Dear Friends,

Once again, we had a great conference last August in Iowa City, Iowa. I enjoyed the presentations and discussing many things with you as I find myself continuing to learn new things. The conference was well attended, had excellent information on emerging topics, and ran smoothly thanks to the hard work of Iowa DOT, University of Iowa and many others. I hope those attended found the same. Recorded presentations and copies of the presentations are available on line at http://ir.uiowa.edu/nhec2014/ for those who could not attend the conference. You may access information for majority of past conferences from a FHWA webpage at http://www.fhwa.dot.gov/engineering/hydraulics/conference_listing.cfm. I hope many of you can attend or present at the upcoming conference in 2016.

We held a concurrent meeting with this conference and it was short. Fall 2015 meeting will be held in Seattle from September 21st through 24th at the same time as ASHTO's SCOD meeting. Since there will be few joint meeting sessions, this particular meeting will provide an opportunity for TCHH members meet with SCOD and learn about the emerging issues. This will provide better coordination and vision to TCHH in future directions.

In the meantime, TCHH continues to discuss impact of the Federal Rule making of Federal Flood Risk Management Standard. An NCHRP study related to the Extreme Weather proposed by TCHH has been accepted and expected to begin this fall. Please continue to be informed on current developments, practices, products and programs. We should draw conclusions based on rational analysis, and must always be open to new evidence and new interpretations.

With retirements, promotions and such, TCHH continues to have openings for new membership. Three new members have joined the committee last year and we look forward to few more this year. The opportunity to be a TCHH membership provides an opportunity to serve at a national level for the benefit of transportation engineers while utilizing your expertise and experience. Our field contains so many emphases area – classic hydrology and hydraulics, fish passage, sediment transport, stormwater quality, coastal hydraulics, erosion and sediment control, pump stations etc. So whatever facet of hydraulics you have mastered, share it with others. We welcome diversity of experience and expertise. If you are considering joining, please contact any of the TCHH members or your States SCOD member. Follow this link to view current membership list. http://design.transportation.org/Pages/HydrologyandHydraulics.aspx

Many DOTs are still continuing to face cutbacks in spending while safety, mobility, asset management, sustainability, and livability continue to drive our organizations. Right here in Maryland, we continue to improve highway infrastructure in ways to best serve our customers with high attention to safety. In that I
find it challenging that drainage designs require careful thinking where roads are being designed to accommodate bicycle and pedestrian traffic where it previously did not exist. As we encounter these situations, re-examining what is most important to us – both professionally and personally. As one of my respected predecessors says -Share the Road – Share the Role. What is your role in sharing the road? Let us ask, find the answers, and make the change. Enjoy what you do and find fulfillment in ways that leave lasting impressions.

Sincerely,
Karuna Pujara, Chair, TCHH

**TCHH Membership—Vacancies**

The Technical Committee on Hydrology and Hydraulics (TCHH) of AASHTO is part of the Subcommittee on Design (SCOD). State SCOD members submit nominees to their Regional Steering Committee, who then submits the names to the SCOD chair. The SCOD chair, Carlos Braceras from Utah, appoints new members to TCHH.

TCHH currently has 4 vacancies – 2 from Region 1, and 1 each from Regions 2 and 3. If you are interested, contact your SCOD member to be nominated.

**2015 TCHH Annual Meeting**

The 2015 TCHH Annual Meeting will be held in Seattle, Washington on September 21-24. The meeting will be held in conjunction with the AASHTO Subcommittee on Design and the TRB Committee on Access Management. The main conference web page can be found [here](#). The agenda for with TCHH meeting will be posted on the TCHH page soon.

**Infiltration into Roadside Drainage Ditches**

**Introduction**

Dry grassed swales carry and treat water through settling and infiltration. In most cases, roadside drainage ditches receive road runoff directly and water is infiltrated over the side slope of the ditch and down the center. Both swales and roadside drainage ditches act as stormwater management practices, however the latter is not typically given volume reduction or pollution prevention credit. This research project is designed to document infiltration performance and establish methods by which the roadside drainage ditches can be assigned this credit.

Infiltration rates are currently calculated by assuming that water flows as sheet flow over the side slope of swales. However, water flow, for most intensities, occurs in narrow and shallow micro-channels and
concentrates in depressions rather than flowing as sheet flow. This channelization reduces the fraction of the soil surface covered with water. The non-uniform distribution of water along a hill slope directly affects infiltration. The objective of this study is to quantify the wetted contact surface and determine how partially wetted areas affect the amount of volume infiltrated. If water infiltrated in a one-dimensional vertical direction due to gravity, the rate of infiltration would be directly proportional to the wetted area. Alternatively, if water infiltrates vertically due to gravity and laterally due to soil capillary suction, the infiltration rate will be higher than the wetted area would indicate.

Field experiments have been conducted to investigate the effective contact surface for infiltration modeling. Results will be used to calibrate a coupled infiltration and overland model that allows the calculation of stormwater infiltration efficiency of roadside drainage ditches.

**Method**

Four highways in the Minneapolis-St. Paul metropolitan area, with different soil types (loam, loamy sand, sandy loam, and sandy clay loam), were selected for a series of field studies. The soil types studied represent approximately 53% of the soils found in road embankments in the State of Minnesota.

The process consisted of: cutting the surface vegetation, collecting surface roughness data using a pin meter, and applying a measured discharge of water at the top of the side slope. To see the flow patterns, the water was mixed with kaolin to achieve a 0.1 lb/gal (13 g/l) uniform concentration.

For each experiment water was applied to the side slope for 30 minutes. The application rate was equivalent to a rainfall with constant 2.2 in/h (5.59 cm/h) intensity over a 32.8 ft (10m) wide road and shoulder. A 1.1in-30min storm is a 2-year event in the region, according to NOAA Atlas 14. This storm exceeds 90% of the total volume and 99% of rainfall events in the region. The total volume of water for each experiment was 67.47 gal (255.4 L).

The water patterns were recorded by installing a camera with a mounting pole set in the channel of the drainage ditch. The camera was programmed to take a picture every five seconds. A 3.28X3.28 ft (1x1m) mesh frame was installed on the swale to facilitate corrections of angle distortions in the pictures taken (Figure 1).

The water not infiltrated by the swale was collected at the bottom of the side slope. The total amount of water that was not infiltrated (runoff) was recorded, as well as the runoff rate when the system reached steady state.

**Results**

Figure 2 and Table 1 show the results of the percentage of wetted area and infiltration of the field experiments. More wetted area was associated with higher infiltration. For the cases of equal wetted area, the percentage of water infiltrated appears to be related to the saturated hydraulic conductivity of the soil.

The average percentage of observed water infiltrated in the field was 78.2% with a standard deviation of 13.9%.
Figure 2. Dimensionless percentage water infiltrated versus percentage wetted area in the field experiments. Seven tests were performed during Fall 2014 and four during Spring 2015. Most of the soils were in hydrologic soil group B (NRCS, 2009).

Table 1. Results of Field infiltration tests on side slopes of roadside drainage ditches.

<table>
<thead>
<tr>
<th>Season</th>
<th>Type of soil</th>
<th>Site</th>
<th>Length studied (cm)</th>
<th>Total Runoff (L)</th>
<th>Volume Infiltrated (L)</th>
<th>%Infiltrated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hwy 51</td>
<td>Fall loam/sandy loam</td>
<td>Site 1</td>
<td>413</td>
<td>3.45</td>
<td>220.98</td>
<td>86.5%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Site 2</td>
<td>398</td>
<td>66.2</td>
<td>189.28</td>
<td>74.1%</td>
</tr>
<tr>
<td>Hwy 77</td>
<td>Fall loamy sand</td>
<td>Site 1</td>
<td>406</td>
<td>9.0</td>
<td>165.48</td>
<td>64.8%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Site 2</td>
<td>408</td>
<td>59.7</td>
<td>195.78</td>
<td>76.6%</td>
</tr>
<tr>
<td>Hwy 47</td>
<td>Fall loamy sand/sandy loam</td>
<td>Site 1</td>
<td>792</td>
<td>0</td>
<td>255.48</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Site 2</td>
<td>765</td>
<td>0.1</td>
<td>255.38</td>
<td>99.96%</td>
</tr>
<tr>
<td>Hwy 13</td>
<td>Fall loam/sandy clay loam/silt</td>
<td>Site 1</td>
<td>420</td>
<td>29.6</td>
<td>225.88</td>
<td>88.4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Site 2</td>
<td>424</td>
<td>33.25</td>
<td>222.23</td>
<td>87.0%</td>
</tr>
<tr>
<td>Hwy 51</td>
<td>Spring loam/sandy loam</td>
<td>Site 1</td>
<td>413</td>
<td>98.3</td>
<td>156.18</td>
<td>61.4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Site 2</td>
<td>398</td>
<td>70.25</td>
<td>184.23</td>
<td>72.4%</td>
</tr>
<tr>
<td>Hwy 77</td>
<td>Spring loamy sand</td>
<td>Site 1</td>
<td>406</td>
<td>97.25</td>
<td>157.23</td>
<td>61.8%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Site 2</td>
<td>408</td>
<td>86.7</td>
<td>167.78</td>
<td>65.9%</td>
</tr>
</tbody>
</table>

Based on the data obtained, the infiltration rate is linked to the saturated hydraulic conductivity and fraction of the surface covered by water. With the preliminary data obtained during the fall experiments, a regression equation has been developed:

\[
\text{Infiltration Rate} = \beta_0 \cdot K_{sat}^{\beta_1} \cdot \text{Fraction Coverage}^{\beta_2}
\]

where, \( \beta_0 = 3.19 \) [L/T]\(^{1-\beta_1} \) \( \beta_1 = 0.34 \) \( \beta_2 = 0.67 \)

The normalized standard error of the regression is 1.9 percent.

Conclusions
The goal of this study was to analyze the effect of fractional coverage of water on infiltration rates. All the tests showed that water on the lateral slope of a swale flows as a concentrated flow, not as sheet flow, at the typical intensities for which infiltration practices are designed and utilized to improve surface water quality.

The field experiments demonstrate that there is a relationship between the percentage of wetted area and the volume infiltrated. The trend is to have more infiltration when there is more wetted area, and the results show a proportional relationship. In addition, the trend is to have more infiltration when the saturated hydraulic
conductivity is higher, as expected. The soil during the spring experiments had higher initial soil moisture content, which often resulted in a larger overall spread in the flow field and lower percent wetted area. The volume infiltrated during spring was in average 10% lower than in fall due to the increase in the initial soil moisture content.

Additional work will need to be done to determine whether infiltration below a fractionally wetted surface is predominantly vertical and one-dimensional, or vertical with a significant lateral capillary component (multi-dimensional). Such an effect will impact the infiltration rate, with the one-dimensional flow having a lower rate than the multi-dimensional flow. It is not possible to evaluate this effect with the current data. An analysis will be conducted with a computational flow model with soil parameters of the field tests to provide further analysis on the significance of the lateral flow component in the presence of fractionally wetted surfaces.

The average percentage of water infiltrated for a 2-year event observed in the field was 78% for these hydrologic soil group B soils, with a 14% standard deviation. Further experiments will be conducted using other rain intensities. The results will be incorporated in the regression equation and a Runoff-Infiltration Model for swales will be developed. This model will be a contribution to the calculations related to the infiltration capacity of roadside drainage ditches.

References


Contributed by Maria Garcia-Serrana, Ph.D. student, St. Anthony Falls Laboratory, Department of Civil, Environmental and Geo-Engineering, University of Minnesota; Advisors: John S. Gulliver, Professor, Department of Civil, Environmental and Geo-Engineering, University of Minnesota; and John L. Nieber, Professor, Department of Bioproducts and Biosystems Engineering, University of Minnesota.

Funded by the Minnesota Department of Transportation (MnDOT), Minnesota Local Road Research Board (LRRB).

Extreme Storm Transposition Helps Communities Assess Flood Vulnerability

Heavy Rain

Prolonged heavy rains over south-central Wisconsin in June 2008 did not particularly concern Reedsburg Public Works Director Steve Zibell. After all, just two years earlier the city had completed an $11 million upgrade to their wastewater treatment plant, including construction of a new berm along the Baraboo River to protect the plant from a 100-year flood. However, after two weeks a whopping 14 inches of rain had fallen across the area, and river levels rose two feet higher than the new berm. The new treatment plant was inundated and inoperable for weeks, discharging raw sewage into the Baraboo River.

After spending $850,000 in repairs, plus $400,000 to raise the berm an additional three feet, Zibell feels that Reedsburg is ready for the next big storm event. But across the country, communities learning of what happened at Reedsburg wondered, “How would a storm like that impact our community?”
More Heavy Rains
The historical record of rainfall and projections of future rainfall from climate models both paint a picture of heavier and more frequent extreme storms for Wisconsin in the future.

However, the potential for flooding—identified through mapping of areas anticipated to experience flooding once or more per century—is calculated from historical records that don’t reflect today’s changing climate conditions. Combined with the typical municipal approach of adapting to rainfall impacts after a large storm has occurred, many communities are vulnerable to extreme rainfall events.

Concerns in Madison
Just south of the Baraboo River watershed, Madison—Wisconsin’s state capitol—is in the Yahara River watershed. The most obvious feature of the Yahara watershed is a slow-draining chain of lakes that runs through a mixed urban and agricultural landscape. A portion of Madison is on low-lying land between two of the lakes; in fact, no place in the city is far from a lake.

Runoff from expanding urban development is already causing erosion of wetlands and shorelines, so residents have some awareness of flooding issues. Several communities in the region recognized they were ill-prepared for the flooding that would occur if they experienced extreme rainfall.

Simulating Extreme Precipitation
NOAA’s Sectoral Applications Research Program provided funding to scientists at the University of Wisconsin-Madison to build a tool that would allow communities to assess their vulnerability to extreme rainfall without needing to experience it. Using NOAA’s NEXRAD rainfall radar record of the 2008 Baraboo River storm, they built a computer simulation to “transpose” the 2008 rainfall over the Yahara River watershed, and model the runoff, stream flows, and lake levels as if the storm had occurred further south than its actual location.

Using this approach, the model helped planners discover unforeseen vulnerabilities and adaptation opportunities. The simulated storm helped municipalities and businesses recognize

Simulation Results

What would happen if the 2008 storm had occurred over the Yahara watershed?
- Overland flows and urban runoff would swell streams to new heights.
- Lake Mendota would overflow its banks, closing the regional airport.
- The City of Madison would be split in half by floodwaters that could remain standing for as long as ten days.

How are local governments in the Yahara River watershed preparing for extreme rainfall?
- Evaluating the ability to detain water in natural depressions upstream from Madison.
- Improving monitoring of rainfall and stream flows.
- Updating Lake Mendota water level management scenarios to increase downstream discharges prior to heavy rainfall.
- Budgeting for more sandbags and emergency response capacity.
- Identifying infrastructure at greater risk of flooding.
- Discussing new controls on stormwater runoff from urbanized areas.
steps they could take to minimize the impacts of future extreme storms.

**Transposing Virtual Storms to New Locations**

Building on this storm transposition simulation, communities can now use NOAA NEXRAD rainfall data from any recent rainfall event to demonstrate what would happen if the event occurred in their location. Understanding how a storm that happened nearby would impact their own location identifies vulnerabilities and helps communities see options for how they can build resilience. To inquire about using the tool for new locations, interested individuals can contact Kenneth Potter at kwpotter@wisc.edu and/or David S. Liebl at david.liebl@wisc.edu.

To explore the rainfall data for the June 2008 Baraboo watershed storm, [visit the Climate Explorer](http://toolkit.climate.gov/taking-action/using-demonstration-storms-prepare-extreme-rainfall) on the U.S. Climate Resilience Toolkit website.

This article first appeared in the U.S. Climate Resilience Toolkit:


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**The New FHWA Stochastic Empirical Loading and Dilution Model (SELDM) for Stormwater-Quality Analysis**

**Gregory E. Granato & Susan C. Jones, USGS**

SELDM is a stormwater quality model developed by the U.S. Geological Survey, in cooperation with the Federal Highway Administration (FHWA) to help develop planning-level estimates of event mean concentrations, flows, and loads of stormwater. Figure 1 shows the type of risk-based information SELDM can provide. In this graph, concentrations of total phosphorus in highway runoff and grassy-swale discharge can be compared to water-quality standards to estimate the risk of exceeding each standard.

![Figure 1](image-url)

*Figure 1. The stochastic populations of total phosphorus concentrations in highway runoff and BMP discharge showing the risks for exceeding two hypothetical runoff-quality criteria (modified from Granato and Jones 2014, http://doi.org/10.3141/2436-14).*
SELDM uses information about a highway site, the associated receiving-water basin, precipitation events, stormflow, water quality, and the performance of mitigation measures to produce a stochastic population of runoff-quality variables. Although SELDM is, nominally, a highway runoff model it can be used to estimate flow concentrations and loads of runoff-quality constituents from other land use areas as well.

SELDM can perform stream-basin analysis and lake-basin analysis. The stream-basin analysis uses a stochastic mass-balance analysis based on multi-year simulations including hundreds to thousands of runoff events. The lake-basin analysis also is a stochastic multi-year mass-balance analysis. The lake-basin analysis uses the highway loads that occur during runoff periods, the total annual loads from the lake basin to calculate annual loads to and from the lake. The lake basin analysis uses the volume of the lake and pollutant-specific attenuation factors to calculate a population of average-annual lake concentrations.

The annual flows and loads SELDM calculates for the stream and lake analyses also can be used to estimate total maximum daily loads (TMDLs) for the site of interest and the upstream lake basin. The TMDL can be based on the average of annual loads because product of the average load times the number of years of record will be the sum-total load for that simulated period of record. The variability in annual values can be used to estimate the risk of exceedance and the margin of safety for the TMDL analysis. SELDM is easy to use because it has a simple graphical user interface and because much of the information and data needed to run SELDM are embedded in the model. Information about the model including software, documentation and case studies are available on the model web page at http://webdmamrl.er.usgs.gov/g1/fhwa/SELDM.htm.

### Culvert Inlet Design

Nicole Bartelt, MnDOT

One of the often overlooked or least considered pieces to culvert design and analysis is the culvert inlet configuration. Culvert inlet configurations can have a significant impact on your computed headwater, and need to be adequately selected and modeled to properly describe the culvert crossing conditions. In particular, if you have an inlet control condition, the inlet configuration edge can vary the headwater depth by up to 25-40% (or more). This article will summarize some of the resources available for unusual inlet configurations, and will provide case examples using HY-8, version 7.3.

Many times it is standard practice to select a default inlet edge condition, especially if it yields conservative results (i.e. always selecting a square edge with headwall inlet configuration). This is probably acceptable in many locations, where you are replacing your culvert with a similar culvert configuration. However, there are a number of situations where you need to maximize your culvert capacity, including:

- Locations with strict headwater increase requirements (or no stage increase allowed)
- Culvert lining jobs
- Culvert extensions
- Replacing a culvert that is a non-standard (not precast) size

The first step is making sure you are modeling the inplace or proposed standard culvert inlet properly. Some things to consider are:

- Does the pipe include a headwall or wingwalls, what is the geometry/configuration of those (0-degrees - straight out from the pipe, 45-degrees, etc.)?
- Does your standard pipe apron or precast box culvert inlet configuration include a beveled edge?

Next review your software program inlet configuration selection to select the inlet configuration that best matches your condition. HY-8 has a number of inlet configurations for each culvert type. Be careful to select an inlet edge that matches the inlet flow characteristics of your constructed or proposed inlet.

Here is a link to the standard precast box culvert inlets for MnDOT. Note that the wingwall is at a 0-degree skew, but the top edges of the edge section are beveled. So the inlet entrance loss, ke = 0.4. If you select the “Square Edge (0ø flare) Wingwall”, the inlet ke = 0.7. So you may need to select an inlet configuration that has a different description, but matches the inlet edge flow characteristics. In this example, we would select...
“Square Edge (30-75° flare) Wingwall”. The blue question help button located right next to the inlet configuration box opens up a pdf document with the ke values and other details for each inlet configuration.

If you have a need to increase capacity further, there are options to increase capacity using an improved inlet section. You may design a tapered inlet section, as described in Section 3.4 of HDS-5. Alternatively, Iowa DOT commissioned a study on using a standard precast increaser/reducer pipe section as an improved inlet section, see below for a schematic.

South Dakota DOT commissioned a study for multiple box culvert lines, and a larger variety of box culvert inlet
types (including chamfered or rounded edges). The SDDOT inlet values are directly available in HY-8 if you select the culvert shape “South Dakota Concrete Box Culvert”. [LINK]

CASE EXAMPLES:

MnDOT Metro District had a culvert that was being repaired and extended in a sensitive watershed. The inplace culvert had a 45-degree wingwall with no bevel as the inlet edge condition. MnDOT standard precast sections are a 0-degree wingwall with a bevel. To meet the strict watershed district requirements of 0.0-ft stage increase, the inlet configuration needed to be improved using a 45-degree chamfer or rounded edge (using the SDDOT box culvert inlet study data).

MnDOT District 1 had a 9-ft CMP under over 25-ft of fill that needed to be repaired (replacement was not an option). To reduce the amount of headwater increase in the proposed lined condition, MnDOT used a reducer section at the inlet to improve the pipe capacity. The pipe liner reduced the crossing capacity significantly, so both an improved inlet and an overflow pipe were necessary. Due to the complex hydraulic condition (including roadway overtopping), hydraulic calculations were completed outside of standard culvert computational software. Design, drafting, and construction were relatively straight-forward, as all of the sections were standard precast sections. Before and after pictures are shown below of the inlet.

Figure 6. Inlet section of 9-ft CMP before lining.

Figure 7. Inlet section of 9-ft CMP: Lined with 7.5’ RCP with inlet reducer section.
Two-dimensional hydraulic modeling has become ever more widely used to evaluate transportation route impacts with respect to floodplains. While two-dimensional modeling has great capabilities to assess complicated river crossings, often two-dimensional modeling’s abilities to produce fantastic visuals can be overlooked. Recently the Montana Department of Transportation (MDT) Hydraulics Section completed a two-dimensional model using SMS SRH-2D for a proposed bridge replacement project on a county owned gravel road over the Musselshell River near Roundup, Montana. The Musselshell River has all of the characteristics that make using a two-dimensional model essential in analyzing crossings of the river.

A key aspect of this project was the public’s desire for a new bridge to be constructed as quickly as possible; expressed through a petition sent to MDT’s leadership. One of the major requests was for a higher level-of-service bridge crossing with respect to flooding. Which in turn had to be balanced with the restrictions that come with the bridge being located in a Zone A floodplain. Montana state law limits the allowable rise in water surface elevation at the Base Flood to 0.5 feet.

From the two-dimensional models it was estimated that the existing roadway began to experience overtopping somewhere just above the 5-yr event. Working with the road designers; the bridge opening and roadway overtopping elevations were balanced to provide a new 25-yr level-of-service roadway while still maintaining a rise less than 0.5-ft in the estimated Base Flood Elevations. An armoring design was developed for the overtopping area in an effort to save the majority of the road during an overtopping event.

Once the modeling was completed and the maximum increase in the level-of-service for the new bridge and roadway was determined it was time to communicate those results. The most important people that need to approve designs are not always the engineers, for this project it was the upstream impacted landowners and the floodplain administrator. If these individuals did not support the proposed design then the design was not feasible. The blue shaded area on Figure 2 shows the change in the extent of inundated land during the 100-yr event. This aspect was important to the upstream landowners. Using a color aerial as a background image behind the existing and proposed water surface extents provided a very effective discussion tool that non-engineers could easily understand.

Typically for floodplain permit applications a HEC-RAS model is used to convey the change in water surface elevations for proposed versus existing conditions. With 56 counties in Montana not every county floodplain administrator has the technical background necessary to review a hydraulic model. Therefore being able to produce a great visual aide, such as figures 3 and 4 below that show the estimated water surface contours for the proposed and existing conditions is of great help. Specific points of interest can then be pointed out and discussed.
Being able to calibrate the model to a historical aerial flood photo as a background image, as seen in figure 5 can be very helpful in establishing the reliability of the model.

In the end, the visual aids went a long way to ensuring the success of the project. The impacted landowners were satisfied that the raise in water surface would have minimal impacts on their land. The county floodplain administrator was convinced that the proposed roadway would fall within the allowable limits of a Zone A floodplain, and the county commissioners and travelling public that frequent the route were pleased with the significant increase in level-of-service of the new roadway, an increase from a 5-yr event to a 25-yr event.

FY 2016 NCHRP Projects
National Cooperative Highway Research Program (NCHRP) has come out with their list of projects for FY 2016 and they are now soliciting for people interested in serving as panel members. A solicitation letter including a list of projects is located at: http://onlinepubs.trb.org/onlinepubs/nchrp/NCHRP_PanelSolicit2016.pdf. There are several projects related to hydraulics or water quality that might interest you:

<table>
<thead>
<tr>
<th>Project Number</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-61</td>
<td>Applying and Adapting Climate Models to Hydraulic Design Procedures</td>
</tr>
<tr>
<td>24-47</td>
<td>Clear-Water and Live-Bed Scour in Long Contractations</td>
</tr>
<tr>
<td>25-53</td>
<td>The Efficacy of Treating Highway Runoff to Meet Watershed TMDL Goals</td>
</tr>
<tr>
<td>25-54</td>
<td>Field Trials of BMP to Remove Dissolved Metals in Highway Runoff</td>
</tr>
</tbody>
</table>

Serving on a panel allows you to help shape the research, provides an opportunity for you to share your expertise and support for research that could solve life’s vexing hydraulic questions, and gives you an
opportunity to meet and learn from other panel members and researchers. If you are interested in nominating
yourself or someone else for a panel, information is located at

Recent NCHRP publications include:

- **Report 795**— *Design Methods for In-Stream Flow Control Structures*
- **Report 800**— *Successful Practices in GIS-Based Asset Management*
- **Report 801**— *Proposed Practice for Alternative Bidding of Highway Drainage Systems*
- **Synthesis 472**— *FEMA and FHWA Emergency Relief Funds Reimbursements to State Departments of Transportation*
- **Synthesis 474**— *Service Life of Culverts*
- **Research Results Digest 395**— *Claims Related to Stormwater Discharge*
- **Legal Research Digest 64**— *Legal Aspect of Environmental Permitting in the Emergency Response Environment*

Additional information on these and other NCHRP publications can be found at

News and information on hydraulics and hydrology research at TRB can be found at

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**Want to Be a HydroLink Contributor?**

Andrea Hendrickson, MnDOT

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

The Waters of the U.S. rule to clarify which smaller waterways and wetlands come under Clean Water Act regulation was finalized earlier this month by the EPA and U.S. Army Corps of Engineers. For more information, see the links below.


Calendar of Events

The 2015 TCHH Annual Meeting will be held in conjunction with the 2015 AASHTO Subcommittee on Design and TRB Subcommittee on Access Management Annual Meetings in Seattle, Washington, on September 21–24, 2015. Check the TCHH Meetings page for more information in the coming days.

TRB is sponsoring the International Conference on Surface Transportation System Resilience to Climate Change and Extreme Weather Events on September 16–18, 2015 in Washington, DC. Early Bird Registration Expires July 10. For additional information, see the TRB website.

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.