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the Current

A NEWSLETTER FROM THE WATER RESOURCES ENGINEERING GROUP OF HALFF ASSOCIATES, INC.

No Rainfall Gauge...No Problem!

Andrew Ickert, P.E., CFM

Many people across the state of Texas are interested in how much it rained within their local region for a myriad of reasons. Some people will look at their own personal Home Depot backyard rainfall gauge or published gauge data on the Internet or from other local media. Others may look at radar estimates from the National Weather Service. For the hydrologic and civil engineering community, accurate high-resolution rainfall data are important to many of us in our day-to-day job descriptions. For those of us with

term water demands and provide decision support for the operation of water supply reservoirs.

Point rainfall gauges provide accurate data, but their spatial extent is extremely limited. The frequency of the gauge recording can also make temporal estimates of the rainfall difficult. Accurately estimating rainfall duration, intensity, and areal coverage across a large watershed with limited gauge data can be extremely difficult if not impossible. On

the other hand, if you have a very localized drainage issue with a small watershed, rainfall gauge data may not exist within or near that area either. Radar estimates of rainfall data provide good spatial estimates, but hail and other variables can impact the reflectivity and accuracy of the radar estimated rainfall depths and intensities.

The National Weather Service (NWS) has developed a gridded (4km x 4km cell size) Multisensor Precipitation Estimator (MPE) product to optimally combine information from multiple sensors such as radar and point rainfall gauges (satellite imagery can also be used). The MPE product is created from a combination of automated and interactive procedures at the NWS to take advantage of the point accuracy of rainfall gauges and the spatial resolution that a radar product can provide. The goal is to ensure that the final MPE product is better than any single sensor. The gridded rainfall data product is on an hourly time-step and is now available to the public for the entire state of Texas



floodplain management and drainage backgrounds, knowing how much, where, and how fast rainfall occurs is critical for both real-time and post-event analyses. For those of us in the water supply world, accurate estimates of rainfall can aid in predicting short

and portions of surrounding states through a hydrologic data server hosted by the Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI). The data is archived to 1995 and is current to near real-time (within the last 2-3 hours).

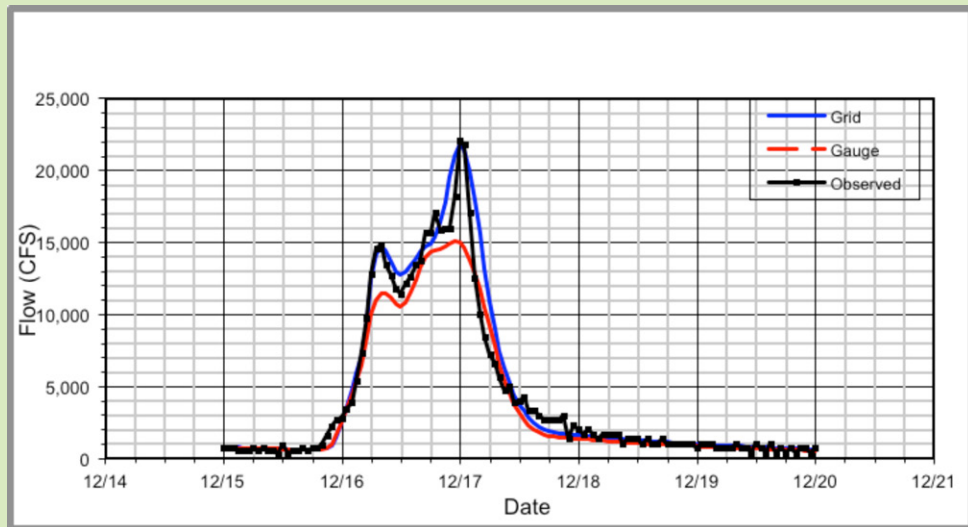
No Rainfall Gauge...No Problem!

In other words, we now have access to hourly rainfall data from 1995 through today for any 4km x 4km grid cell within Texas.

So what do we do with the data? There are tools available for accessing, viewing, and processing the data. Half has also developed some custom interfaces and tools as well. We are using the product currently for historical storm calibrations of hydrologic models, real-time flood forecasting systems, and analysis of existing or proposed drainage/floodplain systems with historical rainfall. The gridded rainfall product also yields itself to storm transposition applications to evaluate "what if" scenarios. The rainfall data can be used as precipitation input to a range of hydrologic modeling software programs. The figure on the top right compares hydrologic modeling results for a 170 square mile watershed using limited point rainfall gauge data with results using the gridded MPE product. You can see the gridded MPE rainfall produced much better calibration results with the observed streamflow gauge.

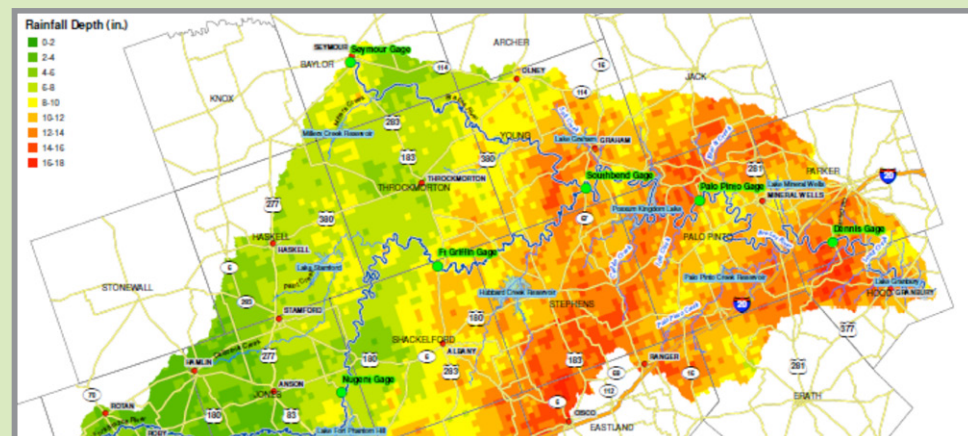
The availability of high resolution rainfall data makes taking photos of flows and highwater levels during an event even more beneficial for future model calibration and post-event analyses. Half Associates is taking advantage of Smartphone technology and applications to collect photos during flood events that include the date, time and geo-coordinates, as well as, the addition of comments. The data are then directly sent via phone to a master Geographic Information System (GIS) database server in our corporate office for future reference and analysis. The rainfall data in conjunction with the photos provide for additional non-peak and non-gauged calibration and analysis points throughout a watershed. We can also compare the MPE product to point rainfall frequency depths-durations-intensities from TP-40 or the USGS to estimate the approximate return interval of an event at a specific location.

We are actively developing and utilizing additional applications for the rainfall product. If you have thoughts, comments, potential applications, or just want to learn more about the rainfall product, please do not hesitate to contact Andrew Ickert, aickert@half.com, 817-847-1422 or your local Half Associates' representative. ♦



Above: Hydrologic modeling results with a few point rainfall gauges versus gridded MPE product.

Below: Storm totals from gridded MPE product.



Low Impact Development Design in Federal Projects

Dennis Haar, P.E.

In the summer 2011 issue of the Current, Half published an article about the Low Impact Development (LID) and the federal requirements of LID practices. Half is working on Department of Defense (DOD) projects that must meet the Energy Independence and Security Act (EISA) Section 438 requirements. Currently, Half Associates has three large DOD projects under design that must meet the EISA Section 438 requirements. Half is working on the Carl R. Darnall Army Medical Center Replacement and the Fiscal Year 2012 Unmanned Aircraft Systems Facility Site Work and Utilities in Fort Hood, Texas, as well as, the Fort Knox Hospital Replacement in Fort Knox, Kentucky. The preliminary plans for the Darnall site and the Unmanned Aircraft Facility are under review by the U.S. Army Corps of Engineers. Half will present the designs in upcoming Current articles, once the designs are approved. ♦



Emergency Water Supply

Andy Carter, P.E.

In the summer of 2011, the City of Llano suffered its worst drought in the last 50 years. With temperatures of 107 degrees and no rain, fears were that the Llano River, the City's sole source of water, would run dry leaving its 3,200 residents without a viable supply. To preserve its water, the City enacted strict Stage 4 drought restrictions eliminating all outdoor watering. Additionally, the City of Llano requested that the Texas Commission on Environmental Quality issue a senior water right call right suspending withdrawal of water upstream by all non-municipal junior water rights holders. The drought restrictions and senior call created a charged and contentious environment amongst concerned citizens, businesses and neighboring cities. The City's dire predicament was featured on ABC's Nightline and the Wall Street Journal.

In response to the summer drought, the City entrusted Half Associates (Half) to develop an analysis of existing water supply. Further, the City requested a reconnaissance of a secondary water supply to combat the drought problems that frequent the City.

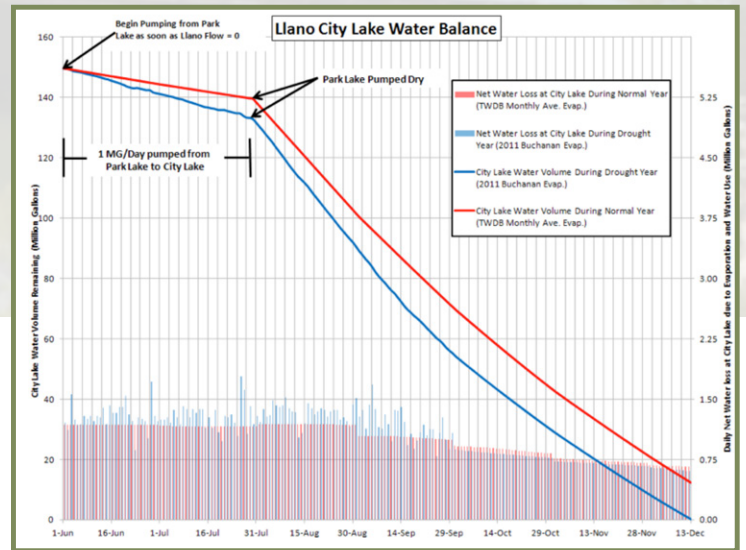
Two low profile dams on the Llano River impound approximately 700 acre-feet of water which currently serves as the City's only raw water supply. To quantify the "days remaining" availability during a worst case drought, Half conducted a water balance analysis. Leveraging bathymetric surveys of the lakes, this analysis accounted for variables such as evaporation, stream inflow and water use. To defend the City's lakes from extreme evaporation during summer months, results of Half's analysis demonstrated that the City could inexpensively extend the usability of their impounded supply by simply siphoning water from the upstream

lake. Calculations demonstrate that this transfer could extend the City's supply by over two months sustaining them through the longest recorded summer drought.

Reconnaissance of additional water supply for the City yielded three possible options. Half investigated (1) the construction of a third lake, (2) the construction of an offsite well field in the nearest aquifer and (3) the tapping of flooded fractures in the underflow of the Llano River. Cost / benefit analysis indicated that the most viable option is to drill additional wells adjacent to the river.

By simulating the 2011 drought, Half was able to assist the City of Llano in successfully implementing a strategy for water management for the next drought. With a new drought of record, results of this analysis included recommended revisions to the City's Drought Contingency Plan.

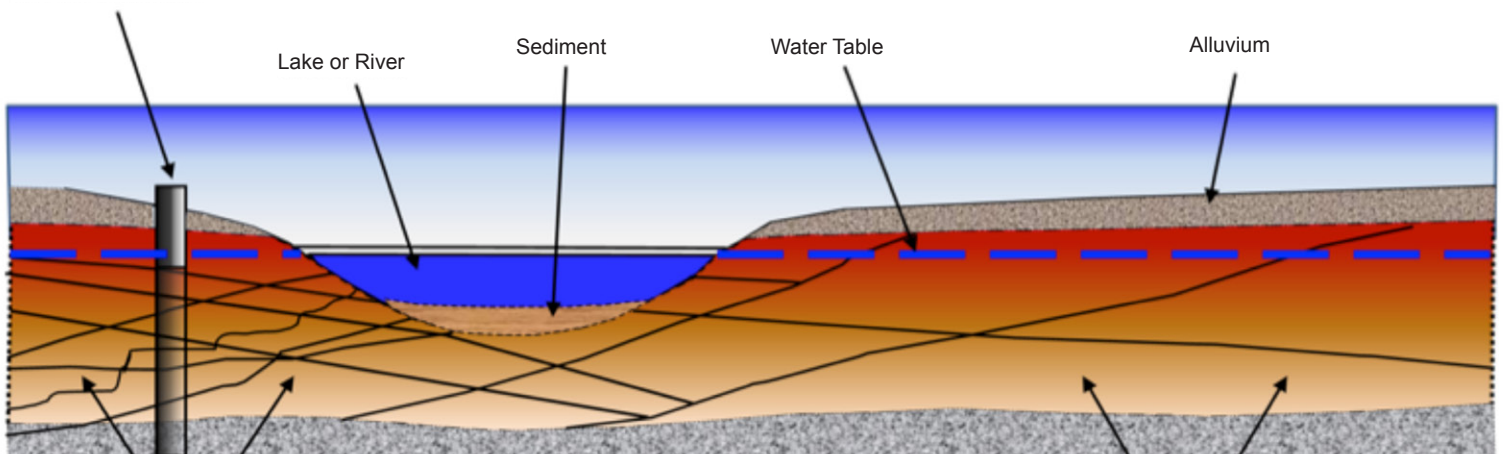
With similar droughts likely over the next few years, proper water management strategies are paramount to Texas cities. Half is ready to assist with locating and protecting water supplies to ensure Texas' communities continued growth and prosperity. ♦



Right: City of Llano, Lake Water Balance Analysis.


Below: Depiction of Water Table Recharge by River Flow courtesy of Collier Consulting.

Proposed Well completed in fractured bedrock



Highly Fractured Bedrock = Higher Well Yield

Poorly Fractured Bedrock = Low or No Well Yield



Halff Associates Wins *Three* 2012 American Council of Engineering Companies (ACEC) Texas Gold Medal Awards

"The Engineering Excellence Awards Competition has been held by the ACEC since its inception in 1975 to honor and recognize outstanding achievements within the engineering community. The distinguished panel of judges from around the state selected 13 Gold Medal and 8 Silver Medal winning projects from 44 entries based on uniqueness, originality, technical, value to the engineering profession, complexity and how successfully the project met the needs of the client." For more information about the ACEC Texas, visit www.ectexas.org. The Engineering Excellence Awards will be presented at the annual ACEC Texas Meeting on April 13, 2012 in Bastrop, Texas.

Gold Medal Winner: Category A: Studies, Research and Consulting Engineering Services - Texas Water Development Board FloodFUND Research Project

Halff developed the Flood Funding Needs Database (FloodFUND) to obtain a comprehensive assessment of the cost of flood mitigation projects throughout Texas. The FloodFUND Research Project reached out to more than 2,500 project stakeholders through several methods including emails, newsletters and phone calls. A project website (www.TexasFloodFUND.org) was created and an online questionnaire was utilized to capture stakeholder project information. Project data was incorporated into an ESRI Geographic Information Systems (GIS) database and then processed and analyzed.

Responding stakeholders represented approximately 75% of the overall Texas population. Project data was used to project an estimated \$13.84 billion in current and planned flood mitigation projects, and this data is being incorporated into the 2012 State Water Plan.



Gold Medal Winner: Category C: Structural Systems - Ponte Avenue Bridge, Town of Addison

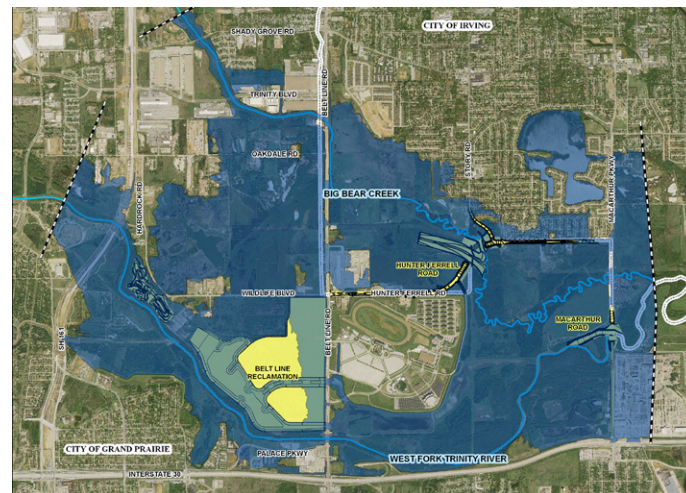
The Ponte Avenue Bridge is a centerpiece for Vitruvian Park, a ninety-nine acre mixed-use development in the southwest quadrant of the Town of Addison, Texas. When awarding the bridge design work, Addison staff freely admitted they thought they were giving Halff a nearly impossible task. Their previous designer had taken almost a year to produce the bridge plans, while Halff would need to prepare new designs for bid in only eight weeks with a small budget. Achieving consensus was an issue, since the stakeholders had differing visions of what the bridge should be. To ease this effort, Halff's Visual Science and Technology department created a brief animation to use in public meetings. Please click [here](#) to view the video. Through creative design, Halff was ultimately successful in meeting all the challenges.

Gold Medal Winner: Category G: Water Resources - West Fork Trinity River 2D Analysis, City of Grand Prairie

The goal of Halff's West Fork Trinity River 2D Analysis

was to evaluate the drainage patterns along the West Fork along the Beltline Road corridor, an area which includes several important attractions and is critical for revenue generation. Specifically, the study aimed to analyze the overland flow interaction between the West Fork and Big Bear Creek, a significant tributary that drains into the West Fork. It was critical for the City to understand the potential flooding within the study area in order to look for opportunities to foster sustainable development along this important corridor. Given the complex nature of the flow patterns, the City and Halff determined that a hydraulic model incorporating both 1D and 2D capabilities would be the most effective tool to accurately determine the flow patterns during both low-flow and high-flow situations.

The 2D model provided a comprehensive look at the flow patterns and allowed Halff to evaluate both the existing conditions, as well as the impacts that several proposed improvements along the river might have. The model has since been approved by the City Council as the best available information through a resolution. ♦



Levee Safety Viewpoints – FEMA, USACE, NCLS, Coastal Levees, and Halff

Walter Skipwith, P.E., D.WRE

FEMA

FEMA's proposed approach for Analysis and Mapping Procedures for Non-Accredited Levees was released for public comment on 15 December 2011, with a comment deadline of 30 January 2012. The document outlines revised procedures for the analysis and mapping of non-accredited levees on FEMA's Flood Insurance Rate Maps. Under the former "without levee" approach, the area on the landside of the levee was mapped as if the levee did not exist. Members of both the House and Senate expressed concern over this approach to FEMA leadership and asked that more precise techniques be employed to reflect the level of flood hazard reduction that even a non-accredited levee may have. FEMA characterizes the proposed approach as "technically sound, understandable to stakeholders, and cost effective". Halff Associates staff reviewed the document in detail and submitted comments through the National Waterways Conference, the Levee Issues Alliance and the City of Dallas.

USACE

Release of the draft Levee Safety Engineering Circular (EC) by the USACE has been delayed. Halff staff attended the June 2011, 3 day workshop for the Levee Safety EC in Denver. At this workshop, USACE staff indicated that the draft EC would be released in Late Summer/Early Fall of 2011. Most recently, the report from the Corps is that the Levee Safety Policy and Procedures Team is reviewing comments and drafting the chapters for the Levee Safety Program Engineering Circular. Once the draft EC is complete, USACE plans to host another series of outreach activities for sponsors and stakeholders. At last report, the release date of the draft EC had been pushed back to February 2012.

The USACE also released a new policy for development and implementation of System-Wide Improvements Frameworks (SWIF) (29 November 2011). The SWIF approach allows levee sponsors to remain eligible for rehabilitation assistance while they implement broader system-wide improvements to their levee. Under the SWIF policy, the Corps supports a "fix-the-worst-first" systems approach to flood risk management infrastructure to reduce risk to life safety, the economy, and the environment.

The USACE National Levee Database (NLD) was officially opened to the public on 27 October 2011. The NLD was authorized by the Water Resources Development Act of 2007, which called for a comprehensive database of our nation's levees. The NLD is an information source that allows visualization and search capability on the location and condition of levee systems nationwide. Currently, the NLD includes detailed information on more than 14,700 miles of levee systems associated with the USACE program. This includes levee systems operated and maintained by USACE; federally authorized projects built by the Corps and operated by a non-federal entity; and levees built, operated and maintained by a non-federal entity. The NLD is available at <http://nld.usace.army.mil>.



NCLS

The National Committee on Levee Safety (NCLS) has canceled its meeting scheduled for 7 February 2012 in San Jose, California. The authority and funding of NCLS is reportedly under review in Washington. The NCLS was created by Congress to "develop recommendations for a national levee safety program, including a strategic plan for implementation of the program." The Committee is made up of representatives from state, regional, and local agencies, the private sector, the U.S. Army Corps of Engineers, and the Federal Emergency Management Agency. The NCLS issued Recommendations for a National Levee Safety Program: A Report to Congress from the National Committee on Levee Safety on 15 January 2009. This Report to Congress outlined the critical components of a National Levee Safety Program and a high-level time frame and steps for its creation. Since completing the Report to Congress, the members of the NCLS have been working to further refine their recommendations, better understand the opportunities and challenges associated with the implementation of a National Levee Safety Program, and gather additional stakeholder feedback.

Coastal Levees

FEMA and the USACE are finalizing the update of surge and wave analysis to define floodplains along the Texas Coast. This updated information is critical to coastal levee systems in assessing compliance determinations with FEMA's guidelines for flood hazard mapping of leveed areas. FEMA and their study contractors recently met with each county to share the draft data that incorporate the results of the wave modeling and provide a preview of the Preliminary Flood Insurance Rate Maps (FIRM). These meetings with Texas coastal counties began in late January and continued throughout February 2012. Contact your county floodplain administrator for meeting information.

Halff

For the past 35 years, Halff Associates has been working with levee owners and operators throughout Texas on design, assessment, compliance and other issues critical to Levee Safety. Recently, Halff was selected to provide levee compliance assessment and engineering assistance to two levee systems in North Texas. Our staff is dedicated to levee safety and works diligently to maintain a complete understanding of the complex engineering and evolving policy issues at the local, state and federal levels. ♦

FEMA Approved Mitigation Plans Are Required to Receive FEMA Mitigation Project Funding

John Ivey, P.E., CFM

Local governments are required to develop a hazard mitigation plan as a condition for receiving certain types of non-emergency disaster assistance, including funding for mitigation projects. The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288), as amended by the Disaster Mitigation Act of 2000, provides the legal basis for State, local, and Indian Tribal governments to undertake a risk-based approach to reducing risks from natural hazards through mitigation planning.

The Governor's Division of Emergency Management (DEM) is the designated state agency that manages the mitigation program in Texas. Interested communities must prepare a hazard mitigation plan, submit the plan to DEM to initiate the formal review process that includes FEMA Region 6, and when FEMA approval is received, the community can formally adopt the plan.

FEMA's Multi-Hazard Mitigation Planning Guidance is the official guidance for local governments to meet the requirements of the Mitigation Planning regulations under the Stafford Act and the Code of Federal Regulations (CFR) at Title 44, Chapter 1, Part 201 (44 CFR Part 201). FEMA has published mitigation planning guidance documents that are available on the web at:

<http://www.fema.gov/plan/mitplanning/guidance.shtm>

If you are unsure if you have a FEMA approved mitigation plan you can access the Governor's Division of Emergency Management (DEM) list of FEMA approved mitigation plans in Texas at: <http://www.txdps.state.tx.us/dem/documents/FEMAApprovedMAPs.pdf>

FEMA's mitigation grant programs provide funding for eligible mitigation activities that reduce losses and protect life and property from future disaster damages. FEMA mitigation grant programs include:

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation (PDM) Program
- Flood Mitigation Assistance (FMA) Program
- Severe Repetitive Loss (SRL) Program
- Repetitive Flood Claims Program

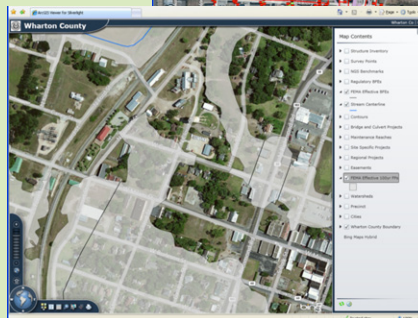
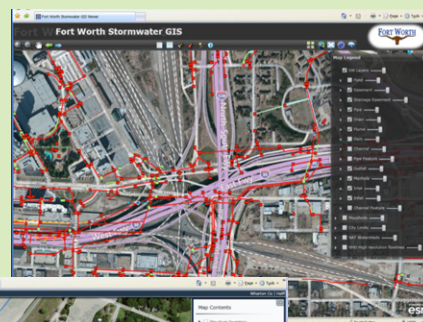
For information see FEMA's Hazard Mitigation Assistance (HMA) Grant Programs Fact Sheet: <http://www.fema.gov/library/viewRecord.do?id=3648>. If you have any questions regarding mitigation plans or the mitigation project funding requirements please contact John Ivey at jivey@half.com or 817-847-1422.



GIS Web Maps Designed & Hosted by Halff

Erin Atkinson, P.E., CFM, GISP

Not all communities have Geographic Information System (GIS) capabilities. Halff Associates, Inc. is now developing and hosting GIS-based web mapping services. A web map is an interactive display of GIS data using a standard web browser (Internet Explorer, Chrome, Safari, etc.) instead of traditional desktop GIS software. Halff has developed and is hosting web maps for the City of Lubbock, City of Fort Worth, Town of Northlake, Town of Westlake, Wharton County including the Cities of El Campo, Wharton, and East Bernard, as well as, the Texas Colorado River Floodplain Coalition (TCRFC). Each of the communities use their web maps to display a variety of information. The Cities of Lubbock and Fort Worth are using their web maps to display stormwater management features, while the Wharton County and the TCRFC are using their web maps to display floodplain information. These web maps can be designed and customized to meet specific needs. Halff also has the in-house programming expertise to develop custom applications to support geoprocessing, security logins, dashboard reporting, and mobile device integration with the web maps. The capabilities are endless. For more information please contact: Erin Atkinson, PE, GISP, CFM at eatkinson@half.com or call 817-847-1422. ♦



Texas Colorado River Floodplain Coalition

Cindy Engelhardt, P.E., CFM

In 2010, the Texas Colorado River Floodplain Coalition (TCRFC) contracted Half Associates to prepare a Flood Modeling and Mapping Needs Assessment (MNA) throughout the TCRFC basin. During the MNA process, Half coordinated with the Texas Water Development Board (TWDB) to build a database of prior, current, and planned engineering flood studies. Information for this database was gathered during several community meetings throughout the TCRFC basin. The meetings included two annual meetings and three regional meetings. In all, Half was able to document over 1,600 stream miles of floodplain mapping needs from its member communities. This first MNA was completed in early 2011. The data collected from this study was then used to apply for FEMA funding through the Cooperating Technical Partner (CTP) program.

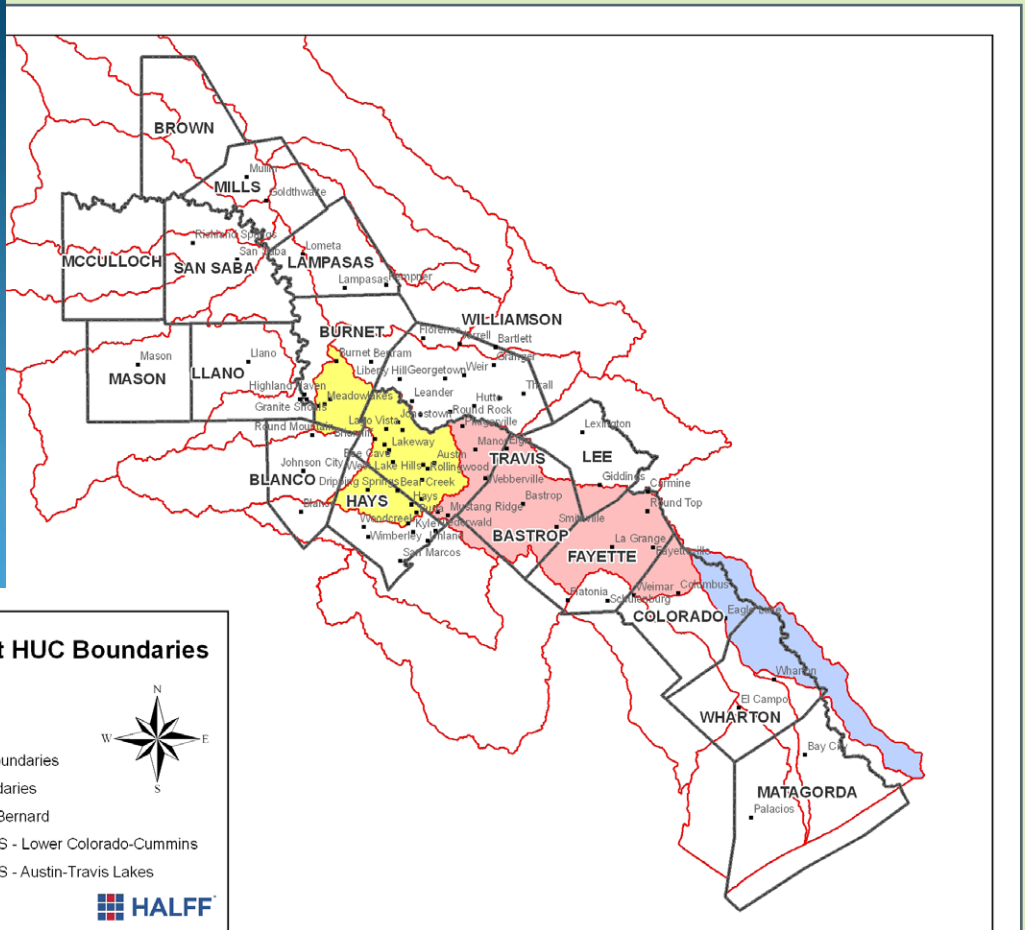
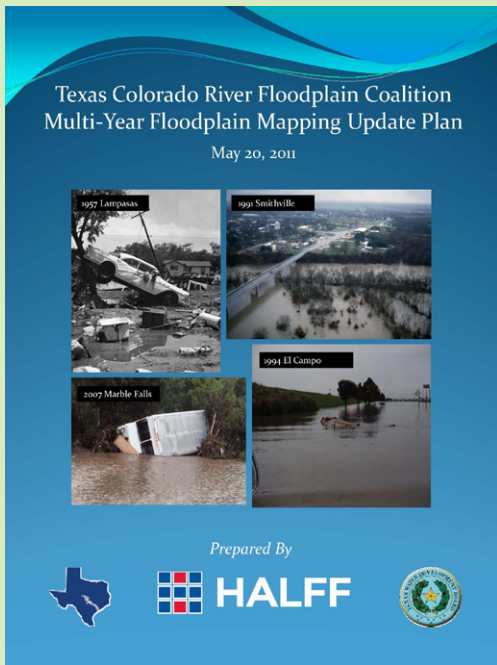
The TCRFC coordinated closely with the TWDB to apply for a FEMA CTP grant. The TWDB is a designated FEMA CTP, which allows for them to collaborate with FEMA in order to maintain current flood hazard information. With the guidance of TCRFC and the TWDB, Half Associates prepared a Multi-Year Floodplain Mapping Update Plan based on information from the TCRFC MNA. Half utilized the results of the Multi-Year Floodplain Mapping Plan to develop a Mapping Activity Statement (MAS) as the basis of the CTP grant. In the MNA, streams were categorized and ranked on an individual stream basis. To be eligible for FEMA funding, the streams needed to be grouped into large watersheds, called Hydrologic Unit Codes (HUCs).

The San Bernard HUC includes the streams within the 8-digit HUC that ranked the highest in the MNA, combined with communities that had available leverage, and was also ranked high on the FEMA Coordinated Needs Management Strategy (CNMS) prioritization. Therefore, a FEMA CTP Grant was awarded to TWDB/TCRFC for the San Bernard HUC. This study is referred to as the TCRFC Year One MAS (YR 1 MAS).

In late 2011, the TCRFC board contracted Half Associates to execute the tasks of the YR 1 MAS. The project will be implemented in multiple phases with the initial task to Perform Project Discovery and associated Project Outreach activities. The goal of the YR 1 MAS is to utilize planning information previously developed by the TCRFC communities to document the Discovery Process and prepare floodplain mapping and eventually update DFIRM maps for areas within the San Bernard watershed.

This year we intend to submit an application for federal assistance for fiscal year 2012. At this point in time it is unclear which HUC will be selected for the Year Two Mapping Activity Statement (YR 2 MAS). Based on existing data, it is possible that the next HUC proposed will be the Lower Colorado-Cummins watershed within Bastrop and Fayette counties. Once the Multi-Year Floodplain Mapping Plan is updated, we will have a better indication of the mapping needs on an 8-digit HUC basis.

The graphic displays the HUC boundaries in the TCRFC basin. ♦



Papers & Presentations:

Texas Floodplain Management Association, Spring Meeting, 2-5 Apr 2012, Corpus Christi, TX

- Wednesday, 4 Apr 2012:
 - 8:00am - Concurrent Session A1: *Utilizing Advanced Modeling for Storm Water Management*; Stephen Reiter, PE, CFM and Chris Steubing, PE, City of Sugar Land
 - 10:45am - Concurrent Session B4: *Houston, We Have a Problem: Evaluating Neighborhood Flooding and Phasing Drainage Improvements Using Dynamic 2D Analysis*; Terry M. Barr, PE, CFM and Rod Pinheiro, PE, CFM, City of Houston
 - 4:00pm - Concurrent Session G3: *Ethics in Flooding and Drainage Litigation Cases*; T. Lynn Lovell, PE, CFM and John Ivey, PE, CFM
- Thursday, 5 April 2012:
 - Plenary Session #1: *TFMA Freeboard Surveys 2004-2012*, John Ivey PE, CFM and Roy Sedwick, CFM, TFMA

www.tfma.org

Association of State Floodplain Managers, Annual Meeting, 20-25 May 2012, San Antonio, TX

- Tuesday, 22 May 2012:
 - 10:30am - Concurrent Session A3: *TFMA Freeboard Surveys 2004-2012*, John Ivey PE, CFM and Roy Sedwick, CFM, TFMA
 - 1:45pm - Concurrent Session B6: *TFMA's 2011 'No Adverse Impact' Survey of Texas Communities*; Mike Moya, PE, CFM; Brian Reis, PE, RPS Espey; Brian Wells, PE, MWM Design Group, Inc.; and Mike Newman, PE, City of Temple
 - 3:45pm - Concurrent Session C7: *Where Did the Creek Go? Examining a Zone 'A' Where There is No Stream*; Terry M. Barr, PE, CFM and Sam Hinojosa, PE, CFM

www.asfpmconference.org

Call for Volunteers: If you are interested in volunteering at the 2012 ASFPM Conference, please contact Jessica Baker at jbaker@halff.com. Volunteer roles range from Room Monitors, Assistance with Luncheons and Plenary Sessions to Social Event Direction. Volunteers are needed Sunday – Friday and shifts last between 30 minutes – all day.

CHECK THESE
IMPORTANT

Dates

2-5 April 2012

TEXAS FLOODPLAIN MANAGERS
ASSOCIATION, SPRING MEETING,
CORPUS CHRISTI, TX
WWW.TFMA.ORG

10-13 April 2012

TEXAS WATER 2012 CONFERENCE
WEAT & TAWWA
SAN ANTONIO, TX
WWW.TEXAS-WATER.COM

18-21 April 2012

TEXAS SECTION ASCE,
SPRING MEETING,
SAN ANTONIO, TX
WWW.TEXASCE.ORG

20-25 May 2012

ASFPM
ANNUAL NATIONAL CONFERENCE,
SAN ANTONIO
WWW.FLOODS.ORG

6-9 June 2012

TEXAS PUBLIC
WORKS ASSOCIATION
ANNUAL CONFERENCE
MESQUITE, TX
WWW.TPWA.ORG

13-15 June 2012

TEXAS WATER
CONSERVATION ASSOCIATION
MID-YEAR CONFERENCE,
HORSESHOE BAY, TX
WWW.TWCA.ORG