

ASCE

American Society
of Civil Engineers



ASCE Illinois Section

News

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Available Computational Tools for Floodplain Analyses

By Tatiana Hernandez, PE, CFM, Tetra Tech

With the development and availability of high-resolution topographic data, state-of-the-art Laser Imaging Detection and Ranging (LIDAR), and Geographic Information Systems (GIS) raster and feature datasets, using geospatial data for hydrologic and hydraulic modeling, floodplain analysis and mapping is now mainstream. This trend has prompted the usage of computational aids to process and analyze the substantial amount of data on hand.

Computer models such as the Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS) and the Hydrologic Engineering Center's River Analysis System (HEC-RAS) are widely used for floodplain analyses or to create digital flood insurance rate maps (DFIRMs) for the FEMA map modernization program. Utilizing these models for regional and state-wide projects, however, requires significant amounts of input data. In addition, the post-processing of hydrologic and hydraulic modeling results, if not automated, can be time consuming when using GIS for floodplain mapping. The integration of widely available computational tools into hydrologic and hydraulic modeling and floodplain mapping improves accuracy, efficiency, and provides better visualization of results. The various tools discussed include HEC-GeoHMS, HEC-GeoRAS, WISE, CHECK-RAS, and RASPLOT.

Hydrologic Tools

Many hydrologic studies for floodplain analysis use the Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS). HEC-HMS is a rainfall-runoff model developed by the U.S. Army Corps of Engineers (USACE) Hydrologic Engineering Center and is designed to simulate event-based and continuous precipitation-runoff

The integration of widely available computational tools into hydrologic and hydraulic modeling and floodplain mapping improves accuracy, efficiency, and provides better visualization of results.

processes in a watershed. Setting up the HEC-HMS model involves the use of high-resolution spatial data including topographic, land use and hydrologic soil conditions. The spatial data analysis is performed in a GIS interface and using the Geospatial Hydrologic Modeling extension, HEC-GeoHMS, developed by USACE.

(continued on page 4)

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President's Notes

Kay Whitlock, P.E., M. ASCE



The national ASCE conference was held this past month in Orlando, Florida. I attended the conference as the new Illinois Section President. I will share some observations from the experience. The first two days centered on international issues. Through service on the Task Committee on Global Principles for Professional Conduct, I had developed an interest in civil

engineering practice worldwide. After moderating an early session on the first day, I was able to participate as an

Opportunities to meet new people and welcome them to ASCE were constant.

interested attendee. This year the sessions were largely focused on water policy. It was interesting to note that the problems we experience in this part of Illinois are so universal. The Administrator of the Panama Canal spoke at a luncheon. The business of the canal is changing as they work to deliver safe and efficient passage. Major improvements are being implemented on canal capacity and efficiency. An interesting concept in their commitment to schedule is a guaranteed passage time: the ship does not pay the toll if the passage does not meet the stated passage time.

Because the student activities are spread through the conference timeline also, there were often students in the audiences. The breaks were particularly fun. Opportunities to meet new people and welcome them to ASCE were constant. Again, I observed that the Illinois Section (and its President by association) was well respected. I met engineers from Ghana, Spain, Panama, Costa Rica, Mumbai, Korea, Mexico, and Japan. As we talked

I met engineers from Ghana, Spain, Panama, Costa Rica, Mumbai, Korea, Mexico, and Japan.

about the civil engineering groups back home, the similarities of our issues were striking. How do we serve our members? How do we serve the large

ASCE Illinois Section News

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Illinois Section - Zone III - District 8

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Newsletter is the 10th of the month.**

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One very valuable session was a brainstorming opportunity where we did a free-for-all of ideas.

geography of our section, group? How do we get young engineers involved? How do we keep older members actively involved? Many times, the parting comment was: "Let's keep in touch; we can help each other."

One focus at the convention was on national awards and recognition. A proud Illinois Section occasion took place as Nick Textor was among

those honored for his service as ASCE Director. The Illinois Section has been well represented by Nick's service over the years. We should thank Nick for his dedicated service to our profession.

The most valuable time spent at the conference was at the Council of Presidents as it was attended by Presidents of sections and branches from around the country. New ASCE President, David Mongan, spoke to us about his focus on local leadership. Other sessions included getting better news coverage for civil engineers and engineering issues: an update on "Raising the Bar", the new Body of Knowledge to be released in February

2008 and policy 465, State Capitol "Drive-In" days; ASCE Strategic Planning, the new infrastructure program related to water and wastewater, entitled "Liquid Assets". One very valuable session was a brainstorming opportunity where we did a free-for-all of ideas. The other Presidents were particularly interested in the fact that we've been hiring a radio personality to MC our annual awards dinner. All agreed that it could work to keep the evening on schedule and perhaps enliven the event. We also agreed that some radio discussion in the following days would be a secondary benefit. **ASCE**



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Available Computational Tools for Floodplain Analyses

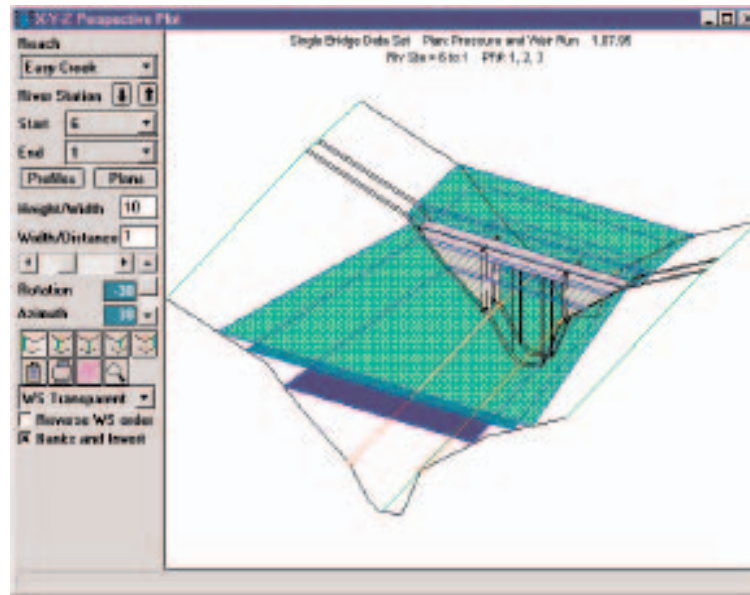
(continued from page 1)

HEC-GeoHMS capabilities extend from processing the digital elevation model to performing spatially intensive analysis of grid-based land use and soils data to estimate and import the hydrologic parameters required by HEC-HMS. The HEC-GeoHMS extension automates the process of watershed delineation, composite curve numbers, time of concentrations, and storage coefficients.

The appropriate resolution and consistency of the datasets is one of the main challenges in developing hydrologic parameters for GIS use. In some areas, for instance, a state's Land Cover Class System (LCCS) dataset and the Gap Analysis Program (GAP) land-cover dataset are both needed for the land use analysis. In order to obtain consistent land use classifications for curve number definition, the more detailed land use dataset from the LCCS can be reclassified into common class levels of the GAP data.

Hydraulic and Floodplain Mapping Tools

Hydraulic modeling of surface streams for floodplain analysis is usually performed using the USACE Hydrologic Engineering Center's River Analysis System (HEC-RAS) model. HEC-RAS performs one-dimensional water surface profile calculations using geometric data and steady flow data. The flow data required by the model include peak flows for each flood profile, which are exported from HEC-HMS into HEC-RAS. The geometric data required by the model include the stream network, cross-section river stationing, elevation and station information for each cross section, channel and overbank downstream reach lengths.



Geometry of a culvert crossing using HEC-GeoRAS

The HEC-RAS geometric data can be developed using the ArcMap GIS application in conjunction with HEC-GeoRAS, created by USACE. HEC-GeoRAS is a GIS tool designed to process geospatial data for use with the HEC-RAS model. It automates and streamlines a number of GIS operations and eventually creates a HEC-RAS import file containing geometric data based on digital terrain model (DTM) information such as station identifiers, cross-section station and elevations, downstream river reach lengths, main channel alignment, right and left overbank data, ineffective flow areas, storage areas, and Manning's roughness coefficients. In addition, the HEC-GeoRAS tool is used to post-process HEC-RAS modeling results and delineate floodplains and floodways for each stream.

The DTMs, if not available, can be created using GIS point layers extracted from LIDAR data and converted into Triangular Irregular Network

(TIN) layers that represent the ground topography. Field survey data for channel crossings are required for input of bridge and culvert properties. The locations of the cross sections can be set and edited by the user or can be created automatically using HEC-GeoRAS. Aerial photographs and contour data, if available, are very useful to lay out the cross sections. Existing FEMA 100-year floodplain boundaries can be used as guides in determining the extent of the cross sections. The average distance between cross sections varies but smaller distances between cross sections should be selected near structures and near abrupt changes in channel conveyance.

Field survey data, including cross sections and structures, can be processed using the Watershed Information System (WISE). WISE (Watershed Concepts, 2005) is a tool for managing and utilizing data for watershed studies. WISE consists of several modules that provide integration of GIS with hydrologic and hydraulic programs. The Open Inventory

module can be used to convert the structure and cross section data from field survey ASCII format into HEC-RAS input data format. The cross sections and structures, with available field survey data, that are generated from a TIN layer in HEC-GeoRAS should be adjusted in HEC-RAS with the surveyed cross section and structure data exported from WISE.

The HEC-RAS model geometry should be reviewed and adjusted using field survey data to correct potential erroneous representations caused by DTM resolution constraints, such as poor resolution in areas with tree canopy. The HEC-RAS model should also be checked for reasonableness of the hydraulic parameters assumed and water surface profiles obtained. The HEC-RAS Automated Review Program, CHECK-RAS can be used for this purpose.

Typically, there are two ways to visualize HEC-RAS modeling results. Results can be displayed as X/Y coordinate plots or in spatial graphical maps. X/Y coordinate plots are two-dimensional graphs of the flooding profiles that show the relationship between distance along the stream and water surface elevations. X/Y coordinate plots of flood profiles can be automatically generated using RASPLOT. Spatial graphical maps are two-dimensional representations of flooding areas. These maps can be automatically generated using HEC-GeoRAS.

RASPLOT is a computer program that creates flood profiles by automatically extracting data from HEC-RAS input and output files. The final product from RASPLOT is in DXF file format (drawing interchange format)

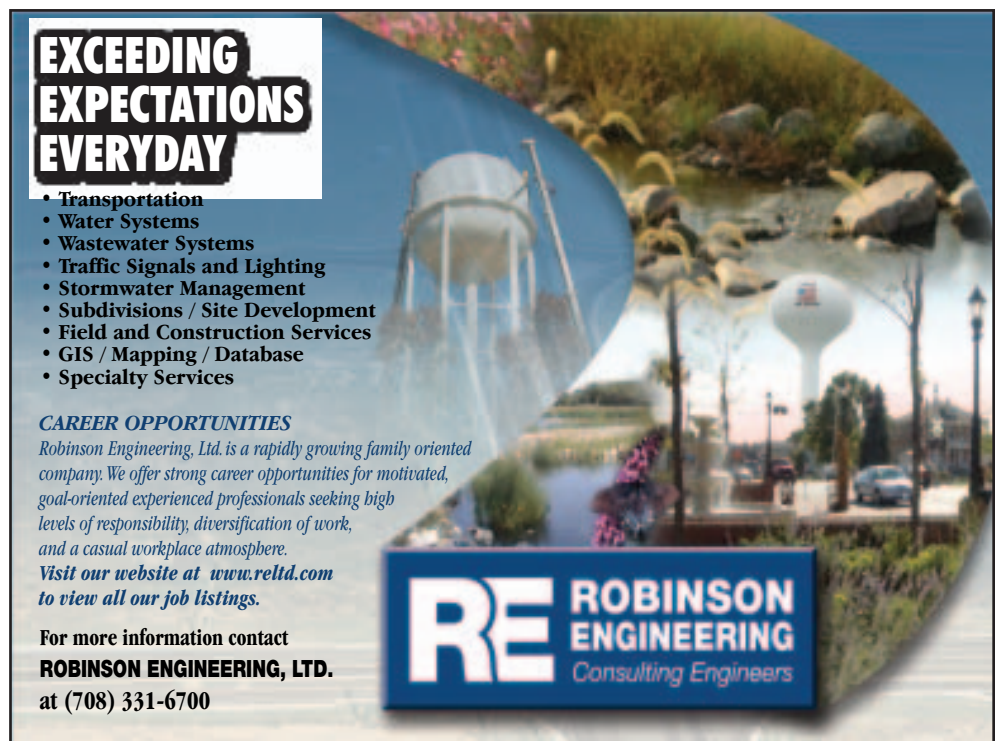
which allows for editing and printing of profiles as necessary. Flood profiles for the 10-, 50-, 100-, and 500-year events are generated for a specific stream or reach and are format-ready for FEMA Flood Insurance Studies.

Water surface elevation data exported from HEC-RAS simulations are processed by HEC-GeoRAS for visualization of flood hazard zones in a GIS interface. HEC-GeoRAS facilitates the generation of floodplain maps by reading the spatial data format (SDF) file from HEC-RAS, creating a geodatabase that contains the terrain data and water surface information extracted from the SDF, and intersecting this layer to create a polygon of the floodplain. Floodplain boundaries are created based on TIN surfaces. The resolution of the floodplain boundary varies depending on the resolution of the TIN. The floodplain

generated by HEC-GeoRAS should be carefully reviewed against topographic or survey data.

Regional or statewide floodplain analyses require substantial amounts of data processing. By using GIS raster and feature datasets, HEC-GeoHMS and HEC-GeoRAS automate the pre-processing of input data and post-processing of results. Pre- and post-processing data should be carefully checked when using these computational tools because most geospatial data is not centralized in one clearinghouse and data comes in different resolutions and formats, and from various sources.

For a more in-depth description of these tools and its applicability to a DFRIM case study, obtain the full article titled “*Floodplain Analysis Using Computational Tools*” from <http://cedb.asce.org/>. **ASCE**



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Section Activities

D E C E M B E R 2 0 0 7 - J A N U A R Y 2 0 0 8

Transportation Group

Luncheon Program

Speaker: Catherine Kibble, P.E. –
IDOT Region 1, District 1

Topic: I-55 Widening Project

Date: Tuesday, December 4

Time: 11:30 am – 1:30 pm

Place: Maggiano's
1901 E. Woodfield Road
Schaumburg, IL 60193

Information: Catherine Kibble has been employed by the Illinois Department of Transportation for 23+ years and is currently the Consultant Services Section Chief in the Bureau of Design. Catherine has taken on a variety of roles such as Resident Engineer in construction, Phase I Squad Leader in the Bureau of Programming, and Phase II oversight of contract plan preparation. In addition to her dynamic responsibilities, Catherine has also made many noteworthy accomplishments including being named Civil Engineer of the Year, by IDOT, for her oversight in the \$410 million Kingery Expressway reconstruction project. Catherine will now be joining us to discuss the current status of the widening projects along I-55 from Interstate 80 to Weber Rd. The main topics of this discussion will include the timelines and scope of work for each roadway contract and their connection to the ultimate plan for improvement of Interstate 55.

Cost: \$40/\$15 Students

PDH: 0.5 Professional Development
Hours will be earned by attendance

RSVP: Arun Heer, Arun.Heer@hdrinc.com

Holiday Party

Date: Tuesday, December 4

Time: 5:30 pm – 9:30 pm

Place: Rock Bottom Brewery
1 W. Grand Ave.
Chicago, IL 60610

RSVP: James Reisert,
James.Reisert@strand.com

Information: FREE food, cash bar.

We request that you bring one unwrapped toy to donate to Toys for Tots (No stuffed animals please)

Structural Group

Monthly Meeting / Holiday Dinner

Date: Wednesday, December 19

Time: 5:30 pm

RSVP: Timothy Gall (312) 616-7916
GALLTC@teng.com

Younger Member Group

Holiday Party

Date: Tuesday, December 4

Time: 5:30 pm – 9:30 pm

Place: Rock Bottom Brewery
1 W. Grand Ave.
Chicago, IL 60610

RSVP: James Reisert
James.Reisert@strand.com

Information: FREE food, cash bar.
We request that you bring one unwrapped toy to donate to Toys for Tots (No stuffed animals please)

Outreach Project

Date: Sunday, January 6, 2008

Time: 10:00 am – 2:00 pm

Place: 5414B West Roosevelt Rd.
Chicago, IL 60644

Organization: H.O.M.E. (Housing
Opportunities & Maintenance
for the Elderly)

Contact: Carrie Westhoff
cwesthoff@kudrna.com
or 312-895-3108

Information: We are organizing a group to volunteer with H.O.M.E. (Housing Opportunities & Maintenance for the Elderly) on Sunday, January 6th. H.O.M.E. is an organization that dedicates themselves to assisting the elder members of our community who have limited resources. The particular project that we'll be assisting with is called Weatherization. It consists of installing temporary windows to help keep a person's home warmer and more energy efficient during our harsh winter months. This requires absolutely no experience and can be mastered thru a simple 20 minute training session.

Environmental Engineering & Water Resources Group

Annual Holiday Dinner

Date: Tuesday, December 11

Time: 5:30pm Cash Bar
6:00 pm Dinner

Place: Greek Islands Restaurant
200 S. Halsted
Chicago, IL

Cost: \$5 per person

Contact: Heather E. Henneman
(312) 683-7832
HennemanHE@bv.com

Urban Planning & Development Group

Holiday Party

Date: Thursday, December 13

Time: Social Hour 6:00 pm
Dinner 7:00 pm

Place: Weber Grill
1010 N. Meacham Rd.
Schaumburg, IL 60173

RSVP: Jon Vogt, jon-v@haegerengineering.com
(847) 230-3181

Information: We ask all attendees to donate goods (or money) to support our troops serving overseas. Information can be obtained from www.osotil.org Guests are welcome but space is limited.

Monthly Meeting

Date: Thursday, January 10, 2008

Time: 6:00 pm

Place: Bollinger, Lach & Associates
333 Pierce Rd, Suite 200
Itasca, IL 60143

RSVP: Jon Vogt
jon-v@haegerengineering.com
(847) 230-3181

Information: Monthly meeting sponsored and hosted by Bollinger, Lach & Associates; dinner and refreshments served at the meeting.

Illinois Section News & Secretary Report

N O V E M B E R 2 0 0 7

In an effort to inform Illinois Section members of the discussions at the monthly Board meetings, the Section Secretary contributes this monthly article to the newsletter. Any questions or comments on the Board activities are welcome by contacting Chris King, at cking@reltd.com

■ Treasurer's Report

▲ Treasurer Olson distributed the Treasurer's Monthly Report and Income Statement. The report was reviewed and approved as submitted. See Attachment 1. The revenues for the annual dinner are lagging the expenses, but the overall cost should be a net positive. Discussion on the use of an external audit on an annual basis took place and will be investigated.

■ Group Reports

▲ All Groups presented a written report outlining previous and current month's activities.

■ Standing Committee Reports

▲ Communication & Web Site: The new website has been launched and all members have been notified via email. The new site includes a membership survey. The web site will continue to be a work in progress and feedback is encouraged. The Board thanked the national offices of ASCE for their help in this endeavor.

▲ Minority Affairs: Minority Affairs continues to coordinate the section activities with other organizations such as Engineers without Borders in an effort to pool resources.

▲ Public Affairs Committee: Discussion took place on the combining of resources with ISPE for a General Assembly Reception. ISPE has declined to participate. The legislative reception is targeted for late February early March.

▲ Membership Committee: A summary of the Annual Dinner was discussed. The final headcount was 410 people. The venue was received well. A suggestion was made to focus more on the awards and less on a keynote speaker. Also, the use of an emcee was viewed very positively. These thoughts will be passed on to the 2008 Dinner Committee. Students from IIT, UIC and Northwestern volunteered to assist with the dinner and the board expressed their gratitude. Also, the sponsors (listed at the end of the minutes) were thanked. The communications chair will research the use of ASCE National for possible distribution of the newsletter at a reduced cost. Future pizza parties for membership recruitment will be investigated. Additionally, the chapter will focus on reaching out to our more remote members.

■ New Business

▲ President Whitlock indicated that she will be preparing a controlling calendar for the upcoming year. Work on the current year budget will begin.

▲ Contact Information for New Board Members – Past President Johnson requested that all new board members and group chairs verify and update the contact information for the chapter database.

▲ IIT Funding Request. Students from IIT made a presentation on the Haiti Outreach program. A request for assistance in funding this year's program in the amount of \$1000 was made. The budget has the means to provide for this funding. The motion was approved unanimously

▲ UIC students made a presentation on the student activities this year, including the steel bridge contest and the concrete canoe. A request for \$1,000 to be used towards the steel bridge contest was presented. The budget has the means to provide for this funding. The motion was approved unanimously

▲ Director Cussen has prepared an application for a SPAG grant to begin planning for an IL Section ASCE Report Card on the infrastructure in Illinois.

▲ Mr. Matt Miller made a presentation on the Future City Chicago program. A request for \$1,000 in funding was made and was approved unanimously. This was a budgeted item. VOL-UNTEERS are still needed. Corporate sponsorships are also available.

▲ Infrastructure Report Card – Past President Khan is still preparing a large SPAG application for "2008 STATE PUBLIC AFFAIRS GRANT PROGRAM" for a minimum amount of \$5000. A committee of ten persons (maximum) will be formed that includes CEOs, senior managers and government/public sector officials from different branches of civil engineering. Collection of data and their input will be of prime importance. The Section will seek support from the National and also from other Sections to make this project successful. The SPAG amount will be used for collecting various data (from private & public sector), meetings, travel, preparation of draft and the final "ASCE-Illinois Section Infrastructure Report Card". The Report Card will be presented at the Illinois Section Annual Dinner meeting in 2008 and also released to the media. If you are interested in participating in this effort please contact moid46@sbcglobal.net. As part of the report card – an element of solutions will be included.

▲ Committee Chair Openings for 2007-2008 – President elect Whitlock discussed the many openings and will be seeking past chairs and past presidents to fill these openings. President elect Whitlock would also like to focus on diversity and participation by public agencies. These positions include:

- Annual Dinner Committee
- Awards and Prizes Committee
- Committee for Public Information
- Finance Committee
- Minority Affairs Committee
- Membership Committee
- Communications Committee
- Nominating Committee
- Past President's Council
- Planning Committee
- Student Chapter Committee
- Student Outreach Committee

If interested in any of these positions please contact kwhitlock@cbbel.com.

■ Old Business

▲ National Conference Involvement (Orlando, Nov. 1-3, 2007) – President Whitlock attended the annual conference and found that the information learned about ASCE National is invaluable. In future years, it is recommended to budget additional people to attend for the betterment of our local chapter.

▲ ASCE Public Relations Training (November 15) – Secretary King will be attending on behalf of the Section, the event will be held at Purdue University and is called You May Have Your P.E., But Do You Know Your PR?

▲ Future Cities Program - This event is in need of new volunteers, please contact Past President Wittmer dwittmer@hntb.com if interested in participating. Technical groups have provided judges and sponsored awards for this event and should begin planning now. For more information see <http://www.futurecitychicago.org/>

▲ The next board meeting is scheduled for Monday, December 3, 5:30pm at MWH Americas, Inc., 175 West Jackson Blvd, 19th Floor

By Christopher J. King, PE, SE, Secretary
cking@reltd.com

ASCE Illinois Section News

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December 4 Transportation Group Luncheon Program

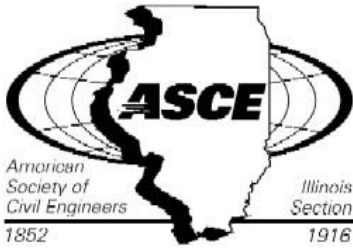
December 4 Younger Member Group / Transportation
Group Joint Holiday Party

December 11 Environmental Engineering & Water Resources
Holiday Dinner

December 13 Urban Planning & Development Group
Holiday Party

December 19 Structural Group Monthly Meeting /
Holiday Dinner

PLEASE VISIT ISASCE.ORG FOR MORE
INFORMATION REGARDING ILLINOIS SECTION
ACTIVITIES AND EVENTS



The Environmental Engineering and Water Resources Group is hosting a

Levee Certification Dinner Seminar

Michael DePue, P.E., CFM, D. WRE is the Floodplain Hazards Management Group Operations Manager at PBS&J. Mr. DePue is author or co-author of four papers on flood modeling and has taught several dozen courses and seminars on FEMA flood mapping. His experience includes management of countywide Digital Flood Insurance Rate Map (DFIRM) production, levee database development, and flood mapping operational and business planning. At the Association of State Floodplain Managers 2007 Annual Conference he presented a technical session on "Levees – Policy, Analysis, and Accreditation."

Levee Certification

- Procedure Memorandums 34 and 43
- Accreditation vs. Certification
- Corps of Engineers and FEMA
- 44CFR65.10 Requirements
- Recent Experience with Certification

Date: Thursday, January 10, 2008

Time: 5:30 to 8:30 pm

Location: Marcello's
645 West North Avenue
Chicago, Illinois 60610
Free Parking

Professional Development Hours: 2

Registration includes full family-style dinner (entrée, salad, homemade Italian bread, vegetables, dessert) and non-alcoholic beverages. A cash bar will also be available. Seating is limited so please respond early!

Registration Form

Reservations are required by close of business on Wednesday, January 2, 2008. If you have any questions please call Heather Henneman at Black & Veatch at the number below.

Please fill out one registration form per person.

Name: _____

Company: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Phone: _____ Fax: _____

Email: _____

Levee Certification Dinner Seminar – ASCE Member (\$45) Member #: _____.

Levee Certification Dinner Seminar – Non-ASCE Member (\$50)

Amount Enclosed: \$ _____

Send completed form and check made out to "ASCE Illinois Section EE&WR" to:

EE&WR c/o Black & Veatch, Attn: Heather Henneman, 101 N Wacker Drive – Suite 1100,
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