Dear Friends,
I hope everyone enjoyed their Thanksgiving holiday and had a chance to spend some time with those closest to you and joyfully step into the holiday season. As we approach the end of 2015, I want to express gratitude towards my peers, predecessors and others that have made sound contributions to the engineering profession of Hydrology and Hydraulics. I know we continually learn, develop and get better. Often we need to pause, refine and document our learning for others to come; just as we have benefited from the work of others whom we follow.

It is an exciting time with renewed leadership within AASHTO coupled with refreshing and emerging strengths through new membership of TCHH. This year we are joined by several new members and each brings new strength and energy to the committee. We are maturing, reforming, and renewing.

There are still open seats for membership – please come forward if you are interested. Those who are continuing to serve on the committee find the changeover chaotic, but very creative, just like mixing of paints and creating products that we will hold dear in the times to come.

If you are a Hydrolink reader and find this committee’s work useful, I suggest you become active with us. You do not need to be a member of the committee to contribute. You are empowered to contribute your knowledge and experience with others through sharing of knowledge. If you have an idea or a potential contribution, please contact one of the newsletter work group members. If you have a unique situation and would like TCHH to explore the topic, we might explore that, as well.

As the new version of the AASHTO Drainage Manual was published in 2014, the committee is busy with the process of updating – where appropriate – and also considering publishing short articles of the State of Practice or Exchange of Information. Currently, we have not named or entitled these short publications. However, their purpose is to shed light on the technical details of certain policies, practices and computational procedures often used by H&H engineers. An example is the design criteria typically used by States to determine stream diversion during bridge construction or a culvert replacement. Granted there are differences due to variation in regulatory requirements across the nation, but often there are many similarities in approaches that one may adopt. Do you have any ideas? Talk to us. We will listen and we will grow together. I promise, you will find that the committee is very welcoming and supportive. I hope you find this issue of Hydrolink informative. With this little serving of information, I wish you a very happy holiday season and the beginning of a new year!

Sincerely,
Karuna Pujara, Chair, TCHH
The National Hydraulic Engineering Conference (NHEC) has been scheduled for 2016. The theme this year is *Hydraulic Engineering Diversity: Bridging Coast to Desert*. Transportation hydraulic engineers often have diverse conditions within their states, from variable climate conditions to differences in geography, soils, urbanization or even culture. At this conference we will hear about how engineers and researchers consider how to accommodate diverse needs.

**Location:** Portland, Oregon

**Hotel:** Red Lion Inn on the River Jantzen Beach ([link](#))

**Dates:** August 9 – 12, 2016

Conference Website can be found [here](#).

The conference is being hosted by ODOT and is sponsored by AASHTO TCHH, TRB AFB60, COE and FHWA. Contacts are Cynthia Nurmi, FHWA Hydraulics [cynthia.nurmi@dot.gov](mailto:cynthia.nurmi@dot.gov) or Beth Sandver, Oregon GES Program Coordinator [Beth.R.SANDVER@odot.state.or.us](mailto: Beth.R.SANDVER@odot.state.or.us)

Watch for upcoming announcements soliciting abstracts, hope to see you there.

**Iowa DOT’s Climate Change and Extreme Weather Vulnerability Assessment Pilot**

David Claman, Iowa DOT

The Iowa Department of Transportation (IDOT), in cooperation with the Federal Highway Administration (FHWA) implemented a research project to link climate projections of precipitation with streamflow simulation to provide a vulnerability assessment of six major infrastructure locations for two large river basins in Iowa.

Climate scientists from Iowa State University used 19 different downscaled global climate models (GCM) and more than 22,000 precipitation data points across Iowa were used to develop hydrological data for the University of Iowa’s CUENCAS model that generated streamflow simulations from 1960 through 2100 for the two river basins. Using high-end computing, 22.1 billion data points were analyzed generating streamflows for a 140-year period to determine peak discharge/frequency relationships for the South Skunk River and Cedar River basins at critical infrastructure locations which are near continuous USGS gage sites with significant periods of record.

USGS protocols were utilized to calculate flood frequencies for a historical (1960 to 2009) and a future period (1960 to 2100). The results showed an acceptable correlation between the simulated historical period and actual 100 year flow (1% Annual Exceedance-Probability Discharge or AEPD). For the Cedar River basin, the projected 1% AEPD increased from 37% to 67% and for the South Skunk River locations the range increased from 9% to 50%.
Some of the projected 1% AEPD estimates were near the upper 95% confidence interval for the historical period. This 95% confidence limit could be utilized as a design standard for critical infrastructure to provide resiliency for extreme weather events. The study revealed that Iowa’s highway infrastructure will be more prone to driver inconvenience and disruptions to commerce as well as potential damage to pavement, road embankments, and bridges, all of which can be costly to repair or replace.

Traditionally, the hydraulic engineering community has looked at past data to establish design discharges for infrastructure that may last for 100 years. However, historical methods may no longer provide a reliable method for estimating design discharges in the future for our infrastructure. The results of Iowa’s pilot project may provide a possible framework for incorporating climate change/extreme weather considerations for critical highway and bridge infrastructure.

### 3D Laser Scan Used to Assess Culvert Deformation

3D laser scanning, combined with total station measurements and global positioning, were recently used by the Connecticut Department of Transportation (CTDOT) to evaluate the condition of two deteriorating culverts in Middletown, Connecticut.

The culverts were built in 1964 and are separate structures that convey an unnamed brook under Interstate 91 Southbound (SB) and Northbound (NB). The culverts were constructed of corrugated metal structural plate pipe-arches with the original design dimensions having a span of 8’ 10”, a rise of 6’ 1” and 18” corner radii. The culverts are approximately 150’ long and support about 15-20’ of roadway embankment. Figure 1 is a photograph looking toward the inlet of the I-91 SB culvert.
Both culverts were rated in poor condition and were programmed for rehabilitation or replacement. The existing steel pipe-arches showed mass section loss, extensive perforations to the inverts and ribs, sagging bolt lines and shape deformations. Portions of the inverts had failed and deflected upward.

Due to their condition, the culverts were monitored on a regular basis. The monitoring consisted of inspectors going in the culverts to look for any changes and taking measurements at specified locations. Subsequently, the condition of the culverts was determined to be worsening, and personnel were restricted from entering the structures. An emergency project was initiated to take corrective action.

The Average Daily Traffic (ADT) over each of the culverts is approximately 57,000 vehicles. Because of the high ADT and the fill height over the culverts, relining the existing pipe-arches and/or other trenchless methods were being considered for repair or replacement of the structures.

A 3D laser scan of the culverts was proposed to facilitate the evaluation of relining options. The scan, which could be performed without personnel entering the structures, would more accurately "map" the shape deformations and identify points of constriction that may control the size of the proposed structures and the relining operations. Figure 2 shows the scanned image of the SB culvert looking toward the inlet. Figure 3 shows the scanned images of both culverts with the outlet of the SB culvert at the left side of the figure.

The 3D laser scan of the culverts was performed by a survey crew from Close, Jensen & Miller, P.C., a consulting firm assisting CTDOT in the preparation of plans and environmental permits for the project. The survey crew used a single instrument that combines precise 3D laser scanning, total station capabilities, high resolution digital imagery and Global Navigation Satellite System (GNSS) connectivity. Using this instrument, the result is a merging of the data. The images are synchronized with the 3D laser scans and the scans are tied into the total station measurements.
Two scans were performed at each culvert; one toward the inlet and one toward the outlet. The instrument was setup using a known backsight, and the accuracy was set for $\frac{1}{4}'' \times \frac{1}{4}''$. Each scan took 45 minutes to 1 hour to complete. The survey/scans were tied into the system of GNSS base-station receivers owned and operated by CT DOT. The “point cloud” created by the scans consisted of approximately 2.8 million data points and a file size of 191 MB.

Figures 4, 5 and 6 show profiles and cross sections of the SB culvert developed from the scans. The profile at the top of Figure 4 and the enlargement in Figure 5 indicate the distortion along the crown of the existing pipe-arch based on the culvert scan (“TOP OF PIPE FIELD LOCATION”) relative to the design rise (height) and slope.

Figure 6 is a cross section developed from the culvert scan showing the deformed shape of the existing pipe-arch (“PIPE FIELD LOCATION”) as compared to the design shape and dimensions (“PIPE PER DESIGN”). The cross section also shows (in blue) the potential fit of a proposed, custom-sized, tunnel liner plate pipe-arch inside the existing pipe-arch. The intent was to maximize the size of the liner pipe for hydraulic capacity as well as to be large enough to allow workers inside.

The 3D laser scan survey provided for worker safety, while obtaining accurate field conditions within the culverts. This information has expedited a complicated hydraulic design, design and fabrication of the liner materials, and the contactor’s means and methods of construction.
Welcome New Members!
In 2015, the following people were welcomed to TCHH:

Dave Claman  
Iowa DOT
Dave Claman has over 30 years of experience in the water resource engineering field. Dave has been a supervisor for the Preliminary Bridge Section of the Iowa Department of Transportation’s Office of Bridges & Structures for 16 years. Prior to working for the Iowa DOT, Dave worked for the Iowa Department of Natural Resources where he was responsible for the administration and enforcement of the State’s floodplain management regulations to insure that bridges, dams, levees, and other flood plain development projects met the State’s criteria for construction.

Dave’s current duties as supervisor of the Preliminary Bridge Section is to insure the State’s highway structures are cost-effective and appropriately sized/design in accordance with Iowa DOT guidelines and policies. He is also the DOT’s expert regarding drainage disputes, bridge scour, stream geomorphology, 2-D hydraulic analysis and FEMA/floodplain management issues.

Dave has been involved in many advisory committees on the local, state and national level regarding climate change, flood mitigation, water resources and bridge scour. He has also been involved in many research projects as technical advisor or co-investigator for various issues involving the prediction and monitoring of bridge scour (NCHRP 24-20), the reduction of sedimentation accumulation in multi-barrel culverts (IHRB TR-665) and other hydraulic or stream migration/degradation issues facing the civil engineer profession in Iowa.

Dave received his Bachelor of Science degree in Civil Engineering from Iowa State University. He has also been a member of the American Society of Civil Engineers since 2000 and currently holds a leadership position as “Governor” for Iowa and South Dakota. Dave can be contacted by mail at the Iowa Department of Transportation, Office of Bridges & Structures, 800 Lincoln Way, Ames, IA 50010, by telephone at 515-239-1487, or by e-mail at david.claman@dot.iowa.gov.

Randall Mungo  
South Carolina Department of Transportation
Randall Mungo is a graduate of the University of South Carolina with a Bachelors of Science in Civil Engineering and is a Registered Professional Engineer in the State of South Carolina. Since his graduation in 1989, he has been employed by SCDOT in the Hydraulic Design Department.

Mr. Mungo started his career as an entry level hydraulic design engineer, promoted to Hydraulic Design Manager where he served for 12 years and as of June of this year became the Hydraulic Design Support Engineer.

Randall has designed and supervised various complex hydraulic design projects including storm drainage systems, sediment and erosion control, culvert design, detention basins, storm water management, bridge hydraulics, scour analysis and FEMA studies. Currently, Randall’s department consists of providing support to four hydraulic design teams, bridge hydraulics and scour, storm water management and coordination, roadway hydraulics, permit reviews, Quality Assurance, and setting policy and procedures. Randall may be contacted by mail at the South Carolina Department of Transportation, 955 Park Street, P.O. Box 191, Columbia, SC 29201-3939, by telephone at 803-737-9872, or by email at mungogr@scdot.org.
Nick Wark
Vermont Agency of Transportation

Nick began his career at the Vermont Agency of Transportation in 2001 under their engineering rotation program. He spent 3-9 months in many sections of the Agency including geotech, roadway, structures, environmental permitting, contract administration and construction. In 2004 he began a full time in the Hydraulics Unit and was promoted four years later to the head VTrans Hydraulics Engineer.

Nick’s engineering experience includes hydrologic and hydraulic analysis for bridges and culverts, bridge scour and countermeasures, climate change, fish passage, fluvial geomorphology, environmental permitting and floodplain management. He manages a federal work program that allows the Hydraulics Unit to assist Vermont communities in correctly sizing drainage structures. This program also funds a large portion of Vermont’s stream gage network and paid for Vermont’s portion of NOAA Atlas 14. Nick’s most recent accomplishment is the publication of the updated VTrans Hydraulics Manual.

Nick is a graduate of Clarkson University where he received a BS in Civil & Environmental Engineering. He is a licensed Professional Engineer in the State of Vermont as well as a Certified Floodplain Manager. Nick is also a member of the Vermont Society of Engineers where his team is three time defending champions of VSE’s yearly charity golf outing. Nick may be contacted by mail at the Vermont Agency of Transportation, 1 National Life Drive, Montpelier, VT 05633, by phone at 802-309-8542, or by email at nick.wark@vermont.gov.

Steve Sisson Receives AASHTO Subcommittee on Design (SCOD) Award

Steve Sisson (right), DelDOT’s Sussex County Review Coordinator and member of the AASHTO Technical Committee on Hydrology and Hydraulics (TCHH), was awarded plaque and challenge coin as recognition for his contribution to AASHTO’s Subcommittee on Design. At the recent SCOD Annual Meeting in Seattle, Steve was recognized by his peers in absentia for his leadership in Region 1 for “Outstanding Achievement in the Field of Highway and Transportation Design.” This award is given to a member of the Subcommittee on or one of its technical committees deserving recognition for outstanding achievement in the field of highway and transportation design. The recipient’s qualifying achievements are based on AASHTO-related work of work of such extent that it would be recognizably known and outstanding to the Subcommittee as a whole during the preceding years. Consideration is given to those who have made significant contributions to the design field with an emphasis on quality, originality, or response to an important problem or issue. Since Steve was unable to attend in person due to travel restrictions, he listened in on conference calls to the Subcommittee’s proceedings and was able to contribute his talent and expertise despite not being there in person. Steve has been a member of TCHH since 2008, participating in development of the latest AASHTO Drainage Manual and sharing his expertise in environmental issues and roadway hydraulics.
TCHH Work Groups

TCHH has several small work groups that focus on particular areas of interest. These groups are made up of TCHH members, as well as FHWA staff.

**LRFD Bridge Design Work Group**

Reviews the LRFD Bridge Design Manual sections related to hydraulics; Determines if LRFD and TCHH documents are in synch; Promotes cross functional coordination.

Facilitators: Wesley Peck (TN)  
Rachel Westerfield (MS)  

Team Members: Bill Bailey (WY)  
Lotwick Reese (ID)  
Bart Bergendahl (FHWA)  
Kornel Kerenyi (FHWA)  
Joe Krolak (FHWA)

**Design Manual Chapter 17 Bridge Work Group**

Updates Drainage Manual Chapter 17, Volumes 1 & 2; Reviews and determines if Bridge Chapter in Highway Drainage Guidelines needs to be updated.

Facilitators: Dave Hedstrom (MT)  
Matt O’Conner (IL)

Team Members: Michael Hogan (CT)  
Wesley Peck (TN)  
Nick Wark (VT)  
Rachel Westerfield (MS)

**Exchange Work Group**

Creates TCHH Exchange format and content; Develops process and procedures for collecting ideas, peer reviewing submittals, and running exchange.

Facilitators: Lotwick Reese (ID)  
Nick Wark (VT)

Team Members: Dave Claman (IA)  
Andrea Hendrickson (MN)  
Rick Renna (FL)  
Hani Farghaly (FHWA)

**Climate Change Work Group**

Develops work plan, white paper/fact sheet; Identifies research needs; Participates in ongoing NCHRP research projects

Facilitators: Dave Claman (IA)  
Rick Renna (FL)

Team Members: Bill Bailey (WY)  
Andrea Hendrickson (MN)  
Steve Sisson (DE)  
Brian Beucler (FHWA)  
Hani Farghaly (FHWA)

**Water Quality Work Group**

Determines if white paper or chapter update is needed; includes two members of the Technical Committee on Environmental Design

Facilitators: Steve Sisson (DE)  
Brad McManus (GA)

Team Members: Karuna Pujara (MD)  
Ann-Marie Kirsch (WI)  
Dave Henderson (FHWA)
Hydrolink Newsletter Work Group
Publishes up to two issues per year

Facilitators: Andrea Hendrickson (MN)  
Ann-Marie Kirsch (WI)  

Team Members: David Hedstrom (MT)  
Matt O’Connor (IL)  
Patricia Bush (AASHTO)

NHEC Work Group
Participates on the planning committee for the Biennial National Hydraulic Engineering Conference (NHEC). Other members of the planning committee which is led by Cynthia Nurmi (FHWA) include FHWA, COE, TRB, and the host state.

TCHH Representatives: Mike Hogan (CT)  
Matt O’Connor (IL)  
Steve Sisson (DE)  
Rachel Westerfield (MS)

LRFD Bridge Design Work Group Update
One of the current activities of the TCHH is reviewing the AASHTO LRFD Bridge Specifications to recommend changes to portions related to hydraulics and hydrology at the request of the Subcommittee on Bridges and Structures. Thus far the working group has reviewed Section 2 with an eye toward reconciling the differences between the LRFD Bridge Specifications and the AASHTO Drainage Manual and updating the hydraulic definitions. The working group is also considering implementing a risk based approach to setting recurrence intervals for the design and check floods used for structure opening capacity and scour events.

Questions or comments can be directed to the work group at Wesley.Peck@tn.gov.

TRB Update
The Transportation Research Board (TRB) 95th Annual Meeting will be held in Washington, DC, on January 10-14, 2016. The following meetings and workshops may be of interest to those attending:

Sunday, January 10
- 160: Sensing Technologies for Transportation Applications, 1:30 pm – 4:30 pm
- 164: Meet the Regulators: Emerging issues in Hazardous Materials Management and Climate Change, 1:30 pm – 4:30 pm
- 171: Structural Health Monitoring for Bridge Infrastructure Management: What Owners and Practitioners Should Know, 1:30pm – 4:30 pm
- Hydrology Subcommittee Meeting, AFB60(1), 7:00 pm – 9:00 pm

Monday, January 11
- Hydraulics Subcommittee Meeting, AFB60(2), 8:00 am – 9:45 am
- Water Quality Subcommittee Meeting, AFB60(3), 10:15 am – noon
- Climate Change, Energy and Sustainability Impacts on the Transportation Infrastructure Subcommittee, AF000(3), 10:15 am – noon
- 311: NCHRP IDEA Program: Sponsoring Innovation in Highway Transportation, 10:45 am – 12:30 pm
- 340: Transportation and the Environment: What’s Hot in State DOTs?, 1:30 pm – 3:15 pm
- Hydrology, Hydraulics, and Water Quality Committee, AFB60, 1:30 pm – 5:30 pm
- 407: Applications of Structural Health Monitoring for Transportation Structures, 3:45 pm – 5:30 pm
Monday, January 11 (cont.)

- **416: Structures Maintenance: Coatings and Scour**, 3:45 pm – 5:30 pm
- **419: Legal Issues Related to the Vulnerability of Transportation Facilities to Catastrophic Events**, 3:45 pm – 5:30 pm
- **437: Current Issues in Environmental Analysis in Transportation**, 4:15 pm – 6:00 pm
- **461: In the Wake of Hurricane Sandy: Toward a More Resilient Transportation System in Connecticut, New Jersey, and New York**, 7:30 pm – 9:30 pm

Tuesday, January 12

- **586: Soil Erodibility and Sediment Basins and Barriers**, 10:45 am – 12:30 pm
- **612: Bridge Scour: Predictions, Processes, and Programs**, 1:30 pm – 3:15 pm
- **686: Solutions to Improved Highway Runoff Water Quality**, 3:45 pm – 5:30 pm
- **Climate Change Joint Subcommittee of ADC70, ADC80, and ADD40**, 7:00 pm – 9:30 pm

Wednesday, January 13

- **796: Surface Transportation System Resilience to Climate Change and Extreme Weather Events: Status and Path Forward**, 10:15 am – noon

TRB recently published *Report 809: Environmental Performance Measures for State Departments of Transportation*. This report identifies potential environmental performance measures that may be integrated into a transportation agency’s performance management program, and explores relationships between agency activities and environmental outcomes. The study also produced a spreadsheet-based “Measure Calculation Tool” that helps transportation agencies implement performance measures that were outlined in the report. The tool can be used to record the component data needed to calculate the measures.

The October edition of the *Transportation Research Record: Journal of the Transportation Research Board, No. 2532* contains 18 papers that examine resilience and climate change issues as it relates to transportation.

As part of a series of reports for *NCHRP 20-83: Long-Range Strategic Issues Facing the Transportation Industry*, TRB has published *NCHRP 750: Strategic Issues Facing Transportation, Volume 2: Climate Change, Extreme Weather Events, and the Highway System: Practitioner’s Guide and Research Report*. This report provides guidance on adaptation strategies to the likely impacts of climate change through 2050 in the planning, design, construction, operation, and maintenance of infrastructure assets in the United States. In addition to the practitioner’s guide and research report, the project also developed a software tool that provides specific, region-base information on incorporating climate change adaptation into the planning and design of bridges, culverts, stormwater infrastructure, slopes, walls, and pavement; tables that provide the same information as the software tool; and two spreadsheets that illustrate examples of the benefit-cost analysis of the adaptation strategies discussed in the report.

Additional information on these and other NCHRP publications can be found at [http://www.trb.org/Publications/PubsNCHRPPublications.aspx](http://www.trb.org/Publications/PubsNCHRPPublications.aspx).

Want to Be a Hydrolink Contributor?

The Hydrolink newsletter is a publication that has been provided by the AASHTO Technical Committee on Hydrology and Hydraulics for the last seven years. Our goal has been to share information about what is going on in other states or nationwide on topics related to transportation hydraulics. We hope you have found the articles to be interesting and relevant. We would like to expand the sources of articles and are inviting our readers to consider submitting topics, suggest authors or provide articles that you think would be of interest to people involved in hydraulics, hydrology, water quality or transportation drainage.

Some ideas include:

- State research results or research implementation projects,
- DOT experiences with exciting new stuff i.e. product trials, new technologies or automation,
- Experiences or lessons learned with flooding, failures, construction projects,
- Emerging issues i.e. climate change, environmental requirements.

Suggestions should be sent to andrea.hendrickson@state.mn.us. Hope to hear from you.

AASHTO Update

On December 4, President Obama signed the Fixing America’s Surface Transportation (FAST) Act. The FAST Act marks the first time in a decade that Congress has approved a long-term surface transportation authorization. AASHTO has set up a page to provide information regarding the implementation of the FAST Act at fast.transportation.org. You will find links to the legislation itself, summaries, funding tables, and news releases from various organizations, as well as the status of MAP-21 implementation efforts.

AASHTO offers the Resilient and Sustainable Transportation Systems (RSTS) Technical Assistance Program to assist state DOTs maintaining resilient transportation systems in the face of increasingly frequent extreme weather events, infrastructure vulnerabilities, energy demands, and diminishing resources. The Technical Assistance Program is a voluntary pooled fund program for AASHTO members which serves as a critical resource for state DOTs to better understand how to respond to and prepare for increasingly frequent and more severe extreme weather events, and to understand the range of strategies to reduce energy consumption.

Responding to and preparing for extreme weather events is a challenge that requires interdisciplinary solutions. This program provides assistance to transportation practitioners across transportation disciplines and modes, including planning, asset management, highway and bridge design, hydrology and hydraulics, materials, construction, operations and emergency response, maintenance, and the environment.

Member benefits include:

- **Bimonthly newsletter** with articles describing projects, programs, state practices, and technical information related to responding and adapting to extreme weather events and strategies for reducing energy consumption
- **Breaking news stories** on important presidential announcements, critical publications, or new proposed legislation related to extreme weather and energy
- **On-the-Scene case studies** that include lessons learned and best practices from the State DOTs responding to an extreme weather event
- **Travel support** to RSTS-sponsored events and meetings
- Ability to provide input that directly affects the RSTS Program’s focus and product development
- **First to receive RSTS products** after development
Because responsibility for climate change issues is often spread across the department, you may have access to this information and not know it. To find out if your state is a member, or more information on how to become one, contact Gabriel Weil, Program Manager for the Environment, at gweil@aashto.org.

**NCHRP Update**  
Andrea Hendrickson, MnDOT

The following is an update on active NCHRP projects with upcoming completion dates. If any of these are of interest, look for the report to come out in the next year or so. For additional information please visit: http://www.trb.org/NCHRP/NCHRPProjects.aspx.

**NCHRP 24-20(02) Evaluation of Abutment-Scour Equations from NCHRP Projects 24-15(02) and 24-20 using Field Data**

The product of this continuation study will be a report prepared by the USGS to TRB and inter-action with the Principal Investigators for Projects 24-20 and 24-15(2) that will accomplish the following:
- Indicate the strengths and weaknesses of the two scour prediction methodologies based on field data
- Serve as a guide to calibrate and improve the performance of the scour prediction methods
- Serve as a model for future research

Principal Investigator: Stephen Benedict, USGS;
Budget: $265,000

**NCHRP 24-36 Scour at the Base of Retaining Walls and Other longitudinal Structures**

The objective of this research is to develop predictive methods to estimate scour at the base of longitudinal structures including vertical and sloping walls in a riverine environment.

Principal Investigator: Fotis Sotiropoulus, University of Minnesota;
Budget: $500,000

**NCHRP 24-37 Combining Individual Scour Components to Determine Total Scour**

The objective of this research is to determine the relationship between combined, independent estimates of the individual scour components and total scour actually observed for the same event. This will require identifying, compiling, and assessing existing, appropriate laboratory and field data sets where simultaneous scour processes have been observed and quantified.

Principal Investigator: Dr. Terry W. Sturm, Georgia Tech;
Budget: $600,000

**NCHRP 24-39 Evaluation and Assessment of Environmentally Sensitive Stream Bank Protection Measures**

The purpose of this study is to establish a baseline and set of protocols for long-term study of the most common of these biotechnical stream bank protection measures. Site-specific field evaluations as well as data assessments associated with the design, construction, and maintenance of selected facilities will be undertaken such that engineering recommendations can be made on the design and installation limitations and requirements for the selected techniques.

Principal Investigator: Peter F. Lagasse PhD, PE, D.WRE, Ayres Associates;
Budget: $500,000

**NCHRP 24-40 Design Hydrology for Stream Restoration and Channel Stability at Stream Crossings**

The objective of this research is to develop a scientifically supported method for defining the design hydrology for stream restoration and channel stability at stream crossings along with an understanding of how that design hydrology might change with land-use changes.

Principal Investigator: Brian P. Bledsoe, Ph. D., P.E., Colorado State University;
**Budget: $350,000**

**NCHRP 24-42 Techniques for Installation of Filters under Water**

The objective of this research is to conduct a study on filter installation techniques in various under water conditions and develop specific guidance tailored for construction personnel on the function of filters and installation techniques in various depths and velocities of stream flow for placing geotextiles and granular filters under countermeasures.

Principal Investigator: Peter F. Lagasse PhD, PE, D.WRE, Ayres Assoc.;

Budget: $300,000

**NCHRP 25-42 Bridge Stormwater Runoff Analysis and Treatment Options**

The objective of this research is to develop a guide for managing bridge runoff to protect environmental quality and meet regulatory requirements including: runoff and its effects on quality of receiving waters; current and emerging runoff management strategies; what criteria may be used to identify appropriate runoff management strategies; level of effort that is reasonable or appropriate to address bridge runoff issues at a particular location; and BMPs for bridge runoff.

Principal Investigator: Scott Taylor, P.E., RBF Consulting

Budget: $300,000

**NCHRP 24-47 Clear-Water and Live-Bed Scour in Long Contractions**

The objectives of this research are to 1) Develop a reliable data base of scour in long contractions under both clear-water and live-bed conditions, and 2) Develop live-bed and clear-water contraction scour equations suitable for use in bridge design, not simply a best-fit prediction. This research would identify, compile, and assess existing laboratory data sets to supplement the NCHRP 24-34 analyses.

Budget: $500,000

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**Calendar of Events**

| Transportation Research Board (TRB) |
| Washington, DC |
| January 10-13, 2016 |

Meeting, workshop, and presentation information can be found on the [TRB Annual Meeting website](#).

The **2016 TCHH Annual Meeting** will be held in conjunction with the National Hydraulic Engineering Conference in Portland, Oregon. Check the TCHH Meetings page in early spring for more information.

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

To be added or removed from the mailing list, please email Patricia Bush at pbush@aashto.org.

For more information on the Technical Committee on Hydrology and Hydraulics, see [http://design.transportation.org/Pages/HydrologyandHydraulics.aspx](http://design.transportation.org/Pages/HydrologyandHydraulics.aspx).