

## The Killers In Our Rivers

By Tim Gokie, PE

In the summer, we see the headlines: “18-year Old Identified as Drowning Victim”, “Search Continues for Missing Kayaker” or “Two Men Drown While Fishing on Sunday”. In the past, I would pass over the headlines without reading the article and think, “That’s sad, someone must not have been wearing their life jacket.” Over time however, I have learned that a life jacket is not always enough. I have started reading below the headlines and found many of those who drown in our rivers were not doing anything different from the rest of us. They were out fishing with friends or taking a refreshing dip on a hot summer night or kayaking down a river on a beautiful spring day. Sometimes, those who drown are the best among us, heroes who jump in the water to try to save a stranger.

As I have dug deeper, I have found many of these drownings are not happening on isolated, random locations along our rivers. Often there is a man-made hydraulic structure involved. An abandoned low head dam, a small sheet pile wall constructed across the stream to stop erosion, or large steel gates that are being used to control the flow of water. During certain times of the year, if the flow conditions are just right (or actually wrong), these structures can change a slow meandering stream into a drowning



Top: Dangerous low head dam in the Big Blue River under the Court Street Bridge in Beatrice. Photo by NeDNR Staff.

Bottom: Aerial view of the low head dam on the Big Blue River under the Court Street Bridge in Beatrice. Image courtesy Google.

machine. The two most common killers in our rivers in Nebraska can be classified into two categories: hydraulic rollers and strainers. In Nebraska, 2019 was a particularly bad year with at least four drownings occurring at hydraulic structures in our rivers.

### Hydraulic Rollers

A 2016 PBS documentary entitled, *Over, Under, Gone: The Killer in Our Rivers*, provides an excellent introduction to the dangers associated with hydraulic rollers. Hydraulic rollers develop anywhere large quantities

of water go over a vertical drop into a pool of water. Any vertical wall spanning from one side of a river to the other, like a low head dam, can create a hydraulic roller. What’s surprising, a drop as small as six inches under certain flow conditions can create this deadly roller effect while the surface of the water can appear calm, hiding the submerged dangers below.

Once a victim is trapped in the roller, it can be very difficult to get out, regardless of whether or not the victim is wearing a life jacket.

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Powerful, recirculating currents force anything caught in the roller down to the bottom of the stream and then release it back up to the surface only to plunge it back down again. Due to the way the water churns and aerates in the roller, air bubbles decrease the buoyancy of the water making it difficult to stay afloat, even if you are wearing a life jacket. The best way to try to escape a roller is to perform the dangerous maneuver of removing your life jacket and swimming out the bottom of the roller along the riverbed.

### Strainers

A strainer is anything in a river that allows water to flow through but will trap a kayaker or a swimmer. Small pipes, open cracks or joints in concrete, partially open gates, or even a fallen tree can act as a strainer in a river. Similar to a kitchen strainer used to drain spaghetti or wash vegetables, a strainer in a river allows water to pass while holding on to everything else. People can become pinned against the face of a structure by the force of suction created by water flowing through holes and cracks. Structures such as spillways and bridge piers can catch logs, sticks and debris and form large strainers. Always be alert to the possibility of fallen trees and debris and do not swim close to dams or other hydraulic structures.

### Know the Risk and Be Aware

Most of these structures are not well marked and there are no signs warning of the dangers. Therefore, before going out on a tube or kayak, plan your trip. Scan aerial photos along the route, looking for potential hazards. Avoid fallen trees. Talk to someone who has made the trip before. Get on the Nebraska Canoe and Kayak Public Facebook Page and ask for advice; or visit the Nebraska Game and Parks Commission's website and see their Water Trails Guide for well-traveled canoe routes. Give friends a trip itinerary and let

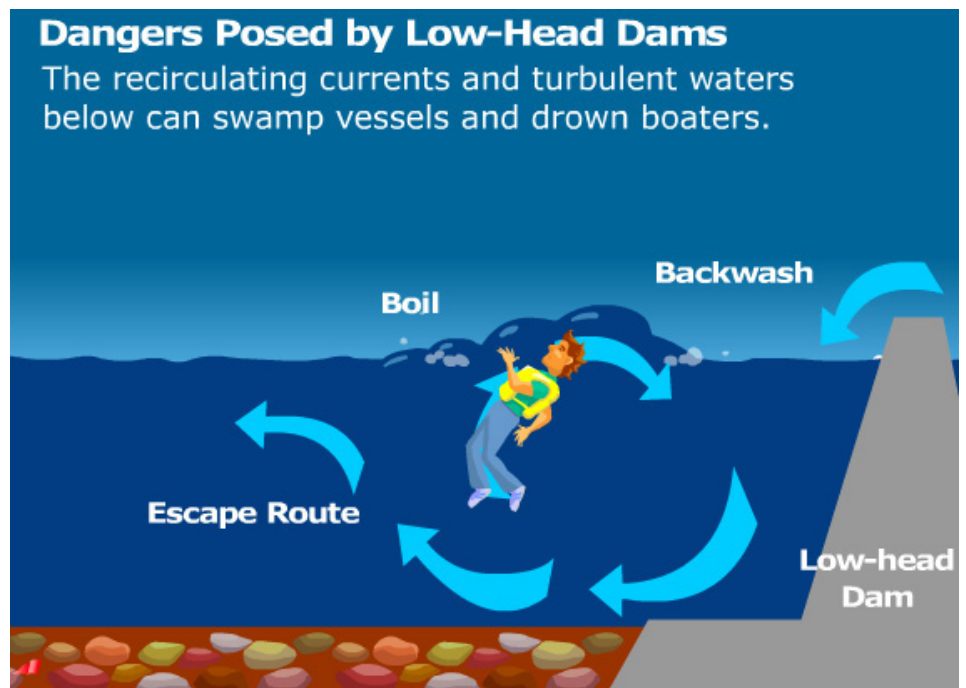


Figure Courtesy of the Associate of State Dam Safety Officials.

them know when you expect to be home. If you see a hydraulic structure ahead, get out and portage around it. The thrill of going over or through the structure is not worth the risk. Concrete walls encroaching from the banks of a river are a sign there may be trouble ahead. Watch and share the 30-minute, online PBS documentary *Over, Under, Gone: The Killer in Our Rivers*.

If you are swimming in a river, do not go near dams, spillways, bridges or culverts, even if there are no signs warning of the potential danger. Always wear a life jacket. Rivers are constantly changing. A swimming hole next to a low head dam that was completely docile yesterday could be a drowning machine today, even with a life jacket. Sand bars are temporary. They can evaporate and disappear in an instant, plunging you or your loved ones into the water. If you are near a hydraulic structure, even if you are a good swimmer, you may become trapped in the current. Educate your kids and grandkids of the dangers.

### Make It Home Safe

Some of my favorite memories growing up in Nebraska are from

swimming off a sand bar on the Niobrara River, fishing along the Elkhorn River, or going for a boat ride on the Missouri River. Let's continue to take advantage of our rivers and lakes in Nebraska in 2020, but let's make sure we know the risks and make it home safe. ■

### Updated FEMA Forms and Documents

By Chuck Chase, CFM

*Elevation Certificate.* Many of you are aware that a new Elevation Certificate (EC) was released this year. The new EC is, for all practical purposes, identical to the one it replaced. One improvement is that the elevations on the 'fillable' form only carry decimals to the tenth of a foot. Another improvement is an upgrade to the expiration date. Be aware that though the new EC is identical in all other ways to the old, it became effective immediately and is the only EC that FEMA will accept, and the only one you should accept.

- See [FEMA Forms](#) cont. on next pg.



FEMA Forms continued from page 2.

## Walk-out Basements and the Elevation Certificate

By Adele Phillips and Chuck Chase, CFM

**Floodproofing Certificate.** You may not be aware that a new Floodproofing Certificate (FC) has also been released. I am told that the Floodproofing Certificate is also identical to the former FC with an updated expiration date. If you have non-residential structures being floodproofed, be sure that you use the new form. It also became effective the day it was released and is the only version you should accept.

For any development on or after February 21, 2020, ensure that the current Elevation Certificate and/or Floodplain Certificate is submitted.

**Technical Bulletin #1.** Technical Bulletin #1 (TB-1) has been rewritten and gives improved guidance for the requirements, use, and installation of both engineered and non-engineered flood openings. The bulletin contains instructions for filling out the Elevation Certificate when flood openings are utilized and has new tables comparing NFIP with other building codes.

**Technical Bulletin #5.** Technical Bulletin #5 (TB-5) is new but deals with coastal construction and obstruction guidance in V Zones. It is of little use in Nebraska, yet, it is worthy to note that it highlights FEMA's increased focus on reducing wreckage, rubble, and debris in floodwaters. In the future we might expect the same type of increased focus on debris with riverine flooding.

**Floodplain Management Requirements for Agricultural Structures and Accessory Structures.** FEMA Policy #104-008-03 was issued in February. It is intended to provide technical assistance to local Floodplain Administrators regarding the implementation of the design and performance standards for agricultural structures and accessory structures in the floodplain. ■

The Elevation Certificate (EC) is an important tool in the administration of the National Flood Insurance Program (NFIP). It is used to demonstrate compliance with flood regulations, to determine flood insurance premium rates, and to provide supporting evidence for Letters of Map Change Requests. Elevation Certificates are required for development in A zones, and they may only be certified by a licensed professional such as a surveyor, engineer, or architect. To figure out the flood insurance rating for a building, the Lowest Floor Elevation (LFE) needs to be determined and compared to the Base Flood Elevation (BFE). The Elevation Certificate form contains several diagrams which provide guidance as to which elevation measurement may serve as the LFE, because for insurance rating purposes, the LFE is not always literally the bottom floor of the building.

One of the most common errors found on ECs is the referencing of the incorrect diagram, particularly when considering basements and walk-out basements. The NFIP defines a basement in 44 CFR 59.1 as, "any area of the building having its floor subgrade (below ground level) on all sides." Elevation Certificate Diagram 2A depicts a basement and should be used in a typical basement scenario.

Note the asterisk in Diagram 2A. It is important to keep in mind that for EC purposes, a basement is a basement regardless of its use. As stated in the



Example of grading resulting in a positive flow toward the house. Copyright 2015, Mobius.

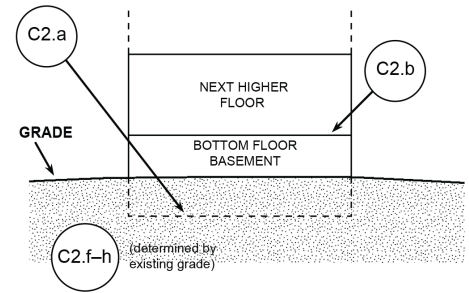


Diagram 2A of the Elevation Certificate.

fine print, "a floor that is below ground level (grade) on all sides is considered a basement even if the floor is used for living purposes, or as an office, garage, workshop, etc"

Walk-out basements create confusion. In most cases, a walkout basement has at least one side at or above grade. Because not all sides of a walk-out basement are subgrade, the NFIP does not consider walk-outs to be basements. A structure with a walk-out basement is actually considered an elevated building, as depicted in EC Diagram 7. Use Diagram 7 when a building is elevated on full-story foundation walls with a partially or fully enclosed area below the elevated floor.

According to Chris Parsons, the NFIP Insurance Liaison for FEMA Region VII, insurance underwriters consider nearly all walkouts to be encompassed by Diagram 7. However, there are a couple special scenarios which can cause a walk-out to be considered a basement, and placed under either Diagram 2A or 2B.

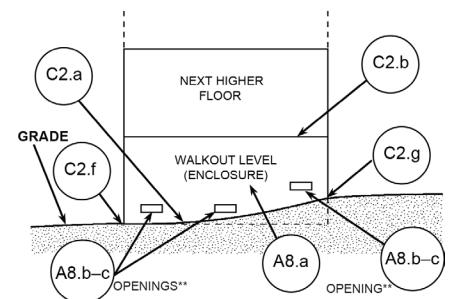


Diagram 7 of the Elevation Certificate.

- See [Walk-out](#) cont. on next pg.

**Walk-out** continued from page 3.

Usually, the grade leading up to the walk-out slopes away from the structure, creating a neutral or positive flow. However, if the grade slopes toward the structure (as shown in Photo 1), a negative flow is created. In this scenario, the walk-out is considered a basement. The appropriate diagram to use in this case is Diagram 2A.

Sometimes earth has been excavated away from a basement to create an entryway. In this scenario, the basement floor is subgrade on all sides, even though on one of the sides, the grade is not in immediate contact with the building. See Photo 2. In this case, Diagram 2B is applicable.

When using the EC for compliance purposes it is important to remember the purpose of the diagrams. NFIP insurance underwriters use the EC and other forms submitted by the insurance agent to determine which is the lowest level for NFIP insurance rating purposes. FEMA uses the form to verify and approve Letters of Map Change. The local Floodplain Administrator uses the EC along with the floodplain development permit to ensure compliance with the local floodplain management ordinance standards.

Walkout basements are very common in Nebraska, so remember in most cases to use Diagram 7. These are just a few situations to keep in mind as you use the EC as a compliance tool. ■



Copyright 2005, Absolute Green Homes.

## Nebraska's Five-Year Business Plan

By Jamie Reinke, PE, CFM

As part of NeDNR's Cooperating Technical Partners (CTP) agreement with FEMA, the Floodplain Management team is tasked with developing a vision for mapping priorities for five-years into the future. NeDNR and FEMA have separate mechanisms for how projects are selected, but often the mapping priorities of the two agencies are well aligned.

NeDNR, by state statute, prioritizes mapping needs by considering the following factors:

1. Potential for future development;
2. Potential for flood damage or loss of life;
3. Probability that adequate data and maps will be prepared within a reasonable time by other sources;
4. Availability and adequacy of any existing maps;
5. Availability of flood data and other information necessary to produce adequate maps; and
6. Degree of interest shown by the local governments in the area in utilizing flood data and maps in an effective flood plain management program.

Similarly, FEMA has identified the following types of projects as the highest priority:

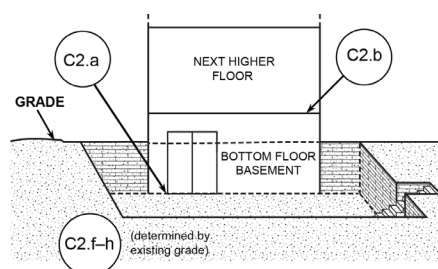
1. On-hold County Wide Projects
2. Levee PMR Projects
3. On-going Watershed Projects
4. Watershed Projects
5. Paper Inventory Reduction Projects

NeDNR uses the data associated with regulatory maps throughout the state regularly, whether for a Base Flood Elevation (BFE) Determination or for providing technical assistance to communities. When we use this data, it often becomes clear which areas of the state are in need of updated regulatory maps, however, we are still required to consider the state statutes and FEMA's priorities before identifying a project for future funding.

NeDNR works to sequence projects in our five-year business plan in a logical manner to address these mapping needs. Projects are selected at a watershed level and, when possible, NeDNR is leveraging the work of other agencies to avoid overlapping efforts and to maintain cost-efficiency. This allows NeDNR to maximize funding opportunities to provide more of the state with updated, high-quality regulatory products.

The FEMA Fiscal Year 2020 Business Plan update was due the end of March. The spring 2019 flooding resulted in significant changes to NeDNR's five-year plan last year, and those changes continue to be modified as we analyze state and federal priorities. The Lower Elkhorn and Upper Elkhorn watersheds continue to be on-hold while NeDNR is obtaining new topographic data (LiDAR) to accurately map the changes in stream alignment. To view changes to NeDNR's future mapping project sequencing please view the current business plan [here](#).

Questions or comments can be directed to Katie Ringland at [katie.ringland@nebraska.gov](mailto:katie.ringland@nebraska.gov). ■



**Diagram 2B** of the Elevation Certificate.

**06.07-06.11 ■**  
**ASFPM Annual Conference**

**Location:**  
 Fort Worth Convention Center,  
 Fort Worth, TX

The Association of State Floodplain Mangers will host their 44th annual conference, “Resiliency Where the West Begins” from June 7th through June 11th. Join over 1,000 flood-risk professionals from all over the world to network with local, state, regional, tribal, and federal officials, industry leaders, consultants, and a wide variety of subject matter experts from diverse fields. To learn more, visit this [link](#).

**07.23 ■**  
**NeFSMA Annual Conference**

**Location:**  
 Younes Conference Center,  
 Kearney, NE  
 8:00 am – 5:00 pm

The Nebraska Floodplain and Stormwater Managers Association will host their 12th annual conference, “Taking Care of Flood Risk Business.” The conference will focus on mitigation efforts related to the 2019 flood, offering three topic areas for presentations, Floodplain: Risk Management, Mapping, and Flood Risk Mitigation, Stormwater, and “Taking Care of Flood Risk Business”. For event updates, visit this [link](#).

**Webinars:**

**Natural Hazards Center □**

The Natural Hazards Center, in partnership with FEMA, have created these free 1-hour “Making Mitigation Work” webinars to feature innovative speakers and highlight recent progress in mitigation policy, practice, and research. All webinars are from 12:00 pm - 1:00 pm Eastern time. More information is available [here](#).

- 05.12** *Communication for Community Resilience: The Homeowner’s Handbook to Prepare for Natural Hazards*
- 06.09** *Collaborative Risk Communication: Landslide Guide for Residents of Puerto Rico*

**Strategic Alliance for Risk Reduction (STARR) □**

To register, visit this [link](#) and search “STARR” under the upcoming training tab. Unless otherwise stated, all courses offer 1 CEC for CFMs.

- 05.21** 11:00 am - 12:00 pm This session is the first in a two-part series and will highlight eight basic steps to reviewing development inside the Special Flood Hazard Area (SFHA). This is a beginner training, recommended for those new to the role of floodplain administrator.
- 05.21** 12:30 pm - 2:00 pm This 90-minute session immediately follows the training on Floodplain Development Permit Review and will highlight special considerations for plan reviewers and building inspectors when evaluating and inspecting development inside the SFHA, including basic concepts and terminology, minimum construction standards (from the I-Codes), and conducting inspections.

**May**

Su	M	Tu	W	Th	F	Sa
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				.21		

**June**

Su	M	Tu	W	Th	F	Sa
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**July**

Su	M	Tu	W	Th	F	Sa
					.23	

## Additional Webinars and Online Resources:

### ASFPM Online Webinars and Training

ASFPM has a variety of classes for members and non-members, some free, such as the *Lunch and Learn Webinars*, and some for a reduced fee for members such as the *Red Vector* classes offered through the *ASFPM Online University*. To learn more, go [here](#).

### COMET Independent Study Courses

The COMET® Program is a free collection of hundreds of training resources intended for the geoscience community. COMET offers over 30 classes with pre-approved CECs for CFMs. Over 50 CECs may be acquired through COMET. To be eligible to obtain CECs for any of these courses, the CFM must provide proof of successful completion of the course and pass the applicable quiz. To learn more, visit this [link](#).

### Emergency Management Institute Independent Study Courses

#### IS-273 How to Read a Flood Insurance Rate Map

The purpose of this course is to provide the participants with the knowledge and skills required to use Flood Insurance Rate Maps (FIRMs) to determine the potential flood risks for a specific property to determine if a property should be protected against flood loss. For details and to register, visit this [link](#).

#### IS-274 How to Use a Flood Insurance Study (FIS)

The purpose of this course is to provide the participants with the knowledge and skills required to access and properly use a FIS to determine the flood risk for a property and allow participants to take actions that may prevent flood disasters or insure against losses caused by floods. To learn more and to register, visit this [link](#).

#### Other FEMA Independent Study Courses

FEMA has almost 100 additional Independent Study courses offered with pre-approved CECs for Certified Floodplain Managers (CFMs). To be eligible to obtain CECs for any of these courses, the CFM must provide proof of successful completion of the course. Courses may become unavailable due to revisions, retirement, or various other reasons. For a full list of courses, visit [here](#).

### Floodproofing.com Webinar Wednesdays

Floodproofing.com is a private company specializing in floodproofing options. The courses on Webinar Wednesdays are offered by the Floodproofing.com Team, in partnership with FENEX & Risk Reduction Plus Group, and not only provide training for CFMs to earn CECs. Architects, Builders, Code Officials, Engineers, Insurance Agents, Realtors, and Surveyors may also earn CECs and CEUs. To learn more, visit this [link](#)





## Want More Information?

Visit Our Floodplain Website at: <https://dnr.nebraska.gov/floodplain>

Or, Contact:

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