MINUTES OF
SOUTHEAST LOUISIANA FLOOD PROTECTION AUTHORITY-EAST
COASTAL ADVISORY COMMITTEE MEETING
HELD ON FEBRUARY 21, 2014

PRESENT: G. Paul Kemp, Chair
Rick Luettich, Committee Member
John Lopez, Committee Member
Albert Gaude, Committee Member
Carlton Dufrechou, Committee Member

The Coastal Advisory Committee (CAC) of the Southeast Louisiana Flood Protection Authority-East (SLFPA-E or Authority) met on Friday, February 21, 2014, in Meeting Room 201, Orleans Levee District Franklin Administrative Complex, 6920 Franklin Avenue, New Orleans, Louisiana. Mr. Kemp called the meeting to order at 9:30 a.m.

Opening Comments: Mr. Kemp advised that Dr. Chris Swarzenski with the U.S. Geological Survey (USGS) informed the CAC during his presentation last month of the impending removal of the water velocity gage at the Seabrook Complex. The CAC recommended that a resolution be brought to the SLFPA-E Board in order to continue the operation and maintenance of the gage. The resolution was subsequently adopted by the Board at its February 20th meeting.

Adoption of Agenda: The agenda was approved as presented.

Approval of Minutes: The minutes of the January 17, 2014 CAC meeting were approved.

Public Comments: None

New Business:

A. Potential utility of amphibious machinery for maintaining drainage channels and building marshes. (Tom Diano P.E., Upperline Equipment)

Mr. Kemp stated that he met Norman Grant with Normrock Industries (the inventor of the Amphibex dredge) and Tom Diano with Upperline Equipment Company at an Amphibex 400 demonstration project that was put together by Windell Curole, General Manager of the South Lafourche Levee District. He noted that the new technology could be an effective tool for cleaning drainage ditches and marsh restoration.

Mr. Diano advised that a presentation on the Amphibex was also provided to the U.S. Army Corps of Engineers (USACE) yesterday. The presentation is intended to provide a broad overview of the product and he welcomed the opportunity to provide additional detailed information. The Amphibex is a fully self-contained amphibious dredging-excavator with additional function capabilities. It is equipped with a set of stern spuds, and, depending on the model, either forward spuds or stabilizers. The Amphibex can

be utilized to address coastal restoration, marsh creation, vegetation control and other related tasks. It accomplishes its work while being minimally evasive to the environment. One of the strongest features of the Amphibex is its mobilization and demobilization capabilities. The machine can be delivered close to a job site on a single lowboy and can then walk using its spuds, stabilizers and boom into the body of water. The Amphibex can operate and navigate in very shallow water. If it encounters a no water situation, it can walk across the area. The Amphibex is self-propelled and easy to position. It maintains its position using the front stabilizers and rear adjustable spuds. GPS is utilized onboard to return to a particular spot each day.

Mr. Diano discussed the Amphibex's operational capabilities. It provides high dredge production by utilizing a horizontal suction pump bucket. The bucket has a horizontal cutter with two hydraulic pumps located in the bucket. The material is pushed, not suctioned, so more solids are contained in the water. In addition to dredging and removal of material by dredge pipe, the Amphibex can spray or broadcast material by way of a pipe spray. An excavator bucket or rake attachment can be utilized for vegetation or debris removal. Other special tools, such as a pile driving attachment, can be incorporated onto the front of the operating boom.

Mr. Diano explained that the Amphibex 400 is the smallest unit. Two larger models (600/650 and 800) are available and a larger model is in design. Slides with specifications for the three models were reviewed. All models are self-propelled (vessel speed varies from 5 to 8 knots) and include an excavator bucket, jib crane, rake and below deck compartments with a large quantity of spares. Fuel consumption in full production mode ranges from 7 to 9 gallons per hour. A video of the Amphibex in operation in various applications around the world was viewed.

Mr. Diano advised that the first Amphibex for U.S. consumption will be completed in early April with five units to be subsequently produced. The cost of the Amphibex 400 fully equipped is $1.35 million. He pointed out that the maintenance costs are low.

B. Monitoring earthen & pile-supported flood risk reduction structures for the Greater New Orleans System – Vertical Datum issues & System Geotechnical and Structural Monitoring Efforts. (Rickey P. Brouillette P.E., CPRA)

Mr. Kemp advised that today's CPRA presentation is a follow up to the presentation provided at last month's CAC meeting by Mr. Cliff Mugnier, Chief of Geodesy, Center for GeoInformatics, Louisiana State University. He explained that the SLFPA-E would like to tie instrumentation on the Hurricane and Storm Damage Risk Reduction System (HSDRRS) to a precise vertical control. Mr. Brouillette is leading the State's efforts in the area of geodetics.

Rickey Brouillette, P.E., Engineer Manager, CPRA, provided the status of CPRA's survey checks on the HSDRRS and datum concerns. He advised that the CPRA is utilizing the services of Trevor Greening with Towill Surveying, Mapping and GIS Services in the area of gravimetric and hybrid geoidal models and discussed some of the work that Mr. Greening will be performing. Mr. Greening will be comparing U.S. Gravimetric Geoid 2012 (USGG2012) relative to the ellipsoid (GRS80) associated with

the datum NAD 83 (2011) and GEOID03 and GEOID12A. Mr. Greening will also process and analyze the survey data collected on the levees and floodwalls and reprocess this information. The HSDRRS was designed to NAVD88 epoch 2004.65, which was based on some modifications of GEOID03. In 2004 the National Geodetic Survey (NGS) constrained the geoid to some benchmarks across the system. The current geoidal model is GEOID12A. The CPRA is attempting to address the implications in moving forward with the monitoring of the system in terms of elevations. In addition, NGS is moving to a gravity-based only system. He noted that the ellipsoid does not change very much; therefore, the intent is to tie measurements to the ellipsoidal height in order to determine location in relation to mean sea level. The CPRA will be looking at the implications elevation-wise across the HSDRRS in terms of what it was designed for versus where it is believed to be today and the most critical needs for entities such as the SLFPA-E. This will not be known until all of the information is collected. NTB, a contractor retained by the CPRA, is collecting survey data across the HSDRRS. Phase one of the collection process has been completed; phase two is addressing on-going construction activities. The ellipsoid height for every reading across the system is being collected so that the transformations can be done to establish where things are today and where they will be in the future.

Mr. Brouillette advised that the NGS has finished collecting the airborne gravitational data for the Louisiana Gulf Coast. The result will be the development of an absolute gravity contour map and a gravity-based system. A slide showed the locations where the NTB established GPS primary control points and the location of the points NGS used to constrain the geoid. Mr. Greening wanted to ensure that the CPRA's contractor established a relationship between these factors. The slide also depicted the continually operating Global Navigation Satellite System (NSS) stations and lines showing the contours of GEOID12A. Mr. Greening downloaded the measurements that had been taken and created the undulations in the geoid for mean sea level for the Greater New Orleans area. Once this procedure is accomplished for other epochs of information, Mr. Greening will be able to review the surface differences and determine whether there are any peculiarities. The CPRA is attempting to collect and store as much information as possible for transitioning until the goal of a gravity-based system is reached. The NGS has multiple years of elevation data for benchmarks; therefore, the movement of a benchmark can be established so that corrections can be applied for how the benchmark is changing with time. Mr. Greening is unable to provide his final recommendations until all of the information is collected and analyzed. Information will also evolve over time as additional gravity data is collected.

Mr. Brouillette explained that five benchmarks appear in almost all of the height modernization programs beginning with 2004.65. The datasheets for the five benchmarks were obtained. The benchmarks are mixed in type and include surface marks and at least one deep rod monument. Therefore, movement could be associated with a variety of causes, including hydrology changes or deep seated subsidence. Additional analysis will be done to determine what may be going on at the benchmarks.

Mr. Brouillette advised that the NGS ten-year plan includes the elimination of constraining benchmarks and going totally to a gravity-based system. A contour map of the gravity relative to the ellipsoid will be developed and measurements will be taken

relative to the ellipsoid. The goal is to have one centimeter accuracy using fifteen minutes of GNSS data collection. NAD 83 and NAVD88 will be replaced with a true geocentric reference frame. The plan also calls for a transition to techniques such as Precise Point Positioning (PPP) and RTN instead of using a differentially-processed GNSS network and tracking new GNSS positioning techniques as the science advances. NAVD 88 will be replaced with a four-dimensional (time varying) geopotential gravity field (requires completion of Grav-D and new terrestrial gravity measurements).

Mr. Brouillette advised that Mr. Greening recommended that the CPRA start co-locating some of the GNSS receivers at tide stations to provide an accurate interface between the NSRS and tidal datums and phase out support for passive control.

Mr. Brouillette provided an update on the Intelligent Levee (iLevee) System. Instrumentation installed at selected sites across the HSDRRS includes in-place inclinometers (IPI), shape accelerometers arrays (SAA), tilt meters, extensometers, global positioning systems (GPS) and piezometers. Each site has different types of instrumentation. He discussed the instrumentation placed in several locations:

- 17th Street Canal Floodwall - Fiber optic cables were placed on the top of the wall and at the toe of the levee at the location of the failure during Hurricane Katrina.
- LPV-148 - Due to corrosion issues and low factors of safety for top of wall conditions, the T-wall was instrumented with a tilt meter, extensometers and an IPI. Field tests were performed to ensure that the GIS and data acquisition systems were working correctly. The tilt meter picked up some response during Hurricane Isaac (a tilt of about a millimeter per meter). The IPI moved about an inch since it was installed several months after the wall was constructed. The levee is settling and has moved laterally about an inch on the protected side. The CPRA is in the process of calibrating a three-dimensional geotechnical finite element model with soil plasticity modeling. The model will be run for 100-year and 500-year surge top of wall conditions. If a corroded pile condition is discovered, an evaluation will be made to determine the point at which there should be concern about problems with the piles.
- IHNC Surge Barrier - The USACE's contractor installed some instrumentation (shape arrays and IPIs); however, the instruments were not collecting information for a period of time. The CPRA requested that the information be pulled into the iLevee Program. Three GPS systems were also placed on the Surge Barrier as part of the iLevee Program.

Mr. Brouillette discussed monitoring that took place during Hurricane Isaac. The CPRA's contractor (Geocomp) only had funding for two GIS sites; however, e-mail alerts were provided for every site and for selected gages on rivergages.com. As part of the iLevee Program, the CPRA automated the USACE's instruments in the Chalmette area where sheetpile was driven to cut off seepage and monitored the readings during Isaac and the 2013 high river event. The relief wells along the Industrial Canal were also monitored.

Mr. Brouillette advised that the future maintenance and growth of the iLevee Program must be addressed. The HSDRRS water gages should be brought into the system. The onetime cost to bring in the HSDRRS gages is estimated at $250,000 to $300,000. The annual cost to maintain the HSDRRS gages, excluding damages, is approximately $300,000. The baseline cost of the system (East and West Banks) could be in the range of $500,000 to $1.1 million, depending on failures or damage to the system. The health monitoring portion of the system can be grown over time. The CPRA as part of the surveying effort flew the entire system with low flight aerial photography imagery, which provides a baseline elevation for the entire system. The CPRA is asking whether the Flood Protection Authorities wish to standup the system and maintain it as is, grow the system or dismantle the system.

Mr. Luettich stated that it appears that thus far the iLevee Program consists of a handful of pilot projects and asked how to go about developing a comprehensive monitoring program. Mr. Brouillette replied that the Geocomp team has a strategy relative to risk evaluations that prioritize what should be done at specific locations. The short term decision that must be made is whether the Program should be kept alive and then a decision is needed on a systematic rollout. Mr. Kemp suggested that the insurance industry may wish to contribute to the program. He recommended that a path forward be developed that includes a proposal for reaching the overall big picture. Many of the technologies have been tested and seem to work well. Mr. Luettich suggested that a five or ten year build out plan could be developed. Mr. Brouillette offered to provide a copy of the report that includes risk priorities and a rollout plan. Robert Turner, SLFPA-E Regional Director, pointed out that the SLFPA-E is obligated to collect the data from the instrumentation built into the Surge Barrier and to provide a report to the USACE. The data is currently being collected under the iLevee Program. The SLFPA-E is also obligated to maintain additional gages throughout the HSDRRS and will be obligated to collect the data from these gages as well. The Committee discussed the potential public outreach benefits that could be gained from the monitoring of the system.

Mr. Turner recommended that SLFPA-E and CPRA staff meet to discuss continuing the iLevee Program and the development of priorities. The Committee instructed Mr. Turner to proceed with the meeting and report to the Committee or the Board.

C. <u>Update on Mardi Gras Pass. (John Lopez, Ph.D., LPBF)</u>

Dr. John Lopez, Lake Pontchartrain Basin Foundation (LPBF) Executive Director, provided an update on Mardi Gras Pass located in the Bohemia Spillway. On March 20, 2012, the Pass was about 32-ft wide at the river and the water depth was 5-ft or elevation -2.5-ft. At this point a continuous connection was established to the river regardless of river stage. In January, 2014, the width of the Pass at the river was about 100-ft. Dr. Lopez discussed the bathymetric survey completed on January 18, 2012. Reaches 1 through 4 of the Pass are in degradation; at the back levee and beyond it is in deposition. Scour holes and erosion are occurring; therefore, the depths and widths of the Pass are enlarging over time. The development of the Pass has been entirely driven by natural processes with the exception of some fill that was placed in Reach 3 on the north side of the breach at the roadway.

Dr. Lopez discussed an analysis in which the depths and widths of various reaches of the channel over time were plotted. The starting point for the analysis was May, 2012 (the first complete survey of the Pass) and the ending point was August, 2013. An additional survey took place after August, 2013; however, the data has not yet been processed. The analysis showed a positive trend of increasing depth and width. The channel on average grew shallower from May to August, 2012, due to the deposition that took place during the low water period. The channel deepens during the period of August to September, 2012—a low water period during which Hurricane Isaac took place. A high water trend of increasing depths and widths took place after September, 2012. Over time the channel is gaining equilibrium and becoming more uniform. He explained that Reach 4 (the reach farthest from the river) should have been divided into two different reaches since it exhibits two different behaviors. The depth and width is more uniform in Reach 4A. In Reach 4B the channel is much deeper and wider and large scour holes appear. Reach 4A is eroding at a much lower rate than Reach 4B or the remainder of the Pass. The highest discharge measurement was 3,800 cfs during the 2013 high water period. The discharge when the river was at a two-foot stage was about 475 cfs in 2012 and about 971 cfs in 2013.

Dr. Lopez advised that ADCP surveys were conducted in the outfall area. The water from the Pass splits almost in half, flows down the Back Levee Canal and is dispersed in canals and natural waterways. Overland flow does not seem to be occurring. A survey was performed looking at turbidity and other water quality parameters. Turbidity is higher in the Back Levee Canal than in the water entering the Pass. Salinity and nitrate levels were measured in the Fucich Bayou Route from Mardi Gras Pass. The discharge plume coming out of the Pass can be divided into two zones: 1) a zone high in sediment and high in nutrients, and 2) a zone where the water is relatively clear and depleted of sediment but high in nutrients. He discussed the rating curve developed for Mardi Gras Pass. He noted that the rate of increase of the discharge is lagging behind the rate of the average growth of the channel. Reach 4A is eroding much more slowly than the remainder of the Pass and acts as a constriction limiting the maximum water flow of the Pass. The maximum theoretical discharge predicted for 2014 is 5,200 cfs with a high end of 7,000 to 12,000 cfs; however, the discharge could double should Reach 4A begin behaving like the remainder of the channel. The behavior of Reach 4A is primarily due to the soils condition. Dr. Lopez noted that theoretically there is a geomorphic limit—the Pass could evolve, stabilize and then somewhat regress. A question that must be asked is whether the geomorphic limit is above or below what is considered acceptable from a management standpoint. The State Master Plan includes a Lower Breton Diversion (50,000 cfs) at essentially the same location.

Dr. Lopez provided an update on the status of the revised permit application by Sundown Energy to install four 6-ft. culverts at the roadway. The permit was approved by the State; however, the USACE has not yet approved the permit. The culverts would reduce the cross sectional area of the Pass at Reach 3 by 95 percent.

There were no further business; therefore, the meeting was adjourned at 11:45 a.m.