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Wednesday, Nov. 11
3:30 PM – 5:00 PM
SESSION 53: Addressing the State of our Nation's Levees

Addressing the State of Our Nation's Levees – Investment Priorities and Approaches - Rob Vining, HNTB Federal, Baton Rouge, LA

While levee failures following Hurricane Katrina and last year's Midwest flooding should have sparked the political will to address this national issue, evaporating state and federal resources are placing levees in danger of becoming a "forgotten crisis." The stimulus package provides a case in point. While transportation infrastructure received much of the focus and funding in the stimulus package to upgrade public infrastructure and create jobs, our water infrastructure has taken a back seat in funding. As experts in our industry, we must play a critical role in helping bring this crisis to the public's attention and pushing forward smart policy recommendations to the politicians and policy makers. The presentation will address the state of our nation's levees, industry's role and approaches to advance this issue for national debate. As vice president and leader for HNTB Federal's water resources and geotechnical practice in the Gulf Coast region and throughout the United States, Rob Vining leads a dedicated group of levee, water and geotechnical experts who restore and rebuild infrastructure that protects the environment and secures our homeland in major metropolitan areas. Vining brings more than 30 years of experience to HNTB and its clients. He is a well-recognized leader in water resources planning as well as program and project management. His in-depth knowledge and relationships with policymakers and engineers alike give him a unique perspective valued by federal, state and local governments. He currently serves on the National Levee Safety Review Board.

Flood Risk Management and Innovative Technology Applications: How the Latest Advances in Levee Technology Can Help Agencies Plan and Prioritize and Understand Their Projects - Tom Poer, HNTB, Kansas City, MO

Water is seeping through a levee near a major metropolitan area. Sensors in the levee detect the seepage and warn the agency of the risk, simultaneously alerting authorities and notifying first responders. The agency mobilizes and repairs the levee, saving lives and property. Intelligent levee systems can make that hypothetical situation a reality – dramatically increasing an agency's ability to evaluate, maintain and monitor its levee system, as well as protect critical infrastructure, natural resources and, above all, citizens. HNTB created Levee Vital Signs™ after seeing agencies struggle to define risk, liability and priorities with limited funding. Tom Poer, HNTB national levee practice director and industry veteran, is prepared to discuss this technology and its pilot application with test projects with the USACE Kansas City District as well as potential applications along the Gulf Coast. Flood Risk Management has evolved over the recent years. Approaches including levee asset management and new technology applications are helping agencies operate and maintain their water resource infrastructure in better ways. He will describe the geospatial software, how it's built over the National Levee Database model, and how it can serve as a decision-making and database visualization tool that works through a levee's life cycle. Poer then will detail Levee Vital Signs' components, including: --New technology applications that allow us to monitor a levee's "vital signs" in real time. --Visual and gaming technology that allows stakeholders/public to test-drive and modify a design before breaking ground, perform what-if analyses and create simulations of what might happen if infrastructure problems are left unaddressed. Intelligent levees and levee asset management can help agencies increase their effectiveness, plan more efficiently and respond faster. Finally, he will highlight the benefits of new technologies and explain how Levee Vital Signs and other applications can help agencies inventory their systems, assess conditions, identify critical repairs, measure risk, estimate repair or replacement costs and prioritize projects to maximize limited budgets. He will be available after the presentation to answer questions.

Implementing Levees, Reservoirs and Stream and Floodplain Restoration in Concert to Reduce Flood Risk - Michael Schwar, HNTB, Milwaukee, WI

In response to two large and damaging flood events in the late 1990's the Milwaukee Metropolitan Sewerage District (MMSD) initiated watershed-wide planning with the aim of reducing the risk of flooding within Milwaukee County and some adjacent waterways. The resulting plans incorporate multiple approaches including stormwater regulations, non-structural measures (open-space preservation and buy-out of flooded structures) and structural measures (flood management reservoirs and levees). Since developing these plans the MMSD has spent or committed more than $200 million to reduce flood risk along the Menomonee River alone with the ultimate goal of reducing the probability of flooding to one percent annual levels or less for all residential structures. Along the lower Menomonee River levees have been constructed or designed to reduce the flood risk for a number of urban areas that experienced severe flooding during 1997 and 1998. A 970 acre-foot flood control reservoir (currently under construction) is also required to adequately reduce downstream flood flows. Floodplain lowering, often tied to structure buy-out and removal, is being incorporated at selected locations and provides opportunities for environmental enhancement. This paper presents an overview of several of the lower Menomonee River project components and discusses how design considerations have evolved since plan development (such as flows, modeling techniques and incorporation of environmental function) and how the evolution of design considerations such as acceptable level of protection and levee concerns are likely to affect future planning efforts.

Westbank and Vicinity, New Orleans, Louisiana Hurricane Protection Project's West Closure Complex, Interior Drainage Pump Station Design and Construction - Robert Ivarson, HNTB Corporation, Chicago, IL

The studies are complete. The design was initiated in January and required to be complete in November. The Contractor is on board under a type of contract called Early Contractor Involvement (ECI), reviewing the AE design, providing advice, and starting construction of components as the design of those components is completed. This paper / presentation describes the design and early stages of construction for this 100% reliable pump station which will have a design discharge capacity of 20,000 cfs. 13 Diesel driven pumps each capable of discharging 1,540 cfs will be housed in a 606' long pump station. And the station has to be partially operational (12,500 cfs discharge capacity) by June 2011. All of the technical issues are significant because of the station size and flow rate. The station will sit on 1,700, 105' long, 24" diameter pipe piles. The pile cap / base slab will contain 24,000 cy of reinforced concrete. The 5,000 Hp engines will consume over 300 gallons of fuel an hour each so the station requires a 300,000 gallon tank farm. The engines will produce so much waste heat that their radiators need to be submerged in the discharge channel. Emergency power requires 4, 1,000 KW generators and a safehouse within the station will protect 10 operational staff from 250 mph winds. Impressive, yes, yet as we all know, this pump station will only reduce the risk of flooding, not eliminate it.

Modeling Dam/Levee Breach Scenarios Using the Finite Element Code Developed by the US Army Engineer Research and Development Center - Jennifer Tate, USACE-ERDC, Vicksburg, MS (co-authors: Tate McAlpin, Gaurav Savant, Robert McAdory)

Due to the aging infrastructure in the United States, dam and levee breach scenarios are a very real threat. Although there is currently an effort underway to improve this aging infrastructure, the vastness of this endeavor requires that these undertakings be prioritized in the most effective manner. When determining an order of importance, it is vital to take into account the results of a dam/levee failure and the probability of such an occurrence. The ADaptive Hydraulics Code (ADH) is used to model dam/levee breach scenarios and as such serves as a means of identifying the resulting effects (water levels, velocities, and time of arrival). ADH is a state-of-the-art finite element code developed by the US Army Engineer Research and Development. This code utilizes an unstructured gridding approach which allows for increased resolution near breaches without the need for the increased resolution to be maintained over the entire model domain, resulting in significant computational savings. ADH also utilizes adaptive meshing which allows resolution to be added or removed as needed during a model run so as to attain a given degree of accuracy for the hydrodynamic solution. This is usually due to the movement of high gradient areas through the domain. The ability to model supercritical flow and hydraulic jumps along with the movement of wetting/drying fronts, both vital to any accurate modeling of dam/levee breach conditions, are also features of ADH. Multiple dam/levee breach test cases will be presented.