5 | NC | NC | 8.0 | NC | NC | NC | 8.5 | 28.0 | NC | NC | 8.5 |
| 65.5 MPH WIND GUSTS FTOL | -11.5 | -6.0 | -4.0 | -2.5 | -18.0 | -10.0 | -7.0 | -4.5 | -12.0 | -6.5 | -4.5 | -3.0 | -20.0 | -11.0 | -7.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 21.5 | 12.0 | 8.5 | 6.0 | 23.0 | 13.0 | 9.0 | 6.0 | 22.0 | 12.5 | 9.0 | 6.5 | 22.5 | 12.5 | 9.0 | 6.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | -1.5 | NC | NC | 1.5 | -8.5 | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | -1.5 | NC | NC | 1.5 | -9.5 | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | -2.0 | NC | NC | 1.5 | -9.0 | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | 24.6 | NC | NC | 22.7 | 24.9 | . | . | . |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -14.5 | -7.5 | -5.0 | -3.5 | NC | NC | NC | -4.5 | -15.0 | -8.0 | -5.0 | -4.0 | -22.0 | -11.0 | -7.5 | -5.5 |
| DIRECTION OF WIND | N | N | N | N | NC | NC | NC | NE | NE | NE | E | NE | NE | NE | NE | NE |
| DURATION IN HOURS | 26.0 | 13.5 | 9.5 | 6.5 | NC | NC | NC | 7.0 | NC | NC | NC | 7.5 | 28.0 | 15.0 | 10.5 | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -10.5 | -5.0 | -3.5 | -2.5 | -16.5 | -8.0 | -5.0 | -3.5 | -11.0 | -5.5 | -4.0 | -3.0 | -18.0 | -9.0 | -6.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NE | NE | NE | NE |
| DURATION IN HOURS | 19.0 | 10.5 | 7.5 | 5.0 | 20.5 | 11.0 | 8.0 | 5.0 | 22.5 | 12.5 | 9.0 | 6.0 | 22.0 | 12.0 | 9.0 | 5.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | -1.0 | NC | NC | 1.0 | -8.5 | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | -1.0 | NC | NC | 1.0 | -8.5 | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | -1.5 | NC | NC | 1.0 | -8.5 | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | 26.8 | NC | NC | 23.4 | 26.7 | . | . | . |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

FM 1495 BY MOUTH OF BRAZOS RIVER AT QUINTANA BEACH (BRAZORIA) ELEVATION: 6.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.5 | -4.5 | -3.0 | -1.5 | -15.5 | -9.0 | -6.0 | -3.5 | -9.5 | -5.5 | -4.0 | -2.5 | -16.0 | -9.0 | -6.0 | -3.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 15.5 | 8.5 | 6.0 | 3.5 | 17.5 | 10.0 | 7.0 | 4.5 | 16.5 | 9.5 | 7.0 | 4.5 | 15.0 | 8.5 | 6.5 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -5.0 | -3.0 | -2.0 | 0.5 | -12.0 | -8.0 | -7.5 | -2.5 | -6.0 | -4.0 | -3.0 | -1.5 | -12.5 | -8.5 | -6.0 | -3.0 |
| DIRECTION OF WIND | N | N | N | W | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 9.0 | 5.0 | 3.0 | 1.0 | 12.0 | 7.0 | 5.0 | 2.5 | 11.0 | 6.5 | 5.0 | 3.5 | 8.5 | 5.0 | 4.0 | 3.0 |
| LOW TIDE FLOODING FTOL | • | • | • | • | • | • | • | • | • | • | • | 0.0 | • | • | • | -1.5 |
| M.S.L. FLOODING FTOL | • | • | • | • | • | • | • | • | • | • | • | -0.5 | • | • | • | -2.0 |
| HIGH TIDE FLOODING FTOL | • | • | • | • | • | • | • | • | • | • | • | -0.5 | • | • | • | -2.0 |
| MAXIMUM HIGH TIDE SURGE | • | • | • | • | • | • | • | • | • | • | • | 9.3 | • | • | • | 9.3 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -11.0 | -6.0 | -4.0 | -2.5 | -18.0 | -10.0 | -7.0 | -4.5 | -11.5 | -6.5 | -4.5 | -3.0 | -18.5 | -10.0 | -7.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | N | NE | NE | NE | N | NE | E | E | N | E |
| DURATION IN HOURS | 19.5 | 11.0 | 7.5 | 5.0 | 21.0 | 11.5 | 8.0 | 5.0 | 20.0 | 11.0 | 8.0 | 5.5 | 18.5 | 10.5 | 7.5 | 5.5 |
| 65.5 MPH WIND GUSTS FTOL | -7.5 | -4.0 | -2.5 | -1.5 | -14.5 | -8.5 | -5.5 | -3.5 | -8.5 | -5.0 | -3.5 | -2.0 | -15.0 | -8.5 | -6.0 | -3.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 13.0 | 7.5 | 5.0 | 3.0 | 15.5 | 9.0 | 6.0 | 3.5 | 14.5 | 8.5 | 6.0 | 4.0 | 12.5 | 7.5 | 5.5 | 4.0 |
| LOW TIDE FLOODING FTOL | • | • | • | • | • | • | • | • | • | • | • | -0.5 | • | • | • | -2.0 |
| M.S.L. FLOODING FTOL | • | • | • | • | • | • | • | • | -4.5 | NC | NC | -1.0 | -9.0 | NC | NC | -2.5 |
| HIGH TIDE FLOODING FTOL | • | • | • | • | • | • | • | • | NC | NC | NC | -1.0 | NC | NC | NC | -2.5 |
| MAXIMUM HIGH TIDE SURGE | • | • | • | • | • | • | • | • | 8.7 | NC | NC | 10.8 | 8.1 | NC | NC | 11.0 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -14.5 | -8.0 | -5.0 | -3.5 | -22.0 | -12.0 | -8.0 | -5.5 | -15.5 | -8.5 | -5.5 | -4.0 | -22.0 | -12.0 | -8.0 | -5.5 |
| DIRECTION OF WIND | N | NC | N | N | NE | NC | NC | NE | NE | NC | NC | NE | NE | NC | NC | E |
| DURATION IN HOURS | 25.0 | 14.0 | 9.5 | 6.5 | 27.0 | 15.0 | 10.0 | 7.0 | 26.0 | 14.5 | 10.0 | 7.5 | 25.0 | 14.0 | 10.0 | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -11.0 | -6.0 | -4.0 | -2.5 | -18.0 | -10.0 | -6.5 | -4.5 | -12.0 | -6.5 | -4.5 | -3.0 | -18.0 | -10.0 | -6.5 | -4.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 18.5 | 10.5 | 7.0 | 5.0 | 21.0 | 12.0 | 8.0 | 5.0 | 20.0 | 11.0 | 8.0 | 5.5 | 19.0 | 11.0 | 7.5 | 5.5 |
| LOW TIDE FLOODING FTOL | • | • | • | • | • | • | • | -2.5 | -6.5 | NC | NC | -1.5 | -12.0 | NC | NC | -3.0 |
| M.S.L. FLOODING FTOL | • | • | • | • | -14.5 | NC | NC | -3.0 | -9.5 | NC | NC | -1.5 | NC | NC | NC | -3.0 |
| HIGH TIDE FLOODING FTOL | • | • | • | • | NC | NC | NC | -3.0 | -12.5 | NC | NC | -2.0 | NC | NC | NC | -3.0 |
| MAXIMUM HIGH TIDE SURGE | • | • | • | • | 8.3 | NC | NC | 9.0 | 11.7 | NC | NC | 14.0 | 10.4 | NC | NC | 14.2 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -18.0 | -9.5 | -6.5 | -4.5 | NC | NC | NC | -6.0 | -18.5 | -10.0 | -7.0 | -5.0 | -25.0 | -13.0 | -9.0 | -6.0 |
| DIRECTION OF WIND | N | N | N | N | NC | NC | NC | NE | NE | N | NE | NE | NE | NE | NE | E |
| DURATION IN HOURS | 29.5 | 15.5 | 11.0 | 8.0 | NC | NC | NC | 8.5 | 30.0 | 16.0 | 11.5 | 8.5 | 29.0 | 16.0 | 11.5 | 8.5 |
| 65.5 MPH WIND GUSTS FTOL | -13.5 | -7.5 | -5.0 | -3.5 | -20.5 | -11.0 | -7.5 | -5.0 | -14.5 | -8.0 | -5.0 | -3.5 | -21.0 | -11.0 | -7.5 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | NE | NE | E |
| DURATION IN HOURS | 22.0 | 12.5 | 8.5 | 6.0 | 24.5 | 14.0 | 5.0 | 6.5 | 23.0 | 13.0 | 9.0 | 6.5 | 22.5 | 13.0 | 9.0 | 6.5 |
| LOW TIDE FLOODING FTOL | • | • | • | • | -14.5 | NC | NC | -3.0 | -9.5 | NC | NC | -1.5 | -15.5 | NC | NC | -3.5 |
| M.S.L. FLOODING FTOL | • | • | • | • | -16.5 | NC | NC | -3.5 | -12.0 | NC | NC | -2.0 | 18.5 | NC | NC | -3.5 |
| HIGH TIDE FLOODING FTOL | • | • | • | • | -18.0 | NC | NC | -3.5 | -15.0 | NC | NC | -2.0 | 0.0 | NC | NC | -4.0 |
| MAXIMUM HIGH TIDE SURGE | • | • | • | • | 10.4 | NC | NC | 10.6 | 14.7 | NC | NC | 17.9 | 13.3 | NC | NC | 17.7 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -17.0 | -8.5 | -5.5 | -4.0 | NC | NC | NC | -5.0 | -11.5 | -6.0 | -5.0 | -4.5 | -24.0 | -12.0 | -8.0 | -6.0 |
| DIRECTION OF WIND | N | N | N | N | NC | NC | NC | NE | NE | NE | NE | NE | NE | NE | NE | E |
| DURATION IN HOURS | 26.5 | 14.0 | 10.0 | 6.5 | NC | NC | NC | 7.0 | 23.5 | 13.0 | 10.0 | 7.5 | 28.5 | 15.5 | 11.0 | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -12.5 | -6.5 | -4.0 | -3.0 | NC | NC | NC | -4.0 | -13.5 | -7.0 | -5.0 | -3.5 | -20.0 | -10.0 | -7.0 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | NC | NC | NC | NE | NE | NE | NE | NE | NE | NE | NE | E |
| DURATION IN HOURS | 19.0 | 11.0 | 7.5 | 5.0 | NC | NC | NC | 5.5 | 22.5 | 13.0 | 9.0 | 6.0 | 23.0 | 13.0 | 9.0 | 6.0 |
| LOW TIDE FLOODING FTOL | • | • | • | • | • | • | • | • | -7.5 | NC | NC | -1.5 | -5.5 | NC | NC | -3.0 |
| M.S.L. FLOODING FTOL | • | • | • | • | • | • | • | • | -10.5 | NC | NC | -1.5 | -17.0 | NC | NC | -3.5 |
| HIGH TIDE FLOODING FTOL | • | • | • | • | NC | NC | NC | NC | -13.5 | NC | NC | -2.0 | -28.0 | NC | NC | -3.5 |
| MAXIMUM HIGH TIDE SURGE | • | • | • | • | 7.1 | NC | NC | 7.3 | 15.6 | NC | NC | 18.9 | 15.1 | NC | NC | 18.9 |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

MOUTH OF OLD BRAZOS RIVER (SURF) — ELEVATION: 0.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.0 | -5.0 | -3.5 | -2.0 | -16.0 | -9.0 | -6.0 | -4.0 | -10.0 | -5.5 | -4.0 | -2.5 | -16.0 | -9.0 | -6.0 | -4.0 |
| DIRECTION OF WIND | N | N | N | N | NE | N | N | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 15.5 | 8.5 | 6.0 | 3.5 | 18.0 | 10.0 | 7.0 | 4.5 | 17.0 | 9.5 | 6.5 | 4.5 | 15.0 | 8.5 | 6.0 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -5.5 | -3.0 | -2.0 | 0.0 | -12.5 | -8.0 | -5.5 | -2.5 | -6.5 | -4.5 | -3.0 | -2.0 | -12.5 | -8.5 | -5.5 | -3.0 |
| DIRECTION OF WIND | N | N | N | W | NE | NE | NE | NE | NE | NE | E | NE | E | E | SE | E |
| DURATION IN HOURS | 9.5 | 5.0 | 3.5 | 1.0 | 12.5 | 7.0 | 5.0 | 2.5 | 11.5 | 6.5 | 5.0 | 3.5 | 9.0 | 5.0 | 4.0 | 3.0 |
| LOW TIDE FLOODING FTOL | -10.0 | * | * | * | -19.0 | NC | NC | -4.0 | -14.0 | NC | NC | -2.5 | -19.5 | NC | NC | -4.0 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 4.0 | 3.9 | 3.9 | 3.9 | 5.0 | 5.0 | 5.2 | 5.4 | 6.4 | 6.8 | 7.5 | 8.2 | 5.8 | 6.5 | 7.4 | 8.3 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -11.5 | -6.0 | -4.0 | -2.5 | -18.5 | -10.0 | -7.0 | -4.5 | -12.0 | -6.5 | -4.5 | -3.0 | -18.5 | -10.0 | -7.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | E | NE | E | E | E | E |
| DURATION IN HOURS | 19.5 | 12.0 | 7.5 | 5.0 | 21.5 | 12.5 | 9.0 | 6.5 | 20.0 | 12.5 | 8.0 | 5.5 | 18.5 | 11.5 | 8.0 | 5.5 |
| 65.5 MPH WIND GUSTS FTOL | -8.0 | -4.5 | -3.0 | -1.5 | -15.0 | -8.5 | -6.0 | -3.5 | -8.5 | -5.0 | -3.5 | -2.5 | -15.0 | -8.5 | -6.0 | -3.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | N | NE | E | E | N | E |
| DURATION IN HOURS | 13.5 | 7.5 | 5.0 | 3.0 | 16.0 | 9.0 | 6.0 | 4.0 | 14.5 | 8.5 | 6.0 | 4.0 | 12.5 | 7.5 | 5.5 | 4.0 |
| LOW TIDE FLOODING FTOL | -13.5 | -5.0 | -2.5 | -1.5 | -20.0 | -6.0 | -2.0 | 4.5 | -16.5 | -6.0 | -2.5 | -3.0 | -22.5 | -9.0 | -5.0 | -4.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 4.5 | 4.3 | 4.3 | 4.3 | 5.9 | 5.5 | 6.1 | 6.5 | 7.8 | 8.1 | 8.7 | 9.5 | 7.0 | 7.8 | 8.9 | 10.2 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.0 | -8.0 | -5.5 | -3.5 | -22.5 | -12.0 | -8.0 | -5.5 | -16.0 | -8.5 | -6.0 | -4.0 | -22.0 | -12.0 | -8.0 | -5.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | E | NE | NE | NE | NE | NE | E | E | F | E |
| DURATION IN HOURS | 25.5 | 14.0 | 10.0 | 6.5 | 27.5 | 15.0 | 10.5 | 7.0 | 26.0 | 14.5 | 10.0 | 7.0 | 25.0 | 14.0 | 10.0 | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -11.5 | -6.0 | -4.0 | -2.5 | -18.5 | -10.0 | -7.0 | -4.5 | -12.0 | -6.5 | -4.5 | -3.0 | -18.5 | -10.0 | -7.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | F | E | E |
| DURATION IN HOURS | 19.0 | 11.0 | 7.5 | 5.0 | 21.5 | 12.0 | 8.0 | 5.0 | 20.0 | 11.5 | 8.0 | 5.5 | 18.5 | 11.0 | 7.5 | 5.5 |
| LOW TIDE FLOODING FTOL | -16.5 | -6.5 | -3.5 | -2.0 | -20.5 | -9.0 | -5.0 | -5.0 | -20.5 | -8.5 | -4.5 | -3.5 | -27.5 | -11.5 | -6.5 | -6.0 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 5.6 | 5.1 | 5.0 | 5.0 | 7.9 | 7.7 | 8.0 | 8.4 | 10.4 | 10.7 | 11.5 | 12.7 | 9.2 | 10.0 | 11.2 | 12.8 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -18.5 | -10.0 | -6.5 | -4.5 | NC | NC | NC | -6.0 | -19.0 | -10.0 | -7.0 | -5.0 | -25.5 | -13.5 | -9.0 | -6.0 |
| DIRECTION OF WIND | N | N | N | N | NC | NC | NC | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 29.5 | 16.0 | 11.0 | 8.0 | NC | NC | NC | 8.5 | 30.0 | 16.0 | 11.5 | 8.5 | 29.0 | 16.0 | 11.5 | 8.5 |
| 65.5 MPH WIND GUSTS FTOL | -14.0 | -7.5 | -5.0 | -3.5 | -21.0 | -11.0 | -7.5 | -5.0 | -14.5 | -8.0 | -5.5 | -4.0 | -21.0 | -11.0 | -7.5 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | NE | E | E | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.0 | 12.5 | 8.5 | 6.0 | 24.5 | 14.0 | 9.5 | 6.5 | 22.5 | 13.0 | 9.0 | 6.5 | 22.5 | 13.0 | 9.0 | 6.5 |
| LOW TIDE FLOODING FTOL | -18.5 | -7.5 | -3.5 | -2.0 | -21.0 | -9.0 | -5.0 | -6.0 | -24.0 | -9.5 | -5.0 | -4.0 | -32.5 | -13.5 | -7.5 | -7.0 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 6.6 | 6.0 | 5.8 | 5.7 | 9.8 | 9.5 | 9.9 | 10.4 | 13.0 | 13.2 | 14.3 | 15.7 | 11.9 | 12.7 | 14.3 | 16.2 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -17.5 | -8.5 | -6.0 | -4.0 | NC | NC | NC | -5.0 | -18.0 | -9.0 | -6.0 | -4.5 | -24.5 | -12.0 | -8.5 | -6.0 |
| DIRECTION OF WIND | N | N | N | N | NC | NC | NC | NE | NC | NC | NC | NE | NE | NE | NE | NE |
| DURATION IN HOURS | 27.0 | 14.0 | 10.0 | 6.5 | NC | NC | NC | 7.5 | NC | NC | NC | 7.5 | 29.0 | 15.0 | 11.0 | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -13.0 | -6.5 | -4.5 | -3.0 | NC | NC | NC | -4.0 | -14.0 | -7.0 | -5.0 | -3.5 | -20.5 | -10.0 | -7.0 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | NC | NC | NC | NE | NC | NC | NC | NE | NE | E | E | E |
| DURATION IN HOURS | 19.5 | 11.0 | 7.5 | 5.0 | NC | NC | NC | 5.5 | 23.0 | 13.0 | 9.0 | 6.0 | 22.5 | 13.0 | 9.0 | 6.0 |
| LOW TIDE FLOODING FTOL | -11.0 | -5.0 | * | 3.0 | * | * | * | * | -20.5 | NC | NC | -3.0 | -28.5 | NC | NC | -4.0 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | -15.0 | NC | NC | -4.0 | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 4.1 | 4.4 | 3.9 | 4.8 | 7.4 | 7.6 | 6.5 | 7.8 | 13.4 | 14.2 | 12.5 | 15.3 | 12.4 | 14.0 | 13.1 | 16.9 |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

# HIGHWAY 332 AND THE INTRACOASTAL WATERWAY 6b

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

HIGHWAY 332 AND AND THE INTRACOASTAL WATERWAY (SURF) — ELEVATION: 8.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.0 | -5.0 | -3.5 | -2.0 | -16.0 | -9.0 | -6.0 | -4.0 | -10.0 | -5.5 | -4.0 | -2.5 | -16.0 | -9.0 | -6.0 | -4.0 |
| DIRECTION OF WIND | N | N | N | N | N E | N E | N E | N E | N E | N E | N E | N E | E | E | E | E |
| DURATION IN HOURS | 15.5 | 6.5 | 6.0 | 3.5 | 18.0 | 10.0 | 7.0 | 4.5 | 17.0 | 9.5 | 6.5 | 4.5 | 15.0 | 8.5 | 6.0 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -5.5 | -3.0 | -2.0 | 0.0 | -12.5 | -6.0 | -5.0 | -2.5 | -6.5 | -4.5 | -3.0 | -2.0 | -12.5 | -8.5 | -6.0 | -3.0 |
| DIRECTION OF WIND | N | N | N | W | N E | N E | N E | N E | N E | N E | E | N E | E | E | S E | E |
| DURATION IN HOURS | 9.5 | 5.0 | 3.5 | 1.0 | 12.5 | 7.0 | 5.0 | 2.5 | 11.5 | 6.5 | 5.0 | 3.5 | 9.0 | 5.0 | 4.0 | 3.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | N C | . | . | . | N C |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | 8.2 | . | . | . | 8.3 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -11.5 | -6.0 | -4.0 | -2.5 | -18.5 | -10.0 | -7.0 | -4.5 | -12.0 | -6.5 | -4.5 | -3.0 | -18.5 | -10.0 | -7.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | N | N E | E | E | N E | N E | N E | E | N E | E | S E | S | E |
| DURATION IN HOURS | 19.5 | 12.0 | 7.5 | 5.0 | 21.5 | 13.0 | 8.5 | 5.5 | 20.0 | 12.5 | 8.0 | 5.5 | 18.5 | 11.5 | 8.0 | 5.5 |
| 65.5 MPH WIND GUSTS FTOL | -9.0 | -4.5 | -3.0 | -1.5 | -15.0 | -8.5 | -6.0 | -3.5 | -8.5 | -5.0 | -3.5 | -2.5 | -15.0 | -8.5 | -6.0 | -3.5 |
| DIRECTION OF WIND | N | N | N | N | N E | N E | N E | N E | N E | N E | N E | N E | E | E | E | E |
| DURATION IN HOURS | 13.5 | 7.5 | 5.0 | 3.0 | 16.0 | 9.0 | 6.0 | 4.0 | 14.5 | 8.5 | 6.0 | 4.0 | 12.5 | 7.5 | 5.5 | 4.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | 0.0 | . | . | . | -2.0 |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | N C | N C | . | . | N C | N C |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | 8.7 | 9.5 | . | . | 8.9 | 10.2 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.0 | -8.0 | -5.5 | -3.5 | -22.5 | -12.0 | -8.0 | -5.5 | -16.0 | -8.5 | -6.0 | -4.0 | -22.0 | -12.0 | -8.0 | -5.5 |
| DIRECTION OF WIND | N | N | N | N | N E | N E | E | N E | N E | N E | N E | N E | E | E | E | E |
| DURATION IN HOURS | 25.5 | 14.0 | 10.0 | 6.5 | 27.5 | 15.0 | 10.5 | 7.0 | 26.0 | 14.5 | 10.0 | 7.0 | 25.0 | 14.0 | 10.0 | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -11.5 | -6.0 | -4.0 | -2.5 | -18.5 | -10.0 | -7.0 | -4.5 | -12.0 | -6.5 | -4.5 | -3.0 | -18.5 | -10.0 | -7.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | N | N E | N E | N E | N E | N E | N E | N E | N E | E | E | E | E |
| DURATION IN HOURS | 19.0 | 11.0 | 7.5 | 5.0 | 21.5 | 12.0 | 8.0 | 5.5 | 20.0 | 11.5 | 8.0 | 5.5 | 18.5 | 11.0 | 7.5 | 5.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | -0.5 | . | . | . | -2.5 |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | -4.5 | N C | N C | -1.0 | . | . | . | -2.5 |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | N C | N C | N C | N C | -2.0 | N C | N C | N C | -3.0 |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | 8.4 | 10.4 | 10.7 | 11.5 | 12.7 | 9.2 | 10.0 | 11.2 | 12.8 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -18.5 | -10.0 | -6.5 | -4.5 | N C | N C | N C | -6.0 | -19.0 | -10.0 | -7.0 | -5.0 | -25.5 | -13.5 | -9.0 | -6.0 |
| DIRECTION OF WIND | N | N | N | N | N C | N C | N C | N E | N C | N C | N C | N E | N C | N C | N C | E |
| DURATION IN HOURS | 29.5 | 16.0 | 11.0 | 8.0 | N C | N C | N C | 8.5 | 30.0 | 16.0 | 11.5 | 8.5 | 29.0 | 16.0 | 11.0 | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -14.0 | -7.5 | -5.0 | -3.5 | -21.0 | -11.0 | -7.5 | -5.0 | -14.5 | -8.0 | -5.5 | -4.0 | -21.0 | -11.0 | -7.5 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | N E | N | N E | N E | N C | N C | N C | N E | N C | N C | N C | E |
| DURATION IN HOURS | 22.0 | 12.5 | 8.5 | 6.0 | 24.5 | 14.0 | 9.5 | 6.5 | 22.5 | 13.0 | 9.0 | 6.5 | 22.5 | 13.5 | 9.0 | 6.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | -6.0 | N C | N C | -1.0 | -9.5 | N C | N C | -3.0 |
| M.S.L. FLOODING FTOL | . | . | . | . | -12.0 | N C | N C | -3.0 | -8.5 | N C | N C | -1.5 | -13.5 | N C | N C | -3.0 |
| HIGH TIDE FLOODING FTOL | . | . | . | . | N C | N C | N C | N C | -11.5 | N C | N C | -2.0 | -18.0 | N C | N C | -3.5 |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | 9.8 | 9.5 | 9.9 | 10.4 | 13.0 | 13.2 | 14.3 | 15.7 | 11.8 | 12.7 | 14.3 | 16.2 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -17.5 | -8.5 | -6.0 | -4.0 | N C | N C | N C | -5.0 | -18.0 | -9.0 | -6.0 | -4.5 | -24.5 | -12.0 | -8.5 | -6.0 |
| DIRECTION OF WIND | N | N | N | N | N C | N C | N C | N E | N C | N C | N C | N E | N E | N E | N E | N E |
| DURATION IN HOURS | 27.0 | 14.0 | 10.0 | 6.5 | N C | N C | N C | 7.5 | N C | N C | N C | 7.5 | 25.0 | 15.0 | 11.0 | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -13.0 | -6.5 | -4.5 | -3.0 | N C | N C | N C | -4.0 | -14.0 | -7.0 | -5.0 | -3.5 | -20.5 | -10.0 | -7.0 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | N C | N C | N C | N E | N C | N C | N C | N E | N E | N E | E | E |
| DURATION IN HOURS | 19.5 | 11.0 | 7.5 | 5.0 | N C | N C | N C | 5.5 | 22.5 | 13.0 | 9.0 | 6.0 | 22.5 | 13.0 | 9.0 | 6.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | -4.5 | N C | N C | -1.0 | -11.0 | N C | N C | -2.5 |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | -6.5 | N C | N C | -1.5 | -12.5 | N C | N C | -3.0 |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | -9.0 | N C | N C | -2.0 | -14.5 | N C | N C | -3.5 |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | 13.4 | 14.2 | 12.5 | 15.7 | 12.4 | 14.0 | 13.1 | 16.9 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

# FREEPORT NORTH LEVEE 7

FREEPORT NORTH LEVEE (NOR LEVEE) — ELEVATION: 17.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -7.5 | -4.5 | -3.0 | -1.5 | -14.0 | -8.0 | -6.0 | -3.5 | -8.0 | -5.0 | -3.5 | -2.0 | -15.0 | -9.5 | -6.0 | -3.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 14.5 | 8.5 | 6.0 | 3.5 | 16.5 | 10.0 | 7.0 | 4.0 | 15.5 | 9.5 | 7.0 | 4.5 | 13.5 | 8.0 | 6.0 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -4.0 | -2.5 | -2.0 | 0.5 | -11.0 | -7.0 | -5.0 | -2.0 | -4.5 | -3.5 | -3.5 | -1.5 | -11.5 | -7.0 | -5.0 | -2.5 |
| DIRECTION OF WIND | N | N | N | W | NE | NE | NE | N | NE | NE | E | NE | E | E | E | E |
| DURATION IN HOURS | 8.5 | 5.0 | 3.5 | 1.5 | 11.0 | 7.0 | 5.0 | 2.5 | 10.0 | 6.5 | 5.0 | 3.0 | 7.0 | 5.0 | 4.0 | 3.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -3.5 | -2.5 | -17.0 | -9.5 | -6.0 | -4.0 | -11.0 | -6.0 | -4.0 | -3.0 | -17.0 | -9.5 | -6.0 | -4.0 |
| DIRECTION OF WIND | NW | N | N | N | NE | NE | NE | NE | N | N | N | N | N | N | N | N |
| DURATION IN HOURS | 18.0 | 11.0 | 7.5 | 5.0 | 20.0 | 12.0 | 8.0 | 5.0 | 19.5 | 12.0 | 8.5 | 6.0 | 18.0 | 11.0 | 8.0 | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -6.5 | -4.0 | -2.5 | -1.0 | -13.0 | -8.0 | -5.5 | -3.0 | -7.0 | -4.5 | -4.0 | -2.0 | -14.0 | -9.0 | -5.5 | -3.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | N | N | N | N | N | N | N | N |
| DURATION IN HOURS | 12.5 | 7.5 | 5.0 | 3.0 | 14.5 | 9.0 | 6.0 | 3.5 | 14.0 | 9.0 | 6.0 | 4.0 | 11.0 | 7.0 | 5.5 | 4.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -14.0 | -7.5 | -5.0 | -3.5 | -20.5 | -11.0 | -7.5 | -5.0 | -13.5 | -7.5 | -5.0 | -3.5 | -21.0 | -11.0 | -7.5 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 25.0 | 14.0 | 9.5 | 6.5 | 26.5 | 14.5 | 10.0 | 7.0 | 24.5 | 14.0 | 10.0 | 7.0 | 24.5 | 14.0 | 10.0 | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -3.5 | -2.5 | -16.5 | -9.0 | -6.0 | -4.0 | -9.5 | -5.5 | -4.0 | -2.5 | -17.0 | -9.5 | -6.0 | -4.0 |
| DIRECTION OF WIND | N | N | N | N | NE | E | E | NE | NE | E | E | NE | E | SE | SE | E |
| DURATION IN HOURS | 18.5 | 10.5 | 7.5 | 5.0 | 20.0 | 11.5 | 8.0 | 5.0 | 18.0 | 10.5 | 7.5 | 5.5 | 18.0 | 10.5 | 7.5 | 5.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -17.0 | -9.0 | -6.0 | -4.0 | -24.0 | -12.5 | -8.5 | -6.0 | -17.5 | -9.0 | -6.0 | -4.5 | -24.0 | -13.0 | -8.5 | -6.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.5 | 11.0 | 8.0 | 30.5 | NC | NC | 8.5 | 29.5 | NC | NC | 8.5 | 28.5 | NC | NC | 8.5 |
| 65.5 MPH WIND GUSTS FTOL | -12.5 | -7.0 | -4.5 | -3.0 | -19.5 | -10.5 | -7.0 | -5.0 | -11.0 | -6.0 | -4.0 | -3.5 | -19.5 | -10.5 | -7.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.0 | 12.5 | 8.5 | 6.0 | 23.5 | 13.0 | 9.0 | 6.5 | 20.0 | 11.5 | 8.5 | 6.5 | 22.0 | 12.5 | 9.0 | 6.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | -2.0 | NC | NC | 0.5 | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | NC | NC | NC | NC | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | 19.6 | NC | NC | 19.9 | . | . | . | . |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -16.0 | -8.0 | -5.5 | -3.5 | NC | NC | NC | -5.0 | -16.5 | -8.0 | -5.5 | -4.0 | -15.0 | -8.5 | -7.0 | -8.0 |
| DIRECTION OF WIND | N | N | N | N | NC | NC | NC | NE | NC | NC | NC | NE | NE | SE | S | NE |
| DURATION IN HOURS | 27.0 | 14.0 | 10.0 | 6.5 | NC | NC | NC | 7.0 | NC | NC | NC | 7.5 | 24.0 | 13.5 | 10.5 | 9.5 |
| 65.5 MPH WIND GUSTS FTOL | -12.0 | -6.0 | -4.0 | -3.0 | -18.0 | -9.0 | -6.0 | -3.5 | -12.5 | -6.0 | -4.0 | -3.0 | -11.0 | -5.0 | -5.0 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NL | NC | NE | NE | NE | NE | E |
| DURATION IN HOURS | 19.0 | 11.0 | 7.5 | 5.0 | 21.5 | 12.5 | 8.5 | 5.5 | 23.0 | 13.0 | 9.0 | 6.0 | 22.0 | 13.0 | 9.0 | 6.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | -2.0 | NC | NC | 0.0 | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | -3.0 | NC | NC | 0.0 | -10.0 | NC | NC | -1.0 |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | -4.0 | NC | NC | 0.0 | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | 20.8 | NC | NC | 21.4 | 19.7 | NC | NC | 18.6 |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

HIGHWAY 227A AT BASTROP BAYOU (BA BI 227A) — ELEVATION: 6.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -7.5 | -4.0 | -3.0 | -1.5 | -13.5 | -7.0 | -5.5 | -3.0 | -7.0 | -4.0 | -3.0 | -2.0 | -13.5 | -7.0 | -5.5 | -3.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | NE | E | E |
| DURATION IN HOURS | 15.0 | 8.5 | 6.5 | 4.0 | 16.5 | 9.0 | 6.5 | 3.5 | 14.5 | 8.5 | 6.5 | 4.5 | 12.0 | 7.0 | 6.0 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -4.5 | -3.0 | -2.0 | -0.5 | -10.0 | -6.5 | -4.0 | -1.0 | -3.5 | -2.5 | -2.0 | -1.0 | -10.0 | -7.0 | -5.0 | -2.5 |
| DIRECTION OF WIND | N | N | N | N | NE | N | N | NW | NE | NE | E | E | E | E | E | E |
| DURATION IN HOURS | 6.0 | 5.5 | 4.0 | 2.5 | 10.5 | 8.5 | 5.0 | 1.5 | 8.0 | 7.0 | 5.0 | 3.0 | 6.0 | 5.5 | 4.5 | 3.0 |
| LOW TIDE FLOODING FTOL | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| M.S.L. FLOODING FTOL | • | • | • | • | • | • | • | • | 4.0 | • | • | • | • | • | • | • |
| HIGH TIDE FLOODING FTOL | • | • | • | • | • | • | • | • | NC | • | • | • | • | • | • | • |
| MAXIMUM HIGH TIDE SURGE | • | • | • | • | • | • | • | • | 7.6 | • | • | • | • | • | • | • |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -3.5 | -2.5 | -16.0 | -9.0 | -6.0 | -4.0 | -10.0 | -5.5 | -3.5 | -2.5 | -16.0 | -9.0 | -6.0 | -4.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 19.0 | 11.0 | 7.5 | 5.0 | 20.0 | 11.0 | 7.5 | 4.0 | 18.0 | 11.0 | 7.5 | 5.5 | 17.0 | 10.0 | 7.0 | 5.5 |
| 65.5 MPH WIND GUSTS FTOL | -6.5 | -4.0 | -2.5 | -1.5 | -12.5 | -7.0 | -5.0 | -3.0 | -6.0 | -3.5 | -2.5 | -1.5 | -12.5 | -7.0 | -5.0 | -3.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | E | E | NE | E | E | SE | E |
| DURATION IN HOURS | 12.5 | 8.0 | 5.5 | 3.5 | 14.5 | 9.0 | 6.0 | 3.5 | 12.0 | 8.0 | 5.5 | 3.5 | 15.5 | 10.0 | 7.0 | 4.0 |
| LOW TIDE FLOODING FTOL | • | • | • | • | • | • | • | • | -0.5 | • | • | • | -5.0 | • | • | • |
| M.S.L. FLOODING FTOL | • | • | • | • | • | • | • | • | -2.0 | NC | NC | 1.5 | -7.0 | • | • | • |
| HIGH TIDE FLOODING FTOL | • | • | • | • | • | • | • | • | -4.0 | NC | NC | NC | -8.5 | • | • | • |
| MAXIMUM HIGH TIDE SURGE | • | • | • | • | • | • | • | • | 11.0 | NC | NC | 9.0 | 9.3 | • | • | • |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -14.0 | -7.5 | -5.0 | -3.5 | -20.0 | -11.0 | -7.0 | -5.0 | -13.5 | -7.5 | -5.0 | -3.5 | -19.0 | -10.0 | -7.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 25.5 | 14.0 | 10.0 | 7.0 | 26.0 | 14.5 | 10.0 | 7.0 | 24.5 | 13.5 | 10.0 | 7.0 | 23.0 | 13.0 | 9.5 | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -3.5 | -2.5 | -16.0 | -9.0 | -6.0 | -4.0 | -9.5 | -5.5 | -3.5 | -2.5 | -16.0 | -9.0 | -6.0 | -3.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 19.0 | 12.0 | 7.5 | 5.0 | 20.0 | 12.5 | 8.0 | 5.0 | 18.0 | 11.5 | 7.5 | 5.0 | 17.0 | 11.0 | 7.5 | 5.5 |
| LOW TIDE FLOODING FTOL | • | • | • | • | -7.5 | • | • | • | -4.5 | NC | NC | 0.0 | -9.0 | NC | NC | -1.0 |
| M.S.L. FLOODING FTOL | • | • | • | • | -11.0 | NC | NC | -1.0 | -6.0 | NC | NC | 0.0 | -10.0 | NC | NC | -1.5 |
| HIGH TIDE FLOODING FTOL | • | • | • | • | -15.0 | NC | NC | NC | -8.0 | NC | NC | -0.5 | -11.0 | NC | NC | -1.5 |
| MAXIMUM HIGH TIDE SURGE | • | • | • | • | 8.6 | NC | NC | 7.8 | 15.1 | NC | NC | 15.4 | 15.0 | NC | NC | 15.4 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -17.0 | -9.0 | -6.0 | -4.0 | -23.0 | -12.0 | -6.0 | -5.5 | -17.0 | -9.0 | -6.0 | -4.5 | -22.5 | -12.0 | -8.0 | -5.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 16.0 | 11.0 | 8.0 | 30.5 | NC | NC | 8.5 | 28.5 | NC | NC | 8.0 | 27.5 | NC | NC | 8.5 |
| 65.5 MPH WIND GUSTS FTOL | -12.5 | -7.0 | -4.5 | -3.0 | -18.5 | -10.0 | -7.0 | -4.5 | -12.5 | -7.0 | -4.5 | -3.0 | -19.5 | -10.5 | -7.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.5 | 12.5 | 9.0 | 6.0 | 23.5 | 13.0 | 9.0 | 6.5 | 21.0 | 12.0 | 8.5 | 6.0 | 21.0 | 12.0 | 8.5 | 6.5 |
| LOW TIDE FLOODING FTOL | • | • | • | • | -10.5 | NC | NC | -1.5 | -6.0 | NC | NC | 0.0 | -11.5 | NC | NC | -2.0 |
| M.S.L. FLOODING FTOL | • | • | • | • | -12.0 | NC | NC | -1.5 | NC | NC | NC | -0.5 | NC | NC | NC | -2.0 |
| HIGH TIDE FLOODING FTOL | • | • | • | • | -13.5 | NC | NC | -2.0 | NC | NC | NC | -0.5 | NC | NC | NC | -2.0 |
| MAXIMUM HIGH TIDE SURGE | • | • | • | • | 12.8 | NC | NC | 10.4 | 18.1 | NC | NC | 19.4 | 19.2 | NC | NC | 19.1 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -16.0 | -8.0 | -5.5 | -3.5 | NC | NC | NC | -4.5 | -15.0 | -7.5 | -5.0 | -4.0 | -22.0 | -11.0 | -7.5 | -5.5 |
| DIRECTION OF WIND | N | N | N | N | NC | NC | NC | NE | NC | NC | NC | NE | NE | E | E | E |
| DURATION IN HOURS | 27.5 | 14.5 | 10.0 | 7.0 | NC | NC | NC | 7.0 | NC | NC | NC | 7.5 | 26.0 | 14.0 | 10.0 | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -12.0 | -6.0 | -4.0 | -3.0 | -17.5 | -8.5 | -5.5 | -3.5 | -12.0 | -5.5 | -3.0 | -0.5 | -18.0 | -9.0 | -5.0 | -4.5 |
| DIRECTION OF WIND | • | N | N | N | NE | NC | NC | NE | • | • | • | NE | NE | NC | NC | E |
| DURATION IN HOURS | 16.5 | 11.5 | 8.0 | 5.5 | 21.5 | 14.0 | 9.5 | 5.5 | 22.0 | 14.0 | 8.0 | 3.0 | 24.0 | 16.0 | 10.5 | 6.0 |
| LOW TIDE FLOODING FTOL | • | • | • | • | • | • | • | • | -4.5 | NC | NC | 0.0 | -11.5 | NC | NC | -2.0 |
| M.S.L. FLOODING FTOL | • | • | • | • | • | • | • | • | NC | NC | NC | 0.0 | NC | NC | NC | 2.0 |
| HIGH TIDE FLOODING FTOL | • | • | • | • | • | • | • | • | NC | NC | NC | 0.0 | NC | NC | NC | 0.0 |
| MAXIMUM HIGH TIDE SURGE | • | • | • | • | • | • | • | • | 19.0 | NC | NC | 20.7 | 19.2 | NC | NC | 22.2 |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: Winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

# HIGHWAY 257 BY DRUM BAY 9

HIGHWAY 257 BY DRUM BAY (DRUM BAY) — ELEVATION: 8.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.0 | -5.0 | -3.5 | -2.0 | -15.0 | -8.5 | -6.0 | -3.5 | -8.5 | -5.0 | -3.5 | -2.5 | -14.5 | -8.0 | -6.0 | -3.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 16.0 | 9.5 | 6.5 | 4.0 | 18.0 | 10.5 | 7.0 | 4.0 | 15.5 | 9.0 | 6.5 | 4.5 | 13.5 | 8.0 | 6.0 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -6.0 | -3.5 | -2.5 | -1.0 | -12.0 | -7.0 | -5.0 | -2.5 | -5.0 | -3.0 | -2.0 | -1.5 | -11.0 | -5.5 | -4.5 | -2.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | E | E | E | E | E | E | E |
| DURATION IN HOURS | 10.5 | 6.0 | 4.0 | 3.0 | 12.0 | 7.0 | 4.5 | 3.0 | 9.0 | 5.5 | 4.0 | 3.0 | 7.0 | 4.5 | 3.0 | 3.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | NC | . | . | . | NC |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | 8.2 | . | . | . | 8.1 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -11.5 | -6.5 | -4.0 | -2.5 | -17.5 | -9.5 | -6.5 | -4.0 | -11.5 | -6.5 | -4.0 | -3.0 | -17.0 | -9.5 | -6.0 | -4.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 20.0 | 11.5 | 8.0 | 5.0 | 21.0 | 12.0 | 8.0 | 5.5 | 19.0 | 11.0 | 8.0 | 5.5 | 18.0 | 10.5 | 7.5 | 5.5 |
| 65.5 MPH WIND GUSTS FTOL | -8.0 | -4.5 | -3.0 | -2.0 | -14.0 | -8.0 | -5.5 | -3.5 | -7.5 | -4.5 | -3.0 | -2.0 | -13.5 | -7.5 | -5.0 | -3.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | E | NE | NE | E | E | NE | E | SE | SE | E |
| DURATION IN HOURS | 14.0 | 8.5 | 5.5 | 3.5 | 16.0 | 9.5 | 6.5 | 4.0 | 13.5 | 8.5 | 6.0 | 4.5 | 11.0 | 7.0 | 5.0 | 4.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | 0.0 | . | . | . | -1.5 |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | NC | . | . | . | NC |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | 9.6 | . | . | . | 9.8 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.5 | -8.5 | -5.5 | -3.5 | -21.0 | -11.5 | -7.5 | -5.0 | -15.0 | -8.5 | -5.5 | -4.0 | -21.0 | -11.5 | -7.5 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 26.5 | 14.5 | 10.0 | 7.0 | 27.0 | 15.0 | 10.0 | 7.0 | 25.0 | 14.0 | 10.0 | 7.0 | 24.5 | 13.5 | 9.5 | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -11.5 | -6.5 | -4.0 | -3.0 | -17.5 | -9.5 | -6.0 | -4.5 | -11.0 | -6.0 | -4.0 | -3.0 | -17.0 | -9.0 | -6.0 | -4.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 19.5 | 11.5 | 7.5 | 5.5 | 21.0 | 12.0 | 8.0 | 5.5 | 18.5 | 11.0 | 7.5 | 5.5 | 17.5 | 10.5 | 7.0 | 5.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | 0.5 | . | . | . | -2.0 |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | -2.5 | -5.0 | NC | NC | 0.0 | -8.5 | NC | NC | -2.5 |
| HIGH TIDE FLOODING FTOL | . | . | . | . | NC | NC | NC | NC | NC | NC | NC | -1.0 | NC | NC | NC | -3.0 |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | 9.2 | NC | NC | 10.3 | 10.5 | NC | NC | 13.2 | 9.7 | NC | NC | 12.6 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -18.5 | -10.0 | -6.5 | -4.5 | -24.5 | -13.0 | -8.5 | -6.0 | -18.5 | -10.0 | -6.5 | -4.5 | -24.0 | -13.0 | -8.5 | -5.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 30.0 | 16.0 | 11.5 | 8.0 | 31.5 | 17.0 | 12.0 | 8.5 | 29.0 | 16.0 | 11.0 | 8.0 | 28.0 | 15.0 | 11.0 | 8.5 |
| 65.5 MPH WIND GUSTS FTOL | -14.0 | -7.5 | -5.0 | -3.5 | -20.0 | -11.0 | -7.0 | -5.0 | -14.0 | -7.5 | -5.0 | -3.5 | -20.5 | -11.0 | -7.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 23.0 | 13.0 | 9.0 | 6.5 | 24.5 | 14.0 | 9.5 | 6.5 | 36.5 | 19.5 | 12.5 | 6.5 | 42.0 | 23.0 | 16.0 | 11.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | -9.5 | NC | NC | -2.5 | -5.5 | NC | NC | -1.0 | -9.5 | NC | NC | -2.5 |
| M.S.L. FLOODING FTOL | . | . | . | . | -14.0 | NC | NC | -3.0 | -8.5 | NC | NC | -1.5 | -13.5 | NC | NC | -3.0 |
| HIGH TIDE FLOODING FTOL | . | . | . | NC | -18.5 | NC | NC | -4.0 | -11.5 | NC | NC | -2.0 | -17.5 | NC | NC | -4.0 |
| MAXIMUM HIGH TIDE SURGE | . | . | . | 8.3 | 11.0 | NC | NC | 12.3 | 13.1 | NC | NC | 16.0 | 12.0 | NC | NC | 16.3 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -18.0 | -9.0 | -6.0 | -4.0 | NC | NC | NC | -5.0 | -18.0 | -9.0 | -6.0 | -4.5 | -23.0 | -11.5 | -8.0 | -6.0 |
| DIRECTION OF WIND | N | N | N | N | NC | NC | NC | NE | NC | NC | NC | NE | E | E | E | E |
| DURATION IN HOURS | 28.0 | 16.5 | 10.5 | 7.0 | NC | NC | NC | 7.5 | 29.5 | 17.5 | 11.0 | 7.5 | 28.0 | 17.0 | 10.5 | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -13.5 | -7.5 | -4.5 | -3.0 | NC | NC | NC | -4.0 | -13.5 | -8.0 | -4.5 | -3.5 | -19.0 | -11.0 | -6.5 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | NC | NC | NC | NE | NC | NC | NC | NE | E | NW | SW | E |
| DURATION IN HOURS | 20.5 | 12.5 | 8.0 | 5.5 | NC | NC | NC | 6.0 | 22.0 | 13.5 | 9.0 | 6.0 | 22.0 | 13.5 | 9.0 | 6.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | 6.5 | . | . | . | -4.0 | NC | NC | -1.0 | -8.5 | NC | NC | -1.5 |
| M.S.L. FLOODING FTOL | . | . | . | . | -11.0 | NC | NC | -1.5 | -7.0 | NC | NC | -1.5 | -12.0 | NC | NC | -3.0 |
| HIGH TIDE FLOODING FTOL | . | . | . | . | -28.5 | NC | NC | NC | -9.5 | NC | NC | -1.5 | -16.0 | NC | NC | -4.5 |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | 11.1 | NC | NC | 10.0 | 14.0 | NC | NC | 16.1 | 12.3 | NC | NC | 17.0 |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

## + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

## RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

## HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

## MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

# HIGHWAY 257 BY SAN LUIS PASS BRIDGE

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

HIGHWAY 257 BY SAN LUIS PASS BRIDGE (SAN LUBR) — ELEVATION: 3.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.5 | -5.5 | -3.5 | -2.0 | -14.0 | -8.0 | -5.0 | -3.5 | -7.5 | -4.5 | -3.0 | -2.0 | -12.5 | -7.0 | -5.0 | -3.0 |
| DIRECTION OF WIND | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E |
| DURATION IN HOURS | 17.0 | 9.5 | 6.5 | 4.5 | 17.5 | 10.0 | 7.0 | 4.5 | 14.0 | 8.0 | 6.0 | 4.0 | 12.0 | 7.0 | 5.0 | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -6.5 | -4.0 | -2.5 | -1.5 | -7.0 | -5.0 | -3.5 | -2.5 | -2.0 | -1.5 | -1.0 | -1.0 | -8.5 | -5.5 | -4.0 | -2.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 5.5 | 6.5 | 4.5 | 3.0 | 7.5 | 8.0 | 6.0 | 3.0 | 5.0 | 6.0 | 4.0 | 2.5 | 5.0 | 6.0 | 4.0 | 2.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | -3.0 | -2.0 | NC | NC | -1.0 | . | . | . | -2.0 |
| M.S.L. FLOODING FTOL | -9.0 | -4.0 | -2.5 | -1.5 | -15.5 | -7.5 | -4.5 | -3.5 | -11.0 | -5.0 | -3.0 | -2.0 | -14.0 | -7.0 | -4.0 | -3.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | -20.0 | NC | NC | -3.0 | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 4.7 | 5.0 | 5.3 | 5.7 | 5.9 | 6.2 | 6.5 | 6.8 | 6.1 | 6.6 | 7.1 | 7.5 | 5.7 | 6.3 | 6.9 | 7.6 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -11.5 | -6.5 | -4.5 | -3.0 | -16.5 | -9.0 | -6.0 | -4.0 | -10.5 | -6.0 | -4.0 | -3.0 | -15.5 | -8.5 | -5.5 | -3.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 20.0 | 11.5 | 8.0 | 5.5 | 20.5 | 12.0 | 8.5 | 5.5 | 18.0 | 10.5 | 7.5 | 5.0 | 16.0 | 9.5 | 7.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -8.5 | -5.0 | -3.0 | -2.0 | -13.0 | -7.5 | -5.0 | -3.0 | -6.0 | -3.5 | -2.5 | -2.0 | -11.5 | -6.5 | -4.5 | -3.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E |
| DURATION IN HOURS | 14.5 | 8.5 | 6.0 | 4.0 | 15.0 | 9.0 | 6.0 | 4.0 | 11.5 | 7.0 | 5.0 | 3.5 | 9.5 | 6.0 | 4.5 | 3.5 |
| LOW TIDE FLOODING FTOL | . | . | -1.5 | -1.0 | -12.5 | NC | NC | -3.0 | -7.5 | NC | NC | -1.5 | -11.0 | NC | NC | -2.5 |
| M.S.L. FLOODING FTOL | -12.0 | -5.0 | -3.0 | -2.0 | -18.5 | -8.0 | -5.0 | -4.0 | -14.0 | -6.0 | -3.5 | -2.5 | -18.0 | -8.0 | -5.0 | -3.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | -4.5 | -3.0 | -24.5 | NC | NC | -4.5 | -20.5 | NC | NC | -3.5 | -25.0 | NC | NC | -4.5 |
| MAXIMUM HIGH TIDE SURGE | 4.3 | 5.8 | 6.1 | 6.7 | 7.0 | 8.3 | 8.1 | 8.2 | 7.3 | 8.9 | 8.8 | 8.9 | 6.8 | 8.5 | 8.7 | 9.2 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.5 | -8.5 | -5.5 | -4.0 | -20.0 | -11.0 | -7.0 | -5.0 | -14.5 | -8.0 | -5.0 | -4.0 | -19.5 | -11.0 | -7.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 26.5 | 14.5 | 10.0 | 7.0 | 27.0 | 15.0 | 10.5 | 7.0 | 24.0 | 13.5 | 9.5 | 7.0 | 23.0 | 13.0 | 9.0 | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -11.5 | -6.5 | -4.0 | -3.0 | -16.5 | -9.0 | -6.0 | -4.0 | -10.0 | -5.5 | -4.0 | -2.5 | -15.0 | -8.0 | -5.5 | -3.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 20.0 | 11.5 | 7.5 | 5.5 | 20.5 | 12.0 | 8.0 | 5.5 | 17.5 | 10.0 | 7.0 | 5.0 | 16.0 | 9.0 | 6.5 | 5.0 |
| LOW TIDE FLOODING FTOL | -10.0 | -4.5 | -2.5 | -1.5 | -16.0 | -7.0 | -4.0 | -3.5 | -12.5 | -5.5 | -3.0 | -2.0 | -16.0 | -7.0 | -4.0 | -3.0 |
| M.S.L. FLOODING FTOL | -15.5 | -6.5 | -3.5 | -2.5 | -20.0 | -9.0 | -5.0 | -4.5 | -18.0 | -8.0 | -4.0 | -3.0 | -23.0 | -10.0 | -5.5 | -4.5 |
| HIGH TIDE FLOODING FTOL | -21.0 | -5.0 | -4.5 | -3.0 | -24.0 | -10.5 | -6.0 | -5.5 | -23.5 | -10.0 | -5.5 | -4.0 | -30.0 | -13.0 | -7.0 | -5.5 |
| MAXIMUM HIGH TIDE SURGE | 6.7 | 7.2 | 7.8 | 8.5 | 9.3 | 9.6 | 10.2 | 10.8 | 9.8 | 10.5 | 11.4 | 12.4 | 9.2 | 10.1 | 11.2 | 12.4 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -18.5 | -10.0 | -6.5 | -4.5 | -23.5 | -12.5 | -8.5 | -6.0 | -18.0 | -9.5 | -6.5 | -4.5 | -22.5 | -12.0 | -8.0 | -5.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 30.0 | 16.5 | 11.5 | 8.0 | 31.0 | 17.0 | 12.0 | 8.5 | 28.0 | 15.0 | 11.0 | 8.0 | 27.0 | 15.0 | 11.0 | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -14.0 | -7.5 | -5.0 | -3.5 | -19.0 | -10.0 | -7.0 | -4.5 | -13.0 | -7.0 | -5.0 | -3.5 | -18.0 | -10.0 | -6.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 23.5 | 13.0 | 9.0 | 6.5 | 24.5 | 13.5 | 9.0 | 6.0 | 20.5 | 11.5 | 8.0 | 6.0 | 20.0 | 11.5 | 8.0 | 6.0 |
| LOW TIDE FLOODING FTOL | -13.0 | -5.5 | -3.0 | -2.0 | -19.5 | -8.0 | -5.0 | -4.0 | -15.0 | -6.5 | -3.5 | -2.5 | -20.0 | -8.5 | -4.5 | -3.0 |
| M.S.L. FLOODING FTOL | -17.0 | -7.5 | -4.0 | -2.5 | -20.5 | -9.5 | -6.0 | -5.0 | -21.0 | -9.0 | -5.5 | -3.5 | -27.0 | -12.0 | -7.0 | -5.5 |
| HIGH TIDE FLOODING FTOL | -21.0 | -10.0 | -5.5 | -3.0 | -21.5 | -10.5 | -7.0 | -6.5 | -26.5 | -12.5 | -7.0 | -4.5 | -34.0 | -16.0 | -10.0 | -8.0 |
| MAXIMUM HIGH TIDE SURGE | 9.2 | 9.2 | 9.1 | 10.0 | 11.6 | 11.9 | 12.1 | 13.6 | 12.2 | 12.9 | 13.6 | 15.6 | 11.5 | 12.6 | 13.7 | 16.1 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | NC | -9.0 | -6.0 | -4.0 | NC | NC | NC | -4.5 | -17.0 | NC | NC | -4.5 | -21.5 | NC | NC | -5.5 |
| DIRECTION OF WIND | NC | N | N | N | NC | NC | NC | NE | NC | NC | NC | NE | E | NC | NC | E |
| DURATION IN HOURS | NC | 15.0 | 10.5 | 7.5 | NC | NC | NC | 7.5 | 28.0 | NC | NC | 7.5 | 27.5 | NC | NC | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -14.0 | -7.0 | -4.5 | -3.0 | -18.0 | -9.0 | -6.0 | -4.0 | -13.0 | -6.5 | -4.5 | -3.5 | -17.5 | -9.0 | -6.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | E | E | E | E |
| DURATION IN HOURS | 21.0 | 12.0 | 8.5 | 5.5 | 22.5 | 13.0 | 9.0 | 6.0 | 21.0 | 12.0 | 8.5 | 5.5 | 21.0 | 12.0 | 8.5 | 5.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | -14.0 | NC | NC | -2.5 | -13.5 | NC | NC | -2.0 | -18.0 | NC | NC | -3.5 |
| M.S.L. FLOODING FTOL | -12.0 | -5.5 | -2.5 | -1.5 | -15.0 | -7.0 | -4.0 | -3.5 | -18.0 | -8.5 | -4.0 | -3.0 | -24.0 | -11.5 | -6.0 | -5.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | -16.0 | NC | NC | -4.5 | -22.5 | NC | NC | -4.0 | -30.0 | NC | NC | -6.5 |
| MAXIMUM HIGH TIDE SURGE | 5.4 | 5.7 | 5.9 | 5.8 | 10.1 | 10.6 | 10.9 | 10.6 | 12.9 | 14.5 | 15.7 | 16.1 | 12.1 | 14.1 | 15.7 | 16.4 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

FM 2004 AT CHOCOLATE BAYOU (CH BI 2004) — ELEVATION: 9.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -7.5 | -4.5 | -3.0 | -1.5 | -12.0 | -7.0 | -5.0 | -3.0 | -5.5 | -3.0 | -2.0 | -1.5 | -11.5 | -7.0 | -4.5 | -2.5 |
| DIRECTION OF WIND | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E |
| DURATION IN HOURS | 14.5 | 9.5 | 6.5 | 4.0 | 15.0 | 9.5 | 6.5 | 4.0 | 12.5 | 8.0 | 6.0 | 4.0 | 10.5 | 7.0 | 5.5 | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -4.5 | -3.0 | -2.0 | -1.0 | -9.0 | -6.0 | -4.0 | -2.0 | 1.0 | 0.5 | 0.0 | -0.5 | -8.0 | -5.0 | -3.5 | -2.0 |
| DIRECTION OF WIND | N | N | N | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 5.5 | 6.0 | 5.5 | 3.0 | 6.0 | 6.5 | 5.5 | 2.5 | 2.0 | 2.0 | 2.0 | 1.0 | 4.5 | 5.0 | 5.0 | 3.0 |
| LOW TIDE FLOODING FTOL | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| M.S.L. FLOODING FTOL | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| HIGH TIDE FLOODING FTOL | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| MAXIMUM HIGH TIDE SURGE | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.5 | -5.5 | -3.5 | -2.5 | -14.5 | -8.0 | -5.5 | -3.5 | -8.0 | -5.0 | -3.0 | -2.0 | -14.0 | -8.0 | -5.0 | -3.5 |
| DIRECTION OF WIND | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 19.0 | 11.5 | 8.0 | 5.5 | 18.5 | 11.0 | 8.0 | 5.5 | 16.5 | 10.0 | 7.0 | 5.0 | 15.0 | 9.0 | 7.0 | 5.5 |
| 65.5 MPH WIND GUSTS FTOL | -6.5 | -4.0 | -2.5 | -1.5 | -11.0 | -6.5 | -4.5 | -2.5 | -4.0 | -2.5 | -1.5 | -1.0 | -10.5 | -5.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | E | E | E | E | E | E | E |
| DURATION IN HOURS | 8.0 | 8.5 | 6.0 | 4.0 | 12.5 | 12.0 | 7.5 | 3.5 | 9.5 | 9.5 | 6.0 | 3.0 | 8.0 | 8.5 | 6.0 | 4.0 |
| LOW TIDE FLOODING FTOL | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| M.S.L. FLOODING FTOL | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| HIGH TIDE FLOODING FTOL | • | • | • | • | • | • | • | • | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | • | • | • | • | • | • | • | • | 9.0 | NC | NC | 9.1 | 9.7 | NC | NC | 9.3 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -13.5 | -7.5 | -5.0 | -3.5 | -21.0 | -11.5 | -7.0 | -4.5 | -12.5 | -7.0 | -4.5 | -3.0 | -18.0 | -10.0 | -6.5 | -4.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | NC | 14.5 | 10.0 | 7.0 | 29.0 | NC | NC | 7.0 | 22.5 | NC | NC | 6.5 | 22.5 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -9.5 | -5.5 | -3.5 | -2.5 | -14.5 | -8.0 | -5.0 | -3.5 | -8.0 | -4.5 | -3.0 | -2.0 | -14.0 | -7.5 | -5.0 | -3.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 19.0 | 11.0 | 8.0 | 5.5 | 19.5 | 11.0 | 8.0 | 5.5 | 16.0 | 9.5 | 7.0 | 5.0 | 15.5 | 9.0 | 7.0 | 5.0 |
| LOW TIDE FLOODING FTOL | • | • | • | • | • | • | • | • | 1.0 | NC | NC | 1.0 | -6.0 | NC | NC | -0.5 |
| M.S.L. FLOODING FTOL | • | • | • | • | • | • | • | • | -0.5 | NC | NC | 0.5 | -6.5 | NC | NC | -1.0 |
| HIGH TIDE FLOODING FTOL | • | • | • | • | • | • | • | • | -1.5 | NC | NC | 0.5 | -7.0 | NC | NC | -1.0 |
| MAXIMUM HIGH TIDE SURGE | • | • | • | • | • | • | • | • | 15.7 | NC | NC | 16.9 | 14.9 | NC | NC | 19.0 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -16.5 | -9.0 | -6.0 | -4.0 | -21.5 | -11.5 | -8.0 | -5.5 | -15.5 | -8.0 | -6.0 | -4.0 | -21.0 | -11.5 | -7.5 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 16.0 | 11.5 | 7.0 | 30.0 | NC | NC | 8.5 | 27.0 | NC | NC | 8.0 | 26.5 | NC | NC | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -17.0 | -9.0 | -6.0 | -4.0 | -11.0 | -6.0 | -4.0 | -3.0 | -16.5 | -9.0 | -5.0 | -4.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 23.0 | 13.0 | 9.0 | 6.5 | 23.0 | 13.0 | 9.0 | 6.5 | 19.0 | 11.0 | 8.0 | 6.0 | 19.5 | 11.0 | 8.0 | 6.5 |
| LOW TIDE FLOODING FTOL | • | • | • | • | -5.5 | • | • | • | -2.5 | NC | NC | 0.5 | -8.5 | NC | NC | -1.0 |
| M.S.L. FLOODING FTOL | • | • | • | • | -6.0 | NC | NC | -1.0 | -3.0 | NC | NC | 0.5 | -9.0 | NC | NC | -1.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | -6.5 | NC | NC | NC | -3.5 | NC | NC | 0.5 | -9.5 | NC | NC | -1.0 |
| MAXIMUM HIGH TIDE SURGE | 10.3 | 10.2 | 10.3 | 9.2 | 12.8 | 12.6 | 12.7 | 11.5 | 16.9 | 18.6 | 20.8 | 20.6 | 17.4 | 20.0 | 22.7 | 22.8 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -16.0 | -8.0 | -5.5 | -3.5 | NC | NC | NC | -4.0 | -15.0 | -7.5 | -5.0 | -4.0 | -20.0 | -10.0 | -7.0 | -5.0 |
| DIRECTION OF WIND | N | N | N | N | NC | NC | NC | NE | NC | NC | NC | NE | E | E | E | E |
| DURATION IN HOURS | NC | 14.5 | 10.5 | 7.5 | NC | NC | NC | 7.0 | NC | NC | NC | 7.5 | 27.0 | NC | NC | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -12.0 | -6.0 | -4.0 | -3.0 | -16.0 | -8.0 | -5.0 | -3.0 | -10.5 | -5.5 | -4.0 | -3.0 | -15.0 | -8.0 | -5.5 | -4.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | E | E | E | E |
| DURATION IN HOURS | 21.0 | 12.0 | 8.5 | 6.0 | 21.0 | 12.0 | 8.0 | 5.5 | 20.5 | 11.5 | 8.0 | 5.5 | 21.0 | 12.0 | 8.0 | 6.0 |
| LOW TIDE FLOODING FTOL | • | • | • | • | • | • | • | • | -1.5 | NC | NC | -0.5 | -8.0 | NC | NC | -1.0 |
| M.S.L. FLOODING FTOL | • | • | • | • | • | • | • | • | -4.5 | NC | NC | -0.5 | -8.5 | NC | NC | -1.0 |
| HIGH TIDE FLOODING FTOL | • | • | • | • | • | • | • | • | -7.5 | NC | NC | -0.5 | -9.0 | NC | NC | -1.0 |
| MAXIMUM HIGH TIDE SURGE | • | • | • | • | • | • | • | • | 17.5 | NC | NC | 21.6 | 20.4 | NC | NC | 26.7 |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour, (+ or -) FTOL = from time of landfall in hours when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

# BEACH OFF SEA ISLE 12a

BEACH OFF SEA ISLE (SEA ISLE) — ELEVATION: 0.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.5 | -5.5 | -3.5 | -2.5 | -13.5 | -8.0 | -5.0 | -3.5 | -6.5 | -4.0 | -3.0 | -2.0 | -11.5 | -6.5 | -4.5 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 17.0 | 10.0 | 7.0 | 4.5 | 17.0 | 10.0 | 7.0 | 4.5 | 12.0 | 7.0 | 5.0 | 3.5 | 10.5 | 6.5 | 5.0 | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -6.5 | -4.0 | -2.5 | -1.5 | -10.5 | -6.5 | -4.0 | -2.5 | • | • | • | -0.5 | -7.0 | -4.0 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | • | • | • | E | SE | SE | SE | SE |
| DURATION IN HOURS | 11.5 | 7.0 | 5.0 | 3.0 | 5.5 | 4.0 | 3.0 | 3.0 | • | • | • | 1.5 | 1.0 | 1.0 | 1.5 | 2.5 |
| LOW TIDE FLOODING FTOL | -12.5 | -5.5 | -3.0 | -2.0 | -19.0 | -8.5 | -5.0 | -4.0 | -14.0 | -6.0 | -3.5 | -2.5 | -17.0 | -7.5 | -4.5 | -4.0 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 4.9 | 5.6 | 6.0 | 6.6 | 6.0 | 6.6 | 6.9 | 7.4 | 5.7 | 6.4 | 6.7 | 7.3 | 5.4 | 6.3 | 6.8 | 7.7 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -16.0 | -8.5 | -6.0 | -4.0 | -10.0 | -5.5 | -4.0 | -2.5 | -14.5 | -8.0 | -5.5 | -3.5 |
| DIRECTION OF WIND | N | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 20.5 | 11.5 | 8.5 | 4.5 | 20.0 | 12.0 | 9.0 | 5.5 | 17.0 | 10.0 | 7.5 | 5.0 | 15.0 | 9.0 | 7.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -9.0 | -5.0 | -3.5 | -2.0 | -12.5 | -7.0 | -5.0 | -3.0 | -5.0 | -3.0 | -2.0 | -2.0 | -10.0 | -5.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | N | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 15.0 | 9.0 | 6.0 | 4.0 | 14.5 | 8.5 | 6.0 | 4.0 | 9.0 | 5.5 | 4.0 | 3.0 | 7.5 | 5.0 | 4.0 | 3.5 |
| LOW TIDE FLOODING FTOL | -15.5 | -6.5 | -3.5 | -2.5 | -20.0 | -8.5 | -5.0 | -4.5 | -16.5 | -7.0 | -4.0 | -3.0 | -22.0 | -9.5 | -5.5 | -4.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 5.6 | 6.6 | 7.2 | 7.9 | 7.3 | 8.1 | 8.4 | 8.9 | 6.9 | 7.8 | 8.2 | 8.8 | 6.4 | 7.6 | 8.4 | 9.3 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.5 | -8.5 | -5.5 | -4.0 | -19.5 | -10.5 | -7.0 | -5.0 | -14.0 | -7.5 | -5.0 | -3.5 | -18.5 | -10.0 | -7.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 27.5 | 14.5 | 10.5 | 7.0 | 26.5 | 14.0 | 10.0 | 6.0 | 23.0 | 12.5 | 9.0 | 6.5 | 22.0 | 12.0 | 9.0 | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -15.5 | -8.5 | -6.0 | -4.0 | -9.5 | -5.5 | -3.5 | -2.5 | -14.0 | -8.0 | -5.0 | -3.5 |
| DIRECTION OF WIND | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 20.0 | 11.5 | 8.0 | 5.5 | 20.5 | 12.0 | 8.0 | 5.5 | 16.0 | 9.5 | 6.5 | 4.5 | 14.5 | 8.5 | 6.0 | 5.0 |
| LOW TIDE FLOODING FTOL | -17.5 | -8.0 | -4.5 | -3.0 | -20.5 | -9.5 | -6.0 | -5.5 | -21.0 | -9.5 | -5.0 | -4.0 | -26.0 | -12.0 | -7.0 | -5.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 7.3 | 8.5 | 9.4 | 10.3 | 9.7 | 10.5 | 10.9 | 11.3 | 9.0 | 10.1 | 10.8 | 11.5 | 8.6 | 9.9 | 10.9 | 11.9 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -18.5 | -10.0 | -6.5 | -4.5 | -23.0 | -12.0 | -8.0 | -5.5 | -17.5 | -9.5 | -6.0 | -4.5 | -21.5 | -11.5 | -8.0 | -5.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 30.5 | 16.5 | 11.5 | 8.5 | 30.5 | 16.5 | 12.0 | 8.5 | 26.5 | 14.5 | 10.5 | 8.0 | 26.0 | 14.5 | 10.5 | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -14.5 | -8.0 | -5.0 | -3.5 | -18.5 | -10.0 | -6.5 | -4.5 | -12.5 | -7.0 | -4.5 | -3.5 | -17.0 | -9.0 | -6.0 | -4.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 23.5 | 13.5 | 9.5 | 6.5 | 24.0 | 14.0 | 9.5 | 7.0 | 19.5 | 11.0 | 8.0 | 6.0 | 18.5 | 11.0 | 8.0 | 6.0 |
| LOW TIDE FLOODING FTOL | -21.0 | -8.5 | -5.0 | -3.0 | -21.0 | -9.0 | -6.0 | -6.5 | -24.0 | -10.0 | -6.0 | -4.5 | -31.0 | -13.0 | -8.0 | -6.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 9.4 | 10.2 | 10.8 | 11.9 | 11.7 | 12.4 | 12.9 | 14.0 | 11.2 | 12.2 | 13.0 | 14.3 | 10.6 | 12.1 | 13.3 | 15.1 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | NC | -9.0 | -6.0 | -4.5 | NC | NC | NC | -4.5 | -17.0 | NC | NC | -4.5 | -21.0 | NC | NC | -5.5 |
| DIRECTION OF WIND | NC | N | N | N | NC | NC | NC | NE | NC | NC | NC | NE | E | NC | NC | E |
| DURATION IN HOURS | 10.5 | 15.0 | 11.0 | 7.5 | NC | NC | NC | 7.5 | 27.5 | 33.0 | 18.0 | 7.5 | 26.5 | 32.0 | 17.5 | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -14.0 | -7.0 | -5.0 | -3.5 | -17.5 | -9.5 | -6.0 | -3.5 | -12.5 | -6.5 | -4.5 | -3.5 | -17.0 | -8.5 | -6.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | E | E | E | E |
| DURATION IN HOURS | 22.5 | 12.5 | 8.5 | 6.0 | 21.5 | 12.0 | 8.0 | 6.0 | 20.0 | 11.0 | 8.0 | 5.5 | 19.0 | 10.5 | 7.5 | 5.5 |
| LOW TIDE FLOODING FTOL | -12.5 | -7.0 | -3.5 | -2.0 | -15.5 | -9.0 | -5.0 | -4.5 | -24.0 | -13.0 | -6.5 | -3.5 | -27.0 | -15.5 | -8.0 | -6.0 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 6.0 | 6.3 | 6.9 | 7.0 | 10.4 | 11.0 | 12.1 | 12.3 | 11.7 | 12.3 | 13.5 | 13.7 | 10.0 | 11.7 | 13.9 | 15.1 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

FM 3005 BY SEA ISLE (SEA ISLE) — ELEVATION: 8.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.5 | -5.5 | -3.5 | -2.5 | -13.5 | -8.0 | -5.0 | -3.5 | -6.5 | -4.0 | -3.0 | -2.0 | -11.5 | -6.5 | -4.5 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 17.0 | 10.0 | 7.0 | 4.5 | 17.0 | 10.0 | 7.0 | 4.5 | 12.0 | 7.0 | 5.0 | 3.5 | 10.5 | 6.5 | 5.0 | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -6.5 | -4.0 | -2.5 | -1.5 | -10.5 | -6.5 | -4.0 | -2.5 | . | . | . | -0.5 | -7.0 | -4.0 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | E | SE | SE | SE | SE |
| DURATION IN HOURS | 11.5 | 7.0 | 5.0 | 3.0 | 5.5 | 4.0 | 3.0 | 3.0 | . | . | . | 1.5 | 1.0 | 1.0 | 1.5 | 2.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -16.0 | -8.5 | -6.0 | -4.0 | -10.0 | -5.5 | -4.0 | -2.5 | -14.5 | -8.0 | -5.5 | -3.5 |
| DIRECTION OF WIND | N | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 20.5 | 11.5 | 8.5 | 4.5 | 20.0 | 12.0 | 9.0 | 5.5 | 17.0 | 10.0 | 7.5 | 5.0 | 15.0 | 9.0 | 7.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -9.0 | -5.0 | -3.5 | -2.0 | -12.5 | -7.0 | -5.0 | -3.0 | -5.0 | -3.0 | -2.0 | -2.0 | -10.0 | -5.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | N | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 15.0 | 9.0 | 6.0 | 4.0 | 14.5 | 8.5 | 6.0 | 4.0 | 9.0 | 5.5 | 4.0 | 3.0 | 7.5 | 5.0 | 4.0 | 3.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | NC | NC | . | . | . | NC | NC | . | . | NC | NC |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | 8.1 | 8.4 | 8.9 | . | . | 8.2 | 8.8 | . | . | 8.4 | 9.3 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.5 | -8.5 | -5.5 | -4.0 | -19.5 | -10.5 | -7.0 | -5.0 | -14.0 | -7.5 | -5.0 | -3.5 | -18.5 | -10.0 | -7.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 27.5 | 14.5 | 10.5 | 7.0 | 26.5 | 14.0 | 10.0 | 6.0 | 23.0 | 12.5 | 9.0 | 6.5 | 22.0 | 12.0 | 9.0 | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -15.5 | -8.5 | -6.0 | -4.0 | -9.5 | -5.5 | -3.5 | -2.5 | -14.0 | -8.0 | -5.0 | -3.5 |
| DIRECTION OF WIND | N | N | N | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 20.0 | 11.5 | 8.0 | 5.5 | 20.5 | 12.0 | 8.0 | 5.5 | 16.0 | 9.5 | 6.5 | 4.5 | 14.5 | 8.5 | 6.0 | 5.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | -1.5 | . | . | . | 0.0 | . | . | . | -1.5 |
| M.S.L. FLOODING FTOL | . | . | . | -0.5 | -4.5 | NC | NC | -2.5 | . | . | . | -1.0 | . | . | . | -2.0 |
| HIGH TIDE FLOODING FTOL | . | NC | NC | NC | NC | NC | NC | -3.5 | NC | NC | NC | -2.0 | NC | NC | NC | -2.5 |
| MAXIMUM HIGH TIDE SURGE | . | 8.5 | 9.4 | 10.3 | 9.7 | 10.5 | 10.9 | 11.3 | 9.1 | 10.1 | 10.8 | 11.5 | 8.6 | 9.9 | 10.9 | 11.9 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -18.5 | -10.0 | -6.5 | -4.5 | -23.0 | -12.0 | -8.0 | -5.5 | -17.5 | -9.5 | -6.0 | -4.5 | -21.5 | -11.5 | -8.0 | -5.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 30.5 | 16.5 | 11.5 | 8.5 | 30.5 | 16.5 | 12.0 | 8.5 | 26.5 | 14.5 | 10.5 | 8.0 | 26.0 | 14.5 | 10.5 | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -14.5 | -8.0 | -5.0 | -3.5 | -18.5 | -10.0 | -6.5 | -4.5 | -12.5 | -7.0 | -4.5 | -3.5 | -17.0 | -9.0 | -6.0 | -4.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 23.5 | 13.5 | 9.5 | 6.5 | 24.0 | 14.0 | 9.5 | 7.0 | 19.5 | 11.0 | 8.0 | 6.0 | 18.5 | 11.0 | 8.0 | 6.0 |
| LOW TIDE FLOODING FTOL | . | . | . | -1.0 | -9.0 | NC | NC | -2.5 | -1.5 | NC | NC | -1.0 | . | . | . | -2.0 |
| M.S.L. FLOODING FTOL | . | -3.0 | -2.0 | -1.0 | -11.5 | NC | NC | -3.0 | -7.0 | NC | NC | -1.5 | -9.0 | NC | NC | -2.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | -1.0 | -14.0 | NC | NC | -3.5 | -12.5 | NC | NC | -2.0 | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 9.4 | 10.2 | 10.8 | 11.9 | 11.7 | 12.4 | 12.9 | 14.0 | 11.2 | 12.2 | 13.0 | 14.3 | 10.6 | 12.1 | 13.3 | 15.1 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | NC | -9.0 | -6.0 | -4.5 | NC | NC | NC | -4.5 | -17.0 | NC | NC | -4.5 | -21.0 | NC | NC | -5.5 |
| DIRECTION OF WIND | NC | N | N | N | NC | NC | NC | NE | NC | NC | NC | NE | E | NC | NC | E |
| DURATION IN HOURS | 10.5 | 15.0 | 11.0 | 7.5 | NC | NC | NC | 7.5 | 27.5 | 33.0 | 18.0 | 7.5 | 26.5 | 32.0 | 17.5 | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -14.0 | -7.0 | -5.0 | -3.5 | -17.5 | -9.5 | -6.0 | -3.5 | -12.5 | -6.5 | -4.5 | -3.5 | -17.0 | -8.5 | -6.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | E | E | E | E |
| DURATION IN HOURS | 22.5 | 12.5 | 8.5 | 6.0 | 21.5 | 12.0 | 8.0 | 6.0 | 20.0 | 11.0 | 8.0 | 5.5 | 19.0 | 10.5 | 7.5 | 5.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | -1.0 | -3.0 | NC | NC | -0.5 | . | . | . | -2.0 |
| M.S.L. FLOODING FTOL | . | . | . | . | -9.0 | NC | NC | -1.5 | -5.0 | NC | NC | -1.0 | -9.0 | NC | NC | -2.5 |
| HIGH TIDE FLOODING FTOL | . | . | . | . | NC | NC | NC | -2.0 | -7.0 | NC | NC | -2.0 | NC | NC | NC | -3.0 |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | 10.4 | 11.0 | 12.1 | 12.3 | 11.7 | 12.3 | 13.5 | 13.7 | 10.0 | 11.7 | 13.9 | 15.1 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

# BEACH OFF PIRATES BEACH 13a

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

BEACH OFF PIRATES BEACH (PIRATES BE) — ELEVATION: 0.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.5 | -5.5 | -3.5 | -2.5 | -12.5 | -7.0 | -5.0 | -3.0 | -4.5 | -3.0 | -2.0 | -1.5 | -9.5 | -5.5 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 17.0 | 10.0 | 7.0 | 4.5 | 16.0 | 9.5 | 6.5 | 4.5 | 9.0 | 5.5 | 4.0 | 3.5 | 8.5 | 5.5 | 4.0 | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -6.5 | -4.0 | -2.5 | -1.5 | -9.5 | -6.0 | -4.0 | -2.5 | • | • | • | • | • | • | • | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | • | • | • | • | • | • | • | SE |
| DURATION IN HOURS | 11.5 | 7.0 | 5.0 | 3.5 | 6.0 | 4.0 | 3.0 | 3.0 | • | • | • | • | • | • | • | 1.5 |
| LOW TIDE FLOODING FTOL | -13.0 | -6.0 | -3.5 | -2.5 | -19.0 | -8.5 | -5.0 | -4.0 | -13.5 | -6.0 | -3.5 | -2.5 | -16.0 | -7.5 | -4.5 | -3.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 5.8 | 6.5 | 7.1 | 7.7 | 6.4 | 6.9 | 7.4 | 7.9 | 5.5 | 6.0 | 6.5 | 7.0 | 5.1 | 5.9 | 5.6 | 7.4 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -15.0 | -8.0 | -5.5 | -3.5 | -8.5 | -5.0 | -3.5 | -2.5 | -12.5 | -7.0 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NE | NE | NE | E | E | E | E | E |
| DURATION IN HOURS | 20.5 | 12.0 | 8.5 | 5.5 | 20.0 | 12.0 | 8.0 | 5.5 | 15.0 | 9.0 | 6.0 | 4.5 | 13.5 | 8.0 | 6.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -9.0 | -5.0 | -3.5 | -2.0 | -11.5 | -6.5 | -4.5 | -3.0 | • | • | • | -1.0 | -8.0 | -4.5 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | • | • | • | E | E | E | E | SE |
| DURATION IN HOURS | 15.0 | 9.0 | 6.0 | 4.0 | 14.0 | 8.5 | 6.0 | 4.0 | • | • | • | 2.5 | 5.0 | 3.5 | 3.0 | 3.0 |
| LOW TIDE FLOODING FTOL | -15.5 | -7.0 | -4.0 | -2.5 | -19.5 | -9.0 | -5.0 | -4.5 | -17.5 | -8.0 | -4.5 | -3.0 | -20.0 | -9.0 | -5.0 | -4.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 7.0 | 7.9 | 8.5 | 9.3 | 7.7 | 8.5 | 9.0 | 9.7 | 6.5 | 7.2 | 7.7 | 8.4 | 6.1 | 7.1 | 8.0 | 8.9 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.5 | -8.5 | -5.5 | -4.0 | -19.0 | -10.0 | -7.0 | -4.5 | -13.5 | -7.0 | -5.0 | -3.5 | -17.0 | -9.0 | -6.0 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 28.5 | 15.0 | 10.5 | 7.0 | 26.5 | 14.0 | 10.5 | 8.5 | 21.5 | 11.5 | 8.0 | 6.5 | 20.5 | 11.0 | 8.0 | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -15.0 | -8.0 | -5.5 | -3.5 | -8.5 | -4.5 | -3.0 | -2.5 | -12.5 | -7.0 | -4.5 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NE | NE | NE | E | E | E | E | E |
| DURATION IN HOURS | 20.0 | 11.5 | 8.0 | 5.5 | 20.0 | 12.0 | 8.0 | 5.5 | 14.0 | 8.0 | 6.0 | 4.0 | 12.5 | 7.5 | 5.5 | 4.5 |
| LOW TIDE FLOODING FTOL | -18.0 | -8.0 | -4.5 | -3.0 | -20.5 | -9.5 | -6.0 | -5.5 | -20.5 | -9.0 | -5.0 | -4.0 | -25.5 | -11.5 | -7.0 | -5.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 9.1 | 10.4 | 10.2 | 11.9 | 10.3 | 11.1 | 10.2 | 11.4 | 8.5 | 9.7 | 9.3 | 10.9 | 8.1 | 9.6 | 9.7 | 11.7 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -18.5 | -10.0 | -6.5 | -4.5 | -22.0 | -12.0 | -8.0 | -5.5 | -17.0 | -9.0 | -6.0 | -4.5 | -20.5 | -11.0 | -7.0 | -5.0 |
| DIRECTION OF WIND | N | N | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 29.5 | 16.5 | 11.5 | 8.5 | 30.5 | 17.0 | 12.0 | 8.5 | 25.0 | 14.0 | 10.0 | 7.5 | 25.0 | 14.0 | 10.0 | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -14.5 | -8.0 | -5.0 | -3.5 | -17.5 | -9.5 | -6.0 | -4.5 | -12.0 | -6.5 | -4.5 | -3.0 | -15.5 | -8.5 | -5.5 | -3.5 |
| DIRECTION OF WIND | N | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 23.0 | 13.5 | 9.5 | 6.5 | 23.5 | 13.5 | 9.5 | 6.5 | 18.0 | 10.5 | 7.5 | 5.5 | 17.0 | 10.0 | 7.0 | 5.5 |
| LOW TIDE FLOODING FTOL | -20.5 | -9.0 | -5.0 | -3.0 | -20.5 | -9.5 | NC | -6.0 | -24.5 | -11.0 | -6.0 | -4.5 | -30.5 | -14.0 | -8.0 | -6.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 11.8 | 12.4 | 12.9 | 14.0 | 12.6 | 13.3 | 13.8 | 15.0 | 10.4 | 11.2 | 11.8 | 13.0 | 10.1 | 11.3 | 12.4 | 14.1 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | NC | -9.5 | -6.0 | -4.5 | NC | NC | NC | -4.5 | -16.5 | NC | NC | -4.0 | -19.5 | NC | NC | -5.0 |
| DIRECTION OF WIND | NC | N | N | N | NC | NC | NC | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.5 | 11.0 | 7.5 | NC | NC | NC | 7.5 | 25.5 | NC | NC | 7.0 | 25.5 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -14.5 | -7.5 | -5.0 | -3.5 | -17.0 | -8.5 | -5.5 | -3.5 | -12.0 | -6.0 | -4.0 | -3.0 | -15.5 | -8.0 | -5.5 | -4.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 23.0 | 12.5 | 9.0 | 6.0 | 23.0 | 12.5 | 9.0 | 6.0 | 18.5 | 10.0 | 7.5 | 5.0 | 19.0 | 10.5 | 7.5 | 5.5 |
| LOW TIDE FLOODING FTOL | -13.0 | -7.5 | -4.0 | -2.5 | -15.5 | -9.5 | -5.5 | -4.5 | -21.5 | -13.0 | -6.5 | -3.5 | -27.0 | -16.0 | -9.0 | -6.0 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 9.5 | 8.2 | 9.6 | 11.8 | 11.9 | 10.8 | 11.9 | 14.0 | 10.8 | 9.7 | 10.7 | 12.5 | 9.1 | 9.0 | 10.7 | 13.3 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

FM 3005 BY PIRATES BEACH (PIRATES BE) — ELEVATION: 10.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.5 | -5.5 | -3.5 | -2.5 | -12.5 | -7.0 | -5.0 | -3.0 | -4.5 | -3.0 | -2.0 | -1.5 | -9.5 | -5.5 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 17.0 | 10.0 | 7.0 | 4.5 | 16.0 | 9.5 | 6.5 | 4.5 | 9.0 | 5.5 | 4.0 | 3.5 | 8.5 | 5.5 | 4.0 | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -6.5 | -4.0 | -2.5 | -1.5 | -9.5 | -6.0 | -4.0 | -2.5 | . | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 11.5 | 7.0 | 5.0 | 3.5 | 6.0 | 4.0 | 3.0 | 3.0 | . | . | . | . | . | . | . | 1.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -15.0 | -8.0 | -5.5 | -3.5 | -8.5 | -5.0 | -3.5 | -2.5 | -12.5 | -7.0 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NE | NE | NE | E | E | E | E | E |
| DURATION IN HOURS | 20.5 | 12.0 | 8.5 | 5.5 | 20.0 | 12.0 | 8.0 | 5.5 | 15.0 | 9.0 | 6.0 | 4.5 | 13.5 | 8.0 | 6.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -9.0 | -5.0 | -3.5 | -2.0 | -11.5 | -6.5 | -4.5 | -3.0 | . | . | . | -1.0 | -8.0 | -4.5 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | E | E | E | E | SE |
| DURATION IN HOURS | 15.0 | 9.0 | 6.0 | 4.0 | 14.0 | 8.5 | 6.0 | 4.0 | . | . | . | 2.5 | 5.0 | 3.5 | 3.0 | 3.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.5 | -8.5 | -5.5 | -4.0 | -19.0 | -10.0 | -7.0 | -4.5 | -13.5 | -7.0 | -5.0 | -3.5 | -17.0 | -9.0 | -6.0 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 28.5 | 15.0 | 10.5 | 7.0 | 26.5 | 14.0 | 10.5 | 8.5 | 21.5 | 11.5 | 8.0 | 6.5 | 20.5 | 11.0 | 8.0 | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -15.0 | -8.0 | -5.5 | -3.5 | -8.5 | -4.5 | -3.0 | -2.5 | -12.5 | -7.0 | -4.5 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NE | NE | NE | E | E | E | E | F |
| DURATION IN HOURS | 20.0 | 11.5 | 8.0 | 5.5 | 20.0 | 12.0 | 8.0 | 5.5 | 14.0 | 8.0 | 6.0 | 4.0 | 12.5 | 7.5 | 5.5 | 4.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | NC | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | -0.5 | . | . | . | -1.5 | . | . | . | . | . | . | . | -1.0 |
| HIGH TIDE FLOODING FTOL | . | NC | NC | NC | NC | NC | NC | NC | . | . | . | NC | . | . | . | NC |
| MAXIMUM HIGH TIDE SURGE | . | 10.4 | 10.2 | 11.9 | 10.3 | 11.0 | 10.2 | 11.4 | . | . | . | 10.9 | . | . | . | 11.7 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -18.5 | -10.0 | -6.5 | -4.5 | -22.0 | -12.0 | -8.0 | -5.5 | -17.0 | -9.0 | -6.0 | -4.5 | -20.5 | -11.0 | -7.0 | -5.0 |
| DIRECTION OF WIND | N | N | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 29.5 | 16.5 | 11.5 | 8.5 | 30.5 | 17.0 | 12.0 | 8.5 | 25.0 | 14.0 | 10.0 | 7.5 | 25.0 | 14.0 | 10.0 | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -14.5 | -8.0 | -5.0 | -3.5 | -17.5 | -9.5 | -6.0 | -4.5 | -12.0 | -6.5 | -4.5 | -3.0 | -15.5 | -8.5 | -5.5 | -3.5 |
| DIRECTION OF WIND | N | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 23.0 | 13.5 | 9.5 | 6.5 | 23.5 | 13.5 | 9.5 | 6.5 | 18.0 | 10.5 | 7.5 | 5.5 | 17.0 | 10.0 | 7.0 | 5.5 |
| LOW TIDE FLOODING FTOL | . | . | . | -0.5 | . | . | . | -2.0 | . | . | . | 0.0 | . | . | . | -1.0 |
| M.S.L. FLOODING FTOL | -6.0 | -2.0 | -1.5 | -1.0 | -8.5 | -3.0 | -3.0 | -2.5 | . | . | . | -0.5 | . | . | . | -1.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | -1.5 | NC | NC | NC | NC | NC | NC | NC | -1.0 | NC | NC | NC | -2.0 |
| MAXIMUM HIGH TIDE SURGE | 11.8 | 12.4 | 12.9 | 14.0 | 12.6 | 13.3 | 13.8 | 15.0 | 10.4 | 11.2 | 11.8 | 13.0 | 10.1 | 11.3 | 12.5 | 14.1 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | NC | -9.5 | -6.0 | -4.5 | NC | NC | NC | -4.5 | -16.5 | NC | NC | -4.0 | -19.5 | NC | NC | -5.0 |
| DIRECTION OF WIND | NC | N | N | N | NC | NC | NC | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.5 | 11.0 | 7.5 | NC | NC | NC | 7.5 | 25.5 | NC | NC | 7.0 | 25.5 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -14.5 | -7.5 | -5.0 | -3.5 | -17.0 | -8.5 | -5.5 | -3.5 | -12.0 | -6.0 | -4.0 | -3.0 | -15.5 | -8.0 | -5.5 | -4.0 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 23.0 | 12.5 | 9.0 | 6.0 | 23.0 | 12.5 | 9.0 | 6.0 | 18.5 | 10.0 | 7.5 | 5.0 | 19.0 | 10.5 | 7.5 | 5.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | 0.5 | . | . | . | . | . | . | . | -1.0 |
| M.S.L. FLOODING FTOL | . | . | . | 0.0 | -6.5 | NC | NC | -1.0 | . | . | . | 0.0 | . | . | . | -1.5 |
| HIGH TIDE FLOODING FTOL | . | . | . | NC | NC | NC | NC | -3.0 | NC | NC | NC | NC | . | . | NC | -1.5 |
| MAXIMUM HIGH TIDE SURGE | . | . | . | 11.8 | 11.9 | 10.8 | 12.0 | 14.0 | 10.8 | NC | 10.6 | 12.5 | . | . | 10.7 | 13.3 |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

BEACH AT END OF SEAWALL (SEA WA END) — ELEVATION: 0.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -4.0 | -2.5 | -12.0 | -7.0 | -5.0 | -3.0 | -1.0 | -1.0 | -1.0 | -1.5 | -8.0 | -4.5 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | SE | SE | SE | SE |
| DURATION IN HOURS | 17.0 | 10.0 | 7.0 | 4.5 | 8.5 | 5.5 | 5.0 | 4.5 | 2.0 | 2.0 | 2.0 | 2.5 | 6.5 | 4.0 | 3.5 | 3.0 |
| 65.5 MPH WIND GUSTS FTOL | -6.5 | -4.0 | -3.0 | -1.5 | -9.0 | -5.5 | -4.0 | -2.5 | • | • | • | • | • | • | • | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | • | • | • | • | • | • | • | SE |
| DURATION IN HOURS | 11.5 | 7.0 | 5.0 | 3.5 | 8.0 | 5.0 | 4.0 | 3.0 | • | • | • | • | • | • | • | 1.0 |
| LOW TIDE FLOODING FTOL | -13.5 | -6.0 | -3.5 | -2.5 | -18.5 | -6.5 | -5.0 | -4.0 | -13.5 | -6.0 | -4.0 | -2.5 | -15.5 | -7.0 | -4.5 | -3.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 6.4 | 7.0 | 7.6 | 8.2 | 6.4 | 7.0 | 7.6 | 8.2 | 5.2 | 6.0 | 6.8 | 7.6 | 4.9 | 5.6 | 6.2 | 7.0 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -14.5 | -8.0 | -5.5 | -3.5 | -8.0 | -4.5 | -3.0 | -2.5 | -11.5 | -6.5 | -4.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 20.0 | 12.0 | 8.5 | 5.5 | 19.5 | 11.5 | 8.0 | 5.5 | 13.5 | 8.0 | 6.0 | 4.0 | 12.0 | 7.5 | 5.5 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -9.0 | -5.0 | -3.5 | -2.0 | -11.0 | -6.5 | -4.0 | -3.0 | • | • | • | -0.5 | -6.0 | -3.5 | -2.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | • | • | • | E | SE | SE | SE | SE |
| DURATION IN HOURS | 15.0 | 9.0 | 6.0 | 4.0 | 13.0 | 8.0 | 6.0 | 4.0 | • | • | • | 1.5 | 1.5 | 1.5 | 2.0 | 2.5 |
| LOW TIDE FLOODING FTOL | -16.0 | -7.0 | -4.0 | -3.0 | -19.5 | -9.0 | -5.5 | -4.5 | -16.5 | -7.5 | -4.5 | -3.0 | -19.5 | -9.0 | -5.5 | -4.0 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 7.7 | 8.5 | 9.1 | 10.0 | 7.8 | 8.5 | 9.0 | 9.8 | 6.2 | 6.8 | 7.2 | 7.9 | 5.8 | 6.7 | 7.5 | 8.4 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -16.0 | -8.5 | -5.5 | -4.0 | -18.5 | -10.0 | -6.5 | -4.5 | -13.0 | -7.0 | -5.0 | -3.5 | -16.0 | -8.5 | -5.5 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 27.5 | 14.5 | 10.5 | 7.5 | 26.0 | 14.0 | 10.5 | 8.0 | 20.5 | 11.0 | 8.0 | 6.0 | 19.0 | 10.5 | 8.0 | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -14.5 | -8.0 | -5.5 | -3.5 | -7.5 | -4.5 | -3.0 | -2.0 | -11.5 | -6.0 | -4.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 20.0 | 11.5 | 8.0 | 5.5 | 19.5 | 11.5 | 8.0 | 5.5 | 12.5 | 7.5 | 5.5 | 4.0 | 10.5 | 6.5 | 5.0 | 4.5 |
| LOW TIDE FLOODING FTOL | -19.0 | -8.5 | -5.0 | -3.5 | -20.5 | -9.0 | -6.0 | -5.5 | -20.5 | -9.0 | -5.5 | -4.0 | -25.5 | -11.0 | -7.0 | -5.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 9.9 | 11.0 | 11.8 | 12.5 | 10.3 | 11.3 | 12.0 | 12.6 | 8.0 | 8.9 | 9.6 | 10.1 | 7.6 | 9.0 | 10.2 | 11.3 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -19.0 | -10.0 | -7.0 | -4.5 | -21.5 | -11.5 | -8.0 | -5.5 | -16.5 | -9.0 | -6.0 | -4.5 | -19.5 | -10.5 | -7.0 | -5.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 30.0 | 16.5 | 11.5 | 8.5 | 30.0 | 16.5 | 12.0 | 8.5 | 24.5 | 13.5 | 10.0 | 7.5 | 23.5 | 13.0 | 10.0 | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -14.5 | -8.0 | -5.5 | -3.5 | -17.0 | -9.0 | -6.0 | -4.5 | -11.5 | -6.0 | -4.0 | -3.0 | -14.5 | -8.0 | -5.0 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.5 | 13.0 | 9.5 | 6.5 | 23.0 | 13.5 | 9.5 | 6.5 | 17.0 | 10.0 | 7.0 | 5.0 | 15.5 | 9.0 | 7.0 | 5.5 |
| LOW TIDE FLOODING FTOL | -21.0 | -9.0 | -5.5 | -3.5 | -21.0 | -10.0 | -6.0 | -6.0 | -24.5 | -11.0 | -6.5 | -5.0 | -30.5 | -13.5 | -8.0 | -6.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 12.5 | 12.3 | 13.8 | 14.9 | 12.7 | 13.7 | 14.4 | 15.6 | 9.5 | 10.4 | 11.1 | 12.2 | 9.5 | 10.8 | 11.9 | 13.5 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | NC | -9.5 | -6.5 | -4.5 | NC | NC | NC | -4.5 | -16.5 | NC | NC | -4.0 | -19.0 | NC | NC | -5.0 |
| DIRECTION OF WIND | NC | N | N | NE | NC | NC | NC | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.5 | 12.0 | 7.5 | NC | NC | NC | 7.5 | 22.5 | NC | NC | 7.0 | 24.5 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -15.0 | -7.5 | -5.0 | -3.5 | -16.5 | -8.0 | -5.0 | -3.5 | -11.5 | -6.0 | -4.0 | -3.0 | -14.5 | -7.5 | -5.0 | -4.0 |
| DIRECTION OF WIND | N | N | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 23.0 | 12.5 | 9.0 | 6.0 | 23.0 | 12.5 | 9.0 | 6.0 | 19.5 | 10.5 | 7.5 | 5.0 | 17.5 | 9.5 | 7.0 | 5.0 |
| LOW TIDE FLOODING FTOL | -13.0 | -8.5 | -4.5 | -3.0 | -15.5 | -10.0 | -6.0 | -4.5 | -21.5 | -13.5 | -7.0 | -4.0 | -26.5 | -17.0 | -9.0 | -5.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 10.4 | 10.4 | 11.5 | 13.5 | 12.1 | 12.0 | 13.2 | 15.4 | 10.9 | 10.1 | 10.5 | 11.7 | 8.4 | 8.9 | 10.3 | 12.6 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

BEACH AT END OF SEAWALL 14a

# FM 3005 AT END OF SEAWALL 14b

FM 3005 AT END OF SEAWALL (SEA WA END) — ELEVATION: 6.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -4.0 | -2.5 | -12.0 | -7.0 | -5.0 | -3.0 | -1.0 | -1.0 | -1.0 | -1.5 | -8.0 | -4.5 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | SE | SE | SE | SE |
| DURATION IN HOURS | 17.0 | 10.0 | 7.0 | 4.5 | 8.5 | 5.5 | 5.0 | 4.5 | 2.0 | 2.0 | 2.0 | 2.5 | 6.5 | 4.0 | 3.5 | 3.0 |
| 65.5 MPH WIND GUSTS FTOL | -6.5 | -4.0 | -2.0 | -1.5 | -9.0 | -5.5 | -4.0 | -2.5 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 11.5 | 7.0 | 5.0 | 3.5 | 8.0 | 5.0 | 4.0 | 3.0 | . | . | . | . | . | . | . | 1.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | -0.5 | -0.5 | . | . | . | -1.5 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | . | NC | NC | NC | . | . | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 6.4 | 7.0 | 7.6 | 8.2 | 6.4 | 7.0 | 7.6 | 8.2 | . | 6.0 | 6.2 | 7.6 | . | . | 6.9 | 7.0 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -14.5 | -8.0 | -5.5 | -3.5 | -8.0 | -4.5 | -3.0 | -2.5 | -11.5 | -6.5 | -4.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 20.0 | 12.0 | 8.5 | 5.5 | 19.5 | 11.5 | 8.0 | 5.5 | 13.5 | 8.0 | 6.0 | 4.0 | 12.0 | 7.5 | 5.5 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -9.0 | -5.0 | -3.5 | -2.0 | -11.0 | -6.5 | -4.0 | -3.0 | . | . | . | -0.5 | -6.0 | -3.5 | -2.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | E | SE | SE | SE | SE |
| DURATION IN HOURS | 15.0 | 9.0 | 6.0 | 4.0 | 13.0 | 8.0 | 6.0 | 4.0 | . | . | . | 1.5 | 1.5 | 1.5 | 2.0 | 2.5 |
| LOW TIDE FLOODING FTOL | . | . | -0.5 | -0.5 | . | . | . | -1.5 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -1.5 | -2.0 | -1.5 | -1.0 | 8.0 | NC | NC | -2.0 | . | . | . | 0.0 | . | . | . | -1.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | -2.5 | -2.0 | NC | NC | NC | -2.5 | NC | NC | NC | NC | . | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 7.7 | 8.5 | 9.1 | 10.0 | 7.8 | 8.5 | 9.0 | 9.8 | 6.2 | 6.6 | 7.2 | 7.9 | . | 6.7 | 7.5 | 8.4 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -16.0 | -8.5 | -5.5 | -4.0 | -18.5 | -10.0 | -6.5 | -4.5 | -13.0 | -7.0 | -5.0 | -3.5 | -16.0 | -8.5 | -5.5 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 27.5 | 14.5 | 10.5 | 7.5 | 26.0 | 14.0 | 10.5 | 8.0 | 20.5 | 11.0 | 8.0 | 6.0 | 19.0 | 10.5 | 8.0 | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -14.5 | -8.0 | -5.5 | -3.5 | -7.5 | -4.5 | -3.0 | -2.0 | -11.5 | -6.0 | -4.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 20.0 | 11.5 | 8.0 | 5.5 | 19.5 | 11.5 | 8.0 | 5.5 | 12.5 | 7.5 | 5.5 | 4.0 | 10.5 | 6.5 | 5.0 | 4.5 |
| LOW TIDE FLOODING FTOL | -4.0 | -3.0 | -2.0 | -1.5 | -8.0 | -6.0 | -4.0 | -2.5 | . | . | . | -0.5 | . | . | . | -1.5 |
| M.S.L. FLOODING FTOL | -8.0 | -4.0 | -2.5 | -1.5 | -11.5 | -6.0 | -4.0 | -3.0 | -5.5 | -3.0 | -2.0 | -1.5 | -7.0 | -4.0 | -2.5 | -2.0 |
| HIGH TIDE FLOODING FTOL | -12.0 | -5.5 | -3.0 | -2.0 | -15.0 | -7.0 | -4.0 | -3.5 | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 9.9 | 11.0 | 11.8 | 12.5 | 10.3 | 11.3 | 12.0 | 12.6 | 8.0 | 8.5 | 9.6 | 10.1 | 7.6 | 9.0 | 10.2 | 11.3 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -19.0 | -10.0 | -7.0 | -4.5 | -21.5 | -11.5 | -8.0 | -5.5 | -16.5 | -5.0 | -6.0 | -4.5 | -19.5 | -10.5 | -7.0 | -5.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 30.0 | 16.5 | 11.5 | 8.5 | 30.0 | 16.5 | 12.0 | 8.5 | 24.5 | 13.5 | 10.0 | 7.5 | 23.5 | 13.0 | 10.0 | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -14.5 | -8.0 | -5.5 | -3.5 | -17.0 | -9.0 | -6.0 | -4.5 | -11.5 | -6.0 | -4.0 | -3.0 | -14.5 | -8.0 | -5.0 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.5 | 13.0 | 9.5 | 6.5 | 23.0 | 13.5 | 9.5 | 6.5 | 17.0 | 10.0 | 7.0 | 5.0 | 15.5 | 9.0 | 7.0 | 5.5 |
| LOW TIDE FLOODING FTOL | -8.5 | -4.0 | -2.5 | -1.5 | -11.5 | -6.0 | -4.0 | -3.0 | -5.5 | -3.0 | -2.0 | -1.5 | -8.0 | -4.0 | -2.5 | -2.0 |
| M.S.L. FLOODING FTOL | -11.5 | -5.0 | -3.0 | -2.0 | -15.0 | -7.0 | -4.0 | -3.5 | -24.5 | -10.5 | -5.5 | -2.0 | -12.5 | -6.0 | -3.5 | -3.0 |
| HIGH TIDE FLOODING FTOL | -14.5 | -6.0 | -3.5 | -2.5 | -19.0 | -8.0 | -5.0 | -4.0 | -43.5 | -18.0 | -9.0 | -2.5 | -17.0 | -7.5 | -4.5 | -3.5 |
| MAXIMUM HIGH TIDE SURGE | 12.5 | 13.3 | 13.8 | 14.9 | 12.7 | 13.8 | 14.4 | 15.6 | 9.5 | 10.4 | 11.1 | 12.2 | 9.5 | 10.9 | 11.9 | 13.5 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | NC | -9.5 | -6.5 | -4.5 | NC | NC | NC | -4.5 | -16.5 | NC | NC | -4.0 | -19.0 | NC | NC | -5.0 |
| DIRECTION OF WIND | NC | N | N | NE | NC | NC | NC | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.5 | 12.0 | 7.5 | NC | NC | NC | 7.5 | 22.5 | NC | NC | 7.0 | 24.5 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -15.0 | -7.5 | -5.0 | -3.5 | -16.5 | -8.0 | -5.0 | -3.5 | -11.5 | -6.0 | -4.0 | -3.0 | -14.5 | -7.5 | -5.0 | -4.0 |
| DIRECTION OF WIND | N | N | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 23.0 | 12.5 | 9.0 | 6.0 | 23.0 | 12.5 | 9.0 | 6.0 | 19.5 | 10.5 | 7.5 | 5.0 | 17.5 | 9.5 | 7.0 | 5.0 |
| LOW TIDE FLOODING FTOL | -4.5 | -2.5 | -2.0 | -1.0 | -9.5 | -5.0 | -3.5 | -1.5 | -6.0 | -3.0 | -2.0 | -1.0 | . | . | . | -1.5 |
| M.S.L. FLOODING FTOL | -6.0 | -4.0 | -2.5 | -1.5 | -13.0 | -8.0 | -4.5 | -2.0 | -10.0 | -6.0 | -3.5 | -1.5 | -11.0 | -7.0 | -4.0 | -2.5 |
| HIGH TIDE FLOODING FTOL | -8.0 | -5.5 | -3.0 | -1.5 | -16.5 | -11.5 | -5.5 | -2.5 | -13.5 | -10.0 | -5.0 | -2.5 | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 10.4 | 10.4 | 11.5 | 13.5 | 12.1 | 12.0 | 13.2 | 15.4 | 10.9 | 10.1 | 10.5 | 11.7 | 8.4 | 8.9 | 10.3 | 12.6 |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour; FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

BEACH AT PLEASURE PIER (PLSURE PR) — ELEVATION: 0.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.5 | -5.5 | -4.0 | -2.5 | -11.0 | -6.5 | -4.5 | -3.0 | . | . | . | -0.5 | -6.0 | -3.5 | -2.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | E | SE | SE | SE | SE |
| DURATION IN HOURS | 16.5 | 10.0 | 7.0 | 4.5 | 15.5 | 9.0 | 6.5 | 4.5 | . | . | . | 1.5 | 3.0 | 2.0 | 2.0 | 3.0 |
| 65.5 MPH WIND GUSTS FTOL | -6.5 | -4.0 | -2.5 | -1.5 | -8.0 | -5.0 | -3.0 | -2.0 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | 11.0 | 6.5 | 4.5 | 3.5 | 9.0 | 5.5 | 4.0 | 3.0 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | -14.0 | -6.5 | -4.0 | -2.5 | -18.5 | -8.5 | -5.0 | -3.5 | -13.0 | -6.0 | -3.5 | -2.5 | -14.0 | -6.5 | -4.0 | -3.0 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 6.8 | 7.4 | 8.0 | 8.3 | 6.5 | 7.2 | 7.9 | 8.4 | 4.9 | 5.4 | 5.9 | 6.2 | 4.7 | 5.4 | 6.1 | 6.6 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -16.5 | -9.0 | -6.0 | -3.5 | -6.0 | -3.5 | -2.5 | -2.0 | -10.0 | -5.5 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 20.0 | 12.0 | 8.0 | 5.5 | 21.5 | 13.0 | 9.0 | 5.5 | 10.5 | 6.5 | 4.5 | 3.5 | 9.5 | 6.0 | 5.0 | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -8.5 | -5.0 | -3.5 | -2.0 | -10.0 | -6.0 | -4.0 | -2.5 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 14.5 | 8.5 | 6.0 | 4.0 | 12.5 | 7.5 | 5.5 | 4.0 | . | . | . | . | . | . | . | 2.0 |
| LOW TIDE FLOODING FTOL | -16.0 | -7.5 | -4.5 | -3.0 | -19.5 | -9.0 | -5.5 | -4.5 | -16.0 | -7.5 | -4.5 | -3.0 | -18.5 | -9.0 | -5.0 | -4.0 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 8.5 | 8.9 | 9.5 | 10.3 | 7.9 | 8.1 | 8.5 | 9.1 | 5.8 | 6.2 | 6.8 | 7.4 | 5.5 | 6.2 | 7.0 | 7.9 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.5 | -8.5 | -5.5 | -4.0 | -17.5 | -9.5 | -6.5 | -4.5 | -12.0 | -6.5 | -4.5 | -3.5 | -15.0 | -8.0 | -5.5 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 27.0 | 14.5 | 10.0 | 7.0 | 25.5 | 14.0 | 10.0 | 7.0 | 19.0 | 10.5 | 7.5 | 6.0 | 17.5 | 10.0 | 7.0 | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -13.5 | -7.5 | -5.0 | -3.5 | -5.5 | -3.0 | -2.0 | -2.0 | -9.5 | -5.5 | -3.5 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 19.5 | 11.5 | 8.0 | 5.5 | 19.0 | 11.0 | 7.5 | 5.5 | 9.5 | 5.5 | 4.0 | 3.0 | 8.0 | 5.0 | 4.0 | 4.0 |
| LOW TIDE FLOODING FTOL | -19.5 | -9.0 | -5.0 | -3.5 | -20.5 | -9.5 | -6.0 | -5.5 | -20.5 | -9.0 | -5.5 | -4.0 | -24.5 | -11.0 | -7.0 | -5.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 10.8 | 11.5 | 12.3 | 13.2 | 10.4 | 11.1 | 11.9 | 12.8 | 7.5 | 8.0 | 8.6 | 9.3 | 7.1 | 8.0 | 9.0 | 10.1 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -19.0 | -10.0 | -7.0 | -4.5 | -20.5 | -11.0 | -7.5 | -5.0 | -16.0 | -8.5 | -6.0 | -4.0 | -18.5 | -10.0 | -7.0 | -4.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 30.0 | 16.0 | 11.5 | 8.5 | 29.5 | 16.0 | 11.5 | 8.5 | 23.0 | 12.5 | 9.0 | 7.0 | 22.0 | 12.0 | 9.0 | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -14.5 | -8.0 | -5.5 | -3.5 | -16.0 | -9.0 | -6.0 | -4.0 | -10.0 | -5.5 | -4.0 | -3.0 | -13.0 | -7.0 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 22.5 | 13.0 | 9.5 | 6.5 | 23.0 | 13.0 | 9.5 | 6.5 | 15.0 | 9.0 | 6.5 | 5.0 | 13.5 | 8.0 | 6.0 | 5.0 |
| LOW TIDE FLOODING FTOL | -22.0 | -10.0 | -6.0 | -4.0 | -21.0 | -10.0 | -6.5 | -6.5 | -24.5 | -11.0 | -7.0 | -5.0 | -29.5 | -13.5 | -8.0 | -6.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 13.4 | 13.9 | 14.6 | 15.5 | 12.9 | 13.5 | 14.4 | 15.4 | 9.1 | 9.6 | 10.2 | 11.1 | 8.8 | 9.7 | 10.8 | 12.0 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | NC | -5.5 | -6.5 | -4.5 | NC | NC | NC | -4.0 | -15.5 | NC | NC | -4.0 | -18.0 | NC | NC | -4.5 |
| DIRECTION OF WIND | NC | NE | NE | NE | NC | NC | NC | NE | NE | NC | NC | NE | E | NC | NC | E |
| DURATION IN HOURS | NC | 15.5 | 11.0 | 7.5 | NC | NC | NC | 7.5 | 23.0 | NC | NC | 6.5 | 23.5 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -14.5 | -7.5 | -5.0 | -3.5 | -15.5 | -8.0 | -5.0 | -3.0 | -10.5 | -5.5 | -4.0 | -3.0 | -13.5 | -7.0 | -5.0 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 23.5 | 12.5 | 9.0 | 6.0 | 23.0 | 12.5 | 8.5 | 6.0 | 15.5 | 8.5 | 6.0 | 4.5 | 15.5 | 8.5 | 6.0 | 4.5 |
| LOW TIDE FLOODING FTOL | -13.5 | -9.0 | -5.0 | -3.0 | -15.5 | -10.5 | -6.0 | -4.5 | -21.5 | -14.0 | -7.0 | -4.0 | -27.0 | -17.5 | -9.5 | -5.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 13.3 | 12.8 | 13.9 | 15.8 | 13.3 | 13.0 | 14.2 | 16.3 | 9.3 | 8.8 | 9.3 | 10.4 | 7.6 | 8.1 | 9.4 | 11.4 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

BEACH AT PLEASURE PIER 15a

# SEAWALL AT PLEASURE PIER 15b

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

SEAWALL AT PLEASURE PIER (PLSURE PR) — ELEVATION: 14.5 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.5 | -5.5 | -4.0 | -2.5 | -11.0 | -6.5 | -4.5 | -3.0 | . | . | . | -0.5 | -6.0 | -3.5 | -2.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | E | SE | SE | SE | SE |
| DURATION IN HOURS | 16.5 | 10.0 | 7.0 | 4.5 | 15.5 | 9.0 | 6.5 | 4.5 | . | . | . | 1.5 | 3.0 | 2.0 | 2.0 | 3.0 |
| 65.5 MPH WIND GUSTS FTOL | -6.5 | -4.0 | -2.5 | -1.5 | -8.0 | -5.0 | -3.0 | -2.0 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | 11.0 | 6.5 | 4.5 | 3.5 | 9.0 | 5.5 | 4.0 | 3.0 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -16.5 | -9.0 | -6.0 | -3.5 | -6.0 | -3.5 | -2.5 | -2.0 | -10.0 | -5.5 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 20.0 | 12.0 | 8.0 | 5.5 | 21.5 | 12.0 | 9.0 | 5.5 | 10.5 | 6.5 | 4.5 | 3.5 | 9.5 | 6.0 | 5.0 | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -8.5 | -5.0 | -3.5 | -2.0 | -10.0 | -6.0 | -4.0 | -2.5 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 14.5 | 8.5 | 6.0 | 4.0 | 12.5 | 7.5 | 5.5 | 4.0 | . | . | . | . | . | . | . | 2.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.5 | -8.5 | -5.5 | -4.0 | -17.5 | -9.5 | -6.5 | -4.5 | -12.0 | -6.5 | -4.5 | -3.5 | -15.0 | -8.0 | -5.5 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 27.0 | 14.5 | 10.0 | 7.0 | 25.5 | 14.0 | 10.0 | 7.0 | 19.0 | 10.5 | 7.5 | 6.0 | 17.5 | 10.0 | 7.0 | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -13.5 | -7.5 | -5.0 | -3.5 | -5.5 | -3.0 | -2.0 | -2.0 | -9.5 | -5.5 | -3.5 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | NE | E | E | E | E | E | E |
| DURATION IN HOURS | 19.5 | 11.5 | 8.0 | 5.5 | 19.0 | 11.0 | 7.5 | 5.5 | 9.5 | 5.5 | 4.0 | 3.0 | 8.0 | 5.0 | 4.0 | 4.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -19.0 | -10.0 | -7.0 | -4.5 | -20.5 | -11.0 | -7.5 | -5.0 | -16.0 | -8.5 | -6.0 | -4.0 | -18.5 | -10.0 | -7.0 | -4.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 30.0 | 16.0 | 11.5 | 8.5 | 29.5 | 16.0 | 11.5 | 8.5 | 23.0 | 12.5 | 9.0 | 7.0 | 22.0 | 12.0 | 9.0 | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -14.5 | -8.0 | -5.5 | -3.5 | -16.0 | -9.0 | -6.0 | -4.0 | -10.0 | -5.5 | -4.0 | -3.0 | -13.0 | -7.0 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 22.5 | 13.0 | 9.5 | 6.5 | 23.0 | 13.0 | 9.5 | 6.5 | 15.0 | 9.0 | 6.5 | 5.0 | 13.5 | 8.0 | 6.0 | 5.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | NC | NC | . | . | . | NC | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | 14.6 | 15.5 | . | . | . | 15.4 | . | . | . | . | . | . | . | . |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | NC | -9.5 | -6.5 | -4.5 | NC | NC | NC | -4.0 | -15.5 | NC | NC | -4.0 | -18.0 | NC | NC | -4.5 |
| DIRECTION OF WIND | NC | NE | NE | NE | NC | NC | NC | NE | NE | NC | NC | NE | E | NC | NC | E |
| DURATION IN HOURS | NC | 15.5 | 11.0 | 7.5 | NC | NC | NC | 7.5 | 23.0 | NC | NC | 6.5 | 23.5 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -14.5 | -7.5 | -5.0 | -3.5 | -15.5 | -8.0 | -5.0 | -3.0 | -10.5 | -5.5 | -4.0 | -3.0 | -13.5 | -7.0 | -5.0 | 3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 23.5 | 12.5 | 9.0 | 6.0 | 23.0 | 12.5 | 8.5 | 6.0 | 15.5 | 8.5 | 6.0 | 4.5 | 15.5 | 8.5 | 6.0 | 4.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | 0.0 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | NC | . | . | . | NC | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | 15.8 | . | . | . | 16.3 | . | . | . | . | . | . | . | . |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

GALVESTON BAY ENTRANCE BY FORT POINT (FRT POINT) — ELEVATION: 0.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.5 | -5.0 | -3.5 | -2.0 | -10.0 | -6.0 | -4.0 | -2.5 | . | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 15.5 | 9.5 | 6.5 | 4.5 | 14.5 | 9.0 | 6.0 | 4.5 | . | . | . | . | . | . | . | 3.0 |
| 65.5 MPH WIND GUSTS FTOL | -5.5 | -3.5 | -2.5 | -1.5 | -7.0 | -4.5 | -3.0 | -2.0 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | 9.5 | 6.5 | 4.5 | 3.0 | 8.0 | 5.0 | 4.0 | 3.0 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | -12.0 | -5.5 | -3.0 | -2.0 | -12.5 | -6.0 | -3.0 | -2.0 | -8.0 | -3.5 | -2.0 | -1.0 | -6.0 | -3.0 | -1.5 | -1.0 |
| M.S.L. FLOODING FTOL | -29.5 | -17.5 | -17.5 | -17.5 | -24.5 | -15.5 | -16.5 | -18.0 | -59.5 | -37.5 | -40.5 | -44.5 | -59.5 | -32.5 | -28.0 | -21.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 7.3 | 7.6 | 8.1 | 8.4 | 7.2 | 7.5 | 7.9 | 8.2 | 4.8 | 5.4 | 6.1 | 6.7 | 4.2 | 5.1 | 6.2 | 7.2 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -11.0 | -6.5 | -4.5 | -3.0 | -12.5 | -7.0 | -5.0 | -3.0 | -3.5 | -2.0 | -2.0 | -1.5 | -8.5 | -5.0 | -3.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 19.0 | 11.5 | 8.0 | 5.5 | 18.0 | 11.0 | 8.0 | 5.5 | 7.0 | 4.5 | 3.5 | 3.0 | 7.5 | 5.0 | 4.0 | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -7.5 | -4.5 | -3.0 | -2.0 | -9.0 | -5.5 | -4.0 | -2.5 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 13.5 | 8.5 | 6.0 | 4.0 | 11.5 | 7.5 | 5.5 | 4.0 | . | . | . | . | . | . | . | 2.0 |
| LOW TIDE FLOODING FTOL | -14.5 | -6.5 | -3.5 | -2.5 | -16.0 | -7.0 | -4.0 | -3.0 | -12.5 | -5.5 | -3.0 | -2.5 | -12.5 | -5.5 | -3.0 | -2.0 |
| M.S.L. FLOODING FTOL | -30.0 | -17.5 | -17.5 | -17.5 | -24.5 | -15.0 | -16.0 | -17.5 | -59.5 | -37.5 | -40.5 | -44.5 | -59.5 | -32.0 | -28.0 | -21.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 8.5 | 8.8 | 9.3 | 9.5 | 8.0 | 8.3 | 8.9 | 9.2 | 5.6 | 6.2 | 6.9 | 7.4 | 5.3 | 6.3 | 7.4 | 8.3 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.0 | -8.0 | -5.5 | -4.0 | -16.5 | -9.0 | -6.0 | -4.0 | -11.0 | -6.0 | -4.0 | -3.0 | -14.0 | -7.5 | -5.0 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 36.5 | 14.5 | 10.0 | 7.0 | 25.0 | 10.0 | 8.0 | 7.0 | 17.5 | 7.0 | 6.0 | 5.5 | 17.0 | 7.0 | 6.0 | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -11.0 | -6.0 | -4.0 | -3.0 | -9.5 | -5.5 | -4.0 | -3.0 | -3.0 | -2.0 | -1.5 | -1.5 | -8.5 | -5.0 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | NE | E | N | NE | NE | E | E | E | E | E |
| DURATION IN HOURS | 18.5 | 11.0 | 8.0 | 5.5 | 15.5 | 9.5 | 7.0 | 5.5 | 5.0 | 3.5 | 3.0 | 2.5 | 6.5 | 4.5 | 4.0 | 4.0 |
| LOW TIDE FLOODING FTOL | -17.5 | -8.0 | -5.0 | -3.0 | -21.0 | -9.5 | -6.0 | -3.5 | -17.5 | -8.0 | -5.0 | -2.5 | -20.0 | -9.0 | -5.5 | -3.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | -17.5 | -59.5 | NC | NC | -44.5 | -59.5 | NC | NC | -21.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 11.3 | 11.2 | 11.5 | 11.7 | 10.2 | 10.4 | 10.7 | 11.2 | 7.1 | 7.5 | 7.7 | 8.4 | 5.8 | 7.1 | 7.3 | 8.8 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -18.0 | -9.5 | -6.5 | -4.5 | -19.5 | -10.5 | -7.0 | -5.0 | -15.0 | -8.0 | -5.5 | -4.0 | -17.5 | -9.0 | -6.0 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 29.5 | 16.0 | 11.5 | 8.0 | 29.0 | 16.0 | 11.5 | 8.5 | 21.5 | 12.0 | 9.0 | 7.0 | 21.5 | 12.0 | 9.0 | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -14.0 | -7.5 | -5.0 | -3.5 | -15.0 | -8.0 | -5.5 | -4.0 | -9.0 | -5.0 | -3.5 | -2.5 | -12.0 | -6.5 | -4.5 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | NE | NE | E | E | NE | NE | E | E | E | E | E |
| DURATION IN HOURS | 21.5 | 13.0 | 9.0 | 6.5 | 22.0 | 13.0 | 9.0 | 6.5 | 13.5 | 8.0 | 6.0 | 4.5 | 12.5 | 8.0 | 6.0 | 5.0 |
| LOW TIDE FLOODING FTOL | -20.5 | -9.5 | -5.5 | -3.5 | -20.0 | -9.5 | -6.0 | -5.0 | -21.5 | -10.0 | -6.0 | -4.0 | -25.0 | -12.0 | -7.0 | -4.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | -44.5 | -60.0 | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 14.3 | 14.1 | 14.3 | 14.5 | 13.4 | 13.3 | 13.5 | 13.7 | 8.4 | 8.7 | 9.3 | 9.8 | 8.1 | 8.7 | 9.4 | 10.2 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | NC | -5.0 | -6.0 | -4.5 | -18.5 | NC | NC | -4.0 | -14.5 | NC | NC | -4.0 | -17.0 | NC | NC | -4.5 |
| DIRECTION OF WIND | NC | NE | NE | NE | NE | NC | NC | NE | NE | NC | NC | NE | E | NC | NC | E |
| DURATION IN HOURS | NC | 15.5 | 11.0 | 7.5 | 29.0 | NC | NC | 7.5 | 21.5 | NC | NC | 6.0 | 22.5 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -14.0 | -7.0 | -5.0 | -3.5 | -14.5 | -7.5 | -5.0 | -3.0 | -9.5 | -5.0 | -3.5 | -2.5 | -12.5 | -6.0 | -4.5 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 22.5 | 12.5 | 9.0 | 6.0 | 22.5 | 12.5 | 9.0 | 6.0 | 14.0 | 8.0 | 5.5 | 4.0 | 14.5 | 8.0 | 6.0 | 4.5 |
| LOW TIDE FLOODING FTOL | -13.5 | -8.5 | -5.0 | -3.0 | -14.5 | -9.0 | -5.0 | -3.5 | -19.0 | -12.0 | -6.0 | -3.5 | -21.5 | -13.0 | -7.0 | -4.0 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | -17.5 | -60.0 | NC | NC | NC | NC | NC | NC | -18.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 14.9 | 14.1 | 13.8 | 13.4 | 13.6 | 13.2 | 13.2 | 13.1 | 8.6 | 8.6 | 8.8 | 9.0 | 7.3 | 7.8 | 8.6 | 9.4 |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

A & M UNIVERSITY ON PELICAN ISLAND (ANMUN) — ELEVATION: 10.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.0 | -5.0 | -3.5 | -2.5 | -10.5 | -6.0 | -4.0 | -2.5 | . | . | . | -0.5 | -6.0 | -3.5 | -2.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | E | SE | SE | SE | SE |
| DURATION IN HOURS | 16.0 | 9.5 | 6.5 | 4.5 | 14.0 | 9.0 | 6.0 | 4.5 | . | . | . | 1.0 | 3.5 | 2.5 | 2.5 | 3.0 |
| 65.5 MPH WIND GUSTS FTOL | -5.5 | -3.5 | -2.5 | -1.5 | -7.5 | -5.0 | -3.5 | -2.0 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | 10.5 | 6.5 | 4.5 | 3.0 | 8.0 | 5.0 | 4.0 | 3.0 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -11.5 | -6.5 | -4.5 | -3.0 | -13.0 | -7.0 | -5.0 | -3.5 | -5.0 | -3.0 | -2.0 | -1.5 | -9.5 | -5.5 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 19.5 | 11.5 | 8.0 | 5.5 | 18.5 | 11.0 | 8.0 | 5.5 | 9.5 | 6.0 | 4.0 | 3.0 | 9.0 | 6.0 | 5.0 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -8.0 | -4.5 | -3.0 | -2.0 | -9.5 | -6.0 | -4.0 | -2.5 | . | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 14.0 | 8.5 | 6.0 | 4.0 | 12.0 | 7.5 | 5.5 | 4.0 | . | . | . | . | . | . | . | 2.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.0 | -8.0 | -5.5 | -4.0 | -17.0 | -9.0 | -6.0 | -4.0 | -11.5 | -6.0 | -4.0 | -3.0 | -14.5 | -8.0 | -5.0 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 27.0 | 14.5 | 10.0 | 7.0 | 25.5 | 14.0 | 10.0 | 7.0 | 18.5 | 10.0 | 7.0 | 5.5 | 17.5 | 10.0 | 7.0 | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -11.0 | -6.0 | -4.0 | -3.0 | -13.0 | -7.0 | -5.0 | -3.5 | -4.5 | -2.5 | -2.0 | -1.5 | -9.5 | -5.0 | -3.5 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 19.0 | 11.0 | 8.0 | 5.5 | 18.5 | 11.0 | 8.0 | 5.5 | 8.5 | 5.0 | 3.5 | 3.0 | 8.0 | 5.0 | 4.0 | 4.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | NC | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 10.3 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -18.0 | -9.5 | -6.5 | -4.5 | -20.0 | -11.0 | -7.0 | -5.0 | -15.0 | -8.0 | -5.5 | -4.0 | -18.0 | -9.5 | -6.5 | -4.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 30.0 | 16.0 | 11.5 | 8.0 | 29.0 | 16.0 | 11.5 | 8.5 | 22.5 | 12.0 | 9.0 | 7.0 | 22.0 | 12.0 | 9.0 | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -14.0 | -7.5 | -5.0 | -3.5 | -15.5 | -8.5 | -5.5 | -4.0 | -9.5 | -5.0 | -3.5 | -2.5 | -13.0 | -7.0 | -4.5 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.0 | 13.0 | 9.0 | 6.5 | 22.5 | 13.0 | 9.5 | 6.5 | 14.5 | 8.5 | 6.0 | 4.5 | 13.0 | 8.0 | 6.0 | 5.5 |
| LOW TIDE FLOODING FTOL | -2.5 | 0.0 | 1.0 | 1.0 | . | . | . | 0.0 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -4.5 | -2.0 | -1.0 | 1.0 | -4.5 | -2.0 | -2.0 | 0.0 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -6.5 | -3.5 | -3.0 | 0.5 | NC | NC | NC | NC | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 14.2 | 12.5 | 14.0 | 14.7 | 13.0 | 13.0 | 14.2 | 15.6 | . | . | . | . | . | . | . | . |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | NC | -9.0 | -6.0 | -4.5 | NC | NC | NC | -4.0 | -15.0 | NC | NC | -4.0 | -17.5 | NC | NC | -4.5 |
| DIRECTION OF WIND | NC | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.5 | 11.0 | 7.5 | NC | NC | NC | 7.5 | 22.5 | NC | NC | 6.5 | 23.5 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -14.0 | -7.0 | -5.0 | -3.5 | -15.0 | -7.5 | -5.0 | -3.0 | -10.0 | -5.0 | -3.5 | -2.5 | -13.0 | -7.0 | -4.5 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.5 | 12.5 | 9.0 | 6.0 | 23.0 | 12.5 | 9.0 | 6.0 | 15.0 | 8.5 | 6.0 | 4.5 | 16.0 | 9.0 | 6.5 | 5.0 |
| LOW TIDE FLOODING FTOL | -4.0 | 0.5 | 1.0 | . | -1.0 | NC | NC | 1.0 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -5.0 | -2.0 | -1.0 | -0.5 | -5.0 | -2.0 | -0.5 | 1.0 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -6.0 | -4.5 | -3.0 | NC | -9.0 | NC | NC | 1.0 | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 14.4 | 13.8 | 13.3 | 12.2 | 14.0 | 14.1 | 14.2 | 13.8 | . | . | . | . | . | . | . | . |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

51st STREET LEADING TO PELICAN ISLAND 17b

| 51ST STREET LEADING TO PELICAN ISLAND (ANMUN) | | | | | | | | | | | | | | | | ELEVATION: 4.3 FT. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.0 | -5.0 | -3.5 | -2.5 | -10.5 | -6.0 | -4.0 | -2.5 | . | . | . | -0.5 | -6.0 | -3.5 | -2.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | E | SE | SE | SE | SE |
| DURATION IN HOURS | 16.0 | 9.5 | 6.5 | 4.5 | 14.0 | 9.0 | 6.0 | 4.5 | . | . | . | 1.0 | 3.5 | 2.5 | 2.5 | 3.0 |
| 65.5 MPH WIND GUSTS FTOL | -5.5 | -3.5 | -2.5 | -1.5 | -7.5 | -5.0 | -3.5 | -2.0 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | 10.5 | 6.5 | 4.5 | 3.0 | 8.0 | 5.0 | 4.0 | 3.0 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -1.0 | -1.0 | -0.5 | 0.0 | . | . | . | -0.5 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 6.1 | 6.2 | 6.3 | 6.2 | 5.7 | 5.9 | 6.0 | 6.0 | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -11.5 | -6.5 | -4.5 | -3.0 | -13.0 | -7.0 | -5.0 | -3.5 | -5.0 | -3.0 | -2.0 | -1.5 | -9.5 | -5.5 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 19.5 | 11.5 | 8.0 | 5.5 | 18.5 | 11.0 | 8.0 | 5.5 | 9.5 | 6.0 | 4.0 | 3.0 | 9.0 | 6.0 | 5.0 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -8.0 | -4.5 | -3.0 | -2.0 | -9.5 | -6.0 | -4.0 | -2.5 | . | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 14.0 | 8.5 | 6.0 | 4.0 | 12.0 | 7.5 | 5.5 | 4.0 | . | . | . | . | . | . | . | 2.0 |
| LOW TIDE FLOODING FTOL | -2.0 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -5.0 | -2.5 | -1.5 | -0.5 | -5.0 | -3.0 | -1.5 | -1.0 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -8.5 | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 7.4 | 7.2 | 7.2 | 6.7 | 6.5 | 6.4 | 6.5 | 6.3 | 5.6 | 5.6 | 5.8 | 5.7 | 5.6 | 5.6 | 5.8 | 5.7 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.0 | -8.0 | -5.5 | -4.0 | -17.0 | -9.0 | -6.0 | -4.0 | -11.5 | -6.0 | -4.0 | -3.0 | -14.5 | -8.0 | -5.0 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 27.0 | 14.5 | 10.0 | 7.0 | 25.5 | 14.0 | 10.0 | 7.0 | 18.5 | 10.0 | 7.0 | 5.5 | 17.5 | 10.0 | 7.0 | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -11.0 | -6.0 | -4.0 | -3.0 | -13.0 | -7.0 | -5.0 | -3.5 | -4.5 | -2.5 | -2.0 | -1.5 | -9.5 | -5.0 | -3.5 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 19.0 | 11.0 | 8.0 | 5.5 | 18.5 | 11.0 | 8.0 | 5.5 | 8.5 | 5.0 | 3.5 | 3.0 | 8.0 | 5.0 | 4.0 | 4.0 |
| LOW TIDE FLOODING FTOL | -7.0 | -3.0 | -1.5 | -0.5 | -7.5 | -3.0 | -1.5 | -1.0 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -14.0 | -4.5 | -2.5 | -1.5 | -10.5 | -3.5 | -2.0 | -2.0 | -4.0 | -1.0 | -0.5 | 0.0 | . | . | . | -0.5 |
| HIGH TIDE FLOODING FTOL | -20.5 | -5.5 | -3.0 | -2.0 | -13.5 | -4.0 | -2.5 | -3.0 | NC | NC | NC | NC | . | . | . | NC |
| MAXIMUM HIGH TIDE SURGE | 10.4 | 9.6 | 9.7 | 9.1 | 8.8 | 8.2 | 8.2 | 7.8 | 6.2 | 6.2 | 6.7 | 6.8 | . | . | . | 6.3 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -18.0 | -9.5 | -6.5 | -4.5 | -20.0 | -11.0 | -7.0 | -5.0 | -15.0 | -6.0 | -5.5 | -4.0 | -18.0 | -9.5 | -6.5 | -4.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 30.0 | 16.0 | 11.5 | 8.0 | 29.0 | 16.0 | 11.5 | 8.5 | 22.5 | 12.0 | 9.0 | 7.0 | 22.0 | 12.0 | 9.0 | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -14.0 | -7.5 | -5.0 | -3.5 | -15.5 | -8.5 | -5.5 | -4.0 | -9.5 | -5.0 | -3.5 | -2.5 | -13.0 | -7.0 | -4.5 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.0 | 13.0 | 9.0 | 6.5 | 22.5 | 13.0 | 9.5 | 6.5 | 14.5 | 8.5 | 6.0 | 4.5 | 13.0 | 8.0 | 6.0 | 5.5 |
| LOW TIDE FLOODING FTOL | -9.5 | -4.5 | -2.0 | -1.0 | -10.5 | -5.0 | -2.5 | -1.5 | -4.0 | -1.5 | -0.5 | 1.0 | . | . | . | 0.5 |
| M.S.L. FLOODING FTOL | -12.5 | -5.5 | -3.0 | -2.5 | -14.0 | -6.0 | -3.0 | -2.5 | -10.0 | -4.0 | -2.0 | -1.0 | . | . | . | -1.5 |
| HIGH TIDE FLOODING FTOL | -15.0 | -7.0 | -4.0 | -4.0 | -17.5 | -7.5 | -4.0 | -3.0 | -16.5 | -7.0 | -4.0 | -3.0 | . | . | . | -3.5 |
| MAXIMUM HIGH TIDE SURGE | 14.2 | 13.5 | 14.0 | 14.7 | 13.0 | 13.0 | 14.2 | 15.6 | 7.5 | 7.5 | 8.2 | 9.0 | . | . | . | 10.1 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | NC | -9.0 | -6.0 | -4.5 | NC | NC | NC | -4.0 | -15.0 | NC | NC | -4.0 | -17.5 | NC | NC | -4.5 |
| DIRECTION OF WIND | NC | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.5 | 11.0 | 7.5 | NC | NC | NC | 7.5 | 22.5 | NC | NC | 6.5 | 23.5 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -14.0 | -7.0 | -5.0 | -3.5 | -15.0 | -7.5 | -5.0 | -3.0 | -10.0 | -5.0 | -3.5 | -2.5 | -13.0 | -7.0 | -4.5 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.5 | 12.5 | 9.0 | 6.0 | 23.0 | 12.5 | 9.0 | 6.0 | 15.0 | 8.5 | 6.0 | 4.5 | 16.0 | 9.0 | 6.5 | 5.0 |
| LOW TIDE FLOODING FTOL | -9.5 | -3.5 | -2.0 | -1.0 | -10.5 | -4.0 | -2.0 | -0.5 | -3.0 | -1.0 | 0.0 | 1.5 | . | . | . | 0.5 |
| M.S.L. FLOODING FTOL | -10.5 | -4.5 | -2.5 | -1.5 | -12.5 | -5.0 | -2.5 | -1.5 | -9.0 | -3.5 | -2.0 | -0.5 | -9.5 | -4.0 | -2.0 | -1.0 |
| HIGH TIDE FLOODING FTOL | -12.0 | -5.0 | -3.0 | -2.0 | -14.0 | -6.0 | -3.0 | -2.0 | -15.5 | -7.0 | -4.0 | -3.0 | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 14.4 | 13.8 | 13.3 | 12.2 | 14.0 | 14.1 | 14.2 | 13.8 | 7.5 | 7.6 | 7.7 | 7.6 | 6.3 | 7.1 | 7.9 | 8.4 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

# GALVESTON BAY OFF PELICAN ISLAND 18

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

GALVESTON BAY OFF PELICAN ISLAND (PELICAN IS) — ELEVATION: 0.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.5 | -5.0 | -3.5 | -2.0 | -10.5 | -6.0 | -4.0 | -2.5 | . | . | . | -0.5 | -6.0 | -3.5 | -2.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | E | SE | SE | SE | SE |
| DURATION IN HOURS | 15.5 | 9.5 | 7.0 | 4.5 | 14.0 | 9.0 | 6.0 | 4.5 | . | . | . | 1.0 | 3.5 | 3.0 | 3.0 | 3.0 |
| 65.5 MPH WIND GUSTS FTOL | -5.5 | -3.5 | -2.5 | -1.5 | -7.5 | -4.5 | -3.0 | -2.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 10.0 | 6.5 | 4.5 | 3.5 | 7.0 | 5.0 | 3.5 | 3.0 | . | . | . | . | . | . | . | 0.5 |
| LOW TIDE FLOODING FTOL | -11.0 | NC | NC | -1.5 | -12.5 | NC | NC | -2.0 | -8.0 | NC | NC | -0.5 | -7.0 | NC | NC | -1.0 |
| M.S.L. FLOODING FTOL | -29.5 | NC | NC | -17.5 | -24.5 | NC | NC | -18.0 | -59.5 | NC | NC | -44.5 | -59.5 | NC | NC | -21.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 6.5 | 6.8 | 7.0 | 7.0 | 6.3 | 6.6 | 6.8 | 6.8 | 5.2 | 5.4 | 5.6 | 5.7 | 4.5 | 4.9 | 5.2 | 5.5 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -11.0 | -6.0 | -4.0 | -3.0 | -13.0 | -7.0 | -5.0 | -3.0 | -6.0 | -3.5 | -2.5 | -1.5 | -9.5 | -5.5 | -3.5 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 19.5 | 11.5 | 8.0 | 5.5 | 18.0 | 11.0 | 8.0 | 5.5 | 10.5 | 6.5 | 4.5 | 3.0 | 9.0 | 6.0 | 5.0 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -7.5 | -4.5 | -3.0 | -2.0 | -9.5 | -5.5 | -4.0 | -2.5 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 14.0 | 8.5 | 6.0 | 4.0 | 11.5 | 7.0 | 5.5 | 4.0 | . | . | . | . | . | . | . | 2.0 |
| LOW TIDE FLOODING FTOL | -14.0 | NC | NC | -2.0 | -15.5 | NC | NC | -2.5 | -12.5 | NC | NC | -1.5 | -13.0 | NC | NC | -2.0 |
| M.S.L. FLOODING FTOL | -30.0 | NC | NC | -17.5 | -24.5 | NC | NC | -18.0 | -59.5 | NC | NC | -44.5 | -59.5 | NC | NC | -21.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 7.2 | 7.2 | 7.4 | 7.4 | 7.2 | 7.3 | 7.5 | 7.6 | 5.8 | 5.8 | 6.0 | 6.0 | 5.7 | 5.7 | 5.9 | 5.9 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.0 | -8.0 | -5.5 | -3.5 | -17.0 | -9.0 | -6.0 | -4.0 | -11.0 | -6.0 | -4.0 | -3.0 | -14.5 | -8.0 | -5.5 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 27.5 | 14.5 | 10.5 | 7.0 | 25.5 | 14.0 | 12.0 | 11.5 | 18.0 | 11.0 | 10.5 | 5.5 | 18.5 | 11.5 | 11.0 | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -11.0 | -6.0 | -4.0 | -3.0 | -13.0 | -7.0 | -5.0 | -3.0 | -4.5 | -2.5 | -2.0 | -1.5 | -4.5 | -3.0 | -2.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | F |
| DURATION IN HOURS | 19.0 | 11.0 | 8.0 | 5.5 | 18.5 | 12.0 | 7.5 | 5.5 | 13.0 | 7.5 | 5.0 | 3.0 | 13.0 | 7.5 | 5.5 | 4.0 |
| LOW TIDE FLOODING FTOL | -17.0 | NC | NC | -2.5 | -18.5 | NC | NC | -3.5 | -17.0 | NC | NC | -2.5 | -20.5 | NC | NC | -3.0 |
| M.S.L. FLOODING FTOL | -30.0 | NC | NC | -18.0 | -25.0 | NC | NC | -18.0 | NC | NC | NC | -45.0 | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 11.0 | 10.4 | 10.0 | 9.8 | 9.8 | 9.5 | 9.4 | 9.5 | 6.4 | 6.6 | 6.8 | 7.3 | 6.1 | 6.6 | 7.2 | 7.9 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -18.0 | -9.5 | -6.5 | -4.5 | -20.0 | -10.5 | -7.0 | -5.0 | -15.0 | -8.0 | -5.5 | -4.0 | -18.0 | -9.5 | -6.5 | -4.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 29.5 | 16.0 | 11.5 | 8.5 | 28.0 | 15.5 | 11.0 | 8.5 | 22.0 | 12.0 | 9.0 | 7.0 | 22.5 | 12.5 | 9.0 | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -13.5 | -7.5 | -5.0 | -3.5 | -15.5 | -8.5 | -5.5 | -4.0 | -9.5 | -5.0 | -3.5 | -2.5 | -13.0 | -7.0 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 22.0 | 13.0 | 9.0 | 6.5 | 22.5 | 13.0 | 9.0 | 6.5 | 14.5 | 8.5 | 6.0 | 4.5 | 13.5 | 8.0 | 6.5 | 5.5 |
| LOW TIDE FLOODING FTOL | -19.5 | NC | NC | -3.5 | -19.5 | NC | NC | -4.5 | -21.0 | NC | NC | -3.5 | -25.0 | NC | NC | -4.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | 17.5 | NC | NC | NC | -17.5 | -35.5 | NC | NC | -44.5 | -60.5 | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 14.9 | 14.2 | 14.7 | 14.8 | 13.9 | 13.8 | 14.8 | 15.4 | 7.5 | 7.8 | 8.8 | 9.5 | 7.8 | 8.5 | 10.0 | 11.2 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | NC | -9.0 | -6.0 | -4.5 | NC | NC | NC | -4.0 | -14.5 | NC | NC | -4.0 | -17.5 | NC | NC | -4.5 |
| DIRECTION OF WIND | NC | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.5 | 11.0 | 7.5 | NC | NC | NC | 7.5 | 22.5 | NC | NC | 6.5 | 23.5 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -14.0 | -7.0 | -4.5 | -3.5 | -15.0 | -7.5 | -5.0 | -3.0 | -9.5 | -5.0 | -3.5 | -2.5 | -13.0 | -6.5 | -4.5 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | F |
| DURATION IN HOURS | 22.5 | 12.5 | 8.5 | 6.0 | 23.0 | 12.5 | 8.5 | 6.0 | 15.0 | 8.0 | 6.0 | 4.5 | 16.5 | 9.0 | 6.5 | 5.0 |
| LOW TIDE FLOODING FTOL | -13.0 | -8.0 | -4.0 | -2.5 | -14.0 | -8.5 | -4.5 | -3.0 | -18.5 | -11.0 | -5.5 | -3.0 | -21.5 | -15.5 | -6.5 | -3.5 |
| M.S.L. FLOODING FTOL | -18.0 | -17.5 | -17.5 | -17.5 | -18.5 | -18.0 | -18.0 | -17.5 | NC | NC | NC | NC | -53.5 | -35.5 | -35.5 | -17.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 14.9 | 14.4 | 13.9 | 12.2 | 14.7 | 14.8 | 14.9 | 13.6 | 7.0 | 7.6 | 8.2 | 8.0 | 7.9 | 9.1 | 10.5 | 10.9 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

# GALVESTON CAUSEWAY 19

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

GALVESTON CAUSEWAY (CAUSEWAY) — ELEVATION: 6.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.0 | -5.0 | -3.5 | -2.0 | -11.0 | -6.5 | -4.5 | -3.0 | . | . | . | -1.0 | -7.5 | -4.5 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | E | E | E | E | SE |
| DURATION IN HOURS | 16.5 | 10.0 | 7.0 | 4.5 | 14.5 | 9.0 | 6.5 | 4.5 | . | . | . | 2.5 | 6.0 | 4.0 | 3.5 | 3.5 |
| 65.5 MPH WIND GUSTS FTOL | -5.5 | -3.5 | -2.5 | -1.5 | -8.0 | -5.0 | -3.5 | -2.0 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 10.5 | 7.0 | 5.0 | 3.0 | 6.5 | 4.5 | 3.5 | 3.0 | . | . | . | . | . | . | . | 1.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | NC | NC | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | 6.2 | 6.2 | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -11.0 | -6.0 | -4.0 | -3.0 | -13.5 | -7.5 | -5.0 | -3.5 | -6.5 | -3.5 | -2.5 | -2.0 | -11.0 | -6.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 19.5 | 11.5 | 8.0 | 5.5 | 18.5 | 11.0 | 8.0 | 5.5 | 12.0 | 7.0 | 5.0 | 4.0 | 11.0 | 7.0 | 5.0 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -8.0 | -4.5 | -3.0 | -2.0 | -10.0 | -6.0 | -4.0 | -2.5 | . | . | . | . | -5.0 | -3.0 | -2.0 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | SE | SE | E | SE |
| DURATION IN HOURS | 14.0 | 8.5 | 6.0 | 4.0 | 9.5 | 6.0 | 5.0 | 4.0 | . | . | . | . | 5.0 | 3.0 | 2.5 | 2.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 7.4 | 6.9 | 7.0 | 6.7 | 7.1 | 6.6 | 6.5 | 6.1 | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.0 | -8.0 | -5.5 | -3.5 | -17.5 | -9.5 | -6.5 | -4.5 | -11.5 | -6.5 | -4.5 | -3.0 | -15.5 | -8.0 | -5.5 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | . | . | . | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 26.0 | 14.5 | 10.5 | 7.0 | 25.5 | 14.5 | 10.0 | 7.0 | 19.0 | 11.0 | 8.0 | 6.0 | 19.0 | 11.0 | 8.0 | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -11.0 | -6.0 | -4.0 | -3.0 | -13.5 | -7.5 | -5.0 | -3.5 | -6.0 | -3.5 | -2.5 | -2.0 | -10.5 | -6.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | . | . | . | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 19.0 | 11.5 | 8.0 | 5.5 | 19.5 | 11.5 | 8.0 | 5.5 | 11.0 | 6.5 | 5.0 | 3.5 | 11.5 | 7.0 | 5.5 | 4.5 |
| LOW TIDE FLOODING FTOL | -2.0 | -0.5 | 0.0 | 0.5 | -2.5 | -1.0 | 0.5 | 0.0 | . | . | . | . | . | . | . | 1.0 |
| M.S.L. FLOODING FTOL | -4.0 | -2.0 | -0.5 | -0.5 | -5.0 | -2.5 | -1.0 | -1.0 | . | . | . | 2.5 | . | . | . | 0.5 |
| HIGH TIDE FLOODING FTOL | -6.0 | -3.0 | -1.5 | -1.0 | -7.5 | -4.0 | -2.0 | -1.5 | NC | NC | NC | NC | . | . | . | 0.0 |
| MAXIMUM HIGH TIDE SURGE | 11.6 | 10.5 | 10.2 | 10.2 | 10.2 | 9.9 | 9.6 | 9.9 | 6.3 | 6.9 | 7.4 | 8.4 | 7.2 | 7.8 | 8.3 | 9.4 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -18.0 | -9.5 | -6.5 | -4.5 | -20.5 | -11.0 | -7.5 | -5.0 | -15.5 | -8.0 | -6.0 | -4.0 | -19.0 | -10.0 | -7.0 | -4.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | NE | . | . | . | E |
| DURATION IN HOURS | 30.0 | 16.0 | 11.5 | 8.5 | 29.5 | 16.0 | 11.5 | 8.5 | 23.0 | 13.0 | 9.5 | 7.0 | 23.0 | 13.0 | 9.5 | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -13.5 | -7.5 | -5.0 | -3.5 | -16.0 | -8.5 | -6.0 | -4.0 | -10.0 | -5.5 | -4.0 | -2.5 | -14.0 | -7.5 | -5.0 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | NE | . | . | . | E |
| DURATION IN HOURS | 22.5 | 13.0 | 9.0 | 6.5 | 22.5 | 12.0 | 9.0 | 6.5 | 15.5 | 9.0 | 6.5 | 5.0 | 15.5 | 9.0 | 7.0 | 5.5 |
| LOW TIDE FLOODING FTOL | -5.5 | -2.5 | -1.0 | 0.0 | -7.0 | -3.0 | -1.5 | -1.0 | . | . | . | 1.0 | . | . | . | -0.5 |
| M.S.L. FLOODING FTOL | -7.0 | -3.0 | -1.5 | -0.5 | -8.0 | -3.5 | -2.0 | -1.0 | 0.0 | 0.0 | 0.5 | 1.0 | -4.0 | -2.0 | -1.0 | -0.5 |
| HIGH TIDE FLOODING FTOL | -8.5 | -4.0 | -2.0 | -1.0 | -9.0 | -4.0 | -2.0 | -1.5 | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 15.3 | 15.3 | 16.0 | 16.1 | 14.2 | 14.6 | 15.7 | 16.2 | 8.2 | 9.2 | 10.7 | 11.8 | 9.0 | 10.3 | 12.3 | 13.7 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -17.5 | -9.0 | -6.0 | -4.0 | NC | NC | NC | -4.0 | -15.0 | -8.0 | -5.5 | -4.0 | -18.0 | -9.5 | -6.5 | -4.5 |
| DIRECTION OF WIND | N | NE | NE | NE | NC | NC | NC | NE | . | . | . | NE | . | . | . | E |
| DURATION IN HOURS | 29.0 | 15.5 | 11.0 | 7.5 | NC | NC | NC | 7.5 | 23.0 | 12.5 | 9.0 | 7.0 | 24.5 | 13.0 | 9.5 | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -14.0 | -7.0 | -4.5 | -3.5 | -15.5 | -8.0 | -5.0 | -3.0 | -10.0 | -5.0 | -3.5 | -3.0 | -14.0 | -7.0 | -5.0 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | NE | . | . | . | E |
| DURATION IN HOURS | 23.0 | 12.5 | 8.5 | 6.0 | 23.0 | 12.5 | 8.5 | 6.0 | 16.0 | 9.0 | 6.0 | 4.5 | 17.5 | 9.5 | 7.0 | 5.0 |
| LOW TIDE FLOODING FTOL | -5.0 | -2.0 | -1.0 | -0.5 | -6.5 | -2.5 | -1.0 | 0.0 | . | . | . | 1.5 | -0.5 | 0.0 | 0.0 | 0.0 |
| M.S.L. FLOODING FTOL | -6.0 | -2.5 | -1.5 | -0.5 | -7.5 | -3.0 | -1.5 | 0.0 | 7.5 | 3.5 | 2.0 | 1.0 | -1.5 | -1.0 | -0.5 | -0.5 |
| HIGH TIDE FLOODING FTOL | -7.0 | -3.5 | -2.0 | -1.0 | -8.0 | -4.0 | -2.0 | -0.5 | NC | NC | NC | NC | -3.0 | -1.5 | -1.0 | -0.5 |
| MAXIMUM HIGH TIDE SURGE | 15.5 | 14.9 | 14.5 | 13.6 | 15.2 | 15.0 | 15.1 | 14.6 | 7.7 | 8.6 | 9.8 | 10.6 | 9.5 | 10.9 | 12.5 | 13.6 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

# I-45 NEAR VIRGINIA POINT 20

## I 45 NEAR VIRGINIA POINT (VIRGINIA P)

ELEVATION: 6.4 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.5 | -5.0 | -3.5 | -2.0 | -11.0 | -6.0 | -4.0 | -2.5 | . | . | . | -1.0 | -7.5 | -4.0 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | NE | E | E | E | SE |
| DURATION IN HOURS | 17.0 | 10.0 | 7.0 | 4.5 | 14.5 | 8.5 | 6.0 | 4.5 | . | . | . | 2.5 | 6.0 | 4.0 | 3.5 | 3.5 |
| 65.5 MPH WIND GUSTS FTOL | -5.5 | -3.5 | -2.5 | -1.5 | -8.0 | -5.0 | -3.5 | -2.0 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 10.0 | 6.5 | 5.0 | 3.0 | 6.5 | 4.5 | 4.0 | 3.0 | . | . | . | . | . | . | . | 1.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -11.0 | -6.0 | -4.0 | -2.5 | -13.5 | -7.5 | -5.0 | -3.5 | -6.0 | -3.5 | -2.5 | -2.0 | -11.0 | -6.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 19.5 | 11.5 | 8.5 | 5.5 | 18.5 | 11.0 | 8.0 | 5.5 | 12.0 | 7.0 | 5.5 | 3.5 | 11.5 | 7.5 | 5.5 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -7.5 | -4.5 | -3.0 | -2.0 | -10.0 | -6.0 | -4.0 | -2.5 | . | . | . | 0.0 | -5.5 | -3.5 | -2.5 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | SE | SE | SE | SE | SE |
| DURATION IN HOURS | 14.0 | 6.5 | 6.0 | 4.0 | 9.0 | 6.0 | 5.0 | 4.0 | . | . | . | 0.0 | 1.5 | 1.5 | 2.0 | 2.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 7.8 | 7.5 | 7.3 | 6.8 | 7.4 | 7.0 | 6.8 | 6.2 | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -14.5 | -8.0 | -5.5 | -3.5 | -17.0 | -9.5 | -6.0 | -4.5 | -11.5 | -6.5 | -4.5 | -3.0 | -15.5 | -8.5 | -5.5 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 26.0 | 14.5 | 10.5 | 7.0 | 26.0 | 14.0 | 10.0 | 7.0 | 19.0 | 11.0 | 8.0 | 6.0 | 19.5 | 11.0 | 8.0 | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -11.0 | -6.0 | -4.0 | -2.5 | -13.0 | -7.0 | -5.0 | -3.5 | -6.0 | -3.0 | -2.0 | -1.5 | -10.5 | -6.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 19.5 | 11.5 | 8.0 | 5.5 | 19.0 | 11.5 | 8.0 | 5.5 | 10.5 | 6.5 | 4.5 | 3.5 | 10.5 | 6.5 | 5.0 | 4.5 |
| LOW TIDE FLOODING FTOL | -1.5 | -0.5 | 0.0 | 0.5 | -3.0 | -1.5 | -0.5 | 0.0 | . | . | . | . | . | . | . | 1.0 |
| M.S.L. FLOODING FTOL | -3.5 | -1.5 | -0.5 | -0.5 | -5.0 | -2.0 | -1.0 | -1.0 | . | . | . | 2.5 | 1.0 | 0.5 | 0.0 | 0.5 |
| HIGH TIDE FLOODING FTOL | -5.0 | -2.5 | -1.0 | -1.0 | -6.5 | -3.0 | -1.0 | -1.5 | NC | NC | NC | NC | NC | NC | NC | 0.0 |
| MAXIMUM HIGH TIDE SURGE | 12.4 | 11.8 | 11.2 | 11.0 | 10.7 | 10.4 | 10.1 | 10.2 | 6.9 | 7.4 | 7.9 | 8.6 | 7.9 | 8.5 | 9.0 | 9.9 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -17.5 | -9.5 | -6.5 | -7.5 | -20.0 | -12.5 | -8.5 | -8.0 | -15.5 | -6.0 | -4.0 | -4.0 | -18.5 | -10.5 | -7.0 | -4.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 30.0 | 16.0 | 11.5 | 15.5 | 29.0 | 18.0 | 11.5 | 16.5 | 22.0 | NC | NC | 7.0 | 23.5 | NC | NC | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -13.5 | -7.0 | -5.0 | -8.5 | -16.0 | -6.0 | -4.0 | -9.0 | -10.0 | -3.0 | -2.0 | -2.5 | -14.0 | -4.0 | -3.0 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.5 | 12.5 | 9.0 | 15.0 | 23.0 | 13.0 | 9.0 | 15.5 | 15.5 | NC | NC | 5.0 | 15.5 | NC | NC | 5.5 |
| LOW TIDE FLOODING FTOL | -5.0 | -2.0 | -1.0 | -0.5 | -7.0 | NC | NC | -1.0 | . | . | . | 1.0 | 0.5 | NC | NC | -0.5 |
| M.S.L. FLOODING FTOL | -6.0 | -2.5 | -1.0 | -0.5 | -8.0 | -3.5 | -1.5 | -1.5 | -0.5 | 0.0 | 0.0 | 1.0 | -4.5 | -2.0 | -1.0 | -0.5 |
| HIGH TIDE FLOODING FTOL | -7.0 | -3.0 | -1.5 | -1.0 | -9.0 | -4.0 | -2.0 | -1.5 | NC | NC | NC | 1.0 | -9.5 | -4.0 | -2.0 | -0.5 |
| MAXIMUM HIGH TIDE SURGE | 16.1 | 16.0 | 17.0 | 18.0 | 15.0 | 14.7 | 15.4 | 16.2 | 8.7 | 9.5 | 10.9 | 12.4 | 9.4 | 10.7 | 12.6 | 14.5 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -17.5 | -9.0 | -6.0 | -4.0 | NC | NC | NC | -4.0 | -15.0 | -7.5 | -5.0 | -4.0 | -18.0 | -9.0 | -6.0 | -4.5 |
| DIRECTION OF WIND | N | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 29.0 | 15.0 | 11.0 | 7.5 | NC | NC | NC | 7.5 | 23.0 | 12.0 | 9.0 | 6.5 | 23.5 | 12.5 | 9.0 | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -13.5 | -7.0 | -4.5 | -3.0 | -15.5 | -7.5 | -5.0 | -3.0 | -10.0 | -5.0 | -3.5 | -2.5 | -13.5 | -7.0 | -5.0 | -3.5 |
| DIRECTION OF WIND | N | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 23.0 | 12.5 | 8.5 | 6.0 | 23.0 | 12.5 | 9.0 | 6.0 | 16.5 | 9.0 | 6.5 | 4.5 | 17.5 | 9.5 | 7.0 | 5.0 |
| LOW TIDE FLOODING FTOL | -4.5 | -1.5 | -1.0 | -0.5 | -6.5 | -2.0 | -1.0 | 0.0 | . | . | . | 1.5 | -0.5 | 0.0 | 0.0 | 0.0 |
| M.S.L. FLOODING FTOL | -5.5 | -2.0 | -1.0 | -0.5 | -7.0 | -3.0 | -1.0 | -0.5 | 6.0 | 2.5 | 1.0 | 1.0 | -2.0 | -0.5 | 0.0 | 0.5 |
| HIGH TIDE FLOODING FTOL | -6.0 | -3.0 | -1.0 | -0.5 | -8.0 | -3.5 | -1.0 | -1.0 | NC | NC | NC | .5 | -3.0 | 0.0 | 0.0 | 0.0 |
| MAXIMUM HIGH TIDE SURGE | 16.3 | 15.6 | 15.4 | 14.5 | 15.6 | 15.1 | 15.1 | 14.4 | 8.2 | 9.1 | 10.3 | 11.1 | 10.1 | 11.3 | 12.9 | 13.9 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

TEXAS CITY LEVEE SOUTH (TEX CITY) — ELEVATION: 21.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.0 | -4.5 | -3.0 | -2.0 | -10.5 | -6.0 | -4.0 | -2.5 | . | . | . | -0.5 | -7.0 | -4.0 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | NE | E | E | E | SE |
| DURATION IN HOURS | 15.5 | 9.5 | 6.5 | 4.5 | 10.5 | 6.5 | 5.0 | 4.5 | . | . | . | 1.0 | 5.5 | 4.0 | 3.5 | 3.5 |
| 65.5 MPH WIND GUSTS FTOL | -5.0 | -3.0 | -2.0 | -1.5 | -7.5 | -5.0 | -3.0 | -2.0 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 10.0 | 6.5 | 4.5 | 3.0 | 6.5 | 4.5 | 3.5 | 3.0 | . | . | . | . | . | . | . | 1.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.5 | -6.0 | -4.0 | -2.5 | -13.0 | -7.5 | -5.0 | -3.0 | -5.0 | -3.0 | -2.0 | -1.5 | -10.0 | -6.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 19.5 | 11.5 | 8.0 | 5.5 | 18.0 | 11.0 | 8.0 | 5.5 | 10.5 | 6.5 | 5.0 | 3.5 | 11.0 | 7.0 | 5.5 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -7.0 | -4.5 | -3.0 | -2.0 | -9.5 | -6.0 | -4.0 | -2.5 | . | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 13.5 | 8.5 | 6.0 | 4.0 | 9.0 | 6.0 | 5.0 | 4.0 | . | . | . | . | . | . | . | 3.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -14.0 | -7.5 | -5.0 | -3.5 | -16.5 | -9.0 | -6.0 | -4.0 | -11.0 | -6.0 | -4.0 | -3.0 | -14.5 | -8.0 | -5.0 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 25.5 | 14.5 | 10.0 | 7.0 | 25.0 | 14.0 | 10.0 | 7.0 | 18.5 | 10.5 | 7.5 | 6.0 | 18.5 | 11.0 | 8.0 | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -10.5 | -6.0 | -4.0 | -2.5 | -12.5 | -7.0 | -4.5 | -3.0 | -4.5 | -3.0 | -2.0 | -1.5 | -10.0 | -5.5 | -3.5 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 19.0 | 11.5 | 8.0 | 5.5 | 18.5 | 11.0 | 8.0 | 5.5 | 9.0 | 5.5 | 4.0 | 3.0 | 9.5 | 6.0 | 5.0 | 4.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -17.0 | -9.5 | -6.0 | -4.5 | -20.0 | -11.0 | -7.0 | -5.0 | -14.5 | -8.0 | -5.5 | -4.0 | -18.0 | -10.0 | -6.5 | -4.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 16.0 | 11.5 | 8.5 | 29.5 | NC | NC | 8.5 | 22.5 | NC | NC | 7.0 | 23.0 | NC | NC | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -13.0 | -7.0 | -4.5 | -3.5 | -15.5 | -8.0 | -5.5 | -4.0 | -9.0 | -5.0 | -3.5 | -3.0 | -13.0 | -7.0 | -4.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.5 | 12.5 | 9.0 | 6.5 | 22.5 | 12.5 | 9.0 | 6.5 | 14.5 | 8.5 | 6.5 | 5.0 | 14.5 | 8.5 | 6.0 | 5.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -17.0 | -8.5 | -6.0 | -4.0 | -18.5 | -9.5 | -6.0 | -4.0 | -14.5 | -7.0 | -5.0 | -3.5 | -17.5 | -9.0 | -6.0 | -4.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 29.0 | 15.0 | 11.0 | 7.5 | 29.0 | 15.0 | 11.0 | 7.5 | 22.5 | 12.0 | 9.0 | 6.5 | 24.5 | 13.0 | 9.5 | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -13.0 | -6.5 | -4.5 | -3.0 | -14.5 | -7.0 | -5.0 | -3.0 | -12.5 | -6.0 | -4.0 | -2.5 | -13.0 | -7.0 | -4.5 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.5 | 12.5 | 8.5 | 6.0 | 23.0 | 13.0 | 9.0 | 6.0 | 18.5 | 10.0 | 7.0 | 4.5 | 17.5 | 9.5 | 7.0 | 5.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

TEXAS CITY DIKE (TEX CITY DK) — ELEVATION: 6.7 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.0 | -4.5 | -3.0 | -2.0 | -10.0 | -6.0 | -4.0 | -2.5 | . | . | . | 0.0 | -5.5 | -3.5 | -2.5 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | NE | SE | SE | SE | SE |
| DURATION IN HOURS | 15.5 | 9.5 | 6.5 | 3.5 | 13.0 | 8.5 | 6.5 | 4.5 | . | . | . | 0.5 | 3.0 | 2.5 | 3.0 | 3.0 |
| 65.5 MPH WIND GUSTS FTOL | -4.5 | -3.0 | -2.0 | -1.0 | -6.5 | -4.5 | -3.0 | -1.5 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 9.5 | 6.5 | 4.5 | 3.0 | 6.5 | 4.5 | 4.0 | 3.0 | . | . | . | . | . | . | . | 0.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.5 | -6.0 | -4.0 | -2.5 | -12.0 | -7.0 | -4.5 | -3.0 | -3.5 | -2.0 | -1.5 | -1.5 | -9.0 | -5.0 | -3.5 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 18.5 | 11.5 | 8.0 | 5.5 | 17.5 | 10.5 | 8.0 | 5.5 | 8.0 | 5.0 | 4.0 | 3.0 | 9.0 | 6.0 | 5.0 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -7.0 | -4.0 | -3.0 | -2.0 | -9.0 | -5.5 | -3.5 | -2.0 | . | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 13.0 | 8.5 | 6.0 | 4.0 | 9.5 | 6.5 | 5.0 | 4.0 | . | . | . | . | . | . | . | 2.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 7.4 | 7.4 | 7.5 | 7.2 | 6.4 | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -14.0 | -7.5 | -5.0 | -3.5 | -16.0 | -9.0 | -6.0 | -4.0 | -10.0 | -5.5 | -4.0 | -2.5 | -14.0 | -7.5 | -5.0 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 25.5 | 14.0 | 10.0 | 7.0 | 25.0 | 14.0 | 10.0 | 7.0 | 17.5 | 10.0 | 7.0 | 5.5 | 17.5 | 10.0 | 7.5 | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -4.0 | -2.5 | -12.0 | -7.0 | -4.5 | -3.0 | -3.0 | -2.0 | -1.0 | -1.0 | -9.0 | -5.0 | -3.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 18.5 | 11.0 | 8.0 | 5.5 | 18.5 | 11.0 | 8.0 | 5.5 | 6.5 | 4.0 | 3.0 | 3.0 | 7.5 | 5.0 | 4.0 | 4.0 |
| LOW TIDE FLOODING FTOL | -1.5 | -1.0 | -0.5 | 0.0 | -3.5 | -1.5 | -1.0 | -0.5 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -4.5 | -2.5 | -1.5 | -0.5 | -6.0 | -3.0 | -2.0 | -1.0 | . | . | . | 1.5 | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -7.5 | -4.0 | -2.0 | -1.0 | -9.0 | -4.5 | -3.0 | -1.5 | . | . | . | NC | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 12.4 | 11.7 | 11.2 | 11.0 | 11.0 | 10.4 | 10.0 | 9.9 | . | . | . | 8.4 | . | . | . | . |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -17.0 | -5.0 | -6.0 | -4.5 | -19.0 | -10.0 | -7.0 | -5.0 | -14.0 | -7.5 | -5.0 | -3.5 | -17.5 | -9.0 | -6.0 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 16.0 | 11.5 | 8.0 | 29.0 | NC | NC | 8.5 | 21.5 | NC | NC | 7.0 | 22.0 | NC | NC | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -13.0 | -7.0 | -4.5 | -3.0 | -14.5 | -8.0 | -5.5 | -3.5 | -8.0 | -4.5 | -3.0 | -2.5 | -12.0 | -6.5 | -4.5 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 21.5 | 12.5 | 9.0 | 6.5 | 22.0 | 13.0 | 9.0 | 6.5 | 13.0 | 8.0 | 6.0 | 4.5 | 13.5 | 8.0 | 6.0 | 5.5 |
| LOW TIDE FLOODING FTOL | -5.0 | -2.5 | -1.0 | 0.5 | -7.0 | -3.5 | -3.0 | -1.0 | . | . | . | . | . | . | . | 0.5 |
| M.S.L. FLOODING FTOL | -8.0 | -3.5 | -2.0 | -1.0 | -9.5 | -4.5 | -2.5 | -1.5 | . | . | . | 1.5 | . | . | . | 0.0 |
| HIGH TIDE FLOODING FTOL | -10.5 | -5.0 | -3.0 | -3.0 | -12.0 | -5.5 | -3.0 | -2.0 | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 16.8 | 15.7 | 16.2 | 15.9 | 15.9 | 14.5 | 15.4 | 15.2 | 7.4 | 7.6 | 8.5 | 9.0 | 6.3 | 7.2 | 8.8 | 10.1 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -17.0 | -6.5 | -6.0 | -4.0 | -18.0 | -9.0 | -6.0 | -4.0 | -14.0 | -7.0 | -5.0 | -3.5 | -16.5 | -8.5 | -6.0 | -4.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 29.0 | 15.0 | 11.0 | 7.5 | 29.0 | 15.0 | 11.0 | 7.5 | 21.5 | 11.5 | 8.5 | 6.5 | 23.5 | 12.5 | 9.0 | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -13.0 | -6.5 | -4.5 | -3.0 | -14.0 | -7.0 | -4.5 | -3.0 | -8.5 | -4.5 | -3.0 | -2.5 | -12.5 | -6.0 | -4.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.5 | 12.5 | 8.5 | 6.0 | 22.5 | 12.0 | 8.5 | 6.0 | 14.0 | 8.0 | 5.5 | 4.0 | 16.5 | 9.0 | 6.5 | 5.0 |
| LOW TIDE FLOODING FTOL | -4.5 | -2.0 | -1.0 | -0.5 | -6.5 | -2.5 | -1.5 | -0.5 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -7.0 | -3.0 | -2.0 | -1.0 | -8.5 | -3.5 | -2.0 | -1.0 | . | . | . | . | . | . | . | 0.5 |
| HIGH TIDE FLOODING FTOL | -10.0 | -4.5 | -2.5 | -2.0 | -11.0 | -5.0 | -2.5 | -1.5 | NC | NC | NC | NC | . | . | . | NC |
| MAXIMUM HIGH TIDE SURGE | 17.8 | 16.8 | 16.3 | 14.7 | 17.1 | 16.0 | 15.4 | 13.9 | 7.4 | 7.1 | 7.2 | 6.8 | . | . | . | 8.9 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

# HIGHWAY 6 BY HIGHLAND BAYOU

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour; FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

HIGHWAY 6 BY HIGHLAND BAYOU (HILAND BID) — ELEVATION: 3.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.0 | -5.0 | -3.0 | -2.0 | -11.0 | -6.5 | -4.0 | -2.5 | . | . | . | -1.0 | -8.0 | -5.0 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | NE | E | E | E | E |
| DURATION IN HOURS | 15.5 | 10.0 | 7.0 | 4.5 | 9.5 | 6.5 | 5.0 | 4.5 | . | . | . | 2.5 | 7.0 | 5.0 | 4.0 | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -5.0 | -3.0 | -2.0 | -1.5 | -8.0 | -5.0 | -3.5 | -2.0 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 10.0 | 6.5 | 5.0 | 3.0 | 6.0 | 4.5 | 4.0 | 3.0 | . | . | . | . | . | . | . | 2.0 |
| LOW TIDE FLOODING FTOL | 3.0 | 3.0 | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 1.0 | 1.0 | 1.5 | 1.5 | -1.5 | NC | NC | 0.5 | 7.5 | NC | NC | 5.5 | -1.5 | NC | NC | 1.5 |
| HIGH TIDE FLOODING FTOL | -1.0 | -1.0 | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 6.9 | 6.3 | 5.0 | 4.6 | 5.4 | 5.3 | 4.7 | 4.7 | 4.8 | 4.8 | 4.7 | 4.6 | 5.3 | 5.2 | 5.0 | 4.8 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.5 | -6.0 | -4.0 | -2.5 | -13.0 | -7.0 | -5.0 | -3.5 | -6.0 | -3.5 | -2.5 | -2.0 | -11.0 | -5.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 19.5 | 11.5 | 8.0 | 5.5 | 18.5 | 11.0 | 8.0 | 5.5 | 12.5 | 7.5 | 5.0 | 4.0 | 12.0 | 7.5 | 5.5 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -7.0 | -4.0 | -3.0 | -2.0 | -10.0 | -6.0 | -4.0 | -2.5 | . | . | . | 0.0 | -6.5 | -4.0 | -2.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | E | E | E | E | SE |
| DURATION IN HOURS | 13.5 | 8.5 | 6.0 | 4.0 | 8.5 | 6.0 | 4.5 | 4.0 | . | . | . | 1.0 | 3.5 | 3.0 | 3.0 | 3.0 |
| LOW TIDE FLOODING FTOL | 0.0 | 0.5 | 0.5 | 1.5 | -3.0 | . | . | . | . | . | . | . | -7.5 | . | . | . |
| M.S.L. FLOODING FTOL | -2.0 | -1.0 | 0.0 | 1.0 | -4.5 | -2.5 | -2.0 | 0.5 | 2.5 | 2.5 | 2.5 | 3.0 | -4.0 | -2.0 | -1.5 | 0.5 |
| HIGH TIDE FLOODING FTOL | -4.0 | -2.0 | -0.5 | 1.0 | -6.0 | NC | NC | NC | NC | NC | NC | NC | 0.0 | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 9.1 | 8.7 | 7.9 | 6.8 | 7.7 | 7.3 | 6.7 | 5.7 | 5.6 | 5.5 | 5.5 | 5.4 | 6.1 | 5.3 | 6.3 | 5.9 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -14.0 | -7.5 | -5.0 | -3.5 | -17.0 | -9.0 | -6.0 | -4.0 | -11.5 | -6.0 | -4.0 | -3.0 | -15.5 | -8.5 | -5.5 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 26.0 | 14.5 | 10.0 | 7.0 | 25.5 | 14.0 | 10.0 | 7.0 | 19.5 | 11.0 | 7.5 | 6.0 | 19.5 | 11.0 | 7.5 | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -10.5 | -6.0 | -4.0 | -2.5 | -13.0 | -7.5 | -5.0 | -3.5 | -6.0 | -3.5 | -2.0 | -1.5 | -11.0 | -5.0 | -3.5 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | SE |
| DURATION IN HOURS | 19.5 | 11.5 | 8.0 | 5.5 | 19.0 | 11.0 | 7.5 | 5.5 | 11.0 | 7.0 | 5.0 | 3.5 | 11.5 | 7.0 | 5.0 | 3.5 |
| LOW TIDE FLOODING FTOL | -3.5 | -1.0 | -0.5 | 0.0 | -6.5 | -2.5 | -1.0 | -0.5 | 2.0 | NC | NC | 2.0 | -3.5 | -1.0 | -0.5 | 0.0 |
| M.S.L. FLOODING FTOL | -6.0 | -2.0 | -1.0 | 0.0 | -8.0 | -3.0 | -1.5 | -1.0 | -2.5 | -0.5 | 0.0 | 1.5 | -7.0 | -2.5 | -1.0 | -0.5 |
| HIGH TIDE FLOODING FTOL | -8.5 | -3.0 | -1.5 | -0.5 | -10.0 | -4.0 | -1.5 | -1.0 | -7.0 | -2.0 | -1.0 | 0.5 | -10.0 | -4.0 | -1.5 | -1.0 |
| MAXIMUM HIGH TIDE SURGE | 13.9 | 13.3 | 12.9 | 12.8 | 11.8 | 11.1 | 10.5 | 10.2 | 7.7 | 8.2 | 8.8 | 9.6 | 9.2 | 9.8 | 10.5 | 11.4 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -17.0 | -9.0 | -6.0 | -4.5 | -20.0 | -11.0 | -7.0 | -5.0 | -15.0 | -8.0 | -5.5 | -4.0 | -19.0 | -10.0 | -6.5 | -4.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 16.0 | 11.5 | 8.5 | 29.5 | NC | NC | 8.5 | 23.0 | NC | NC | 7.5 | 23.5 | NC | NC | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -13.0 | -7.0 | -4.5 | -3.0 | -15.5 | -8.5 | -6.0 | -4.0 | -9.5 | -5.0 | -3.5 | -2.5 | -14.0 | -7.5 | -5.0 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.5 | 13.0 | 9.0 | 6.5 | 22.5 | 13.0 | 9.0 | 6.5 | 16.0 | 9.0 | 6.5 | 5.0 | 16.0 | 9.0 | 7.0 | 5.5 |
| LOW TIDE FLOODING FTOL | -5.0 | -2.5 | -1.0 | 0.0 | -8.0 | -4.0 | -1.5 | -1.0 | -3.0 | -1.0 | 0.0 | 0.5 | -7.0 | -3.0 | -1.0 | -0.5 |
| M.S.L. FLOODING FTOL | -8.0 | -3.0 | -1.5 | -0.5 | -10.5 | -4.5 | -2.0 | -1.5 | -7.5 | -3.0 | -1.0 | 0.5 | -10.0 | -4.0 | -2.0 | -1.0 |
| HIGH TIDE FLOODING FTOL | -11.0 | -4.0 | -2.0 | -0.5 | -13.0 | -5.0 | -3.0 | -1.5 | -11.5 | -4.0 | -2.0 | 0.5 | -13.5 | -5.0 | -3.0 | -1.0 |
| MAXIMUM HIGH TIDE SURGE | 17.4 | 17.6 | 18.1 | 18.7 | 16.1 | 16.2 | 16.6 | 17.2 | 9.9 | 11.2 | 12.7 | 14.2 | 11.1 | 13.0 | 15.1 | 17.3 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -17.0 | -8.5 | -5.5 | -4.0 | NC | NC | NC | -4.0 | -14.5 | -7.5 | -5.0 | -4.0 | -18.0 | -9.0 | -5.0 | -4.5 |
| DIRECTION OF WIND | N | N | N | NE | NC | NC | NC | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 28.5 | 15.0 | 10.5 | 7.5 | NC | NC | NC | 7.5 | 24.0 | 13.0 | 9.0 | 7.0 | 25.0 | 13.0 | 9.5 | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -13.0 | -6.5 | -4.5 | -3.0 | -15.0 | -7.5 | -5.0 | -3.0 | -10.0 | -5.0 | -3.5 | -2.5 | -14.0 | -7.0 | -5.0 | -3.5 |
| DIRECTION OF WIND | N | N | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.5 | 12.0 | 8.5 | 6.0 | 23.0 | 12.5 | 9.0 | 6.0 | 16.5 | 9.0 | 6.5 | 5.0 | 18.0 | 10.0 | 7.0 | 5.0 |
| LOW TIDE FLOODING FTOL | -4.0 | -1.5 | -0.5 | 0.0 | -6.5 | -2.5 | -1.0 | 0.0 | -1.5 | -0.5 | 0.0 | 1.0 | -6.0 | -2.0 | -1.0 | -0.5 |
| M.S.L. FLOODING FTOL | -5.5 | -2.5 | -1.0 | 0.0 | -8.0 | -3.0 | -1.5 | 0.0 | -5.5 | -2.0 | -1.0 | 1.0 | -8.0 | -3.5 | -2.0 | -0.5 |
| HIGH TIDE FLOODING FTOL | -7.0 | -3.0 | -2.0 | 0.0 | -9.5 | -4.0 | -2.0 | 0.0 | -9.0 | -4.0 | -2.0 | 0.5 | -10.0 | -4.5 | -3.0 | -1.0 |
| MAXIMUM HIGH TIDE SURGE | 16.5 | 15.9 | 16.3 | 12.3 | 16.5 | 16.1 | 16.7 | 12.9 | 9.7 | NC | NC | 12.5 | 12.1 | NC | NC | 16.6 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

# TEXAS CITY LEVEE WEST (LAMARQ)

ELEVATION: 14.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.0 | -4.5 | -3.0 | -2.0 | -10.5 | -6.0 | -4.0 | -2.5 | . | . | . | 1.0 | -7.5 | -4.5 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 15.5 | 9.5 | 7.0 | 4.5 | 9.5 | 6.5 | 5.0 | 4.5 | . | . | . | 1.0 | 7.0 | 5.0 | 4.0 | 3.5 |
| 65.5 MPH WIND GUSTS FTOL | -5.5 | -3.0 | -2.0 | -1.0 | -7.5 | -4.0 | -3.0 | -2.0 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 11.0 | 6.5 | 5.0 | 3.0 | 6.0 | 4.0 | 3.5 | 3.0 | . | . | . | . | . | . | . | 1.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -4.0 | -2.5 | -13.0 | -7.0 | -5.0 | -3.0 | -5.5 | -3.0 | -2.0 | -1.5 | -10.5 | -6.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 19.5 | 11.5 | 8.0 | 5.5 | 18.0 | 11.0 | 8.0 | 5.5 | 12.0 | 7.0 | 5.0 | 3.5 | 11.5 | 7.0 | 6.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -7.0 | -4.0 | -3.0 | -1.5 | -10.5 | -6.0 | -4.0 | -2.5 | . | . | . | 0.0 | -6.0 | -3.5 | -2.5 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | E | E | E | E | SE |
| DURATION IN HOURS | 13.5 | 8.5 | 6.0 | 4.0 | 9.5 | 6.0 | 5.0 | 4.0 | . | . | . | 0.5 | 2.5 | 2.5 | 2.5 | 3.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -14.0 | -7.5 | -5.0 | -3.5 | -16.5 | -9.0 | -6.0 | -4.0 | -11.0 | -6.0 | -4.0 | -3.0 | -15.0 | -8.0 | -5.5 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 37.5 | 14.5 | 10.5 | 7.0 | 25.0 | 10.0 | 8.0 | 7.0 | 19.0 | NC | NC | 6.0 | 19.5 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -4.0 | -2.5 | -16.0 | -9.0 | -5.5 | -3.0 | -5.5 | -3.0 | -2.0 | -1.5 | -10.5 | -5.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 19.0 | 11.5 | 8.0 | 5.5 | 21.5 | 13.0 | 8.5 | 5.5 | 10.5 | 6.5 | 5.0 | 3.5 | 11.5 | 7.0 | 5.5 | 4.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 15.0 | 14.9 | 14.9 | 14.6 | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -17.0 | -9.0 | -6.0 | -4.0 | -20.0 | -11.0 | -7.0 | -5.0 | -14.5 | -8.0 | -5.5 | -4.0 | -20.5 | -11.0 | -7.0 | -4.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 16.0 | 11.5 | 8.0 | 29.5 | NC | NC | 8.5 | 22.5 | NC | NC | 7.0 | 25.0 | NC | NC | 9.0 |
| 65.5 MPH WIND GUSTS FTOL | -12.5 | -7.0 | -4.5 | -3.0 | -15.5 | -8.0 | -5.5 | -4.0 | -9.0 | -5.0 | -3.5 | -2.5 | -15.5 | -8.0 | -5.5 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.5 | 12.5 | 9.0 | 6.5 | 22.5 | 12.5 | 9.0 | 6.5 | 15.5 | 9.0 | 6.5 | 5.0 | 17.0 | 10.0 | 7.0 | 5.5 |
| LOW TIDE FLOODING FTOL | 1.5 | 0.5 | 0.5 | 0.5 | . | . | . | -0.5 | . | . | . | . | . | . | . | 0.0 |
| M.S.L. FLOODING FTOL | 0.5 | 0.0 | 0.0 | 0.5 | -3.5 | 0.5 | -0.5 | -0.5 | . | . | . | . | . | . | . | 0.0 |
| HIGH TIDE FLOODING FTOL | 0.0 | -0.5 | 0.0 | 0.5 | NC | NC | NC | NC | . | . | . | NC | . | . | . | 0.0 |
| MAXIMUM HIGH TIDE SURGE | 18.5 | 18.7 | 19.3 | 19.9 | 16.8 | 17.1 | 17.9 | 18.6 | . | . | . | 15.0 | . | . | . | 19.4 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -16.5 | -8.5 | -5.5 | -4.0 | -18.5 | -9.5 | -6.0 | -4.0 | -14.0 | -7.0 | -5.0 | -3.5 | -17.5 | -9.0 | -5.0 | -4.5 |
| DIRECTION OF WIND | N | N | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.0 | 11.0 | 7.5 | 29.0 | NC | NC | 7.5 | 24.0 | NC | NC | 6.5 | 24.5 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -13.0 | -6.5 | -4.5 | -3.0 | -14.5 | -7.5 | -5.0 | -3.0 | -9.5 | -5.0 | -3.0 | -2.5 | -13.5 | -7.0 | -5.0 | -3.5 |
| DIRECTION OF WIND | N | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.5 | 12.5 | 8.5 | 6.0 | 22.5 | 12.0 | 8.5 | 6.0 | 16.0 | 9.0 | 6.5 | 4.5 | 18.0 | 10.0 | 7.0 | 5.0 |
| LOW TIDE FLOODING FTOL | 1.0 | 1.5 | 1.0 | 1.0 | 1.0 | . | . | . | NC | . | . | . | . | . | . | 0.5 |
| M.S.L. FLOODING FTOL | 0.5 | 0.5 | 1.0 | 1.0 | 1.0 | . | . | . | NC | . | . | . | . | . | . | 0.0 |
| HIGH TIDE FLOODING FTOL | 0.5 | 0.0 | 0.5 | 1.0 | 1.0 | . | . | . | NC | . | . | . | . | . | . | 0.0 |
| MAXIMUM HIGH TIDE SURGE | 17.3 | 17.5 | 18.5 | 17.4 | 19.1 | . | . | . | NC | . | . | . | . | . | . | 19.9 |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

## + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

## RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

## HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

## MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

I 45 SOUTH OF LA MARQUE (LAMARQ) — ELEVATION: 5.3 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.0 | -4.5 | -3.0 | -2.0 | -10.5 | -6.0 | -4.0 | -2.5 | . | . | . | 1.0 | -7.5 | -4.5 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 15.5 | 9.5 | 7.0 | 4.5 | 9.5 | 6.5 | 5.0 | 4.5 | . | . | . | 1.0 | 7.0 | 5.0 | 4.0 | 3.5 |
| 65.5 MPH WIND GUSTS FTOL | -5.5 | -3.0 | -2.0 | -1.0 | -7.5 | -4.0 | -3.0 | -2.0 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 11.0 | 6.5 | 5.0 | 3.0 | 6.0 | 4.0 | 3.5 | 3.0 | . | . | . | . | . | . | . | 1.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | NC | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 6.8 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -4.0 | -2.5 | -13.0 | -7.0 | -5.0 | -3.0 | -5.5 | -3.0 | -2.0 | -1.5 | -10.5 | -6.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 19.5 | 11.5 | 8.0 | 5.5 | 18.0 | 11.0 | 8.0 | 5.5 | 12.0 | 7.0 | 5.0 | 3.5 | 11.5 | 7.0 | 6.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -7.0 | -4.0 | -3.0 | -1.5 | -10.5 | -6.0 | -4.0 | -2.5 | . | . | . | 0.0 | -6.0 | -3.5 | -2.5 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | E | E | E | E | SE |
| DURATION IN HOURS | 13.5 | 8.5 | 6.0 | 4.0 | 9.5 | 6.0 | 5.0 | 4.0 | . | . | . | 0.5 | 2.5 | 2.5 | 2.5 | 3.0 |
| LOW TIDE FLOODING FTOL | 2.0 | 1.5 | 2.5 | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 0.5 | 0.5 | 1.0 | . | -2.5 | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -1.0 | -.5 | -.5 | NC | NC | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 10.7 | 10.5 | 8.9 | 6.7 | 8.0 | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -14.0 | -7.5 | -5.0 | -3.5 | -16.5 | -9.0 | -6.0 | -4.0 | -11.0 | -6.0 | -4.0 | -3.0 | -15.0 | -8.0 | -5.5 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 37.5 | 14.5 | 10.5 | 7.0 | 25.0 | 10.0 | 8.0 | 7.0 | 19.0 | NC | NC | 6.0 | 19.5 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -4.0 | -2.5 | -16.0 | -9.0 | -5.5 | -3.0 | -5.5 | -3.0 | -2.0 | -1.5 | -10.5 | -5.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 19.0 | 11.5 | 8.0 | 5.5 | 21.5 | 13.0 | 8.5 | 5.5 | 10.5 | 6.5 | 5.0 | 3.5 | 11.5 | 7.0 | 5.5 | 4.5 |
| LOW TIDE FLOODING FTOL | 0.5 | -0.5 | 0.0 | 0.5 | -4.0 | NC | NC | 0.0 | . | . | . | 3.0 | 1.0 | NC | NC | 1.0 |
| M.S.L. FLOODING FTOL | -2.5 | -1.0 | 0.0 | 0.0 | -5.0 | -3.0 | -0.5 | -0.5 | 5.5 | NC | NC | 2.5 | -1.0 | NC | NC | 0.5 |
| HIGH TIDE FLOODING FTOL | -5.5 | -2.0 | -0.5 | 0.0 | -6.5 | -2.5 | -1.0 | -1.0 | NC | NC | NC | NC | -2.5 | -1.0 | 0.0 | 0.5 |
| MAXIMUM HIGH TIDE SURGE | 15.0 | 14.8 | 14.9 | 14.6 | 12.6 | 12.2 | 12.1 | 11.6 | 8.0 | 8.5 | 9.1 | 9.6 | 9.6 | 10.5 | 11.6 | 12.4 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -17.0 | -9.0 | -6.0 | -4.0 | -20.0 | -11.0 | -7.0 | -5.0 | -14.5 | -8.0 | -5.5 | -4.0 | -20.5 | -11.0 | -7.0 | -4.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 16.0 | 11.5 | 8.0 | 29.5 | NC | NC | 8.5 | 22.5 | NC | NC | 7.0 | 25.0 | NC | NC | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -12.5 | -7.0 | -4.5 | -3.0 | -15.5 | -8.0 | -5.5 | -4.0 | -9.0 | -5.0 | -3.5 | -2.5 | -15.5 | -8.0 | -5.5 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.5 | 12.5 | 9.0 | 6.5 | 22.5 | 12.5 | 9.0 | 6.5 | 15.5 | 9.0 | 6.5 | 5.0 | 17.0 | 10.0 | 7.0 | 5.5 |
| LOW TIDE FLOODING FTOL | -2.5 | -1.0 | -0.5 | 0.0 | -6.5 | -3.5 | -1.0 | -0.5 | 2.5 | 2.0 | 1.0 | 1.5 | -4.0 | -2.0 | -1.0 | 0.0 |
| M.S.L. FLOODING FTOL | -4.5 | -2.0 | -1.0 | 0.0 | -7.5 | -3.5 | -1.5 | -1.0 | 0.5 | 0.5 | 0.5 | 1.0 | -5.0 | -2.5 | -1.0 | -0.5 |
| HIGH TIDE FLOODING FTOL | -6.5 | -3.0 | -1.5 | -0.5 | -8.0 | -4.0 | -2.0 | -1.0 | -1.5 | -0.5 | 0.0 | 1.0 | -6.5 | -3.0 | -1.0 | -0.5 |
| MAXIMUM HIGH TIDE SURGE | 18.5 | 18.7 | 19.3 | 19.9 | 16.8 | 17.1 | 17.9 | 18.6 | 10.6 | 11.9 | 13.5 | 15.0 | 12.0 | 14.3 | 16.8 | 19.4 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -16.5 | -8.5 | -5.5 | -4.0 | -18.5 | -9.5 | -6.0 | -4.0 | -14.0 | -7.0 | -5.0 | -3.5 | -17.5 | -9.0 | -6.0 | -4.5 |
| DIRECTION OF WIND | N | N | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.0 | 11.0 | 7.5 | 29.0 | NC | NC | 7.5 | 24.0 | NC | NC | 6.5 | 24.5 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -13.0 | -6.5 | -4.5 | -3.0 | -14.5 | -7.5 | -5.0 | -3.0 | -9.5 | -5.0 | -3.0 | -2.5 | -13.5 | -7.0 | -5.0 | -3.5 |
| DIRECTION OF WIND | N | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.5 | 12.5 | 8.5 | 6.0 | 22.5 | 12.0 | 8.5 | 6.0 | 16.0 | 9.0 | 6.5 | 4.5 | 18.0 | 10.0 | 7.0 | 5.0 |
| LOW TIDE FLOODING FTOL | -2.0 | -0.5 | 0.0 | 0.5 | -5.0 | -1.0 | -0.5 | 0.5 | 3.0 | NC | NC | 2.0 | -2.0 | -0.5 | 0.0 | 0.0 |
| M.S.L. FLOODING FTOL | -4.0 | -1.5 | -0.5 | 0.0 | -6.5 | -2.5 | -1.0 | 0.0 | 1.5 | 1.0 | 0.5 | 1.5 | -3.0 | -1.0 | -0.5 | 0.0 |
| HIGH TIDE FLOODING FTOL | -5.5 | -2.5 | -1.0 | -0.5 | -8.0 | -4.0 | -1.0 | -1.0 | -0.5 | NC | NC | 1.5 | -4.0 | -2.0 | -0.5 | 0.0 |
| MAXIMUM HIGH TIDE SURGE | 17.3 | 17.5 | 18.5 | 17.4 | 19.1 | NC | NC | 10.1 | NC | NC | NC | 12.9 | 13.2 | NC | NC | 19.9 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20 possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

HIGHWAY 6 AT HITCHCOCK (WEST LEVEE) — ELEVATION: 9.9 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -7.5 | -4.5 | -3.0 | -2.0 | -10.5 | -6.0 | -4.0 | -2.5 | -0.5 | -0.5 | -0.5 | -1.0 | -9.5 | -5.0 | -3.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 16.0 | 10.0 | 7.0 | 4.5 | 9.5 | 6.0 | 5.0 | 4.5 | 4.5 | 3.0 | 2.5 | 2.5 | 7.5 | 5.0 | 4.0 | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -4.5 | -3.0 | -2.0 | -1.0 | -7.5 | -5.0 | -3.5 | -2.0 | . | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | S E |
| DURATION IN HOURS | 9.0 | 6.5 | 4.5 | 3.0 | 5.5 | 4.5 | 3.5 | 3.0 | . | . | . | . | . | . | . | 2.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -4.0 | -2.5 | -13.0 | -7.0 | -5.0 | -3.0 | -6.0 | -3.0 | -2.5 | -1.5 | -11.0 | -6.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 19.0 | 11.5 | 8.5 | 5.5 | 12.0 | 8.0 | 6.0 | 5.5 | 12.5 | 7.5 | 5.5 | 4.0 | 13.0 | 8.0 | 6.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -6.5 | -4.0 | -2.5 | -1.5 | -9.5 | -5.5 | -4.0 | -2.5 | . | . | . | -0.5 | -7.0 | -4.0 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 13.0 | 8.5 | 6.0 | 4.0 | 8.0 | 5.5 | 5.0 | 4.0 | . | . | . | 1.5 | 4.0 | 3.0 | 3.0 | 3.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -13.5 | -7.5 | -5.0 | -3.5 | -16.5 | -9.0 | -6.0 | -4.0 | -11.0 | -6.0 | -4.0 | -3.0 | -15.5 | -8.5 | -5.5 | -3.5 |
| DIRECTION OF WIND | NE | NC | NE | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 25.5 | 14.5 | 10.0 | 7.0 | 25.0 | 14.0 | 10.0 | 7.0 | 19.5 | 11.0 | 8.0 | 6.0 | 20.0 | 11.5 | 8.5 | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -3.5 | -2.5 | -13.0 | -7.0 | -5.0 | -3.0 | -5.5 | -3.0 | -2.0 | -1.5 | -11.0 | -5.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | N | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 19.0 | 11.5 | 8.0 | 5.5 | 18.5 | 11.0 | 8.0 | 5.5 | 11.5 | 7.0 | 5.0 | 4.0 | 12.5 | 8.0 | 6.0 | 4.5 |
| LOW TIDE FLOODING FTOL | 1.0 | NC | NC | 1.5 | -2.5 | NC | NC | NC | . | . | . | . | . | . | . | NC |
| M.S.L. FLOODING FTOL | NC | NC | NC | 0.5 | -4.0 | NC | NC | NC | . | . | . | . | . | . | . | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | -0.5 | -5.5 | NC | NC | NC | . | . | . | . | . | . | . | NC |
| MAXIMUM HIGH TIDE SURGE | 16.6 | 16.0 | 15.6 | 14.0 | 13.5 | NC | NC | NC | . | . | . | . | . | . | . | 11.9 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -16.5 | -9.0 | -6.0 | -4.0 | -20.0 | -10.5 | -7.0 | -5.0 | -14.5 | -8.0 | -5.5 | -4.0 | -19.0 | -10.0 | -7.0 | -4.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 16.0 | 11.5 | 8.5 | 29.5 | NC | NC | 8.5 | 23.0 | NC | NC | 7.5 | 24.0 | NC | NC | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -12.5 | -6.5 | -4.5 | -3.0 | -15.5 | -8.5 | -6.0 | -4.0 | -9.0 | -5.0 | -3.5 | -2.5 | -14.0 | -7.5 | -5.0 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 23.0 | 12.5 | 9.0 | 6.5 | 22.5 | 12.5 | 9.0 | 6.5 | 16.0 | 9.0 | 7.0 | 5.0 | 16.5 | 9.5 | 7.0 | 6.0 |
| LOW TIDE FLOODING FTOL | -0.5 | -0.5 | 0.0 | 0.5 | -5.0 | NC | NC | -0.5 | . | . | . | 2.0 | -0.5 | NC | NC | 0.0 |
| M.S.L. FLOODING FTOL | -2.0 | -1.0 | -0.5 | 0.5 | -6.5 | -4.0 | -2.0 | -1.0 | 2.5 | 2.0 | 1.5 | 1.5 | -4.0 | -2.5 | -1.5 | -0.5 |
| HIGH TIDE FLOODING FTOL | -3.0 | -1.5 | -0.5 | 0.0 | -8.0 | NC | NC | -1.5 | NC | NC | NC | 0.5 | -7.0 | -4.0 | -1.5 | -1.5 |
| MAXIMUM HIGH TIDE SURGE | 20.4 | 20.1 | 20.6 | 21.0 | 18.5 | NC | NC | 17.4 | 11.7 | 12.5 | 13.8 | 15.0 | 13.0 | 15.0 | 17.6 | 20.2 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -16.5 | -8.0 | -5.5 | -4.0 | -18.5 | -9.0 | -6.0 | -4.0 | -14.0 | -7.0 | -5.0 | -3.5 | -18.0 | -10.5 | -9.0 | -10.5 |
| DIRECTION OF WIND | N | N | N | N | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.0 | 10.5 | 7.5 | 29.0 | NC | NC | 7.5 | 25.0 | NC | NC | 7.0 | 25.5 | NC | NC | 13.0 |
| 65.5 MPH WIND GUSTS FTOL | -12.5 | -6.0 | -4.0 | -3.0 | -14.5 | -7.0 | -5.0 | -3.0 | -9.5 | -5.0 | -3.5 | -2.5 | -14.0 | -7.0 | -5.0 | -3.5 |
| DIRECTION OF WIND | N | N | N | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.5 | 12.0 | 8.5 | 6.0 | 22.5 | 12.0 | 8.5 | 6.0 | 16.5 | 9.0 | 6.5 | 5.0 | 18.5 | 10.0 | 7.5 | 5.5 |
| LOW TIDE FLOODING FTOL | 0.5 | 0.5 | 0.5 | 1.5 | -5.0 | NC | NC | NC | . | . | . | . | -1.0 | -0.5 | 0.0 | 0.0 |
| M.S.L. FLOODING FTOL | NC | -1.0 | 0.0 | 0.5 | -4.0 | NC | NC | NC | NC | NC | NC | 2.0 | -2.0 | NC | NC | -0.5 |
| HIGH TIDE FLOODING FTOL | NC | -2.5 | -.5 | 0.0 | -3.0 | NC | NC | NC | NC | NC | NC | NC | -3.5 | NC | NC | -1.0 |
| MAXIMUM HIGH TIDE SURGE | 18.4 | 16.5 | 17.0 | NC | 20.4 | NC | NC | NC | 11.6 | NC | NC | 12.4 | 14.6 | NC | NC | 20.5 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

HIGHWAY 6 AT HITCHCOCK 25

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

DICKINSON BAY (DICK BAY) — ELEVATION: 0.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -6.5 | -4.0 | -2.5 | -1.5 | -9.0 | -5.5 | -4.0 | -2.0 | . | . | . | 0.0 | -6.0 | -3.5 | -2.5 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 14.5 | 9.5 | 6.5 | 4.5 | 9.5 | 6.5 | 5.0 | 4.5 | . | . | . | 1.0 | 4.5 | 3.5 | 3.5 | 3.5 |
| 65.5 MPH WIND GUSTS FTOL | -3.0 | -2.0 | -1.5 | -1.0 | -6.0 | -4.5 | -3.0 | -1.5 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 8.0 | 6.0 | 4.5 | 3.0 | 5.5 | 4.0 | 4.0 | 3.0 | . | . | . | . | . | . | . | 1.5 |
| LOW TIDE FLOODING FTOL | -10.0 | -4.5 | -3.0 | -0.5 | -13.0 | -6.5 | -4.5 | -2.5 | -8.5 | -4.0 | -2.5 | -1.0 | -12.0 | -6.0 | -4.0 | -1.5 |
| M.S.L. FLOODING FTOL | -29.0 | -17.0 | -17.0 | -16.5 | -24.0 | -15.0 | -15.5 | -16.5 | -58.5 | -36.5 | -39.5 | -43.5 | -59.0 | -31.5 | -27.0 | -20.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 7.1 | 7.1 | 7.4 | 7.2 | 7.1 | 6.8 | 6.8 | 6.4 | 4.9 | 4.7 | 4.7 | 4.5 | 4.9 | 4.8 | 4.8 | 4.6 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.5 | -5.0 | -3.5 | -2.0 | -11.0 | -6.5 | -4.5 | -3.0 | -2.5 | -1.5 | -1.0 | -1.0 | -9.0 | -5.0 | -3.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 18.0 | 11.0 | 8.0 | 5.5 | 11.5 | 8.0 | 6.5 | 5.5 | 8.0 | 5.0 | 4.0 | 3.0 | 10.0 | 6.5 | 5.5 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -5.0 | -3.5 | -2.5 | -1.5 | -8.0 | -5.0 | -3.5 | -2.0 | . | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 12.0 | 8.0 | 6.0 | 4.0 | 8.0 | 6.0 | 5.0 | 4.0 | . | . | . | . | . | . | . | 3.0 |
| LOW TIDE FLOODING FTOL | -12.0 | -5.5 | -3.5 | -2.0 | -15.5 | -7.0 | -4.5 | -3.0 | -12.0 | -5.5 | -3.0 | -2.0 | -16.0 | -7.5 | -4.5 | -2.5 |
| M.S.L. FLOODING FTOL | -29.0 | -17.0 | -17.0 | -16.5 | -24.5 | -15.0 | -16.0 | -17.0 | -58.5 | -36.5 | -40.0 | -43.5 | -59.0 | -31.5 | -27.5 | -21.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 9.2 | 9.1 | 9.1 | 8.8 | 8.8 | 8.4 | 8.1 | 7.6 | 5.6 | 5.4 | 5.3 | 5.1 | 5.7 | 5.6 | 5.6 | 5.5 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.5 | -7.0 | -4.5 | -3.0 | -15.0 | -8.0 | -5.5 | -3.5 | -8.5 | -5.0 | -3.0 | -2.5 | -13.5 | -7.0 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | NC | 14.0 | 10.0 | 7.0 | 24.5 | NC | NC | 7.0 | 16.5 | NC | NC | 5.5 | 18.0 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -8.5 | -5.0 | -3.5 | -2.0 | -11.0 | -6.5 | -4.0 | -3.0 | -2.0 | -1.0 | -1.0 | -1.0 | -9.0 | -5.0 | -3.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | N | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 18.0 | 11.0 | 8.0 | 5.5 | 17.0 | 10.5 | 7.5 | 5.5 | 6.0 | 4.0 | 3.0 | 3.0 | 9.0 | 6.0 | 5.0 | 4.5 |
| LOW TIDE FLOODING FTOL | -15.5 | -7.5 | -4.5 | -3.0 | -19.0 | -9.0 | -6.0 | -4.0 | -17.0 | -8.0 | -5.0 | -3.0 | -22.0 | -10.5 | -6.5 | -4.0 |
| M.S.L. FLOODING FTOL | -29.0 | -17.0 | -17.0 | -16.5 | -24.5 | -15.0 | -16.0 | -17.0 | -59.0 | -37.0 | -40.0 | -43.5 | -59.0 | -31.5 | -27.5 | -21.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 14.9 | 13.6 | 12.8 | 12.1 | 13.6 | 12.2 | 11.4 | 10.5 | 6.4 | 6.1 | 6.1 | 6.1 | 6.7 | 6.5 | 6.5 | 6.6 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.5 | -8.5 | -5.5 | -4.0 | -18.0 | -10.0 | -6.5 | -4.5 | -12.5 | -7.0 | -4.5 | -3.5 | -17.0 | -9.0 | -6.0 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.5 | 11.5 | 8.5 | 28.0 | NC | NC | 8.5 | 20.5 | NC | NC | 7.0 | 22.5 | NC | NC | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -11.0 | -6.0 | -4.0 | -3.0 | -13.5 | -7.5 | -5.0 | -3.5 | -7.0 | -4.0 | -2.5 | -2.0 | -12.0 | -6.5 | -4.5 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 21.5 | 12.5 | 9.0 | 6.5 | 21.0 | 12.0 | 9.0 | 6.5 | 12.5 | 7.0 | 5.5 | 4.5 | 14.0 | 8.5 | 6.5 | 5.5 |
| LOW TIDE FLOODING FTOL | -18.5 | -9.0 | -5.5 | -3.5 | -20.5 | -10.0 | -6.5 | -5.0 | -20.5 | -10.0 | -6.0 | -4.0 | -27.0 | -13.0 | -8.0 | -5.0 |
| M.S.L. FLOODING FTOL | -29.0 | -17.0 | -17.0 | -17.0 | -24.5 | -15.0 | -16.0 | -17.0 | -59.0 | -37.0 | -40.0 | -43.5 | -59.0 | -32.0 | -27.5 | -21.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 20.3 | 18.0 | 16.2 | 16.4 | 19.9 | 16.5 | 14.4 | 13.8 | 8.5 | 8.2 | 7.7 | 8.1 | 8.3 | 8.1 | 8.0 | 9.0 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -15.5 | -8.0 | -5.0 | -3.5 | -17.0 | -8.5 | -5.5 | -3.5 | -12.5 | -6.0 | -4.0 | -3.0 | -16.0 | -8.0 | -5.5 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.0 | 10.5 | 7.5 | 32.0 | NC | NC | 7.5 | 21.5 | NC | NC | 6.0 | 24.5 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -11.5 | -6.0 | -4.0 | -3.0 | -13.0 | -6.5 | -4.0 | -2.5 | -7.0 | -4.0 | -2.5 | -2.0 | -12.0 | -6.0 | -4.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.0 | 12.0 | 8.5 | 6.0 | 26.5 | 14.0 | 9.5 | 6.0 | 13.5 | 7.5 | 5.5 | 4.0 | 17.0 | 9.5 | 7.0 | 5.0 |
| LOW TIDE FLOODING FTOL | -13.5 | -7.5 | -5.0 | -3.0 | -15.5 | -9.0 | -6.0 | -4.0 | -18.5 | -10.0 | -6.0 | -3.5 | -24.0 | -13.5 | -8.0 | -4.5 |
| M.S.L. FLOODING FTOL | -17.0 | -17.0 | -17.0 | -17.0 | -18.5 | -18.0 | -18.0 | -17.0 | -59.0 | -50.0 | -40.5 | -30.5 | -53.0 | -41.5 | -29.5 | -17.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 22.7 | 19.3 | 18.0 | 17.8 | 23.0 | 19.4 | 18.0 | 17.7 | 8.6 | 7.5 | 7.2 | 7.4 | 7.5 | 7.0 | 7.2 | 7.9 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

HIGHWAY 146 AND DICKINSON BAYOU (D BI 146) — ELEVATION: 19.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -6.0 | -4.0 | -2.5 | -1.5 | -9.0 | -5.5 | -4.0 | -2.0 | . | . | . | 0.0 | -6.5 | -4.0 | -3.0 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | E | E | | E | E |
| DURATION IN HOURS | 14.5 | 9.5 | 6.5 | 4.5 | 9.0 | 6.0 | 5.0 | 4.5 | . | . | . | 1.5 | 5.5 | 4.0 | 3.5 | 3.5 |
| 65.5 MPH WIND GUSTS FTOL | -3.0 | -2.0 | -1.5 | -1.0 | -6.0 | -4.5 | -3.5 | -1.5 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 8.0 | 6.0 | 4.5 | 3.0 | 5.5 | 4.0 | 4.0 | 3.0 | . | . | . | . | . | . | . | 2.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.5 | -5.0 | -3.5 | -2.0 | -11.0 | -6.5 | -4.0 | -3.0 | -2.5 | -2.0 | -1.0 | -1.0 | -9.0 | -5.0 | -3.5 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 18.5 | 11.0 | 8.0 | 5.5 | 11.5 | 7.5 | 6.0 | 5.5 | 8.5 | 5.5 | 4.0 | 3.5 | 10.0 | 6.5 | 5.5 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -5.0 | -3.5 | -2.5 | -1.5 | -8.0 | -5.0 | -3.5 | -2.0 | . | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 12.0 | 8.0 | 6.0 | 4.0 | 8.0 | 6.0 | 5.0 | 4.0 | . | . | . | . | . | . | . | 3.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.5 | -7.0 | -4.5 | -3.0 | -15.0 | -8.0 | -5.5 | -3.5 | -9.0 | -5.0 | -3.5 | -2.5 | -13.5 | -7.5 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | NC | 14.0 | 10.0 | 7.0 | 24.5 | NC | NC | 8.0 | 17.0 | NC | NC | 5.5 | 18.5 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -8.5 | -5.0 | -3.5 | -2.0 | -11.0 | -6.5 | -4.5 | -3.0 | -2.5 | -1.5 | -1.0 | -1.0 | -5.0 | -5.0 | -3.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | N | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 18.0 | 11.0 | 8.0 | 5.5 | 17.0 | 10.5 | 7.5 | 5.5 | 7.0 | 4.5 | 3.5 | 3.0 | 10.0 | 6.5 | 5.0 | 4.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.5 | -8.5 | -5.5 | -4.0 | -18.5 | -10.0 | -6.5 | -4.5 | -12.5 | -7.0 | -4.5 | -3.5 | -17.0 | -9.0 | -6.0 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.5 | 11.5 | 8.0 | 28.0 | NC | NC | 8.5 | 20.5 | NC | NC | 7.0 | 23.0 | NC | NC | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -11.0 | -6.0 | -4.0 | -3.0 | -14.0 | -7.5 | -5.0 | -3.5 | -7.0 | -4.0 | -3.0 | -2.0 | -12.0 | -6.5 | -4.5 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 21.5 | 12.5 | 9.0 | 6.5 | 21.0 | 12.0 | 9.0 | 6.5 | 13.0 | 7.5 | 6.0 | 4.5 | 15.0 | 9.0 | 7.0 | 5.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | NC | . | . | . | NC | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 19.8 | . | . | . | 20.1 | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -15.5 | -7.5 | -5.0 | -3.5 | -17.0 | -8.5 | -5.5 | -3.5 | -12.5 | -6.0 | -4.0 | -3.0 | -16.5 | -8.0 | -5.5 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 14.5 | 10.5 | 7.5 | 32.0 | NC | NC | 7.5 | 22.5 | NC | NC | 6.5 | 24.5 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -11.5 | -5.5 | -4.0 | -2.5 | -13.0 | -6.5 | -4.0 | -2.5 | -7.5 | -4.0 | -2.5 | -2.0 | -12.0 | -6.0 | -4.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.0 | 12.0 | 8.5 | 6.0 | 26.0 | 14.0 | 9.5 | 6.5 | 14.0 | 7.5 | 5.5 | 4.0 | 17.5 | 9.5 | 7.0 | 5.5 |
| LOW TIDE FLOODING FTOL | 0.5 | . | . | . | -0.5 | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 0.5 | . | . | . | -1.5 | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | 0.5 | NC | . | . | -2.0 | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 23.6 | 19.1 | . | . | 23.8 | . | . | . | . | . | . | . | . | . | . | . |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

HIGHWAY 517 AND GUM BAYOU (GUM BIO) — ELEVATION: 7.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -6.0 | -3.5 | -2.5 | -1.5 | -9.0 | -5.5 | -4.0 | -2.0 | . | . | . | 0.0 | -6.5 | -4.0 | -3.0 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 14.0 | 9.5 | 6.5 | 4.5 | 9.0 | 6.0 | 5.0 | 4.5 | . | . | . | 2.0 | 6.0 | 4.5 | 4.0 | 3.5 |
| 65.5 MPH WIND GUSTS FTOL | -2.5 | -2.0 | -1.5 | -1.0 | -6.0 | -5.0 | -3.0 | -1.5 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 8.0 | 6.0 | 4.5 | 3.0 | 5.0 | 4.0 | 3.5 | 2.5 | . | . | . | . | . | . | . | 2.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.5 | -5.0 | -3.5 | -2.0 | -11.5 | -6.5 | -4.5 | -2.5 | -3.0 | -2.0 | -1.5 | -1.0 | -9.5 | -5.5 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 18.0 | 11.0 | 8.0 | 5.5 | 11.5 | 7.5 | 6.0 | 5.5 | 9.0 | 5.5 | 4.0 | 2.5 | 11.0 | 7.0 | 6.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -5.0 | -3.0 | -2.0 | -1.5 | -8.0 | -5.0 | -3.5 | -2.0 | . | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 12.0 | 8.0 | 6.0 | 4.0 | 7.5 | 5.5 | 4.5 | 4.0 | . | . | . | . | . | . | . | 3.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -15.0 | -8.0 | -5.5 | -3.5 | -9.0 | -5.0 | -3.5 | -2.5 | -12.5 | -7.5 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | NC | 14.0 | 10.0 | 7.0 | 24.5 | NC | NC | 8.0 | 17.5 | NC | NC | 5.5 | 18.5 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -8.5 | -5.0 | -3.0 | -2.0 | -11.0 | -6.5 | -4.0 | -2.5 | -2.5 | -1.5 | -1.0 | -1.0 | -9.5 | -5.5 | -3.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | N | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 18.5 | 11.0 | 8.0 | 5.5 | 11.5 | 7.5 | 6.0 | 5.5 | 8.0 | 5.0 | 4.0 | 3.0 | 10.5 | 7.0 | 5.0 | 4.5 |
| LOW TIDE FLOODING FTOL | 1.5 | 3.5 | NC | . | -1.0 | NC | NC | NC | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -0.5 | -2.0 | NC | . | -3.5 | NC | NC | NC | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -2.0 | NC | NC | . | -5.5 | NC | NC | NC | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 17.4 | NC | NC | . | 14.1 | NC | NC | NC | . | . | . | . | . | . | . | . |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.0 | -8.0 | -5.5 | -4.0 | -18.0 | -10.0 | -6.5 | -4.5 | -12.5 | -7.0 | -4.5 | -3.5 | -17.0 | -9.0 | -6.0 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.5 | 11.0 | 8.0 | 28.0 | NC | NC | 8.5 | 21.0 | NC | NC | 7.0 | 23.0 | NC | NC | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -11.0 | -6.0 | -4.0 | -2.5 | -13.5 | -7.5 | -5.0 | -3.5 | -7.0 | -4.0 | -3.0 | -2.0 | -12.5 | -7.0 | -4.5 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.0 | 12.5 | 9.0 | 6.5 | 21.0 | 12.0 | 9.0 | 6.5 | 13.0 | 7.5 | 6.0 | 4.5 | 15.0 | 9.0 | 7.0 | 5.5 |
| LOW TIDE FLOODING FTOL | -0.5 | 0.0 | 0.5 | NC | -3.0 | NC | NC | NC | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -2.0 | -1.5 | -0.5 | NC | -4.5 | NC | NC | NC | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -3.5 | -2.0 | -1.5 | NC | -6.5 | NC | NC | NC | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 22.2 | 19.4 | 17.3 | 10.0 | 21.9 | NC | NC | NC | . | . | . | . | . | . | . | . |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -15.0 | -7.5 | -5.0 | -3.5 | -17.0 | -10.5 | -15.0 | -3.5 | -12.0 | -8.0 | -11.5 | -3.0 | -16.5 | -10.5 | -15.5 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 14.5 | 10.5 | 4.0 | 32.0 | NC | NC | 7.5 | 23.0 | NC | NC | 6.5 | 24.5 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -11.0 | -5.5 | -3.5 | -2.5 | -13.0 | -8.0 | -12.0 | -2.5 | -7.0 | -4.5 | -7.0 | -2.0 | -12.0 | -8.0 | -12.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 24.0 | 12.0 | 8.5 | 3.0 | 26.0 | 14.0 | 12.5 | 6.0 | 14.0 | 8.0 | 7.5 | 4.5 | 17.5 | 10.0 | 9.5 | 5.5 |
| LOW TIDE FLOODING FTOL | -1.0 | 0.0 | 0.5 | NC | -3.0 | NC | NC | NC | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -2.5 | -1.0 | 0.0 | NC | -4.5 | NC | NC | NC | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -4.0 | -2.0 | 0.0 | NC | -6.5 | NC | NC | NC | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 26.3 | 22.5 | 19.4 | NC | 26.0 | NC | NC | NC | . | . | . | . | . | . | . | . |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: Winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

# HIGHWAY 3 AND DICKINSON BAYOU 29

HIGHWAY 3 AND DICKINSON BAYOU (D BI 3)

ELEVATION: 11.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -6.0 | -3.5 | -2.5 | -1.5 | -9.0 | -5.5 | -4.0 | -2.0 | . | . | . | -0.5 | -7.0 | -4.5 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | F | E | E | E | E |
| DURATION IN HOURS | 14.0 | 9.5 | 7.0 | 4.5 | 8.5 | 6.5 | 5.0 | 4.5 | . | . | . | 2.0 | 7.0 | 5.0 | 4.5 | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -2.5 | -2.0 | -1.5 | -0.5 | -6.0 | -4.5 | -3.0 | -1.5 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 7.5 | 6.0 | 5.0 | 3.0 | 5.0 | 4.5 | 4.0 | 2.5 | . | . | . | . | . | . | . | 2.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.0 | -5.0 | -3.0 | -2.0 | -11.5 | -7.0 | -4.5 | -2.5 | -3.5 | -2.0 | -1.5 | -1.0 | -10.0 | -6.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | F | F | E | E | E |
| DURATION IN HOURS | 18.0 | 11.5 | 8.0 | 5.5 | 11.0 | 7.5 | 6.0 | 4.0 | 10.0 | 6.5 | 5.0 | 4.0 | 11.5 | 7.5 | 6.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -5.0 | -3.0 | -2.0 | -1.0 | -8.0 | -5.0 | -4.0 | -2.0 | . | . | . | 0.5 | -5.5 | -3.5 | -2.5 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | . | E | E | E | E |
| DURATION IN HOURS | 11.5 | 8.0 | 6.0 | 4.0 | 7.5 | 6.0 | 5.0 | 4.0 | . | . | . | 0.5 | 3.0 | 3.0 | 3.0 | 3.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -15.0 | -8.5 | -5.5 | -3.5 | -9.0 | -5.0 | -3.5 | -2.5 | -14.0 | -8.0 | -5.0 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | NC | 14.0 | 10.0 | 7.0 | 24.5 | NC | NC | 8.0 | 18.0 | NC | NC | 5.5 | 19.0 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -8.0 | -4.5 | -3.0 | -2.0 | -11.0 | -6.5 | -4.5 | -3.0 | -3.0 | -2.0 | -1.5 | -1.0 | -9.5 | -5.5 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | N | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 18.0 | 11.0 | 8.0 | 5.5 | 11.0 | 7.0 | 6.0 | 5.5 | 9.0 | 5.5 | 4.0 | 3.5 | 11.5 | 7.0 | 5.5 | 4.5 |
| LOW TIDE FLOODING FTOL | NC | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | NC | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | NC | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | NC | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -17.0 | -8.0 | -5.5 | -8.5 | -18.5 | -8.0 | -4.5 | -4.5 | -12.5 | -5.0 | -3.5 | -3.5 | -17.5 | -7.5 | -4.0 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 16.0 | 11.5 | 16.5 | 28.0 | NC | NC | 8.5 | 22.0 | NC | NC | 7.0 | 23.5 | NC | NC | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -15.0 | -6.0 | -4.0 | -9.5 | -11.5 | NC | NC | -3.5 | -7.0 | NC | NC | -2.0 | -12.5 | NC | NC | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 12.5 | 9.0 | 15.5 | 14.5 | NC | NC | 6.5 | 14.0 | NC | NC | 5.0 | 16.0 | NC | NC | 6.0 |
| LOW TIDE FLOODING FTOL | 1.0 | 1.0 | -3.5 | NC | -2.0 | NC | NC | NC | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -0.5 | 0.5 | NC | NC | -4.0 | NC | NC | NC | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -2.5 | 0.0 | NC | NC | -5.5 | NC | NC | NC | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 24.1 | 20.1 | 17.1 | NC | 22.5 | NC | NC | NC | . | . | . | . | . | . | . | . |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -14.5 | -7.5 | -5.0 | -3.5 | -17.0 | -8.5 | -5.5 | -3.5 | -12.0 | -6.0 | -4.0 | -3.0 | -16.5 | -8.5 | -6.0 | -4.0 |
| DIRECTION OF WIND | N | N | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.0 | 10.5 | 7.5 | 28.0 | NC | NC | 7.5 | 23.5 | NC | NC | 6.5 | 25.0 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -11.0 | -5.5 | -3.5 | -2.5 | -13.0 | -6.5 | -4.0 | -2.5 | -7.5 | -4.0 | -2.5 | -2.0 | -12.5 | -6.5 | -4.5 | -3.0 |
| DIRECTION OF WIND | N | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.0 | 12.0 | 8.5 | 6.0 | 26.0 | 12.5 | 9.5 | 5.5 | 14.5 | 8.0 | 6.0 | 4.5 | 18.0 | 10.0 | 7.0 | 5.5 |
| LOW TIDE FLOODING FTOL | 0.5 | 1.0 | NC | . | -1.5 | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -0.5 | 0.0 | NC | . | -2.5 | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -1.0 | -0.5 | NC | . | -4.0 | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 30.1 | 24.2 | 17.0 | . | 28.7 | . | . | . | . | . | . | . | . | . | . | . |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

I 45 AND DICKINSON BAYOU (C BI 45)

ELEVATION: 14.2 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -5.5 | -3.5 | -2.5 | -1.5 | -9.0 | -5.5 | -4.0 | -2.0 | . | . | . | -0.5 | -7.5 | -4.5 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 14.0 | 9.5 | 7.0 | 4.5 | 8.5 | 6.0 | 5.0 | 4.0 | . | . | . | 2.0 | 7.0 | 5.5 | 4.5 | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -2.5 | -2.0 | -1.5 | -0.5 | -6.0 | -5.0 | -3.0 | -1.5 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 7.5 | 6.0 | 4.5 | 3.0 | 5.0 | 4.5 | 3.5 | 2.5 | . | . | . | . | . | . | . | 2.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.0 | -4.5 | -3.0 | -2.0 | -11.5 | -6.5 | -4.5 | -2.5 | -3.5 | -2.0 | -1.5 | -1.0 | -10.0 | -6.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 18.0 | 11.0 | 8.0 | 5.5 | 11.0 | 7.5 | 6.0 | 5.0 | 10.5 | 6.5 | 5.0 | 4.0 | 11.5 | 7.5 | 6.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -4.5 | -3.0 | -2.0 | -1.0 | -8.0 | -5.0 | -3.5 | -2.0 | . | . | . | 0.5 | -6.0 | -4.0 | -2.5 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | SE | E | E | E | E |
| DURATION IN HOURS | 11.0 | 8.0 | 6.0 | 4.0 | 7.5 | 6.0 | 4.5 | 4.0 | . | . | . | 1.0 | 3.5 | 3.0 | 3.0 | 3.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -15.0 | -8.0 | -5.5 | -3.5 | -9.0 | -5.0 | -3.5 | -2.5 | -14.0 | -8.0 | -5.0 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | N | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E |
| DURATION IN HOURS | NC | 14.0 | 10.0 | 7.0 | 24.0 | NC | NC | 8.0 | 18.0 | NC | NC | 5.5 | 19.5 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -8.0 | -4.5 | -3.0 | -2.0 | -11.5 | -6.5 | -4.5 | -3.0 | -3.5 | -2.0 | -1.5 | -1.0 | -10.0 | -6.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | N | NE | NE | NE | NE | E | E | E | E | E | E | F | E |
| DURATION IN HOURS | 18.0 | 11.0 | 8.0 | 5.5 | 11.0 | 7.0 | 6.0 | 5.5 | 9.5 | 6.0 | 4.5 | 3.5 | 11.5 | 7.5 | 6.0 | 4.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 5.0 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | NC | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 17.2 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.0 | -8.0 | -5.5 | -8.5 | -18.5 | -10.0 | -7.0 | -4.5 | -12.5 | -6.0 | -3.5 | -3.5 | -17.5 | -9.5 | -6.5 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.5 | 11.5 | 28.5 | 28.0 | NC | NC | 8.5 | 22.5 | NC | NC | 7.0 | 24.0 | NC | NC | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -10.5 | -6.0 | -4.0 | -2.0 | -15.0 | -9.0 | -6.0 | -3.5 | -7.0 | -4.5 | -3.0 | -2.0 | -13.0 | -7.0 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.0 | 12.5 | 9.0 | 6.0 | 22.0 | 13.0 | 9.0 | 6.5 | 14.0 | 8.5 | 6.0 | 5.0 | 16.0 | 10.0 | 7.0 | 6.0 |
| LOW TIDE FLOODING FTOL | 2.0 | 2.0 | NC | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 1.5 | 1.5 | 7.0 | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | 1.5 | 1.0 | NC | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 25.6 | 15.7 | NC | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -14.5 | -7.5 | -5.0 | -3.5 | -17.0 | -8.5 | -5.5 | -3.5 | -12.0 | -6.0 | -4.0 | -3.0 | -16.5 | -8.5 | -6.0 | -4.0 |
| DIRECTION OF WIND | N | N | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 14.5 | 10.5 | 7.5 | 28.0 | NC | NC | 7.5 | 24.0 | NC | NC | 6.5 | 25.0 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -10.5 | -5.5 | -3.5 | -2.5 | -13.0 | -6.5 | -4.0 | -2.5 | -7.5 | -4.0 | -2.5 | -2.0 | -12.5 | -6.0 | -4.5 | -3.0 |
| DIRECTION OF WIND | N | N | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.0 | 12.0 | 8.5 | 6.0 | 26.0 | 13.5 | 9.0 | 5.5 | 15.0 | 8.0 | 6.0 | 4.5 | 18.0 | 10.0 | 7.0 | 5.5 |
| LOW TIDE FLOODING FTOL | 1.0 | 1.5 | . | . | -1.0 | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 0.5 | 1.5 | . | . | -1.5 | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | 0.0 | 1.0 | NC | . | -1.5 | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 31.8 | 22.9 | NC | . | 29.5 | . | . | . | . | . | . | . | . | . | . | . |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

WEST GALVESTON BAY (W GAL BA) — ELEVATION: 0.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -5.0 | -3.5 | -2.5 | -1.5 | -8.0 | -5.0 | -3.5 | -2.0 | . | . | . | . | -5.0 | -3.5 | -2.5 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | E | E | E | E |
| DURATION IN HOURS | 13.0 | 9.0 | 6.5 | 4.5 | 8.5 | 6.5 | 5.0 | 4.0 | . | . | . | . | 4.5 | 4.0 | 3.5 | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -1.5 | -1.5 | -1.0 | 0.5 | -5.0 | -3.5 | -1.5 | -1.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 7.0 | 5.5 | 4.5 | 2.0 | 5.0 | 4.5 | 4.5 | 3.0 | . | . | . | . | . | . | . | 2.0 |
| LOW TIDE FLOODING FTOL | -6.0 | -2.5 | -1.5 | -0.5 | -9.5 | -4.5 | -2.5 | -1.5 | -4.0 | . | . | . | -9.5 | -4.5 | -2.0 | -0.5 |
| M.S.L. FLOODING FTOL | -28.0 | -17.0 | -17.0 | -16.5 | -24.0 | NC | NC | -16.5 | -58.5 | NC | NC | -43.0 | -58.5 | NC | NC | -20.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 6.4 | 6.3 | 6.2 | 5.9 | 6.8 | 6.4 | 6.3 | 5.6 | 4.6 | 4.5 | 4.4 | 4.0 | 4.9 | 4.7 | 4.7 | 4.4 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -7.5 | -4.5 | -3.0 | -2.0 | -10.0 | -6.0 | -4.0 | -2.5 | 0.0 | 0.0 | 0.0 | -0.5 | -8.0 | -5.0 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 17.5 | 11.0 | 8.0 | 5.5 | 11.5 | 8.0 | 6.0 | 5.5 | 5.0 | 3.5 | 3.0 | 3.0 | 9.0 | 6.0 | 5.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -4.0 | -2.5 | -2.0 | -1.0 | -7.0 | -4.5 | -3.0 | -1.5 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 11.0 | 7.5 | 5.5 | 4.0 | 7.5 | 5.5 | 4.5 | 4.0 | . | . | . | . | . | . | . | 3.0 |
| LOW TIDE FLOODING FTOL | -8.0 | -3.5 | -2.0 | -1.0 | -12.0 | -5.5 | -3.0 | -2.0 | -7.5 | -3.0 | -1.5 | -0.5 | -13.5 | -6.0 | -3.0 | -1.5 |
| M.S.L. FLOODING FTOL | -29.0 | -17.0 | -17.0 | -16.5 | -24.5 | NC | NC | -16.5 | -58.5 | NC | NC | -43.5 | -58.5 | NC | NC | -20.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 8.6 | 8.2 | 7.5 | 7.3 | 8.5 | 7.9 | 7.4 | 6.7 | 5.4 | 5.0 | 4.8 | 4.4 | 5.6 | 5.4 | 5.3 | 5.1 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -11.5 | -6.5 | -4.5 | -3.0 | -13.5 | -7.5 | -5.5 | -3.5 | -7.0 | -4.0 | -3.0 | -2.0 | -12.5 | -7.0 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | N | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E |
| DURATION IN HOURS | NC | 14.0 | 10.0 | 7.0 | 23.0 | NC | NC | 7.5 | 15.0 | NC | NC | 5.0 | 17.5 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -7.5 | -4.5 | -3.0 | -2.0 | -10.0 | -6.0 | -4.0 | -2.5 | 0.5 | 0.0 | 0.0 | -0.5 | -8.0 | -4.5 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | N | N | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 17.5 | 10.5 | 7.5 | 5.0 | 11.0 | 7.5 | 5.5 | 5.5 | 3.0 | 2.0 | 2.0 | 2.5 | 8.5 | 5.5 | 5.0 | 4.5 |
| LOW TIDE FLOODING FTOL | -10.5 | -5.0 | -3.0 | -2.0 | -15.5 | -7.0 | -4.5 | -3.0 | -12.0 | -5.5 | -3.0 | -1.5 | -19.0 | -8.5 | -5.0 | -2.5 |
| M.S.L. FLOODING FTOL | -29.0 | -17.0 | -17.0 | -16.5 | -24.5 | NC | NC | -17.0 | -58.5 | NC | NC | -43.5 | -59.0 | NC | NC | -21.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 15.9 | 14.3 | 12.9 | 12.0 | 14.6 | 12.6 | 11.0 | 9.7 | 6.1 | 5.8 | 5.5 | 5.4 | 6.7 | 6.4 | 6.1 | 6.1 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -14.5 | -8.0 | -5.5 | -3.5 | -17.0 | -9.0 | -6.0 | -4.0 | -11.5 | -6.0 | -4.0 | -3.0 | -16.0 | -8.5 | -5.5 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.5 | 11.0 | 8.0 | 27.5 | NC | NC | 8.5 | 19.0 | NC | NC | 6.5 | 22.0 | NC | NC | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -4.0 | -2.5 | -12.5 | -7.0 | -5.0 | -3.0 | -5.0 | -3.0 | -2.0 | -1.5 | -11.0 | -6.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 21.0 | 12.0 | 9.0 | 6.0 | 20.0 | 11.5 | 9.0 | 6.5 | 10.5 | 6.5 | 5.0 | 4.0 | 13.5 | 8.0 | 6.5 | 5.5 |
| LOW TIDE FLOODING FTOL | -12.5 | -6.0 | -3.5 | -2.5 | -17.5 | -8.5 | -5.5 | -4.0 | -15.5 | -7.0 | -4.5 | -2.5 | -23.5 | -11.0 | -6.5 | -3.5 |
| M.S.L. FLOODING FTOL | -29.0 | -17.0 | -17.0 | -17.0 | -24.5 | NC | NC | -17.0 | -59.0 | NC | NC | -43.5 | -59.0 | NC | NC | -21.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 21.5 | 20.5 | 18.4 | 17.6 | 21.4 | 19.3 | 16.3 | 14.6 | 8.7 | 8.4 | 7.6 | 7.4 | 8.2 | 8.3 | 8.0 | 8.2 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -14.5 | -7.0 | -5.0 | -3.5 | -16.0 | -8.0 | -5.0 | -3.0 | -11.0 | -5.5 | -4.0 | -3.0 | -15.0 | -7.5 | -5.0 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 26.5 | 14.5 | 10.5 | 7.5 | 31.5 | 17.0 | 12.0 | 7.5 | 20.5 | 11.5 | 8.5 | 6.0 | 24.0 | 13.5 | 10.0 | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -10.5 | -5.0 | -3.5 | -2.5 | -12.0 | -6.0 | -4.0 | -2.5 | -5.5 | -3.0 | -2.0 | -1.5 | -11.0 | -5.5 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 21.5 | 11.5 | 8.5 | 6.0 | 25.5 | 13.5 | 9.5 | 6.0 | 11.5 | 6.5 | 5.0 | 4.0 | 16.5 | 9.0 | 6.5 | 5.0 |
| LOW TIDE FLOODING FTOL | -10.0 | -5.0 | -3.0 | -2.0 | -14.5 | -7.0 | -4.0 | -3.0 | -13.5 | -6.5 | -4.0 | -2.0 | -2.5 | -2.0 | -2.0 | -3.5 |
| M.S.L. FLOODING FTOL | -17.5 | -17.0 | -17.0 | -17.0 | -18.5 | -18.0 | -18.0 | -17.0 | -59.0 | -49.5 | -46.5 | -30.5 | -53.0 | -41.0 | -29.0 | -17.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 25.1 | 22.6 | 20.0 | 16.9 | 23.6 | 21.5 | 19.3 | 16.6 | 8.2 | 7.6 | 7.0 | 6.2 | 7.5 | 7.5 | 7.4 | 7.2 |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: Hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

HIGHWAY 146 AND KEMAH (KEMAH 146) — ELEVATION: 3.6 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -4.5 | -3.0 | -2.0 | -1.0 | -8.0 | -5.0 | -3.5 | -2.0 | . | . | . | 0.5 | -5.5 | -4.0 | -3.0 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 13.0 | 9.0 | 6.5 | 4.5 | 8.5 | 6.5 | 5.0 | 4.0 | . | . | . | 1.0 | 5.0 | 4.0 | 4.0 | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -1.5 | -1.5 | -1.0 | -0.5 | -4.5 | NC | NC | -1.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 6.5 | 6.0 | 4.5 | 3.0 | 4.5 | 4.0 | 4.0 | 3.0 | . | . | . | . | . | . | . | 2.0 |
| LOW TIDE FLOODING FTOL | 2.0 | 2.0 | . | . | -2.0 | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -1.0 | -0.5 | 0.0 | 0.5 | -5.0 | -4.0 | -2.0 | -0.5 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -3.5 | -3.5 | NC | NC | -7.5 | NC | NC | NC | NC | . | . | . | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 7.2 | 6.8 | 6.3 | 5.7 | 7.4 | 6.9 | 6.2 | 5.3 | 4.7 | . | . | . | 5.0 | 4.9 | 4.9 | 4.6 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -7.0 | -4.5 | -3.0 | -2.0 | -10.0 | -6.0 | -4.0 | -2.5 | -0.5 | -0.5 | -0.5 | -0.5 | -8.5 | -5.0 | -3.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 17.0 | 11.0 | 8.0 | 5.5 | 11.0 | 7.5 | 6.0 | 5.5 | 6.5 | 4.0 | 3.5 | 3.0 | 10.0 | 7.0 | 5.5 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -3.5 | -2.5 | -2.0 | -1.0 | -7.0 | -4.5 | -3.0 | -1.5 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 10.5 | 7.5 | 6.0 | 4.0 | 7.5 | 6.0 | 5.0 | 4.0 | . | . | . | . | . | . | . | 3.0 |
| LOW TIDE FLOODING FTOL | -0.5 | 0.0 | 0.5 | 1.0 | -4.5 | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -2.5 | -1.5 | -0.5 | 0.0 | -7.0 | -3.5 | -2.0 | -1.0 | 1.5 | . | . | . | -5.0 | . | . | . |
| HIGH TIDE FLOODING FTOL | -5.0 | -3.0 | -2.0 | -1.5 | -9.5 | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 9.6 | 9.2 | 8.8 | 7.9 | 9.4 | 8.6 | 7.6 | 6.3 | 5.8 | 5.5 | 5.2 | 4.6 | 6.0 | 5.8 | 5.6 | 5.1 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -11.0 | -6.0 | -4.0 | -2.5 | -14.0 | -7.5 | -5.0 | -3.0 | -7.0 | -4.0 | -3.0 | -2.0 | -12.5 | -7.0 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | N | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | NC | 14.0 | 10.0 | 7.0 | 23.5 | NC | NC | 7.0 | 15.0 | NC | NC | 5.5 | 18.5 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -7.0 | -4.0 | -3.0 | -2.0 | -10.0 | -5.5 | -4.0 | -2.5 | 0.0 | 0.0 | 0.0 | -0.5 | -8.0 | -5.0 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | N | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 17.5 | 10.5 | 7.5 | 5.5 | 11.0 | 7.5 | 5.5 | 5.5 | 4.5 | NC | NC | 3.0 | 9.5 | 6.0 | 5.0 | 4.5 |
| LOW TIDE FLOODING FTOL | -6.0 | -1.5 | -0.5 | 0.0 | -8.5 | NC | NC | -1.5 | 2.0 | . | . | . | -6.5 | . | . | . |
| M.S.L. FLOODING FTOL | NC | -2.5 | -1.5 | -0.5 | -9.5 | NC | NC | -1.5 | -3.5 | NC | NC | 1.5 | -10.5 | NC | NC | -1.0 |
| HIGH TIDE FLOODING FTOL | NC | -3.5 | -3.0 | -1.5 | -10.5 | NC | NC | -2.0 | -9.5 | NC | NC | NC | -14.5 | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 16.9 | 15.1 | 13.6 | 14.1 | 15.5 | 13.1 | 10.9 | 10.3 | 6.7 | 6.0 | 5.3 | 5.4 | 7.4 | 6.6 | 6.0 | 6.3 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -14.0 | -7.5 | -5.0 | -3.5 | -17.0 | -9.0 | -6.0 | -4.0 | -11.0 | -6.0 | -4.0 | -3.0 | -16.0 | -8.5 | -6.0 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.5 | 11.0 | 8.0 | 27.5 | NC | NC | 8.5 | 19.0 | NC | NC | 6.5 | 22.5 | NC | NC | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -3.5 | -2.5 | -12.5 | -7.0 | -4.5 | -3.0 | -5.5 | -3.0 | -2.0 | -1.5 | -11.0 | -6.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 22.0 | 12.0 | 9.0 | 6.5 | 14.0 | 8.0 | 7.0 | 6.5 | 11.0 | 6.5 | 5.0 | 4.0 | 14.5 | 9.0 | 6.5 | 6.0 |
| LOW TIDE FLOODING FTOL | -5.5 | -2.0 | -1.0 | 0.0 | -9.5 | -4.0 | -2.0 | -1.0 | -4.0 | -1.0 | 0.0 | 1.5 | -10.0 | -3.5 | -1.5 | -0.5 |
| M.S.L. FLOODING FTOL | -8.0 | -3.5 | -2.0 | -1.0 | -12.0 | -5.5 | -3.0 | -2.5 | -7.0 | -3.0 | -1.5 | -0.5 | -14.0 | -6.0 | -3.5 | -2.0 |
| HIGH TIDE FLOODING FTOL | -10.5 | -5.0 | -3.0 | -2.0 | -14.5 | -7.0 | -4.5 | -3.5 | -10.5 | -5.0 | -3.0 | -2.5 | -18.5 | -9.0 | -5.0 | -3.0 |
| MAXIMUM HIGH TIDE SURGE | 23.5 | 22.0 | 19.3 | 18.4 | 23.0 | 20.4 | 16.8 | 14.7 | 9.4 | 8.5 | 8.0 | 7.7 | 9.0 | 9.0 | 8.4 | 8.6 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -14.0 | -7.0 | -4.5 | -3.5 | -16.0 | -8.0 | -5.0 | -3.0 | -10.5 | -5.5 | -4.0 | -3.0 | -15.5 | -8.0 | -5.0 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 14.5 | 10.5 | 7.5 | 31.5 | NC | NC | 7.5 | 21.5 | NC | NC | 6.0 | 24.5 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -10.0 | -5.0 | -3.5 | -2.5 | -12.0 | -6.0 | -4.0 | -2.5 | -5.5 | -3.0 | -2.0 | -1.5 | -11.0 | -5.5 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 21.5 | 11.5 | 8.5 | 6.0 | 25.5 | 13.5 | 9.5 | 6.0 | 12.0 | 7.0 | 5.0 | 4.0 | 17.0 | 9.5 | 7.0 | 5.0 |
| LOW TIDE FLOODING FTOL | -4.0 | -1.5 | -0.5 | 0.0 | -8.0 | -2.5 | -1.0 | -0.5 | -3.5 | -1.0 | 0.0 | 2.0 | -8.5 | -3.0 | -1.0 | -0.5 |
| M.S.L. FLOODING FTOL | -4.5 | -2.5 | -1.5 | -1.0 | -10.5 | -6.0 | -3.0 | -1.5 | -6.5 | -3.5 | -1.5 | -0.5 | -12.5 | -7.0 | -4.0 | -2.0 |
| HIGH TIDE FLOODING FTOL | -5.0 | -4.0 | -2.5 | -2.0 | -12.5 | -9.0 | -5.0 | -2.5 | -9.0 | -7.0 | -4.5 | -3.0 | -16.5 | -12.0 | -6.5 | -3.0 |
| MAXIMUM HIGH TIDE SURGE | 27.4 | 25.0 | 21.0 | 18.0 | 25.5 | 23.5 | 20.0 | 17.5 | 8.8 | 8.3 | 7.3 | 6.6 | 8.4 | 8.7 | 8.5 | 8.6 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour; FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

CLEAR LAKE (CL LAK CITY) — ELEVATION: 0.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -4.5 | -3.0 | -2.0 | -1.0 | -7.5 | -5.0 | -3.5 | -2.0 | . | . | . | 0.5 | -6.0 | -4.0 | -2.5 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 12.5 | 9.0 | 6.5 | 4.5 | 8.5 | 6.5 | 5.0 | 4.0 | . | . | . | 1.5 | 6.0 | 5.0 | 4.0 | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -1.0 | -1.5 | -1.0 | -0.5 | -4.5 | NC | NC | -1.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 6.5 | 5.5 | 4.5 | 3.0 | 4.5 | 4.0 | 3.5 | 2.5 | . | . | . | . | . | . | . | 2.0 |
| LOW TIDE FLOODING FTOL | -0.5 | 0.5 | 0.5 | 1.0 | -4.5 | NC | NC | 0.5 | -3.0 | . | . | . | -3.0 | . | . | . |
| M.S.L. FLOODING FTOL | -4.0 | -1.5 | -1.0 | -0.5 | -8.0 | -3.5 | -2.5 | -2.0 | -4.0 | NC | NC | -2.0 | -20.5 | NC | NC | -6.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 6.8 | 7.4 | 6.5 | 5.8 | 7.9 | 7.6 | 6.0 | 4.0 | 4.8 | 4.6 | 3.7 | 2.6 | 5.2 | 5.2 | 4.3 | 3.1 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -7.0 | -4.0 | -3.0 | -1.5 | -10.0 | -6.0 | -4.0 | -2.5 | -1.0 | -0.5 | -0.5 | -0.5 | -8.5 | -5.0 | -3.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 16.5 | 11.0 | 8.0 | 5.5 | 11.0 | 7.5 | 6.0 | 5.0 | 7.0 | 5.0 | 4.0 | 3.0 | 10.0 | 7.0 | 6.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -3.5 | -2.5 | -1.5 | -1.0 | -6.5 | -4.5 | -3.5 | -1.5 | . | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 10.0 | 7.5 | 6.0 | 4.0 | 7.0 | 6.0 | 5.0 | 4.0 | . | . | . | . | . | . | . | 3.5 |
| LOW TIDE FLOODING FTOL | -2.0 | 0.0 | 0.0 | 0.5 | -6.5 | NC | NC | -0.5 | 0.0 | . | . | . | -6.5 | NC | NC | 0.5 |
| M.S.L. FLOODING FTOL | -5.5 | -2.5 | -1.0 | -0.5 | -10.5 | NC | NC | -2.0 | -5.0 | NC | NC | -2.0 | -22.5 | NC | NC | -7.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 10.2 | 10.2 | 9.9 | 8.8 | 10.0 | 9.1 | 7.9 | 6.1 | 6.1 | NC | NC | NC | 6.4 | 6.3 | 6.0 | 5.3 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.5 | -6.0 | -4.0 | -2.5 | -14.0 | -8.0 | -5.0 | -3.5 | -7.0 | -4.0 | -3.0 | -2.0 | -12.5 | -7.0 | -4.5 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 23.5 | 14.0 | 10.0 | 7.0 | 23.5 | 14.0 | 10.0 | 6.5 | 16.0 | 10.0 | 7.0 | 5.5 | 18.5 | 11.0 | 8.5 | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -7.0 | -4.0 | -2.5 | -1.5 | -10.0 | -5.5 | -3.5 | -2.0 | -0.5 | -0.5 | -0.5 | -0.5 | -8.5 | -5.0 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 17.5 | 10.5 | 7.5 | 5.5 | 11.0 | 8.0 | 6.5 | 6.0 | 5.5 | 3.5 | 3.0 | 3.0 | 10.0 | 6.5 | 5.5 | 4.5 |
| LOW TIDE FLOODING FTOL | -5.0 | -1.5 | -0.5 | 0.0 | -9.5 | NC | NC | -1.0 | -5.0 | NC | NC | 1.0 | -11.5 | NC | NC | -0.5 |
| M.S.L. FLOODING FTOL | -7.5 | -3.5 | -2.0 | -1.0 | -13.5 | -6.0 | -3.5 | -2.5 | -9.5 | -4.0 | -2.5 | -2.0 | -25.0 | -12.0 | NC | -7.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 18.0 | 16.1 | 14.1 | 13.0 | 16.3 | 14.3 | 12.4 | 11.1 | 7.2 | 6.5 | 5.9 | 5.6 | 7.9 | 7.4 | 6.9 | 6.8 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -14.0 | -7.5 | -5.0 | -3.5 | -17.0 | -9.0 | -6.0 | -4.0 | -11.0 | -6.0 | -4.0 | -3.0 | -16.0 | -8.5 | -6.0 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.5 | 11.0 | 8.0 | 27.0 | NC | NC | 8.5 | 20.0 | NC | NC | 7.0 | 22.5 | NC | NC | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -9.5 | -5.5 | -3.5 | -2.5 | -12.5 | -7.0 | -4.5 | -3.0 | -5.5 | -3.0 | -2.0 | -1.5 | -11.5 | -6.0 | -4.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 21.5 | 12.0 | 8.5 | 6.0 | 14.0 | 8.5 | 7.0 | 6.5 | 11.5 | 7.0 | 5.0 | 4.5 | 14.5 | 8.5 | 6.5 | 5.5 |
| LOW TIDE FLOODING FTOL | -7.0 | -2.5 | -1.0 | -0.5 | -12.0 | -4.5 | -2.0 | -1.5 | -8.0 | -3.0 | -1.0 | 0.0 | -15.5 | -5.5 | -2.0 | -1.0 |
| M.S.L. FLOODING FTOL | -9.5 | -4.0 | -2.5 | -1.5 | -15.5 | -7.0 | -4.0 | -3.5 | -12.5 | -5.5 | -3.0 | -2.0 | -26.5 | -12.0 | -8.0 | -8.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 29.8 | 23.7 | 20.6 | 19.1 | 24.8 | 19.1 | 15.9 | 13.8 | 9.8 | NC | NC | 8.1 | 9.6 | NC | NC | 9.7 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -13.5 | -7.0 | -4.5 | -3.0 | -15.5 | -8.0 | -5.0 | -3.0 | -10.5 | -5.5 | -4.0 | -3.0 | -15.5 | -8.0 | -5.5 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 14.5 | 10.5 | 7.5 | 31.5 | NC | NC | 7.0 | 22.0 | NC | NC | 6.5 | 25.0 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -9.5 | -5.0 | -3.5 | -2.5 | -11.5 | -6.0 | -4.0 | -2.0 | -5.5 | -3.0 | -2.0 | -1.5 | -11.0 | -5.5 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 21.5 | 11.5 | 8.5 | 6.0 | 25.0 | 13.0 | 9.0 | 5.5 | 12.5 | 7.0 | 5.0 | 4.0 | 17.0 | 9.0 | 7.0 | 5.0 |
| LOW TIDE FLOODING FTOL | -5.5 | -1.5 | -0.5 | 0.0 | -9.5 | -3.0 | -1.0 | -0.5 | -6.5 | -2.0 | -0.5 | 0.5 | -13.5 | -4.0 | -2.0 | -1.5 |
| M.S.L. FLOODING FTOL | -7.5 | -3.0 | -1.5 | -1.0 | -13.0 | -5.0 | -3.0 | -2.0 | -11.0 | -4.5 | -2.5 | -1.5 | -23.5 | -10.0 | -7.0 | -7.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 29.8 | 27.7 | 23.4 | 19.6 | 26.9 | 24.1 | 19.4 | 15.0 | 9.3 | 9.0 | 8.0 | 7.1 | 9.1 | 9.9 | 9.9 | 10.1 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

NASA 1 BY SHORE OF CLEAR LAKE 33b

B-44

NASA 1BY SHORE OF CLEAR LAKE (CL LAK CITY) — ELEVATION: 5.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -4.5 | -3.0 | -2.0 | -1.0 | -7.5 | -5.0 | -3.5 | -2.0 | . | . | . | 0.5 | -6.0 | -4.0 | -2.5 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 12.5 | 9.0 | 6.5 | 4.5 | 8.5 | 6.5 | 5.0 | 4.0 | . | . | . | 1.5 | 6.0 | 5.0 | 4.0 | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -1.0 | -1.5 | -1.0 | -0.5 | -4.5 | NC | NC | -1.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 6.5 | 5.5 | 4.5 | 3.0 | 4.5 | 4.0 | 3.5 | 2.5 | . | . | . | . | . | . | . | 2.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 1.5 | 1.5 | 1.5 | . | -2.5 | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | . | . | . | . | . | NC | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 6.8 | 7.4 | 6.5 | 5.8 | 7.9 | 7.6 | 6.0 | . | . | . | . | . | 5.2 | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -7.0 | -4.0 | -3.0 | -1.5 | -10.0 | -6.0 | -4.0 | -2.5 | -1.0 | -0.5 | -0.5 | -0.5 | -8.5 | -5.0 | -3.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 16.5 | 11.0 | 8.0 | 5.5 | 11.0 | 7.5 | 6.0 | 5.0 | 7.0 | 5.0 | 4.0 | 3.0 | 10.0 | 7.0 | 6.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -3.5 | -2.5 | -1.5 | -1.0 | -6.5 | -4.5 | -3.5 | -1.5 | . | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 10.0 | 7.5 | 6.0 | 4.0 | 7.0 | 6.0 | 5.0 | 4.0 | . | . | . | . | . | . | . | 3.5 |
| LOW TIDE FLOODING FTOL | 0.5 | 1.0 | 1.0 | 1.5 | -0.5 | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -0.5 | 0.5 | 1.0 | 1.0 | -4.5 | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -1.5 | 0.0 | 0.5 | 1.0 | -8.0 | NC | NC | NC | NC | . | . | . | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 10.2 | 10.2 | 9.9 | 8.8 | 10.0 | 9.1 | 7.9 | 6.1 | 6.1 | . | . | . | 6.4 | 6.3 | 6.0 | 5.3 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.5 | -6.0 | -4.0 | -2.5 | -14.0 | -8.0 | -5.0 | -3.0 | -7.0 | -4.0 | -3.0 | -2.0 | -12.5 | -7.0 | -4.5 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | 23.5 | 14.0 | 10.0 | 7.0 | 23.5 | 14.0 | 10.0 | 6.5 | 16.0 | 10.0 | 7.0 | 5.5 | 18.5 | 11.0 | 8.5 | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -7.0 | -4.0 | -2.5 | -1.5 | -10.0 | -5.5 | -3.5 | -2.0 | -0.5 | -0.5 | -0.5 | -0.5 | -8.5 | -5.0 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 17.5 | 10.5 | 7.5 | 5.5 | 11.0 | 8.0 | 6.5 | 6.0 | 5.5 | 3.5 | 3.0 | 3.0 | 10.0 | 6.5 | 5.5 | 4.5 |
| LOW TIDE FLOODING FTOL | -2.0 | -0.5 | 0.5 | 0.5 | -6.5 | NC | NC | -0.5 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -3.5 | -1.0 | 0.0 | 0.5 | -8.0 | -2.0 | -0.5 | -0.5 | 0.0 | . | . | . | -7.5 | -2.0 | -0.5 | 0.5 |
| HIGH TIDE FLOODING FTOL | -5.0 | -1.0 | -0.5 | 0.5 | -10.0 | -2.5 | -1.5 | -0.5 | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 18.0 | 16.1 | 14.1 | 13.0 | 16.3 | 14.4 | 12.4 | 11.1 | 7.2 | 6.5 | 5.9 | 5.6 | 7.9 | 7.4 | 6.9 | 6.8 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -14.0 | -7.5 | -5.0 | -3.5 | -17.0 | -9.0 | -6.0 | -4.0 | -11.0 | -6.0 | -4.0 | -3.0 | -16.0 | -8.5 | -6.0 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.5 | 11.0 | 8.0 | 27.0 | NC | NC | 8.5 | 20.0 | NC | NC | 7.0 | 22.5 | NC | NC | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -9.5 | -5.5 | -3.5 | -2.5 | -12.5 | -7.0 | -4.5 | -3.0 | -5.5 | -3.0 | -2.0 | -1.5 | -11.5 | -6.5 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 21.5 | 12.0 | 8.5 | 6.0 | 14.0 | 8.5 | 7.0 | 6.5 | 11.5 | 7.0 | 5.0 | 4.5 | 14.5 | 9.0 | 7.0 | 6.0 |
| LOW TIDE FLOODING FTOL | -4.0 | -1.5 | 0.0 | 0.0 | -8.5 | NC | NC | -0.5 | -1.5 | NC | NC | 2.5 | -7.5 | NC | NC | 0.0 |
| M.S.L. FLOODING FTOL | -5.5 | -1.5 | -0.5 | 0.0 | -9.5 | NC | NC | -1.0 | -5.5 | NC | NC | 1.5 | -11.0 | NC | NC | -0.5 |
| HIGH TIDE FLOODING FTOL | -6.5 | -2.0 | -1.0 | 0.0 | -11.0 | -3.5 | -2.0 | -1.0 | -9.5 | -3.0 | -1.0 | 0.0 | -14.5 | -4.5 | -2.0 | -0.5 |
| MAXIMUM HIGH TIDE SURGE | 29.8 | 23.7 | 20.6 | 19.1 | 24.8 | 19.1 | 15.9 | 13.8 | 5.8 | 8.3 | 7.9 | 8.1 | 9.6 | 8.7 | 8.8 | 9.7 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -13.5 | -7.0 | -4.5 | -3.0 | -15.5 | -8.0 | -5.0 | -3.0 | -10.5 | -5.5 | -4.0 | -3.0 | -15.5 | -8.0 | -5.5 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 14.5 | 10.5 | 7.5 | 31.5 | NC | NC | 7.0 | 22.0 | NC | NC | 6.5 | 25.0 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -9.5 | -5.0 | -3.5 | -2.5 | -11.5 | -6.0 | -4.0 | -2.0 | -5.5 | -3.0 | -2.0 | -1.5 | -11.0 | -5.5 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 21.5 | 11.5 | 8.5 | 6.0 | 25.0 | 13.0 | 9.0 | 5.5 | 12.5 | 7.0 | 5.0 | 4.0 | 17.0 | 9.0 | 7.0 | 5.0 |
| LOW TIDE FLOODING FTOL | -5.5 | -0.5 | 0.0 | 0.5 | -7.0 | -1.0 | 0.0 | 0.5 | -1.5 | . | . | . | -5.5 | -1.0 | 0.0 | -0.5 |
| M.S.L. FLOODING FTOL | -7.5 | -1.0 | 0.0 | 0.5 | -8.0 | NC | NC | 0.0 | -3.5 | NC | NC | 1.5 | -9.5 | NC | NC | -0.5 |
| HIGH TIDE FLOODING FTOL | -10.0 | -1.0 | 0.0 | 0.5 | -9.0 | -1.0 | 0.0 | -0.5 | -6.0 | NC | NC | NC | -13.5 | -1.5 | 0.0 | -0.5 |
| MAXIMUM HIGH TIDE SURGE | 29.8 | 27.7 | 23.4 | 19.6 | 26.9 | 24.1 | 19.4 | 15.0 | 9.3 | 9.0 | 8.0 | 7.1 | 9.1 | 9.9 | 9.9 | 10.1 |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

# HIGHWAY 3 AND CLEAR LAKE CREEK 34

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

HIGHWAY 3 AND CLEAR LAKE CREEK (CL CR 3) — ELEVATION: 11.7 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -5.0 | -3.0 | -2.0 | -1.0 | -8.0 | -5.5 | -4.0 | -2.0 | . | . | . | 0.0 | -6.5 | -4.5 | -3.0 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 13.0 | 9.0 | 6.5 | 4.5 | 8.5 | 6.5 | 5.0 | 4.0 | . | . | . | 2.0 | 6.5 | 5.0 | 4.5 | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -2.5 | -1.5 | -1.0 | -0.5 | -5.0 | -3.0 | -2.5 | -1.0 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 8.0 | 6.0 | 4.5 | 3.0 | 5.0 | 4.0 | 3.0 | 2.5 | . | . | . | . | . | . | . | 2.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -7.5 | -4.5 | -3.0 | -2.0 | -9.5 | -5.5 | -4.0 | -2.5 | -2.0 | -1.5 | -1.0 | -1.0 | -9.5 | -5.5 | -4.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 17.0 | 11.0 | 8.0 | 5.5 | 10.0 | 7.0 | 6.0 | 5.5 | 9.0 | 6.0 | 5.0 | 3.5 | 11.0 | 7.5 | 6.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -4.0 | -2.5 | -2.0 | -1.0 | -7.5 | -5.0 | -3.5 | -1.5 | . | . | . | . | -5.0 | -3.5 | -2.5 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | . | E | E | E | E |
| DURATION IN HOURS | 10.5 | 8.0 | 6.0 | 4.0 | 7.5 | 6.0 | 5.0 | 3.5 | . | . | . | . | 8.0 | 6.0 | 5.0 | 3.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -11.0 | -6.0 | -4.0 | -2.5 | -14.5 | -8.0 | -5.5 | -3.5 | -8.0 | -4.5 | -3.0 | -2.0 | -13.5 | -7.5 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | NC | 14.0 | 10.0 | 7.0 | 24.0 | NC | NC | 7.0 | 17.0 | NC | NC | 5.5 | 19.0 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -7.0 | -4.0 | -3.0 | -2.0 | -10.5 | -6.0 | -4.0 | -2.5 | -2.0 | -1.0 | 0.0 | 1.0 | -9.0 | -5.0 | -3.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 17.5 | 10.5 | 8.0 | 5.5 | 11.5 | 7.0 | 6.0 | 5.0 | 7.5 | 4.5 | 3.0 | 1.5 | 11.0 | 7.0 | 6.0 | 5.0 |
| LOW TIDE FLOODING FTOL | 2.0 | 2.5 | . | . | -0.5 | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 1.5 | 1.5 | . | . | -2.0 | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | 0.5 | 1.0 | . | . | -3.0 | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 17.6 | 15.6 | . | . | 16.5 | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -14.0 | -7.5 | -5.0 | -3.5 | -17.5 | -9.5 | -6.5 | -4.5 | -11.5 | -6.5 | -4.0 | -3.0 | -16.5 | -9.0 | -6.0 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.5 | 11.0 | 8.0 | 28.0 | NC | NC | 8.5 | 21.5 | NC | NC | 7.0 | 23.0 | NC | NC | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -3.5 | -2.5 | -13.0 | -7.0 | -5.0 | -3.0 | -6.0 | -3.5 | -2.5 | -1.5 | -12.0 | -6.5 | -4.5 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 21.5 | 12.5 | 9.0 | 6.5 | 20.5 | 12.0 | 8.5 | 6.5 | 13.0 | 7.5 | 6.0 | 4.5 | 15.5 | 9.0 | 7.0 | 6.0 |
| LOW TIDE FLOODING FTOL | 0.0 | 0.5 | 1.0 | 1.5 | -3.5 | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -1.0 | -0.5 | 0.0 | 0.5 | -4.0 | NC | NC | 0.0 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -2.0 | -2.0 | -1.5 | -0.5 | -5.0 | NC | NC | NC | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 27.8 | 22.2 | 19.3 | 16.7 | 26.5 | 21.5 | 17.1 | 13.8 | . | . | . | . | . | . | . | . |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -14.0 | -7.0 | -4.5 | -3.0 | -16.0 | -8.0 | -5.0 | -3.5 | -11.0 | -5.5 | -4.0 | -3.0 | -16.0 | -8.0 | -5.5 | -4.0 |
| DIRECTION OF WIND | N | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.0 | 10.5 | 7.5 | 27.5 | NC | NC | 7.5 | NC | NC | NC | 6.5 | 25.0 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -10.0 | -5.0 | -3.5 | -2.5 | -12.0 | -6.0 | -4.0 | -2.5 | -6.5 | -3.0 | -2.0 | -1.5 | -12.0 | -6.0 | -4.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | F |
| DURATION IN HOURS | 21.5 | 11.5 | 8.5 | 6.0 | 21.5 | 11.5 | 8.0 | 5.5 | 13.5 | 7.5 | 5.5 | 4.5 | 18.0 | 10.0 | 7.0 | 5.5 |
| LOW TIDE FLOODING FTOL | -0.5 | 1.0 | 1.5 | 1.0 | -2.5 | NC | NC | 1.0 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -1.0 | 0.0 | 0.0 | 0.5 | -3.5 | NC | NC | 0.5 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -2.0 | -1.0 | -1.0 | 0.0 | -4.5 | NC | NC | 0.0 | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 32.4 | 28.9 | 22.2 | 16.2 | 29.6 | 27.0 | 21.5 | 16.5 | . | . | . | . | . | . | . | . |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

I 45 AND CLEAR LAKE CREEK (CL CR 45) — ELEVATION: 10.7 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -5.0 | -3.0 | -2.0 | -1.0 | -8.0 | -5.0 | -3.5 | -2.0 | . | . | . | 0.0 | -7.0 | -4.5 | -3.0 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 13.0 | 9.0 | 6.5 | 4.5 | 8.5 | 6.5 | 5.0 | 4.0 | . | . | . | 2.0 | 6.5 | 5.0 | 4.5 | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -1.5 | -1.5 | -1.0 | -0.5 | -5.0 | -5.0 | -3.5 | -1.0 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 6.5 | 6.0 | 4.5 | 3.0 | 5.0 | 4.5 | 3.5 | 2.5 | . | . | . | . | . | . | . | 2.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -7.0 | -4.0 | -3.0 | -2.0 | -10.5 | -6.0 | -4.0 | -2.5 | -2.5 | -1.5 | -1.0 | -1.0 | -9.5 | -5.5 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 17.0 | 11.0 | 8.0 | 5.5 | 11.0 | 7.5 | 6.0 | 5.0 | 9.5 | 6.0 | 5.0 | 3.5 | 11.0 | 7.5 | 6.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -3.5 | -2.5 | -2.0 | -1.0 | -7.5 | -5.0 | -3.5 | -1.5 | . | . | . | 0.0 | -5.5 | -3.5 | -3.0 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 13.0 | 8.0 | 6.0 | 4.0 | 7.5 | 6.0 | 5.0 | 3.5 | . | . | . | 1.5 | 2.5 | 3.0 | 3.0 | 3.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -11.0 | -6.0 | -4.0 | -2.5 | -14.5 | -8.0 | -5.5 | -3.5 | -8.0 | -4.5 | -3.0 | -2.0 | -13.5 | -7.5 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E |
| DURATION IN HOURS | NC | 14.0 | 10.0 | 7.0 | 24.0 | NC | NC | 7.0 | 17.5 | NC | NC | 5.5 | 19.0 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -7.0 | -4.0 | -3.0 | -1.5 | -10.5 | -6.0 | -4.0 | -2.5 | -2.0 | -1.0 | 0.0 | 1.0 | -9.5 | -5.5 | -4.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 17.5 | 10.5 | 8.0 | 5.5 | 11.5 | 7.5 | 6.0 | 5.0 | 8.0 | 5.0 | 3.0 | 1.5 | 11.0 | 7.0 | 6.0 | 5.0 |
| LOW TIDE FLOODING FTOL | 2.5 | 3.0 | . | . | -0.5 | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 0.5 | 1.5 | . | . | -2.5 | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -1.0 | 0.0 | . | . | -4.0 | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 18.0 | 15.8 | . | . | 16.9 | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -14.0 | -7.5 | -5.0 | -3.5 | -17.5 | -9.5 | -6.5 | -4.5 | -11.5 | -6.5 | -4.5 | -3.0 | -17.0 | -9.0 | -6.0 | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 16.0 | 11.0 | 8.0 | 29.0 | NC | NC | 8.5 | 22.0 | NC | NC | 7.0 | 23.5 | NC | NC | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -9.5 | -5.5 | -3.5 | -2.5 | -13.0 | -7.5 | -5.0 | -3.0 | -6.0 | -3.5 | -2.5 | -1.5 | -12.0 | -7.0 | -4.5 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 21.5 | 12.5 | 9.0 | 6.0 | 20.5 | 12.0 | 8.5 | 6.5 | 13.0 | 8.0 | 6.0 | 4.5 | 15.5 | 9.5 | 7.0 | 6.0 |
| LOW TIDE FLOODING FTOL | 0.0 | 0.5 | 1.5 | 2.0 | -3.0 | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -1.5 | -1.5 | -0.5 | 1.0 | -5.0 | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -3.0 | -3.5 | -2.5 | 0.5 | -6.5 | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 29.0 | 23.2 | 18.5 | 16.7 | 27.2 | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -13.5 | -7.0 | -4.5 | -3.0 | -16.0 | -8.0 | -5.5 | -3.5 | -11.0 | -5.5 | -4.0 | -3.0 | -16.0 | -8.0 | -5.5 | -4.0 |
| DIRECTION OF WIND | N | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 14.5 | 10.5 | 7.5 | 27.5 | NC | NC | 7.5 | NC | NC | NC | 6.5 | 25.0 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -10.0 | -5.0 | -3.5 | -2.5 | -12.0 | -6.0 | -4.0 | -2.5 | -6.5 | -3.0 | -2.0 | -2.0 | -12.0 | -5.0 | -4.0 | -3.0 |
| DIRECTION OF WIND | N | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 11.5 | 11.5 | 8.5 | 6.0 | 21.5 | 19.0 | 12.0 | 5.5 | 14.0 | 12.5 | 8.0 | 4.5 | 18.0 | 16.0 | 10.5 | 5.5 |
| LOW TIDE FLOODING FTOL | 0.0 | 0.5 | 1.0 | 3.0 | -2.0 | NC | NC | NC | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -1.0 | -0.5 | 0.0 | 1.0 | -3.5 | NC | NC | NC | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -2.5 | -1.5 | -1.0 | -1.0 | -5.5 | NC | NC | NC | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 33.4 | 29.6 | 22.5 | 15.9 | 30.6 | 26.8 | 19.9 | 13.5 | . | . | . | . | . | . | . | . |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

BAYPORT ROAD IN SHOREACRES (SHOREACRES) — ELEVATION: 4.50 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -4.0 | -2.5 | -2.0 | -1.0 | -7.0 | -5.0 | -3.5 | -1.5 | • | • | • | • | -4.5 | -3.0 | -2.5 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | • | • | • | • | E | E | E | E |
| DURATION IN HOURS | 12.5 | 8.5 | 6.5 | 4.0 | 8.5 | 6.0 | 5.5 | 4.5 | • | • | • | • | 3.0 | 3.0 | 3.0 | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -0.5 | -1.0 | -1.0 | -0.5 | -4.0 | NC | NC | -1.0 | • | • | • | • | • | • | • | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | • | • | • | • | • | • | • | SE |
| DURATION IN HOURS | 6.0 | 5.5 | 4.0 | 3.0 | 4.5 | 4.0 | 3.5 | 2.5 | • | • | • | • | • | • | • | 2.0 |
| LOW TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -6.5 | -4.0 | -2.5 | -1.5 | -9.0 | -5.5 | -3.5 | -2.0 | 2.0 | 1.0 | 0.5 | -0.5 | -7.5 | -4.5 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 16.5 | 10.5 | 8.0 | 5.5 | 11.0 | 7.5 | 6.0 | 5.5 | 2.0 | 2.0 | 2.0 | 2.5 | 9.0 | 6.5 | 5.5 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -3.0 | -2.0 | -1.5 | -1.0 | -6.0 | -4.5 | -3.0 | -1.5 | • | • | • | • | • | • | • | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | • | • | • | • | • | • | • | E |
| DURATION IN HOURS | 9.5 | 7.5 | 5.5 | 4.0 | 7.0 | 5.5 | 5.0 | 4.0 | • | • | • | • | • | • | • | 3.0 |
| LOW TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.5 | -6.0 | -4.0 | -2.5 | -13.0 | -7.5 | -5.0 | -3.0 | -6.0 | -3.5 | -2.5 | -1.5 | -11.5 | -5.5 | -4.5 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | # | E |
| DURATION IN HOURS | NC | 14.0 | 10.0 | 7.0 | 22.5 | NC | NC | 7.0 | 14.0 | NC | NC | 5.0 | 17.5 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -6.5 | -4.0 | -2.5 | -1.5 | -9.0 | -5.5 | -4.0 | -2.0 | • | • | • | 0.0 | -7.0 | -4.5 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | • | • | • | E | E | E | E | E |
| DURATION IN HOURS | 16.5 | 10.5 | 7.5 | 5.0 | 11.0 | 7.5 | 6.0 | 5.0 | • | • | • | 2.0 | 8.0 | 5.5 | 5.0 | 4.5 |
| LOW TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -13.5 | -7.5 | -5.0 | -3.5 | -16.0 | -9.0 | -6.0 | -4.0 | -10.0 | -5.5 | -4.0 | -2.5 | -15.0 | -8.0 | -5.5 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.5 | 11.0 | 8.0 | 27.0 | NC | NC | 8.5 | 18.0 | NC | NC | 6.5 | 21.5 | NC | NC | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -9.0 | -5.0 | -3.5 | -2.5 | -11.5 | -6.5 | -4.5 | -3.0 | -4.0 | -2.0 | -1.5 | -1.0 | -10.0 | -5.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 20.5 | 12.0 | 8.5 | 6.0 | 14.0 | 8.5 | 7.0 | 6.5 | 9.0 | 5.5 | 4.5 | 4.0 | 13.0 | 8.0 | 6.5 | 5.5 |
| LOW TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -14.5 | -6.5 | -4.5 | -3.0 | -15.0 | -7.0 | -4.5 | -3.0 | -9.5 | -4.5 | -3.0 | -2.5 | -14.5 | -7.0 | -5.0 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 14.5 | 10.5 | 7.5 | NC | NC | NC | 7.5 | 20.0 | NC | NC | 6.0 | 24.0 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -9.5 | -4.5 | -3.0 | -2.0 | -11.0 | -5.5 | -3.5 | -2.0 | -4.5 | 2.0 | -1.5 | -1.5 | -10.0 | -5.0 | -3.5 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 21.0 | NC | 8.5 | 6.0 | 21.0 | NC | 8.0 | 5.5 | 10.0 | NC | 4.5 | 3.5 | 16.0 | NC | 7.0 | 5.0 |
| LOW TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

TABBS BAY (BAYTOWN) — ELEVATION: 0.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -2.5 | -2.0 | -1.5 | -1.0 | -5.5 | -4.5 | -3.0 | -1.5 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 11.0 | 8.0 | 6.5 | 4.0 | 8.0 | 6.0 | 5.5 | 4.0 | . | . | . | . | . | . | . | 3.5 |
| 65.5 MPH WIND GUSTS FTOL | 1.0 | -0.5 | -0.5 | 0.0 | -2.5 | 1.0 | 2.0 | -0.5 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | E | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 4.0 | 4.5 | 4.0 | 2.5 | 3.5 | 4.0 | 3.5 | 2.5 | . | . | . | . | . | . | . | 2.0 |
| LOW TIDE FLOODING FTOL | 1.5 | 1.5 | 1.5 | 1.5 | -4.0 | -3.0 | -1.0 | 0.5 | 1.0 | . | . | . | -6.5 | -4.5 | -2.0 | 0.5 |
| M.S.L. FLOODING FTOL | -12.0 | -2.5 | -0.5 | -1.0 | -21.5 | NC | NC | -14.0 | -44.0 | NC | NC | -18.5 | -56.0 | NC | NC | -18.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 6.3 | 6.4 | 6.4 | 6.3 | 1.1 | 2.5 | 3.9 | 5.2 | 4.7 | 4.6 | 4.2 | 4.0 | 5.2 | 5.3 | 5.2 | 5.1 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -5.5 | -3.5 | -2.5 | -1.5 | -8.0 | -5.0 | -3.5 | -2.0 | . | . | . | 0.0 | -6.0 | -4.0 | -2.5 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 15.0 | 10.0 | 7.5 | 5.0 | 10.5 | 8.0 | 6.0 | 5.5 | . | . | . | 2.0 | 7.0 | 5.0 | 5.0 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -1.5 | -1.5 | -1.0 | -0.5 | -5.0 | -4.5 | -3.5 | -1.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 8.5 | 7.0 | 5.5 | 3.5 | 6.5 | 6.0 | 5.0 | 4.0 | . | . | . | . | . | . | . | 3.0 |
| LOW TIDE FLOODING FTOL | 0.0 | 1.0 | 1.0 | 1.0 | -6.0 | NC | NC | 0.0 | -2.0 | NC | NC | 2.0 | -9.5 | NC | NC | 0.0 |
| M.S.L. FLOODING FTOL | -10.5 | -2.0 | -0.5 | 0.0 | -21.5 | NC | NC | -14.0 | -41.5 | NC | NC | -12.0 | -56.0 | NC | NC | -18.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 8.8 | 9.1 | 9.4 | 9.2 | 8.2 | 8.1 | 7.9 | 7.3 | 5.5 | 5.2 | 4.9 | 4.3 | 6.0 | 6.2 | 6.1 | 5.9 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.5 | -5.5 | -3.5 | -2.5 | -11.5 | -6.5 | -4.5 | -3.0 | -4.0 | -2.5 | -2.0 | -1.5 | -10.5 | -6.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | NC | 13.5 | 9.5 | 7.0 | 20.5 | NC | NC | 7.0 | 11.0 | NC | NC | 4.5 | 16.0 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -5.0 | -3.5 | -2.5 | -1.5 | -8.0 | -5.0 | -3.5 | -2.0 | . | . | . | 0.5 | 5.0 | 2.5 | 0.5 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 15.0 | 10.0 | 7.5 | 5.0 | 11.0 | 7.5 | 6.0 | 5.5 | . | . | . | 1.0 | -1.5 | 0.5 | 2.0 | 4.5 |
| LOW TIDE FLOODING FTOL | -2.0 | 0.0 | 0.5 | 1.0 | -8.0 | -4.0 | -2.0 | 0.0 | -4.5 | NC | NC | 1.0 | -14.0 | NC | NC | -1.0 |
| M.S.L. FLOODING FTOL | -8.5 | -1.5 | 0.0 | 0.0 | -21.0 | NC | NC | -14.0 | -37.5 | NC | NC | -7.0 | -56.0 | NC | NC | -18.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 16.1 | 16.1 | 15.6 | 18.4 | 16.1 | 14.3 | 12.2 | 12.8 | 6.3 | 5.7 | 4.9 | 5.3 | 7.4 | 7.5 | 7.3 | 8.7 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.5 | -5.0 | -4.5 | -3.0 | -15.0 | -6.0 | -5.5 | -3.5 | -8.5 | -3.5 | -3.0 | -2.5 | -12.5 | -5.5 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 13.0 | 10.5 | 8.0 | 26.0 | NC | NC | 8.5 | 16.0 | NC | NC | 6.0 | 20.5 | NC | NC | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -8.0 | -4.5 | -3.0 | -2.0 | -10.5 | -6.0 | -4.0 | -2.5 | -1.5 | -1.0 | -1.0 | -1.0 | -9.0 | -5.0 | -3.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 19.5 | 11.5 | 8.5 | 6.0 | 13.5 | 6.5 | 7.0 | 6.0 | 5.5 | 4.0 | 3.5 | 3.5 | 11.5 | 7.5 | 6.0 | 5.5 |
| LOW TIDE FLOODING FTOL | -3.5 | -0.5 | 0.5 | 0.5 | -10.0 | NC | NC | -0.5 | -7.0 | NC | NC | 1.0 | -18.0 | NC | NC | -1.0 |
| M.S.L. FLOODING FTOL | -8.0 | -2.0 | 0.0 | 0.0 | -21.0 | NC | NC | -14.0 | -35.0 | NC | NC | -5.0 | -56.0 | NC | NC | -18.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 22.8 | 23.6 | 21.0 | 21.2 | 22.5 | 23.4 | 20.8 | 21.1 | 8.8 | 9.1 | 8.1 | 8.2 | 8.8 | 10.6 | 10.8 | 12.4 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -12.5 | -6.5 | -4.5 | -3.0 | -14.0 | -7.0 | -4.5 | -3.0 | -8.0 | -4.0 | -3.0 | -2.0 | -13.0 | -6.5 | -4.5 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 14.5 | 2.0 | 7.5 | NC | NC | NC | 7.5 | 16.0 | NC | NC | 5.5 | 23.0 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -8.5 | -4.5 | -3.0 | -2.0 | -10.0 | -5.0 | -3.0 | -2.0 | -2.5 | -1.0 | -1.0 | -0.5 | -7.0 | -4.0 | -2.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 20.5 | 11.0 | 2.5 | 5.5 | 20.5 | 11.0 | 2.5 | 6.0 | 4.5 | 3.0 | 1.0 | 2.5 | 13.5 | 8.0 | 2.0 | 5.0 |
| LOW TIDE FLOODING FTOL | -1.5 | 0.5 | 1.0 | 1.0 | -7.0 | NC | NC | 1.0 | -5.0 | NC | NC | 1.0 | -15.0 | NC | NC | -1.0 |
| M.S.L. FLOODING FTOL | -2.5 | 0.0 | 0.5 | 1.0 | -15.0 | NC | NC | -14.0 | -30.0 | NC | NC | -4.0 | -50.5 | NC | NC | -14.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 26.6 | 27.9 | 25.5 | 22.9 | 21.8 | 22.6 | 20.9 | 18.7 | 7.9 | 8.0 | 7.1 | 6.1 | 9.1 | 10.8 | 11.0 | 11.1 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

# HIGHWAY 146 NORTH OF BAYTOWN TUNNEL 38a

HIGHWAY 146 NORTH OF BAYTOWN TUNNEL (BAY TUNN) — ELEVATION: 10.1 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -2.5 | -2.0 | -1.5 | -1.0 | -5.5 | -5.0 | -3.0 | -1.5 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 11.5 | 8.5 | 6.5 | 4.0 | 8.0 | 6.0 | 5.0 | 4.0 | . | . | . | . | . | . | . | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | 1.0 | -0.5 | -0.5 | 0.0 | -2.5 | NC | NC | -0.5 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | E | NE | NE | NE | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 4.5 | 5.0 | 4.0 | 3.0 | 3.5 | 4.0 | 3.5 | 2.5 | . | . | . | . | . | . | . | 2.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -5.0 | -3.5 | -2.5 | -1.5 | -8.0 | -5.0 | -3.5 | -2.0 | . | . | . | 0.0 | -6.0 | -4.0 | -3.0 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 15.0 | 10.0 | 7.5 | 5.0 | 10.5 | 7.5 | 6.0 | 5.0 | . | . | . | 2.0 | 7.0 | 5.5 | 5.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -1.5 | -1.5 | -1.0 | -0.5 | -4.5 | -4.5 | -3.0 | -1.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 8.5 | 7.0 | 5.5 | 4.0 | 6.5 | 5.5 | 4.5 | 4.0 | . | . | . | . | . | . | . | 3.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.0 | -5.0 | -3.5 | -2.5 | -11.5 | -6.5 | -4.5 | -3.0 | -4.0 | -2.5 | -2.0 | -1.5 | -10.5 | -6.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | NC | 13.5 | 9.5 | 7.0 | 15.0 | NC | NC | 7.0 | 11.5 | NC | NC | 4.5 | 16.0 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -5.0 | -3.0 | -2.0 | -1.5 | -8.0 | -5.0 | -3.0 | -2.0 | . | . | . | -0.5 | -5.5 | -3.5 | -2.5 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 15.5 | 10.0 | 7.5 | 5.5 | 10.5 | 7.0 | 6.0 | 5.0 | . | . | . | 2.5 | 5.5 | 4.0 | 4.0 | 4.5 |
| LOW TIDE FLOODING FTOL | 4.0 | 2.0 | 2.5 | 2.5 | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 4.0 | 2.0 | 2.0 | 2.5 | 0.0 | 0.0 | 0.5 | 1.5 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | 3.5 | 2.0 | 2.0 | 2.0 | NC | NC | NC | NC | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 14.5 | 14.0 | 14.6 | 13.1 | 12.4 | 12.2 | 13.1 | 12.1 | . | . | . | . | . | . | . | . |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.5 | -7.0 | -4.5 | -3.0 | -15.0 | -8.0 | -5.5 | -3.5 | -8.5 | -5.0 | -3.5 | -2.5 | -14.0 | -7.5 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.0 | 11.0 | 8.0 | 26.0 | NC | NC | 8.5 | 16.0 | NC | NC | 6.0 | 21.0 | NC | NC | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -8.0 | -4.5 | -3.0 | -2.0 | -10.5 | -6.0 | -4.0 | -2.5 | -1.5 | -1.0 | -1.0 | -1.0 | -9.0 | -5.0 | -3.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 19.5 | 11.5 | 8.5 | 6.0 | 13.5 | 8.0 | 7.0 | 6.0 | 6.0 | 4.0 | 3.5 | 3.5 | 11.5 | 7.0 | 6.0 | 6.0 |
| LOW TIDE FLOODING FTOL | 2.0 | 1.0 | 1.5 | 1.5 | -1.5 | -0.5 | 0.0 | 1.0 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 0.5 | 1.0 | 1.5 | 1.5 | -2.0 | -1.5 | 0.0 | 0.5 | . | . | . | . | . | . | . | 1.5 |
| HIGH TIDE FLOODING FTOL | -1.0 | 1.0 | 1.5 | 1.5 | -2.0 | NC | NC | 0.5 | . | . | . | . | . | . | . | NC |
| MAXIMUM HIGH TIDE SURGE | 23.4 | 24.3 | 22.0 | 20.1 | 23.2 | 23.3 | 20.4 | 17.8 | . | . | . | . | . | . | . | 12.6 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -12.0 | -6.0 | -4.0 | -3.0 | -13.5 | -7.0 | -4.5 | -2.5 | -8.0 | -4.0 | -3.0 | -2.0 | -13.0 | -6.5 | -4.5 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 14.5 | 10.0 | 7.5 | NC | NC | NC | 7.5 | 16.0 | NC | NC | 5.5 | 23.0 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -8.0 | -4.0 | -3.0 | -2.0 | -10.0 | -5.0 | -3.0 | -1.5 | -2.5 | -1.5 | -1.0 | -0.5 | -8.0 | -4.0 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | NC | 11.0 | 8.0 | 6.0 | 20.5 | NC | NC | 5.5 | 5.5 | NC | NC | 3.0 | 15.0 | NC | NC | 5.0 |
| LOW TIDE FLOODING FTOL | 1.5 | 1.5 | 1.5 | 1.5 | -0.5 | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 0.0 | 1.5 | 1.5 | 1.5 | -0.5 | 0.0 | 1.0 | 1.5 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -1.0 | 1.5 | 1.5 | 1.5 | -1.0 | NC | NC | NC | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 28.1 | 30.4 | 27.0 | 22.8 | 22.8 | 22.3 | 17.4 | 12.3 | . | . | . | . | . | . | . | . |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

BAYTOWN TUNNEL CHANNEL (BAY TUNN) — ELEVATION: 0.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -2.5 | -2.0 | -1.5 | -1.0 | -5.5 | -5.0 | -3.0 | -1.5 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 11.5 | 8.5 | 6.5 | 4.0 | 8.0 | 6.0 | 5.0 | 4.0 | . | . | . | . | . | . | . | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | 1.0 | -0.5 | -0.5 | 0.0 | -2.5 | NC | NC | -0.5 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | E | NE | NE | NE | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 4.5 | 5.0 | 4.0 | 3.0 | 3.5 | 4.0 | 3.5 | 2.5 | . | . | . | . | . | . | . | 2.0 |
| LOW TIDE FLOODING FTOL | 1.5 | 1.5 | 1.5 | 1.5 | -4.5 | -3.0 | -1.0 | 0.5 | 1.0 | . | . | . | -6.5 | -4.5 | -2.0 | 0.5 |
| M.S.L. FLOODING FTOL | -15.5 | -5.5 | -3.5 | -5.5 | -23.0 | -9.5 | -7.0 | -14.5 | -47.5 | -18.0 | -12.5 | -22.0 | -57.0 | -20.5 | -13.0 | -18.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 6.4 | 6.5 | 6.4 | 6.4 | 6.5 | 6.1 | 5.5 | 5.0 | 4.8 | 4.6 | 4.2 | 4.0 | 5.3 | 5.3 | 5.1 | 5.1 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -5.0 | -3.5 | -2.5 | -1.5 | -8.0 | -5.0 | -3.5 | -2.0 | . | . | . | 0.0 | -6.0 | -4.0 | -3.0 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 15.0 | 10.0 | 7.5 | 5.5 | 10.5 | 7.5 | 6.0 | 5.0 | . | . | . | 2.0 | 7.0 | 5.5 | 5.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -1.5 | -1.5 | -1.0 | -0.5 | -4.5 | -4.5 | -3.0 | -1.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 8.5 | 7.0 | 5.5 | 4.0 | 6.5 | 5.5 | 4.5 | 4.0 | . | . | . | . | . | . | . | 3.0 |
| LOW TIDE FLOODING FTOL | 0.0 | 1.0 | 1.5 | 1.5 | -6.5 | -6.0 | -3.0 | 0.0 | -2.0 | -1.0 | 1.0 | 2.5 | -9.5 | -10.0 | -5.0 | 0.0 |
| M.S.L. FLOODING FTOL | -13.0 | -4.0 | -2.0 | -3.5 | -23.5 | -8.5 | -6.0 | -15.0 | -45.5 | -15.0 | -9.0 | -18.0 | -57.0 | -18.5 | -10.0 | -19.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 8.9 | 9.5 | 9.5 | 9.1 | 8.4 | 6.3 | 3.8 | 1.2 | 5.5 | 5.4 | 5.0 | 4.4 | 6.1 | 6.4 | 6.3 | 5.9 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.0 | -5.0 | -3.5 | -2.5 | -11.5 | -6.5 | -4.5 | -3.0 | -4.0 | -2.5 | -2.0 | -1.5 | -10.5 | -6.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | NC | 13.5 | 9.5 | 7.0 | 15.0 | NC | NC | 7.0 | 11.5 | NC | NC | 4.5 | 16.0 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -5.0 | -3.0 | -2.0 | -1.5 | -8.0 | -5.0 | -3.0 | -2.0 | . | . | . | -0.5 | -5.5 | -3.5 | -2.5 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 15.5 | 10.0 | 7.5 | 5.5 | 10.5 | 7.0 | 6.0 | 5.0 | . | . | . | 2.5 | 5.5 | 4.0 | 4.0 | 4.5 |
| LOW TIDE FLOODING FTOL | -2.0 | 0.0 | 1.0 | 1.0 | -8.5 | NC | NC | -0.5 | -5.0 | NC | NC | 1.5 | -14.5 | NC | NC | -0.5 |
| M.S.L. FLOODING FTOL | -11.0 | -3.0 | -1.5 | -1.5 | -23.5 | NC | NC | -15.0 | -4.5 | NC | NC | -7.5 | -57.5 | NC | NC | -19.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 14.5 | 14.0 | 14.6 | 13.1 | 12.4 | 12.2 | 13.1 | 12.1 | 6.4 | 6.0 | 6.1 | 5.3 | 7.5 | 7.9 | 9.0 | 8.8 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.5 | -7.0 | -4.5 | -3.0 | -15.0 | -8.0 | -5.5 | -3.5 | -8.5 | -5.0 | -3.5 | -2.5 | -14.0 | -7.5 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.0 | 11.0 | 8.0 | 26.0 | NC | NC | 8.5 | 16.0 | NC | NC | 6.0 | 21.0 | NC | NC | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -8.0 | -4.5 | -3.0 | -2.0 | -10.5 | -6.0 | -4.0 | -2.5 | -1.5 | -1.0 | -1.0 | -1.0 | -9.0 | -5.0 | -3.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 19.5 | 11.5 | 8.5 | 6.0 | 13.5 | 8.0 | 7.0 | 6.0 | 6.0 | 4.0 | 3.5 | 3.5 | 11.5 | 7.0 | 6.0 | 6.0 |
| LOW TIDE FLOODING FTOL | -3.5 | -0.5 | 0.5 | 1.0 | -10.5 | NC | NC | -0.5 | -6.5 | NC | NC | 0.5 | -18.5 | NC | NC | -1.5 |
| M.S.L. FLOODING FTOL | -9.5 | -2.5 | -1.0 | -1.0 | -24.0 | NC | NC | -15.5 | -38.0 | NC | NC | -7.0 | -58.0 | NC | NC | -19.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 23.4 | 24.3 | 22.0 | 20.1 | 23.2 | 23.3 | 20.4 | 17.8 | 8.6 | 9.2 | 8.7 | 8.2 | 9.0 | 11.1 | 11.9 | 12.6 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -12.0 | -6.0 | -4.0 | -3.0 | -13.5 | -7.0 | -4.5 | -2.5 | -8.0 | -4.0 | -3.0 | -2.0 | -13.0 | -6.5 | -4.5 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 14.5 | 10.0 | 7.5 | NC | NC | NC | 7.5 | 16.0 | NC | NC | 5.5 | 23.0 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -8.0 | -4.0 | -3.0 | -2.0 | -10.0 | -5.0 | -3.0 | -1.5 | -2.5 | -1.5 | -1.0 | -0.5 | -8.0 | -4.0 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | NC | 11.0 | 8.0 | 6.0 | 20.5 | NC | NC | 5.5 | 5.5 | NC | NC | 3.0 | 15.0 | NC | NC | 5.0 |
| LOW TIDE FLOODING FTOL | -1.5 | 0.5 | 1.0 | 1.0 | -7.5 | NC | NC | 0.5 | -5.0 | NC | NC | 1.0 | -15.5 | NC | NC | -1.0 |
| M.S.L. FLOODING FTOL | -3.5 | -0.5 | 0.5 | 0.0 | -18.0 | NC | NC | -15.5 | -34.0 | NC | NC | -7.0 | -52.0 | NC | NC | -15.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 28.1 | 30.4 | 27.0 | 22.8 | 22.8 | 22.3 | 17.4 | 12.3 | 8.0 | 8.5 | 7.4 | 6.1 | 9.3 | 11.3 | 11.4 | 10.9 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

BAYTOWN TUNNEL CHANNEL 38b

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

SCOTT BAY (SCOTT BAY) — ELEVATION: 0.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -2.0 | -2.0 | -1.5 | -0.5 | -5.0 | -4.5 | -3.0 | -1.0 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 11.0 | 8.5 | 6.0 | 4.0 | 7.5 | 6.0 | 5.0 | 4.0 | . | . | . | . | . | . | . | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | 1.5 | 0.0 | 0.0 | 0.0 | -2.0 | 0.0 | 0.0 | -0.5 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | E | NE | NE | NE | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 3.0 | 5.0 | 4.0 | 2.5 | 3.5 | 4.5 | 3.0 | 1.0 | . | . | . | . | . | . | . | 2.5 |
| LOW TIDE FLOODING FTOL | 8.0 | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -9.5 | -2.5 | -0.5 | -2.0 | -22.0 | NC | NC | -12.5 | -38.0 | NC | NC | -9.5 | -55.0 | NC | NC | -16.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 4.0 | 3.9 | 3.9 | 3.9 | 4.0 | 3.7 | 3.5 | 3.3 | 3.4 | 3.2 | 3.1 | 3.0 | 3.6 | 3.5 | 3.5 | 3.5 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -4.5 | -3.0 | -2.0 | -1.0 | -7.5 | -5.0 | -3.5 | -2.0 | . | . | . | 0.5 | -6.0 | -4.0 | -3.0 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 15.0 | 10.0 | 7.5 | 5.0 | 10.5 | 7.5 | 6.0 | 5.5 | . | . | . | 2.0 | 6.5 | 5.0 | 5.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -1.0 | -1.0 | -1.0 | -0.5 | -4.0 | NC | NC | -1.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 7.5 | 6.5 | 5.0 | 3.5 | 6.0 | 5.5 | 5.0 | 3.5 | . | . | . | . | . | . | . | 3.0 |
| LOW TIDE FLOODING FTOL | 3.0 | 2.5 | 1.5 | 2.5 | -0.5 | 0.0 | 0.5 | 1.5 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -8.5 | -2.0 | -1.0 | -0.5 | -22.5 | NC | NC | -13.0 | -36.5 | NC | NC | -8.5 | -56.5 | NC | NC | -17.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 4.8 | 5.2 | 5.3 | 5.3 | 4.7 | 4.7 | 4.5 | 4.1 | NC | NC | NC | 3.2 | 3.9 | 4.1 | 4.0 | 3.8 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.5 | -5.0 | -3.5 | -2.0 | -11.0 | -6.5 | -4.0 | -2.5 | -3.5 | -2.0 | -1.5 | -1.0 | -10.0 | -5.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | NC | 13.5 | 9.5 | 7.0 | 15.0 | NC | NC | 7.0 | 10.5 | NC | NC | 4.5 | 16.5 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -4.5 | -3.0 | -2.0 | -1.0 | -7.5 | -5.0 | -3.0 | -2.0 | . | . | . | 0.5 | -5.0 | -3.0 | -2.0 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 15.0 | 9.5 | 7.0 | 5.0 | 10.5 | 7.0 | 6.0 | 5.0 | . | . | . | 1.5 | 3.5 | NC | NC | 4.5 |
| LOW TIDE FLOODING FTOL | 0.5 | 1.5 | 1.5 | 1.0 | -3.0 | NC | NC | 1.0 | 7.5 | . | . | . | -4.5 | NC | NC | 1.0 |
| M.S.L. FLOODING FTOL | -5.5 | -1.5 | 0.0 | 0.0 | -21.0 | NC | NC | -13.5 | -33.0 | NC | NC | -6.5 | -56.0 | NC | NC | -17.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | NC | 10.9 | 9.1 | 10.0 | 11.2 | NC | NC | 7.6 | 4.0 | NC | NC | 3.5 | 4.6 | NC | NC | 5.1 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -14.5 | -8.0 | -5.0 | -3.5 | -8.0 | -4.5 | -3.0 | -2.0 | -13.5 | -7.0 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NC | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.0 | 10.5 | 8.0 | 25.5 | NC | NC | 8.0 | 15.5 | NC | NC | 6.0 | 29.5 | NC | NC | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -7.0 | -4.0 | -3.0 | -2.0 | -10.0 | -6.0 | -4.0 | -2.5 | -1.0 | -0.5 | -0.5 | -0.5 | -8.5 | -5.0 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 19.0 | 11.0 | 8.5 | 6.0 | 13.5 | 8.5 | 7.0 | 6.5 | 5.0 | NC | NC | 3.5 | 11.5 | 7.5 | 5.0 | 5.5 |
| LOW TIDE FLOODING FTOL | -1.0 | 0.5 | 1.5 | 1.5 | -5.5 | NC | NC | 0.5 | 0.5 | NC | NC | 2.5 | -7.0 | NC | NC | 0.0 |
| M.S.L. FLOODING FTOL | -6.0 | -1.0 | 0.5 | 1.0 | -19.0 | NC | NC | -14.0 | -29.0 | NC | NC | -2.0 | -56.0 | NC | NC | -18.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 23.7 | 26.8 | 23.6 | 20.1 | 23.6 | 23.1 | 16.8 | 11.0 | 5.0 | 5.9 | 5.5 | 4.9 | 5.2 | 5.0 | 9.2 | 9.9 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -11.5 | -6.0 | -4.0 | -3.0 | -13.0 | -6.5 | -4.0 | -2.5 | -7.5 | -4.0 | -2.5 | -2.0 | -12.5 | -5.5 | -4.5 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 14.5 | 10.0 | 7.5 | NC | NC | NC | 7.5 | 15.5 | NC | NC | 5.5 | 23.0 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -7.5 | -4.0 | -2.5 | -2.0 | -9.0 | -4.5 | -3.0 | -1.5 | -0.5 | NC | NC | -1.5 | -6.5 | -3.5 | -2.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | NC | 11.0 | 8.0 | 6.0 | 19.5 | NC | NC | 5.5 | 3.0 | NC | NC | 4.5 | 13.5 | NC | NC | 5.0 |
| LOW TIDE FLOODING FTOL | -0.5 | 1.5 | 1.5 | 1.5 | -3.5 | NC | NC | 1.5 | 0.5 | NC | NC | 3.5 | -5.5 | NC | NC | 0.0 |
| M.S.L. FLOODING FTOL | -0.5 | 1.0 | 1.0 | 1.0 | -5.0 | NC | NC | -14.0 | -24.5 | NC | NC | -1.5 | -49.5 | NC | NC | -14.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 29.7 | 38.3 | 30.1 | 21.4 | 23.2 | 26.7 | 17.8 | 9.8 | 4.7 | 6.4 | 5.3 | 4.1 | 7.9 | 12.4 | 11.9 | 10.4 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

SCOTT BAY 39a

BAYWAY DRIVE BY SCOTT BAY (SCOTT BAY) — ELEVATION: 6.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -2.0 | -2.0 | -1.5 | -0.5 | -5.0 | -4.5 | -3.0 | -1.0 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 11.0 | 8.5 | 6.0 | 4.0 | 7.5 | 6.0 | 5.0 | 4.0 | . | . | . | . | . | . | . | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | 1.5 | 0.0 | 0.0 | 0.0 | -2.0 | 0.0 | 0.0 | -0.5 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | E | NE | NE | NE | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 3.0 | 5.0 | 4.0 | 2.5 | 3.5 | 4.5 | 3.0 | 1.0 | . | . | . | . | . | . | . | 2.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -4.5 | -3.0 | -2.0 | -1.0 | -7.5 | -5.0 | -3.5 | -2.0 | . | . | . | 0.5 | -6.0 | -4.0 | -3.0 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 15.0 | 10.0 | 7.5 | 5.0 | 10.5 | 7.5 | 6.0 | 5.5 | . | . | . | 2.0 | 6.5 | 5.0 | 5.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -1.0 | -1.0 | -1.0 | -0.5 | -4.0 | NC | NC | -1.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 7.5 | 6.5 | 5.0 | 3.5 | 6.0 | 5.5 | 5.0 | 3.5 | . | . | . | . | . | . | . | 3.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | NC | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | NC | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.5 | -5.0 | -3.5 | -2.0 | -11.0 | -6.5 | -4.0 | -2.5 | -3.5 | -2.0 | -1.5 | -1.0 | -10.0 | -6.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | NC | 13.5 | 9.5 | 7.0 | 15.0 | NC | NC | 7.0 | 10.5 | NC | NC | 4.5 | 16.5 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -4.5 | -3.0 | -2.0 | -1.0 | -7.5 | -5.0 | -2.0 | -2.0 | . | . | . | 0.5 | -5.0 | -3.0 | -2.0 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 15.0 | 9.5 | 7.0 | 5.0 | 10.5 | 7.0 | 6.0 | 5.0 | . | . | . | 1.5 | 3.5 | 3.0 | 3.5 | 4.5 |
| LOW TIDE FLOODING FTOL | 5.0 | 7.0 | 3.0 | 5.0 | 1.0 | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 4.5 | 6.0 | 3.0 | 4.0 | 1.0 | 4.5 | 4.0 | 7.5 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | 4.5 | 5.5 | 2.5 | 2.5 | 1.0 | NC | NC | NC | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | NC | 10.9 | 9.1 | 10.0 | 11.2 | NC | NC | 7.6 | . | . | . | . | . | . | . | . |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -14.5 | -8.0 | -5.0 | -3.5 | -8.0 | -4.5 | -3.0 | -2.0 | -13.5 | -7.0 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.0 | 10.5 | 8.0 | 25.5 | NC | NC | 8.0 | 15.5 | NC | NC | 6.0 | 20.5 | NC | NC | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -7.0 | -4.0 | -3.0 | -2.0 | -10.0 | -6.0 | -4.0 | -2.5 | -1.0 | -0.5 | -0.5 | -0.5 | -8.5 | -5.0 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 19.0 | 11.0 | 8.5 | 6.0 | 13.5 | 8.5 | 7.0 | 6.5 | 5.0 | NC | NC | 3.5 | 11.5 | 7.5 | 6.0 | 5.5 |
| LOW TIDE FLOODING FTOL | 2.5 | 2.0 | 2.0 | 2.0 | -1.0 | 0.0 | 0.5 | 1.5 | . | . | . | . | . | . | . | 1.5 |
| M.S.L. FLOODING FTOL | 2.5 | 2.0 | 2.0 | 2.0 | -1.0 | -0.5 | 0.5 | 1.0 | . | . | . | . | . | . | . | 1.0 |
| HIGH TIDE FLOODING FTOL | 2.0 | 2.0 | 2.0 | 1.5 | -1.5 | -0.5 | 0.0 | 1.0 | . | . | . | . | . | NC | NC | 1.0 |
| MAXIMUM HIGH TIDE SURGE | 23.7 | 26.8 | 23.6 | 20.1 | 23.6 | 23.1 | 16.8 | 11.0 | . | . | . | . | . | 8.5 | 9.2 | 9.9 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -11.5 | -6.0 | -4.0 | -3.0 | -13.0 | -6.5 | -4.0 | -2.5 | -7.5 | -4.0 | -2.5 | -2.0 | -12.5 | -6.5 | -4.5 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 14.5 | 10.0 | 7.5 | NC | NC | NC | 7.5 | 15.5 | NC | NC | 5.5 | 23.0 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -7.5 | -4.0 | -2.5 | -2.0 | -9.0 | -4.5 | -3.0 | -1.5 | -0.5 | NC | NC | -1.5 | -6.5 | -3.5 | -2.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | NC | 11.0 | 8.0 | 6.0 | 19.5 | NC | NC | 5.5 | 3.0 | NC | NC | 4.5 | 13.5 | NC | NC | 5.0 |
| LOW TIDE FLOODING FTOL | 2.0 | 2.0 | 2.0 | 2.0 | 0.0 | 2.0 | 4.0 | 6.0 | . | . | . | . | . | . | . | 1.5 |
| M.S.L. FLOODING FTOL | 2.0 | 2.0 | 2.0 | 2.0 | 0.0 | 2.0 | 3.0 | 5.0 | . | . | . | . | 6.5 | 4.5 | 3.0 | 1.0 |
| HIGH TIDE FLOODING FTOL | 2.0 | 2.0 | 1.5 | 1.5 | 0.0 | 1.5 | 2.5 | 4.0 | . | NC | . | . | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 29.7 | 38.3 | 30.1 | 21.4 | 23.2 | 26.7 | 17.8 | 9.8 | . | 6.4 | . | . | 7.9 | 12.4 | 11.9 | 10.4 |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

BURNETT BAY AND 134 NORTH OF LYNCHBURG FERRY CROSSING (LYNCHBURG) ELEVATION: 0.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -1.5 | -1.5 | -1.0 | -0.5 | -5.0 | -5.0 | -3.0 | -1.0 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 10.5 | 8.0 | 6.0 | 4.0 | 7.5 | 6.0 | 5.0 | 4.0 | . | . | . | . | . | . | . | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | 2.0 | 0.5 | 0.0 | 0.0 | -2.0 | -0.5 | 0.0 | -0.5 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | E | NE | NE | NE | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 3.0 | 4.5 | 4.0 | 2.5 | 3.0 | 4.0 | 2.5 | 1.0 | . | . | . | . | . | . | . | 2.5 |
| LOW TIDE FLOODING FTOL | 4.5 | 3.5 | 3.0 | 3.0 | 0.0 | . | . | . | 7.0 | . | . | . | -1.5 | NC | NC | 2.0 |
| M.S.L. FLOODING FTOL | -2.5 | 1.0 | 1.5 | 1.0 | -19.0 | -11.5 | -12.0 | -11.5 | -32.0 | NC | NC | -4.5 | -54.0 | NC | NC | -16.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 5.8 | 5.5 | 4.9 | 4.6 | 5.4 | 4.9 | 4.2 | 3.8 | NC | NC | NC | 3.5 | 5.1 | 4.8 | 4.3 | 4.2 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -4.0 | -3.0 | -2.0 | -1.0 | -7.0 | -5.0 | -3.0 | -1.5 | . | . | . | 0.5 | -5.5 | -4.0 | -2.5 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 15.0 | 10.0 | 7.5 | 5.0 | 10.0 | 7.0 | 6.0 | 5.0 | . | . | . | 2.0 | 6.5 | 5.0 | 5.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -0.5 | -1.0 | -1.0 | -0.5 | -4.0 | NC | NC | -1.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 7.5 | 6.5 | 5.5 | 3.5 | 6.0 | 6.0 | 5.0 | 3.5 | . | . | . | . | . | . | . | 3.0 |
| LOW TIDE FLOODING FTOL | 2.5 | 2.5 | 2.5 | 2.0 | -1.5 | -0.5 | 0.5 | 1.5 | 3.5 | . | . | . | -4.5 | -2.5 | -0.5 | 1.5 |
| M.S.L. FLOODING FTOL | -1.5 | 1.0 | 1.5 | 1.0 | -19.0 | -11.5 | -12.0 | -11.5 | -28.5 | NC | NC | -2.5 | -54.0 | NC | NC | -16.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 8.0 | 6.7 | 6.1 | 5.7 | 6.7 | 5.6 | 5.1 | 4.9 | NC | NC | NC | 3.7 | 5.9 | 5.1 | 4.9 | 4.9 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.0 | -5.0 | -3.5 | -2.0 | -11.0 | -6.5 | -4.5 | -2.5 | -3.0 | -2.0 | -1.5 | -1.0 | -5.5 | -6.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | NC | 13.5 | 9.5 | 6.5 | 14.5 | NC | NC | 7.0 | 10.0 | NC | NC | 4.5 | 16.0 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -4.0 | -2.5 | -2.0 | -1.0 | -7.0 | -5.0 | -3.0 | -1.5 | . | . | . | 1.0 | -4.0 | -3.0 | -2.0 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 14.5 | 9.5 | 7.0 | 5.0 | 10.5 | 7.5 | 6.0 | 5.0 | . | . | . | 1.0 | 2.5 | 2.5 | 3.5 | 4.5 |
| LOW TIDE FLOODING FTOL | 0.5 | 1.5 | 2.0 | 2.0 | -4.5 | -4.0 | -1.0 | 1.0 | 0.5 | 2.5 | 4.0 | 4.0 | -11.5 | -10.5 | -4.5 | 0.5 |
| M.S.L. FLOODING FTOL | -2.0 | 1.0 | 1.5 | 1.0 | -18.5 | NC | NC | -11.5 | -23.5 | NC | NC | -1.0 | -54.0 | NC | NC | -16.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | NC | 11.0 | 10.0 | 9.4 | 11.2 | NC | NC | 7.4 | NC | NC | NC | 4.5 | 7.6 | NC | NC | 5.8 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -11.5 | -6.5 | -4.5 | -3.0 | -14.0 | -8.0 | -5.0 | -3.5 | -7.5 | -4.0 | -3.0 | -2.0 | -13.0 | -7.0 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.0 | 10.5 | 8.0 | 18.0 | NC | NC | 8.5 | 15.0 | NC | NC | 6.0 | 20.5 | NC | NC | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -7.0 | -4.0 | -3.0 | -1.5 | -9.5 | -5.5 | -4.0 | -2.5 | -0.5 | 0.0 | -0.5 | -0.5 | -8.5 | -5.0 | -3.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | NC | 11.0 | 8.5 | 6.0 | 13.0 | NC | NC | 6.0 | 4.5 | NC | NC | 3.5 | 11.5 | NC | NC | 6.0 |
| LOW TIDE FLOODING FTOL | -1.5 | 0.5 | 1.5 | 1.5 | -7.0 | NC | NC | 0.5 | -3.5 | NC | NC | 2.0 | -15.0 | NC | NC | 0.0 |
| M.S.L. FLOODING FTOL | -2.5 | 0.5 | 1.5 | 1.0 | -18.5 | -11.0 | -11.5 | -11.0 | -20.5 | NC | NC | -1.0 | -54.0 | NC | NC | -16.0 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 23.7 | 27.5 | 24.0 | 19.5 | 23.5 | 23.9 | 17.4 | 11.0 | 8.4 | NC | NC | NC | 9.3 | 11.2 | 10.2 | 8.6 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -11.5 | -5.5 | -4.0 | -2.5 | -13.0 | -6.0 | -4.0 | -2.5 | -7.0 | -3.5 | -2.5 | -2.0 | -12.5 | -6.0 | -4.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NC | NC | NC | NC | E |
| DURATION IN HOURS | NC | 14.5 | 10.0 | 7.5 | NC | NC | NC | 7.5 | 15.0 | NC | NC | 5.5 | 23.0 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -7.5 | -3.5 | -2.5 | -1.5 | -9.0 | -4.0 | -3.0 | -1.5 | 0.0 | 0.0 | 0.0 | -0.5 | -6.5 | -3.5 | -2.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | NC | 11.0 | 8.0 | 5.5 | 19.5 | NC | NC | 5.5 | 2.5 | NC | NC | 2.5 | 13.5 | NC | NC | 5.0 |
| LOW TIDE FLOODING FTOL | -0.5 | 1.5 | 2.0 | 1.5 | -4.0 | NC | NC | 2.0 | -2.0 | -NC | NC | 2.0 | -12.5 | NC | NC | 0.0 |
| M.S.L. FLOODING FTOL | -0.5 | 1.5 | 2.0 | 1.5 | -11.0 | NC | NC | -11.0 | -17.0 | NC | NC | 0.0 | -48.5 | NC | NC | -12.5 |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 30.4 | 41.8 | 37.4 | 22.2 | 23.0 | 27.6 | 20.4 | 9.0 | NC | NC | NC | 5.4 | 9.5 | 13.3 | 12.3 | 7.6 |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

# I-10 AT LYNCHBURG 40b

I 10 AT LYNCHBURG (LYNCHBURG) — ELEVATION: 12.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -1.5 | -1.5 | -1.0 | -0.5 | -5.0 | -5.0 | -3.0 | -1.0 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 10.5 | 8.0 | 6.0 | 4.0 | 7.5 | 6.0 | 5.0 | 4.0 | . | . | . | . | . | . | . | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | 2.0 | 0.5 | 0.0 | 0.0 | -2.0 | -0.5 | 0.0 | -0.5 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | E | NE | NE | NE | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 3.0 | 4.5 | 4.0 | 2.5 | 3.0 | 4.0 | 2.5 | 1.0 | . | . | . | . | . | . | . | 2.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | NC | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | NC | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -4.0 | -3.0 | -2.0 | -1.0 | -7.0 | -5.0 | -3.0 | -1.5 | . | . | . | 0.5 | -5.5 | -4.0 | -2.5 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 15.0 | 10.0 | 7.5 | 5.0 | 10.0 | 7.0 | 6.0 | 5.0 | . | . | . | 2.0 | 6.5 | 5.0 | 5.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -0.5 | -1.0 | -1.0 | -0.5 | -4.0 | NC | NC | -1.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 7.5 | 6.5 | 5.5 | 3.5 | 6.0 | 6.0 | 5.0 | 3.5 | . | . | . | . | . | . | . | 3.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | NC | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | NC | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.0 | -5.0 | -3.5 | -2.0 | -11.0 | -6.5 | -4.5 | -2.5 | -3.0 | -2.0 | -1.5 | -1.0 | -9.5 | -6.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | NC | 13.5 | 9.5 | 6.5 | 14.5 | NC | NC | 7.0 | 10.0 | NC | NC | 4.5 | 16.0 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -4.0 | -2.5 | -2.0 | -1.0 | -7.0 | -5.0 | -3.0 | -1.5 | . | . | . | 1.0 | -4.0 | -3.0 | -2.0 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 14.5 | 9.5 | 7.0 | 5.0 | 10.5 | 7.5 | 6.0 | 5.0 | . | . | . | 1.0 | 2.5 | 2.5 | 3.5 | 4.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | NC | . | . | . | . | . | . | . | NC | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | NC | . | . | . | . | . | . | . | NC | . | . | . | . | . | . | . |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -11.5 | -6.5 | -4.5 | -3.0 | -14.0 | -8.0 | -5.0 | -3.5 | -7.5 | -4.0 | -3.0 | -2.0 | -13.0 | -7.0 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.0 | 10.5 | 8.0 | 18.0 | NC | NC | 8.5 | 15.0 | NC | NC | 6.0 | 20.5 | NC | NC | 8.0 |
| 65.5 MPH WIND GUSTS FTOL | -7.0 | -4.0 | -3.0 | -1.5 | -9.5 | -5.5 | -4.0 | -2.5 | -0.5 | 0.0 | -0.5 | -0.5 | -8.5 | -5.0 | -3.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | NC | 11.0 | 8.5 | 6.0 | 13.0 | NC | NC | 6.0 | 4.5 | NC | NC | 3.5 | 11.5 | NC | NC | 6.0 |
| LOW TIDE FLOODING FTOL | 3.5 | 3.0 | 2.5 | 2.5 | 0.0 | NC | NC | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 3.0 | 2.5 | 2.5 | 2.5 | 0.0 | NC | NC | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | 2.5 | 2.0 | 2.5 | 2.5 | -0.5 | NC | NC | . | . | . | . | NC | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 23.7 | 27.5 | 24.0 | 19.5 | 23.5 | 23.0 | 17.5 | . | . | . | . | NC | . | . | . | . |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -11.5 | -5.5 | -4.0 | -2.5 | -13.0 | -6.0 | -4.0 | -2.5 | -7.0 | -3.5 | -2.5 | -2.0 | -12.5 | -6.0 | -4.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 14.5 | 10.0 | 7.5 | NC | NC | NC | 7.5 | 15.0 | NC | NC | 5.5 | 23.0 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -7.5 | -3.5 | -2.5 | -1.5 | -9.0 | -4.0 | -2.0 | -1.5 | 0.0 | 0.0 | 0.0 | -0.5 | -6.5 | -3.5 | -2.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | NC | 11.0 | 8.0 | 5.5 | 15.5 | NC | NC | 5.5 | 2.5 | NC | NC | 2.5 | 13.5 | NC | NC | 5.0 |
| LOW TIDE FLOODING FTOL | 2.5 | 2.5 | 2.0 | 2.0 | 1.5 | NC | NC | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 2.5 | 2.5 | 2.0 | 2.0 | 1.0 | NC | NC | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | 2.5 | 2.5 | 2.0 | 2.0 | 1.0 | NC | NC | . | NC | . | . | . | . | NC | NC | . |
| MAXIMUM HIGH TIDE SURGE | 30.4 | 41.8 | 37.4 | 22.2 | 23.0 | 27.5 | 20.5 | . | NC | . | . | . | . | 13.3 | 12.2 | . |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

FM 2354 NORTH OF CEDAR BAYOU (CEDAR B) — ELEVATION: 2.2 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -3.0 | -2.5 | -2.0 | -1.0 | -6.0 | -4.0 | -3.0 | -1.5 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 11.5 | 8.5 | 6.0 | 4.0 | 8.0 | 6.5 | 5.0 | 4.5 | . | . | . | . | . | . | . | 3.5 |
| 65.5 MPH WIND GUSTS FTOL | 0.5 | -0.5 | -0.5 | 0.0 | -3.0 | NC | NC | -0.5 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | E | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 4.0 | 4.5 | 4.0 | 2.5 | 4.0 | 4.5 | 4.0 | 2.5 | . | . | . | . | . | . | . | 2.0 |
| LOW TIDE FLOODING FTOL | 3.0 | 1.5 | 1.5 | 1.5 | -1.0 | NC | NC | 0.5 | . | . | . | . | . | . | . | 1.0 |
| M.S.L. FLOODING FTOL | -1.0 | 0.0 | 0.5 | 0.5 | -7.0 | NC | NC | -0.5 | -2.5 | -0.5 | 1.0 | 1.5 | -9.5 | -3.0 | -33.0 | -0.5 |
| HIGH TIDE FLOODING FTOL | -4.5 | -2.0 | -0.5 | -0.5 | -13.5 | -5.0 | -1.0 | -1.5 | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 6.1 | 6.4 | 6.6 | 6.9 | 6.1 | 6.3 | 6.2 | 6.3 | 4.9 | 4.6 | 4.3 | 4.1 | 5.0 | 5.2 | 5.2 | 5.4 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -6.0 | -3.5 | -2.5 | -1.5 | -8.5 | -5.0 | -3.5 | -2.0 | . | . | . | 0.5 | -6.0 | -3.5 | -2.5 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 15.5 | 10.0 | 7.5 | 5.0 | 11.0 | 7.5 | 6.0 | 5.5 | . | . | . | 1.5 | 6.0 | 4.5 | 4.5 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -2.0 | -2.0 | -1.5 | -0.5 | -5.0 | -4.5 | -3.5 | -1.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 8.5 | 7.0 | 5.0 | 3.5 | 7.0 | 6.0 | 5.0 | 4.0 | . | . | . | . | . | . | . | 3.0 |
| LOW TIDE FLOODING FTOL | 1.0 | 0.5 | 1.0 | 1.0 | -2.5 | NC | NC | 0.0 | 6.5 | . | . | . | -2.5 | NC | NC | 0.5 |
| M.S.L. FLOODING FTOL | -2.0 | -0.5 | 0.5 | 0.5 | -9.5 | NC | NC | -1.0 | -8.5 | NC | NC | 0.5 | -13.0 | NC | NC | -1.5 |
| HIGH TIDE FLOODING FTOL | -5.0 | -1.5 | 0.0 | 0.0 | -16.0 | -5.5 | -0.5 | -2.0 | -17.0 | NC | NC | NC | -24.0 | -8.0 | -1.0 | -3.0 |
| MAXIMUM HIGH TIDE SURGE | 8.1 | 8.2 | 8.7 | 9.1 | 7.6 | 7.7 | 8.2 | 8.6 | 5.3 | 4.9 | 4.7 | 4.5 | 5.8 | 5.8 | 6.0 | 6.2 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -4.0 | -2.5 | -12.0 | -7.0 | -4.5 | -3.0 | -4.0 | -2.5 | -2.0 | -1.5 | -10.0 | -6.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | NC | 13.5 | 9.5 | 7.0 | 22.0 | NC | NC | 7.0 | 11.0 | NC | NC | 4.5 | 15.0 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -5.5 | -3.5 | -2.5 | -1.5 | -8.0 | -5.0 | -3.5 | -2.0 | . | . | . | 1.0 | -4.5 | -3.0 | -2.0 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 15.0 | 10.0 | 7.5 | 5.0 | 11.0 | 7.5 | 6.0 | 5.0 | . | . | . | 0.5 | 2.5 | 3.0 | 3.0 | 4.5 |
| LOW TIDE FLOODING FTOL | -1.0 | 0.0 | 0.5 | 0.5 | -5.5 | NC | NC | -0.5 | 2.0 | NC | NC | 1.5 | -6.5 | NC | NC | 0.5 |
| M.S.L. FLOODING FTOL | -4.0 | -1.0 | 0.0 | 0.0 | -11.5 | -3.5 | -0.5 | -1.5 | -8.5 | -2.5 | -0.5 | -0.5 | -17.5 | -5.5 | -1.0 | -2.0 |
| HIGH TIDE FLOODING FTOL | -7.5 | -2.0 | -1.0 | -0.5 | -17.5 | -5.5 | -2.5 | -3.0 | -19.0 | -6.0 | -2.5 | -2.5 | -28.5 | -9.0 | -4.0 | -5.0 |
| MAXIMUM HIGH TIDE SURGE | 15.5 | 15.2 | 15.2 | 14.8 | 14.2 | 13.8 | 13.6 | 13.1 | 6.0 | 5.7 | 5.6 | 5.3 | 7.0 | 7.5 | 8.2 | 8.7 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -13.0 | -7.0 | -5.0 | -3.5 | -15.0 | -8.0 | -5.5 | -3.5 | -9.0 | -5.0 | -3.5 | -2.5 | -14.0 | -7.5 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 15.0 | 11.0 | 8.0 | 26.0 | NC | NC | 8.5 | 16.0 | NC | NC | 6.0 | 20.5 | NC | NC | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -8.5 | -5.0 | -3.5 | -2.0 | -10.5 | -6.0 | -4.0 | -2.5 | -1.5 | -1.0 | -1.0 | -1.0 | -8.5 | -5.0 | -3.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 19.5 | 11.5 | 8.5 | 6.0 | 14.0 | 8.5 | 7.0 | 6.5 | 5.5 | 3.5 | 3.0 | 3.0 | 10.5 | 7.0 | 6.0 | 5.5 |
| LOW TIDE FLOODING FTOL | -3.0 | 1.0 | 0.0 | 0.5 | -8.0 | NC | NC | -0.5 | -3.0 | NC | NC | 1.5 | -9.5 | -3.0 | 1.0 | -0.5 |
| M.S.L. FLOODING FTOL | -5.5 | -1.5 | -0.5 | 0.0 | -12.5 | -4.0 | -1.5 | -1.5 | -9.5 | -3.0 | -1.0 | -0.5 | -21.5 | -7.0 | -2.5 | -2.5 |
| HIGH TIDE FLOODING FTOL | -8.5 | -4.0 | -1.0 | -0.5 | -17.0 | -9.0 | -3.0 | -3.0 | -16.5 | -8.5 | -3.0 | -2.5 | -33.5 | -18.0 | -5.5 | -5.0 |
| MAXIMUM HIGH TIDE SURGE | 21.4 | 22.0 | 19.6 | 19.8 | 21.2 | 21.4 | 18.8 | 18.6 | 8.3 | 8.6 | 7.8 | 7.9 | 8.3 | 9.9 | 10.1 | 11.6 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -14.0 | -6.5 | -4.5 | -3.0 | -14.0 | -7.0 | -4.5 | -3.0 | -8.5 | -4.0 | -3.0 | -2.5 | -13.0 | -6.0 | -4.5 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 14.5 | 10.5 | 7.0 | NC | NC | NC | 7.5 | 16.0 | NC | NC | 5.5 | 22.5 | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -9.0 | -4.5 | -3.0 | -2.0 | -10.0 | -5.0 | -3.0 | -2.0 | -3.0 | -1.5 | -1.0 | -1.0 | -7.0 | -3.5 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 23.5 | 11.0 | 8.0 | 5.5 | 20.5 | 10.0 | 7.5 | 5.5 | 5.0 | 3.0 | 2.5 | 3.0 | 13.0 | 6.5 | 5.0 | 5.0 |
| LOW TIDE FLOODING FTOL | -1.5 | 0.5 | 0.5 | 1.0 | -5.5 | NC | NC | 1.0 | -2.0 | NC | NC | 1.5 | -7.5 | NC | NC | -0.5 |
| M.S.L. FLOODING FTOL | -2.5 | -0.5 | 0.5 | 0.5 | -9.5 | NC | NC | -0.5 | -7.5 | NC | NC | 0.0 | -18.5 | NC | NC | -2.5 |
| HIGH TIDE FLOODING FTOL | -3.5 | -1.0 | 0.0 | 0.5 | -13.0 | -4.5 | 0.0 | -1.5 | -13.5 | -4.5 | 0.0 | -2.0 | -29.5 | -10.0 | 0.0 | -4.5 |
| MAXIMUM HIGH TIDE SURGE | 24.9 | 25.8 | 23.5 | 21.6 | 20.3 | 21.0 | 19.1 | 17.6 | 7.5 | 7.7 | 6.9 | 6.3 | 8.5 | 10.0 | 10.3 | 10.7 |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

FM 2354 BY TRINITY BAY (BEACH RD) — ELEVATION: 12.5 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -2.5 | -2.0 | -1.5 | -1.0 | -5.5 | -4.0 | -3.0 | -1.5 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | E | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 10.0 | 7.5 | 6.0 | 3.5 | 8.5 | 7.0 | 5.5 | 4.5 | . | . | . | . | . | . | . | 3.0 |
| 65.5 MPH WIND GUSTS FTOL | 2.5 | 0.0 | -0.5 | 0.0 | -2.0 | 0.0 | 0.5 | -0.5 | . | . | . | . | . | . | . | 0.0 |
| DIRECTION OF WIND | E | E | E | E | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 0.0 | 3.5 | 3.0 | 2.5 | 3.5 | 6.0 | 5.0 | 3.0 | . | . | . | . | . | . | . | 1.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -5.5 | -3.5 | -2.5 | -1.5 | -7.5 | -5.0 | -3.5 | -2.0 | . | . | . | . | -3.5 | -2.0 | -2.0 | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | E | E | E | E |
| DURATION IN HOURS | 14.5 | 9.5 | 7.5 | 5.0 | 11.0 | 8.0 | 6.5 | 5.5 | . | . | . | . | 1.0 | 2.0 | 3.0 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -1.5 | -1.5 | -1.0 | -0.5 | -4.0 | -3.5 | -2.5 | -1.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | E | E | E | E | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 7.0 | 6.0 | 5.0 | 3.0 | 6.0 | 6.0 | 5.0 | 4.0 | . | . | . | . | . | . | . | 2.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.5 | -5.5 | -4.0 | -2.5 | -11.5 | -6.5 | -4.5 | -3.0 | -2.5 | -1.5 | -1.0 | -1.0 | -9.0 | -5.0 | -3.5 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | NC | 13.0 | 9.5 | 6.5 | 21.5 | NC | NC | 7.0 | 8.0 | NC | NC | 3.5 | 13.5 | NC | NC | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -5.5 | -3.5 | -2.5 | -1.5 | -7.5 | -4.5 | -3.0 | -2.0 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 14.0 | 9.5 | 7.0 | 5.0 | 11.5 | 8.0 | 6.5 | 5.0 | . | . | . | . | . | . | . | 4.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | 2.0 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 4.5 | 3.5 | . | . | 2.5 | NC | NC | -1.5 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | NC | NC | . | NC | NC | NC | NC | -5.0 | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 14.9 | 14.9 | . | 17.1 | 14.3 | NC | NC | 15.2 | . | . | . | . | . | . | . | . |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -13.0 | -7.0 | -5.0 | -3.5 | -14.5 | -8.0 | -5.5 | -3.5 | -8.0 | -4.5 | -3.0 | -2.5 | -12.5 | -7.0 | -4.5 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | NC | 14.5 | 10.5 | 8.0 | 25.5 | NC | NC | 8.5 | 14.5 | NC | NC | 5.5 | 18.5 | NC | NC | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -8.5 | -5.0 | -3.5 | -2.0 | -10.0 | -6.0 | -4.0 | -2.5 | 1.5 | 1.0 | 0.0 | -0.5 | -7.5 | -4.5 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 18.0 | 11.0 | 8.0 | 6.0 | 15.0 | 9.5 | 7.5 | 6.5 | 0.5 | 1.0 | 1.5 | 2.5 | 6.0 | NC | NC | 5.0 |
| LOW TIDE FLOODING FTOL | 1.5 | 1.5 | 1.5 | 2.0 | -1.5 | -1.0 | 0.0 | 1.0 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 1.0 | 1.5 | 1.5 | 1.5 | -2.0 | -1.0 | 0.0 | 1.0 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | 1.0 | 1.0 | 1.5 | 1.5 | -2.5 | -1.5 | 0.0 | 1.0 | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 19.5 | 20.5 | 19.9 | 20.1 | 20.6 | 22.0 | 21.9 | 22.6 | . | . | . | . | . | . | . | . |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -14.0 | -6.5 | -4.5 | -3.0 | -13.5 | -6.5 | -4.0 | -2.5 | -8.0 | -4.0 | -3.0 | -2.0 | -12.0 | -6.0 | -4.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | NC | 14.0 | 10.0 | 7.0 | NC | NC | NC | 7.5 | 14.0 | NC | NC | 5.0 | 21.0 | NC | NC | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -9.0 | -4.5 | -3.0 | -2.0 | -9.5 | -5.0 | -3.0 | -1.5 | . | . | . | 0.0 | -4.0 | -2.0 | -2.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | . | . | . | E | NC | NC | NC | E |
| DURATION IN HOURS | 20.0 | 11.0 | 8.0 | 5.5 | 20.5 | 11.0 | 8.0 | 5.5 | . | . | . | 1.5 | 9.5 | 5.5 | 5.0 | 4.5 |
| LOW TIDE FLOODING FTOL | 1.0 | 1.5 | 1.5 | 1.5 | -0.5 | 0.0 | 1.0 | 1.5 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 1.0 | 1.5 | 1.5 | 1.5 | -1.0 | 0.0 | 1.0 | 1.5 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | 0.5 | 1.0 | 1.5 | 1.5 | -1.5 | -0.5 | 1.0 | 1.5 | NC | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 21.9 | 23.2 | 23.8 | 2.4 | 22.3 | NC | NC | 20.8 | NC | . | . | . | . | . | . | . |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

I 10 AT WALLISVILLE (WALVILL) — ELEVATION: 13.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -0.5 | -1.0 | -1.0 | -0.5 | -3.5 | -4.0 | -3.0 | -1.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | E | E | E | E | E | E | E | E | . | . | . | . | . | . | . | S E |
| DURATION IN HOURS | 6.5 | 6.0 | 5.0 | 3.0 | 7.5 | 7.5 | 6.0 | 4.0 | . | . | . | . | . | . | . | 2.5 |
| 65.5 MPH WIND GUSTS FTOL | . | . | . | 1.0 | . | . | . | -0.5 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | . | . | . | S E | . | . | . | E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | . | . | . | 0.5 | . | . | . | 3.0 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -4.0 | -3.0 | -2.0 | -1.0 | -6.0 | -4.0 | -3.0 | -1.5 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | N E | N E | N E | E | E | E | E | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 11.5 | 8.5 | 6.5 | 4.0 | 11.0 | 9.0 | 7.0 | 5.5 | . | . | . | . | . | . | . | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | 2.0 | 0.0 | -0.5 | 0.0 | -2.5 | N C | N C | -0.5 | . | . | . | . | . | . | . | 0.0 |
| DIRECTION OF WIND | E | E | E | E | E | E | E | E | . | . | . | . | . | . | . | S E |
| DURATION IN HOURS | 0.5 | 4.0 | 3.5 | 2.5 | 5.0 | 7.0 | 5.5 | 3.5 | . | . | . | . | . | . | . | 2.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.5 | -5.0 | -3.5 | -2.0 | -9.5 | -5.5 | -4.0 | -2.5 | . | . | . | 0.0 | -6.5 | -4.0 | -3.0 | -1.5 |
| DIRECTION OF WIND | N E | N E | N E | N E | E | E | E | E | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 18.5 | 12.0 | 9.0 | 6.0 | 20.5 | 13.0 | 10.0 | 7.0 | . | . | . | 2.0 | 8.0 | 6.0 | 5.5 | 5.5 |
| 65.5 MPH WIND GUSTS FTOL | -3.5 | -2.5 | -2.0 | -1.0 | -5.5 | -4.0 | -3.0 | -1.5 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | N E | N E | N E | E | E | E | E | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 11.0 | 8.0 | 6.0 | 4.0 | 12.0 | 9.0 | 7.0 | 5.0 | . | . | . | . | . | . | . | 3.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | 2.0 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | 4.0 | 4.0 | 4.0 | 3.5 | N C | N C | 2.0 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | N C | N C | N C | N C | N C | N C | 2.0 | . | . | . | . | . | . | . | N C |
| MAXIMUM HIGH TIDE SURGE | . | 15.7 | 15.0 | 1[illegible].8 | 14.6 | N C | N C | 19.1 | . | . | . | . | . | . | . | N C |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.0 | -4.5 | -4.5 | -3.0 | -13.0 | -5.5 | -5.0 | -3.0 | -5.0 | -2.0 | -2.0 | -1.5 | -10.5 | -4.0 | -4.0 | -2.5 |
| DIRECTION OF WIND | N E | N E | N E | N E | N E | N E | N E | E | N C | N C | N C | E | N C | N C | N C | E |
| DURATION IN HOURS | N C | 11.5 | 10.0 | 7.5 | 24.5 | N C | N C | 8.0 | 9.5 | N C | N C | 4.5 | 14.5 | N C | N C | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -7.0 | -4.0 | -3.0 | -2.0 | -8.5 | -5.0 | -3.5 | -2.0 | . | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | N E | N E | N E | N E | E | E | E | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 14.0 | 10.0 | 7.5 | 5.0 | 16.0 | 11.0 | 8.5 | 6.0 | . | . | . | . | . | . | . | 4.5 |
| LOW TIDE FLOODING FTOL | 3.0 | 2.5 | 2.5 | 3.0 | 0.0 | 0.5 | 1.0 | 1.5 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 3.0 | 2.5 | 2.5 | 2.5 | 0.0 | 0.5 | 1.0 | 1.5 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | 3.0 | 2.5 | 2.5 | 2.5 | -0.5 | 0.0 | 1.0 | 1.5 | . | . | . | . | N C | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 17.9 | 20.9 | 20.7 | 21.4 | 20.1 | 22.5 | 22.5 | 27.6 | . | . | . | . | N C | . | . | . |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -12.0 | -6.0 | -4.0 | -3.0 | -12.0 | -6.0 | -4.0 | -2.5 | -5.5 | -3.0 | -2.0 | -1.5 | -9.0 | -4.5 | -3.0 | -2.5 |
| DIRECTION OF WIND | N E | N E | N E | N E | N E | N E | N E | E | N C | N C | N C | E | N C | N C | N C | E |
| DURATION IN HOURS | 24.0 | 13.0 | 9.5 | 7.0 | N C | N C | N C | 7.5 | 7.5 | 4.5 | 4.0 | 3.5 | 17.5 | 10.0 | 7.5 | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -8.0 | -4.0 | -3.0 | -2.0 | -8.0 | -4.0 | -2.5 | -1.5 | . | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | N E | N E | N E | N E | N E | E | N E | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 17.5 | 10.0 | 7.5 | 5.0 | 19.5 | 11.0 | 8.0 | 5.5 | . | . | . | . | . | . | . | 4.0 |
| LOW TIDE FLOODING FTOL | 2.5 | 2.5 | 2.5 | 3.0 | 1.5 | 2.0 | 2.0 | 2.5 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 2.0 | 2.5 | 2.5 | 3.0 | 1.0 | 1.5 | 2.0 | 2.5 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | 2.0 | 2.5 | 2.5 | 3.0 | 1.0 | 1.5 | 2.0 | 2.0 | . | . | . | . | N C | N C | N C | N C |
| MAXIMUM HIGH TIDE SURGE | 21.9 | 26.0 | 25.1 | 20.8 | 22.6 | 30.2 | 32.7 | 30.1 | . | . | . | . | N C | N C | N C | N C |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

BAYSHORE ROAD AT ANAHUAC (ANAHUAC) — ELEVATION: 17.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -1.5 | -1.5 | -1.5 | -0.5 | -4.0 | -4.5 | -3.5 | -1.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | E | E | E | E | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 7.5 | 6.5 | 5.0 | 3.0 | 8.5 | 7.5 | 6.0 | 4.0 | . | . | . | . | . | . | . | 2.5 |
| 65.5 MPH WIND GUSTS FTOL | . | . | . | 0.5 | 0.0 | NC | NC | -0.5 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | . | . | . | E | E | NC | NC | E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | . | . | . | 1.0 | 1.5 | NC | NC | 2.5 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | NC | . | . | . | . | . | . | . | NC | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | NC | . | . | . | . | . | . | . | NC | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -5.0 | -3.5 | -2.5 | -1.5 | -6.5 | -4.5 | -3.0 | -1.5 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | E | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 12.5 | 9.0 | 6.5 | 4.5 | 11.5 | 9.0 | 7.0 | 5.0 | . | . | . | . | . | . | . | 3.5 |
| 65.5 MPH WIND GUSTS FTOL | 0.5 | -1.0 | -1.0 | -0.5 | -3.0 | -3.5 | -3.0 | -1.0 | . | . | . | . | . | . | . | 0.0 |
| DIRECTION OF WIND | E | E | E | E | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 3.5 | 4.5 | 3.5 | 2.5 | 6.0 | 7.0 | 5.5 | 3.5 | . | . | . | . | . | . | . | 1.5 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | NC | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | NC | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.5 | -5.5 | -4.0 | -2.5 | -10.5 | -6.0 | -4.0 | -2.5 | . | . | . | -0.5 | -7.0 | -4.0 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 20.5 | 12.5 | 9.0 | 6.5 | 21.0 | 13.0 | 9.5 | 7.0 | . | . | . | 2.5 | 8.5 | 6.0 | 5.0 | 5.5 |
| 65.5 MPH WIND GUSTS FTOL | -4.5 | -3.0 | -2.0 | -1.5 | -6.5 | -4.0 | -3.0 | -1.5 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 11.5 | 8.5 | 6.0 | 4.0 | 13.0 | 9.5 | 7.0 | 5.0 | . | . | . | . | . | . | . | 3.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | NC | NC | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | 18.5 | NC | . | . | . | . | . | . | . |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -13.0 | -7.0 | -5.0 | -3.5 | -13.5 | -7.5 | -5.0 | -3.5 | -6.5 | -3.5 | -2.5 | -2.0 | NC | NC | NC | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 24.5 | 14.0 | 10.5 | 7.5 | 25.0 | 14.5 | 11.0 | 8.0 | NC | NC | NC | 4.5 | NC | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -8.0 | -4.5 | -3.0 | -2.0 | -9.0 | -5.5 | -4.0 | -2.5 | . | . | . | . | NC | NC | NC | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | NC | NC | NC | E |
| DURATION IN HOURS | 15.0 | 10.5 | 7.5 | 5.5 | 17.5 | 12.0 | 8.5 | 6.0 | . | . | . | . | NC | NC | NC | 4.5 |
| LOW TIDE FLOODING FTOL | . | . | 3.0 | 3.0 | . | . | . | 1.5 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | 3.0 | 3.0 | 2.5 | 3.0 | NC | NC | 1.5 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | NC | 3.0 | 1.5 | NC | NC | NC | NC | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 17.6 | 19.7 | 20.5 | 21.4 | 18.9 | 22.3 | 24.3 | 26.3 | . | . | . | . | . | . | . | . |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -13.0 | -6.5 | -4.5 | -3.0 | -13.0 | -6.5 | -4.0 | -2.5 | NC | NC | NC | -2.0 | -9.5 | -5.0 | -3.5 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 25.0 | 13.5 | 10.0 | 7.0 | NC | NC | NC | 7.5 | NC | NC | NC | 4.0 | 17.5 | 9.5 | 7.5 | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -9.0 | -4.5 | -3.0 | -2.0 | -9.0 | -4.5 | -3.0 | -1.5 | NC | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | . | . | . | . | . | . | E |
| DURATION IN HOURS | 16.0 | 10.5 | 7.5 | 5.0 | 19.5 | 12.5 | 9.0 | 5.5 | NC | . | . | . | . | . | . | 4.0 |
| LOW TIDE FLOODING FTOL | 5.0 | 2.5 | 2.0 | 2.5 | 4.0 | 2.0 | 2.0 | 2.5 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 4.5 | 2.5 | 2.0 | 2.5 | 3.5 | 2.0 | 2.0 | 2.0 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | 4.0 | 2.5 | 2.0 | 2.0 | 3.0 | 2.0 | 2.0 | 2.0 | NC | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 20.8 | 23.7 | 24.2 | 20.8 | 20.5 | 26.1 | 29.6 | 27.9 | NC | . | . | . | . | . | . | . |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

# BEFORE LEVEE ROAD AT ANAHUAC 44b

BEFORE LEVEE ROAD AT ANAHUAC (ANAHUAC) — ELEVATION: 2.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -1.5 | -1.5 | -1.5 | -0.5 | -4.0 | -4.5 | -3.5 | -1.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | E | E | E | E | E | E | E | E | . | . | . | . | . | . | . | S E |
| DURATION IN HOURS | 7.5 | 6.5 | 5.0 | 3.0 | 8.5 | 7.5 | 6.0 | 4.0 | . | . | . | . | . | . | . | 2.5 |
| 65.5 MPH WIND GUSTS FTOL | . | . | . | 0.5 | 0.0 | N C | N C | -0.5 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | . | . | . | E | E | N C | N C | E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | . | . | . | 1.0 | 1.5 | N C | N C | 2.5 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | 11.0 | . | . | . | 4.5 | N C | N C | 2.0 | . | . | . | . | 2.5 | . | . | . |
| M.S.L. FLOODING FTOL | 5.5 | 3.5 | 3.5 | 3.0 | 1.5 | 1.0 | 1.0 | 1.0 | 5.5 | 4.5 | 5.0 | 5.5 | -1.0 | 0.0 | 0.5 | 1.5 |
| HIGH TIDE FLOODING FTOL | -0.5 | N C | N C | N C | -1.5 | N C | N C | 0.0 | N C | N C | N C | N C | -5.0 | N C | N C | N C |
| MAXIMUM HIGH TIDE SURGE | N C | 4.9 | 4.6 | 4.4 | 5.8 | N C | N C | 7.3 | N C | N C | N C | 3.6 | 4.8 | N C | N C | 4.7 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -5.0 | -3.5 | -2.5 | -1.5 | -6.5 | -4.5 | -3.0 | -1.5 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | N E | N E | N E | E | E | E | E | E | . | . | . | . | . | . | . | S E |
| DURATION IN HOURS | 12.5 | 9.0 | 6.5 | 4.5 | 11.5 | 9.0 | 7.0 | 5.0 | . | . | . | . | . | . | . | 3.5 |
| 65.5 MPH WIND GUSTS FTOL | 0.5 | -1.0 | -1.0 | -0.5 | -3.0 | -3.5 | -3.0 | -1.0 | . | . | . | . | . | . | . | 0.0 |
| DIRECTION OF WIND | E | E | E | E | E | E | E | E | . | . | . | . | . | . | . | S E |
| DURATION IN HOURS | 3.5 | 4.5 | 3.5 | 2.5 | 6.0 | 7.0 | 5.5 | 3.5 | . | . | . | . | . | . | . | 1.5 |
| LOW TIDE FLOODING FTOL | 6.5 | 4.5 | 4.0 | 3.5 | 3.0 | 2.0 | 2.0 | 1.5 | 8.0 | . | . | . | 4.5 | 3.0 | 3.0 | 3.0 |
| M.S.L. FLOODING FTOL | 3.5 | 3.0 | 2.5 | 2.5 | 0.5 | 1.0 | 1.0 | 1.0 | 3.5 | 3.5 | 4.0 | 4.5 | -3.0 | -1.0 | 0.0 | 1.5 |
| HIGH TIDE FLOODING FTOL | 1.0 | 1.0 | 1.5 | 1.5 | -2.0 | -1.0 | -0.5 | 0.5 | -0.5 | N C | N C | N C | -10.0 | -7.5 | -4.0 | -0.5 |
| MAXIMUM HIGH TIDE SURGE | 6.4 | 6.3 | 6.1 | 6.2 | 6.8 | 7.5 | 8.1 | 9.0 | N C | N C | N C | 3.7 | 5.4 | 5.3 | 5.3 | 5.4 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -9.5 | -5.5 | -4.0 | -2.5 | -10.5 | -6.0 | -4.0 | -2.5 | . | . | . | -0.5 | -7.0 | -4.0 | -3.0 | -2.0 |
| DIRECTION OF WIND | N E | N E | N E | N E | E | E | E | E | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 20.5 | 12.5 | 9.0 | 6.5 | 21.0 | 13.0 | 9.5 | 7.0 | . | . | . | 2.5 | 8.5 | 6.0 | 5.0 | 5.5 |
| 65.5 MPH WIND GUSTS FTOL | -4.5 | -3.0 | -2.0 | -1.5 | -6.5 | -4.0 | -3.0 | -1.5 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | N E | N E | N E | N E | E | E | E | E | . | . | . | . | . | . | . | E |
| DURATION IN HOURS | 11.5 | 8.5 | 6.0 | 4.0 | 13.0 | 9.5 | 7.0 | 5.0 | . | . | . | . | . | . | . | 3.0 |
| LOW TIDE FLOODING FTOL | 2.5 | 2.5 | 2.5 | 2.5 | 0.0 | 0.5 | 1.0 | 1.5 | . | . | . | . | 3.0 | 2.5 | 2.5 | 2.5 |
| M.S.L. FLOODING FTOL | 1.5 | 2.0 | 2.0 | 2.0 | -1.5 | -1.0 | 0.0 | 1.0 | 4.0 | 4.5 | 4.0 | 3.5 | -4.0 | -3.0 | -1.0 | 1.0 |
| HIGH TIDE FLOODING FTOL | 0.0 | 1.5 | 2.0 | 2.0 | -3.0 | -4.0 | -1.0 | 1.0 | N C | N C | N C | N C | -11.5 | -8.5 | -5.5 | -0.5 |
| MAXIMUM HIGH TIDE SURGE | 13.7 | 14.5 | 13.6 | 13.3 | 13.6 | 16.3 | 17.1 | 18.5 | N C | N C | N C | 4.6 | 6.5 | 7.1 | 6.8 | 6.9 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -13.0 | -7.0 | -5.0 | -3.5 | -13.5 | -7.5 | -5.0 | -3.5 | -6.5 | -3.5 | -2.5 | -2.0 | N C | N C | N C | -2.5 |
| DIRECTION OF WIND | N E | N E | N E | N E | E | E | E | E | N C | N C | N C | E | N C | N C | N C | E |
| DURATION IN HOURS | 24.5 | 14.0 | 10.5 | 7.5 | 25.0 | 14.5 | 11.0 | 8.0 | N C | N C | N C | 4.5 | N C | N C | N C | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -8.0 | -4.5 | -3.0 | -2.0 | -9.0 | -5.5 | -4.0 | -2.5 | . | . | . | . | N C | N C | N C | -1.5 |
| DIRECTION OF WIND | N E | N E | N E | N E | E | E | E | E | . | . | . | . | N C | N C | N C | E |
| DURATION IN HOURS | 15.0 | 10.5 | 7.5 | 5.5 | 17.5 | 12.0 | 8.5 | 6.0 | . | . | . | . | N C | N C | N C | 4.5 |
| LOW TIDE FLOODING FTOL | 0.5 | 1.5 | 2.0 | 2.0 | -2.5 | -2.0 | 0.0 | 1.0 | 5.0 | 6.0 | 5.0 | 4.0 | 0.0 | 1.0 | 1.5 | 2.0 |
| M.S.L. FLOODING FTOL | -0.5 | 1.0 | 1.5 | 2.0 | -4.0 | -8.5 | -1.0 | 1.0 | 0.0 | 3.0 | 3.0 | 3.0 | -5.0 | -11.0 | -1.5 | 1.0 |
| HIGH TIDE FLOODING FTOL | -1.5 | 0.5 | 1.5 | 1.5 | -5.5 | N C | N C | 0.5 | -5.0 | N C | N C | 1.5 | -10.0 | N C | N C | 0.0 |
| MAXIMUM HIGH TIDE SURGE | 17.6 | 19.7 | 20.5 | 21.4 | 18.9 | 22.3 | 24.3 | 26.3 | 6.8 | 7.3 | 7.4 | 7.5 | 7.3 | 8.7 | 9.5 | 10.3 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -13.0 | -6.5 | -4.5 | -3.0 | -13.0 | -6.5 | -4.0 | -2.5 | N C | N C | N C | -2.0 | -9.5 | -5.0 | -3.5 | -2.5 |
| DIRECTION OF WIND | N E | N E | N E | N E | N E | N E | E | E | N C | N C | N C | E | N C | N C | N C | E |
| DURATION IN HOURS | 25.0 | 13.5 | 10.0 | 7.0 | N C | N C | N C | 7.5 | N C | N C | N C | 4.0 | 17.5 | 9.5 | 7.5 | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -9.0 | -4.5 | -3.0 | -2.0 | -9.0 | -4.5 | -3.0 | -1.5 | N C | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | N E | N E | N E | N E | E | E | E | E | N C | . | . | . | . | . | . | E |
| DURATION IN HOURS | 16.0 | 10.5 | 7.5 | 5.0 | 19.5 | 12.5 | 9.0 | 5.5 | N C | . | . | . | . | . | . | 4.0 |
| LOW TIDE FLOODING FTOL | 0.5 | 2.0 | 2.0 | 2.0 | -1.0 | 0.0 | 1.0 | 2.0 | 6.0 | 9.0 | 7.0 | 5.5 | 2.5 | 4.0 | 2.5 | 2.0 |
| M.S.L. FLOODING FTOL | 0.0 | 1.5 | 2.0 | 2.0 | -2.0 | -2.0 | 0.0 | 1.5 | 0.5 | 3.0 | 3.0 | 3.0 | -4.0 | -5.0 | -1.0 | 1.0 |
| HIGH TIDE FLOODING FTOL | -0.5 | N C | N C | 2.0 | -3.5 | N C | N C | 0.5 | -4.5 | N C | N C | 0.5 | -10.5 | N C | N C | -0.5 |
| MAXIMUM HIGH TIDE SURGE | 20.8 | 22.7 | 24.2 | 20.8 | 20.5 | 26.1 | 29.6 | 27.9 | N C | N C | N C | 5.5 | 7.5 | 9.2 | 10.0 | 9.2 |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

EAGLE ROAD AT OAK ISLAND (OAK ISL) — ELEVATION: 4.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -3.5 | -2.5 | -2.0 | -1.0 | -5.5 | -4.0 | -3.0 | -1.5 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | E | E | E | E | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 9.5 | 7.0 | 5.5 | 3.5 | 9.5 | 7.5 | 6.0 | 4.5 | . | . | . | . | . | . | . | 2.0 |
| 65.5 MPH WIND GUSTS FTOL | . | 1.0 | -0.5 | 0.0 | -2.0 | NC | NC | -0.5 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | . | E | E | E | E | NC | NC | E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | . | 0.5 | 2.0 | 2.0 | 3.5 | NC | NC | 2.5 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -6.5 | -4.0 | -3.0 | -2.0 | -8.0 | -5.0 | -3.5 | -2.0 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 14.0 | 9.5 | 7.0 | 5.0 | 13.5 | 9.5 | 7.0 | 5.0 | . | . | . | . | . | . | . | 3.5 |
| 65.5 MPH WIND GUSTS FTOL | -2.0 | -2.0 | -1.5 | -1.0 | -4.5 | -4.0 | -3.0 | -1.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | E | E | E | E | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 7.0 | 5.5 | 4.5 | 3.0 | 7.0 | 6.0 | 5.0 | 4.0 | . | . | . | . | . | . | . | 1.5 |
| LOW TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -11.0 | -6.0 | -4.5 | -3.0 | -11.5 | -6.5 | -4.5 | -3.0 | -0.5 | -0.5 | -1.0 | -1.0 | -8.5 | -5.0 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 21.5 | 12.5 | 9.5 | 6.5 | 21.5 | 13.0 | 9.5 | 7.0 | 4.5 | 3.0 | 3.0 | 3.0 | 10.0 | 6.5 | 6.0 | 5.5 |
| 65.5 MPH WIND GUSTS FTOL | -6.5 | -4.0 | -3.0 | -1.5 | -7.5 | -5.0 | -3.5 | -2.0 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 13.5 | 9.0 | 6.5 | 4.5 | 14.5 | 10.0 | 7.0 | 5.0 | . | . | . | . | . | . | . | 3.0 |
| LOW TIDE FLOODING FTOL | NC | 1.0 | 1.0 | . | NC | NC | NC | 1.0 | NC | NC | NC | NC | NC | NC | NC | NC |
| M.S.L. FLOODING FTOL | NC | 1.0 | 0.5 | 1.0 | -2.0 | NC | NC | 0.5 | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | 1.0 | 0.0 | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 12.8 | 12.1 | 12.1 | 11.3 | 12.8 | 14.2 | 14.1 | 15.4 | NC | NC | NC | NC | NC | NC | NC | NC |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -14.5 | -8.0 | -5.5 | -3.5 | -15.0 | -8.0 | -5.5 | -3.5 | -8.5 | -5.0 | -3.5 | -2.5 | NC | NC | NC | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 26.0 | 14.5 | 10.5 | 7.5 | 26.0 | 14.5 | 11.0 | 8.0 | NC | NC | NC | 5.0 | NC | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -9.5 | -5.5 | -3.5 | -2.5 | -10.5 | -6.0 | -4.0 | -2.5 | . | . | . | 0.0 | NC | NC | NC | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | E | NC | NC | NC | E |
| DURATION IN HOURS | 17.0 | 11.0 | 8.0 | 5.5 | 18.5 | 12.0 | 9.0 | 6.0 | . | . | . | 1.5 | NC | NC | NC | 4.5 |
| LOW TIDE FLOODING FTOL | -0.5 | -0.5 | 0.5 | 0.5 | -4.5 | NC | NC | 0.0 | NC | NC | NC | NC | NC | NC | NC | NC |
| M.S.L. FLOODING FTOL | -1.0 | -1.0 | 0.0 | 0.5 | -4.5 | NC | NC | 0.0 | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | -2.0 | -1.0 | -1.0 | 0.5 | -4.5 | NC | NC | 0.0 | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 17.0 | 18.0 | 17.7 | 17.7 | 17.8 | 19.9 | 20.5 | 21.5 | NC | NC | NC | NC | NC | NC | NC | 8.4 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -14.5 | -7.5 | -5.0 | -3.5 | -14.0 | -7.0 | -4.5 | -3.0 | NC | NC | NC | -2.5 | -12.0 | -6.0 | -4.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 26.5 | 14.0 | 10.0 | 7.0 | NC | NC | NC | 7.5 | NC | NC | NC | 4.5 | 19.0 | 10.0 | 8.0 | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -10.5 | -5.0 | -3.5 | -2.5 | -10.0 | -5.0 | -3.0 | -2.0 | NC | . | . | . | . | . | . | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | . | . | . | . | . | . | E |
| DURATION IN HOURS | 19.5 | 11.0 | 7.5 | 5.5 | 20.5 | 11.5 | 8.0 | 5.5 | NC | . | . | . | . | . | . | 4.0 |
| LOW TIDE FLOODING FTOL | NC | -1.0 | 0.0 | 1.0 | -3.0 | NC | NC | 1.0 | NC | NC | NC | NC | NC | NC | NC | NC |
| M.S.L. FLOODING FTOL | NC | -0.5 | 0.0 | 1.0 | -3.0 | NC | NC | 1.0 | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | -1.0 | 0.0 | 1.0 | -3.5 | NC | NC | 1.0 | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 18.9 | 20.0 | 19.7 | 16.4 | 18.8 | 22.4 | 24.8 | 23.2 | NC | NC | NC | NC | NC | NC | NC | NC |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

HIGHWAY 562 NORTH OF LAKE STEPHENSON (SMITH POIN) — ELEVATION: 4.6 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -4.5 | -3.5 | -2.0 | -1.5 | -6.0 | -4.5 | -3.0 | -1.5 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | E | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 11.0 | 7.5 | 5.5 | 3.5 | 10.5 | 7.5 | 5.5 | 4.0 | . | . | . | . | . | . | . | 2.0 |
| 65.5 MPH WIND GUSTS FTOL | . | -0.5 | -1.0 | -0.5 | -2.5 | NC | NC | -1.0 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | . | E | E | E | E | NC | NC | E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | . | 3.0 | 2.5 | 2.0 | 4.0 | NC | NC | 2.5 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -7.5 | -4.5 | -3.5 | -2.0 | -8.5 | -5.0 | -4.0 | -2.0 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 15.0 | 10.0 | 7.5 | 5.0 | 14.5 | 10.0 | 7.5 | 5.0 | . | . | . | . | . | . | . | 3.5 |
| 65.5 MPH WIND GUSTS FTOL | -3.5 | -2.5 | -2.0 | -1.0 | -5.0 | -4.0 | -3.0 | -1.5 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | E | E | E | E | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 8.0 | 6.0 | 4.5 | 3.0 | 8.0 | 6.0 | 5.0 | 3.5 | . | . | . | . | . | . | . | 1.0 |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | NC | . | . | . | NC | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | 5.6 | . | . | . | 5.9 | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -12.5 | -7.0 | -5.0 | -3.0 | -4.0 | -2.5 | -2.0 | -1.5 | -9.0 | -5.0 | -3.5 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 22.5 | 13.0 | 9.5 | 6.5 | 22.0 | 13.0 | 9.5 | 7.0 | 8.0 | 5.0 | 4.0 | 3.5 | 11.0 | 7.0 | 6.0 | 5.5 |
| 65.5 MPH WIND GUSTS FTOL | -7.5 | -4.5 | -3.0 | -2.0 | -8.5 | -5.0 | -3.5 | -2.0 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 14.5 | 9.5 | 7.0 | 4.5 | 15.5 | 10.0 | 7.0 | 5.0 | . | . | . | . | . | . | . | 3.0 |
| LOW TIDE FLOODING FTOL | 0.5 | 1.0 | 1.0 | 1.5 | -1.5 | -0.5 | 0.0 | 0.5 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 0.0 | 0.5 | 1.0 | 1.0 | -2.0 | -1.5 | -0.5 | 0.5 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -0.5 | 0.5 | 1.0 | 1.0 | -2.5 | NC | NC | 0.5 | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 12.1 | 12.7 | 13.2 | 13.6 | 12.1 | 13.2 | 14.2 | 14.9 | . | . | . | . | . | . | . | . |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.5 | -8.5 | -5.5 | -4.0 | -16.0 | -8.5 | -6.0 | -4.0 | -10.0 | -5.5 | -4.0 | -3.0 | NC | NC | NC | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 26.5 | 15.0 | 11.0 | 7.5 | 26.0 | 15.0 | 11.0 | 8.5 | NC | NC | NC | 5.5 | NC | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -10.5 | -6.0 | -4.0 | -2.5 | -11.5 | -6.5 | -4.0 | -3.0 | . | . | . | -0.5 | NC | NC | NC | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | E | NC | NC | NC | E |
| DURATION IN HOURS | 18.0 | 11.5 | 8.0 | 5.5 | 19.0 | 12.0 | 9.0 | 6.0 | . | . | . | 2.0 | NC | NC | NC | 4.5 |
| LOW TIDE FLOODING FTOL | -1.5 | -0.5 | 0.0 | 0.5 | -4.0 | NC | NC | 0.0 | . | . | . | . | . | . | . | 3.0 |
| M.S.L. FLOODING FTOL | -2.0 | -1.0 | 0.0 | 0.5 | -4.0 | -2.0 | -1.0 | 0.0 | . | . | . | . | . | . | . | 2.0 |
| HIGH TIDE FLOODING FTOL | -2.0 | -1.0 | -0.5 | 0.5 | -4.5 | -2.0 | -1.5 | 0.0 | . | . | . | . | . | . | . | 1.5 |
| MAXIMUM HIGH TIDE SURGE | 15.8 | 16.3 | 15.7 | 16.9 | 16.7 | 17.7 | 17.5 | 19.2 | . | . | . | . | . | . | . | 8.8 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -15.5 | -8.0 | -5.5 | -3.5 | -15.0 | -7.5 | -5.0 | -3.0 | NC | NC | NC | -2.5 | -12.5 | -6.5 | -4.5 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 27.0 | 14.0 | 10.5 | 7.0 | NC | NC | NC | 7.5 | NC | NC | NC | 4.5 | 19.5 | 10.5 | 8.0 | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -11.0 | -5.5 | -4.0 | -3.0 | -11.0 | -5.5 | -3.5 | -2.0 | NC | NC | NC | -1.0 | . | . | . | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | E | . | . | . | E |
| DURATION IN HOURS | 18.5 | 11.0 | 8.0 | 5.5 | 21.0 | 12.5 | 9.0 | 6.0 | NC | NC | NC | 1.5 | . | . | . | 4.0 |
| LOW TIDE FLOODING FTOL | -0.5 | 0.0 | 0.5 | 1.0 | -3.0 | -0.5 | 0.0 | 1.0 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -2.0 | -0.5 | 0.5 | 0.5 | -3.5 | -0.5 | 0.5 | 1.0 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -4.0 | -0.5 | 0.5 | 0.5 | -3.5 | -0.5 | 0.0 | 1.0 | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 16.8 | 17.5 | 16.9 | 18.0 | 17.6 | 19.3 | 19.4 | 21.6 | . | . | . | . | . | . | . | . |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

FM 1985 AT OYSTER BAYOU (WHITE RANCH) — ELEVATION: 7.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -3.5 | -2.5 | -2.0 | -1.0 | -4.5 | -3.5 | -3.0 | -1.5 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | E | E | E | E | E | E | E | E | . | . | . | . | . | . | . | S E |
| DURATION IN HOURS | 8.0 | 6.0 | 4.5 | 3.0 | 9.5 | 7.5 | 6.0 | 4.0 | . | . | . | . | . | . | . | 1.0 |
| 65.5 MPH WIND GUSTS FTOL | . | . | . | . | . | . | . | -0.5 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | . | . | . | . | . | . | . | S E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | . | . | . | . | . | . | . | 2.5 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -7.0 | -4.5 | -3.0 | -2.0 | -7.5 | -4.5 | -3.0 | -2.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | N E | N E | N E | E | E | E | E | E | . | . | . | . | . | . | . | S E |
| DURATION IN HOURS | 13.5 | 9.0 | 6.5 | 4.5 | 14.0 | 9.5 | 7.0 | 5.0 | . | . | . | . | . | . | . | 2.5 |
| 65.5 MPH WIND GUSTS FTOL | -1.0 | -1.5 | -1.5 | -1.0 | -3.5 | -4.5 | -3.0 | -1.0 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | E | E | E | E | E | E | E | E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | 4.0 | 4.0 | 3.5 | 2.5 | 6.5 | 6.5 | 5.0 | 3.5 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | . | . | . | . | N C | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | . | . | . | . | 8.3 | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -11.5 | -6.5 | -4.5 | -3.0 | -11.5 | -6.0 | -4.5 | -3.0 | . | . | . | -0.5 | -7.0 | -4.0 | -3.0 | -2.0 |
| DIRECTION OF WIND | N E | N E | N E | N E | E | E | E | E | . | . | . | E | E | E | E | E |
| DURATION IN HOURS | 20.0 | 12.5 | 9.0 | 6.0 | 21.0 | 13.0 | 9.5 | 6.5 | . | . | . | 2.0 | 5.0 | 4.0 | 4.0 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -6.5 | -4.0 | -3.0 | -2.0 | -7.0 | -4.5 | -3.0 | -2.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | N E | N E | N E | E | E | E | E | E | . | . | . | . | . | . | . | S E |
| DURATION IN HOURS | 12.5 | 8.5 | 6.0 | 4.0 | 13.5 | 9.0 | 7.0 | 4.5 | . | . | . | . | . | . | . | 2.5 |
| LOW TIDE FLOODING FTOL | 3.5 | 2.5 | 2.0 | 2.0 | 1.0 | 1.0 | 1.0 | 1.0 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 2.5 | 2.0 | 2.0 | 1.5 | 0.5 | 0.5 | 0.5 | 0.5 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | 2.0 | 2.0 | 1.5 | 1.5 | 0.0 | 0.0 | 0.0 | 0.5 | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 11.2 | 11.5 | 11.6 | 12.6 | 12.5 | 13.5 | 14.0 | 15.9 | . | . | . | . | . | . | . | . |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.0 | -8.5 | -5.5 | -4.0 | -14.5 | -8.0 | -5.5 | -3.5 | -8.0 | -4.5 | -3.0 | -2.5 | N C | N C | N C | -2.5 |
| DIRECTION OF WIND | N E | N E | N E | N E | E | E | E | E | N C | N C | N C | E | N C | N C | N C | E |
| DURATION IN HOURS | 24.0 | 14.5 | 10.5 | 7.5 | 25.0 | 15.0 | 11.0 | 8.0 | N C | N C | N C | 4.5 | N C | N C | N C | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -10.0 | -6.0 | -4.0 | -2.5 | -10.0 | -6.0 | -4.0 | -2.5 | . | . | . | . | N C | N C | N C | -1.5 |
| DIRECTION OF WIND | N E | N E | N E | N E | E | E | E | E | . | . | . | . | N C | N C | N C | S E |
| DURATION IN HOURS | 15.5 | 10.5 | 7.5 | 5.5 | 18.0 | 11.0 | 8.0 | 6.0 | . | . | . | . | N C | N C | N C | 3.5 |
| LOW TIDE FLOODING FTOL | 1.0 | 0.5 | 1.0 | 1.5 | -1.0 | N C | N C | 0.5 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | 0.5 | 0.5 | 0.5 | 1.0 | -1.5 | -0.5 | 0.0 | 0.5 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -0.5 | 0.0 | 0.5 | 1.0 | -2.0 | 0.0 | 0.0 | 0.5 | . | . | . | . | . | . | . | N C |
| MAXIMUM HIGH TIDE SURGE | 14.1 | 15.0 | 15.3 | 16.1 | 15.5 | 17.3 | 18.5 | 20.2 | . | . | . | . | . | . | . | 7.6 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -15.5 | -8.0 | -5.5 | -4.0 | -14.0 | -7.0 | -4.5 | -3.0 | N C | N C | N C | -2.5 | -11.0 | -5.5 | -4.0 | -2.5 |
| DIRECTION OF WIND | N E | N E | N E | N E | E | E | E | E | N C | N C | N C | E | N C | N C | N C | E |
| DURATION IN HOURS | 24.5 | 14.0 | 10.0 | 7.0 | N C | N C | N C | 7.0 | N C | N C | N C | 3.5 | 16.0 | 9.0 | 7.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -11.0 | -5.5 | -4.0 | -2.5 | -10.0 | -5.0 | -3.0 | -2.0 | N C | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | N E | N E | N E | N E | E | E | E | E | N C | . | . | . | . | . | . | E |
| DURATION IN HOURS | 17.5 | 10.5 | 7.5 | 5.0 | 20.0 | 12.0 | 8.5 | 5.5 | N C | . | . | . | . | . | . | 3.0 |
| LOW TIDE FLOODING FTOL | 3.0 | 1.0 | 1.0 | 1.5 | 0.0 | 1.0 | 1.0 | 1.5 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -0.5 | 0.5 | 1.0 | 1.5 | -0.5 | 0.5 | 1.0 | 1.5 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | -1.0 | 0.5 | 0.5 | 1.5 | -1.0 | 0.5 | 0.5 | 1.0 | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 14.5 | 15.8 | 16.5 | 14.4 | 16.8 | 20.0 | 22.7 | 21.5 | . | . | . | . | . | . | . | . |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

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### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: Winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

HIGHWAY 87 EAST OF FERRY (PORT BOLIV) — ELEVATION: 5.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.5 | -5.0 | -3.5 | -2.0 | -10.0 | -6.0 | -4.0 | -2.5 | . | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 15.5 | 9.5 | 6.5 | 4.5 | 14.0 | 9.0 | 6.0 | 4.5 | . | . | . | . | . | . | . | 3.0 |
| 65.5 MPH WIND GUSTS FTOL | -5.0 | -3.0 | -2.5 | -1.5 | -6.5 | -4.5 | -3.0 | -1.5 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | NE | NE | NE | E | E | E | E | E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | 9.5 | 6.0 | 4.5 | 3.0 | 7.5 | 5.0 | 4.0 | 3.0 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | . | . | . | 0.0 | . | . | . | -0.5 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -5.5 | -2.5 | -1.5 | -1.0 | -6.0 | -3.0 | -2.0 | -1.5 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | -2.0 | NC | NC | NC | NC | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | 7.2 | 7.6 | 7.9 | 8.2 | 6.9 | 7.4 | 7.8 | 8.3 | . | . | . | NC | . | . | . | NC |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -11.0 | -6.0 | -4.0 | -3.0 | -12.0 | -7.0 | -4.5 | -3.0 | -2.0 | -1.5 | -1.0 | -1.5 | -8.5 | -5.0 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 18.5 | 11.5 | 8.0 | 5.5 | 18.0 | 11.0 | 8.0 | 5.5 | 5.0 | 3.5 | 3.0 | 2.5 | 7.0 | 5.0 | 4.0 | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -7.5 | -4.5 | -3.0 | -2.0 | -9.0 | -5.0 | -4.0 | -2.5 | . | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 13.0 | 8.0 | 6.0 | 4.0 | 11.0 | 7.0 | 5.5 | 4.0 | . | . | . | . | . | . | . | 2.0 |
| LOW TIDE FLOODING FTOL | -1.5 | -1.5 | -1.0 | -0.5 | . | . | . | -1.5 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -7.0 | -4.0 | -2.5 | -1.5 | -9.5 | -5.0 | -3.0 | -2.0 | . | . | . | -0.5 | . | . | . | -0.5 |
| HIGH TIDE FLOODING FTOL | -12.5 | -6.0 | -3.5 | -2.0 | NC | NC | NC | NC | . | . | . | NC | . | . | . | NC |
| MAXIMUM HIGH TIDE SURGE | 8.3 | 8.5 | 8.9 | 9.3 | 7.9 | 8.2 | 8.8 | 9.3 | . | . | . | 7.2 | . | . | . | 7.6 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -14.5 | -8.0 | -5.5 | -3.5 | -16.0 | -9.0 | -6.0 | -4.0 | -10.0 | -5.5 | -4.0 | -3.0 | -13.5 | -7.0 | -5.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NE | NE | NE | E | E | E | E | E |
| DURATION IN HOURS | 25.5 | 14.5 | 10.0 | 7.0 | 24.5 | 14.0 | 10.0 | 7.0 | 17.0 | 10.0 | 7.0 | 5.5 | 16.5 | 9.5 | 7.0 | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -10.5 | -6.0 | -4.0 | -2.5 | -12.0 | -7.0 | -4.5 | -3.0 | -10.0 | -5.0 | -3.5 | -1.0 | -8.0 | -4.5 | -3.0 | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 18.5 | 11.0 | 7.5 | 5.5 | 18.0 | 11.0 | 7.5 | 5.5 | 12.0 | 6.5 | 4.5 | 2.5 | 6.5 | 4.5 | 4.0 | 4.0 |
| LOW TIDE FLOODING FTOL | -6.0 | -3.5 | -2.0 | -1.0 | -8.0 | -4.5 | -3.0 | -2.0 | . | . | . | 0.5 | . | . | . | -1.0 |
| M.S.L. FLOODING FTOL | -11.0 | -5.0 | -3.0 | -2.0 | -14.0 | -6.5 | -4.0 | -3.0 | -8.0 | -4.0 | -2.0 | -1.5 | -9.5 | -4.5 | -3.0 | -2.0 |
| HIGH TIDE FLOODING FTOL | -16.0 | -7.0 | -4.0 | -3.0 | -20.0 | -8.5 | -5.0 | -4.0 | NC | NC | NC | NC | NC | NC | NC | -3.0 |
| MAXIMUM HIGH TIDE SURGE | 11.4 | 11.2 | 11.4 | 11.6 | 10.4 | 10.3 | 10.6 | 11.0 | 7.0 | 7.2 | 7.6 | 8.1 | 6.9 | 7.3 | 8.0 | 8.7 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -17.5 | -9.5 | -6.5 | -4.5 | -19.5 | -10.5 | -7.0 | -5.0 | -14.5 | -8.0 | -5.5 | -4.0 | NC | NC | NC | -4.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 29.0 | 16.0 | 11.5 | 8.0 | 29.0 | 16.0 | 11.5 | 8.5 | NC | NC | NC | 6.5 | NC | NC | NC | 7.5 |
| 65.5 MPH WIND GUSTS FTOL | -13.5 | -7.5 | -5.0 | -3.5 | -14.5 | -8.0 | -5.0 | -3.5 | -8.0 | -4.5 | -3.0 | -2.5 | NC | NC | NC | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 21.5 | 12.5 | 9.0 | 6.5 | 21.5 | 13.0 | 9.0 | 6.5 | NC | NC | NC | 4.5 | NC | NC | NC | 5.0 |
| LOW TIDE FLOODING FTOL | -9.5 | -4.5 | -2.5 | -1.5 | -11.5 | -5.5 | -3.5 | -2.5 | -3.0 | -1.5 | -1.0 | -1.0 | . | . | . | -2.0 |
| M.S.L. FLOODING FTOL | -13.5 | -6.0 | -3.5 | -2.5 | -18.0 | -8.5 | -5.0 | -3.0 | -12.0 | -5.5 | -3.0 | -2.0 | -14.5 | -5.5 | -4.0 | -2.5 |
| HIGH TIDE FLOODING FTOL | -17.0 | -8.0 | -4.5 | -3.0 | -24.5 | -11.0 | -6.0 | -4.0 | -20.5 | -9.5 | -5.0 | -3.0 | NC | NC | NC | -3.0 |
| MAXIMUM HIGH TIDE SURGE | 14.9 | 14.4 | 14.8 | 15.2 | 14.0 | 13.7 | 14.2 | 14.7 | 8.1 | 8.3 | 8.8 | 9.4 | 7.9 | 8.3 | 9.1 | 9.9 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -18.0 | -9.0 | -6.0 | -4.5 | -18.5 | -9.0 | -6.0 | -4.0 | NC | NC | NC | -3.5 | -16.5 | -8.5 | -6.0 | -4.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | NE | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 29.0 | 15.0 | 11.0 | 7.5 | 28.5 | 15.0 | 11.0 | 7.5 | NC | NC | NC | 6.0 | 22.5 | 12.0 | 9.0 | 6.5 |
| 65.5 MPH WIND GUSTS FTOL | -13.5 | -7.0 | -4.5 | -3.5 | -14.5 | -7.0 | -4.5 | -3.0 | NC | NC | NC | -2.5 | -12.0 | -5.0 | -4.0 | -3.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | NE | NE | NE | E | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 22.5 | 12.5 | 8.5 | 6.0 | 22.5 | 12.5 | 8.5 | 6.0 | NC | NC | NC | 4.0 | 15.0 | 8.5 | 6.0 | 4.5 |
| LOW TIDE FLOODING FTOL | -8.5 | -3.5 | -2.0 | -1.5 | -10.0 | -4.0 | -2.5 | -1.5 | -2.5 | -1.0 | -1.0 | -0.5 | . | . | . | 0.5 |
| M.S.L. FLOODING FTOL | -11.5 | -5.0 | -3.0 | -2.0 | -13.5 | -6.0 | -3.5 | -2.0 | -11.0 | -5.0 | -3.0 | -1.5 | -12.5 | -5.0 | -3.5 | -2.5 |
| HIGH TIDE FLOODING FTOL | -14.5 | -6.5 | -4.0 | -2.5 | -16.5 | -7.5 | -4.0 | -2.0 | -19.0 | -8.5 | -5.0 | -2.5 | NC | NC | NC | -5.5 |
| MAXIMUM HIGH TIDE SURGE | 15.4 | 14.9 | 14.9 | 13.7 | 14.4 | 14.2 | 14.5 | 13.7 | 8.2 | 8.3 | 8.8 | 8.6 | 7.1 | 7.8 | 8.8 | 9.1 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

# BEACH EAST OF CRYSTAL BEACH 49a

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours. (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

BEACH EAST OF CRYSTAL BEACH (CRYSTAL BE) — ELEVATION: 0.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -7.5 | -4.5 | -3.0 | -2.0 | -8.0 | -5.0 | -3.5 | -2.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | E | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 13.5 | 8.5 | 6.0 | 4.0 | 12.5 | 8.0 | 6.0 | 4.0 | . | . | . | . | . | . | . | 1.5 |
| 65.5 MPH WIND GUSTS FTOL | -3.0 | -2.5 | -2.0 | -1.0 | -4.5 | -3.5 | -2.5 | -1.5 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | E | E | E | E | E | E | E | E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | 6.0 | 4.5 | 3.5 | 3.0 | 5.5 | 4.5 | 3.0 | 2.5 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | -14.0 | -7.0 | -4.0 | -3.0 | -18.0 | -9.0 | -5.0 | -3.5 | -11.5 | -6.0 | -3.5 | -2.5 | -12.0 | -5.0 | -4.0 | -3.0 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 7.1 | 7.6 | 8.3 | 9.0 | 6.8 | 7.5 | 8.4 | 9.4 | 4.6 | 5.0 | 5.4 | 5.9 | 4.7 | 5.2 | 5.9 | 6.6 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.5 | -6.0 | -4.0 | -2.5 | -10.5 | -6.0 | -4.0 | -2.5 | . | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 17.5 | 10.5 | 7.5 | 5.0 | 16.5 | 10.0 | 7.0 | 5.0 | . | . | . | . | . | . | . | 3.0 |
| 65.5 MPH WIND GUSTS FTOL | -6.0 | -4.0 | -2.5 | -1.5 | -7.0 | -4.0 | -3.0 | -2.0 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | NE | NE | NE | E | E | E | E | E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | 11.0 | 7.0 | 5.0 | 3.5 | 10.0 | 6.5 | 5.0 | 3.5 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | -16.5 | -8.0 | -4.5 | -3.5 | -19.0 | -9.0 | -5.5 | -4.0 | -15.0 | -7.0 | -4.5 | -3.0 | -17.0 | -8.0 | -5.0 | -3.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 8.7 | 9.2 | 9.9 | 10.9 | 8.3 | 9.1 | 10.0 | 11.2 | 5.4 | 5.8 | 6.4 | 7.0 | 5.3 | 6.0 | 6.9 | 7.9 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.0 | -8.0 | -5.5 | -3.5 | -14.5 | -7.5 | -5.0 | -3.5 | -8.0 | -4.0 | -3.0 | -2.5 | -11.0 | -5.5 | -4.0 | -2.5 |
| DIRECTION OF WIND | E | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 24.5 | 14.0 | 10.0 | 7.0 | 23.5 | 13.0 | 9.5 | 7.0 | 12.5 | 7.0 | 5.5 | 4.0 | 11.5 | 7.0 | 6.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -4.0 | -2.5 | -10.5 | -6.0 | -4.0 | -2.5 | . | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 17.0 | 10.0 | 7.0 | 5.0 | 16.5 | 10.0 | 7.0 | 5.0 | . | . | . | . | . | . | . | 2.5 |
| LOW TIDE FLOODING FTOL | -20.0 | -9.5 | -5.5 | -4.0 | -20.0 | -10.0 | -6.0 | -5.5 | -20.0 | -9.5 | -5.5 | -4.0 | -23.5 | -11.5 | -7.0 | -5.0 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 11.2 | 11.7 | 12.3 | 12.6 | 10.8 | 11.6 | 12.5 | 13.1 | 6.8 | 7.4 | 8.2 | 8.7 | 6.8 | 7.8 | 8.9 | 9.8 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -17.5 | -9.5 | -6.5 | -4.5 | -18.0 | -9.5 | -6.5 | -4.5 | -13.0 | -7.0 | -5.0 | -3.5 | NC | NC | NC | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 27.5 | 15.5 | 11.0 | 8.0 | 27.5 | 15.5 | 11.0 | 8.5 | NC | NC | NC | 6.0 | NC | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -13.0 | -7.0 | -5.0 | -3.5 | -13.0 | -7.0 | -5.0 | -3.5 | -4.5 | -2.5 | -2.0 | -1.5 | NC | NC | NC | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 20.0 | 12.0 | 8.5 | 6.0 | 20.0 | 12.0 | 8.5 | 6.0 | NC | NC | NC | 3.0 | NC | NC | NC | 4.0 |
| LOW TIDE FLOODING FTOL | -22.5 | -10.5 | -6.0 | -4.5 | -21.0 | -10.0 | -6.5 | -6.5 | -24.0 | -11.0 | -7.0 | -5.0 | -29.0 | -13.5 | -8.0 | -6.0 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 14.0 | 14.2 | 15.1 | 16.2 | 13.2 | 13.9 | 15.1 | 16.6 | 8.2 | 8.6 | 9.4 | 10.4 | 8.3 | 9.1 | 10.2 | 11.6 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -17.5 | -9.0 | -6.0 | -4.5 | -17.0 | -8.5 | -5.5 | -3.5 | NC | NC | NC | -3.5 | -14.5 | -7.5 | -5.0 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 28.0 | 15.0 | 10.5 | 7.5 | 28.0 | 15.0 | 10.5 | 7.5 | NC | NC | NC | 5.5 | 19.5 | 10.5 | 8.0 | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -13.5 | -7.0 | -4.5 | -3.5 | -13.0 | -6.5 | -4.0 | -2.5 | NC | NC | NC | -2.0 | -8.0 | -4.0 | -3.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 20.5 | 12.0 | 8.5 | 6.0 | 21.5 | 12.5 | 8.5 | 6.0 | NC | NC | NC | 2.5 | 6.5 | 4.0 | 3.5 | 3.5 |
| LOW TIDE FLOODING FTOL | -14.0 | -9.5 | -5.5 | -3.5 | -15.5 | -10.5 | -6.5 | -4.5 | -21.0 | -14.0 | -8.0 | -4.5 | -25.0 | -16.5 | -9.0 | -5.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 14.6 | 14.8 | 15.6 | 15.1 | 13.2 | 14.2 | 15.9 | 16.2 | 8.3 | 8.7 | 9.5 | 9.5 | 7.0 | 8.2 | 9.8 | 10.6 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

# HIGHWAY 87 EAST OF CRYSTAL BEACH

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

HIGHWAY 87 EAST OF CRYSTAL BEACH (CRYSTAL BE) — ELEVATION: 9.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -7.5 | -4.5 | -3.0 | -2.0 | -8.0 | -5.0 | -3.5 | -2.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | E | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 13.5 | 8.5 | 6.0 | 4.0 | 12.5 | 8.0 | 6.0 | 4.0 | . | . | . | . | . | . | . | 1.5 |
| 65.5 MPH WIND GUSTS FTOL | -3.0 | -2.5 | -2.0 | -1.0 | -4.5 | -3.5 | -2.5 | -1.5 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | E | E | E | E | E | E | E | E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | 6.0 | 4.5 | 3.5 | 3.0 | 5.5 | 4.5 | 3.0 | 2.5 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | NC | . | . | . | NC | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | 9.0 | . | . | . | 9.4 | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.5 | -6.0 | -4.0 | -2.5 | -10.5 | -6.0 | -4.0 | -2.5 | . | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 17.5 | 10.5 | 7.5 | 5.0 | 16.5 | 10.0 | 7.0 | 5.0 | . | . | . | . | . | . | . | 3.0 |
| 65.5 MPH WIND GUSTS FTOL | -6.0 | -4.0 | -2.5 | -1.5 | -7.0 | -4.0 | -3.0 | -2.0 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | NE | NE | NE | E | E | E | E | E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | 11.0 | 7.0 | 5.0 | 3.5 | 10.0 | 6.5 | 5.0 | 3.5 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | 0.0 | . | . | . | -0.5 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | NC | NC | NC | . | NC | NC | NC | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | 9.2 | 9.9 | 10.9 | . | 9.1 | 10.0 | 11.2 | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.0 | -8.0 | -5.5 | -3.5 | -14.5 | -7.5 | -5.0 | -3.5 | -8.0 | -4.0 | -3.0 | -2.5 | -11.0 | -5.5 | -4.0 | -2.5 |
| DIRECTION OF WIND | E | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 24.5 | 14.0 | 10.0 | 7.0 | 23.5 | 13.0 | 9.5 | 7.0 | 12.5 | 7.0 | 5.5 | 4.0 | 11.5 | 7.0 | 6.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -4.0 | -2.5 | -10.5 | -6.0 | -4.0 | -2.5 | . | . | . | . | . | . | . | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 17.0 | 10.0 | 7.0 | 5.0 | 16.5 | 10.0 | 7.0 | 5.0 | . | . | . | . | . | . | . | 2.5 |
| LOW TIDE FLOODING FTOL | . | . | 0.0 | -0.5 | . | . | . | -1.0 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -2.0 | -2.0 | -1.5 | -1.0 | -3.5 | -3.0 | -2.0 | -1.5 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | NC | NC | -3.0 | -1.5 | NC | NC | NC | NC | . | . | . | . | . | . | . | NC |
| MAXIMUM HIGH TIDE SURGE | 11.2 | 11.7 | 12.3 | 12.6 | 10.8 | 11.6 | 12.5 | 13.1 | . | . | . | . | . | . | . | 9.8 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -17.5 | -9.5 | -6.5 | -4.5 | -18.0 | -9.5 | -6.5 | -4.5 | -13.0 | -7.0 | -5.0 | -3.5 | NC | NC | NC | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 27.5 | 15.5 | 11.0 | 8.0 | 27.5 | 15.5 | 11.0 | 8.5 | NC | NC | NC | 6.0 | NC | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -13.0 | -7.0 | -5.0 | -3.5 | -13.0 | -7.0 | -5.0 | -3.5 | -4.5 | -2.5 | -2.0 | -1.5 | NC | NC | NC | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 20.0 | 12.0 | 8.5 | 6.0 | 20.0 | 12.0 | 8.5 | 6.0 | NC | NC | NC | 3.0 | NC | NC | NC | 4.0 |
| LOW TIDE FLOODING FTOL | -3.0 | -2.0 | -1.5 | -1.0 | -4.5 | -3.0 | -2.0 | -1.5 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -5.5 | -3.0 | -2.0 | -0.5 | -7.0 | -4.0 | -3.0 | -2.0 | . | . | . | . | . | . | . | -0.5 |
| HIGH TIDE FLOODING FTOL | -8.0 | -4.0 | -2.5 | -1.5 | -10.0 | -5.5 | -3.0 | -2.0 | . | . | NC | NC | . | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 14.0 | 14.2 | 15.1 | 16.2 | 13.2 | 13.9 | 15.1 | 16.6 | . | . | 9.4 | 10.4 | . | 9.1 | 10.2 | 11.6 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -17.5 | -9.0 | -6.0 | -4.5 | -17.0 | -8.5 | -5.5 | -3.5 | NC | NC | NC | -3.5 | -14.5 | -7.5 | -5.0 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 28.0 | 15.0 | 10.5 | 7.5 | 28.0 | 15.0 | 10.5 | 7.5 | NC | NC | NC | 5.5 | 19.5 | 10.5 | 8.0 | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -13.5 | -7.0 | -4.5 | -3.5 | -13.0 | -6.5 | -4.0 | -2.5 | NC | NC | NC | -2.0 | -8.0 | -4.0 | -3.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 20.5 | 12.0 | 8.5 | 6.0 | 21.5 | 12.5 | 8.5 | 6.0 | NC | NC | NC | 2.5 | 6.5 | 4.0 | 3.5 | 3.5 |
| LOW TIDE FLOODING FTOL | -3.5 | -1.5 | -1.0 | -0.5 | -4.0 | -1.5 | -1.0 | -0.5 | . | . | . | . | . | . | . | NC |
| M.S.L. FLOODING FTOL | -5.0 | -2.5 | -1.5 | -0.5 | -6.5 | -3.0 | -2.5 | -1.0 | . | . | . | . | . | . | . | 0.0 |
| HIGH TIDE FLOODING FTOL | -6.5 | -3.5 | -2.0 | -0.5 | -9.0 | -5.0 | -4.0 | -1.5 | . | . | NC | NC | . | . | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 14.6 | 14.8 | 15.6 | 15.1 | 13.2 | 14.2 | 15.9 | 16.2 | . | . | 9.5 | 9.5 | . | . | 9.8 | 10.6 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour, FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

HIGHWAY 87 EAST OF GILCHRIST (GILCHRIST) — ELEVATION: 4.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -7.5 | -4.5 | -3.0 | -2.0 | -8.0 | -5.0 | -3.5 | -2.0 | • | • | • | • | • | • | • | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | E | E | E | E | E | • | • | • | • | • | • | • | SE |
| DURATION IN HOURS | 13.5 | 8.5 | 6.0 | 4.0 | 12.5 | 8.0 | 6.0 | 4.0 | • | • | • | • | • | • | • | 1.5 |
| 65.5 MPH WIND GUSTS FTOL | -3.0 | -2.5 | -2.0 | -1.0 | -4.5 | -3.5 | -2.5 | -1.5 | • | • | • | • | • | • | • | • |
| DIRECTION OF WIND | E | E | E | E | E | E | E | E | • | • | • | • | • | • | • | • |
| DURATION IN HOURS | 6.0 | 4.5 | 3.5 | 3.0 | 5.5 | 4.5 | 3.0 | 2.5 | • | • | • | • | • | • | • | • |
| LOW TIDE FLOODING FTOL | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| M.S.L. FLOODING FTOL | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| HIGH TIDE FLOODING FTOL | • | • | • | NC | • | • | • | NC | • | • | • | • | • | • | • | • |
| MAXIMUM HIGH TIDE SURGE | • | • | • | 9.0 | • | • | • | 9.4 | • | • | • | • | • | • | • | • |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -10.5 | -6.0 | -4.0 | -2.5 | -10.5 | -6.0 | -4.0 | -2.5 | • | • | • | • | • | • | • | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | • | • | • | • | • | • | • | SE |
| DURATION IN HOURS | 17.5 | 10.5 | 7.5 | 5.0 | 16.5 | 10.0 | 7.0 | 5.0 | • | • | • | • | • | • | • | 3.0 |
| 65.5 MPH WIND GUSTS FTOL | -6.0 | -4.0 | -2.5 | -1.5 | -7.0 | -4.0 | -3.0 | -2.0 | • | • | • | • | • | • | • | • |
| DIRECTION OF WIND | NE | NE | NE | E | E | E | E | E | • | • | • | • | • | • | • | • |
| DURATION IN HOURS | 11.0 | 7.0 | 5.0 | 3.5 | 10.0 | 6.5 | 5.0 | 3.5 | • | • | • | • | • | • | • | • |
| LOW TIDE FLOODING FTOL | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| M.S.L. FLOODING FTOL | • | • | • | 0.0 | • | • | • | -0.5 | • | • | • | • | • | • | • | • |
| HIGH TIDE FLOODING FTOL | • | NC | NC | NC | • | • | • | NC | • | • | • | • | • | • | • | • |
| MAXIMUM HIGH TIDE SURGE | • | 9.2 | 9.9 | 10.9 | • | • | • | 11.2 | • | • | • | • | • | • | • | • |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -15.0 | -8.0 | -5.5 | -3.5 | -14.5 | -7.5 | -5.0 | -4.0 | -8.0 | -4.0 | -3.0 | -2.5 | -11.0 | -5.5 | -4.0 | -2.5 |
| DIRECTION OF WIND | E | NE | NE | NE | E | E | E | E | E | E | E | E | E | E | E | E |
| DURATION IN HOURS | 24.5 | 14.0 | 10.0 | 7.0 | 23.5 | 13.0 | 9.5 | 7.0 | 12.5 | 7.0 | 5.5 | 4.0 | 11.5 | 7.0 | 5.0 | 5.0 |
| 65.5 MPH WIND GUSTS FTOL | -10.0 | -5.5 | -4.0 | -2.5 | -10.5 | -6.0 | -4.0 | -2.5 | • | • | • | • | • | • | • | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | • | • | • | • | • | • | • | SE |
| DURATION IN HOURS | 17.0 | 10.0 | 7.0 | 5.0 | 16.5 | 10.0 | 7.0 | 5.0 | • | • | • | • | • | • | • | 2.5 |
| LOW TIDE FLOODING FTOL | • | • | 0.0 | -0.5 | • | • | • | -1.0 | • | • | • | • | • | • | • | • |
| M.S.L. FLOODING FTOL | -2.0 | -2.0 | -1.5 | -1.0 | -3.5 | -3.0 | -2.0 | -1.5 | • | • | • | • | • | • | • | • |
| HIGH TIDE FLOODING FTOL | NC | NC | -3.0 | -1.5 | NC | NC | NC | NC | • | • | • | • | • | • | • | NC |
| MAXIMUM HIGH TIDE SURGE | 11.2 | 11.7 | 12.3 | 12.6 | 10.8 | 11.5 | 12.5 | 13.1 | • | • | • | • | • | • | • | 9.8 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -17.5 | -9.5 | -6.5 | -4.5 | -18.0 | -9.5 | -6.5 | -4.5 | -13.0 | -7.0 | -5.0 | -3.5 | NC | NC | NC | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 27.5 | 15.5 | 11.0 | 8.0 | 27.5 | 15.5 | 11.0 | 8.5 | NC | NC | NC | 6.0 | NC | NC | NC | 7.0 |
| 65.5 MPH WIND GUSTS FTOL | -13.0 | -7.0 | -5.0 | -3.5 | -13.0 | -7.0 | -5.0 | -3.5 | -4.5 | -2.5 | -2.0 | -1.5 | NC | NC | NC | -2.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | • | • | • | E | NC | NC | NC | E |
| DURATION IN HOURS | 20.0 | 12.0 | 8.5 | 6.0 | 20.0 | 12.0 | 8.5 | 6.0 | NC | NC | NC | 3.0 | NC | NC | NC | 4.0 |
| LOW TIDE FLOODING FTOL | -3.0 | -2.0 | -1.5 | -1.0 | -4.5 | -3.0 | -2.0 | -1.5 | • | • | • | • | • | • | • | • |
| M.S.L. FLOODING FTOL | -5.5 | -3.0 | -2.0 | -1.5 | -7.0 | -4.0 | -3.0 | -2.0 | • | • | • | • | • | • | • | -0.5 |
| HIGH TIDE FLOODING FTOL | -8.0 | -4.0 | -2.5 | -1.5 | -10.0 | -5.5 | -3.0 | -2.0 | • | • | • | NC | • | • | • | NC |
| MAXIMUM HIGH TIDE SURGE | 14.0 | 14.2 | 15.1 | 16.2 | 13.2 | 13.9 | 15.1 | 16.6 | • | • | • | 10.4 | • | • | • | 11.6 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -17.5 | -9.0 | -6.0 | -4.5 | -17.0 | -8.5 | -5.5 | -3.5 | NC | NC | NC | -3.5 | -14.5 | -7.5 | -5.0 | -3.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | NE | NC | NC | NC | E |
| DURATION IN HOURS | 28.0 | 15.0 | 10.5 | 7.5 | 28.0 | 15.0 | 10.5 | 7.5 | NC | NC | NC | 5.5 | 19.5 | 10.5 | 8.0 | 6.0 |
| 65.5 MPH WIND GUSTS FTOL | -13.5 | -7.0 | -4.5 | -3.5 | -13.0 | -6.5 | -4.0 | -2.5 | NC | NC | NC | -2.0 | -8.0 | -4.0 | -3.0 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 20.5 | 12.0 | 8.5 | 6.0 | 21.5 | 12.5 | 8.5 | 6.0 | NC | NC | NC | 2.5 | 6.5 | 4.0 | 3.5 | 3.5 |
| LOW TIDE FLOODING FTOL | -3.5 | -1.5 | -1.0 | -0.5 | -4.0 | -1.5 | -1.0 | -0.5 | • | • | • | • | • | • | • | NC |
| M.S.L. FLOODING FTOL | -5.0 | -2.5 | -1.5 | -0.5 | -6.5 | -3.0 | -2.5 | -1.0 | • | • | • | • | • | • | • | 0.0 |
| HIGH TIDE FLOODING FTOL | -6.5 | -3.5 | -2.0 | -0.5 | -9.0 | -5.0 | -4.0 | -1.5 | • | • | • | NC | • | • | • | NC |
| MAXIMUM HIGH TIDE SURGE | 14.6 | 14.8 | 15.6 | 15.1 | 13.2 | 14.2 | 15.9 | 16.2 | • | • | • | 9.5 | • | • | • | 10.6 |

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

# HIGHWAY 124 NORTH OF HIGH ISLAND 51

HIGHWAY 124 NORTH OF HIGH ISLAND (HI ISLAND) — ELEVATION: 4.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 360 DEGREE, 20 MILES LEFT OF GALVESTON | | | | 320 DEGREE, 20 MILES LEFT OF FREEPORT | | | | 360 DEGREE, 20 MILES LEFT OF FREEPORT | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH | 5MPH | 10MPH | 15MPH | 20MPH |
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -4.0 | -3.0 | -2.5 | -1.5 | -4.5 | -3.5 | -2.5 | -1.5 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | E | E | E | E | E | E | E | SE | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | 6.5 | 5.5 | 4.0 | 3.0 | 8.5 | 6.5 | 5.0 | 3.5 | . | . | . | . | . | . | . | . |
| 65.5 MPH WIND GUSTS FTOL | . | . | . | . | . | . | . | -0.5 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | . | . | . | . | . | . | . | SE | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | . | . | . | . | . | . | . | 1.5 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | . | . | . | NC | . | . | . | NC | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | . | NC | . | . | . | NC | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | . | . | . | NC | . | . | . | NC | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | . | . | . | NC | . | . | . | NC | . | . | . | . | . | . | . | . |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.0 | -5.0 | -3.5 | -2.5 | -7.5 | -4.5 | -3.0 | -2.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | E | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 13.5 | 8.5 | 6.5 | 4.5 | 13.0 | 8.5 | 6.5 | 4.5 | . | . | . | . | . | . | . | 2.0 |
| 65.5 MPH WIND GUSTS FTOL | . | -1.5 | -1.5 | -1.0 | -3.0 | NC | NC | -1.0 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | . | E | E | E | E | NC | NC | SE | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | . | 2.0 | 2.5 | 2.0 | 4.5 | NC | NC | 3.0 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | NC | NC | NC | . | NC | NC | NC | 3.0 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | NC | NC | 10.5 | 2.5 | NC | NC | NC | 1.5 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | 0.0 | . | . | . | . | . | . | . | . |
| MAXIMUM HIGH TIDE SURGE | NC | NC | NC | 6.6 | NC | NC | NC | 7.2 | . | . | . | . | . | . | . | . |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -12.0 | -7.5 | -5.0 | -3.5 | -11.5 | -7.0 | -5.0 | -3.0 | . | . | . | 0.0 | . | . | . | -1.5 |
| DIRECTION OF WIND | N | NE | NE | NE | E | E | E | E | . | . | . | E | . | . | . | SE |
| DURATION IN HOURS | 19.5 | 12.5 | 9.0 | 6.0 | 20.0 | 13.0 | 9.0 | 6.5 | . | . | . | 0.0 | . | . | . | 4.0 |
| 65.5 MPH WIND GUSTS FTOL | -8.0 | -5.0 | -3.5 | -2.0 | -7.0 | -4.5 | -3.0 | -2.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | E | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 12.5 | 8.0 | 6.0 | 4.0 | 12.5 | 8.0 | 6.0 | 4.5 | . | . | . | . | . | . | . | 0.5 |
| LOW TIDE FLOODING FTOL | -1.0 | 0.5 | 0.5 | 1.0 | -1.5 | NC | NC | 0.5 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -2.0 | 0.0 | 0.5 | 0.5 | -2.5 | 0.0 | 1.0 | 0.0 | . | . | . | . | . | . | . | 3.5 |
| HIGH TIDE FLOODING FTOL | -3.0 | -0.5 | 0.0 | 0.5 | -3.0 | -1.0 | 0.0 | 0.0 | . | . | . | . | . | . | . | NC |
| MAXIMUM HIGH TIDE SURGE | 9.6 | 9.2 | 9.5 | 9.9 | 8.8 | 9.0 | 9.9 | 10.9 | . | . | . | . | . | . | . | 6.1 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -16.5 | -9.0 | -6.0 | -4.5 | -15.0 | -8.0 | -5.5 | -4.0 | -9.0 | -5.0 | -3.5 | -2.5 | NC | NC | NC | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | E | E | E | E | NC | NC | NC | E |
| DURATION IN HOURS | 24.0 | 14.5 | 10.5 | 7.5 | 24.5 | 15.0 | 11.0 | 8.0 | NC | NC | NC | 4.5 | NC | NC | NC | 5.5 |
| 65.5 MPH WIND GUSTS FTOL | -11.5 | -6.5 | -4.5 | -3.0 | -10.0 | -6.0 | -4.0 | -2.5 | . | . | . | . | NC | NC | NC | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | NC | NC | NC | SE |
| DURATION IN HOURS | 17.0 | 10.5 | 7.5 | 5.5 | 16.5 | 10.5 | 7.5 | 5.5 | . | . | . | . | NC | NC | NC | 3.0 |
| LOW TIDE FLOODING FTOL | -3.5 | -1.5 | -0.5 | 0.5 | -4.5 | -2.0 | -1.0 | 0.0 | . | . | . | NC | . | . | . | 4.0 |
| M.S.L. FLOODING FTOL | -5.5 | -2.0 | -1.0 | 0.0 | -6.0 | -2.0 | -1.0 | -0.5 | . | . | . | 3.0 | . | . | . | 1.5 |
| HIGH TIDE FLOODING FTOL | -7.5 | -3.0 | -1.0 | -0.5 | -7.0 | -2.5 | -1.0 | -0.5 | . | . | . | NC | . | . | . | -1.5 |
| MAXIMUM HIGH TIDE SURGE | 12.1 | 12.2 | 12.4 | 13.4 | 11.6 | 12.3 | 13.1 | 14.8 | . | . | . | NC | . | . | . | NC |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -17.0 | -8.5 | -6.0 | -4.0 | -14.5 | -7.0 | -3.5 | -0.5 | NC | NC | NC | -2.5 | -10.5 | -5.5 | -3.5 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 25.0 | 14.0 | 10.0 | 7.0 | 25.5 | 13.5 | 9.0 | 4.5 | NC | NC | NC | 4.0 | 8.5 | 5.0 | 4.5 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -12.5 | -6.5 | -4.5 | -3.0 | -10.5 | -5.0 | -3.5 | -2.0 | NC | . | . | . | . | . | . | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 18.0 | 10.5 | 7.5 | 5.0 | 19.0 | 11.0 | 8.0 | 5.5 | NC | . | . | . | . | . | . | 1.5 |
| LOW TIDE FLOODING FTOL | -4.0 | -1.0 | 0.0 | 0.5 | -4.0 | -1.0 | 0.0 | 1.0 | . | . | . | NC | . | . | . | NC |
| M.S.L. FLOODING FTOL | -4.5 | -1.0 | -0.5 | 0.5 | -5.0 | -1.0 | -0.5 | 1.0 | . | . | . | 3.5 | . | . | . | 3.0 |
| HIGH TIDE FLOODING FTOL | -5.0 | -1.5 | -1.0 | 0.0 | -6.0 | -2.0 | -1.0 | 1.0 | . | . | . | NC | . | . | . | NC |
| MAXIMUM HIGH TIDE SURGE | 12.7 | 12.2 | 12.4 | 10.7 | 10.7 | 11.8 | 13.7 | 13.5 | . | . | . | NC | . | . | . | NC |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

HIGHWAY 87 IN CHAMBERS COUNTY (HI ISL S) — ELEVATION: 5.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -4.5 | -3.5 | -2.5 | -1.5 | -4.5 | -3.5 | -2.5 | -1.5 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | E | E | E | E | E | E | E | S E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | 7.0 | 5.5 | 4.0 | 3.5 | 8.0 | 6.0 | 4.5 | 3.5 | . | . | . | . | . | . | . | . |
| 65.5 MPH WIND GUSTS FTOL | . | . | . | . | . | . | . | -0.5 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | . | . | . | . | . | . | . | S E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | . | . | . | . | . | . | . | 1.5 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | . | . | . | . | . | . | . | 0.0 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | . | . | -0.5 | -0.5 | . | . | . | -1.0 | . | . | . | . | . | . | . | . |
| HIGH TIDE FLOODING FTOL | N C | N C | N C | N C | N C | N C | N C | -2.0 | . | . | . | N C | . | . | . | N C |
| MAXIMUM HIGH TIDE SURGE | 6.1 | 6.4 | 6.9 | 7.6 | 5.9 | 6.4 | 7.3 | 8.3 | . | . | . | 5.2 | . | . | . | 5.6 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -3.5 | -5.5 | -3.5 | -2.5 | -7.5 | -4.5 | -3.0 | -2.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | N E | N E | N E | E | E | E | E | E | . | . | . | . | . | . | . | S E |
| DURATION IN HOURS | 14.0 | 9.0 | 6.5 | 4.0 | 12.5 | 8.0 | 6.0 | 4.5 | . | . | . | . | . | . | . | 1.5 |
| 65.5 MPH WIND GUSTS FTOL | . | -2.0 | -2.0 | -1.0 | -3.0 | N C | N C | -1.0 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | . | E | E | E | S E | N C | N C | S E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | . | 2.5 | 2.5 | 2.0 | 4.5 | N C | N C | 2.5 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | . | . | -0.5 | -0.5 | . | . | . | -0.5 | . | . | . | . | . | . | . | . |
| M.S.L. FLOODING FTOL | -4.0 | -2.5 | -2.0 | -1.5 | -4.5 | -3.0 | -2.0 | -1.5 | . | . | . | . | . | . | . | 0.0 |
| HIGH TIDE FLOODING FTOL | N C | N C | -3.5 | -2.5 | N C | N C | N C | N C | . | . | N C | N C | . | N C | N C | N C |
| MAXIMUM HIGH TIDE SURGE | 7.4 | 7.6 | 8.2 | 9.0 | 7.1 | 7.7 | 8.6 | 9.8 | . | . | 5.5 | 6.0 | . | 5.3 | 6.0 | 6.9 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -13.5 | -7.5 | -5.0 | -3.5 | -12.0 | -6.5 | -4.5 | -3.0 | . | . | . | 0.0 | . | . | . | -1.5 |
| DIRECTION OF WIND | N E | N E | N E | N E | E | E | E | E | . | . | . | E | . | . | . | S E |
| DURATION IN HOURS | 20.5 | 12.5 | 9.0 | 6.0 | 20.0 | 12.0 | 9.0 | 6.5 | . | . | . | 3.5 | . | . | . | 3.5 |
| 65.5 MPH WIND GUSTS FTOL | -8.5 | -5.0 | -3.5 | -2.5 | -7.5 | -4.0 | -3.0 | -2.0 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | N E | N E | N E | E | E | E | E | E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | 13.0 | 8.0 | 6.0 | 4.0 | 12.0 | 8.0 | 6.0 | 4.5 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | -4.5 | -2.5 | -2.0 | -1.0 | -5.0 | -3.0 | -2.0 | -1.5 | . | . | . | . | . | . | . | 0.0 |
| M.S.L. FLOODING FTOL | -9.5 | -5.0 | -3.0 | -2.0 | -9.0 | -4.5 | -3.0 | -2.0 | . | . | . | -0.5 | . | . | . | -1.0 |
| HIGH TIDE FLOODING FTOL | -14.5 | -7.0 | -4.0 | -3.0 | -13.0 | -6.0 | -4.0 | -3.0 | N C | N C | N C | N C | N C | N C | N C | -2.0 |
| MAXIMUM HIGH TIDE SURGE | 9.6 | 9.8 | 10.5 | 11.4 | 9.1 | 9.7 | 10.8 | 12.1 | 6.0 | 6.3 | 6.9 | 7.6 | 5.9 | 6.5 | 7.4 | 8.5 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -17.0 | -9.5 | -6.5 | -4.5 | -15.5 | -8.5 | -6.0 | -4.0 | -9.5 | -5.0 | -4.0 | -3.0 | N C | N C | N C | -2.5 |
| DIRECTION OF WIND | N E | N E | N E | N E | E | E | E | E | N C | N C | N C | E | N C | N C | N C | E |
| DURATION IN HOURS | 24.5 | 14.5 | 10.5 | 7.5 | 24.5 | 15.0 | 11.0 | 8.0 | 13.0 | 8.0 | 6.0 | 4.5 | N C | N C | N C | 5.5 |
| 65.5 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -10.5 | -6.0 | -4.0 | -2.5 | . | . | . | . | N C | N C | N C | -1.0 |
| DIRECTION OF WIND | N E | N E | N E | N E | E | E | E | E | . | . | . | . | N C | N C | N C | S E |
| DURATION IN HOURS | 17.5 | 10.5 | 7.5 | 5.5 | 16.5 | 10.0 | 7.5 | 5.5 | . | . | . | . | N C | N C | N C | 2.5 |
| LOW TIDE FLOODING FTOL | -8.5 | -4.5 | -2.5 | -2.0 | -8.5 | -4.5 | -3.0 | -2.0 | . | . | . | -0.5 | . | . | . | -1.0 |
| M.S.L. FLOODING FTOL | -13.5 | -6.5 | -4.0 | -2.5 | -13.5 | -7.0 | -4.0 | -3.0 | -8.5 | -4.0 | -2.0 | -1.5 | -7.5 | -4.0 | -2.0 | -2.0 |
| HIGH TIDE FLOODING FTOL | -18.0 | -9.0 | -5.0 | -3.5 | -18.5 | -9.0 | -5.0 | -3.5 | N C | N C | N C | N C | N C | N C | N C | N C |
| MAXIMUM HIGH TIDE SURGE | 11.9 | 11.9 | 12.4 | 13.5 | 11.3 | 11.8 | 12.8 | 14.5 | 7.1 | 7.4 | 7.9 | 8.8 | 7.3 | 7.9 | 8.9 | 10.3 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -17.5 | -9.0 | -6.0 | -4.5 | -15.0 | -7.5 | -5.0 | -3.0 | N C | N C | N C | -3.0 | -10.5 | -5.5 | -3.5 | -2.5 |
| DIRECTION OF WIND | N E | N E | N E | N E | E | E | E | E | N C | N C | N C | E | N C | N C | N C | E |
| DURATION IN HOURS | 24.0 | 14.5 | 10.0 | 7.0 | 25.5 | 15.0 | 10.5 | 7.0 | N C | N C | N C | 4.0 | 3.0 | 5.5 | 4.5 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -13.0 | -6.5 | -4.5 | -3.0 | -10.5 | -5.5 | -3.5 | -2.0 | N C | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | N E | N E | N E | N E | E | E | E | E | N C | . | . | . | . | . | . | S E |
| DURATION IN HOURS | 18.5 | 10.5 | 7.5 | 5.0 | 19.0 | 11.0 | 8.0 | 5.0 | N C | . | . | . | . | . | . | 0.5 |
| LOW TIDE FLOODING FTOL | -10.0 | -3.0 | -2.0 | -1.5 | -8.0 | -2.5 | -1.5 | -1.0 | . | . | . | . | . | . | . | 0.0 |
| M.S.L. FLOODING FTOL | -12.5 | -6.0 | -3.5 | -2.5 | -13.0 | -6.0 | -3.0 | -1.5 | -6.5 | -3.0 | -2.0 | -1.0 | . | . | . | -1.5 |
| HIGH TIDE FLOODING FTOL | -15.5 | -8.5 | -5.0 | -3.5 | -18.0 | -9.5 | -5.0 | -2.0 | N C | N C | N C | N C | N C | N C | N C | -2.5 |
| MAXIMUM HIGH TIDE SURGE | 12.5 | 12.1 | 12.5 | 12.4 | 10.6 | 11.4 | 13.0 | 14.1 | 7.0 | 7.1 | 7.7 | 8.0 | 6.0 | 6.8 | 8.1 | 9.0 |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL = from time of landfall in hours. (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

BEACH BY 87 IN CHAMBERS COUNTY (HI ISL S) — ELEVATION: 3.0 FT.

| HURRICANES CLASSIFIED BY WIND SPEED | 320 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF GALVESTON 5MPH | 10MPH | 15MPH | 20MPH | 320 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH | 360 DEGREE, 20 MILES LEFT OF FREEPORT 5MPH | 10MPH | 15MPH | 20MPH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIND RANGE 74-95 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -4.5 | -3.5 | -2.5 | -1.5 | -4.5 | -3.5 | -2.5 | -1.5 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | E | E | E | E | E | E | E | SE | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | 7.0 | 5.5 | 4.0 | 3.5 | 8.0 | 6.0 | 4.5 | 3.5 | . | . | . | . | . | . | . | . |
| 65.5 MPH WIND GUSTS FTOL | . | . | . | . | . | . | . | -0.5 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | . | . | . | . | . | . | . | SE | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | . | . | . | . | . | . | . | 1.5 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | -13.5 | -7.0 | -4.5 | -3.0 | -13.5 | -7.0 | -4.0 | -3.0 | . | . | . | -2.0 | -7.5 | -4.0 | -2.5 | -2.0 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 6.1 | 6.4 | 6.9 | 7.6 | 5.9 | 6.4 | 7.3 | 8.3 | 3.7 | 4.0 | 4.6 | 5.2 | 4.4 | 4.6 | 5.0 | 5.6 |
| WIND RANGE 96-110 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -8.5 | -5.5 | -3.5 | -2.5 | -7.5 | -4.5 | -3.0 | -2.0 | . | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | E | E | E | E | E | . | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 14.0 | 9.0 | 6.5 | 4.0 | 12.5 | 8.0 | 6.0 | 4.5 | . | . | . | . | . | . | . | 1.5 |
| 65.5 MPH WIND GUSTS FTOL | . | -2.0 | -2.0 | -1.0 | -3.0 | NC | NC | -1.0 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | . | E | E | E | SE | NC | NC | SE | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | . | 2.5 | 2.5 | 2.0 | 4.5 | NC | NC | 2.5 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | -16.5 | -8.5 | -5.0 | -3.5 | -18.5 | -9.0 | -5.5 | -3.5 | -13.5 | -7.0 | -4.0 | -3.0 | -14.5 | -7.0 | -4.0 | -3.0 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 7.4 | 7.6 | 8.2 | 9.0 | 7.1 | 7.7 | 8.6 | 9.8 | 4.8 | 5.0 | 5.5 | 6.0 | 4.8 | 5.3 | 6.0 | 6.9 |
| WIND RANGE 111-130 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -13.5 | -7.5 | -5.0 | -3.5 | -12.0 | -6.5 | -4.5 | -3.0 | . | . | . | 0.0 | . | . | . | -1.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | E | . | . | . | SE |
| DURATION IN HOURS | 20.5 | 12.5 | 9.0 | 6.0 | 20.0 | 12.0 | 9.0 | 6.5 | . | . | . | 0.5 | . | . | . | 3.5 |
| 65.5 MPH WIND GUSTS FTOL | -8.5 | -5.0 | -3.5 | -2.5 | -7.5 | -4.0 | -3.0 | -2.0 | . | . | . | . | . | . | . | . |
| DIRECTION OF WIND | NE | NE | NE | E | E | E | E | E | . | . | . | . | . | . | . | . |
| DURATION IN HOURS | 13.0 | 8.0 | 6.0 | 4.0 | 12.0 | 8.0 | 6.0 | 4.5 | . | . | . | . | . | . | . | . |
| LOW TIDE FLOODING FTOL | -21.5 | -10.0 | -6.0 | -4.5 | -20.0 | -9.5 | -6.0 | -5.0 | -18.5 | -9.0 | -5.5 | -4.0 | -21.5 | -10.0 | -6.0 | -4.5 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 9.6 | 9.8 | 10.5 | 11.4 | 9.1 | 9.7 | 10.8 | 12.1 | 6.0 | 6.3 | 6.9 | 7.6 | 5.9 | 6.5 | 7.4 | 8.5 |
| WIND RANGE 131-155 MPH | | | | | | | | | | | | | | | | |
| 52 MPH WIND GUSTS FTOL | -17.0 | -9.5 | -6.5 | -4.5 | -15.5 | -8.5 | -6.0 | -4.0 | -9.5 | -5.0 | -4.0 | -3.0 | NC | NC | NC | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 24.5 | 14.5 | 10.5 | 7.5 | 24.5 | 15.0 | 11.0 | 8.0 | 13.0 | 8.0 | 6.0 | 4.5 | NC | NC | NC | 5.5 |
| 65.5 MPH WIND GUSTS FTOL | -12.0 | -6.5 | -4.5 | -3.0 | -10.5 | -6.0 | -4.0 | -2.5 | . | . | . | . | NC | NC | NC | -1.0 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | . | . | . | . | NC | NC | NC | SE |
| DURATION IN HOURS | NC | 10.5 | 7.5 | 5.5 | 16.5 | 10.0 | 7.5 | 5.5 | . | . | . | . | NC | NC | NC | 2.5 |
| LOW TIDE FLOODING FTOL | NC | -11.0 | -6.5 | -4.5 | -20.5 | NC | NC | -6.0 | -22.5 | NC | NC | -5.0 | -26.5 | NC | NC | -6.0 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 11.9 | 11.9 | 12.4 | 13.5 | 11.3 | 11.8 | 12.8 | 14.5 | 7.1 | 7.4 | 7.9 | 8.8 | 7.3 | 7.9 | 8.9 | 10.3 |
| WIND RANGE 155-OVER MPH | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF GALVESTON | | | | 10 MI. LEFT OF FREEPORT | | | | 10 MI. LEFT OF FREEPORT | | | |
| 52 MPH WIND GUSTS FTOL | -17.5 | -9.0 | -6.0 | -4.5 | -15.0 | -7.5 | -5.0 | -3.0 | NC | NC | NC | -3.0 | -10.5 | -5.5 | -3.5 | -2.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | NC | NC | E | NC | NC | NC | E |
| DURATION IN HOURS | 24.0 | 14.5 | 10.0 | 7.0 | 25.5 | 15.0 | 10.5 | 7.0 | NC | NC | NC | 4.0 | 8.0 | 5.5 | 4.5 | 4.5 |
| 65.5 MPH WIND GUSTS FTOL | -13.0 | -6.5 | -4.5 | -3.0 | -10.5 | -5.5 | -3.5 | -2.0 | NC | . | . | . | . | . | . | -0.5 |
| DIRECTION OF WIND | NE | NE | NE | NE | E | E | E | E | NC | . | . | . | . | . | . | SE |
| DURATION IN HOURS | 13.5 | 10.5 | 7.5 | 5.0 | 19.0 | 11.0 | 8.0 | 5.0 | NC | . | . | . | . | . | . | 0.5 |
| LOW TIDE FLOODING FTOL | -14.5 | -10.5 | -6.0 | -4.0 | -15.0 | -11.0 | -6.0 | -4.5 | -20.5 | -14.0 | -8.0 | -4.5 | -22.5 | -16.0 | -8.5 | -5.0 |
| M.S.L. FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| HIGH TIDE FLOODING FTOL | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| MAXIMUM HIGH TIDE SURGE | 12.5 | 12.1 | 12.5 | 12.4 | 10.6 | 11.4 | 13.0 | 14.1 | 7.0 | 7.1 | 7.7 | 8.0 | 6.0 | 6.8 | 8.1 | 9.0 |

CAUTION 1: Wave action & rainfall not included in calculation. CAUTION 2: Errors of + or - 20% possible with accurate initial data; errors increase with inaccurate initial data. NC = not calculable from data. TIME: hours & 1/2 hour. FTOL - from time of landfall in hours (+ or -) when wind speed exceeded or tide exceeds point elevation. Maximum high tide surge in feet.

BEACH BY 87 IN CHAMBERS COUNTY 52b

B-69

### + or - 20 PERCENT ERROR INTERPRETATION

Example of error of + or - 20%* using the following simulated hurricane: winds 111-130 MPH, movement speed of 5 MPH, track of 320°, and landfalling 20 miles to the left of Galveston.

| | Given | Range |
|---|---|---|
| 52 MPH Wind Gusts FTOL | -15.0 (Hours) | -12.0 to -18.0 |
| Direction of Wind | NE | NE |
| Duration in Hours | 26.0 (Hours) | 20.0 to 31.2 |
| 65.5 MPH Wind Gusts FTOL | -11.0 (Hours) | - 8.8 to -13.2 |
| Direction of Wind | NE | NE |
| Duration in Hours | 19.0 (Hours) | 14.2 to 22.8 |
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 1.6 to - 2.4 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 3.2 to - 4.8 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 4.8 to - 7.2 |
| Maximum High Tide Surge | 11.6 (Feet) | 9.6 to 13.6** |

*Only the peak surges have adequate data to indicate a maximum error range of + or - 20 percent of actual. For illustration, a similar error range is indicated for the other items.

**The 20 percent maximum error is figured on the mean sea level flooding of 10.1 feet and then adding the 1.5 feet for maximum high tide.

### RATIO INTERPRETATION

Hurricanes with movement speeds of 10 MPH and 15 MPH are not based on SLOSH runs, except for the 10 MPH and 15 MPH hurricanes at 320°, landfalling 20 miles (10 for some) to the left of Galveston. They are estimated by ratios. The ratios are based on the difference reflected in the 5 MPH, 10 MPH, 15 MPH, and 20 MPH hurricanes coming in at 320°, landfalling 20 miles (10 for some) to the left of Galveston. Since they are based on ratios, the data should be interpreted as "best estimates."

### HIGH AND LOW TIDE INTERPRETATIONS

High and low tide calculations were based on a 1.5-foot increase above mean sea level and on a 1.5-foot decrease from mean sea level. Since tides vary at different times and in different places, actual estimates for low or high tidal variations should be adjusted accordingly. An example follows:

| | Data Based on Tidal Variation of 1.5 | Actual Tidal Variation of .75 |
|---|---|---|
| Low Tide Flooding FTOL | - 2.0 (Hours) | - 3.0 |
| M. S. L. Flooding FTOL | - 4.0 (Hours) | - 4.0 |
| High Tide Flooding FTOL | - 6.0 (Hours) | - 5.0 |
| Maximum High Tide Surge | 11.6 (Feet) | 10.8 |

### MAXIMUM HIGH TIDE SURGE INTERPRETATION

To obtain the maximum surge depth overland, the land elevation must be subtracted. Further, since high tides vary at different times and places, the maximum high tide surge (based on 1.5 feet) must be adjusted accordingly.

# APPENDIX C

## ADDITIONAL INFORMATION ON SIX CRITICAL DATA POINTS

Caution: For a description of how this additional information is to be interpreted, read *PART D: ADDITIONAL DATA ON SIX CRITICAL POINTS* of SECTION TWO: SLOSH DATA of this report.

| Data Point Location | Appendix Pages |
|---|---|
| Point number 5 before the Freeport levee system (Elevation 6') | C 2, C 3, C 4 |
| Point number 15a before the Galveston Seawall | C 5, C 6, C 7 |
| Point number 19 on the Galveston Causeway (Elevation 6') | C 8, C 9, C10 |
| Point number 21 before the Texas City levee system (Elevation 21') | C11, C12, C13 |
| Point number 38b at the Baytown Tunnel | C14, C15, C16 |
| Point number 40a at the entrance to the Houston Ship Channel | C17, C18, C19 |

# POINT BEFORE FREEPORT LEVEE
## (FM 1495 by Mouth of Brazos River at Quintana Beach)
## Point 5

Point of Impact: POINT BEFORE FREEPORT LEVEE (BRAZORIA)

20 miles to the left of Galveston (category 5 - 10 miles to left of Galveston)

Direction: 320°

| Category (windspeed) | 1 (74-95) | | | | 2 (96-110) | | | | 3 (111-130) | | | | 4 (131-155) | | | | 5 (over 155) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement Speed | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 |
| -24 | 4.0 | - | 4.0 | - | 4.0 | - | - | - | - | - | - | - | 4.0 | - | - | - | - | - | - | - |
| -23 | 4.0 | - | 4.0 | - | 4.0 | - | - | - | - | - | - | - | 4.0 | - | - | - | - | - | - | - |
| -22 | 4.0 | - | 4.0 | - | 4.0 | - | - | - | - | - | - | - | 4.0 | - | - | - | - | - | - | - |
| -21 | 4.0 | - | 4.0 | - | 4.0 | - | - | - | - | - | - | - | 4.0 | - | - | - | - | - | - | - |
| -20 | 4.0 | - | 4.0 | - | 4.0 | - | - | - | - | - | - | - | 4.0 | - | - | - | - | - | - | - |
| -19 | 4.0 | - | 4.0 | - | 4.0 | - | - | - | - | - | - | - | 4.0 | - | - | - | - | - | - | - |
| -18 | 4.0 | 4.0 | 4.0 | - | 4.0 | 4.0 | 4.0 | - | - | - | - | - | 4.0 | | - | - | - | - | - | - |
| -17 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | - | - | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -16 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | - | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -15 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | - | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -14 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -13 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -12 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -11 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -10 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 9 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 8 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 7 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 6 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 5 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 4 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 3 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 2 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 1 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| 0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 1 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 2 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 3 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 4 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 5 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 6 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 7 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 8 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 9 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| +10 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| +11 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| +12 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |

Direction: 360°

| Category (windspeed) | 1 (74-95) | | 2 (96-110) | | 3 (111-130) | | 4 (131-155) | | 5 (over 155) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Movement Speed | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 |
| -24 | 4.0 | - | 4.0 | - | 4.0 | - | 4.0 | - | - | - |
| -23 | 4.0 | - | 4.0 | - | 4.0 | - | 4.0 | - | - | - |
| -22 | 4.0 | - | 4.0 | - | 4.0 | - | 4.0 | - | - | - |
| -21 | 4.0 | - | 4.0 | - | 4.0 | - | 4.0 | - | - | - |
| -20 | 4.0 | - | 4.0 | - | 4.0 | - | 4.0 | - | - | - |
| -19 | 4.0 | - | 4.0 | - | 4.0 | - | 4.3 | - | - | - |
| -18 | 4.0 | - | 4.0 | - | 4.0 | - | 5.7 | - | 4.0 | - |
| -17 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 5.6 | 4.0 | 4.0 | 4.0 |
| -16 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 6.5 | 4.0 | 4.0 | 4.0 |
| -15 | 4.0 | 4.0 | 4.0 | 4.0 | 5.6 | 4.0 | 7.4 | 4.0 | 4.0 | 4.0 |
| -14 | 4.0 | 4.0 | 4.0 | 4.0 | 6.1 | 4.0 | 8.0 | 4.0 | 4.0 | 4.0 |
| -13 | 4.0 | 4.0 | 4.0 | 4.0 | 6.2 | 4.0 | 8.0 | 4.0 | 4.8 | 4.0 |
| -12 | 4.0 | 4.0 | 4.0 | 4.0 | 6.4 | 4.0 | 8.4 | 4.0 | 5.5 | 4.0 |
| -11 | 4.0 | 4.0 | 4.0 | 4.0 | 6.6 | 4.0 | 8.8 | 4.0 | 5.1 | 4.0 |
| -10 | 4.0 | 4.0 | 4.0 | 4.0 | 6.4 | 4.0 | 8.6 | 4.0 | 5.2 | 4.0 |
| - 9 | 4.0 | 4.0 | 4.0 | 4.0 | 5.6 | 4.0 | 7.8 | 4.0 | 5.3 | 4.0 |
| - 8 | 4.0 | 4.0 | 4.0 | 4.0 | 5.3 | 4.0 | 6.7 | 4.0 | 5.3 | 4.0 |
| - 7 | 4.0 | 4.0 | 4.0 | 4.0 | 5.1 | 4.0 | 5.3 | 4.0 | 4.6 | 4.0 |
| - 6 | 4.0 | 4.0 | 4.0 | 4.0 | 5.0 | 4.0 | 4.0 | 4.0 | 4.4 | 4.0 |
| - 5 | 4.0 | 4.0 | 4.0 | 4.0 | 5.1 | 4.0 | 4.0 | 4.0 | 4.2 | 4.0 |
| - 4 | 4.0 | 4.0 | 4.2 | 4.0 | 5.0 | 4.0 | 4.0 | 4.0 | 4.4 | 4.0 |
| - 3 | 4.0 | 4.0 | 4.4 | 4.0 | 5.0 | 5.0 | 4.0 | 8.4 | 4.6 | 4.0 |
| - 2 | 4.0 | 4.0 | 4.7 | 4.1 | 5.0 | 6.4 | 4.0 | 9.0 | 4.7 | 4.6 |
| - 1 | 4.0 | 4.0 | 4.8 | 4.0 | 5.0 | 5.0 | 4.0 | 4.0 | 4.8 | 4.4 |
| 0 | 4.0 | 4.0 | 4.9 | 4.0 | 5.0 | 5.0 | 4.0 | 4.0 | 4.9 | 4.0 |
| + 1 | 4.0 | 4.0 | 4.9 | 4.0 | 5.0 | 4.9 | 4.0 | 4.0 | 4.9 | 4.0 |
| + 2 | 4.0 | 4.0 | 4.9 | 4.0 | 5.0 | 4.9 | 4.0 | 4.0 | 4.9 | 4.0 |
| + 3 | 4.0 | 4.0 | 4.9 | 4.0 | 5.0 | 4.9 | 4.0 | 4.0 | 4.9 | 4.0 |
| + 4 | 4.0 | 4.0 | 4.9 | 4.0 | 5.0 | 4.9 | 4.0 | 4.0 | 4.8 | 4.0 |
| + 5 | 4.0 | 4.0 | 5.0 | 4.0 | 4.9 | 4.9 | 4.0 | 4.0 | 4.7 | 4.0 |
| + 6 | 4.0 | 4.0 | 5.0 | 4.0 | 4.9 | 4.9 | 4.0 | 4.0 | 4.7 | 4.0 |
| + 7 | 4.0 | 4.0 | 5.0 | 4.0 | 4.9 | 5.0 | 4.0 | 4.0 | 4.7 | 4.0 |
| + 8 | 4.0 | 4.0 | 5.0 | 4.0 | 4.9 | 5.0 | 4.0 | 4.0 | 4.6 | 4.0 |
| + 9 | 4.0 | 4.0 | 5.0 | 4.0 | 5.0 | 5.0 | 4.0 | 4.0 | 4.6 | 4.0 |
| +10 | 4.0 | 4.0 | 5.0 | 4.0 | 5.0 | 5.0 | 4.0 | 4.0 | 4.6 | 4.0 |
| +11 | 4.0 | 4.0 | 5.0 | 4.0 | 5.0 | 5.0 | 4.0 | 4.0 | 4.6 | 4.0 |
| +12 | 4.0 | 4.0 | 5.0 | 4.0 | 5.0 | 5.0 | 4.0 | 4.0 | 4.6 | 4.0 |

TRAVELED DISTANCE IN MILES OF EACH HOUR

DAMAGE SCALE AT EACH HOUR

# POINT BEFORE FREEPORT LEVEE
## (FM 1495 by Mouth of Brazos River at Quintana Beach)
## Point 5

| Point of Impact | 20 MILES TO THE LEFT OF FREEPORT (CATEGORY 5 - 10 MILES TO LEFT OF FREEPORT) | | | | | | | | | | POINT BEFORE FREEPORT LEVEE (BRAZORIA) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Direction | 320° | | | | | | | | | | 360° | | | | | | | | | |
| Category (windspeed) | 1 (74-95) | | 2 (96-110) | | 3 (111-130) | | 4 (131-155) | | 5 (over 155) | | 1 (74-95) | | 2 (96-110) | | 3 (111-130) | | 4 (131-155) | | 5 (over 155) | |
| Movement Speed | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 |
| -24 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | - | 4.0 | - | 4.0 | - | 4.0 | - | 4.0 | - |
| -23 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | - | 4.0 | - | 4.0 | - | 4.0 | - | 4.0 | - |
| -22 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | - | 4.0 | - | 4.0 | 4.0 | 4.0 | - | 4.0 | - |
| -21 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | - |
| -20 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | - |
| -19 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 5.8 | 4.0 | 4.0 | - |
| -18 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 6.2 | 4.3 | 5.0 | - |
| -17 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.6 | 4.0 | 6.7 | 4.3 | 6.0 | 4.0 |
| -16 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 5.8 | 4.0 | 7.2 | 4.3 | 6.5 | 4.0 |
| -15 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 6.0 | 4.0 | 7.8 | 4.3 | 7.0 | 4.0 |
| -14 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.1 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 6.5 | 4.0 | 8.4 | 4.3 | 7.8 | 4.0 |
| -13 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 5.5 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 7.0 | 4.0 | 9.2 | 4.3 | 8.8 | 4.0 |
| -12 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 6.1 | 4.0 | 4.3 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 7.5 | 4.0 | 9.5 | 4.3 | 9.6 | 4.0 |
| -11 | 4.0 | 4.0 | 4.0 | 4.0 | 4.1 | 4.0 | 6.6 | 4.0 | 5.9 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 7.8 | 4.0 | 9.6 | 4.3 | 10.8 | 4.0 |
| -10 | 4.0 | 4.0 | 4.4 | 4.0 | 5.7 | 4.0 | 7.2 | 4.0 | 6.4 | 4.0 | 4.0 | 4.0 | 4.4 | 4.0 | 8.4 | 4.0 | 10.1 | 4.3 | 11.6 | 4.0 |
| - 9 | 4.0 | 4.0 | 4.0 | 4.0 | 6.2 | 4.0 | 7.9 | 4.0 | 6.9 | 4.0 | 4.0 | 4.0 | 5.5 | 4.0 | 8.7 | 4.0 | 11.2 | 4.3 | 12.5 | 4.0 |
| - 8 | 4.0 | 4.0 | 4.0 | 4.0 | 6.6 | 4.0 | 8.5 | 4.0 | 7.4 | 4.0 | 4.0 | 4.0 | 6.1 | 4.0 | 8.6 | 4.0 | 11.3 | 4.3 | 12.4 | 4.0 |
| - 7 | 4.0 | 4.0 | 4.0 | 4.0 | 7.1 | 4.0 | 9.1 | 4.0 | 8.1 | 4.0 | 4.0 | 4.0 | 5.7 | 4.0 | 8.0 | 4.0 | 10.1 | 4.3 | 12.0 | 4.0 |
| - 6 | 4.0 | 4.0 | 4.2 | 4.0 | 7.7 | 4.0 | 9.9 | 4.0 | 8.7 | 4.0 | 4.0 | 4.0 | 5.0 | 4.0 | 6.7 | 4.0 | 8.5 | 4.3 | 9.7 | 4.0 |
| - 5 | 4.0 | 4.0 | 5.7 | 4.0 | 8.3 | 4.0 | 10.6 | 4.0 | 9.5 | 4.0 | 4.0 | 4.0 | 4.9 | 4.0 | 5.7 | 4.0 | 6.8 | 4.3 | 6.9 | 4.0 |
| - 4 | 4.0 | 4.0 | 6.2 | 4.0 | 8.8 | 4.0 | 11.5 | 4.0 | 10.5 | 4.0 | 4.0 | 4.0 | 4.8 | 4.0 | 5.4 | 4.0 | 5.3 | 4.3 | 5.3 | 4.0 |
| - 3 | 4.0 | 4.0 | 6.6 | 4.0 | 9.3 | 4.0 | 12.1 | 4.0 | 11.6 | 4.0 | 4.0 | 4.0 | 4.6 | 4.0 | 5.1 | 6.9 | 5.2 | 9.6 | 4.0 | 9.7 |
| - 2 | 4.0 | 4.0 | 6.8 | 4.0 | 9.6 | 4.0 | 12.6 | 5.9 | 12.7 | 4.0 | 4.0 | 5.7 | 4.6 | 9.4 | 4.9 | 12.3 | 4.9 | 15.3 | 4.0 | 16.4 |
| - 1 | 4.0 | 4.0 | 7.0 | 5.5 | 9.8 | 9.9 | 12.4 | 11.6 | 13.5 | 10.8 | 4.0 | 5.7 | 4.5 | 7.2 | 4.6 | 9.8 | 4.9 | 12.7 | 4.0 | 9.0 |
| 0 | 4.0 | 7.7 | 6.9 | 8.8 | 9.6 | 12.2 | 12.2 | 15.5 | 13.2 | 16.1 | 4.0 | 5.0 | 4.5 | 5.0 | 4.2 | 5.0 | 4.8 | 5.0 | 4.0 | 4.4 |
| + 1 | 4.0 | 6.6 | 6.6 | 8.1 | 9.1 | 11.5 | 11.5 | 14.2 | 12.4 | 10.2 | 4.0 | 5.0 | 4.5 | 4.8 | 4.2 | 4.7 | 4.7 | 4.5 | 4.0 | 4.0 |
| + 2 | 4.0 | 5.0 | 6.1 | 5.8 | 8.5 | 8.2 | 10.8 | 10.7 | 10.7 | 6.7 | 4.0 | 5.0 | 4.5 | 4.7 | 4.1 | 4.5 | 4.6 | 4.3 | 4.0 | 4.0 |
| + 3 | 4.0 | 5.0 | 5.0 | 5.0 | 7.3 | 4.8 | 9.0 | 5.3 | 8.3 | 5.1 | 4.0 | 5.0 | 4.5 | 4.5 | 4.1 | 4.3 | 4.5 | 4.1 | 4.0 | 4.0 |
| + 4 | 4.0 | 5.0 | 5.0 | 5.0 | 5.5 | 4.9 | 6.6 | 5.2 | 5.7 | 5.0 | 4.0 | 5.0 | 4.5 | 4.4 | 4.1 | 4.2 | 4.5 | 4.0 | 4.0 | 4.0 |
| + 5 | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | 4.9 | 6.0 | 5.1 | 5.7 | 5.0 | 4.0 | 5.0 | 4.5 | 4.3 | 4.1 | 4.2 | 4.4 | 4.0 | 4.0 | 4.0 |
| + 6 | 4.0 | 5.0 | 4.9 | 5.0 | 5.0 | 4.9 | 5.8 | 5.1 | 5.5 | 5.0 | 4.0 | 5.0 | 4.6 | 4.2 | 4.1 | 4.1 | 4.4 | 4.0 | 4.0 | 4.0 |
| + 7 | 4.0 | 5.0 | 4.9 | 5.0 | 5.0 | 4.9 | 5.6 | 5.0 | 5.4 | 5.0 | 4.0 | 5.0 | 4.6 | 4.2 | 4.1 | 4.1 | 4.5 | 4.0 | 4.0 | 4.0 |
| + 8 | 4.0 | 5.0 | 4.9 | 5.0 | 5.0 | 5.0 | 5.4 | 5.0 | 5.3 | 5.0 | 4.0 | 5.0 | 4.6 | 4.1 | 4.1 | 4.0 | 4.5 | 4.0 | 4.0 | 4.0 |
| + 9 | 4.0 | 5.0 | 4.9 | 5.0 | 5.0 | 5.0 | 5.3 | 5.0 | 5.2 | 5.0 | 4.0 | 5.0 | 4.7 | 4.1 | 4.2 | 4.0 | 4.5 | 4.0 | 4.0 | 4.0 |
| +10 | 4.0 | 5.0 | 4.9 | 5.0 | 5.0 | 5.0 | 5.3 | 5.0 | 5.2 | 5.0 | 4.0 | 5.0 | 4.7 | 4.1 | 4.2 | 4.0 | 4.5 | 4.0 | 4.0 | 4.0 |
| +11 | 4.0 | 5.0 | 4.9 | 5.0 | 5.0 | 5.0 | 5.2 | 5.0 | 5.1 | 5.0 | 4.0 | 5.0 | 4.7 | 4.0 | 4.3 | 4.0 | 4.6 | 6.0 | 4.0 | 4.0 |
| +12 | 4.0 | 5.0 | 4.9 | 5.0 | 5.0 | 5.0 | 5.2 | 5.0 | 5.1 | 5.0 | 4.0 | 5.0 | 4.7 | 4.0 | 4.2 | 4.0 | 4.6 | 6.0 | 4.0 | 4.0 |

HOURS TO SPEED UNDER 40 MPH BEFORE TIME OF LANDFALL

HOURS FROM EACH AT GRADUALLY INCREASING SPEEDS UP TO FULL GRADUALLY INCREASING

Movement Speed - 10 MPH

Direction - 320°

Category - 3 (windspeed 111-130)

POINT BEFORE FREEPORT LEVEE (BRAZORIA)

Miles southwest of Galveston

| Point of Impact | 85 | 80 | 75 | 70 | 65 | 60 | 55 | 50 | 45 | 40 | 35 | 30 | 25 | 20 | 15 | 10 | 5 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -24 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | - | - | - | - | - | - | - | - |
| -23 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | - | - | - | - | - | - | - | - |
| -22 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | - | - | - | - | - | - | - | - |
| -21 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | - | - | - | - | - | - | - |
| -20 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | - | - | - | - | - | - | - |
| -19 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | - | - | - | - | - | - | - |
| -18 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | - | - | - | - | - | - |
| -17 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -16 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -15 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -14 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -13 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -12 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -11 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -10 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 9 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 8 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 7 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 6 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 5 | 4.0 | 4.0 | 4.0 | 4.0 | 4.1 | 4.1 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 4 | 4.1 | 4.3 | 4.4 | 4.3 | 7.0 | 7.0 | 6.5 | 6.0 | 4.5 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 3 | 6.7 | 7.0 | 7.0 | 7.0 | 9.0 | 8.4 | 7.9 | 7.3 | 6.6 | 5.8 | 4.1 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 2 | 7.7 | 8.0 | 8.3 | 8.5 | 9.9 | 9.9 | 9.3 | 8.7 | 7.7 | 6.1 | 4.4 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 1 | 9.0 | 9.4 | 10.0 | 9.9 | 11.1 | 11.0 | 10.4 | 9.4 | 7.8 | 6.6 | 4.6 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| 0 | 10.1 | 10.3 | 11.0 | 11.2 | 11.2 | 11.2 | 10.3 | 8.9 | 7.4 | 6.1 | 4.8 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 1 | 9.4 | 11.0 | 11.0 | 11.0 | 10.3 | 10.0 | 9.2 | 8.1 | 6.4 | 5.1 | 4.8 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 2 | 6.9 | 8.5 | 10.0 | 10.1 | 8.0 | 8.0 | 7.5 | 6.7 | 5.2 | 5.0 | 4.5 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 3 | 4.9 | 4.8 | 6.2 | 7.0 | 4.9 | 5.2 | 5.3 | 5.1 | 5.0 | 4.8 | 4.1 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 4 | 4.9 | 4.8 | 4.9 | 4.8 | 4.9 | 4.9 | 5.0 | 5.0 | 5.0 | 4.7 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 5 | 5.0 | 5.0 | 5.0 | 5.0 | 4.9 | 5.0 | 5.0 | 4.9 | 5.0 | 4.7 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 6 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 4.9 | 5.0 | 4.8 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 7 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 4.9 | 5.0 | 4.9 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 8 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 4.9 | 5.0 | 4.9 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 9 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 4.1 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| +10 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 4.2 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| +11 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 4.3 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| +12 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 4.3 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |

Miles northeast of Galveston

| Point of Impact | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|---|
| -24 | - | - | - | - | - | - | - | - | - |
| -23 | - | - | - | - | - | - | - | - | - |
| -22 | - | - | - | - | - | - | - | - | - |
| -21 | - | - | - | - | - | - | - | - | - |
| -20 | - | - | - | - | - | - | - | - | - |
| -19 | - | - | - | - | - | - | - | - | - |
| -18 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -17 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -16 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -15 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -14 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -13 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -12 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -11 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| -10 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 9 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 8 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 7 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 6 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 5 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 4 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 3 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 2 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| - 1 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| 0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 1 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 2 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 3 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 4 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 5 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 6 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 7 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 8 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| + 9 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| +10 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| +11 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| +12 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |

HOURS PLUS OR MINUS TIME OF LANDFALL

SLOSH ESTIMATED FEET OF STORM SURGE ANTICIPATED AT EACH HOUR

POINT BEFORE FREEPORT LEVEE
(FM 1495 by Mouth of Brazos River at Quintana Beach)
Point 5

# POINT BEFORE GALVESTON SEAWALL
## (Beach at Pleasure Pier)
## Point 15a

| Point of Impact | POINT BEFORE GALVESTON SEAWALL (PLEASURE PIER) | | | | | | | | | | | | | | | | 20 miles to the left of Galveston (category 5 - 10 miles to left of Galveston) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Direction | 320° | | | | | | | | | | | | | | | | | | | | 360° | | | | | | | | | | | |
| Category (windspeed) | 1 (74-95) | | | | 2 (96-110) | | | | 3 (111-130) | | | | 4 (131-155) | | | | 5 (over 155) | | | | 1 (74-95) | | 2 (96-110) | | 3 (111-130) | | 4 (131-155) | | 5 (over 155) | |
| Movement Speed | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 |
| -24 | 1.5 | - | - | - | 1.6 | - | - | - | 1.8 | - | - | - | 2.0 | - | - | - | - | - | - | - | 1.1 | - | 1.2 | - | 1.2 | - | 1.3 | - | - | - |
| -23 | 1.6 | - | - | - | 1.8 | - | - | - | 2.1 | - | - | - | 2.3 | - | - | - | - | - | - | - | 1.2 | - | 1.2 | - | 1.3 | - | 1.4 | - | - | - |
| -22 | 1.6 | - | - | - | 1.8 | - | - | - | 2.1 | - | - | - | 2.5 | - | - | - | - | - | - | - | 1.4 | - | 1.5 | - | 1.6 | - | 1.8 | - | - | - |
| -21 | 1.7 | - | - | - | 1.9 | - | - | - | 2.3 | - | - | - | 2.6 | - | - | - | - | - | - | - | 1.6 | - | 1.8 | - | 2.1 | - | 2.4 | - | - | - |
| -20 | 1.8 | - | - | - | 2.0 | - | - | - | 2.5 | - | - | - | 2.9 | - | - | - | - | - | - | - | 1.9 | - | 2.2 | - | 2.8 | - | 3.4 | - | - | - |
| -19 | 1.9 | - | - | - | 2.1 | - | - | - | 2.6 | - | - | - | 3.1 | - | - | - | - | - | - | - | 2.4 | - | 2.8 | - | 3.7 | 1.1 | 4.5 | - | - | - |
| -18 | 1.9 | - | - | - | 2.2 | - | - | - | 2.7 | - | - | - | 3.3 | - | - | - | - | - | - | - | 2.6 | - | 3.1 | - | 4.2 | 1.1 | 5.2 | - | 1.3 | 1.1 |
| -17 | 2.0 | 1.1 | 1.1 | 1.1 | 2.3 | 1.1 | 1.1 | 1.1 | 3.0 | 1.1 | 1.1 | 1.1 | 3.6 | 1.2 | 1.1 | 1.1 | 1.2 | 1.1 | 1.1 | - | 2.5 | 1.1 | 3.1 | 1.1 | 4.1 | 1.2 | 5.2 | 1.1 | 1.4 | 1.1 |
| -16 | 2.2 | 1.1 | 1.1 | 1.1 | 2.4 | 1.1 | 1.1 | 1.1 | 3.3 | 1.1 | 1.1 | 1.1 | 4.0 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | - | 2.5 | 1.1 | 3.0 | 1.1 | 4.1 | 1.2 | 5.2 | 1.1 | 2.1 | 1.1 |
| -15 | 2.3 | 1.1 | 1.1 | 1.1 | 2.8 | 1.1 | 1.1 | 1.1 | 3.6 | 1.1 | 1.1 | 1.1 | 4.5 | 1.2 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 2.8 | 1.1 | 3.5 | 1.1 | 4.6 | 1.3 | 5.9 | 1.2 | 3.2 | 1.2 |
| -14 | 2.5 | 1.2 | 1.1 | 1.1 | 3.0 | 1.2 | 1.1 | 1.1 | 3.9 | 1.2 | 1.2 | 1.1 | 4.9 | 1.2 | 1.2 | 1.1 | 1.8 | 1.3 | 1.2 | 1.1 | 3.0 | 1.1 | 3.7 | 1.2 | 5.1 | 1.4 | 6.4 | 1.3 | 4.5 | 1.2 |
| -13 | 2.7 | 1.3 | 1.2 | 1.1 | 3.2 | 1.4 | 1.2 | 1.1 | 4.3 | 1.4 | 1.3 | 1.1 | 5.4 | 1.5 | 1.3 | 1.2 | 3.2 | 1.5 | 1.3 | 1.1 | 3.1 | 1.2 | 3.9 | 1.2 | 5.4 | 1.5 | 6.6 | 1.4 | 6.0 | 1.5 |
| -12 | 2.8 | 1.5 | 1.2 | 1.1 | 3.5 | 1.6 | 1.3 | 1.2 | 4.7 | 1.7 | 1.4 | 1.2 | 5.9 | 1.9 | 1.5 | 1.3 | 4.5 | 1.8 | 1.4 | 1.2 | 3.3 | 1.2 | 4.0 | 1.3 | 5.6 | 1.5 | 7.0 | 1.6 | 6.7 | 1.5 |
| -11 | 3.0 | 1.6 | 1.3 | 1.2 | 3.7 | 1.7 | 1.3 | 1.2 | 5.2 | 2.0 | 1.4 | 1.3 | 6.4 | 2.2 | 1.5 | 1.3 | 5.6 | 2.0 | 1.4 | - | 3.5 | 1.3 | 4.4 | 1.3 | 6.1 | 1.6 | 7.7 | 1.6 | 6.3 | 1.5 |
| -10 | 3.2 | 1.7 | 1.3 | 1.2 | 4.0 | 1.9 | 1.3 | 1.2 | 5.5 | 2.2 | 1.4 | 1.3 | 6.9 | 2.5 | 1.5 | 1.3 | 6.7 | 2.1 | 1.4 | 1.3 | 3.7 | 1.3 | 4.7 | 1.4 | 6.6 | 1.8 | 8.3 | 1.7 | 7.2 | 1.5 |
| - 9 | 3.4 | 1.8 | 1.4 | 1.2 | 4.3 | 2.0 | 1.4 | 1.2 | 5.9 | 2.4 | 1.6 | 1.3 | 7.5 | 2.9 | 1.7 | 1.4 | 6.6 | 2.4 | 1.6 | 1.3 | 4.0 | 1.3 | 5.0 | 1.4 | 7.0 | 2.0 | 8.8 | 1.8 | 8.2 | 1.6 |
| - 8 | 3.2 | 1.2 | 1.5 | 1.3 | 4.6 | 2.4 | 1.6 | 1.3 | 6.3 | 2.9 | 1.7 | 1.4 | 8.0 | 3.5 | 1.9 | 1.5 | 6.5 | 2.9 | 1.7 | 1.4 | 4.2 | 1.4 | 5.4 | 1.6 | 7.5 | 2.3 | 9.5 | 2.0 | 9.1 | 1.7 |
| - 7 | 3.8 | 2.3 | 1.5 | 1.3 | 4.8 | 2.8 | 1.7 | 1.4 | 67. | 3.5 | 1.9 | 1.5 | 8.5 | 4.3 | 2.1 | 1.7 | 6.8 | 3.4 | 1.8 | 1.5 | 4.6 | 1.5 | 5.8 | 1.7 | 8.2 | 2.7 | 10.2 | 2.3 | 9.9 | 1.9 |
| - 6 | 4.1 | 2.7 | 1.7 | 1.4 | 5.2 | 3.3 | 1.9 | 1.5 | 7.1 | 4.3 | 2.2 | 1.6 | 9.1 | 5.4 | 2.4 | 1.8 | 7.5 | 4.1 | 2.0 | 1.6 | 4.8 | 1.7 | 6.1 | 1.9 | 8.6 | 3.6 | 10.8 | 2.7 | 10.7 | 2.1 |
| - 5 | 4.3 | 3.2 | 2.0 | 1.6 | 5.5 | 4.0 | 2.2 | 1.7 | 7.6 | 5.4 | 2.7 | 1.9 | 9.6 | 6.8 | 3.1 | 2.0 | 8.6 | 5.2 | 2.5 | 1.7 | 5.0 | 1.9 | 6.3 | 2.2 | 8.8 | 5.3 | 11.2 | 3.2 | 11.5 | 2.4 |
| - 4 | 4.6 | 3.9 | 2.5 | 1.8 | 5.8 | 4.9 | 2.9 | 2.0 | 8.1 | 6.7 | 3.7 | 2.3 | 10.3 | 8.5 | 4.5 | 2.5 | 9.8 | 6.7 | 3.4 | 2.0 | 5.0 | 2.4 | 6.4 | 2.8 | 8.9 | 8.7 | 11.4 | 4.3 | 11.8 | 2.8 |
| - 3 | 4.9 | 4.6 | 3.4 | 2.3 | 6.2 | 5.8 | 3.9 | 2.6 | 8.5 | 8.0 | 5.4 | 3.3 | 10.6 | 10.0 | 6.7 | 3.7 | 10.5 | 8.2 | 4.9 | 2.9 | 4.9 | 3.3 | 6.2 | 4.0 | 8.5 | 1.2 | 11.0 | 6.7 | 11.4 | 3.7 |
| - 2 | 5.1 | 5.4 | 4.6 | 3.5 | 6.5 | 6.7 | 5.9 | 4.1 | 8.9 | 9.1 | 8.0 | 5.5 | 11.5 | 11.3 | 10.0 | 6.8 | 11.2 | 9.7 | 8.3 | 5.1 | 4.6 | 5.0 | 5.9 | 6.3 | 8.0 | 7.9 | 10.3 | 10.8 | 10.3 | 10.6 |
| - 1 | 5.3 | 5.8 | 6.0 | 5.6 | 6.7 | 7.3 | 7.5 | 7.0 | 9.2 | 9.8 | 10.1 | 9.5 | 11.7 | 12.1 | 12.5 | 11.8 | 11.4 | 11.0 | 11.4 | 10.1 | 4.2 | 6.7 | 5.2 | 8.5 | 7.2 | 2.8 | 9.2 | 13.6 | 8.2 | 10.6 |
| 0 | 5.3 | 5.8 | 6.1 | 7.1 | 6.7 | 7.3 | 8.0 | 8.8 | 9.2 | 9.8 | 10.6 | 11.7 | 11.7 | 12.3 | 12.7 | 13.9 | 10.9 | 10.7 | 11.8 | 13.7 | 3.5 | 5.1 | 4.4 | 6.1 | 6.0 | 1.6 | 7.6 | 9.9 | 5.8 | 14.7 |
| + 1 | 5.2 | 5.3 | 5.5 | 5.7 | 6.6 | 6.7 | 6.9 | 7.0 | 9.0 | 8.9 | 8.9 | 9.1 | 11.7 | 11.5 | 11.5 | 11.5 | 9.9 | 9.4 | 8.9 | 7.3 | 3.0 | 1.8 | 3.6 | 2.7 | 5.0 | 2.9 | 6.1 | 3.5 | 9.9 | 2.9 |
| + 2 | 4.9 | 4.6 | 4.2 | 3.8 | 6.2 | 5.6 | 5.0 | 4.7 | 8.6 | 7.7 | 6.8 | 6.1 | 11.2 | 9.9 | 8.6 | 7.9 | 8.4 | 7.4 | 5.8 | 5.0 | 2.5 | 0.9 | 3.0 | 0.7 | 4.1 | 1.6 | 5.1 | 1.2 | 3.0 | 2.5 |
| + 3 | 4.4 | 3.5 | 2.8 | 2.4 | 5.6 | 4.6 | 3.5 | 2.9 | 7.8 | 6.4 | 5.2 | 4.3 | 10.2 | 7.8 | 6.4 | 5.7 | 7.0 | 6.9 | 5.3 | 3.6 | 2.1 | 0.7 | 2.5 | 0.9 | 3.1 | 0.9 | 3.9 | 2.0 | 3.3 | 1.6 |
| + 4 | 3.8 | 2.8 | 2.0 | 1.3 | 4.8 | 3.4 | 2.5 | 1.4 | 6.8 | 4.8 | 3.4 | 2.4 | 8.5 | 5.8 | 4.6 | 3.3 | 5.2 | 5.7 | 3.9 | 2.1 | 1.8 | 0.6 | 2.0 | 0.5 | 2.5 | 1.0 | 2.7 | 0.9 | 2.0 | 1.7 |
| + 5 | 3.3 | 2.2 | 1.6 | 0.9 | 4.2 | 2.7 | 1.8 | 0.9 | 5.7 | 3.4 | 2.3 | 0.8 | 6.7 | 4.0 | 2.6 | 0.7 | 4.1 | 4.1 | 2.4 | 1.0 | 1.7 | 0.3 | 1.8 | 0.1 | 2.1 | -0.0 | 2.1 | 0.0 | 1.3 | 1.1 |
| + 6 | 2.9 | 1.9 | 1.4 | 1.1 | 3.5 | 1.9 | 1.6 | 1.1 | 4.6 | 2.2 | 1.5 | 1.0 | 5.3 | 2.2 | 1.0 | 0.6 | 3.0 | 2.2 | 1.7 | 1.3 | 1.6 | 0.7 | 1.7 | 0.5 | 2.0 | 0.2 | 1.8 | -0.4 | 1.2 | -0.9 |
| + 7 | 2.6 | 1.7 | 1.6 | 1.6 | 3.0 | 1.8 | 1.7 | 1.7 | 3.6 | 1.9 | 1.5 | 1.7 | 3.8 | 1.7 | 1.9 | 1.7 | 1.9 | 1.2 | 1.3 | 2.6 | 1.5 | 1.3 | 1.7 | 1.4 | 1.9 | 1.3 | 1.7 | 1.6 | 1.2 | -0.0 |
| + 8 | 2.4 | 1.6 | 1.7 | 1.9 | 2.7 | 1.7 | 1.8 | 2.1 | 3.0 | 1.7 | 1.8 | 2.4 | 2.5 | 1.4 | 1.7 | 2.3 | 2.0 | 1.0 | 1.5 | 3.5 | 1.5 | 1.4 | 1.6 | 1.5 | 2.0 | 1.8 | 1.7 | 2.0 | 1.8 | 1.6 |
| + 9 | 2.2 | 1.5 | 1.5 | 1.7 | 2.4 | 1.7 | 1.7 | 1.9 | 2.8 | 1.7 | 1.8 | 2.1 | 2.4 | 1.4 | 1.9 | 2.5 | 1.8 | 0.9 | 1.8 | 3.0 | 1.4 | 1.0 | 1.6 | 1.1 | 1.9 | 1.0 | 2.2 | 1.0 | 2.3 | 1.1 |
| +10 | 2.1 | 1.4 | 1.2 | 1.2 | 2.4 | 1.5 | 1.3 | 1.3 | 2.7 | 1.6 | 1.5 | 1.6 | 2.5 | 1.6 | 1.9 | 2.0 | 2.3 | 1.4 | 1.4 | 2.5 | 1.4 | 0.8 | 1.6 | 0.7 | 1.8 | 0.9 | 1.8 | 0.6 | 2.0 | 1.0 |
| +11 | 2.0 | 1.3 | 1.1 | 0.9 | 2.4 | 1.4 | 1.1 | 1.0 | 2.8 | 1.6 | 1.3 | 1.2 | 3.2 | 1.7 | 1.2 | 1.1 | 2.5 | 1.4 | 1.1 | 1.8 | 1.4 | 0.8 | 1.5 | 0.8 | 1.9 | 0.7 | 1.7 | 0.9 | 2.1 | 1.0 |
| +12 | 2.0 | 1.3 | 1.0 | 1.0 | 2.3 | 1.4 | 1.1 | 1.0 | 2.8 | 1.1 | 1.1 | 0.9 | 3.2 | 1.6 | 1.0 | 0.6 | 2.5 | 0.9 | 0.6 | 0.8 | 1.3 | 1.0 | 1.5 | 1.0 | 1.7 | 1.0 | 1.8 | 1.0 | 1.9 | 0.6 |

HOURS PLUS OR MINUS TIME OF LANDFALL — HIGHEST EXPECTED FEET OF STORM SURGE ANTICIPATED AT EACH HOUR

Point of Impact: 20 MILES TO THE LEFT OF FREEPORT (CATEGORY 5 - 10 MILES TO LEFT OF FREEPORT)

Direction: 320°

| Category (windspeed) | 1 (74-95) | | 2 (96-110) | | 3 (111-130) | | 4 (131-155) | | 5 (over 155) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Movement Speed | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 |
| -24 | 1.6 | 1.1 | 1.8 | 1.1 | 2.2 | 1.2 | 2.5 | 1.3 | 2.2 | 1.2 |
| -23 | 1.6 | 1.1 | 1.9 | 1.2 | 2.3 | 1.2 | 2.7 | 1.3 | 2.3 | 1.2 |
| -22 | 1.7 | 1.1 | 1.9 | 1.2 | 2.4 | 1.2 | 2.8 | 1.3 | 2.4 | 1.2 |
| -21 | 1.8 | 1.1 | 2.0 | 1.2 | 2.5 | 1.2 | 2.9 | 1.3 | 2.6 | 1.2 |
| -20 | 1.8 | 1.1 | 2.1 | 1.2 | 2.6 | 1.2 | 3.0 | 1.3 | 2.7 | 1.2 |
| -19 | 1.9 | 1.1 | 2.2 | 1.2 | 2.7 | 1.2 | 3.3 | 1.3 | 2.9 | 1.3 |
| -18 | 2.0 | 1.1 | 2.3 | 1.2 | 2.9 | 1.3 | 3.5 | 1.3 | 3.0 | 1.3 |
| -17 | 2.0 | 1.1 | 2.4 | 1.2 | 3.0 | 1.3 | 3.7 | 1.3 | 3.2 | 1.3 |
| -16 | 2.1 | 1.2 | 2.5 | 1.2 | 3.3 | 1.3 | 4.0 | 1.3 | 3.5 | 1.3 |
| -15 | 2.3 | 1.2 | 2.7 | 1.2 | 3.5 | 1.3 | 4.3 | 1.4 | 3.8 | 1.3 |
| -14 | 2.4 | 1.2 | 2.8 | 1.2 | 3.7 | 1.3 | 4.6 | 1.4 | 4.2 | 1.3 |
| -13 | 2.5 | 1.2 | 3.0 | 1.2 | 4.0 | 1.3 | 5.0 | 1.4 | 4.6 | 1.3 |
| -12 | 2.6 | 1.2 | 3.2 | 1.2 | 4.2 | 1.3 | 5.3 | 1.4 | 5.0 | 1.3 |
| -11 | 2.8 | 1.2 | 3.4 | 1.2 | 4.5 | 1.3 | 5.7 | 1.4 | 5.3 | 1.3 |
| -10 | 2.9 | 1.2 | 3.5 | 1.3 | 4.8 | 1.4 | 6.0 | 1.5 | 5.7 | 1.4 |
| - 9 | 3.0 | 1.3 | 3.7 | 1.3 | 5.0 | 1.5 | 6.3 | 1.6 | 6.0 | 1.4 |
| - 8 | 3.1 | 1.3 | 3.8 | 1.4 | 5.2 | 1.6 | 6.6 | 1.7 | 6.3 | 1.5 |
| - 7 | 3.2 | 1.4 | 3.9 | 1.5 | 5.4 | 1.7 | 6.8 | 1.9 | 6.5 | 1.7 |
| - 6 | 3.3 | 1.5 | 4.1 | 1.6 | 5.6 | 1.9 | 7.0 | 2.1 | 6.8 | 1.9 |
| - 5 | 3.3 | 1.7 | 4.2 | 1.9 | 5.7 | 2.1 | 7.0 | 2.5 | 7.1 | 2.1 |
| - 4 | 3.4 | 1.9 | 4.3 | 2.2 | 5.8 | 2.6 | 7.3 | 3.1 | 7.2 | 2.6 |
| - 3 | 3.5 | 2.3 | 4.3 | 2.7 | 5.9 | 3.4 | 7.5 | 4.0 | 7.6 | 3.3 |
| - 2 | 3.5 | 3.0 | 4.3 | 3.6 | 6.0 | 4.6 | 7.6 | 5.9 | 7.8 | 4.9 |
| - 1 | 3.4 | 3.9 | 4.3 | 4.7 | 6.0 | 6.5 | 7.6 | 8.0 | 7.6 | 7.4 |
| 0 | 3.4 | 4.6 | 4.3 | 5.8 | 5.9 | 7.7 | 7.6 | 9.3 | 7.3 | 8.8 |
| + 1 | 3.3 | 4.6 | 4.1 | 5.8 | 5.7 | 7.7 | 7.3 | 9.4 | 6.7 | 8.6 |
| + 2 | 3.2 | 3.8 | 4.0 | 4.8 | 5.5 | 6.8 | 7.0 | 8.5 | 6.0 | 6.2 |
| + 3 | 2.1 | 2.4 | 3.8 | 2.8 | 5.2 | 4.4 | 6.6 | 5.5 | 5.2 | 2.9 |
| + 4 | 2.9 | 0.2 | 3.6 | -0.2 | 4.7 | -0.6 | 5.8 | -1.3 | 4.6 | -0.5 |
| + 5 | 2.7 | 0.1 | 3.2 | -0.1 | 4.1 | -0.9 | 4.3 | -1.8 | 3.4 | -0.6 |
| + 6 | 2.6 | 2.3 | 3.1 | 2.3 | 3.5 | 2.1 | 3.4 | 2.4 | 3.1 | 1.3 |
| + 7 | 2.6 | 2.1 | 3.1 | 2.5 | 3.4 | 3.0 | 3.3 | 2.8 | 2.4 | 2.2 |
| + 8 | 2.5 | 1.1 | 2.9 | 0.8 | 3.2 | 1.2 | 3.1 | 0.8 | 2.5 | 1.8 |
| + 9 | 2.3 | 0.8 | 2.5 | 0.8 | 3.0 | 0.7 | 2.7 | 0.6 | 2.6 | 1.3 |
| +10 | 2.2 | 1.5 | 2.4 | 1.6 | 2.7 | 2.0 | 2.8 | 2.2 | 2.8 | 1.3 |
| +11 | 2.1 | 1.4 | 2.5 | 1.6 | 3.0 | 1.7 | 3.2 | 1.7 | 2.9 | 1.2 |
| +12 | 2.1 | 0.9 | 2.4 | 0.8 | 2.9 | 0.7 | 3.3 | 0.5 | 3.1 | 1.0 |

Point of Impact: POINT BEFORE GALVESTON SEAWALL (PLEASURE PIER)

Direction: 360°

| Category (windspeed) | 1 (74-95) | | 2 (96-110) | | 3 (111-130) | | 4 (131-155) | | 5 (over 155) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Movement Speed | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 |
| -24 | 1.8 | - | 2.0 | - | 2.6 | - | 3.1 | - | 2.7 | - |
| -23 | 1.8 | - | 2.1 | - | 2.6 | - | 3.2 | - | 2.8 | - |
| -22 | 1.9 | - | 2.2 | - | 2.8 | 1.1 | 3.4 | - | 3.0 | - |
| -21 | 2.0 | 1.0 | 2.3 | 1.1 | 2.9 | 1.1 | 3.6 | 1.1 | 3.2 | - |
| -20 | 2.0 | 1.1 | 2.4 | 1.1 | 3.1 | 1.1 | 3.8 | 1.1 | 3.4 | - |
| -19 | 2.1 | 1.1 | 2.5 | 1.1 | 3.3 | 1.1 | 4.0 | 1.2 | 3.6 | - |
| -18 | 2.2 | 1.1 | 2.6 | 1.1 | 3.4 | 1.2 | 4.2 | 1.3 | 3.8 | - |
| -17 | 2.3 | 1.2 | 2.7 | 1.2 | 3.6 | 1.3 | 4.5 | 1.4 | 4.0 | 1.1 |
| -16 | 2.4 | 1.2 | 2.8 | 1.2 | 3.8 | 1.4 | 4.7 | 1.5 | 4.3 | 1.1 |
| -15 | 2.5 | 1.2 | 2.9 | 1.3 | 3.9 | 1.4 | 4.9 | 1.5 | 4.5 | 1.2 |
| -14 | 2.6 | 1.2 | 3.0 | 1.3 | 4.1 | 1.4 | 5.1 | 1.5 | 4.7 | 1.2 |
| -13 | 2.7 | 1.2 | 3.2 | 1.3 | 4.2 | 1.4 | 5.3 | 1.5 | 5.0 | 1.4 |
| -12 | 2.8 | 1.2 | 3.3 | 1.3 | 4.5 | 1.4 | 5.7 | 1.6 | 5.2 | 1.5 |
| -11 | 2.9 | 1.3 | 3.4 | 1.3 | 4.6 | 1.5 | 5.7 | 1.7 | 5.5 | 1.5 |
| -10 | 3.0 | 1.3 | 3.5 | 1.4 | 4.8 | 1.6 | 5.9 | 1.8 | 5.8 | 1.6 |
| - 9 | 3.1 | 1.4 | 3.7 | 1.5 | 5.0 | 1.7 | 6.1 | 1.9 | 6.0 | 1.7 |
| - 8 | 3.2 | 1.4 | 3.9 | 1.6 | 5.3 | 1.8 | 6.8 | 2.1 | 6.1 | 1.9 |
| - 7 | 3.2 | 1.5 | 4.0 | 1.7 | 5.5 | 2.0 | 7.1 | 2.3 | 6.3 | 2.1 |
| - 6 | 3.2 | 1.7 | 4.0 | 1.9 | 5.5 | 2.3 | 6.8 | 2.7 | 6.2 | 2.4 |
| - 5 | 3.2 | 1.9 | 3.9 | 2.1 | 5.3 | 2.6 | 6.5 | 3.1 | 5.4 | 2.8 |
| - 4 | 3.2 | 2.2 | 3.8 | 2.5 | 4.9 | 3.2 | 6.4 | 3.9 | 5.0 | 3.4 |
| - 3 | 3.2 | 2.7 | 3.7 | 3.2 | 4.7 | 4.2 | 5.8 | 5.2 | 4.4 | 4.7 |
| - 2 | 3.1 | 3.6 | 3.6 | 4.4 | 4.3 | 6.0 | 4.9 | 7.4 | 3.8 | 6.9 |
| - 1 | 2.8 | 4.8 | 3.1 | 6.0 | 3.5 | 8.2 | 4.3 | 10.4 | 3.4 | 9.8 |
| 0 | 2.5 | 4.6 | 2.8 | 5.6 | 3.0 | 7.5 | 3.4 | 9.8 | 2.8 | 8.2 |
| + 1 | 2.4 | 1.6 | 2.7 | 1.8 | 3.9 | 2.8 | 3.3 | 3.7 | 2.8 | -0.3 |
| + 2 | 2.2 | -0.1 | 2.5 | -0.5 | 2.8 | -1.2 | 3.2 | -2.4 | 2.7 | -3.2 |
| + 3 | 2.0 | 1.3 | 2.3 | 1.4 | 2.9 | 1.4 | 3.1 | 1.9 | 2.8 | 2.2 |
| + 4 | 1.8 | 1.8 | 2.1 | 2.1 | 2.5 | 2.6 | 2.9 | 3.2 | 2.6 | 1.3 |
| + 5 | 1.7 | 0.6 | 2.0 | 0.5 | 2.3 | 0.3 | 2.5 | 0.1 | 2.4 | -0.2 |
| + 6 | 1.7 | 0.4 | 1.9 | 0.2 | 2.2 | -0.3 | 2.2 | -0.5 | 2.2 | -0.0 |
| + 7 | 1.6 | 1.4 | 1.8 | 1.5 | 2.0 | 1.7 | 2.1 | 2.3 | 2.2 | 2.9 |
| + 8 | 1.5 | 1.7 | 1.7 | 1.9 | 1.9 | 2.5 | 2.1 | 3.3 | 2.0 | 2.5 |
| + 9 | 1.5 | 0.9 | 1.6 | 0.8 | 1.8 | 0.7 | 2.0 | 1.0 | 1.9 | 0.4 |
| +10 | 1.5 | 0.6 | 1.6 | 0.4 | 1.8 | 0.2 | 2.0 | 0.1 | 1.8 | 0.2 |
| +11 | 1.4 | 1.2 | 1.5 | 1.3 | 1.7 | 1.4 | 1.8 | 1.9 | 1.8 | 2.1 |
| +12 | 1.4 | 1.4 | 1.5 | 1.6 | 1.6 | 1.9 | 1.7 | 2.5 | 1.6 | 2.4 |

HOURS PLUS OR MINUS TIME OF LANDFALL

SLOSH ESTIMATED FEET OF STORM SURGE ANTICIPATED AT EACH HOUR

POINT BEFORE GALVESTON SEAWALL
(Beach at Pleasure Pier)
Point 15a

Movement Speed - 10 MPH

Direction - 320°

Category - 3 (windspeed 111-130)

POINT BEFORE GALVESTON SEAWALL (PLEASURE PIER)

| Point of Impact | Miles southwest of Galveston | | | | | | | | | | | | | | | | | | Miles northeast of Galveston | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 85 | 80 | 75 | 70 | 65 | 60 | 55 | 50 | 45 | 40 | 35 | 30 | 25 | 20 | 15 | 10 | 5 | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
| -24 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.2 | 1.1 | 1.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 |
| -23 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.2 | 1.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.1 | 1.0 |
| -22 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.1 | 1.0 |
| -21 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.3 | 1.2 | 1.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 1.0 |
| -20 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.3 | 1.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 1.0 |
| -19 | 1.5 | 1.4 | 1.5 | 1.4 | 1.5 | 1.5 | 1.5 | 1.4 | 1.4 | 1.4 | 1.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.1 | 1.0 | 1.0 |
| -18 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.4 | 1.2 | 1.1 | - | - | - | - | - | - | - | - | - | - | - | - | 1.1 | 1.0 | 1.0 |
| -17 | 1.6 | 1.5 | 1.6 | 1.5 | 1.6 | 1.6 | 1.6 | 1.6 | 1.5 | 1.5 | 1.3 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 |
| -16 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.5 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 |
| -15 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.6 | 1.6 | 1.2 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| -14 | 1.8 | 1.8 | 1.8 | 1.7 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.7 | 1.7 | 1.4 | 1.2 | 1.2 | 1.2 | 1.1 | 1.1 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 1.0 | 1.0 | 0.9 |
| -13 | 1.9 | 1.9 | 1.9 | 1.8 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.7 | 1.4 | 1.4 | 1.4 | 1.3 | 1.3 | 1.2 | 1.2 | 1.1 | 1.0 | 1.0 | 0.9 | 0.9 | 1.0 | 0.9 | 0.9 |
| -12 | 2.0 | 2.0 | 2.0 | 1.9 | 2.1 | 2.0 | 2.1 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.7 | 1.7 | 1.6 | 1.6 | 1.5 | 1.4 | 1.3 | 1.3 | 1.2 | 1.1 | 1.0 | 0.9 | 0.9 | 0.8 | 0.8 |
| -11 | 2.1 | 2.1 | 2.1 | 2.1 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 1.9 | 1.9 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.9 | 0.8 | 0.7 |
| -10 | 2.3 | 2.3 | 2.3 | 2.3 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.3 | 2.3 | 2.2 | 2.1 | 2.1 | 2.0 | 2.0 | 1.8 | 1.8 | 1.6 | 1.5 | 1.3 | 1.2 | 1.1 | 0.9 | 0.9 | 0.7 | 0.5 |
| -9 | 2.5 | 2.4 | 2.5 | 2.5 | 2.7 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 | 2.6 | 2.5 | 2.4 | 2.4 | 2.3 | 2.3 | 2.1 | 2.0 | 1.9 | 1.8 | 1.5 | 1.3 | 1.1 | 0.9 | 0.8 | 0.6 | 0.3 |
| -8 | 2.7 | 2.7 | 2.7 | 2.7 | 3.0 | 3.0 | 3.1 | 3.1 | 3.0 | 3.0 | 3.0 | 2.9 | 2.9 | 2.9 | 2.8 | 2.8 | 2.6 | 2.6 | 2.5 | 2.3 | 2.0 | 1.7 | 1.4 | 1.1 | 0.7 | 0.5 | 0.1 |
| -7 | 2.9 | 3.0 | 3.0 | 3.1 | 3.5 | 3.5 | 3.6 | 3.6 | 3.5 | 3.5 | 3.6 | 3.4 | 3.4 | 3.4 | 3.4 | 3.4 | 3.3 | 3.4 | 3.3 | 3.2 | 2.9 | 2.4 | 2.0 | 1.4 | 0.9 | 0.7 | 0.1 |
| -6 | 3.3 | 3.4 | 3.5 | 3.5 | 4.1 | 4.2 | 4.3 | 4.4 | 4.3 | 4.4 | 4.4 | 4.2 | 4.2 | 4.1 | 4.0 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 | 3.7 | 3.2 | 2.8 | 2.0 | 1.3 | 0.8 | 0.1 |
| -5 | 3.7 | 3.8 | 4.0 | 4.1 | 4.8 | 5.1 | 5.2 | 5.4 | 5.3 | 5.5 | 5.5 | 5.4 | 5.3 | 5.1 | 4.9 | 4.6 | 4.3 | 4.0 | 3.6 | 3.4 | 3.1 | 2.8 | 2.7 | 2.0 | 1.4 | 0.2 | -0.3 |
| -4 | 4.1 | 4.4 | 4.5 | 4.7 | 5.6 | 5.9 | 6.1 | 6.3 | 6.4 | 6.6 | 6.7 | 6.7 | 6.7 | 6.3 | 5.9 | 5.4 | 4.4 | 3.7 | 2.7 | 2.4 | 2.0 | 1.3 | 1.3 | 1.2 | 0.7 | -0.6 | -1.0 |
| -3 | 4.6 | 4.9 | 5.1 | 5.3 | 6.1 | 5.5 | 6.8 | 7.2 | 7.4 | 7.7 | 7.9 | 7.9 | 7.9 | 7.5 | 6.9 | 6.0 | 4.6 | 3.2 | 1.4 | 0.7 | 0.2 | -0.4 | -0.0 | 0.0 | -0.2 | -1.3 | -1.6 |
| -2 | 4.9 | 5.2 | 5.6 | 5.8 | 6.5 | 7.0 | 7.4 | 7.8 | 8.2 | 8.8 | 9.1 | 9.1 | 9.1 | 8.6 | 7.8 | 6.6 | 4.8 | 2.7 | 0.0 | -1.3 | -2.3 | -2.7 | -2.0 | -1.6 | -1.3 | -2.9 | -2.5 |
| -1 | 5.1 | 5.5 | 5.7 | 6.1 | 6.7 | 7.2 | 7.8 | 8.3 | 8.9 | 9.4 | 9.9 | 10.1 | 9.9 | 9.3 | 8.3 | 7.0 | 4.7 | 2.5 | -0.6 | -2.7 | -4.4 | -5.4 | -5.3 | -4.8 | -3.4 | -5.4 | -4.6 |
| 0 | 5.2 | 5.6 | 5.9 | 6.3 | 6.8 | 7.4 | 8.0 | 8.5 | 9.1 | 9.5 | 9.9 | 10.0 | 9.9 | 9.1 | 7.9 | 6.4 | 4.7 | 2.7 | 0.1 | -2.5 | -4.6 | -5.9 | -6.7 | -6.8 | -6.2 | -6.5 | -6.3 |
| +1 | 5.4 | 5.6 | 5.9 | 6.3 | 6.5 | 6.9 | 7.5 | 8.0 | 8.6 | 8.9 | 9.2 | 9.3 | 8.9 | 8.3 | 7.2 | 6.0 | 4.3 | 2.2 | 0.8 | -0.5 | -1.9 | -3.5 | -5.4 | -6.2 | -6.5 | -4.4 | -5.6 |
| +2 | 4.9 | 5.5 | 5.7 | 6.0 | 5.6 | 6.0 | 6.4 | 6.9 | 7.4 | 7.6 | 7.8 | 8.0 | 7.7 | 7.3 | 6.5 | 5.6 | 4.6 | 3.4 | 2.7 | 1.8 | 0.9 | 0.1 | -1.0 | -2.3 | -3.7 | -0.3 | -2.5 |
| +3 | 3.0 | 4.0 | 4.7 | 5.2 | 4.3 | 4.8 | 5.1 | 5.4 | 5.6 | 6.0 | 6.2 | 6.3 | 6.3 | 6.3 | 5.8 | 5.4 | 4.6 | 4.0 | 3.5 | 2.9 | 2.7 | 2.4 | 1.9 | 1.5 | 1.0 | 2.8 | 2.1 |
| +4 | 1.7 | 1.9 | 2.6 | 3.6 | 2.3 | 3.0 | 3.3 | 3.7 | 4.1 | 4.3 | 4.4 | 4.6 | 4.7 | 4.9 | 4.7 | 4.5 | 4.4 | 4.0 | 3.8 | 3.8 | 3.8 | 3.8 | 3.6 | 3.5 | 3.2 | 3.3 | 3.4 |
| +5 | 1.4 | 1.1 | 1.1 | 1.5 | 1.5 | 1.5 | 2.0 | 2.4 | 2.6 | 2.7 | 3.0 | 3.2 | 3.3 | 3.6 | 3.4 | 3.5 | 3.3 | 3.3 | 3.5 | 3.5 | 3.7 | 3.8 | 3.8 | 3.6 | 3.3 | 2.6 | 2.6 |
| +6 | 3.3 | 2.8 | 2.2 | 1.7 | 2.0 | 1.6 | 1.5 | 1.6 | 1.6 | 1.7 | 1.9 | 2.1 | 2.3 | 2.4 | 2.4 | 2.5 | 2.6 | 2.7 | 2.7 | 2.7 | 2.8 | 2.7 | 2.8 | 2.7 | 2.8 | 1.4 | 1.5 |
| +7 | 3.1 | 3.3 | 3.4 | 2.7 | 2.5 | 2.3 | 2.1 | 1.9 | 1.8 | 1.8 | 1.6 | 1.8 | 1.7 | 2.0 | 1.8 | 1.8 | 2.0 | 1.9 | 2.0 | 2.2 | 2.4 | 2.4 | 2.2 | 1.8 | 1.7 | 0.7 | 0.4 |
| +8 | 1.0 | 1.2 | 1.8 | 2.3 | 1.8 | 2.1 | 2.3 | 2.2 | 2.0 | 1.9 | 1.8 | 1.9 | 1.7 | 1.7 | 1.5 | 1.5 | 1.4 | 1.3 | 1.3 | 1.4 | 1.4 | 1.5 | 1.5 | 1.3 | 0.9 | 0.6 | 0.1 |
| +9 | 1.2 | 1.3 | 1.3 | 1.5 | 1.7 | 1.7 | 1.9 | 2.0 | 2.0 | 2.0 | 1.8 | 1.9 | 1.7 | 1.6 | 1.4 | 1.3 | 1.0 | 1.0 | 0.8 | 0.9 | 1.1 | 1.1 | 1.2 | 1.2 | 1.0 | 1.0 | 0.5 |
| +10 | 2.4 | 2.3 | 2.1 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.6 | 1.8 | 1.7 | 1.5 | 1.3 | 1.2 | 0.8 | 0.6 | 0.6 | 0.6 | 0.8 | 1.0 | 1.2 | 1.2 | 1.1 | 0.8 | 0.6 |
| +11 | 2.3 | 2.4 | 2.4 | 2.1 | 2.0 | 1.9 | 1.9 | 1.8 | 1.7 | 1.7 | 1.7 | 1.8 | 1.6 | 1.5 | 1.4 | 1.1 | 0.7 | 0.5 | 0.5 | 0.5 | 0.6 | 0.6 | 0.7 | 0.9 | 0.8 | 0.6 | 0.5 |
| +12 | 1.2 | 1.2 | 1.4 | 1.9 | 1.6 | 1.7 | 1.8 | 1.8 | 1.7 | 1.6 | 1.6 | 1.5 | 1.3 | 1.3 | 1.3 | 1.0 | 0.8 | 0.7 | 0.6 | 0.4 | 0.4 | 0.4 | 0.4 | 0.6 | 0.7 | 0.5 | 0.5 |

SLOSH ESTIMATED FEET OF STORM SURGE ANTICIPATED AT EACH HOUR

HOURS PLUS OR MINUS OF TIME SHOWN ON TRAVEL

POINT BEFORE GALVESTON SEAWALL
(Beach at Pleasure Pier)
Point 15a

# GALVESTON CAUSEWAY
## Point 19

| Point of Impact | GALVESTON CAUSEWAY | | | | | | | | | | | | | | | | | | | | 20 miles to the left of Galveston (category 5 - 10 miles to left of Galveston) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Direction | 320° | | | | | | | | | | | | | | | | | | | | 360° | | | | | | | | | |
| Category (windspeed) | 1 (74-95) | | | | 2 (96-110) | | | | 3 (111-130) | | | | 4 (131-155) | | | | 5 (over 155) | | | | 1 (74-95) | | 2 (96-110) | | 3 (111-130) | | 4 (131-155) | | 5 (over 155) | |
| Movement Speed | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 |
| -24 | 1.2 | - | - | - | 1.3 | - | - | - | 1.5 | - | - | - | 1.6 | - | - | - | - | - | - | - | 1.0 | - | 1.0 | - | 1.0 | - | 1.1 | - | | |
| -23 | 1.3 | - | - | - | 1.4 | - | - | - | 1.7 | - | - | - | 1.8 | - | - | - | - | - | - | - | 1.1 | - | 1.1 | - | 1.1 | - | 1.2 | - | | |
| -22 | 1.4 | - | - | - | 1.6 | - | - | - | 1.8 | - | - | - | 2.0 | - | - | - | - | - | - | - | 1.1 | - | 1.2 | - | 1.3 | - | 1.4 | - | | |
| -21 | 1.5 | - | - | - | 1.7 | - | - | - | 2.0 | - | - | - | 2.4 | - | - | - | - | - | - | - | 1.2 | - | 1.3 | - | 1.5 | - | 1.7 | - | | |
| -20 | 1.6 | - | - | - | 1.8 | - | - | - | 2.2 | - | - | - | 2.7 | - | - | - | - | - | - | - | 1.4 | - | 1.5 | - | 1.9 | - | 2.1 | - | | |
| -19 | 1.6 | - | - | - | 1.9 | - | - | - | 2.4 | - | - | - | 3.2 | - | - | - | - | - | - | - | 1.6 | - | 1.8 | - | 2.4 | 1.0 | 3.4 | - | | |
| -18 | 1.7 | - | - | - | 2.0 | - | - | - | 2.6 | - | - | - | 3.6 | - | - | - | - | - | - | - | 1.8 | - | 2.1 | - | 3.4 | 1.0 | 3.6 | - | 1.1 | |
| -17 | 1.8 | 1.0 | 1.0 | 1.0 | 2.2 | 1.0 | 1.0 | 1.0 | 2.9 | 1.0 | 1.0 | 1.0 | 4.0 | 1.0 | 1.0 | 1.0 | 1.1 | 1.0 | 1.0 | 1.0 | 2.0 | 1.0 | 2.6 | 1.0 | 3.5 | 1.0 | 3.8 | 1.0 | 1.2 | 1.0 |
| -16 | 1.9 | 1.0 | 1.0 | 1.0 | 2.3 | 1.1 | 1.0 | 1.0 | 3.2 | 1.1 | 1.1 | 1.0 | 3.8 | 1.1 | 1.1 | 1.1 | 1.2 | 1.1 | 1.1 | 1.0 | 2.2 | 1.0 | 2.9 | 1.0 | 3.7 | 1.1 | 4.4 | 1.0 | 1.5 | 1.0 |
| -15 | 2.1 | 1.1 | 1.1 | 1.0 | 2.6 | 1.1 | 1.1 | 1.0 | 3.7 | 1.1 | 1.1 | 1.1 | 4.1 | 1.2 | 1.1 | 1.1 | 1.5 | 1.2 | 1.1 | 1.1 | 2.3 | 1.0 | 3.1 | 1.0 | 3.9 | 1.1 | 4.2 | 1.1 | 2.1 | 1.1 |
| -14 | 2.3 | 1.1 | 1.1 | 1.0 | 2.8 | 1.2 | 1.1 | 1.1 | 3.6 | 1.2 | 1.1 | 1.1 | 4.1 | 1.3 | 1.2 | 1.1 | 1.9 | 1.3 | 1.1 | 1.1 | 2.5 | 1.1 | 3.5 | 1.1 | 4.0 | 1.2 | 4.3 | 1.1 | 3.6 | 1.1 |
| -13 | 2.5 | 1.2 | 1.1 | 1.1 | 3.2 | 1.2 | 1.1 | 1.1 | 3.7 | 1.3 | 1.2 | 1.1 | 4.2 | 1.4 | 1.2 | 1.1 | 2.9 | 1.4 | 1.2 | 1.1 | 2.8 | 1.1 | 3.5 | 1.1 | 4.3 | 1.2 | 4.6 | 1.2 | 3.7 | 1.1 |
| -12 | 2.7 | 1.2 | 1.1 | 1.1 | 3.6 | 1.3 | 1.2 | 1.1 | 3.9 | 1.5 | 1.2 | 1.1 | 4.4 | 1.6 | 1.3 | 1.2 | 3.3 | 1.5 | 1.2 | 1.1 | 3.1 | 1.1 | 3.7 | 1.1 | 4.3 | 1.3 | 4.8 | 1.2 | 4.5 | 1.2 |
| -11 | 3.0 | 1.3 | 1.2 | 1.1 | 3.5 | 1.5 | 1.2 | 1.1 | 4.3 | 1.7 | 1.3 | 1.1 | 4.6 | 1.9 | 1.4 | 1.2 | 3.7 | 1.8 | 1.3 | 1.2 | 3.3 | 1.1 | 3.7 | 1.2 | 4.4 | 1.4 | 4.8 | 1.3 | 4.8 | 1.2 |
| -10 | 3.3 | 1.5 | 1.2 | 1.1 | 3.6 | 1.6 | 1.3 | 1.1 | 4.3 | 1.9 | 1.4 | 1.2 | 4.8 | 2.4 | 1.5 | 1.2 | 4.7 | 2.0 | 1.4 | 1.2 | 3.7 | 1.1 | 4.0 | 1.2 | 4.7 | 1.4 | 5.0 | 1.4 | 4.9 | 1.3 |
| - 9 | 3.7 | 1.6 | 1.2 | 1.1 | 4.0 | 1.2 | 1.3 | 1.2 | 4.6 | 2.3 | 1.5 | 1.2 | 5.0 | 2.8 | 1.6 | 1.3 | 4.9 | 2.4 | 1.5 | 1.2 | 3.5 | 1.2 | 4.2 | 1.2 | 5.0 | 1.6 | 5.4 | 1.4 | 5.0 | 1.3 |
| - 8 | 3.6 | 1.7 | 1.3 | 1.1 | 4.2 | 2.0 | 1.4 | 1.2 | 4.8 | 2.7 | 1.6 | 1.3 | 5.4 | 3.5 | 1.8 | 1.3 | 5.2 | 2.9 | 1.6 | 1.3 | 3.7 | 1.2 | 4.4 | 1.3 | 4.9 | 1.8 | 6.4 | 1.5 | 5.4 | 1.4 |
| - 7 | 3.6 | 2.0 | 1.4 | 1.2 | 4.2 | 2.4 | 1.5 | 1.2 | 5.0 | 3.4 | 1.8 | 1.3 | 6.0 | 3.5 | 2.0 | 1.4 | 5.4 | 3.7 | 1.8 | 1.4 | 3.9 | 1.3 | 4.3 | 1.4 | 5.1 | 2.0 | 8.1 | 1.7 | 6.8 | 1.5 |
| - 6 | 4.0 | 2.4 | 1.5 | 1.2 | 4.3 | 2.9 | 1.7 | 1.3 | 5.4 | 3.4 | 2.0 | 1.5 | 7.1 | 4.2 | 2.5 | 1.6 | 6.0 | 3.6 | 2.1 | 1.5 | 4.2 | 1.4 | 4.6 | 1.5 | 5.5 | 2.7 | 9.2 | 1.9 | 8.3 | 1.6 |
| - 5 | 4.2 | 2.9 | 1.7 | 1.3 | 4.5 | 3.7 | 1.9 | 1.5 | 5.6 | 3.7 | 2.6 | 1.7 | 8.2 | 4.8 | 3.1 | 1.8 | 7.8 | 4.1 | 2.7 | 1.6 | 4.3 | 1.5 | 4.9 | 1.6 | 6.0 | 3.6 | 10.3 | 2.5 | 9.3 | 1.8 |
| - 4 | 4.3 | 3.3 | 2.0 | 1.5 | 4.8 | 3.8 | 2.5 | 1.7 | 5.9 | 4.7 | 3.3 | 2.0 | 9.0 | 5.4 | 3.4 | 2.3 | 9.4 | 4.9 | 3.4 | 2.0 | 4.3 | 1.7 | 5.1 | 1.9 | 6.5 | 3.7 | 11.5 | 3.6 | 10.7 | 2.2 |
| - 3 | 4.3 | 3.7 | 2.7 | 1.8 | 5.0 | 4.3 | 3.4 | 2.0 | 6.8 | 5.3 | 3.7 | 2.7 | 9.7 | 6.1 | 4.1 | 3.6 | 11.0 | 5.5 | 3.7 | 2.8 | 4.3 | 2.0 | 4.8 | 2.5 | 7.3 | 6.0 | 12.4 | 3.8 | 11.6 | 3.2 |
| - 2 | 4.4 | 4.1 | 3.7 | 2.4 | 5.2 | 5.1 | 3.7 | 3.1 | 7.5 | 5.8 | 4.7 | 3.6 | 10.9 | 8.3 | 5.8 | 3.7 | 12.5 | 7.6 | 5.1 | 3.4 | 4.1 | 2.8 | 5.0 | 3.6 | 8.2 | 8.4 | 12.6 | 4.7 | 12.5 | 3.5 |
| - 1 | 4.5 | 4.7 | 3.8 | 3.7 | 5.2 | 5.0 | 4.8 | 3.5 | 8.1 | 7.1 | 5.8 | 4.3 | 11.8 | 10.0 | 7.6 | 5.5 | 13.1 | 9.8 | 7.0 | 5.2 | 4.1 | 3.6 | 5.4 | 3.6 | 8.7 | 7.2 | 12.5 | 7.8 | 13.7 | 4.7 |
| 0 | 4.6 | 4.6 | 4.6 | 3.7 | 5.1 | 5.0 | 5.0 | 4.7 | 8.8 | 8.1 | 7.4 | 6.4 | 12.6 | 12.4 | 10.8 | 9.5 | 13.9 | 11.8 | 11.1 | 9.6 | 4.1 | 3.4 | 5.6 | 4.3 | 8.4 | 6.1 | 11.9 | 14.7 | 12.8 | 6.6 |
| + 1 | 4.5 | 4.5 | 4.5 | 4.3 | 5.2 | 5.8 | 5.0 | 4.7 | 9.2 | 8.9 | 8.7 | 8.4 | 13.3 | 13.6 | 14.5 | 13.4 | 13.8 | 13.1 | 12.8 | 11.1 | 4.2 | 3.9 | 5.4 | 4.5 | 8.0 | 7.2 | 11.0 | 9.6 | 10.7 | 12.3 |
| + 2 | 4.4 | 4.4 | 4.4 | 4.4 | 5.3 | 5.4 | 5.0 | 4.8 | 9.8 | 9.4 | 8.4 | 7.4 | 13.6 | 12.9 | 12.1 | 10.8 | 13.4 | 11.5 | 10.1 | 7.5 | 3.7 | 2.4 | 5.2 | 3.6 | 7.3 | 6.1 | 10.4 | 6.1 | 10.5 | 5.8 |
| + 3 | 4.4 | 4.2 | 3.6 | 3.3 | 5.6 | 5.4 | 4.9 | 4.5 | 10.1 | 8.6 | 7.2 | 6.6 | 13.7 | 11.5 | 10.0 | 9.4 | 12.0 | 8.1 | 6.2 | 6.3 | 3.1 | 1.8 | 5.2 | 2.6 | 6.6 | 5.5 | 9.5 | 6.0 | 7.8 | 5.5 |
| + 4 | 4.3 | 3.6 | 2.8 | 2.6 | 5.8 | 5.0 | 4.2 | 3.7 | 9.8 | 7.5 | 6.5 | 6.2 | 13.0 | 10.5 | 9.4 | 8.9 | 9.7 | 7.4 | 6.6 | 6.2 | 2.8 | 1.8 | 4.3 | 1.9 | 6.1 | 5.1 | 8.5 | 6.8 | 7.2 | 4.2 |
| + 5 | 4.3 | 3.1 | 2.5 | 2.2 | 5.6 | 4.8 | 3.7 | 3.1 | 9.4 | 6.9 | 6.3 | 5.9 | 12.3 | 9.8 | 9.1 | 8.9 | 8.2 | 8.2 | 7.8 | 6.8 | 2.7 | 1.8 | 3.9 | 1.8 | 5.9 | 4.2 | 7.8 | 7.3 | 6.5 | 4.3 |
| + 6 | 3.9 | 2.9 | 2.3 | 1.9 | 5.3 | 4.1 | 3.5 | 2.7 | 8.8 | 6.7 | 6.2 | 5.5 | 11.4 | 9.2 | 8.7 | 8.5 | 7.9 | 8.6 | 8.7 | 7.2 | 2.5 | 1.7 | 3.6 | 1.8 | 5.7 | 3.9 | 7.4 | 7.6 | 6.1 | 5.8 |
| + 7 | 3.7 | 2.7 | 2.3 | 1.9 | 5.1 | 3.8 | 3.1 | 2.6 | 8.2 | 6.8 | 6.3 | 5.3 | 10.5 | 9.0 | 8.6 | 8.2 | 8.1 | 8.9 | 8.3 | 6.9 | 2.0 | 1.7 | 3.0 | 1.8 | 5.4 | 3.6 | 7.0 | 7.0 | 6.1 | 6.3 |
| + 8 | 3.4 | 2.6 | 2.3 | 2.0 | 5.0 | 3.6 | 2.9 | 2.7 | 7.8 | 6.6 | 6.3 | 5.1 | 9.7 | 8.6 | 8.1 | 7.8 | 8.4 | 8.3 | 7.7 | 6.8 | 2.6 | 1.8 | 2.8 | 1.9 | 5.0 | 3.2 | 6.6 | 6.7 | 5.8 | 5.4 |
| + 9 | 3.2 | 2.5 | 2.0 | 2.0 | 4.3 | 3.1 | 2.8 | 2.7 | 7.6 | 6.6 | 6.1 | 4.8 | 9.3 | 8.0 | 7.6 | 7.5 | 8.2 | 7.8 | 7.3 | 6.6 | 1.9 | 1.7 | 2.7 | 1.8 | 4.7 | 3.0 | 6.4 | 6.5 | 5.6 | 4.8 |
| +10 | 3.0 | 2.4 | 1.9 | 1.9 | 4.1 | 2.9 | 2.7 | 2.6 | 7.3 | 6.5 | 5.7 | 4.7 | 8.8 | 7.6 | 7.3 | 7.1 | 7.7 | 7.4 | 7.0 | 6.4 | 1.9 | 1.5 | 2.6 | 1.8 | 4.5 | 2.8 | 6.3 | 6.3 | 5.2 | 4.6 |
| +11 | 2.9 | 2.0 | 1.9 | 1.9 | 3.9 | 2.8 | 2.6 | 2.4 | 7.0 | 6.3 | 5.3 | 4.3 | 8.3 | 7.3 | 7.0 | 6.8 | 7.4 | 7.0 | 6.8 | 6.1 | 1.9 | 1.4 | 2.5 | 1.8 | 4.3 | 2.6 | 6.2 | 5.6 | 5.2 | 4.3 |
| +12 | 2.9 | 1.9 | 1.9 | 1.8 | 3.8 | 2.7 | 2.0 | 1.9 | 6.8 | 6.0 | 4.8 | 4.0 | 7.9 | 7.0 | 6.8 | 6.6 | 7.1 | 6.8 | 6.5 | 5.6 | 1.9 | 1.4 | 2.5 | 1.7 | 4.0 | 2.0 | 6.1 | 4.9 | 5.1 | 3.7 |

SLOSH ESTIMATED FEET OF STORM SURGE ANTICIPATED AT EACH HOUR

HOURS PRIOR OR AFTER TIME OF LANDFALL

Point of Impact: 20 MILES TO THE LEFT OF FREEPORT (CATEGORY 5 - 10 MILES TO LEFT OF FREEPORT — GALVESTON CAUSEWAY

Direction: 320°

| Category (windspeed) | 1 (74-95) | | 2 (96-110) | | 3 (111-130) | | 4 (131-155) | | 5 (over 155) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Movement Speed | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 |
| -24 | 1.5 | 1.1 | 1.7 | 1.1 | 2.0 | 1.2 | 2.4 | 1.2 | 2.0 | 1.1 |
| -23 | 1.5 | 1.1 | 1.7 | 1.1 | 2.1 | 1.2 | 2.5 | 1.2 | 2.2 | 1.1 |
| -22 | 1.6 | 1.1 | 1.8 | 1.1 | 2.2 | 1.2 | 2.6 | 1.2 | 2.3 | 1.2 |
| -21 | 1.6 | 1.1 | 1.8 | 1.1 | 2.3 | 1.2 | 2.8 | 1.2 | 2.4 | 1.2 |
| -20 | 1.7 | 1.1 | 1.9 | 1.1 | 2.4 | 1.2 | 3.1 | 1.3 | 2.6 | 1.1 |
| -19 | 1.7 | 1.1 | 1.9 | 1.1 | 2.6 | 1.2 | 3.5 | 1.3 | 2.7 | 1.2 |
| -18 | 1.8 | 1.1 | 2.0 | 1.2 | 2.7 | 1.2 | 3.8 | 1.3 | 3.0 | 1.3 |
| -17 | 1.8 | 1.1 | 2.1 | 1.2 | 2.9 | 1.2 | 3.6 | 1.3 | 3.4 | 1.3 |
| -16 | 1.9 | 1.1 | 2.2 | 1.2 | 3.2 | 1.2 | 3.7 | 1.3 | 3.8 | 1.2 |
| -15 | 1.9 | 1.1 | 2.4 | 1.2 | 3.4 | 1.2 | 3.8 | 1.3 | 3.6 | 1.2 |
| -14 | 2.0 | 1.1 | 2.5 | 1.2 | 3.7 | 1.2 | 4.0 | 1.3 | 3.7 | 1.2 |
| -13 | 2.2 | 1.1 | 2.7 | 1.2 | 3.7 | 1.3 | 4.3 | 1.3 | 4.0 | 1.3 |
| -12 | 2.3 | 1.1 | 2.9 | 1.2 | 3.7 | 1.3 | 4.1 | 1.3 | 4.2 | 1.3 |
| -11 | 2.4 | 1.2 | 3.1 | 1.2 | 3.9 | 1.3 | 4.3 | 1.4 | 4.2 | 1.3 |
| -10 | 2.6 | 1.2 | 3.4 | 1.2 | 3.9 | 1.3 | 4.3 | 1.4 | 4.1 | 1.3 |
| - 9 | 2.7 | 1.2 | 3.7 | 1.2 | 4.1 | 1.3 | 4.5 | 1.4 | 4.3 | 1.3 |
| - 8 | 2.8 | 1.2 | 3.6 | 1.3 | 4.2 | 1.4 | 4.6 | 1.5 | 4.5 | 1.4 |
| - 7 | 3.0 | 1.2 | 3.6 | 1.3 | 4.3 | 1.5 | 4.7 | 1.6 | 4.6 | 1.5 |
| - 6 | 3.1 | 1.3 | 3.7 | 1.4 | 4.3 | 1.6 | 4.7 | 1.8 | 4.7 | 1.6 |
| - 5 | 3.2 | 1.4 | 3.7 | 1.5 | 4.4 | 1.8 | 4.8 | 2.0 | 4.7 | 1.8 |
| - 4 | 3.4 | 1.5 | 3.9 | 1.7 | 4.4 | 2.1 | 5.2 | 2.5 | 4.7 | 2.1 |
| - 3 | 3.5 | 1.7 | 3.8 | 2.0 | 4.5 | 2.6 | 5.3 | 3.5 | 4.8 | 2.8 |
| - 2 | 3.6 | 2.0 | 4.0 | 2.4 | 4.5 | 3.5 | 5.6 | 3.7 | 5.0 | 4.0 |
| - 1 | 3.6 | 2.4 | 4.0 | 3.3 | 4.5 | 3.6 | 5.8 | 4.2 | 5.3 | 4.0 |
| 0 | 3.5 | 3.3 | 3.9 | 3.5 | 4.5 | 3.8 | 5.9 | 5.1 | 5.5 | 4.8 |
| + 1 | 3.4 | 3.5 | 3.9 | 3.7 | 4.5 | 4.9 | 6.2 | 3.0 | 5.6 | 5.4 |
| + 2 | 3.3 | 3.5 | 3.9 | 3.9 | 4.5 | 5.6 | 6.4 | 10.3 | 5.7 | 9.0 |
| + 3 | 3.2 | 3.1 | 3.7 | 3.6 | 4.5 | 6.9 | 6.6 | 9.0 | 5.7 | 8.4 |
| + 4 | 2.1 | 2.5 | 3.6 | 3.1 | 4.4 | 6.6 | 6.7 | 7.8 | 5.6 | 7.4 |
| + 5 | 2.8 | 1.9 | 3.5 | 2.6 | 4.5 | 6.1 | 6.6 | 7.1 | 5.5 | 6.6 |
| + 6 | 2.8 | 1.8 | 3.3 | 2.0 | 4.5 | 5.8 | 6.4 | 6.2 | 5.7 | 6.0 |
| + 7 | 2.7 | 2.0 | 3.1 | 2.7 | 4.6 | 5.5 | 6.4 | 5.8 | 6.0 | 5.8 |
| + 8 | 2.7 | 2.2 | 3.3 | 3.0 | 4.7 | 5.3 | 6.3 | 5.7 | 6.2 | 5.5 |
| + 9 | 2.7 | 1.8 | 3.3 | 2.7 | 4.8 | 4.7 | 6.3 | 5.4 | 6.2 | 4.9 |
| +10 | 2.6 | 1.8 | 3.3 | 2.0 | 4.7 | 4.3 | 6.1 | 4.8 | 6.1 | 4.5 |
| +11 | 2.6 | 1.9 | 3.2 | 2.5 | 4.6 | 4.1 | 5.9 | 4.5 | 5.9 | 4.2 |
| +12 | 2.6 | 1.8 | 3.3 | 2.0 | 4.6 | 3.9 | 5.8 | 4.3 | 5.9 | 4.0 |

Direction: 360°

| Category (windspeed) | 1 (74-95) | | 2 (96-110) | | 3 (111-130) | | 4 (131-155) | | 5 (over 155) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Movement Speed | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 |
| -24 | 1.6 | - | 1.8 | - | 2.3 | - | 3.0 | - | 2.4 | - |
| -23 | 1.6 | - | 1.8 | - | 2.4 | - | 3.3 | - | 2.5 | - |
| -22 | 1.7 | - | 1.9 | - | 2.5 | 1.0 | 3.6 | - | 2.7 | - |
| -21 | 1.7 | 1.0 | 2.0 | 1.0 | 2.6 | 1.0 | 3.8 | 1.0 | 3.0 | - |
| -20 | 1.7 | 1.0 | 2.0 | 1.0 | 2.8 | 1.0 | 3.6 | 1.0 | 3.4 | - |
| -19 | 1.8 | 1.0 | 2.1 | 1.0 | 3.2 | 1.1 | 3.6 | 1.1 | 3.8 | - |
| -18 | 1.8 | 1.1 | 2.2 | 1.1 | 3.5 | 1.1 | 3.8 | 1.1 | 3.9 | - |
| -17 | 1.9 | 1.1 | 2.3 | 1.1 | 3.8 | 1.1 | 4.2 | 1.2 | 3.6 | 1.0 |
| -16 | 2.0 | 1.1 | 2.4 | 1.1 | 3.9 | 1.2 | 4.1 | 1.2 | 3.7 | 1.0 |
| -15 | 2.1 | 1.1 | 2.5 | 1.1 | 3.6 | 1.2 | 4.3 | 1.2 | 4.1 | 1.0 |
| -14 | 2.1 | 1.1 | 2.6 | 1.1 | 3.8 | 1.2 | 4.5 | 1.3 | 4.1 | 1.1 |
| -13 | 2.2 | 1.1 | 2.7 | 1.2 | 3.9 | 1.2 | 4.7 | 1.3 | 4.4 | 1.1 |
| -12 | 2.3 | 1.1 | 2.9 | 1.2 | 3.7 | 1.2 | 4.1 | 1.3 | 4.6 | 1.2 |
| -11 | 2.4 | 1.1 | 3.1 | 1.2 | 4.0 | 1.3 | 4.2 | 1.4 | 4.7 | 1.2 |
| -10 | 2.5 | 1.2 | 3.4 | 1.2 | 3.7 | 1.3 | 4.5 | 1.4 | 4.2 | 1.3 |
| - 9 | 2.6 | 1.2 | 3.6 | 1.3 | 3.8 | 1.4 | 4.5 | 1.5 | 4.3 | 1.4 |
| - 8 | 2.6 | 1.2 | 3.5 | 1.3 | 3.9 | 1.5 | 4.6 | 1.6 | 4.5 | 1.4 |
| - 7 | 2.8 | 1.3 | 3.6 | 1.4 | 3.9 | 1.6 | 4.9 | 1.7 | 4.5 | 1.6 |
| - 6 | 2.9 | 1.3 | 3.6 | 1.5 | 4.0 | 1.7 | 5.4 | 1.9 | 4.4 | 1.7 |
| - 5 | 3.0 | 1.4 | 3.6 | 1.6 | 4.0 | 1.9 | 5.7 | 2.2 | 4.5 | 1.9 |
| - 4 | 3.0 | 1.5 | 3.6 | 1.7 | 4.1 | 2.3 | 6.1 | 3.1 | 4.4 | 2.5 |
| - 3 | 3.0 | 1.7 | 3.6 | 2.0 | 4.4 | 2.9 | 6.6 | 3.8 | 4.5 | 3.5 |
| - 2 | 2.9 | 1.9 | 3.7 | 2.4 | 4.9 | 3.8 | 7.0 | 3.5 | 5.4 | 3.4 |
| - 1 | 2.8 | 2.3 | 3.7 | 3.3 | 5.3 | 3.6 | 7.4 | 4.1 | 6.7 | 3.5 |
| 0 | 2.8 | 3.2 | 3.6 | 3.4 | 5.5 | 4.7 | 7.5 | 11.3 | 7.9 | 10.8 |
| + 1 | 3.8 | 3.2 | 3.5 | 3.4 | 5.6 | 7.6 | 7.3 | 11.2 | 8.0 | 11.0 |
| + 2 | 2.7 | 2.5 | 3.6 | 3.0 | 5.6 | 7.8 | 7.3 | 8.2 | 7.7 | 7.7 |
| + 3 | 2.7 | 1.9 | 3.6 | 2.6 | 5.7 | 6.9 | 7.2 | 7.1 | 7.4 | 6.9 |
| + 4 | 2.7 | 1.9 | 3.6 | 2.6 | 5.4 | 6.3 | 6.8 | 6.6 | 7.0 | 6.3 |
| + 5 | 2.6 | 2.0 | 3.5 | 2.9 | 5.5 | 5.9 | 6.4 | 6.5 | 6.7 | 5.8 |
| + 6 | 2.6 | 1.8 | 3.2 | 2.7 | 5.2 | 5.7 | 6.0 | 6.1 | 6.2 | 5.6 |
| + 7 | 2.5 | 1.8 | 3.1 | 1.9 | 4.7 | 4.8 | 5.7 | 5.5 | 5.9 | 4.8 |
| + 8 | 2.5 | 1.9 | 3.0 | 2.5 | 4.5 | 4.4 | 5.4 | 5.3 | 5.6 | 4.7 |
| + 9 | 2.4 | 1.8 | 2.9 | 2.0 | 4.2 | 4.2 | 5.3 | 5.0 | 5.5 | 4.5 |
| +10 | 2.0 | 1.7 | 2.9 | 1.9 | 4.0 | 3.9 | 4.8 | 4.7 | 4.9 | 4.1 |
| +11 | 2.0 | 1.7 | 2.8 | 1.8 | 3.9 | 3.6 | 4.5 | 4.2 | 4.6 | 3.8 |
| +12 | 1.9 | 1.7 | 2.7 | 1.9 | 3.7 | 3.2 | 4.2 | 4.0 | 4.3 | 3.7 |

HOURS PLUS OR MINUS TIME OF LANDFALL

SLOSH ESTIMATED FEET OF STORM SURGE ANTICIPATED AT EACH HOUR

GALVESTON CAUSEWAY
Point 19

Movement Speed - 10 MPH

Direction - 320°

Category - 3 (windspeed 111-130)

GALVESTON CAUSEWAY

| Point of Impact (Hours plus or minus time of landfall) | Miles southwest of Galveston | | | | | | | | | | | | | | | | | | Miles northeast of Galveston | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 85 | 80 | 75 | 70 | 65 | 60 | 55 | 50 | 45 | 40 | 35 | 30 | 25 | 20 | 15 | 10 | 5 | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
| -24 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.1 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.1 |
| -23 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.1 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 1.1 |
| -22 | 1.2 | 1.2 | 1.3 | 1.2 | 1.3 | 1.2 | 1.2 | 1.2 | 1.2 | 1.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 1.1 |
| -21 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.2 | 1.2 | 1.1 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.1 | 1.1 |
| -20 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.2 | 1.2 | 1.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.1 | 1.1 |
| -19 | 1.3 | 1.3 | 1.3 | 1.3 | 1.4 | 1.4 | 1.3 | 1.3 | 1.3 | 1.2 | 1.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 1.1 | 1.1 |
| -18 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.3 | 1.3 | 1.2 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | - | 1.1 | 1.1 | 1.1 |
| -17 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.1 | 1.1 | 1.1 |
| -16 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.4 | 1.4 | 1.3 | 1.1 | 1.1 | 1.1 | 1.0 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| -15 | 1.5 | 1.5 | 1.5 | 1.5 | 1.6 | 1.6 | 1.6 | 1.6 | 1.5 | 1.5 | 1.4 | 1.2 | 1.1 | 1.1 | 1.4 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| -14 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.5 | 1.3 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| -13 | 1.7 | 1.7 | 1.7 | 1.6 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.6 | 1.4 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.1 | 1.1 | 1.1 |
| -12 | 1.7 | 1.7 | 1.7 | 1.7 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.7 | 1.5 | 1.5 | 1.4 | 1.4 | 1.4 | 1.4 | 1.3 | 1.3 | 1.3 | 1.3 | 1.2 | 1.2 | 1.2 | 1.2 | 1.1 | 1.1 |
| -11 | 1.8 | 1.8 | 1.8 | 1.8 | 2.0 | 2.0 | 2.0 | 2.0 | 1.9 | 1.9 | 1.9 | 1.7 | 1.7 | 1.6 | 1.6 | 1.6 | 1.5 | 1.5 | 1.4 | 1.4 | 1.3 | 1.3 | 1.2 | 1.2 | 1.2 | 1.1 | 1.1 |
| -10 | 2.0 | 2.0 | 2.0 | 2.0 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.1 | 2.1 | 2.0 | 1.9 | 1.9 | 1.8 | 1.8 | 1.7 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.3 | 1.2 | 1.2 | 1.1 | 1.0 |
| - 9 | 2.1 | 2.1 | 2.2 | 2.2 | 2.4 | 2.4 | 2.5 | 2.5 | 2.6 | 2.4 | 2.4 | 2.3 | 2.3 | 2.2 | 2.1 | 2.1 | 2.0 | 1.9 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.2 | 1.1 | 1.0 |
| - 8 | 2.3 | 2.4 | 2.4 | 2.4 | 2.7 | 2.8 | 2.9 | 2.9 | 3.0 | 2.8 | 2.8 | 2.7 | 2.7 | 2.7 | 2.6 | 2.6 | 2.4 | 2.3 | 2.2 | 2.0 | 1.8 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 0.9 |
| - 7 | 2.6 | 2.6 | 2.7 | 2.7 | 3.2 | 3.2 | 3.3 | 3.3 | 3.5 | 3.3 | 3.4 | 3.3 | 3.3 | 3.3 | 3.3 | 3.2 | 3.1 | 3.1 | 2.9 | 2.6 | 2.3 | 1.9 | 1.6 | 1.4 | 1.2 | 1.1 | 0.9 |
| - 6 | 2.9 | 2.9 | 3.1 | 3.2 | 3.7 | 3.8 | 3.5 | 3.5 | 3.5 | 3.4 | 3.5 | 3.4 | 3.4 | 3.5 | 3.0 | 3.5 | 3.5 | 3.3 | 3.6 | 3.6 | 3.4 | 2.8 | 2.1 | 1.7 | 1.3 | 1.2 | 0.8 |
| - 5 | 3.3 | 3.4 | 3.6 | 3.7 | 3.6 | 3.7 | 3.6 | 3.7 | 3.7 | 3.8 | 3.9 | 3.9 | 4.0 | 4.0 | 3.9 | 3.8 | 3.8 | 3.7 | 3.7 | 3.6 | 3.6 | 3.7 | 3.2 | 2.2 | 1.5 | 1.2 | 0.8 |
| - 4 | 3.8 | 3.5 | 3.6 | 3.6 | 4.0 | 3.9 | 4.2 | 4.3 | 4.4 | 4.5 | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 | 4.5 | 4.3 | 4.3 | 3.8 | 3.7 | 3.6 | 3.6 | 3.4 | 2.4 | 1.7 | 1.1 | 0.7 |
| - 3 | 3.6 | 3.7 | 3.7 | 3.8 | 4.3 | 4.5 | 4.6 | 4.8 | 4.9 | 5.1 | 5.2 | 5.2 | 5.3 | 5.3 | 5.2 | 5.0 | 4.7 | 4.5 | 3.8 | 3.5 | 3.4 | 3.2 | 3.0 | 2.2 | 1.5 | 0.8 | 0.4 |
| - 2 | 3.7 | 4.0 | 3.9 | 4.2 | 4.5 | 4.7 | 5.0 | 5.1 | 5.1 | 5.1 | 5.4 | 5.6 | 5.8 | 5.8 | 5.7 | 5.6 | 5.2 | 4.7 | 3.8 | 3.4 | 3.1 | 2.6 | 2.3 | 1.8 | 1.2 | 0.5 | 0.2 |
| - 1 | 4.1 | 4.1 | 4.2 | 4.3 | 4.6 | 4.9 | 4.8 | 5.0 | 5.3 | 5.7 | 6.0 | 6.4 | 7.0 | 7.2 | 7.4 | 7.0 | 5.8 | 5.1 | 4.0 | 3.3 | 2.4 | 1.6 | 1.4 | 1.1 | 0.8 | -0.0 | -0.2 |
| 0 | 3.9 | 4.1 | 5.9 | 4.4 | 4.6 | 4.8 | 5.0 | 5.5 | 6.0 | 6.3 | 7.2 | 7.5 | 8.1 | 8.4 | 8.4 | 7.9 | 6.7 | 5.2 | 3.9 | 2.9 | 1.3 | 0.9 | 0.7 | 0.4 | 0.0 | -0.5 | -0.7 |
| + 1 | 3.9 | 4.1 | 4.2 | 4.6 | 4.8 | 5.4 | 5.8 | 6.3 | 7.3 | 7.8 | 8.6 | 8.8 | 8.9 | 8.9 | 8.4 | 7.8 | 6.3 | 4.8 | 3.1 | 1.3 | 0.8 | 0.3 | 0.1 | -0.2 | -0.4 | -0.9 | -1.0 |
| + 2 | 4.0 | 4.1 | 4.2 | 4.6 | 5.3 | 6.0 | 6.6 | 7.4 | 8.6 | 9.1 | 9.7 | 9.5 | 9.3 | 9.0 | 8.2 | 7.4 | 6.5 | 5.0 | 1.5 | 0.9 | 0.6 | 0.1 | -0.3 | -0.6 | -0.8 | -1.0 | -1.2 |
| + 3 | 3.9 | 4.1 | 4.2 | 4.7 | 5.6 | 6.4 | 7.1 | 7.7 | 8.4 | 8.8 | 9.1 | 9.0 | 8.6 | 7.9 | 6.8 | 6.1 | 5.6 | 5.0 | 1.7 | 1.1 | 0.6 | 0.1 | -0.2 | -0.5 | -0.8 | -0.7 | -1.0 |
| + 4 | 3.3 | 3.9 | 4.3 | 4.8 | 5.5 | 6.3 | 7.0 | 7.5 | 7.9 | 8.0 | 8.3 | 8.2 | 7.6 | 6.9 | 6.0 | 5.5 | 5.2 | 4.6 | 2.6 | 1.6 | 1.0 | 0.5 | 0.0 | -0.3 | -0.5 | -0.1 | -0.5 |
| + 5 | 3.0 | 3.5 | 3.9 | 4.7 | 5.4 | 6.1 | 6.8 | 7.3 | 7.5 | 7.6 | 7.7 | 7.5 | 7.0 | 6.4 | 5.7 | 5.3 | 4.9 | 4.1 | 3.4 | 2.1 | 1.8 | 1.5 | 1.1 | 0.7 | 0.3 | 1.0 | 0.7 |
| + 6 | 2.8 | 3.1 | 3.7 | 4.3 | 5.6 | 5.9 | 6.4 | 7.0 | 7.3 | 7.3 | 7.3 | 7.1 | 6.8 | 6.5 | 5.9 | 5.0 | 4.0 | 3.7 | 3.5 | 2.7 | 2.3 | 2.0 | 1.8 | 1.6 | 1.2 | 1.4 | 1.1 |
| + 7 | 3.1 | 3.5 | 3.8 | 4.4 | 5.5 | 5.7 | 6.1 | 6.5 | 6.9 | 6.9 | 7.0 | 6.9 | 6.8 | 6.7 | 6.2 | 4.7 | 3.7 | 3.0 | 2.8 | 2.4 | 2.5 | 2.4 | 2.2 | 1.8 | 1.6 | 1.2 | 1.1 |
| + 8 | 3.6 | 3.9 | 4.1 | 4.5 | 5.1 | 5.5 | 5.8 | 6.1 | 6.4 | 6.6 | 6.6 | 6.7 | 6.8 | 6.7 | 6.3 | 4.7 | 3.2 | 2.6 | 2.3 | 2.0 | 2.0 | 1.9 | 1.8 | 1.6 | 1.4 | 0.9 | 0.7 |
| + 9 | 3.1 | 3.6 | 4.0 | 4.5 | 4.9 | 5.5 | 5.6 | 5.8 | 6.0 | 6.2 | 6.2 | 6.5 | 6.6 | 6.5 | 6.2 | 4.7 | 2.9 | 2.0 | 1.9 | 1.8 | 1.7 | 1.7 | 1.6 | 1.3 | 1.1 | 0.9 | 0.6 |
| +10 | 2.7 | 3.1 | 3.8 | 4.3 | 4.6 | 5.0 | 5.5 | 5.5 | 5.6 | 5.8 | 5.9 | 6.3 | 6.5 | 6.4 | 6.0 | 4.4 | 2.6 | 1.9 | 1.8 | 1.5 | 1.4 | 1.4 | 1.3 | 1.3 | 1.0 | 0.9 | 0.6 |
| +11 | 2.9 | 3.3 | 3.8 | 4.1 | 4.4 | 4.7 | 5.0 | 5.4 | 5.3 | 5.5 | 5.6 | 5.9 | 6.2 | 6.2 | 5.7 | 4.0 | 2.0 | 1.8 | 1.7 | 1.4 | 1.3 | 1.3 | 1.2 | 1.1 | 1.0 | 0.8 | 0.6 |
| +12 | 2.9 | 3.5 | 3.8 | 4.0 | 4.2 | 4.5 | 4.7 | 4.9 | 5.2 | 5.2 | 5.3 | 5.6 | 5.9 | 6.0 | 5.3 | 3.7 | 1.9 | 1.8 | 1.6 | 1.2 | 1.2 | 1.1 | 1.1 | 1.0 | 0.9 | 0.7 | 0.5 |

Slosh estimated feet of storm surge anticipated at each hour

GALVESTON CAUSEWAY
Point 19

# POINT BEFORE TEXAS CITY LEVEE
## (Texas City South Levee)
## Point 21

Point of Impact: POINT BEFORE TEXAS CITY LEVEE (TEXAS CITY)

20 miles to the left of Galveston (category 5 - 10 miles to left of Galveston)

SLOSH ESTIMATED FEET OF STORM SURGE ANTICIPATED AT EACH HOUR

| Direction | 320° | | | | | | | | | | | | | | | | | | | | 360° | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Category (Windspeed) | 1 (74-95) | | | | 2 (96-110) | | | | 3 (111-130) | | | | 4 (131-155) | | | | 5 (over 155) | | | | 1 (74-95) | | 2 (96-110) | | 3 (111-130) | | 4 (131-155) | | 5 (over 155) | |
| Movement Speed (HOURS PLUS OR MINUS TIME OF LANDFALL) | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 |
| -24 | 1.2 | - | - | - | 1.2 | - | - | - | 1.3 | - | - | - | 1.4 | - | - | - | - | - | - | - | 1.0 | - | 1.0 | - | 1.0 | - | 1.0 | - | - | - |
| -23 | 1.2 | - | - | - | 1.3 | - | - | - | 1.4 | - | - | - | 1.6 | - | - | - | - | - | - | - | 1.1 | - | 1.1 | - | 1.1 | - | 1.2 | - | - | - |
| -22 | 1.3 | - | - | - | 1.4 | - | - | - | 1.6 | - | - | - | 1.7 | - | - | - | - | - | - | - | 1.2 | - | 1.2 | - | 1.3 | - | 1.4 | - | - | - |
| -21 | 1.4 | - | - | - | 1.5 | - | - | - | 1.8 | - | - | - | 1.9 | - | - | - | - | - | - | - | 1.3 | - | 1.3 | - | 1.5 | - | 1.7 | - | - | - |
| -20 | 1.5 | - | - | - | 1.6 | - | - | - | 1.9 | - | - | - | 2.1 | - | - | - | - | - | - | - | 1.4 | - | 1.5 | - | 1.8 | - | 2.0 | - | - | - |
| -19 | 1.6 | - | - | - | 1.7 | - | - | - | 2.0 | - | - | - | 2.5 | - | - | - | - | - | - | - | 1.6 | - | 1.8 | - | 2.1 | 1.0 | 2.9 | - | - | - |
| -18 | 1.6 | - | - | - | 1.8 | - | - | - | 2.1 | - | - | - | 3.3 | - | - | - | - | - | - | - | 1.8 | - | 2.0 | - | 3.1 | 1.0 | 4.1 | - | 1.0 | - |
| -17 | 1.7 | 1.0 | 1.0 | 1.0 | 1.9 | 1.0 | 1.0 | 1.0 | 2.3 | 1.0 | 1.0 | 1.0 | 3.6 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 2.0 | 1.0 | 2.3 | 1.0 | 4.1 | 1.1 | 4.7 | 1.0 | 1.3 | 1.0 |
| -16 | 1.8 | 1.0 | 1.0 | 1.0 | 2.0 | 1.0 | 1.0 | 1.0 | 2.7 | 1.1 | 1.0 | 1.0 | 4.0 | 1.1 | 1.1 | 1.0 | 1.1 | 1.1 | 1.0 | 1.0 | 2.1 | 1.0 | 2.7 | 1.0 | 4.5 | 1.1 | 4.9 | 1.1 | 1.5 | 1.0 |
| -15 | 1.9 | 1.1 | 1.0 | 1.0 | 2.2 | 1.1 | 1.0 | 1.0 | 3.4 | 1.1 | 1.1 | 1.0 | 4.3 | 1.1 | 1.1 | 1.1 | 1.2 | 1.1 | 1.1 | 1.0 | 2.2 | 1.0 | 3.0 | 1.1 | 4.7 | 1.1 | 5.0 | 1.1 | 1.8 | 1.1 |
| -14 | 2.0 | 1.1 | 1.1 | 1.0 | 2.4 | 1.1 | 1.1 | 1.0 | 4.0 | 1.1 | 1.1 | 1.1 | 4.4 | 1.1 | 1.1 | 1.1 | 1.3 | 1.1 | 1.1 | 1.1 | 2.4 | 1.1 | 3.5 | 1.1 | 4.8 | 1.2 | 5.2 | 1.1 | 2.8 | 1.1 |
| -13 | 2.1 | 1.1 | 1.1 | 1.0 | 2.7 | 1.1 | 1.1 | 1.1 | 4.2 | 1.2 | 1.1 | 1.1 | 4.5 | 1.2 | 1.1 | 1.1 | 1.6 | 1.2 | 1.1 | 1.1 | 2.7 | 1.1 | 4.1 | 1.1 | 5.0 | 1.3 | 5.6 | 1.2 | 4.3 | 1.2 |
| -12 | 2.3 | 1.2 | 1.1 | 1.1 | 3.4 | 1.2 | 1.1 | 1.1 | 4.3 | 1.3 | 1.1 | 1.1 | 4.7 | 1.3 | 1.2 | 1.1 | 2.8 | 1.3 | 1.1 | 1.1 | 2.9 | 1.1 | 4.4 | 1.1 | 5.1 | 1.3 | 5.9 | 1.3 | 5.3 | 1.2 |
| -11 | 2.5 | 1.2 | 1.1 | 1.1 | 3.9 | 1.3 | 1.2 | 1.1 | 4.5 | 1.4 | 1.2 | 1.1 | 5.0 | 1.5 | 1.2 | 1.1 | 4.1 | 1.4 | 1.2 | 1.1 | 3.3 | 1.1 | 4.7 | 1.2 | 5.3 | 1.4 | 6.1 | 1.4 | 5.7 | 1.3 |
| -10 | 2.9 | 1.4 | 1.2 | 1.1 | 4.2 | 1.4 | 1.2 | 1.1 | 4.6 | 1.6 | 1.3 | 1.1 | 5.2 | 1.7 | 1.3 | 1.2 | 4.6 | 1.6 | 1.2 | 1.2 | 4.0 | 1.7 | 4.9 | 1.2 | 5.7 | 1.5 | 6.4 | 1.4 | 5.8 | 1.4 |
| - 9 | 3.5 | 1.5 | 1.2 | 1.1 | 4.4 | 1.6 | 1.2 | 1.1 | 4.8 | 1.8 | 1.3 | 1.2 | 5.6 | 2.1 | 1.4 | 1.2 | 5.0 | 1.8 | 1.3 | 1.2 | 4.4 | 1.2 | 5.0 | 1.3 | 6.1 | 1.6 | 6.8 | 1.5 | 6.1 | 1.4 |
| - 8 | 4.0 | 1.6 | 1.2 | 1.1 | 4.5 | 1.7 | 1.3 | 1.2 | 5.1 | 2.1 | 1.4 | 1.2 | 5.9 | 2.6 | 1.5 | 1.3 | 5.2 | 2.0 | 1.4 | 1.2 | 4.7 | 1.2 | 5.2 | 1.3 | 6.3 | 1.8 | 7.6 | 1.6 | 6.6 | 1.5 |
| - 7 | 4.2 | 1.7 | 1.3 | 1.2 | 4.6 | 1.9 | 1.4 | 1.2 | 5.4 | 2.5 | 1.5 | 1.3 | 6.3 | 3.8 | 1.6 | 1.3 | 5.3 | 2.6 | 1.5 | 1.3 | 5.0 | 1.3 | 5.5 | 1.4 | 6.7 | 2.0 | 8.8 | 1.8 | 8.0 | 1.6 |
| - 6 | 4.5 | 1.9 | 1.4 | 1.2 | 4.7 | 2.2 | 1.5 | 1.3 | 5.8 | 3.7 | 1.7 | 1.4 | 7.4 | 4.4 | 1.8 | 1.4 | 6.0 | 3.7 | 1.6 | 1.3 | 5.2 | 1.4 | 5.9 | 1.5 | 7.1 | 2.3 | 10.2 | 2.0 | 9.1 | 1.7 |
| - 5 | 4.6 | 2.2 | 1.5 | 1.3 | 4.9 | 3.2 | 1.6 | 1.4 | 6.2 | 4.4 | 1.9 | 1.5 | 8.5 | 4.8 | 2.1 | 1.6 | 7.8 | 4.2 | 1.8 | 1.4 | 5.5 | 1.5 | 6.4 | 1.7 | 7.8 | 3.5 | 11.7 | 2.3 | 10.7 | 1.8 |
| - 4 | 4.7 | 3.1 | 1.7 | 1.4 | 5.3 | 4.2 | 1.9 | 1.5 | 6.6 | 4.8 | 2.2 | 1.6 | 9.4 | 5.5 | 3.3 | 1.7 | 9.4 | 4.4 | 2.2 | 1.5 | 5.8 | 1.7 | 6.8 | 1.9 | 8.5 | 5.1 | 13.3 | 3.4 | 12.7 | 2.1 |
| - 3 | 4.9 | 4.2 | 2.0 | 1.6 | 5.7 | 4.8 | 2.4 | 1.7 | 7.5 | 5.6 | 3.9 | 1.9 | 10.5 | 7.1 | 4.4 | 2.4 | 11.2 | 5.4 | 3.7 | 1.7 | 6.1 | 2.0 | 7.0 | 2.3 | 9.5 | 7.7 | 14.5 | 4.7 | 14.5 | 2.7 |
| - 2 | 5.2 | 4.9 | 3.1 | 1.9 | 6.1 | 5.5 | 4.2 | 2.1 | 8.4 | 6.8 | 5.0 | 3.2 | 12.0 | 9.2 | 5.8 | 4.2 | 13.6 | 8.0 | 4.5 | 2.9 | 6.2 | 2.7 | 7.2 | 3.9 | 10.1 | 9.3 | 14.7 | 6.4 | 15.2 | 4.3 |
| - 1 | 5.7 | 5.5 | 4.7 | 3.4 | 6.6 | 6.4 | 5.7 | 4.4 | 9.4 | 8.7 | 6.9 | 5.3 | 13.4 | 11.7 | 9.3 | 6.3 | 15.2 | 10.8 | 8.5 | 4.7 | 5.9 | 4.6 | 7.0 | 5.8 | 10.1 | 7.4 | 14.4 | 9.4 | 15.4 | 6.1 |
| 0 | 6.2 | 6.4 | 6.2 | 5.5 | 6.9 | 7.3 | 7.2 | 6.9 | 10.5 | 10.2 | 10.0 | 9.1 | 14.6 | 14.7 | 13.6 | 11.8 | 16.7 | 14.3 | 13.9 | 12.3 | 5.5 | 5.4 | 6.7 | 6.6 | 9.4 | 6.4 | 13.3 | 14.4 | 14.1 | 10.7 |
| + 1 | 6.5 | 6.9 | 7.0 | 6.8 | 7.1 | 7.4 | 7.5 | 7.7 | 11.2 | 11.0 | 11.0 | 11.0 | 15.5 | 15.6 | 16.3 | 16.0 | 16.7 | 15.3 | 15.9 | 13.7 | 4.9 | 4.8 | 5.9 | 6.0 | 8.6 | 7.4 | 12.2 | 9.6 | 12.0 | 11.1 |
| + 2 | 6.6 | 6.6 | 6.5 | 6.3 | 7.4 | 7.3 | 7.0 | 6.8 | 11.7 | 11.0 | 10.0 | 8.6 | 15.9 | 14.6 | 13.3 | 12.4 | 16.1 | 13.5 | 11.6 | 8.1 | 4.2 | 3.7 | 5.1 | 4.4 | 7.7 | 6.4 | 11.4 | 6.7 | 10.8 | 6.3 |
| + 3 | 6.3 | 5.6 | 5.0 | 4.7 | 7.4 | 6.9 | 6.0 | 5.4 | 11.7 | 9.6 | 8.0 | 7.1 | 15.7 | 12.9 | 10.7 | 9.7 | 14.4 | 10.3 | 7.3 | 6.9 | 3.5 | 2.8 | 4.6 | 3.2 | 6.9 | 5.2 | 10.4 | 6.4 | 9.0 | 5.5 |
| + 4 | 5.8 | 4.8 | 4.1 | 3.6 | 7.2 | 5.8 | 4.8 | 4.3 | 11.2 | 8.4 | 7.0 | 6.5 | 14.6 | 11.6 | 10.1 | 9.5 | 12.4 | 9.7 | 8.2 | 7.3 | 3.0 | 1.9 | 4.0 | 2.6 | 6.5 | 4.4 | 9.3 | 7.6 | 8.0 | 4.6 |
| + 5 | 5.4 | 3.9 | 3.3 | 2.9 | 6.6 | 5.0 | 3.8 | 3.2 | 10.5 | 7.7 | 6.8 | 6.1 | 13.7 | 10.7 | 9.7 | 9.3 | 10.9 | 9.8 | 9.0 | 7.7 | 2.7 | 1.6 | 3.3 | 1.8 | 6.4 | 3.6 | 8.6 | 8.3 | 7.1 | 4.6 |
| + 6 | 4.9 | 3.4 | 2.8 | 2.3 | 6.0 | 4.3 | 3.2 | 2.6 | 9.7 | 7.4 | 6.6 | 5.6 | 12.6 | 9.9 | 9.2 | 8.8 | 10.2 | 10.2 | 9.8 | 7.8 | 2.5 | 1.5 | 2.9 | 1.6 | 6.2 | 2.9 | 8.2 | 8.1 | 6.9 | 7.3 |
| + 7 | 4.3 | 3.0 | 2.5 | 1.9 | 5.5 | 4.6 | 2.8 | 2.2 | 9.1 | 7.5 | 6.8 | 5.2 | 11.4 | 9.7 | 8.9 | 8.5 | 10.1 | 9.7 | 8.8 | 7.3 | 2.4 | 1.5 | 2.5 | 1.6 | 5.6 | 2.3 | 7.6 | 7.2 | 6.7 | 6.7 |
| + 8 | 3.7 | 2.7 | 2.4 | 2.1 | 4.8 | 3.1 | 2.5 | 2.2 | 8.6 | 7.3 | 6.6 | 4.9 | 10.4 | 9.0 | 8.4 | 8.1 | 10.0 | 8.9 | 8.1 | 7.2 | 2.3 | 1.6 | 2.4 | 1.7 | 5.1 | 2.1 | 7.2 | 7.0 | 6.4 | 5.8 |
| + 9 | 3.4 | 2.5 | 2.2 | 2.1 | 4.4 | 2.7 | 2.4 | 2.3 | 8.3 | 7.1 | 6.4 | 4.7 | 10.1 | 8.4 | 7.8 | 7.7 | 9.4 | 8.3 | 7.7 | 7.0 | 2.2 | 1.6 | 2.3 | 1.8 | 4.7 | 2.1 | 7.0 | 6.9 | 6.2 | 5.1 |
| +10 | 3.2 | 2.3 | 2.1 | 2.0 | 3.8 | 2.4 | 2.2 | 2.2 | 7.9 | 6.9 | 5.9 | 4.5 | 9.4 | 7.9 | 7.6 | 7.3 | 8.7 | 7.8 | 7.4 | 6.8 | 2.1 | 1.5 | 2.3 | 1.7 | 4.5 | 2.0 | 6.8 | 6.5 | 5.8 | 4.6 |
| +11 | 3.0 | 2.1 | 2.0 | 1.9 | 3.4 | 2.3 | 2.0 | 2.0 | 7.6 | 6.6 | 5.2 | 3.9 | 8.9 | 7.6 | 7.2 | 7.0 | 8.2 | 7.4 | 7.1 | 6.3 | 2.0 | 1.4 | 2.2 | 1.6 | 4.3 | 2.0 | 6.7 | 5.4 | 5.7 | 4.3 |
| +12 | 2.9 | 2.0 | 1.9 | 1.7 | 3.2 | 3.8 | 2.0 | 2.0 | 7.3 | 6.2 | 4.5 | 3.4 | 8.4 | 7.3 | 7.0 | 6.7 | 7.9 | 7.1 | 6.7 | 5.7 | 1.9 | 1.3 | 2.1 | 1.5 | 3.8 | 2.0 | 6.6 | 4.6 | 5.6 | 3.3 |

Point of Impact: 20 MILES TO THE LEFT OF FREEPORT (CATEGORY 5 - 10 MILES TO LEFT OF FREEPORT)

Direction: 320°

| Category (windspeed) | 1 (74-95) | | 2 (96-110) | | 3 (111-130) | | 4 (131-155) | | 5 (over 155) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Movement Speed | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 |
| -24 | 1.5 | 1.1 | 1.6 | 1.1 | 1.9 | 1.2 | 2.2 | 1.2 | 1.9 | 1.1 |
| -23 | 1.5 | 1.1 | 1.7 | 1.1 | 2.0 | 1.2 | 2.3 | 1.2 | 2.0 | 1.1 |
| -22 | 1.6 | 1.1 | 1.7 | 1.1 | 2.0 | 1.2 | 2.4 | 1.2 | 2.1 | 1.2 |
| -21 | 1.6 | 1.1 | 1.8 | 1.1 | 2.1 | 1.2 | 2.6 | 1.2 | 2.2 | 1.2 |
| -20 | 1.6 | 1.1 | 1.8 | 1.1 | 2.2 | 1.2 | 2.8 | 1.2 | 2.3 | 1.2 |
| -19 | 1.7 | 1.1 | 1.9 | 1.1 | 2.3 | 1.2 | 3.4 | 1.3 | 2.4 | 1.2 |
| -18 | 1.7 | 1.1 | 2.0 | 1.1 | 2.5 | 1.2 | 3.7 | 1.3 | 2.6 | 1.2 |
| -17 | 1.8 | 1.1 | 2.0 | 1.2 | 2.6 | 1.2 | 4.0 | 1.3 | 3.1 | 1.2 |
| -16 | 1.9 | 1.1 | 2.1 | 1.2 | 2.9 | 1.2 | 4.2 | 1.3 | 3.6 | 1.2 |
| -15 | 1.9 | 1.1 | 2.2 | 1.2 | 3.4 | 1.2 | 4.4 | 1.3 | 4.0 | 1.2 |
| -14 | 2.0 | 1.1 | 2.4 | 1.2 | 3.8 | 1.2 | 4.6 | 1.3 | 4.2 | 1.2 |
| -13 | 2.1 | 1.1 | 2.5 | 1.2 | 4.2 | 1.2 | 4.7 | 1.3 | 4.5 | 1.2 |
| -12 | 2.1 | 1.1 | 2.7 | 1.2 | 4.4 | 1.2 | 4.8 | 1.3 | 4.6 | 1.3 |
| -11 | 2.3 | 1.2 | 3.0 | 1.2 | 4.6 | 1.3 | 4.9 | 1.3 | 4.7 | 1.3 |
| -10 | 2.4 | 1.2 | 3.5 | 1.2 | 4.6 | 1.3 | 5.2 | 1.4 | 4.9 | 1.3 |
| - 9 | 2.6 | 1.2 | 3.9 | 1.2 | 4.7 | 1.3 | 5.4 | 1.4 | 5.1 | 1.3 |
| - 8 | 2.7 | 1.2 | 4.2 | 1.3 | 4.9 | 1.4 | 5.6 | 1.5 | 5.4 | 1.4 |
| - 7 | 2.9 | 1.2 | 4.3 | 1.3 | 5.0 | 1.4 | 5.8 | 1.6 | 5.6 | 1.4 |
| - 6 | 3.1 | 1.3 | 4.5 | 1.4 | 5.1 | 1.6 | 6.0 | 1.7 | 5.8 | 1.5 |
| - 5 | 3.3 | 1.4 | 4.6 | 1.5 | 5.3 | 1.7 | 6.2 | 1.9 | 6.0 | 1.7 |
| - 4 | 3.7 | 1.5 | 4.7 | 1.7 | 5.5 | 1.9 | 6.3 | 2.1 | 6.2 | 1.9 |
| - 3 | 3.9 | 1.7 | 4.8 | 1.9 | 5.7 | 2.2 | 6.5 | 3.2 | 6.5 | 2.3 |
| - 2 | 4.1 | 2.0 | 4.9 | 2.2 | 5.9 | 3.9 | 6.7 | 4.4 | 6.7 | 3.8 |
| - 1 | 4.1 | 2.4 | 5.0 | 3.2 | 6.0 | 4.5 | 6.8 | 5.5 | 6.8 | 5.1 |
| 0 | 4.1 | 3.6 | 5.0 | 4.4 | 6.0 | 5.2 | 7.0 | 6.7 | 6.9 | 6.4 |
| + 1 | 4.1 | 4.4 | 5.0 | 5.1 | 6.1 | 6.6 | 7.1 | 7.3 | 6.9 | 6.9 |
| + 2 | 4.0 | 4.6 | 5.0 | 5.1 | 6.0 | 6.6 | 7.3 | 10.0 | 6.9 | 8.8 |
| + 3 | 3.8 | 4.2 | 5.0 | 4.7 | 6.0 | 6.9 | 7.4 | 8.6 | 6.7 | 8.0 |
| + 4 | 3.7 | 3.5 | 4.8 | 3.8 | 5.7 | 6.5 | 7.4 | 7.6 | 6.4 | 7.2 |
| + 5 | 3.6 | 2.6 | 4.6 | 2.9 | 5.5 | 5.6 | 7.1 | 6.8 | 6.0 | 6.1 |
| + 6 | 3.4 | 1.7 | 4.2 | 2.0 | 5.2 | 4.7 | 6.7 | 5.6 | 5.5 | 5.2 |
| + 7 | 3.3 | 1.8 | 3.8 | 2.0 | 4.7 | 4.3 | 6.4 | 5.2 | 5.5 | 4.7 |
| + 8 | 3.2 | 2.2 | 3.7 | 2.5 | 4.6 | 4.3 | 6.2 | 5.1 | 5.6 | 4.4 |
| + 9 | 3.1 | 1.9 | 3.5 | 2.1 | 4.4 | 3.8 | 6.1 | 4.6 | 5.7 | 4.1 |
| +10 | 2.9 | 1.7 | 3.3 | 1.9 | 4.2 | 3.3 | 5.9 | 3.8 | 5.6 | 3.5 |
| +11 | 2.8 | 1.7 | 3.1 | 1.9 | 4.0 | 2.8 | 5.7 | 3.6 | 5.5 | 3.0 |
| +12 | 2.7 | 1.8 | 3.1 | 2.0 | 3.8 | 2.5 | 5.4 | 3.2 | 5.3 | 2.6 |

Point of Impact: POINT BEFORE TEXAS CITY LEVEE (TEXAS CITY)

Direction: 360°

| Category (windspeed) | 1 (74-95) | | 2 (96-110) | | 3 (111-130) | | 4 (131-155) | | 5 (over 155) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Movement Speed | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 |
| -24 | 1.7 | - | 1.9 | - | 2.3 | - | 3.1 | - | 2.5 | - |
| -23 | 1.7 | - | 1.9 | - | 2.4 | - | 3.0 | - | 2.6 | - |
| -22 | 1.8 | - | 2.0 | - | 2.5 | 1.0 | 3.8 | - | 2.7 | - |
| -21 | 1.8 | 1.0 | 2.0 | 1.0 | 2.6 | 1.0 | 4.1 | 1.0 | 3.0 | - |
| -20 | 1.9 | 1.0 | 2.1 | 1.0 | 2.9 | 1.0 | 4.3 | 1.0 | 3.5 | - |
| -19 | 1.9 | 1.0 | 2.2 | 1.0 | 3.3 | 1.1 | 4.4 | 1.1 | 3.9 | - |
| -18 | 2.0 | 1.1 | 2.3 | 1.1 | 3.7 | 1.1 | 4.6 | 1.1 | 4.2 | - |
| -17 | 2.0 | 1.1 | 2.4 | 1.1 | 4.1 | 1.1 | 4.9 | 1.2 | 4.4 | 1.0 |
| -16 | 2.1 | 1.1 | 2.5 | 1.1 | 4.3 | 1.2 | 5.0 | 1.2 | 4.7 | 1.0 |
| -15 | 2.2 | 1.1 | 2.7 | 1.1 | 4.4 | 1.2 | 5.1 | 1.3 | 4.9 | 1.1 |
| -14 | 2.3 | 1.1 | 2.8 | 1.2 | 4.6 | 1.2 | 5.2 | 1.3 | 5.0 | 1.1 |
| -13 | 2.4 | 1.1 | 3.0 | 1.2 | 4.8 | 1.3 | 5.4 | 1.4 | 5.2 | 1.2 |
| -12 | 2.5 | 1.2 | 3.1 | 1.2 | 5.0 | 1.3 | 5.6 | 1.4 | 5.4 | 1.2 |
| -11 | 2.6 | 1.2 | 3.4 | 1.2 | 5.1 | 1.3 | 5.7 | 1.5 | 5.6 | 1.3 |
| -10 | 2.7 | 1.2 | 3.9 | 1.3 | 5.2 | 1.4 | 6.0 | 1.5 | 5.8 | 1.4 |
| - 9 | 2.9 | 1.2 | 4.2 | 1.3 | 5.4 | 1.5 | 6.2 | 1.6 | 6.1 | 1.5 |
| - 8 | 3.0 | 1.3 | 4.4 | 1.4 | 5.6 | 1.6 | 6.5 | 1.7 | 6.3 | 1.6 |
| - 7 | 3.2 | 1.3 | 4.7 | 1.5 | 5.8 | 1.7 | 6.9 | 1.9 | 6.5 | 1.7 |
| - 6 | 3.4 | 1.4 | 4.9 | 1.6 | 5.9 | 1.8 | 7.1 | 2.0 | 6.7 | 1.9 |
| - 5 | 3.5 | 1.5 | 5.1 | 1.7 | 6.0 | 2.0 | 7.1 | 2.3 | 6.7 | 2.1 |
| - 4 | 3.6 | 1.7 | 5.1 | 1.9 | 6.0 | 2.3 | 7.3 | 3.1 | 6.5 | 2.5 |
| - 3 | 3.7 | 1.9 | 5.1 | 2.1 | 5.9 | 3.0 | 7.5 | 4.3 | 6.4 | 3.8 |
| - 2 | 3.7 | 2.2 | 5.0 | 2.8 | 5.8 | 4.3 | 7.6 | 5.3 | 6.4 | 5.0 |
| - 1 | 3.6 | 3.0 | 4.8 | 4.2 | 5.7 | 5.5 | 7.7 | 6.8 | 6.9 | 6.7 |
| 0 | 3.4 | 4.2 | 4.3 | 5.0 | 5.4 | 6.9 | 7.7 | 10.9 | 8.0 | 9.2 |
| + 1 | 3.3 | 4.5 | 3.8 | 5.0 | 5.3 | 8.1 | 7.6 | 10.8 | 8.2 | 10.3 |
| + 2 | 3.1 | 3.6 | 3.5 | 4.0 | 5.2 | 7.6 | 7.5 | 7.4 | 7.8 | 7.0 |
| + 3 | 3.0 | 2.7 | 3.4 | 3.0 | 5.2 | 6.5 | 7.3 | 6.7 | 7.5 | 6.3 |
| + 4 | 2.8 | 2.0 | 3.2 | 2.3 | 4.8 | 5.8 | 6.9 | 6.2 | 7.1 | 5.6 |
| + 5 | 2.6 | 2.2 | 3.0 | 2.5 | 4.6 | 5.2 | 6.4 | 6.3 | 6.7 | 5.1 |
| + 6 | 2.5 | 1.8 | 2.8 | 2.1 | 4.3 | 4.5 | 5.8 | 5.8 | 6.1 | 4.5 |
| + 7 | 2.4 | 1.6 | 2.7 | 1.8 | 4.0 | 3.9 | 5.3 | 4.8 | 5.5 | 3.8 |
| + 8 | 2.3 | 1.6 | 2.6 | 1.8 | 3.6 | 3.4 | 4.8 | 4.4 | 5.0 | 3.6 |
| + 9 | 2.2 | 1.8 | 2.5 | 2.0 | 3.3 | 3.0 | 4.5 | 4.3 | 4.6 | 3.5 |
| +10 | 2.1 | 1.6 | 2.4 | 1.8 | 2.9 | 2.6 | 4.2 | 3.8 | 4.3 | 2.9 |
| +11 | 2.0 | 1.5 | 2.3 | 1.6 | 2.6 | 2.1 | 3.7 | 3.3 | 3.7 | 2.4 |
| +12 | 2.0 | 1.5 | 2.3 | 1.6 | 2.5 | 2.1 | 3.3 | 2.8 | 3.4 | 2.3 |

HOURS PLUS OR MINUS TIME OF LANDFALL

SLOSH ESTIMATED FEET OF STORM SURGE ANTICIPATED AT EACH HOUR

POINT BEFORE TEXAS CITY LEVEE
(Texas City South Levee)
Point 21

Movement Speed - 10 MPH

Direction - 320°

Category - 3 (windspeed 111-130)

POINT BEFORE TEXAS CITY LEVEE (TEXAS CITY)

| Point of Impact | Miles southwest of Galveston | | | | | | | | | | | | | | | | | | Miles northeast of Galveston | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 85 | 80 | 75 | 70 | 65 | 60 | 55 | 50 | 45 | 40 | 35 | 30 | 25 | 20 | 15 | 10 | 5 | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
| -24 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.1 | 1.1 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 |
| -23 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.1 | 1.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 1.0 |
| -22 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.1 | 1.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 1.0 |
| -21 | 1.3 | 1.2 | 1.3 | 1.2 | 1.3 | 1.2 | 1.2 | 1.2 | 1.1 | 1.1 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 1.0 |
| -20 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.2 | 1.2 | 1.1 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 1.0 |
| -19 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.2 | 1.8 | 1.1 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 1.0 | 1.0 |
| -18 | 1.4 | 1.4 | 1.4 | 1.3 | 1.4 | 1.4 | 1.3 | 1.3 | 1.3 | 1.2 | 1.1 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 1.0 | 1.0 |
| -17 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.3 | 1.3 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| -16 | 1.4 | 1.4 | 1.4 | 1.4 | 1.5 | 1.4 | 1.4 | 1.4 | 1.4 | 1.3 | 1.2 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | .0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| -15 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.4 | 1.4 | 1.3 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| -14 | 1.6 | 1.5 | 1.5 | 1.5 | 1.6 | 1.6 | 1.6 | 1.5 | 1.5 | 1.5 | 1.4 | 1.2 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 |
| -13 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.5 | 1.5 | 1.2 | 1.2 | 1.2 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 |
| -12 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.6 | 1.6 | 1.4 | 1.3 | 1.2 | 1.2 | 1.2 | 1.2 | 1.1 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 |
| -11 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.7 | 1.7 | 1.5 | 1.4 | 1.3 | 1.4 | 1.3 | 1.2 | 1.2 | 1.2 | 1.1 | 1.1 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.8 |
| -10 | 1.9 | 1.9 | 1.9 | 1.9 | 2.0 | 1.9 | 1.9 | 1.9 | 1.9 | 1.8 | 1.8 | 1.7 | 1.6 | 1.6 | 1.5 | 1.5 | 1.4 | 1.3 | 1.3 | 1.2 | 1.1 | 1.0 | 1.0 | 0.9 | 0.9 | 0.8 | 0.7 |
| - 9 | 2.0 | 2.0 | 2.0 | 2.0 | 2.1 | 2.1 | 2.1 | 2.1 | 2.0 | 2.0 | 2.0 | 1.8 | 1.8 | 1.7 | 1.7 | 1.6 | 1.5 | 1.5 | 1.4 | 1.3 | 1.1 | 1.0 | 1.0 | 0.9 | 0.8 | 0.7 | 0.7 |
| - 8 | 2.1 | 2.1 | 2.1 | 2.1 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.2 | 2.1 | 2.1 | 2.1 | 2.0 | 1.9 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.9 | 0.8 | 0.6 | 0.5 |
| - 7 | 2.3 | 2.3 | 2.4 | 2.4 | 2.7 | 2.7 | 2.8 | 2.8 | 2.7 | 2.7 | 2.7 | 2.5 | 2.4 | 2.4 | 2.2 | 2.2 | 2.1 | 2.1 | 1.8 | 1.6 | 1.4 | 1.1 | 1.0 | 0.8 | 0.7 | 0.5 | 0.4 |
| - 6 | 2.6 | 2.7 | 2.7 | 2.8 | 3.7 | 3.7 | 3.8 | 3.9 | 3.8 | 3.8 | 3.8 | 3.7 | 3.7 | 3.6 | 3.5 | 3.4 | 3.2 | 3.1 | 3.0 | 2.7 | 2.2 | 1.2 | 1.2 | 0.9 | 0.7 | 0.4 | 0.2 |
| - 5 | 3.1 | 3.4 | 3.5 | 3.6 | 4.4 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.4 | 4.3 | 4.3 | 4.2 | 4.1 | 4.0 | 3.9 | 3.7 | 3.5 | 3.1 | 1.5 | 1.8 | 1.1 | 0.6 | 0.3 | 0.1 |
| - 4 | 3.9 | 4.1 | 4.2 | 4.3 | 4.8 | 4.9 | 5.0 | 5.0 | 4.9 | 5.0 | 5.0 | 4.9 | 4.8 | 4.6 | 4.5 | 4.3 | 4.1 | 3.9 | 3.4 | 3.1 | 2.7 | 2.6 | 2.3 | 1.3 | 0.7 | 0.2 | -0.1 |
| - 3 | 4.4 | 4.6 | 4.7 | 4.8 | 5.1 | 5.3 | 5.5 | 5.6 | 5.6 | 5.7 | 5.7 | 5.7 | 5.6 | 5.3 | 5.1 | 4.6 | 4.1 | 3.6 | 2.4 | 2.4 | 2.2 | 2.5 | 1.7 | 1.1 | 0.6 | -0.1 | -0.3 |
| - 2 | 4.8 | 4.9 | 5.0 | 5.1 | 5.6 | 5.8 | 6.0 | 6.2 | 6.3 | 6.4 | 6.6 | 6.7 | 6.8 | 6.6 | 6.4 | 5.7 | 4.5 | 3.4 | 2.0 | 1.9 | 1.6 | 1.9 | 1.1 | 0.6 | 0.2 | -0.3 | -0.5 |
| - 1 | 4.9 | 5.0 | 5.2 | 5.3 | 6.0 | 6.3 | 6.5 | 6.7 | 7.0 | 7.2 | 7.6 | 7.9 | 8.7 | 8.7 | 8.5 | 7.9 | 6.3 | 4.5 | 2.4 | 1.7 | 0.9 | 0.5 | 0.4 | 0.1 | -0.2 | -0.6 | -0.7 |
| 0 | 5.0 | 5.2 | 5.4 | 5.7 | 6.3 | 6.6 | 6.8 | 7.0 | 7.4 | 7.7 | 8.9 | 9.5 | 10.2 | 10.2 | 9.8 | 8.7 | 6.7 | 4.8 | 1.9 | 1.1 | 0.3 | -0.1 | -0.2 | -0.4 | -0.6 | -1.1 | -1.0 |
| + 1 | 5.1 | 5.3 | 5.5 | 6.0 | 6.4 | 6.7 | 7.0 | 7.4 | 8.1 | 8.7 | 10.0 | 10.6 | 11.0 | 10.8 | 9.8 | 8.2 | 6.3 | 4.3 | 2.1 | 0.0 | -0.1 | -0.9 | -0.9 | -0.9 | -1.0 | -1.4 | -1.3 |
| + 2 | 5.1 | 5.4 | 5.6 | 6.2 | 6.4 | 6.7 | 7.2 | 8.0 | 9.0 | 9.6 | 10.6 | 10.9 | 10.9 | 10.5 | 9.5 | 8.1 | 6.4 | 4.3 | 1.1 | -1.3 | -1.4 | -1.6 | -1.5 | -1.5 | -1.4 | -1.6 | -1.5 |
| + 3 | 5.0 | 5.3 | 5.5 | 6.0 | 6.1 | 6.9 | 7.6 | 8.1 | 8.6 | 9.1 | 9.6 | 9.7 | 9.6 | 9.2 | 8.1 | 7.1 | 6.2 | 4.6 | 2.5 | -1.9 | -2.0 | -2.9 | -1.9 | -1.8 | -1.7 | -1.8 | -1.7 |
| + 4 | 4.2 | 4.8 | 5.2 | 5.5 | 5.5 | 6.4 | 7.2 | 7.8 | 8.1 | 8.2 | 8.5 | 8.6 | 8.4 | 8.1 | 7.1 | 6.7 | 6.0 | 4.8 | 3.3 | -0.1 | -1.8 | -2.0 | -2.0 | -1.9 | -1.8 | -1.3 | -1.8 |
| + 5 | 3.5 | 3.8 | 4.4 | 4.8 | 4.9 | 6.0 | 6.8 | 7.5 | 7.6 | 7.7 | 7.8 | 7.8 | 7.7 | 7.4 | 6.7 | 6.3 | 5.4 | 4.8 | 4.0 | 3.2 | 1.6 | -0.6 | -1.6 | -1.8 | -1.8 | 0.8 | -1.6 |
| + 6 | 3.0 | 3.2 | 3.6 | 4.2 | 4.6 | 5.5 | 6.3 | 7.0 | 7.4 | 7.4 | 7.4 | 7.4 | 7.5 | 7.4 | 6.9 | 5.7 | 4.8 | 4.4 | 4.2 | 3.7 | 3.1 | 2.9 | 2.2 | 0.3 | -1.1 | 1.6 | -0.0 |
| + 7 | 3.1 | 3.2 | 3.2 | 3.5 | 4.4 | 4.9 | 5.7 | 6.4 | 6.8 | 6.9 | 7.1 | 7.2 | 7.5 | 7.5 | 7.2 | 5.3 | 3.9 | 3.8 | 3.7 | 3.6 | 3.4 | 3.2 | 2.9 | 2.6 | 1.8 | 1.2 | 1.0 |
| + 8 | 3.8 | 3.9 | 3.7 | 3.4 | 4.3 | 4.7 | 5.2 | 5.8 | 6.3 | 6.6 | 6.6 | 7.0 | 7.3 | 7.3 | 7.1 | 5.4 | 3.3 | 3.2 | 3.1 | 3.1 | 3.0 | 2.9 | 2.7 | 2.6 | 2.1 | 1.0 | 1.0 |
| + 9 | 3.0 | 3.1 | 3.2 | 3.4 | 3.9 | 4.4 | 4.8 | 5.3 | 5.6 | 6.1 | 6.2 | 6.8 | 7.1 | 7.1 | 6.8 | 5.2 | 2.9 | 2.7 | 2.7 | 2.6 | 2.6 | 2.6 | 2.4 | 1.9 | 1.5 | 1.0 | 0.8 |
| +10 | 2.5 | 2.6 | 2.7 | 3.0 | 3.6 | 4.2 | 4.5 | 4.8 | 5.0 | 5.5 | 5.8 | 6.4 | 6.8 | 6.9 | 6.6 | 4.6 | 2.4 | 2.3 | 2.2 | 2.1 | 2.1 | 2.0 | 1.9 | 1.5 | 1.2 | 1.0 | 0.7 |
| +11 | 2.5 | 2.6 | 2.6 | 2.8 | 3.3 | 3.7 | 4.2 | 4.4 | 4.5 | 4.9 | 5.3 | 5.8 | 6.4 | 6.6 | 6.2 | 4.0 | 2.1 | 1.9 | 1.8 | 1.6 | 1.6 | 1.6 | 1.5 | 1.4 | 1.2 | 0.9 | 0.7 |
| +12 | 2.5 | 2.7 | 2.7 | 2.7 | 3.0 | 3.4 | 3.7 | 4.0 | 4.2 | 4.4 | 4.8 | 5.3 | 6.0 | 6.3 | 5.7 | 3.4 | 2.0 | 1.8 | 1.6 | 1.4 | 1.4 | 1.3 | 1.3 | 1.2 | 1.1 | 0.9 | 0.7 |

HOURS PLUS OR MINUS TIME OF LANDFALL

SLOSH ESTIMATED FEET OF STORM SURGE ANTICIPATED EACH HOUR

POINT BEFORE TEXAS CITY LEVEE
(Texas City South Levee)
Point 21

Point of Impact: 20 MILES TO THE LEFT OF FREEPORT (CATEGORY 5 - 10 MILES TO LEFT OF FREEPORT) BAYTOWN TUNNEL

Direction: 320°

| Category (windspeed) | 1 (74-95) | | 2 (96-110) | | 3 (111-130) | | 4 (131-155) | | 5 (over 155) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Movement Speed (HOURS PLUS OR MINUS TIME OF LANDFALL) | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 |
| -24 | 1.1 | 1.0 | 1.1 | 1.0 | 4.0 | 1.0 | 1.2 | 1.0 | 1.1 | 1.0 |
| -23 | 1.1 | 1.0 | 1.1 | 1.0 | 4.0 | 1.0 | 1.2 | 1.0 | 1.1 | 1.0 |
| -22 | 1.1 | 1.0 | 1.2 | 1.0 | 4.0 | 1.0 | 1.3 | 1.0 | 1.1 | 1.0 |
| -21 | 1.2 | 1.0 | 1.2 | 1.0 | 4.0 | 1.0 | 1.3 | 1.0 | 1.2 | 1.0 |
| -20 | 1.2 | 1.0 | 1.2 | 1.0 | 4.0 | 1.0 | 1.4 | 1.0 | 1.2 | 1.0 |
| -19 | 1.2 | 1.0 | 1.2 | 1.0 | 4.0 | 1.0 | 1.4 | 1.0 | 1.2 | 1.0 |
| -18 | 1.2 | 1.0 | 1.2 | 1.0 | 4.0 | 1.0 | 1.5 | 1.0 | 1.2 | 1.0 |
| -17 | 1.2 | 1.0 | 1.3 | 1.0 | 4.0 | 1.0 | 1.6 | 1.0 | 1.3 | 1.0 |
| -16 | 1.2 | 1.0 | 1.3 | 1.0 | 4.0 | 1.0 | 1.6 | 1.0 | 1.3 | 1.0 |
| -15 | 1.3 | 1.0 | 1.3 | 1.0 | 4.0 | 1.0 | 1.7 | 1.0 | 1.4 | 1.0 |
| -14 | 1.3 | 1.0 | 1.4 | 1.0 | 4.0 | 1.0 | 1.8 | 1.0 | 1.4 | 1.0 |
| -13 | 1.3 | 1.0 | 1.4 | 1.0 | 4.0 | 1.0 | 1.9 | 1.0 | 1.5 | 1.0 |
| -12 | 1.4 | 1.0 | 1.5 | 1.0 | 4.0 | 1.0 | 2.0 | 1.0 | 1.6 | 1.0 |
| -11 | 1.4 | 1.0 | 1.5 | 1.0 | 4.0 | 1.0 | 2.2 | 1.0 | 1.7 | 1.0 |
| -10 | 1.4 | 1.0 | 1.6 | 1.0 | 4.2 | 1.0 | 2.3 | 1.0 | 1.8 | 1.0 |
| - 9 | 1.5 | 1.0 | 1.6 | 1.0 | 4.4 | 1.0 | 2.5 | 1.0 | 1.9 | 1.0 |
| - 8 | 1.6 | 1.0 | 1.7 | 1.0 | 5.2 | 1.0 | 2.7 | 1.0 | 2.0 | 1.0 |
| - 7 | 1.6 | 1.0 | 1.8 | 1.0 | 5.2 | 1.0 | 2.9 | 1.0 | 2.2 | 1.0 |
| - 6 | 1.7 | 1.1 | 1.9 | 1.1 | 5.3 | 1.0 | 3.2 | 1.0 | 2.3 | 1.0 |
| - 5 | 1.8 | 1.1 | 2.1 | 1.1 | 5.3 | 1.0 | 3.6 | 1.1 | 2.6 | 1.0 |
| - 4 | 1.9 | 1.1 | 2.2 | 1.1 | 5.4 | 1.1 | 4.2 | 1.1 | 2.8 | 1.1 |
| - 3 | 2.0 | 1.1 | 2.4 | 1.2 | 5.4 | 1.2 | 4.9 | 1.2 | 3.2 | 1.1 |
| - 2 | 2.1 | 1.2 | 2.5 | 1.2 | 5.5 | 1.3 | 5.5 | 1.3 | 3.6 | 1.2 |
| - 1 | 2.2 | 1.3 | 2.7 | 1.4 | 5.5 | 1.5 | 6.1 | 1.6 | 4.4 | 1.4 |
| 0 | 2.4 | 1.5 | 2.9 | 1.6 | 5.5 | 1.8 | 5.5 | 2.0 | 5.0 | 1.8 |
| + 1 | 2.5 | 1.7 | 3.0 | 1.9 | 5.4 | 2.3 | 6.1 | 2.7 | 5.6 | 2.4 |
| + 2 | 2.6 | 2.1 | 3.2 | 2.4 | 5.3 | 3.1 | 6.4 | 4.0 | 6.1 | 3.4 |
| + 3 | 2.8 | 2.3 | 3.4 | 2.7 | 5.1 | 3.6 | 6.8 | 5.7 | 6.3 | 4.3 |
| + 4 | 2.9 | 2.5 | 3.6 | 2.8 | 4.9 | 3.7 | 7.1 | 6.5 | 6.3 | 4.6 |
| + 5 | 3.0 | 2.5 | 3.7 | 2.8 | 4.9 | 3.7 | 7.4 | 6.7 | 6.4 | 4.5 |
| + 6 | 3.1 | 2.4 | 3.9 | 2.7 | 4.9 | 3.5 | 7.4 | 5.9 | 6.5 | 4.3 |
| + 7 | 3.2 | 2.4 | 4.0 | 2.6 | 4.9 | 3.4 | 7.3 | 5.6 | 6.5 | 4.2 |
| + 8 | 3.2 | 2.3 | 4.0 | 2.5 | 4.9 | 3.3 | 7.1 | 5.4 | 6.3 | 3.9 |
| + 9 | 3.3 | 2.2 | 4.0 | 2.4 | 4.9 | 3.2 | 6.8 | 5.3 | 6.1 | 3.8 |
| +10 | 3.2 | 2.2 | 4.0 | 2.3 | 4.9 | 3.1 | 6.7 | 5.3 | 6.1 | 3.8 |
| +11 | 3.3 | 2.1 | 4.0 | 2.3 | 4.9 | 3.1 | 6.6 | 5.2 | 6.0 | 3.7 |
| +12 | 3.2 | 2.1 | 3.9 | 2.3 | 4.9 | 3.0 | 6.5 | 5.1 | 6.0 | 3.7 |

Direction: 360°

| Category (windspeed) | 1 (74-95) | | 2 (96-110) | | 3 (111-130) | | 4 (131-155) | | 5 (over 155) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Movement Speed (HOURS PLUS OR MINUS TIME OF LANDFALL) | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 |
| -24 | 1.4 | - | 1.5 | - | 1.8 | - | 2.0 | - | 1.8 | - |
| -23 | 1.4 | - | 1.6 | - | 1.8 | - | 2.1 | - | 1.9 | - |
| -22 | 1.5 | - | 1.6 | - | 1.9 | 1.0 | 2.2 | - | 1.9 | - |
| -21 | 1.5 | 1.0 | 1.6 | 1.0 | 1.9 | 1.0 | 2.2 | 1.0 | 2.0 | - |
| -20 | 1.5 | 1.0 | 1.7 | 1.0 | 2.0 | 1.0 | 2.3 | 1.0 | 2.1 | - |
| -19 | 1.6 | 1.0 | 1.7 | 1.0 | 2.1 | 1.0 | 2.4 | 1.0 | 2.1 | - |
| -18 | 1.6 | 1.0 | 1.8 | 1.0 | 2.1 | 1.0 | 2.5 | 1.0 | 2.2 | - |
| -17 | 1.6 | 1.0 | 1.8 | 1.0 | 2.2 | 1.0 | 2.7 | 1.0 | 2.3 | 1.0 |
| -16 | 1.7 | 1.0 | 1.9 | 1.0 | 2.3 | 1.0 | 2.8 | 1.1 | 2.5 | 1.0 |
| -15 | 1.7 | 1.0 | 2.0 | 1.0 | 2.4 | 1.1 | 3.0 | 1.1 | 2.6 | 1.0 |
| -14 | 1.8 | 1.0 | 2.1 | 1.0 | 2.5 | 1.1 | 3.1 | 1.1 | 2.7 | 1.0 |
| -13 | 1.9 | 1.0 | 2.2 | 1.1 | 2.7 | 1.1 | 3.3 | 1.1 | 2.9 | 1.0 |
| -12 | 1.9 | 1.1 | 2.3 | 1.1 | 2.9 | 1.1 | 3.5 | 1.1 | 3.1 | 1.1 |
| -11 | 2.0 | 1.1 | 2.4 | 1.1 | 3.1 | 1.1 | 3.7 | 1.1 | 3.3 | 1.1 |
| -10 | 2.1 | 1.1 | 2.5 | 1.1 | 3.3 | 1.1 | 3.9 | 1.2 | 3.5 | 1.1 |
| - 9 | 2.2 | 1.1 | 2.6 | 1.1 | 3.5 | 1.2 | 4.2 | 1.2 | 3.8 | 1.1 |
| - 8 | 2.3 | 1.1 | 2.8 | 1.1 | 3.7 | 1.2 | 4.7 | 1.2 | 4.0 | 1.2 |
| - 7 | 2.5 | 1.1 | 2.9 | 1.2 | 4.0 | 1.2 | 5.1 | 1.3 | 4.4 | 1.2 |
| - 6 | 2.6 | 1.2 | 3.1 | 1.2 | 4.3 | 1.3 | 5.5 | 1.4 | 4.8 | 1.3 |
| - 5 | 2.8 | 1.2 | 3.3 | 1.3 | 4.7 | 1.4 | 6.0 | 1.5 | 5.2 | 1.4 |
| - 4 | 2.9 | 1.3 | 3.6 | 1.3 | 5.1 | 1.5 | 6.5 | 1.6 | 5.4 | 1.5 |
| - 3 | 3.1 | 1.3 | 3.8 | 1.4 | 5.4 | 1.6 | 6.9 | 1.8 | 5.7 | 1.7 |
| - 2 | 3.3 | 1.5 | 4.0 | 1.6 | 5.5 | 1.9 | 7.3 | 2.1 | 6.1 | 2.0 |
| - 1 | 3.5 | 1.7 | 4.2 | 1.9 | 5.6 | 2.4 | 7.4 | 2.8 | 6.4 | 2.6 |
| 0 | 3.6 | 2.2 | 4.4 | 2.6 | 5.6 | 3.4 | 7.4 | 2.4 | 6.8 | 4.4 |
| + 1 | 3.7 | 2.9 | 4.5 | 3.6 | 5.8 | 6.0 | 7.4 | 8.0 | 5.0 | 7.7 |
| + 2 | 3.7 | 3.5 | 4.6 | 4.3 | 5.9 | 7.1 | 7.5 | 8.7 | 5.0 | 7.9 |
| + 3 | 3.7 | 3.4 | 4.6 | 4.1 | 6.0 | 5.8 | 7.4 | 9.0 | 5.0 | 5.8 |
| + 4 | 3.7 | 3.1 | 4.5 | 3.6 | 5.9 | 4.7 | 7.3 | 7.2 | 5.0 | 5.3 |
| + 5 | 3.7 | 2.9 | 4.4 | 3.3 | 5.7 | 4.3 | 7.1 | 7.1 | 5.0 | 5.2 |
| + 6 | 3.6 | 2.7 | 4.4 | 3.1 | 5.6 | 4.0 | 6.9 | 6.8 | 5.0 | 5.0 |
| + 7 | 3.6 | 2.6 | 4.3 | 2.9 | 5.4 | 3.8 | 6.6 | 6.7 | 5.0 | 4.8 |
| + 8 | 3.5 | 2.5 | 4.2 | 2.8 | 5.3 | 3.7 | 6.4 | 6.4 | 5.0 | 4.7 |
| + 9 | 3.4 | 2.4 | 4.1 | 2.6 | 5.0 | 3.5 | 6.2 | 6.2 | 5.0 | 4.6 |
| +10 | 3.3 | 2.3 | 4.0 | 2.6 | 4.9 | 3.4 | 6.0 | 6.1 | 5.0 | 4.5 |
| +11 | 3.3 | 2.2 | 3.9 | 2.5 | 4.7 | 3.4 | 5.8 | 6.1 | 5.0 | 4.5 |
| +12 | 3.2 | 2.2 | 3.8 | 2.4 | 4.6 | 3.3 | 5.6 | 5.9 | 5.0 | 4.3 |

SLOSH ESTIMATED FEET OF STORM SURGE ANTICIPATED AT EACH HOUR

BAYTOWN TUNNEL
Point 38b

Point of Impact: BAYTOWN TUNNEL — 20 miles to the left of Galveston (category 5 - 10 miles to left of Galveston)

Direction: 320°

| Category (windspeed) | 1 (74-95) | | | | 2 (96-110) | | | | 3 (111-130) | | | | 4 (131-155) | | | | 5 (over 155) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement Speed | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 |
| -24 | 1.0 | - | - | - | 1.0 | - | - | - | 1.0 | - | - | - | 0.9 | - | - | - | - | - | - | - |
| -23 | 1.0 | - | - | - | 1.0 | - | - | - | 0.9 | - | - | - | 0.9 | - | - | - | - | - | - | - |
| -22 | 1.0 | - | - | - | 1.0 | - | - | - | 0.9 | - | - | - | 0.9 | - | - | - | - | - | - | - |
| -21 | 1.0 | - | - | - | 1.0 | - | - | - | 0.9 | - | - | - | 0.9 | - | - | - | - | - | - | - |
| -20 | 1.0 | - | - | - | 1.0 | - | - | - | 0.9 | - | - | - | 0.9 | - | - | - | - | - | - | - |
| -19 | 1.0 | - | - | - | 1.0 | - | - | - | 0.9 | - | - | - | 0.9 | - | - | - | - | - | - | - |
| -18 | 1.0 | - | - | - | 1.0 | - | - | - | 0.9 | - | - | - | 0.9 | - | - | - | - | - | - | - |
| -17 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 1.0 | 1.0 | 1.0 | 0.9 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| -16 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 1.0 | 1.0 | 1.0 | 0.9 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| -15 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 1.0 | 1.0 | 1.0 | 0.9 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| -14 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 1.0 | 1.0 | 1.0 | 0.9 | 1.0 | 1.0 | 1.0 | 0.9 | 1.0 | 1.0 | 1.0 |
| -13 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 1.0 | 1.0 | 0.8 | 0.9 | 1.0 | 1.0 |
| -12 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 1.0 | 1.0 | 0.8 | 0.9 | 1.0 | 1.0 |
| -11 | 1.1 | 1.0 | 1.0 | 1.0 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 1.0 | 0.8 | 0.9 | 1.0 | 1.0 |
| -10 | 1.1 | 1.0 | 1.0 | 1.0 | 1.1 | 1.0 | 1.0 | 1.0 | 1.1 | 0.9 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 1.0 | 0.7 | 0.9 | 0.9 | 1.0 |
| - 9 | 1.1 | 1.0 | 1.0 | 1.0 | 1.1 | 1.0 | 1.0 | 1.0 | 1.1 | 0.9 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 1.0 | 0.5 | 0.9 | 0.9 | 1.0 |
| - 8 | 1.2 | 1.0 | 1.0 | 1.0 | 1.2 | 1.0 | 1.0 | 1.0 | 1.1 | 0.9 | 0.9 | 1.0 | 1.1 | 0.9 | 0.9 | 1.0 | 0.7 | 0.8 | 0.9 | 1.0 |
| - 7 | 1.2 | 1.0 | 1.0 | 1.0 | 1.2 | 1.0 | 1.0 | 1.0 | 1.2 | 0.9 | 0.9 | 1.0 | 1.3 | 0.9 | 0.9 | 0.9 | 0.7 | 0.8 | 0.9 | 0.9 |
| - 6 | 1.3 | 1.0 | 1.0 | 1.0 | 1.3 | 1.0 | 1.0 | 1.0 | 1.3 | 0.9 | 0.9 | 1.0 | 1.5 | 0.8 | 0.9 | 0.9 | 0.8 | 0.8 | 0.9 | 0.9 |
| - 5 | 1.3 | 1.0 | 1.0 | 1.0 | 1.4 | 1.0 | 1.0 | 1.0 | 1.5 | 0.9 | 0.9 | 1.0 | 1.9 | 0.8 | 0.9 | 0.9 | 0.8 | 0.7 | 0.8 | 0.9 |
| - 4 | 1.4 | 1.0 | 1.0 | 1.0 | 1.5 | 1.0 | 1.0 | 1.0 | 1.7 | 1.0 | 0.9 | 1.0 | 2.2 | 0.9 | 0.9 | 0.9 | 1.0 | 0.7 | 0.8 | 0.9 |
| - 3 | 1.5 | 1.1 | 1.0 | 1.0 | 1.6 | 1.1 | 1.0 | 1.0 | 2.0 | 1.0 | 0.9 | 1.0 | 3.1 | 1.0 | 0.8 | 0.9 | 1.1 | 0.7 | 0.8 | 0.9 |
| - 2 | 1.7 | 1.2 | 1.1 | 1.1 | 1.8 | 1.2 | 1.0 | 1.0 | 2.5 | 1.2 | 1.0 | 1.0 | 4.9 | 1.2 | 0.9 | 0.9 | 1.7 | 0.7 | 0.7 | 0.8 |
| - 1 | 1.8 | 1.3 | 1.1 | 1.1 | 2.1 | 1.4 | 1.1 | 1.1 | 3.4 | 1.5 | 1.1 | 1.1 | 7.5 | 1.8 | 1.0 | 1.0 | 5.2 | 0.8 | 0.7 | 0.8 |
| 0 | 2.1 | 1.6 | 1.3 | 1.3 | 2.5 | 1.8 | 1.4 | 1.3 | 5.1 | 2.5 | 1.5 | 1.4 | 9.8 | 4.5 | 1.6 | 1.4 | 9.2 | 1.2 | 0.9 | 1.0 |
| + 1 | 2.4 | 2.1 | 1.9 | 1.9 | 3.2 | 2.7 | 2.2 | 2.1 | 7.6 | 5.9 | 3.6 | 2.8 | 9.0 | 9.9 | 6.1 | 4.0 | 8.9 | 5.7 | 3.0 | 2.3 |
| + 2 | 2.9 | 3.1 | 3.2 | 3.6 | 4.7 | 5.3 | 5.7 | 6.4 | 9.8 | 10.5 | 8.3 | 7.4 | 14.8 | 16.8 | 18.2 | 18.6 | 17.8 | 18.7 | 23.0 | 20.9 |
| + 3 | 3.5 | 4.6 | 4.8 | 4.6 | 6.0 | 7.5 | 7.8 | 7.6 | 8.2 | 11.6 | 11.5 | 8.2 | 16.8 | 19.5 | 18.1 | 15.7 | 21.1 | 25.4 | 24.2 | 13.5 |
| + 4 | 4.3 | 4.8 | 4.6 | 4.1 | 7.0 | 7.8 | 7.1 | 5.6 | 12.1 | 12.1 | 10.4 | 9.5 | 19.5 | 22.7 | 19.8 | 16.0 | 25.4 | 26.6 | 24.6 | 15.7 |
| + 5 | 4.7 | 4.7 | 4.2 | 3.7 | 7.4 | 7.2 | 5.6 | 4.8 | 9.8 | 11.3 | 10.7 | 9.2 | 21.9 | 21.2 | 17.2 | 15.7 | 25.6 | 23.1 | 18.6 | 14.0 |
| + 6 | 4.9 | 4.5 | 3.9 | 3.4 | 7.0 | 6.4 | 5.0 | 4.5 | 12.7 | 8.6 | 9.1 | 8.9 | 19.2 | 18.0 | 16.6 | 13.9 | 24.7 | 18.1 | 16.3 | 12.4 |
| + 7 | 4.8 | 4.4 | 3.7 | 3.2 | 7.0 | 5.7 | 4.8 | 4.4 | 11.7 | 10.1 | 9.7 | 8.8 | 19.7 | 15.9 | 14.4 | 13.1 | 21.9 | 16.3 | 13.2 | 12.2 |
| + 8 | 4.8 | 4.1 | 3.4 | 3.1 | 6.8 | 5.3 | 4.5 | 4.2 | 11.8 | 10.0 | 9.3 | 8.4 | 17.8 | 14.3 | 13.1 | 12.5 | 19.3 | 14.5 | 12.6 | 11.7 |
| + 9 | 4.7 | 3.9 | 3.3 | 2.9 | 6.6 | 5.1 | 4.4 | 4.1 | 11.5 | 9.3 | 8.9 | 8.2 | 16.4 | 13.7 | 12.5 | 12.0 | 17.5 | 13.5 | 12.2 | 11.2 |
| +10 | 4.6 | 3.7 | 3.1 | 2.8 | 6.4 | 4.9 | 4.2 | 4.0 | 11.4 | 9.8 | 8.5 | 8.0 | 15.3 | 12.7 | 11.9 | 11.4 | 16.2 | 12.7 | 11.7 | 10.8 |
| +11 | 4.4 | 3.6 | 3.0 | 2.7 | 6.2 | 4.7 | 4.1 | 4.0 | 11.0 | 10.1 | 8.2 | 7.8 | 14.6 | 12.2 | 11.2 | 11.0 | 15.0 | 12.0 | 11.0 | 9.5 |
| +12 | 4.4 | 3.4 | 2.9 | 2.7 | 6.0 | 4.5 | 4.0 | 4.0 | 10.9 | 9.5 | 8.0 | 7.6 | 14.1 | 11.7 | 10.9 | 9.4 | 14.2 | 11.6 | 9.9 | 9.5 |

Direction: 360°

| Category (windspeed) | 1 (74-95) | | 2 (96-110) | | 3 (111-130) | | 4 (131-155) | | 5 (over 155) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Movement Speed | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 |
| -24 | 1.0 | - | 1.1 | - | 1.0 | - | 1.0 | - | - | - |
| -23 | 1.0 | - | 1.1 | - | 1.0 | - | 1.0 | - | - | - |
| -22 | 1.0 | - | 1.1 | - | 1.0 | - | 1.1 | - | - | - |
| -21 | 1.0 | - | 1.3 | - | 1.1 | - | 1.1 | - | - | - |
| -20 | 1.1 | - | 1.4 | - | 1.2 | - | 2.0 | - | - | - |
| -19 | 1.1 | - | 1.7 | - | 1.2 | 1.0 | 1.3 | - | - | - |
| -18 | 1.2 | - | 2.0 | - | 1.3 | 1.0 | 1.4 | - | 1.0 | - |
| -17 | 1.2 | 1.0 | 2.3 | 1.0 | 1.4 | 1.0 | 1.5 | 1.0 | 1.0 | 1.0 |
| -16 | 1.2 | 1.0 | 2.5 | 1.0 | 1.5 | 1.0 | 1.6 | 1.0 | 1.1 | 1.0 |
| -15 | 1.3 | 1.0 | 2.7 | 1.0 | 1.6 | 1.0 | 1.7 | 1.0 | 1.1 | 1.0 |
| -14 | 1.4 | 1.0 | 3.3 | 1.0 | 1.7 | 1.0 | 1.9 | 1.0 | 1.2 | 1.0 |
| -13 | 1.4 | 1.0 | 3.8 | 1.0 | 1.8 | 1.0 | 2.0 | 1.0 | 1.4 | 1.0 |
| -12 | 1.5 | 1.0 | 4.1 | 1.0 | 2.0 | 1.0 | 2.1 | 1.1 | 1.5 | 1.1 |
| -11 | 1.6 | 1.0 | 4.1 | 1.0 | 2.1 | 1.1 | 2.3 | 1.1 | 1.6 | 1.1 |
| -10 | 1.7 | 1.0 | 4.2 | 1.1 | 2.3 | 1.1 | 2.6 | 1.1 | 1.8 | 1.1 |
| - 9 | 1.8 | 1.1 | 4.3 | 1.1 | 2.4 | 1.1 | 3.0 | 1.1 | 2.0 | 1.1 |
| - 8 | 1.9 | 1.1 | 4.3 | 1.1 | 2.7 | 1.1 | 3.5 | 1.2 | 2.3 | 1.1 |
| - 7 | 2.0 | 1.1 | 4.4 | 1.1 | 3.0 | 1.2 | 4.5 | 1.2 | 2.7 | 1.2 |
| - 6 | 2.2 | 1.1 | 4.7 | 1.1 | 3.4 | 1.2 | 5.5 | 1.3 | 3.3 | 1.2 |
| - 5 | 2.4 | 1.1 | 5.0 | 1.2 | 4.2 | 1.3 | 6.9 | 1.3 | 4.4 | 1.2 |
| - 4 | 2.6 | 1.2 | 5.2 | 1.2 | 5.3 | 1.3 | 8.5 | 1.4 | 5.7 | 1.3 |
| - 3 | 2.9 | 1.3 | 5.3 | 1.3 | 6.4 | 1.4 | 9.3 | 1.6 | 7.8 | 1.4 |
| - 2 | 3.2 | 1.3 | 5.4 | 1.4 | 7.8 | 1.6 | 9.6 | 1.8 | 9.7 | 1.5 |
| - 1 | 3.7 | 1.5 | 5.7 | 1.7 | 9.8 | 2.0 | 16.2 | 2.3 | 9.9 | 1.7 |
| 0 | 4.5 | 2.0 | 5.7 | 2.3 | 9.3 | 3.1 | 17.5 | 4.3 | 16.2 | 2.0 |
| + 1 | 4.9 | 3.0 | 5.2 | 5.0 | 9.7 | 9.0 | 20.6 | 16.3 | 18.2 | 3.6 |
| + 2 | 4.8 | 3.2 | 4.6 | 4.6 | 9.9 | 7.4 | 21.1 | 15.6 | 20.6 | 9.8 |
| + 3 | 4.4 | 2.8 | 4.1 | 3.8 | 10.6 | 6.7 | 18.4 | 9.8 | 20.9 | 6.8 |
| + 4 | 4.1 | 2.4 | 3.7 | 3.3 | 10.6 | 7.5 | 17.7 | 10.1 | 18.3 | 6.8 |
| + 5 | 3.8 | 2.3 | 3.2 | 3.2 | 10.4 | 8.1 | 15.8 | 12.1 | 15.0 | 9.5 |
| + 6 | 3.6 | 2.3 | 2.8 | 3.2 | 10.1 | 6.8 | 14.2 | 10.4 | 12.7 | 9.5 |
| + 7 | 3.4 | 2.2 | 2.5 | 3.1 | 9.8 | 6.7 | 13.3 | 9.6 | 11.9 | 8.0 |
| + 8 | 3.3 | 2.2 | 2.4 | 3.1 | 9.4 | 6.6 | 12.6 | 9.5 | 11.5 | 8.2 |
| + 9 | 3.2 | 2.1 | 2.3 | 3.1 | 9.2 | 6.4 | 12.4 | 9.0 | 11.0 | 8.0 |
| +10 | 3.1 | 2.1 | 2.3 | 3.0 | 8.9 | 6.2 | 11.7 | 8.6 | 11.6 | 7.8 |
| +11 | 3.0 | 2.1 | 2.2 | 3.0 | 8.6 | 6.0 | 11.3 | 8.3 | 9.5 | 7.6 |
| +12 | 3.0 | 2.0 | 2.1 | 3.0 | 8.4 | 5.9 | 11.0 | 8.1 | 9.5 | 7.4 |

HOURS PLUS OR MINUS TIME OF LANDFALL

SLOSH ESTIMATED FEET OF STORM SURGE ANTICIPATED AT EACH HOUR

BAYTOWN TUNNEL
Point 38b

Movement Speed - 10 MPH

Direction - 320°

Category - 3 (windspeed 111-130)

BAYTOWN TUNNEL

| Point of Impact (HOURS PLUS OR MINUS TIME OF LANDFALL) | Miles southwest of Galveston (CLOSH ESTIMATED FEET OF STORM SURGE ANTICIPATED AT EACH HOUR) | | | | | | | | | | | | | | | | | | Miles northeast of Galveston | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 85 | 80 | 75 | 70 | 65 | 60 | 55 | 50 | 45 | 40 | 35 | 30 | 25 | 20 | 15 | 10 | 5 | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
| -24 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 |
| -23 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 1.0 |
| -22 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 1.0 |
| -21 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 1.0 |
| -20 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 0.9 |
| -19 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 0.9 | 0.9 |
| -18 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 1.0 | 0.9 | 0.9 |
| -17 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 |
| -16 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 |
| -15 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.8 |
| -14 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.8 | 0.8 |
| -13 | 1.1 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.8 | 0.8 |
| -12 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.8 | 0.7 | 0.8 |
| -11 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.8 | 0.8 | 0.8 | 0.8 | 0.7 | 0.7 |
| -10 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.7 | 0.6 | 0.7 |
| - 9 | 1.2 | 1.2 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.7 | 0.7 | 0.7 | 0.7 | 0.6 | 0.6 |
| - 8 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.1 | 1.1 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.8 | 0.8 | 0.8 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.6 | 0.7 | 0.5 | 0.6 |
| - 7 | 1.3 | 1.3 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.8 | 0.8 | 0.7 | 0.7 | 0.7 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.4 | 0.5 |
| - 6 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.2 | 1.2 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 0.9 | 0.8 | 0.8 | 0.7 | 0.6 | 0.6 | 0.6 | 0.5 | 0.5 | 0.5 | 0.5 | 0.6 | 0.3 | 0.4 |
| - 5 | 1.4 | 1.4 | 1.4 | 1.3 | 1.4 | 1.3 | 1.3 | 1.3 | 1.2 | 1.1 | 1.1 | 1.0 | 1.0 | 0.8 | 0.8 | 0.7 | 0.6 | 0.6 | 0.5 | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 | 0.5 | 0.1 | 0.4 |
| - 4 | 1.5 | 1.5 | 1.5 | 1.4 | 1.5 | 1.5 | 1.4 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 1.0 | 0.8 | 0.8 | 0.7 | 0.6 | 0.5 | 0.4 | 0.3 | 0.3 | 0.2 | 0.2 | 0.2 | 0.4 | -0.0 | 0.3 |
| - 3 | 1.7 | 1.6 | 1.6 | 1.6 | 1.7 | 1.6 | 1.6 | 1.6 | 1.4 | 1.4 | 1.3 | 1.1 | 1.0 | 0.9 | 0.8 | 0.6 | 0.5 | 0.4 | 0.3 | 0.2 | 0.1 | 0.1 | 0.1 | 0.0 | 0.3 | -0.2 | 0.2 |
| - 2 | 1.8 | 1.8 | 1.8 | 1.7 | 1.9 | 1.9 | 1.8 | 1.8 | 1.7 | 1.6 | 1.5 | 1.3 | 1.2 | 0.9 | 0.8 | 0.6 | 0.4 | 0.3 | 0.1 | 0.0 | -0.0 | -0.3 | -0.1 | -0.1 | 0.2 | -0.4 | 0.0 |
| - 1 | 2.0 | 2.0 | 2.0 | 2.0 | 2.2 | 2.2 | 2.2 | 2.1 | 2.0 | 2.0 | 1.9 | 1.7 | 1.4 | 1.2 | 0.9 | 0.6 | 0.4 | 0.2 | 0.1 | -0.1 | -0.3 | -0.3 | -0.3 | -0.3 | 0.0 | -0.7 | -0.1 |
| 0 | 2.3 | 2.3 | 2.3 | 2.2 | 2.6 | 2.6 | 2.7 | 2.8 | 2.7 | 2.8 | 2.7 | 2.6 | 2.4 | 1.9 | 1.5 | 0.9 | 0.4 | 0.2 | 0.1 | -0.1 | -0.6 | -0.6 | -0.6 | -0.7 | -0.1 | -1.1 | -0.2 |
| + 1 | 2.5 | 2.6 | 2.6 | 2.6 | 3.1 | 3.2 | 3.4 | 3.7 | 4.2 | 4.8 | 5.4 | 5.5 | 6.0 | 5.2 | 4.1 | 2.2 | 0.9 | 0.5 | 0.4 | -0.1 | -0.7 | -0.9 | -1.0 | -1.1 | -0.3 | -1.5 | -0.3 |
| + 2 | 2.8 | 2.8 | 2.9 | 2.9 | 3.5 | 3.8 | 4.5 | 5.4 | 6.2 | 7.3 | 7.5 | 8.9 | 8.3 | 7.5 | 8.3 | 8.3 | 3.3 | 1.1 | 0.3 | -0.3 | -1.0 | -1.2 | -1.4 | -1.5 | -0.4 | -1.9 | -0.3 |
| + 3 | 3.0 | 3.1 | 3.2 | 3.3 | 3.9 | 4.6 | 5.5 | 6.4 | 7.6 | 8.4 | 9.8 | 8.5 | 11.4 | 12.9 | 13.0 | 9.9 | 5.2 | 1.3 | 0.1 | -0.7 | -1.5 | -1.5 | -1.8 | -2.0 | -0.5 | -2.2 | -0.3 |
| + 4 | 3.1 | 3.3 | 3.4 | 3.6 | 4.1 | 4.9 | 5.8 | 6.8 | 7.9 | 9.6 | 10.5 | 8.6 | 12.0 | 12.8 | 8.8 | 10.0 | 6.0 | 1.4 | -0.0 | -1.0 | -1.7 | -1.9 | -2.3 | -2.4 | -0.4 | -2.4 | -0.3 |
| + 5 | 3.3 | 3.4 | 3.5 | 3.7 | 4.3 | 4.9 | 5.9 | 6.8 | 7.8 | 8.7 | 10.5 | 8.6 | 12.3 | 10.7 | 8.8 | 9.9 | 6.9 | 1.6 | 0.1 | -1.2 | -1.7 | -2.1 | -2.4 | -2.5 | -0.3 | -2.5 | -0.3 |
| + 6 | 3.3 | 3.5 | 3.6 | 3.8 | 4.2 | 4.8 | 5.7 | 6.4 | 7.8 | 8.4 | 10.6 | 8.5 | 10.1 | 10.2 | 10.6 | 9.2 | 7.5 | 2.0 | 0.2 | -1.1 | -1.7 | -2.1 | -2.5 | -2.5 | -0.3 | -2.5 | -0.3 |
| + 7 | 3.3 | 3.5 | 3.7 | 3.9 | 4.2 | 4.7 | 5.4 | 6.3 | 7.5 | 8.1 | 8.6 | 10.5 | 8.8 | 10.9 | 11.3 | 10.5 | 7.0 | 2.8 | 0.4 | -1.1 | -1.7 | -2.1 | -2.4 | -2.5 | -0.3 | -2.5 | -0.4 |
| + 8 | 3.3 | 3.4 | 3.6 | 3.8 | 4.1 | 4.5 | 5.1 | 6.0 | 7.2 | 7.9 | 8.6 | 9.8 | 9.9 | 10.8 | 10.4 | 9.7 | 6.5 | 3.3 | 0.8 | -1.1 | -1.7 | -2.1 | -2.4 | -2.5 | -0.3 | -2.4 | -0.4 |
| + 9 | 3.2 | 3.4 | 3.5 | 3.7 | 4.0 | 4.4 | 4.8 | 5.8 | 6.8 | 7.6 | 8.8 | 9.6 | 9.8 | 10.1 | 10.0 | 9.6 | 6.2 | 3.5 | 1.3 | -1.1 | -1.6 | -2.0 | -2.4 | -2.4 | -0.4 | -2.4 | -0.5 |
| +10 | 3.2 | 3.3 | 3.4 | 3.6 | 3.9 | 4.2 | 4.7 | 5.5 | 6.5 | 7.3 | 8.5 | 9.4 | 9.8 | 10.2 | 9.8 | 9.4 | 6.0 | 3.7 | 1.6 | -1.0 | -1.6 | -2.0 | -2.3 | -2.4 | -0.5 | -2.3 | -0.6 |
| +11 | 3.1 | 3.2 | 3.4 | 3.5 | 3.7 | 4.1 | 4.5 | 5.3 | 6.3 | 7.0 | 8.2 | 9.0 | 9.4 | 9.5 | 9.4 | 9.1 | 6.0 | 3.9 | 1.8 | -0.9 | -1.6 | -2.0 | -2.3 | -2.3 | -0.6 | -2.3 | -0.6 |
| +12 | 3.0 | 3.2 | 3.3 | 3.4 | 3.6 | 4.0 | 4.4 | 5.2 | 6.1 | 6.8 | 8.0 | 8.7 | 9.0 | 9.1 | 9.0 | 8.7 | 5.9 | 4.0 | 2.1 | -0.6 | -1.6 | -2.0 | -2.3 | -2.3 | -0.7 | -2.2 | -0.7 |

BAYTOWN TUNNEL
Point 38b

Point of Impact: POINT BEFORE HOUSTON SHIP CHANNEL (LYNCHBURG) — 20 miles to the left of Galveston (category 5 - 10 miles to left of Galveston)

SLOSH ESTIMATED FEET OF STORM SURGE ANTICIPATED AT EACH HOUR

HOURS PLUS OR MINUS TIME OF LANDFALL

Direction 320°

| Category (windspeed) | 1 (74-95) | | | | 2 (96-110) | | | | 3 (111-130) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Movement Speed | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 |
| -24 | 1.0 | - | - | - | 0.9 | - | - | - | 0.9 | - | - | - |
| -23 | 1.0 | - | - | - | 0.9 | - | - | - | 0.9 | - | - | - |
| -22 | 1.0 | - | - | - | 0.9 | - | - | - | 0.9 | - | - | - |
| -21 | 1.0 | - | - | - | 0.9 | - | - | - | 0.9 | - | - | - |
| -20 | 0.9 | - | - | - | 0.9 | - | - | - | 0.8 | - | - | - |
| -19 | 0.9 | - | - | - | 0.9 | - | - | - | 0.8 | - | - | - |
| -18 | 0.9 | - | - | - | 0.9 | - | - | - | 0.8 | - | - | - |
| -17 | 0.9 | 1.0 | 1.0 | 1.0 | 0.9 | 1.0 | 1.0 | 1.0 | 0.8 | 1.0 | 1.0 | 1.0 |
| -16 | 0.9 | 1.0 | 1.0 | 1.0 | 0.9 | 1.0 | 1.0 | 1.0 | 0.8 | 1.0 | 1.0 | 1.0 |
| -15 | 0.9 | 1.0 | 1.0 | 1.0 | 0.9 | 1.0 | 1.0 | 1.0 | 0.8 | 1.0 | 1.0 | 1.0 |
| -14 | 0.9 | 1.0 | 1.0 | 1.0 | 0.9 | 1.0 | 1.0 | 1.0 | 0.7 | 0.9 | 1.0 | 1.0 |
| -13 | 0.9 | 1.0 | 1.0 | 1.0 | 0.8 | 1.0 | 1.0 | 1.0 | 0.7 | 0.9 | 1.0 | 1.0 |
| -12 | 0.9 | 1.0 | 1.0 | 1.0 | 0.8 | 0.9 | 1.0 | 1.0 | 0.7 | 0.9 | 0.9 | 1.0 |
| -11 | 0.9 | 1.0 | 1.0 | 1.0 | 0.8 | 0.9 | 1.0 | 1.0 | 0.7 | 0.9 | 0.9 | 1.0 |
| -10 | 0.9 | 0.9 | 1.0 | 1.0 | 0.8 | 0.9 | 1.0 | 1.0 | 0.7 | 0.9 | 0.9 | 1.0 |
| - 9 | 0.9 | 0.9 | 1.0 | 1.0 | 0:8 | 0.9 | 0.9 | 1.0 | 0.7 | 0.8 | 0.9 | 1.0 |
| - 8 | 0.9 | 0.9 | 1.0 | 1.0 | 0.8 | 0.9 | 0.9 | 1.0 | 0.6 | 0.8 | 0.9 | 0.9 |
| - 7 | 0.9 | 0.9 | 0.9 | 1.0 | 0.8 | 0.9 | 0.9 | 1.0 | 0.6 | 0.8 | 0.9 | 0.9 |
| - 6 | 0.9 | 0.9 | 0.9 | 1.0 | 0.8 | 0.8 | 0.9 | 1.0 | 0.6 | 0.7 | 0.8 | 0.9 |
| - 5 | 0.9 | 0.9 | 0.9 | 1.0 | 0.9 | 0.8 | 0.9 | 0.9 | 0.7 | 0.7 | 0.8 | 0.9 |
| - 4 | 1.0 | 0.9 | 0.9 | 1.0 | 0.9 | 0.8 | 0.9 | 0.9 | 0.7 | 0.6 | 0.8 | 0.9 |
| - 3 | 1.0 | 0.8 | 0.9 | 0.9 | 0.9 | 0.8 | 0.8 | 0.9 | 0.8 | 0.6 | 0.7 | 0.8 |
| - 2 | 1.1 | 0.8 | 0.8 | 0.9 | 1.0 | 0.7 | 0.8 | 0.9 | 1.0 | 0.5 | 0.6 | 0.8 |
| - 1 | 1.2 | 0.8 | 0.8 | 0.9 | 1.1 | 0.7 | 0.7 | 0.8 | 1.5 | 0.5 | 0.5 | 0.7 |
| 0 | 1.3 | 0.9 | 0.8 | 0.9 | 1.4 | 0.8 | 0.7 | 0.8 | 2.3 | 0.6 | 0.4 | 0.6 |
| + 1 | 1.5 | 1.0 | 0.9 | 1.1 | 1.6 | 1.0 | 0.8 | 1.0 | 3.3 | 1.5 | 0.6 | 0.8 |
| + 2 | 1.2 | 1.6 | 1.8 | 2.1 | 2.2 | 2.2 | 2.2 | 2.4 | 4.0 | 3.4 | 2.7 | 3.6 |
| + 3 | 2.0 | 2.3 | 2.7 | 2.9 | 3.1 | 3.6 | 3.6 | 3.7 | 5.2 | 3.5 | 3.5 | 3.6 |
| + 4 | 2.4 | 3.2 | 3.3 | 3.1 | 3.7 | 3.7 | 3.2 | 3.9 | 6.5 | 3.6 | 3.6 | 4.0 |
| + 5 | 3.0 | 3.4 | 3.3 | 3.0 | 4.2 | 3.6 | 4.1 | 3.7 | 7.1 | 5.2 | 4.3 | 5.7 |
| + 6 | 3.3 | 3.6 | 3.3 | 2.9 | 4.9 | 4.1 | 4.4 | 4.0 | 8.2 | 6.7 | 6.3 | 6.8 |
| + 7 | 3.9 | 3.9 | 3.4 | 2.9 | 5.5 | 4.5 | 4.6 | 4.1 | 9.2 | 7.5 | 7.5 | 7.5 |
| + 8 | 4.0 | 3.9 | 3.3 | 2.9 | 6.0 | 4.6 | 4.4 | 4.0 | 9.7 | 8.6 | 8.3 | 7.8 |
| + 9 | 4.2 | 3.8 | 3.3 | 2.8 | 6.3 | 4.6 | 4.4 | 4.0 | 10.1 | 8.8 | 8.5 | 7.9 |
| +10 | 4.2 | 3.7 | 3.2 | 2.8 | 6.4 | 4.7 | 4.3 | 4.0 | 10.3 | 9.1 | 8.5 | 7.9 |
| +11 | 4.3 | 3.7 | 3.1 | 2.7 | 6.5 | 4.8 | 4.2 | 4.0 | 10.5 | 9.5 | 8.4 | 7.9 |
| +12 | 4.2 | 3.6 | 3.1 | 2.7 | 6.5 | 4.8 | 4.2 | 4.0 | 10.7 | 9.5 | 8.3 | 7.9 |

Direction 320° (continued)

| Category (windspeed) | 4 (131-155) | | | | 5 (over 155) | | | |
|---|---|---|---|---|---|---|---|---|
| Movement Speed | 5 | 10 | 15 | 20 | 5 | 10 | 15 | 20 |
| -24 | 0.9 | - | - | - | - | - | - | - |
| -23 | 0.9 | - | - | - | - | - | - | - |
| -22 | 0.8 | - | - | - | - | - | - | - |
| -21 | 0.8 | - | - | - | - | - | - | - |
| -20 | 0.8 | - | - | - | - | - | - | - |
| -19 | 0.8 | - | - | - | - | - | - | - |
| -18 | 0.7 | - | - | - | - | - | - | - |
| -17 | 0.7 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| -16 | 0.7 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| -15 | 0.6 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| -14 | 0.6 | 0.9 | 1.0 | 1.0 | 0.8 | 0.9 | 1.0 | 1.0 |
| -13 | 0.6 | 0.9 | 1.0 | 1.0 | 0.8 | 0.9 | 1.0 | 1.0 |
| -12 | 0.6 | 0.9 | 1.0 | 1.0 | 0.7 | 0.9 | 0.9 | 1.0 |
| -11 | 0.5 | 0.8 | 0.9 | 0.9 | 0.6 | 0.9 | 0.9 | 1.0 |
| -10 | 0.5 | 0.8 | 0.9 | 0.9 | 0.6 | 0.8 | 0.9 | 0.9 |
| - 9 | 0.5 | 0.8 | 0.9 | 0.9 | 0.5 | 0.8 | 0.9 | 0.9 |
| - 8 | 0.4 | 0.7 | 0.9 | 0.9 | 0.4 | 0.7 | 0.9 | 0.9 |
| - 7 | 0.4 | 0.7 | 0.9 | 0.9 | 0.3 | 0.7 | 0.8 | 0.9 |
| - 6 | 0.4 | 0.6 | 0.9 | 0.8 | 0.2 | 0.6 | 0.8 | 0.9 |
| - 5 | 0.5 | 0.6 | 0.9 | 0.8 | 0.2 | 0.6 | 0.7 | 0.9 |
| - 4 | 0.7 | 0.5 | 0.9 | 0.8 | 0.0 | 0.5 | 0.7 | 0.8 |
| - 3 | 0.9 | 0.4 | 0.8 | 0.7 | 0.1 | 0.3 | 0.6 | 0.7 |
| - 2 | 2.1 | 0.3 | 0.9 | 0.6 | 0.1 | 0.2 | 0.4 | 0.6 |
| - 1 | 3.1 | 0.2 | 1.0 | 0.5 | 0.1 | 0.0 | 0.2 | 0.5 |
| 0 | 3.7 | 0.5 | 1.6 | 0.3 | 2.6 | 0.3 | -0.2 | 0.2 |
| + 1 | 5.4 | 3.9 | 6.1 | 1.0 | 4.2 | 0.7 | -0.9 | -0.8 |
| + 2 | 6.4 | 4.0 | 18.2 | 4.2 | 5.5 | 3.8 | 3.5 | 2.8 |
| + 3 | 12.1 | 17.3 | 18.1 | 14.5 | 17.1 | 25.9 | 27.0 | 20.7 |
| + 4 | 18.6 | 23.4 | 19.8 | 18.1 | 24.4 | 36.1 | 19.2 | 16.9 |
| + 5 | 21.9 | 24.4 | 17.2 | 17.0 | 28.8 | 31.8 | 22.9 | 15.5 |
| + 6 | 20.7 | 19.3 | 16.6 | 15.6 | 27.3 | 22.9 | 14.9 | 14.7 |
| + 7 | 21.2 | 16.7 | 14.4 | 14.7 | 23.9 | 16.8 | 14.8 | 13.9 |
| + 8 | 19.7 | 15.7 | 13.1 | 14.0 | 21.0 | 15.6 | 13.9 | 13.4 |
| + 9 | 17.8 | 14.6 | 12.5 | 13.5 | 19.4 | 14.7 | 13.2 | 13.0 |
| +10 | 16.6 | 14.0 | 11.9 | 13.2 | 17.8 | 14.1 | 12.3 | 12.6 |
| +11 | 16.0 | 13.4 | 11.2 | 12.8 | 16.6 | 13.4 | 12.3 | 11.9 |
| +12 | 15.6 | 12.9 | 10.9 | 12.3 | 15.9 | 12.9 | 11.8 | 11.0 |

Direction 360°

| Category (windspeed) | 1 (74-95) | | 2 (96-110) | | 3 (111-130) | | 4 (131-155) | | 5 (over 155) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Movement Speed | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 |
| -24 | 1.0 | - | 3.0 | - | 1.0 | - | 1.0 | - | - | - |
| -23 | 1.0 | - | | | 1.0 | - | 1.0 | - | - | - |
| -22 | 1.0 | - | 3.0 | - | 1.0 | - | 1.0 | - | - | - |
| -21 | 1.0 | - | 3.0 | - | 1.0 | - | 0.9 | - | - | - |
| -20 | 1.0 | - | 3.0 | - | 1.0 | - | 1.0 | - | - | - |
| -19 | 1.0 | - | 3.0 | - | 1.0 | 1.0 | 1.0 | - | - | - |
| -18 | 1.0 | - | 3.0 | - | 1.0 | 1.0 | 1.0 | - | 1.0 | - |
| -17 | 1.1 | 1.0 | 3.0 | 1.0 | 1.1 | 1.0 | 1.1 | 1.0 | 1.0 | 1.0 |
| -16 | 1.1 | 1.0 | 3.0 | 1.0 | 1.1 | 1.0 | 1.2 | 1.0 | 0.9 | 1.0 |
| -15 | 1.1 | 1.0 | 3.0 | 1.0 | 1.2 | 1.0 | 1.2 | 1.0 | 0.9 | 1.0 |
| -14 | 1.1 | 1.0 | 3.1 | 1.0 | 1.2 | 1.0 | 1.3 | 1.0 | 0.9 | 1.0 |
| -13 | 1.2 | 1.0 | 3.1 | 1.0 | 1.3 | 1.0 | 1.4 | 1.0 | 0.9 | 1.0 |
| -12 | 1.2 | 1.0 | 3.1 | 1.0 | 1.4 | 1.0 | 1.5 | 1.0 | 1.0 | 1.0 |
| -11 | 1.2 | 1.0 | 3.1 | 1.0 | 1.5 | 1.0 | 1.6 | 1.0 | 1.0 | 1.0 |
| -10 | 1.3 | 1.0 | 3.2 | 1.0 | 1.6 | 1.0 | 1.7 | 1.0 | 1.1 | 1.0 |
| - 9 | 1.3 | 1.0 | 3.2 | 1.0 | 1.7 | 1.0 | 1.9 | 1.0 | 1.2 | 1.0 |
| - 8 | 1.4 | 1.0 | 3.3 | 1.0 | 1.9 | 1.0 | 2.2 | 1.0 | 1.3 | 1.0 |
| - 7 | 1.5 | 1.0 | 3.5 | 1.0 | 1.9 | 1.1 | 2.7 | 1.1 | 1.5 | 1.0 |
| - 6 | 1.6 | 1.0 | 3.7 | 1.1 | 2.0 | 1.1 | 3.6 | 1.1 | 1.7 | 1.1 |
| - 5 | 1.7 | 1.1 | 4.0 | 1.1 | 2.2 | 1.1 | 4.5 | 1.1 | 2.1 | 1.1 |
| - 4 | 1.8 | 1.1 | 4.6 | 1.1 | 2.8 | 1.1 | 3.9 | 1.1 | 2.6 | 1.1 |
| - 3 | 1.9 | 1.1 | 4.9 | 1.1 | 3.5 | 1.1 | 5.5 | 1.1 | 3.5 | 1.1 |
| - 2 | 2.0 | 1.1 | 5.4 | 1.1 | 3.8 | 1.1 | 6.5 | 1.2 | 4.7 | 1.0 |
| - 1 | 2.2 | 1.1 | 5.8 | 1.1 | 5.1 | 1.1 | 6.9 | 1.3 | 5.9 | 1.0 |
| 0 | 2.5 | 1.3 | 5.9 | 1.3 | 6.2 | 1.4 | 13.1 | 1.9 | 6.4 | 0.8 |
| + 1 | 3.1 | 1.7 | 5.9 | 2.0 | 6.9 | 3.1 | 20.5 | 4.2 | 12.3 | 0.0 |
| + 2 | 3.7 | 2.2 | 5.8 | 3.4 | 7.9 | 4.0 | 20.9 | 8.4 | 19.5 | 2.3 |
| + 3 | 3.7 | 2.3 | 5.5 | 3.1 | 8.8 | 4.0 | 19.9 | 8.6 | 21.0 | 4.5 |
| + 4 | 3.7 | 2.2 | 5.1 | 2.8 | 9.2 | 4.0 | 18.9 | 9.1 | 18.5 | 4.1 |
| + 5 | 3.7 | 2.1 | 4.8 | 2.7 | 9.4 | 4.6 | 16.3 | 9.3 | 15.3 | 4.6 |
| + 6 | 3.6 | 2.1 | 4.6 | 2.7 | 9.5 | 5.2 | 15.2 | 9.5 | 13.6 | 6.2 |
| + 7 | 3.5 | 2.1 | 4.5 | 2.7 | 9.7 | 5.5 | 14.5 | 9.4 | 12.9 | 7.1 |
| + 8 | 3.4 | 2.1 | 4.3 | 2.7 | 9.6 | 5.8 | 14.0 | 9.4 | 12.3 | 7.0 |
| + 9 | 3.4 | 2.1 | 4.1 | 2.7 | 9.5 | 5.9 | 13.5 | 9.3 | 12.0 | 7.2 |
| +10 | 3.3 | 2.1 | 3.9 | 2.7 | 9.3 | 5.9 | 13.1 | 9.1 | 11.6 | 7.3 |
| +11 | 3.3 | 2.1 | 3.8 | 2.7 | 9.1 | 5.9 | 12.7 | 8.8 | 11.4 | 7.4 |
| +12 | 3.2 | 2.1 | 3.7 | 2.7 | 8.9 | 5.9 | 12.4 | 8.6 | 10.8 | 7.4 |

POINT BEFORE HOUSTON SHIP CHANNEL
(Burnett Bay and 134 North at Lynchburg Ferry Crossing)
Point 4a

## POINT BEFORE HOUSTON SHIP CHANNEL
## (Burnett Bay and 134 North at Lynchburg Ferry Crossing)
## Point 4a

| Point of Impact | 20 MILES TO THE LEFT OF FREEPORT (CATEGORY 5 - 10 MILES TO LEFT OF FREEPORT) | | | | | | | | | | POINT BEFORE HOUSTON SHIP CHANNEL (LYNCHBURG) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Direction | 320° | | | | | | | | | | 360° | | | | | | | | | |
| Category (windspeed) | 1 (74-95) | | 2 (96-110) | | 3 (111-130) | | 4 (131-155) | | 5 (over 155) | | 1 (74-95) | | 2 (96-110) | | 3 (111-130) | | 4 (131-155) | | 5 (over 155) | |
| Movement Speed | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 | 5 | 20 |
| -24 | 1.0 | 1.0 | 1.0 | 1.0 | 3.0 | 1.0 | 1.0 | 0.9 | 0.9 | 1.0 | 1.3 | 1.0 | 1.3 | 1.0 | 1.6 | - | 1.4 | - | 1.6 | - |
| -23 | 1.0 | 1.0 | 1.0 | 1.0 | 3.0 | 1.0 | 1.0 | 0.9 | 0.9 | 1.0 | 1.3 | 1.0 | 1.3 | 1.0 | 1.6 | - | 1.8 | - | 1.6 | - |
| -22 | 1.1 | 1.0 | 1.0 | 1.0 | 3.0 | 1.0 | 1.0 | 0.9 | 1.0 | 1.0 | 1.3 | 1.0 | 1.4 | 1.0 | 1.6 | 1.0 | 1.9 | - | 1.7 | - |
| -21 | 1.1 | 1.0 | 1.1 | 1.0 | 3.0 | 1.0 | 1.1 | 0.9 | 1.0 | 1.0 | 1.3 | 1.0 | 1.4 | 1.0 | 1.7 | 1.0 | 1.8 | 1.0 | 1.7 | - |
| -20 | 1.1 | 1.0 | 1.1 | 1.0 | 3.0 | 1.0 | 1.1 | 0.9 | 1.0 | 1.0 | 1.3 | 1.0 | 1.4 | 1.0 | 1.7 | 1.0 | 2.0 | 1.0 | 1.8 | - |
| -19 | 1.1 | 1.0 | 1.1 | 1.0 | 3.0 | 1.0 | 1.1 | 0.9 | 1.0 | 1.0 | 1.4 | 1.0 | 1.4 | 1.0 | 1.8 | 1.0 | 2.1 | 1.0 | 1.8 | - |
| -18 | 1.1 | 1.0 | 1.1 | 1.0 | 3.0 | 1.0 | 1.1 | 0.9 | 1.0 | 1.0 | 1.4 | 1.0 | 1.5 | 1.0 | 1.9 | 1.0 | 2.2 | 1.0 | 1.9 | - |
| -17 | 1.3 | 1.0 | 1.1 | 1.0 | 3.0 | 1.0 | 1.2 | 0.9 | 1.0 | 1.0 | 1.4 | 1.0 | 1.5 | 1.0 | 1.8 | 1.0 | 2.3 | 1.0 | 2.0 | 1.0 |
| -16 | 1.1 | 1.0 | 1.1 | 1.0 | 3.0 | 1.0 | 1.2 | 0.9 | 1.0 | 1.0 | 1.4 | 1.0 | 1.6 | 1.0 | 2.0 | 1.0 | 2.4 | 1.0 | 2.1 | 1.0 |
| -15 | 1.1 | 1.0 | 1.1 | 1.0 | 3.0 | 1.0 | 1.3 | 0.9 | 1.1 | 1.0 | 1.5 | 1.0 | 1.6 | 1.0 | 2.1 | 1.0 | 2.5 | 1.0 | 2.2 | 1.0 |
| -14 | 1.1 | 1.0 | 1.2 | 1.0 | 3.0 | 1.0 | 1.4 | 0.9 | 1.1 | 1.0 | 1.5 | 1.0 | 1.7 | 1.0 | 2.2 | 1.0 | 2.7 | 1.0 | 2.3 | 1.0 |
| -13 | 1.2 | 1.0 | 1.2 | 1.0 | 3.0 | 1.0 | 1.4 | 0.9 | 1.1 | 0.9 | 1.5 | 1.0 | 1.7 | 1.0 | 2.3 | 1.0 | 2.8 | 1.0 | 2.4 | 1.0 |
| -12 | 1.2 | 1.0 | 1.2 | 1.0 | 3.0 | 1.0 | 1.5 | 0.9 | 1.2 | 1.0 | 1.6 | 1.0 | 1.8 | 1.0 | 2.5 | 1.0 | 2.9 | 1.0 | 2.6 | 1.0 |
| -11 | 1.2 | 1.0 | 1.2 | 1.0 | 3.0 | 1.0 | 1.6 | 0.9 | 1.2 | 0.9 | 1.6 | 1.0 | 1.8 | 1.0 | 2.6 | 1.1 | 3.2 | 1.1 | 2.8 | 1.0 |
| -10 | 1.2 | 1.0 | 1.3 | 1.0 | 3.0 | 1.0 | 1.7 | 0.9 | 1.3 | 0.9 | 1.7 | 1.0 | 1.9 | 1.0 | 2.8 | 1.1 | 3.4 | 1.1 | 2.9 | 1.0 |
| - 9 | 1.2 | 1.0 | 1.3 | 1.0 | 3.0 | 1.0 | 1.8 | 0.9 | 1.4 | 0.9 | 1.8 | 1.0 | 2.0 | 1.0 | 2.9 | 1.1 | 3.7 | 1.1 | 3.2 | 1.0 |
| - 8 | 1.3 | 1.0 | 1.4 | 1.0 | 3.0 | 1.0 | 2.0 | 0.9 | 1.5 | 0.9 | 1.8 | 1.1 | 2.0 | 1.1 | 3.2 | 1.1 | 3.6 | 1.1 | 3.5 | 1.1 |
| - 7 | 1.3 | 1.0 | 1.4 | 1.0 | 3.0 | 1.0 | 2.2 | 0.9 | 1.6 | 0.9 | 1.9 | 1.1 | 2.1 | 1.1 | 3.5 | 1.1 | 3.9 | 1.1 | 3.8 | 1.1 |
| - 6 | 1.4 | 1.0 | 1.5 | 1.0 | 3.0 | 1.0 | 2.4 | 0.9 | 1.7 | 0.9 | 1.9 | 1.1 | 2.3 | 1.1 | 3.8 | 1.1 | 4.1 | 1.2 | 3.7 | 1.1 |
| - 5 | 1.4 | 1.0 | 1.6 | 1.0 | 3.0 | 1.0 | 2.7 | 0.9 | 1.8 | 0.9 | 2.0 | 1.1 | 2.4 | 1.1 | 3.7 | 1.2 | 4.0 | 1.2 | 3.9 | 1.1 |
| - 4 | 1.5 | 1.0 | 1.6 | 1.0 | 3.0 | 1.0 | 3.1 | 0.9 | 2.0 | 0.9 | 2.2 | 1.1 | 2.6 | 1.2 | 3.9 | 1.2 | 4.5 | 1.3 | 3.6 | 1.1 |
| - 3 | 1.5 | 1.0 | 1.7 | 1.0 | 3.0 | 1.0 | 3.7 | 0.9 | 2.3 | 0.9 | 2.3 | 1.2 | 2.8 | 1.2 | 3.8 | 1.3 | 5.2 | 1.4 | 4.1 | 1.2 |
| - 2 | 1.6 | 1.0 | 1.8 | 1.0 | 3.0 | 1.0 | 4.0 | 0.9 | 2.6 | 0.9 | 2.5 | 1.2 | 3.0 | 1.3 | 4.2 | 1.4 | 5.9 | 1.6 | 4.5 | 1.3 |
| - 1 | 1.7 | 1.1 | 1.9 | 1.1 | 3.0 | 1.0 | 4.0 | 1.0 | 3.1 | 0.9 | 2.6 | 1.4 | 3.3 | 1.5 | 4.3 | 1.7 | 6.4 | 2.0 | 5.0 | 1.5 |
| 0 | 1.8 | 1.2 | 2.0 | 1.2 | 3.0 | 1.2 | 4.0 | 1.4 | 3.8 | 1.1 | 2.8 | 1.6 | 3.6 | 1.8 | 4.8 | 2.1 | 6.7 | 3.0 | 5.7 | 1.9 |
| + 1 | 1.7 | 1.3 | 2.1 | 1.4 | 3.0 | 1.6 | 4.0 | 1.9 | 4.0 | 1.6 | 2.9 | 2.1 | 3.8 | 2.3 | 5.2 | 2.9 | 6.9 | 3.4 | 3.1 | 3.0 |
| + 2 | 1.9 | 2.5 | 2.3 | 1.7 | 3.0 | 1.9 | 3.9 | 2.7 | 4.0 | 2.4 | 3.1 | 2.4 | 4.3 | 3.0 | 5.4 | 3.7 | 7.3 | 4.1 | 3.1 | 4.0 |
| + 3 | 2.0 | 1.9 | 2.4 | 1.9 | 3.0 | 2.2 | 4.6 | 3.7 | 4.2 | 3.5 | 3.3 | 2.7 | 4.2 | 3.2 | 5.7 | 4.0 | 7.5 | 6.1 | 3.1 | 4.6 |
| + 4 | 2.1 | 1.8 | 2.6 | 2.1 | 3.0 | 2.6 | 5.3 | 4.0 | 4.6 | 3.4 | 3.4 | 2.7 | 4.3 | 3.1 | 5.9 | 4.2 | 7.7 | 6.9 | 3.1 | 5.6 |
| + 5 | 2.3 | 1.9 | 2.8 | 2.2 | 3.0 | 2.7 | 5.9 | 3.7 | 5.1 | 3.7 | 3.5 | 2.6 | 4.3 | 3.1 | 6.1 | 4.2 | 7.8 | 7.0 | 3.1 | 5.8 |
| + 6 | 2.4 | 1.9 | 3.0 | 2.2 | 3.0 | 2.8 | 6.3 | 4.4 | 5.5 | 3.7 | 3.5 | 2.5 | 4.3 | 3.0 | 6.1 | 3.8 | 7.8 | 6.9 | 3.1 | 5.7 |
| + 7 | 2.5 | 2.0 | 3.1 | 2.2 | 3.0 | 2.8 | 6.6 | 4.6 | 5.8 | 3.2 | 3.6 | 2.5 | 4.3 | 3.0 | 6.1 | 3.9 | 7.7 | 6.9 | 3.1 | 5.6 |
| + 8 | 2.6 | 2.0 | 3.3 | 2.2 | 3.0 | 2.8 | 6.7 | 4.8 | 6.0 | 3.4 | 3.6 | 2.4 | 4.3 | 2.9 | 6.1 | 3.8 | 7.6 | 6.9 | 3.1 | 5.5 |
| + 9 | 2.7 | 2.0 | 3.5 | 2.2 | 3.0 | 2.8 | 6.8 | 4.9 | 6.1 | 3.4 | 3.5 | 2.4 | 4.3 | 2.8 | 6.0 | 3.4 | 7.4 | 6.8 | 3.1 | 5.4 |
| +10 | 2.9 | 2.0 | 3.6 | 2.2 | 3.0 | 2.8 | 6.9 | 4.9 | 6.2 | 3.5 | 3.5 | 2.4 | 4.3 | 2.8 | 5.9 | 3.7 | 7.2 | 6.7 | 3.1 | 5.2 |
| +11 | 2.9 | 2.0 | 3.7 | 2.2 | 3.0 | 2.8 | 6.9 | 5.0 | 6.2 | 3.5 | 3.5 | 2.4 | 4.2 | 2.7 | 5.8 | 3.7 | 7.0 | 6.6 | 3.2 | 5.0 |
| +12 | 2.9 | 2.0 | 3.7 | 2.2 | 3.0 | 2.8 | 6.9 | 5.1 | 6.3 | 3.5 | 3.5 | 2.3 | 4.2 | 2.7 | 5.6 | 3.6 | 6.8 | 6.5 | 3.2 | 4.8 |

TRAVEL IN FEET PER SECOND AT EACH HOUR

ESTIMATED PEAK OF STORM SURGE AMPLIFICATION

POINT BEFORE SHIP CHANNEL

Movement Speed - 10 MPH

Direction - 320°

Category - 3
(windspeed 111-130)

POINT BEFORE HOUSTON SHIP CHANNEL (LYNCHBURG)

| Point of Impact | Miles southwest of Galveston | | | | | | | | | | | | | | | | | | Miles northeast of Galveston | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 85 | 80 | 75 | 70 | 65 | 60 | 55 | 50 | 45 | 40 | 35 | 30 | 25 | 20 | 15 | 10 | 5 | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
| -24 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 1.0 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 |
| -23 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 1.0 |
| -22 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 1.0 |
| -21 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 1.0 |
| -20 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 1.0 | 1.0 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 0.9 |
| -19 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 1.0 | 1.0 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 1.0 | 0.9 |
| -18 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 1.0 | 1.0 | - | - | - | - | - | - | - | - | - | - | - | - | 1.0 | 0.9 | 0.9 |
| -17 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 |
| -16 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 |
| -15 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.8 |
| -14 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 1.0 | 0.9 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.8 |
| -13 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.8 | 0.8 |
| -12 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.8 | 0.8 |
| -11 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.8 | 0.8 | 0.7 |
| -10 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.7 | 0.7 |
| - 9 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.7 | 0.7 | 0.6 |
| - 8 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.8 | 0.8 | 0.8 | 0.8 | 0.9 | 0.8 | 0.8 | 0.8 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.6 | 0.6 |
| - 7 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.9 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.6 | 0.5 | 0.5 |
| - 6 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.8 | 0.8 | 0.8 | 0.8 | 0.7 | 0.7 | 0.7 | 0.7 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.5 | 0.4 |
| - 5 | 1.1 | 1.1 | 1.1 | 1.0 | 1.0 | 1.0 | 0.9 | 0.9 | 0.8 | 0.8 | 0.8 | 0.7 | 0.7 | 0.7 | 0.6 | 0.6 | 0.6 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.4 | 0.4 |
| - 4 | 1.2 | 1.2 | 1.1 | 1.1 | 1.1 | 1.0 | 1.0 | 0.9 | 0.9 | 0.8 | 0.7 | 0.7 | 0.6 | 0.6 | 0.5 | 0.5 | 0.5 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.3 | 0.3 |
| - 3 | 1.3 | 1.2 | 1.2 | 1.2 | 1.2 | 1.1 | 1.0 | 1.0 | 0.9 | 0.8 | 0.7 | 0.6 | 0.6 | 0.5 | 0.4 | 0.4 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 0.2 |
| - 2 | 1.4 | 1.3 | 1.3 | 1.2 | 1.3 | 1.3 | 1.2 | 1.1 | 0.9 | 0.8 | 0.7 | 0.6 | 0.5 | 0.4 | 0.3 | 0.3 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.5 | 0.1 | 0.1 | 0.2 | 0.0 | 0.0 |
| - 1 | 1.5 | 1.5 | 1.4 | 1.4 | 1.5 | 1.4 | 1.4 | 1.3 | 1.1 | 1.0 | 0.8 | 0.6 | 0.5 | 0.3 | 0.2 | 0.1 | -0.0 | -0.1 | -0.2 | -0.2 | -0.4 | -0.1 | -0.1 | -0.0 | 0.0 | -0.1 | -0.1 |
| 0 | 1.6 | 1.6 | 1.6 | 1.6 | 1.7 | 1.7 | 1.6 | 1.6 | 1.5 | 1.4 | 1.0 | 0.8 | 0.6 | 0.3 | 0.0 | -0.1 | -0.3 | -0.4 | -0.5 | -0.4 | -0.7 | -0.3 | -0.2 | -0.2 | -0.1 | -0.3 | -0.2 |
| + 1 | 1.8 | 1.8 | 1.8 | 1.8 | 1.9 | 2.0 | 1.9 | 2.0 | 2.0 | 2.1 | 2.0 | 1.7 | 1.5 | 0.7 | 0.2 | -0.4 | -0.6 | -0.8 | -0.9 | -0.8 | -1.0 | -0.6 | -0.5 | -0.4 | -0.3 | -0.4 | -0.3 |
| + 2 | 1.9 | 1.9 | 1.9 | 1.9 | 2.2 | 2.3 | 2.4 | 2.8 | 3.0 | 3.4 | 3.6 | 3.5 | 3.4 | 3.3 | 2.8 | 1.1 | -0.6 | -0.9 | -0.9 | -1.0 | -0.9 | -0.8 | -0.7 | -0.5 | -0.4 | -0.4 | -0.3 |
| + 3 | 2.1 | 2.1 | 2.1 | 2.1 | 2.5 | 2.7 | 3.3 | 3.6 | 3.7 | 3.6 | 3.6 | 4.2 | 3.5 | 3.7 | 3.8 | 3.7 | 2.6 | -0.1 | -0.4 | -0.7 | -0.7 | -0.9 | -0.7 | -0.6 | -0.5 | -0.4 | -0.3 |
| + 4 | 2.2 | 2.3 | 2.3 | 2.4 | 2.8 | 3.3 | 3.7 | 4.0 | 4.0 | 3.8 | 3.6 | 4.3 | 3.9 | 5.2 | 5.8 | 3.2 | 3.4 | 0.3 | -0.2 | -0.5 | -0.5 | -0.8 | -0.7 | -0.5 | -0.4 | -0.3 | -0.3 |
| + 5 | 2.4 | 2.5 | 2.6 | 2.6 | 3.1 | 3.8 | 4.1 | 4.4 | 5.1 | 5.3 | 3.8 | 5.9 | 4.2 | 5.9 | 7.8 | 4.8 | 3.6 | 0.9 | 0.2 | -0.2 | -0.2 | -0.6 | -0.5 | -0.4 | -0.3 | -0.3 | -0.3 |
| + 6 | 2.5 | 2.6 | 2.7 | 2.8 | 3.5 | 4.0 | 4.3 | 5.1 | 5.9 | 6.6 | 3.9 | 7.1 | 5.7 | 8.1 | 9.0 | 6.7 | 4.0 | 1.4 | 0.4 | 0.0 | -0.2 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 |
| + 7 | 2.7 | 2.8 | 2.9 | 3.0 | 3.6 | 4.2 | 4.5 | 5.5 | 6.5 | 6.9 | 5.3 | 8.3 | 7.0 | 9.0 | 9.5 | 8.2 | 4.0 | 1.9 | 0.3 | -0.1 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.4 | -0.4 |
| + 8 | 2.7 | 2.8 | 3.0 | 3.1 | 3.7 | 4.2 | 4.6 | 5.8 | 6.8 | 7.2 | 6.0 | 8.9 | 8.1 | 9.4 | 9.8 | 8.8 | 4.4 | 2.1 | 0.3 | -0.2 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.4 | -0.4 |
| + 9 | 2.8 | 2.9 | 3.0 | 3.2 | 3.7 | 4.1 | 4.7 | 5.8 | 6.8 | 7.4 | 7.4 | 9.3 | 8.7 | 9.7 | 9.8 | 9.3 | 4.6 | 2.3 | 0.4 | -0.3 | -0.4 | -0.4 | -0.4 | -0.4 | -0.4 | -0.5 | -0.5 |
| +10 | 2.8 | 2.9 | 3.1 | 3.3 | 3.7 | 4.1 | 4.7 | 5.9 | 6.8 | 7.4 | 7.8 | 9.4 | 9.1 | 9.7 | 9.9 | 9.4 | 5.0 | 2.6 | 0.6 | -0.4 | -0.5 | -0.5 | -0.5 | -0.5 | -0.5 | -0.6 | -0.6 |
| +11 | 2.8 | 3.0 | 3.2 | 3.3 | 3.7 | 4.1 | 4.7 | 5.8 | 6.8 | 7.4 | 7.9 | 9.2 | 9.2 | 9.8 | 9.9 | 9.3 | 5.3 | 2.7 | 0.8 | -0.5 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 | -0.6 |
| +12 | 2.8 | 3.0 | 3.2 | 3.4 | 3.7 | 4.0 | 4.7 | 5.7 | 6.7 | 7.3 | 7.9 | 9.1 | 9.1 | 9.6 | 9.6 | 9.1 | 5.4 | 2.9 | 1.1 | -0.5 | -0.7 | -0.7 | -0.7 | -0.7 | -0.7 | -0.7 | -0.7 |

HOURS PLUS OR MINUS TIME OF LANDFALL

SURGE ESTIMATED FEET OF STORM SURGE ANTICIPATED AT EACH HOUR

POINT BEFORE HOUSTON SHIP CHANNEL
(Burnett Bay and 134 North at Lynchburg Ferry Crossing)
Point 4a

# APPENDIX D

## SUGGESTED BROCHURE

Suggestions are offered for a brochure using the information in this study. Envision a folded sheet with the words "Hurricane Information" on the front and back and a map of the five-county study area on the inside. The map would show evacuation and contingency zones along with evacuation times and routes, as illustrated in the composite map included in this report.

The suggested basic information to be contained on the front and back of the brochure is as follows:

### HURRICANE INFORMATION

*OFFICIAL SOURCES OF INFORMATION*

The National Hurricane Center in Miami, Florida, will issue Hurricane Advisories (every six hours) and Bulletins (between advisories when necessary) when a hurricane becomes a threat to the U.S. mainland. The Center issues a Hurricane Watch for a definite area and time period to indicate that a hurricane hitting the defined area is a real possibility. If the conditions warrant it, the Center then issues a Hurricane Warning, which indicates expected hurricane conditions in 24 hours. Because of the unpredictability of hurricanes, the warning could come as little as ten hours before hurricane conditions could develop.

The National Weather Service for the Houston and Galveston areas (usually combined into an Emergency Hurricane Information Center) issues Local Statements. These statements interpret the hurricane information for the local area.

County governments advise populations in non-incorporated areas outside municipalities and municipal governments advise those in the incorporated areas about evacuation.

*SPECIAL THREATS*

Storm surge is the abnormal rise in the level of the Gulf of Mexico produced by a hurricane. Under certain conditions, surge can exceed 20 feet. Storm surge can be a threat to life and can block evacuation routes. Nine out of ten persons killed by hurricanes are killed by storm surge.

Wind can tip buses and trucks when gusts reach 47 MPH. Cars can sustain higher gusting conditions. Wind can also propel unsecured items at deadly speeds.

Rain which accompanies hurricanes is almost impossible to predict. It could suddenly flood an area or block an evacuation route.

Tornadoes are often spawned by hurricanes.

*SPECIAL PRECAUTIONS*

If you plan to evacuate, protect your property as best you can if time permits. Protect windows and gather loose objects in yard and place them inside. Plan your evacuation route from the routes displayed on the enclosed map. Estimate the number of hours it will take you to evacuate using the estimated times on the enclosed map. If you do not wish to spend 10 to 20 hours in evacuating traffic, the only alternative may be to leave as soon as a hurricane watch is issued. The locations of shelters and their availability will be relayed to you over radio and television. Do not take pets to shelters. If you are traveling toward Houston, check your radio for information on the best routes to area shelters and through Houston. The primary E.B.S. (Emergency Broadcasting Station) in this area is KTRH (740 AM) and the secondary E.B.S. is KPRC (950 AM).

If you do not evacuate and are in a vulnerable area as described on the enclosed map, make certain you can maintain your household without any utilities. Protect windows and gather loose objects from the yard and place them inside. Have a battery-operated radio (and extra batteries), plenty of stored water, unspoilable food, and flashlights (and extra batteries). Stay away from windows and in the center of the the house (closet, bathroom). Do not go outside during a lull in the winds. This could be the passing eye of the hurricane. You should remain only if you know that the elevation of your residence is high enough

to avoid storm surge and strong enough to withstand flying objects propelled at over 150 MPH. If there is a possibility of being in or near the track of a hurricane, you should know that there is no hurricane-proof residence or building. Mobile home residents should not remain in their mobile homes during a hurricane.

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Evacuation and Contingency Zones on the enclosed map indicate areas where storm surge could penetrate for differing hurricane intensities. In evacuation zones, it would be hurricanes with winds of 130 MPH or less, while in contingency zones, it would be hurricanes with winds over 130 MPH. Use of these zones during an evacuation could permit the evacuation of the most vulnerable areas first. Remember, it is possible that evacuation from areas where no evacuation has been recommended could create traffic congestion during critical evacuation periods, preventing threatened areas from evacuating.

## APPENDIX E

## GLOSSARY OF HURRICANE TERMS[1]

EYE--The relatively calm area in the center of a storm. In this area, winds are light and the sky often is only partly covered by clouds.

GALE WARNING--A warning of sustained winds within the range of 39 to 54 miles an hour.

HURRICANE--A tropical cyclone with sustained winds of 74 mph or greater.

HURRICANE (TROPICAL STORM) ADVISORIES--Messages issued by the National Hurricane Center in Miami which summarize all coastal warnings that are in effect, including hurricane watches. In addition to a description of the storm, its position, anticipated movement, and prospective threat is given. Advisories are issued every six hours unless special intermediate advisories are needed.

HURRICANE WARNING--A warning that one or both of the following conditions are expected in a specified coastal area in 24 hours or less: (a) sustained winds of 74 mph or higher and/or (b) dangerously high water or a combination of dangerously high water and exceptionally high waves, even though winds expected may be less than hurricane force.

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[1]National Weather Service.

HURRICANE WATCH--An announcement for specific areas that a hurricane or an incipient hurricane condition poses a possible threat to coastal and inland communities.

LANDFALL--The position at a seacoast where the center of a hurricane passes from sea to land.

LAND SUBSIDENCE--The sinking of the land, caused mainly by the withdrawal of underground water from wells supplying cities and industries. This phenomenon may cause coastal areas to become more vulnerable to tropical storm flooding.

LOCAL STATEMENT--A public release prepared by a Weather Service Office in or near a threatened area giving specific details for its area of responsibility to protect life and property.

SEICHE--A series of fast-moving waves that sometimes are superimposed upon the storm surge. This phenomenon may cause total destruction and great loss of life.

SMALL CRAFT CAUTIONARY STATEMENTS--When a hurricane or tropical storm threatens a coastal area, small craft are advised to remain in port or not to venture into the open sea.

STORM SURGE--An abnormal rise in the level of the sea produced by a hurricane or tropical storm. This inundation is usually responsible for the greatest loss of life and destruction of property.

STORM WARNING--When associated with a hurricane or tropical storm, a warning of sustained winds in the range of 55 to 73 mph, inclusive.

TROPICAL DISTURBANCE--A moving area of thunderstorms of tropical origin that maintains its identity for 24 hours or more.

TROPICAL DEPRESSION--A rotary circulation at the surface with sustained wind speed of 38 mph or less.

TROPICAL STORM--Distinct rotary circulation with sustained wind speeds of 39 to 73 miles an hour.

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[1]National Weather Service