HYDROLINK

A Hydrology and Hydraulics Newsletter

December 2012 Issue: 8

AASHTO Technical Committee on Hydrology and Hydraulics

Message from the Technical Committee on Hydrology & Hydraulics Chair

Andrea Hendrickson, Minnesota DOT

The Technical Committee on Hydrology and Hydraulics (TCHH) has had a busy year. TCHH recently added five new members, Michael Hogan - Connecticut DOT, Wesley Peck - Tennessee DOT, Rachel Westerfield - Mississippi DOT, Crystal Weaver - Indiana DOT and Casey Kramer - Washington DOT. We are excited to welcome the new members and appreciate their willingness to serve on the committee.

TCHH has just finished up a major rework of the AASHTO Drainage Manual (should be published in 2013) and are considering what our next big project should be. One thing that AASHTO is already providing is "Transportation TV" at www.transportationtv.org/Pages/default.aspx – and it's free. This site has thought-provoking transportation videos on national and state transportation related issues and about AASHTO and how it works.

In This Issue:

The latest TCHH meeting was held in conjunction with the 2012 National Hydraulics Engineering Conference (NHEC) at the Gaylord Opryland Resort and Conference Center in Nashville, Tennessee. The NHEC is a great opportunity for all people involved in transportation related hydraulics to learn about the latest research, hear about national activities, and hear about state or local projects and case studies. The NHEC planning committee is currently looking for a state DOT to host the 2014 conference. If you are interested contact Cynthia Nurmi at Cynthia.Nurmi@dot.gov

Respectfully,
Andrea Hendrickson, Chair – TCHH

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In-situ Scour Testing Device

Kornel Kerenyi, FHWA Turner Fairbank Highway Research Center

BACKGROUND

Current methodologies for predicting scour depths around bridge piers typically employ empirical equations derived from physical model studies using uniformly-graded, fine sands. Although necessary, this approach represents a worst-case condition since non-cohesive, fine sands are one of the most erodible soils found in nature. In practice, the derived equations are commonly applied to all soils that cannot be strictly classified as non-erodible. Since very little, easy-to-apply information is available to evaluate potential scour in erosion-resistant soils, a great deal of engineering experience is necessary for one to feel confident about reducing the scour depths estimated by these equations. Consequently, because of the risk involved, predictions of scour in erosion-resistant soils can be conservative, resulting in overly deep and expensive pier foundations.

The unlimited range of soil types and combinations of soil types found in nature creates a full continuum of erodibility from the easily erodible, very fine silts to the non-erodible, competent rock. If even possible to fully describe this erodibility continuum, it will take significant time, effort, and money to develop reliable, practical methodologies and models for doing so. More immediate assistance is needed in this regard. An effective in-situ scour testing device could provide this assistance by defining the scour potential for a given set of hydraulic design conditions and pier type, regardless of the foundation soil type or types present. Such a field device is currently under development at FHWA's Turner Fairbanks Highway Research Center (TFHRC) Hydraulics Laboratory in McLean, VA.

CONCEPT

In conceptual terms, the device consists of a confined column of continuously flowing water directed downward then horizontally across the soils that are to support the bridge pier foundations. The shear strength of the flow, and hence the erosion rate, is reduced with the depth of advancing scour to reflect the natural decay of the scouring mechanism (commonly referred to as the 'horseshoe vortex' at bridge piers). Initially, the device will be calibrated through physical model testing at laboratory scales in order to identify the input energy needed to produce the scour depths predicted by equations for sand-bed channels. The input energy would then be scaled up for a prototype device and field tests would be run until equilibrium conditions are reached in the resulting scour hole, or until some maximum period of time has elapsed (such as the expected cumulative time the foundation will be exposed to the design discharge over the life of the bridge). The in-situ soils would thereby be exposed to the energy necessary to develop the scour depth predicted by the equations. Any equilibrium or maximum scour depth resulting from a field test that is less than the predicted depth for a sand-bed channel would then be attributable to the erosion-resistant characteristics of the in-situ soils.

The full-scale field device is envisioned to be a closed, recirculation and filtering system that will operate in both wet and dry conditions while minimizing environmental impacts. The column would be suspended vertically from an overhead crane. Attached to the top of the column would be a weight of sufficient magnitude to advance the column into the soil, incrementally upon release, as the in-situ soils are scoured away by the cutting head. The incremental advance of the cutting head and the reductions in flow rate (and shear) will be coordinated by appropriate sensors in the head and computerized controls.

The field device would be used for foundation analysis and design in a manner similar to present-day soil borings in that testing would be conducted at proposed foundation locations across the channel and floodplain area to be occupied by a proposed new or replacement bridge. The scour depth information resulting from the field test(s) would be used, in conjunction with the subsurface soil boring information, to adjust the design scour depth predicted by the equations for sand-bed channels and reflect the actual erodibility of the in-situ soils at the bridge site.

CURRENT STATUS

The second generation, lab-scale device currently being tested at TFHRC consists of an outer circular pipe column with a concentric 'cutting' head centered within the column. The outer pipe column will advance slight ahead of the cutting head to contain the incoming flow, but minimize any disturbance to the in-situ soils. The inflow enters the cutting head-soil interface from around the perimeter of the head, flows horizontally inward across the soil, and exits vertically upward through an outlet in the center of the cutting head, carrying the eroded material away with it. The pipe column and cutting head are independent components (see photos).

Outer Pipe Column with Cutting Head Inserted.

Cutting Head Alone

The intricate shape of the latest cutting head ensures a uniform horizontal shear and symmetrical pressure distribution. The shape was developed with the assistance of 3-dimensional, computational fluid dynamics (CFD) modeling performed by the super-computer at the Transportation Research Analysis Computing Center (TRACC) of Argonne National Laboratories in Illinois. Initial testing of this cutting head has demonstrated excellent performance.

NEXT STEPS

The next steps are to pressurize the lab-scale system to allow accurate control of the flow and shear at the cutting head, and to implement the shear decay function which will define how the flow/shear should be reduced with depth. If successful, work can begin on a prototype device and the various auxiliary components that will be needed to complete the system. The prototype device will be used first for field calibration. If proven successful, the device can be used to test the erodibility and scour potential of a wide range of soils types to depths of 20 meters.

CONCLUSION

Current predictions of scour in erosion resistant cohesive, cementatious, and rock-like soils are frequently overestimated due primarily to the lack of quality information available to temper the estimates. As a result, bridge pier (and abutment) foundation construction can be both difficult and expensive. Available scour prediction methodologies typically do not account for the limitless range of naturally occurring soils and their resistance to erosion and scour. The time and expense needed to define and model the full range of soil types and their erosion characteristics is overwhelming. Successful completion of the research

described above will determine if a practical field testing device can be developed to optimize expensive bridge foundation construction. Preliminary results are very encouraging. If successful, the payoff of such a device will be limitless.

PROJECT INFORMATION

Funding for this research project is through a continuing FHWA Pooled-Fund solicitation. In addition to FHWA, the following states are currently contributing to the project: California, Colorado, Kansas, North Carolina, New York, Texas, Utah, and Wisconsin. For more information on this project, consult the web link below or contact Kornel Kerenyi (202-493-3142) or Bart Bergendahl (720-963-3754).
http://www.pooledfund.org/Details/Study/438

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Hydraulic Considerations in Design/Build Projects

Amy Ronnfeldt – TX DOT and Rick Renna – FL DOT

The design / build method of contracting has been used by agencies for over a decade and has been touted as an approach to expedite the delivery of highway projects. The idea of contractually teaming the designer and the contractor was expected to (1) significantly reduce the need to for detailed, biddable plans, (2) increase practical constructability innovation to the road building process, and (3) result in reduced project delivery time. This contracting approach has been reasonably successful over the last decade.

Recently, however, harsh economic times and fierce competition for design/build contracts have triggered a change in contractors' approach to winning the bid for these projects. In the same way that some construction contractors sought loop holes in plans and specifications to reduce the cost of construction – bid low to win the project and then make claims or cut corners to make a profit – now some design/build teams are seeking to cut corners in design. Designers are facing unprecedented pressure to win bids with low cost designs. The approach being used is to adopt low cost design solutions that are short sighted, sometimes even unsafe, but are not expressly forbidden in the proposal package. Said differently, restraints on design approach that were established by commonly understood prudence are now fair game in the pursuit of winning the design bid award.

Many times the design will favor construction cost savings instead of maintainability; for example, using maximum manhole spacing (i.e. every 900 feet for a 60 inch pipe) instead of including manholes at bends, junctions and what would usually be considered clean-out points. This makes the system cheaper to build but much more expensive to maintain.

Other times, the design can create safety issues. For example, one firm wanted to avoid installing inlets, and consequently a storm drain system, for HOV managed lanes. The designer let the runoff collect along the concrete traffic barrier (CTB) separating the HOV lanes from the highway main lanes and flow through the slots under the CTB. The runoff then ran, as a concentrated flow, across five lanes of traffic to the outside shoulder, creating potential hydroplaning. The DOT tried to make the firm change the design by citing it as a safety hazard.

One plan reviewer reported that the design/build team constantly requested permission to use standards from other entities which were not as stringent as the DOT's.

What, then, is the solution for this undesirable direction in the process of the design/build process? The best, first effort may be to be as specific as possible and include minute details in the specifications and governing manuals as possible. A number of states are revisiting their specifications, plans, and bid packages to "lock the contractual doors" on design approaches that were once inconceivable when agencies had no competition for control of the final design. Maryland for examples was interested in investigating the possibility of putting the designer, rather than the contractor, as the contractual lead on the design/build team for some of its environmental projects. Most recently Maryland is leaning towards Construction Manager/General Contractor (CMGC) modal of Project Delivery for some of its challenging environmental and community driven projects such that much of those interests and input can be better incorporated in to project designs while overall project delivery can be faster and the final quality of product can be much improved from early involvement of the contractor. Florida and others are enacting changes to their design manuals and bid packages to close loop holes. Others have suggested that compromised designs be sent to the state Board of Professional Engineers for disciplinary action. It has also been suggested that FHWA could intervene on the design flaws during their review. Regardless of the solutions undertaken by agencies, the advent of compromised, opportunistic design practice is a sad mark against the integrity of the engineering community.

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Workshop Opportunity – Fish Passage Design for Culverts using HEC-26

The following workshops will be offered at the Transportation Research Board Annual Meeting in Washington, DC – January 13, 2013. More information can be found here: http://www.trb.org/AnnualMeeting2013/AnnualMeeting2013.aspx . The workshop will last for 3 hours and will include presentations and hands on applications. Participants should have a grasp of open channel flow concepts and will need a laptop computer with Excel installed. There is a maximum of 30 participants allowed in the workshop. Please contact Roger Kilgore to sign up: Kilgore Consulting and Management, 303-333-1408, or RKilgore@KCMwater.com

Workshop Agenda

Approximate Time	Topic	Format
1:30 – 1:45 pm	Introduction/Overview	Presentation
1:45 – 2:05 pm	Bed material, embedment, and estimating Manning's n	Presentation
2:05 – 2:35 pm	Project setup, culvert selection, bed material, embedment, and estimating Manning's n	Hands on Computer Activity
2:35 – 2:45 pm	Break	
2:45 – 3:05 pm	Shear stress and bed mobility	Presentation
3:05 – 3:30 pm	Bed mobility and stable bed design	Hands on Computer Activity
3:30 – 3:40 pm	Break	
3:40 – 4:00 pm	Estimating velocity/depth and low flow channels	Presentation
4:00 – 4:20 pm	Final checks and design	Hands-on Computer Activity
4:20 – 4:30 pm	Summary and conclusions	Presentation and discussion

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AASHTO Update – Efforts in Stormwater Regulations

Kelley Rehm P.E.

With the onset of increasingly stringent stormwater regulations and permitting requirements, state transportation agencies should familiarize themselves with best practices for stormwater management and upcoming federal regulations and be prepared for regulatory audits, agencies were advised in an Oct. 23 webinar presented by the Center for Environmental Excellence by AASHTO (CEE).

Webinar speakers discussed topics addressed at the June 2012 AASHTO National Stormwater Practitioners Meeting, which was held in Raleigh, N.C.

Webinar speakers included Kate Kurgan, Senior Program Manager for Environment with AASHTO; Scott McGowen, P.E., Chief Environmental Engineer, California Department of Transportation; Rachel Herbert, Physical Scientist with the U.S. Environmental Protection Agency's Water Permits Division; and Anna Lantin, P.E., Vice President, RBF Consulting, a Company of Michael Baker Corporation.

Scott McGowen, with Caltrans, provided an overview of the National Practitioners meeting, which was the third biannual meeting held by AASHTO. McGowen said attendees included representatives from 44 out of the 52 state DOTs as well as the Federal Highway Administration, AASHTO, and regulators. McGowen described the topics discussed at the meeting, including a peer exchange among DOTs.

Topics included:

- an update on EPA's pending stormwater regulations and effluent limitations guidelines and trends in National Pollutant Discharge Elimination System permitting;
- description of the audit process for state DOTs that have been audited and how to prepare for an audit – including a number of states that have gone through audits and several more preparing for upcoming audit;
- use of asset management for NPDES compliance and planning for operation and maintenance of stormwater controls;
- contemporary treatment best management practices for post-construction stormwater control, including open graded friction course and low-impact development;
- effectively focused construction stormwater management, such as a phased plan for erosion and sediment control, tracking and inspection, and stabilization; and
- watershed-based stormwater management.

McGowen said DOTs face a range of current requirements – including NPDES requirements, complying with the Construction General Permit, EPA administrative orders that may result from audits, and total maximum daily load (TMDL) requirements to fix impaired waters – and more requirements are expected in the immediate future. He advised other state DOTs to plan and prepare for national efforts underway that will affect DOT stormwater programs. DOTs should learn from each other, evaluate their current practices, and maintain an awareness of the upcoming regulations.

"There is a need to strategize and evaluate risks while balancing all the competing interests, mandates, and meeting our mission as DOTs," he said.

Upcoming EPA Regulation

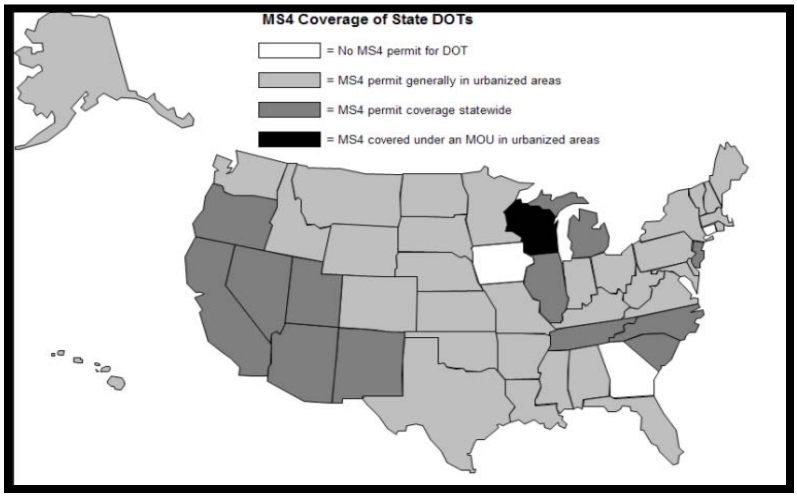
EPA scientist Rachel Herbert discussed the following key elements EPA is considering as it develops a proposed rule to strengthen the stormwater program:

- establishing performance standards for discharges from newly developed and redeveloped sites;
- requiring certain regulated municipal separate storm sewer systems (MS4s) to develop a program to address discharges from existing sites (retrofits);
- extending protection of the MS4 Program;
- considering separate, tailored requirements for transportation MS4s; and
- designating government-owned maintenance yards as industrial sources.

The regulation is expected to be proposed in June 2013 and finalized in December 2014, she said.

Herbert also described the findings of a recent Information Collection Request (ICR) under which EPA requested technical and financial information from state DOTs on their stormwater programs. Herbert said EPA will use the technical and financial information to support its decisions as it develops the stormwater rule.

Herbert said EPA is still considering information it has gathered regarding the Effluent Limitation Guideline (ELG) for the Construction and Development Point Source Category, which established national monitoring requirements and enforceable numeric limitations on stormwater discharges from construction sites. Effective January 4, 2011, EPA stayed the numeric limitation of 280 Nephelometric Turbidity Units (NTU) that was published in the Dec. 1, 2009, guideline. EPA may propose a revised numeric or nonnumeric limit in a future rulemaking.



For more information, link to the White Paper and the PowerPoint presentation and webinar recording, *Connecting the DOTs through Collaboration in Stormwater Management,* on the Stormwater Webinars page of the Center for Environmental Excellence by AASHTO website. Information on EPA's stormwater regulations may be accessed on EPA's Stormwater Proposed Rulemaking Website and Road-Related Municipal Separate Storm Sewer Systems (MS4s) website.

SNAPSHOT OF STATE DOT STORMWATER PROGRAMS FROM EPA INFORMATION COLLECTION REQUEST

- Statewide permit coverage included Arizona, California, Illinois, Michigan, Nevada, New Jersey, New Mexico, North Carolina, Oregon, South Carolina, Tennessee, and Utah.
- A majority (about 57%) of state DOTs have only one MS4 permit; roughly, 26% have more than three MS4 permits.
- Most permits are general Phase II MS4 permits and some permits were individual Phase I MS4 permits. Others were individual Phase II MS4 permits.
- Most (62%) of state DOTs have an administrative approach that splits responsibility for stormwater program implementation between a headquarters office or division and regional/divisional offices.
- Types of roads owned, operated, or maintained by individual state DOTs vary widely. Nearly all state DOTs have state-level highways, interstates, expressways, and principal arterials. Some DOTs manage county level roads, minor arterials, and municipal/local roads/collectors. Only a very small percentage of DOTs are responsible for rural roads or all roads in state.
- Most DOT MS4 permits (77%) do not specify different requirements for linear and non-highway transportation facilities.
- Illicit Discharge Detection and Elimination (IDDE) More than half of the DOTs train their field staff and have database/paper tracking/inventory of outfalls, storm drain system mapping, and public reporting.
- Construction Site Runoff Control Minimum Measures – Responses showed that a large number of DOTs perform construction site inspections, 85% train their field staff, review site plans, track/inventory construction sites, have developed approved construction control manuals, and train contractors.
- Post-Construction Controls – A majority of state DOTs had some form of inspection, review, and maintenance regime, but fewer than half had a tracking system for post-construction stormwater controls, and fewer still offer contractor training. Of state DOTs surveyed, most inspect and maintain post-construction stormwater controls and review site plans for post-construction stormwater water quality and/or water quantity requirements for the DOT's discharging from new construction projects.
- Post-Construction Controls on Adjacent Properties – Less than half of the DOTs reviewed site plans for post-construction stormwater water quality and/or water quantity requirements for discharges from new construction projects on adjacent properties that discharge into the DOT's MS4.
- The most common stormwater controls used include grass swales, wet/dry ponds, and oil/water separators.
- Post-Construction Operation and Maintenance – Less than half of the DOTs had a tracking database of post-construction stormwater controls, and just over half have a standardized prioritization of activities based on the severity of operation and maintenance required.
- Alternative Program to Comply with Performance/Design Standards – A little less than three-quarters of DOTs do not have an alternative to performance/design standard based compliance for stormwater management. Approximately 85% of DOT respondents said they do not have an opportunity for off-site mitigation or payment-in lieu programs.
- Pollution Prevention/Good Housekeeping – Of state DOTs surveyed, most had an inventory of their facilities, facility inspections, field staff training, fueling operations requirements, de-icing/anti-icing material storage, street sweeping/vacuuming activities, storm sewer system maintenance activities (including inspections and cleaning), vehicle maintenance requirements, pesticide/herbicide application and management requirements, vehicle washing requirements, and tracking of the amount of de-icing/anti-icing materials used.
- Retrofits – Approximately 66% of respondents do not have a retrofit program.

Source: AASHTO White Paper: Connecting the DOTs through Collaboration in Stormwater Management Proceedings from the 2012 AASHTO National Stormwater Practitioners Meeting.

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Announcements

2012 Mark Miles Award Presented to Lotwick Reese

The Mark Miles Distinguished Hydraulic Engineer Award was created to honor the memory of Mark Miles. Mark died at the 2004 National Hydraulic Engineering Conference. As a long serving member of the AASHTO Technical Committee on Hydrology and Hydraulics and the Alaska Department of Transportation, Mark made significant contributions and furthered the understanding of the transportation hydraulic engineering profession.

Lotwick Reese received the award at the 2012 National Hydraulic Engineering Conference held in Nashville Tennessee. Lotwick with over 45 years of service with the Idaho Department of Transportation and 16 years as a member of the AASHTO Hydrology and Hydraulics Technical Committee has influenced national policies and guidelines. He not only is a technical expert but treats people with genuine interest and kindness. So congratulations Lotwick and thank you from those of us that have had the honor of working with you.

2012 National Hydraulic Engineering Conference a Success

The 2012 National Hydraulics Engineering Conference was held in Nashville in August. If you were unable to attend or missed a presentation or two, now is your chance to catch up. All sessions were recorded and placed online by Tennessee DOT and are available at the link below. The videos are divided by sessions. When you click the podium for a session a window will pop up with the video of the presenter and the slides are shown. You may click the small button in the lower left corner for conference information and the chapters for each session. Click the word “Chapters” to advance to a different presenter. You may also scroll along the slides at the bottom and advance the video as well.

The following is the link to the presentations:
http://nowuseeit.state.tn.us/mediasite5/Catalog/pages/catalog.aspx?catalogId=5b4b0530-10db-43c3-9d74-377fe958f1ab

For your ease in determining which sessions to watch, the agenda is still available on the conference website.
http://nhec2012.files.wordpress.com/2012/05/final-agenda-nhec-2012.pdf

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Membership News

We welcomed the following new members to the Technical Committee on Hydrology and Hydraulics in 2012:

Michael E Hogan
Connecticut Department of Transportation

Michael E. Hogan is employed by the Connecticut Department of Transportation. He has worked in the Department's Hydraulics & Drainage (H&D) section for the last 26 years and holds the title of Transportation Supervising Engineer. The H&D section provides specialized engineering, technical support and policy advice on all storm water and water resource management issues related to the planning, design, permitting, construction and maintenance of transportation facilities.

Mr. Hogan's engineering experience includes the preparation or review of hydrologic and hydraulic analyses and design for highway and railroad bridges over waterways, storm drainage systems, culverts, channels, detention and sedimentation basins, dams and other storm water facilities using state of the art and industry standard computer programs; bridge scour analysis and the design of bridge scour and stream stability countermeasures; addressing environmental issues including fish passage at highway crossings, channel restoration, bio-engineering techniques for channel stabilization, best management practices for erosion and sediment control, water handling during construction, storm water management, and flood plain management including the preparation of state flood management certifications and FEMA map revisions. Mr. Hogan has assisted the Department's Bridge Safety and Evaluation Section in developing and implementing a scour monitoring program for approximately four hundred "scour critical" and hydraulically deficient bridges and the development of plans of action (POAs) that are linked with a bridge inventory electronic database.

Mr. Hogan has a Bachelor of Science degree in Civil Engineering from Purdue University, West Lafayette, Indiana, and is a licensed Professional Engineer in the State of Connecticut. He has been a member of the American Society of Civil Engineers since 1983.

Mr. Hogan can be contacted by mail at the Connecticut Department of Transportation, 2800 Berlin Turnpike, P.O. Box 317546, Newington, CT 06131-7546, by telephone at 860-594-3241, by fax at 860-594-3374 or email at michael.hogan @ct.gov

Casey Kramer
Washington State Department of Transportation

Casey Kramer has over 10 years of engineering experience in water resources planning, analysis, design and construction and serves as the State Hydraulic Engineer for the Washington State Department of Transportation. He received his Bachelors of Science at Washington State University and his Masters at the Iowa Institute of Hydraulic Research at the University of Iowa.

His experience includes hydrologic, hydraulic, geomorphic, and sediment

transport analyses of streams, floodplains and wetlands both in the private and public sector. Some specific experience includes planning and design of flood control channels, channel stabilization, stream and wetland restoration, fish passage and highway infrastructure located near water bodies. Mr. Kramer has managed teams of specialists in hydrology, hydraulics, and fluvial geomorphology for projects in a variety of riverine and geomorphic settings including steep mountainous streams, alluvial fans, low gradient large and small rivers, estuaries, and wetlands.

He has extensive experience managing inter-disciplinary teams of water resources specialists, aquatic biologists, geomorphologists, geotechnical specialists and structural specialists to develop environmentally beneficial solutions on highway infrastructure, flood control, stormwater, erosion control, channel stabilization, and environmental restoration projects. Mr. Kramer has extensive experience in preparation of plans, specifications and construction estimates for water resources projects, as well as experience in permitting, project implementation, and construction management.

Casey Kramer can be contacted at the Washington State Department of Transportation, 310 Maple Park Ave SE, PO Box 47329, Olympia, WA 98504-7329, by telephone at 360-705-7262, or by e-mail at kramerc@wsdot.wa.gov.

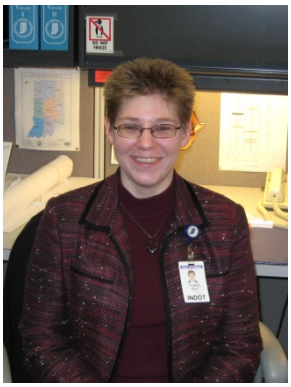
Wesley Peck, PE
Tennessee Department of Transportation

Wesley is a graduate of Tennessee Technological University and the University of Tennessee at Knoxville. He worked for the US Army Corps of Engineers, Jacksonville District before returning to Nashville to accept a job with the Tennessee Department of Transportation. He has worked in the Hydraulic Design Section of Tennessee DOT for 16 years and I'm currently supervisor of all hydraulic design activity for half of the state of Tennessee. Wesley's work at Tennessee DOT has included everything from the rocky streams of the Appalachian Mountains to the deeply entrenched sandy streams on the Mississippi River floodplain near Memphis. He is currently on NCHRP Panel 25-42, "Bridge Runoff Treatment Analysis and Treatment Options".

Contact Information:
Phone: (615) 532-5660
Fax: (615) 532-5990

Crystal Weaver, PE
Indiana Department of Transportation

Crystal is a lifelong resident of Indiana and a proud Hoosier. She attended Valparaiso



University and graduated with my BSCE in 2004, before returning to Indianapolis and beginning her career at the Indiana Department of Transportation. She has worked at INDOT for over eight years, more than seven of which have been in the Hydraulics Office. Crystal was promoted to the Hydraulics Manager last year after her predecessor, Merril Dougherty, moved to a new position within INDOT. Interestingly, she ended up in Hydraulics completely unintentionally. INDOT supports the Graduate Engineer's Development Program, where new engineers spend a portion of their first year in each major division. GEDP Engineers learn about

projects, try different positions, and are given the opportunity to find a specialty that fits their interests. As a GEDP Engineer, Crystal started her five week rotation with Hydraulics and enjoyed it so much I've never left.

Contact Information:
100 N Senate Ave. Rm N 642
Indianapolis, IN 46204
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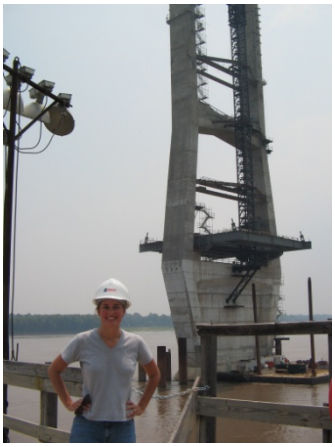
cmweaver@indot.in.gov

Rachel Klein Westerfield, P.E.
Mississippi Department of Transportation

Rachel started with the Mississippi DOT in the Hydraulic Section in 2002. She graduated from Mississippi State University with a Bachelor of Science degree in Biological Engineering and has a Professional Engineering license in Civil Engineering.



Rachel has managed the Hydraulics Section in Bridge Division since July 2011. She supervises employees in the hydraulic design of bridges and culverts including scour analysis, stream stability and countermeasure design, ensuring compliance with MDOT policies and FEMA regulations, and investigation of drainage complaints. She also manages numerous hydraulic consultant contracts. Rachel is a member of NSPE and the Mississippi Engineering Society.

Contact Information:
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Email: rwesterfield@mdot.ms.gov

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Calendar of Events

Transportation Research Board (TRB)
Washington, DC
January 13 – 17, 2013
See the Interactive Program for Hydraulics and Hydrology Workshops and Presentations

http://www.trb.org/AnnualMeeting2013/AnnualMeeting2013.aspx

Kuehnast Lecture Series at the University of Minnesota - Mini-Climate School.

Three lectures in the fields of Meteorology and Climatology were included:

- Canada: No longer the Cold White North by David Phillips, Environment Canada Senior Climatologist
- Current Advances in Monitoring and Modeling Urban Climates by Sue Grimmond, King's College London
- Severe Thunderstorms and Climate Change by Harold Brooks, NOAA National Severe Storms Laboratory

While the event has passed you can still listen to the lectures at

http://climate.umn.edu/doc/journal/kuehnast_lecture/lecture20.htm

This newsletter is published biannually by the AASHTO Technical Committee on Hydrology and Hydraulics. Please send suggestions for articles and comments to: *Andrea.Hendrickson@ state.mn.us*, ***or call 651-366-4466.***

To be added to the mailing list please send your email to Kelley Rehm at: krehm@aashto.org

For more information on the Technical Committee on Hydrology and Hydraulics see:
http://design.transportation.org

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