

# **Draft Harris County Flood Control District Watershed Master Plan**

Gary Bezemek, P.E. Project Manager  
Harris County Flood Control District, Houston, Texas  
Gary L. Struzick, P.E., CFM Vice President  
Klotz Associates, Inc

## **BACKGROUND**

Harris County Flood Control District (District) is one of the few county wide drainage districts in the state. This District has taken a proactive approach to address flooding in the Houston and the Harris County area. Tropical Storm Allison dropped up to 40 inches of rainfall in parts of the Houston area during a 5 day period in June 2001 ( note the 100 year flood event for the Harris County area is approximately 13” of rainfall in 24 hours). Tropical Storm Allison was a significant rainfall event and it flooded large portions of the county. Since that time the District has worked with FEMA to remap all of the flood plains for Harris County. The District has begun the process to prepare Watershed Master Plans for the 22 major watersheds in Harris County. Several sources of information were available to be utilized in the development of the WMP. The 2001 LIDAR was available, new FEMA HEC-HMS and HEC-RAS models were available for the larger watersheds and previous studies or plans for many watersheds were available.

## **OBJECTIVES**

This objective of the work was to complete a reconnaissance level Watershed Master Plan (WMP) for major watersheds in Harris County. Each WMP was to be prepared on a “whole watershed” basis and will provide a plan tailored to the unique characteristics and issues in each of the County’s watersheds. Because of the various sources of data the assessments of the watersheds were split into two basic evaluations. For those major watersheds where HEC-HMS and HEC-RAS models were available these systems were evaluated using the available models. For those systems less than 15 square miles in drainage area models were not available for all portions of the open channels so a different approach was prepared for these smaller watersheds.

## **TASKS FOR THE LARGE WATERSHEDS**

A Level of Service (LOS) analysis for each watershed main stem channel and significant first order laterals was prepared. The LOS for each watershed was determined by visually

examining inundation maps based on the modeled baseline condition. A LOS value was determined for each channel reach. The available hydrologic and hydraulic models from the FEMA update were used to evaluate each watershed. Each large watershed was evaluated to determine the areas where added channel conveyance or structure replacement were needed. Several storm frequency events were evaluated. The channels were then sized to contain most of the flows within the channel without significant structural flooding. The right of way for each sized channel was determined along with the cost to construct the larger channel and associated physical elements including excavation, bridge replacements, and significant utility replacements. A matrix was then prepared to document the various costs and rights of way for each type and size of channel.

### **TASKS FOR THE SMALL WATERSHEDS**

For most of the smaller watersheds hydraulic models were not available for each system nor was there hydrologic analysis for locations within the FEMA sub-areas. Some models were available and those were used in evaluating some of these watersheds. Because much of the area that needed to be evaluated did not have detailed models available, a different process was developed to provide reasonable results while not creating all new models for the smaller areas. The methods that were chosen provided flows at locations within a upper FEMA sub-area. The flows were then used along with the available FEMA LIDAR and other hydraulic data to determine the needed channel sizing. The channels were sized by frequency. The costs for these sized channels and the needed rights of ways were prepared. This information was developed for a large number of locations within each watershed (see the exhibit below). With this approach data could be developed to determine the needed right of ways and costs for portions of channels or all of a system of channels. The summary data was developed and included in a matrix for the watershed. Shown below is a map for White Oak Bayou that shows the drainage areas, main channels and tributary channels. Also show are points within the sub areas where flows were calculated and channels were sized.



	of service Existing/Ultimate	of service Existing/Ultimate	of service Existing/Ultimate
EARTHEN CONVEYANCE CHANNEL	ROW (acres)  Cost (\$)	ROW (acres)  Cost (\$)	ROW (acres)  Cost (\$)
MULTI-USE CONVEYANCE CHANNEL	ROW (acres)  Cost (\$)	ROW (acres)  Cost (\$)	ROW (acres)  Cost (\$)

A plan view schematic map showing the extent and locations of the alternative plans as laid out in the matrix of proposed alternative improvements was developed for each channel sizing. The goal is to provide this information in a form that can be reviewed by Elected Officials, the Public, the District or others to determine where improvements are needed and order of magnitude of cost and right of way needs.

To date four of the major watersheds are nearing completion of the initial analysis and matrix development. The data is in draft form and will undergo reviews and critique. From the reviews and critique it is anticipated that further refinements will be prepared in portions of or complete watersheds where needed. A recommended plan is anticipated for each watershed.

The recommended plan will provide the results and conclusions of all investigations conducted in the planning process along with the recommended improvements and actions for the watershed. The recommended plan will be implement able in that it will not result in downstream impacts.