C2. HYDRAULICS AND HYDROLOGY.

C2.1 Climate. The climate of south central Louisiana is influenced by the proximity of the Gulf of Mexico, which modifies temperature conditions by decreasing the range between extremes. These effects are increased when southerly winds prevail, imparting the characteristics of a maritime climate.

C2.1.1 Temperature.

C2.1.1.1 Records of temperature are available from "Climatological Data" for Louisiana, published by the National Climatic Center. The study area can be described by using the normal temperature data observed at Carville and LSU Ben Hur. These stations are shown in Table C1 with their monthly and annual mean normals based on the period 1961-1990. The average annual mean normal temperature is 66.9°F, with monthly mean temperature normal varying from 81.6°F in July to 49.3°F in January.

C2.1.1.2 A maximum extreme temperature of 102°F was recorded at Carville on 10 August 1962 and also at LSU Ben Hur on 23 August 1980. A minimum extreme temperature of 9°F was recorded on 23 and 24 December 1989 at Ben Hur. Plate H1 shows the location of the climate gages.

TABLE C1
MEAN MONTHLY TEMPERATURES (°F)
30 Year Normals (1961-1990)

Station	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
Carville	49.6	52.6	59.9	67.5	74.4	80.0	81.9	81.6	77.9	68.5	60.1	52.9	67.2
LSU Ben Hur	48.9	52.0	59.6	67.4	73.8	79.1	81.2	80.8	77.2	67.7	59.5	52.3	66.6
Average	49.3	52.3	59.8	67.5	74.1	79.6	81.6	81.2	77.6	68.1	59.8	52.6	66.9

Source: National Climatic Center

C2.1.2 Precipitation. Records of precipitation are also available in publications by the National Climatic Center. Rainfall data for the study area is taken at the Bayou Sorrel Lock gage, which is shown on plate H1. The average annual rainfall is 63.22 inches based on the ten-year period 1989-1998. Table C2 lists the average monthly and annual precipitation for this period at Bayou Sorrel Lock. The wettest month is January with a monthly average of 7.28 inches. December is the driest month averaging 3.96 inches. The greatest day since 1969 measured 10.10 inches of rain on 22 April 1979.

TABLE C2
BAYOU SORREL LOCK
AVERAGE MONTHLY AND ANNUAL PRECIPITATION
(1989-1998)
(Inches)

Station	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
Bayou Sorrel Lock	7.28	4.41	5.43	6.05	4.47	6.91	6.17	5.18	4.50	4.00	4.84	3.96	63.22

Source: National Climatic Center

C2.1.3 Wind. The average wind speed in the study area is 7.2 miles per hour (mph), based on the period 1973-1998 at Baton Rouge Ryan Airport. Prevailing wind direction is southerly during much of the year. The summer is often disturbed by tropical storms and hurricanes that produce the highest winds in the area. The maximum wind speed observed (highest one-minute speed) since 1963 was 58 mph, and was caused by Hurricane Betsy in September 1965.

C2.1.4 Stream Gaging Data. Stream gaging data are available from five major gaging stations in the study area. The stations with their maximum and minimum stages are shown in Table C3. Discharge information is not available for these stations. Station locations are shown on Plate H1.

TABLE C3
STREAM GAGING DATA

STATION	PERIOD OF RECORD	MAXIMUM STAGE FT. (NGVD)	MAXIMUM STAGE DATE	MINIMUM STAGE FT. (NGVD)	MINIMUM STAGE DATE
EABPL BORROW PIT @ BAYOU SORREL(FWS)	1950-95	18.10	5/23/73a	0.00	10/18/76
LOWER GRAND RIVER @ BAYOU SORREL	1947-95	7.90	4/15/80	0.30	10/9/52
UPPER GRAND RIVER @ DIKE	1933-54c 1963-95	19.50	3/4/50	0.50b	1/12/81
BIG BAYOU PIGEON NEAR PIGEON (FWS)	1936-94	18.20	5/25/73	0.37	10/18/76
INTRACOASTAL WATERWAY @ MORLEY	1966-95	9.63	4/14/80	0.95	12/24/89

a And later dates b From incomplete records c Intermittently
Source: U.S. Army Engineers District, New Orleans

C2.1.5 Floods of Record. A couple of the major historical floods in the study area caused by heavy rainfall occurred in 1973 and 1980. A description of these significant floods follows.

C2.1.5.1 1973 Flood. Flooding occurred throughout the study area during the spring of 1973. Record peak stages were recorded at all the gages in Table C3, except at the Upper Grand River

gage. The peak stage at Big Bayou Pigeon measured 18.10 feet (ft.), NGVD on May 25 and the EABPL Borrow Pit at Bayou Sorrel gage recorded a peak stage of 18.10 ft., NGVD on 23 May. Peak stages at Lower Grand Lake and IWW at Morley were 7.10 ft., NGVD on 19 April and 8.97 ft., NGVD on 18 April, respectively.

C2.1.5.2 1980 Flood. Heavy rains at the end of March and early April setup flooding which occurred over the study area during mid April. A maximum extreme was set at the Lower Grand Lake at Bayou Sorrel gage on 15 April with a reading of 7.90 ft., NGVD. LSU Ben Hur recorded a total of 6.11 inches of rain over the two day 12-13 April storm.

C2.1.5.3 Some of the major historical hurricanes that affected the study area include Hilda in 1964, Carmen in 1974, Babe in 1977, Juan in 1985, and Andrew in 1992.

C2.1.6 Visibility.

C2.1.6.1 Fog is formed when the air temperature is cooled to or below the saturation temperature of the air (dew point), producing condensation of water droplets at the surface. Two types of fog are possible in the study area, regional and river fog. River fog is formed when warm, moist gulf air blows gently over the relatively colder waters of the Mississippi and Atchafalaya Rivers during the winter and spring. The potential for widespread river fog is greatest in the basins, deltas, and adjacent wetlands of the two rivers. River fog is uncommon from May to November.

C2.1.6.2 Regional fog occurs primarily at night and early morning during the winter and spring months as relatively warm, moisture-laden gulf air contacts cooler land or water surfaces. Heavy fog days with ¼-mile visibility or less average 35 days a year at Baton Rouge Ryan Airport.

C2.2 Hydrology.

C2.2.1 Existing Conditions.

C2.2.1.1 Stage-duration and differential head-duration data was developed for the 1955-1996 time frame for the landside and floodside of the lock. The duration data was developed for the annual and monthly cases. Tables C4 and C5 provide the results of this analysis.