

IOWA'S 2008 FLOOD RECOVERY WAVERLY



HISTORIC DAM, HISTORIC FLOOD

Waverly straddles the Cedar River roughly 15 miles due north of Cedar Falls and had a population of about 9,000 in 2008. In 1856, the city's first settler chose the location to build a dam that powered his sawmill. Flour mills, a woolen mill, and Iowa's oldest hydroelectric plant (built in 1908) followed.

Along the way, the dam was rebuilt in the 1880s and again in 1915. It was substantially improved in the 1940s. The mills eventually disappeared, but the hydroelectric plant continues to whirl along, saving the city about \$100,000 worth of electricity a year. The dam also provided a broad, elevated river pool just upstream of downtown. The pool is both scenic and recreational. It is used for fishing, swimming, and boating.

But the dam also exacerbates flooding. In fact, Waverly flooded 10 times since 1915. In 1965 and 1993, it flooded twice both years. The dam that founded the town and proven so useful over the years was also contributing to a great deal of damage.

Then along came 2008's record-setting crest, bringing damage Waverly had never before seen.

According to a FEMA report, "The Cedar River flows through the main commercial and residential district of the City of Waverly, so when the river reached 19.3 feet — 8 feet above flood stage — the city's core felt the impact. Damages in the June 2008 flood included an estimated 700 homes or about 15 percent of the housing stock, 100 businesses, and three of the eight schools in the Waverly-Shell Rock school system."

TO BE OR NOT TO BE

Then-City Engineer Mike Cherry and then-City Administrator Richard Crayne outlined the flood's progression and the city's response in the book *Un-Natural Disasters* by Terry Swails and Carolyn Wettstone.

Monday, June 9, the city distributed 200,000 sandbags. "About a quarter of our employees were personally affected by the floodwaters. The majority of them made the decision to stay at work and help with the city's sandbagging efforts. So their families were left trying to

prepare and secure their properties on their own," said Crayne.

That morning, the city ordered about a quarter of Waverly's residents to evacuate by 8 p.m. That's when the city utilities planned to shut off gas and electricity for safety reasons. The fire department went door to door with the order. At 9 p.m., NWS revised Waverly's forecasted crest from 16.8 feet to 19 feet. At that point, "We went from a 100-year flood event to a 500-year flood event," said Cherry.

In the wee hours of Tuesday, June 10, "People who did not heed the evacuation order started to call," said Cherry. "They wanted the city to come and evacuate them." Cherry told the callers that the lack of electrical power and the swiftly moving water made it too dark and too dangerous to try to move them then. It was safer for residents to stay put until morning.

When day dawned, city hall and the civic center were flooded, and all three bridges across the Cedar River were closed. During the height of the flood, getting from one side of the river to the other was about a 25-minute drive.



Businesses several blocks from the river flooded.

EYEWITNESS

SANDBAGGING WASN'T WORTH IT

In retrospect, Crayne said, sandbagging wasn't worth it. "Even if you were able to keep the water out of your property, it would not have helped because the ground pressure would more than likely have caused foundation failures."

Before the recovery efforts were over, 89 properties were bought out and remediated with the help of CDBG funds and the historic downtown and Washington Irving Elementary School were documented to remediate or compensate for the destruction of historic buildings, including the school.

DISASTER EDUCATION

Jere Vyverberg, Superintendent, Waverly-Shell Rock Schools, tells how Waverly built a school from scratch in 56 days.

Perhaps the single hardest-hit entity in Waverly was the Waverly-Shell Rock public school system. With three of its eight schools flooded, the system suffered greater proportional damage than did either the Cedar Rapids public schools or the University of Iowa campus. In this edited version of an interview by Wartburg College's *Lessons Learned* documentary team, Superintendent Jere Vyverberg talks about the flood and its effect.

"On June 9, we spent the better part of the day sandbagging a 4-foot-tall wall around Southeast Elementary School.

"At 1 a.m. June 10, I called our buildings and grounds person Darryl Wilsey and said, 'Let's go check things out.'"

THE DAMAGE

"We drove through the flooded streets of Waverly — the power had been turned off by then — and drove up on the sidewalk in front of Washington Irving Elementary School. Water was halfway up the truck tires. We went in and looked around. The basement was totally flooded. We saw there was nothing we could do there, and by the time we got back to his truck the water was up to the top of his tires. Eventually the school's two lower levels were completely submerged, and there was 12-14 inches of water on first floor.

"The Jr. High School had 12-14 feet of water in the lowest level; the gym had water up to just underneath the basketball baskets. There were wrestling mats floating in 10 feet of water.

"Southeast Elementary was a mess. The sandbags were holding the water in more than they were holding water out."

THE CHALLENGE

"Our greatest challenge was what were we going to do with 244 kids and 50 staff members when school starts?"

"June 11 we started looking at our options: portable buildings, rented buildings, vacant buildings that hadn't been flooded. We settled on Willow Lawn Mall because it had a huge warehouse space. The companies leasing the space said they could be out in October. I said, 'School starts in August.' They agreed to get out within two weeks.

"From date of the flood to completion of that building — 44 classrooms, offices, lunchrooms, multipurpose rooms, music rooms — was 56 days. And we only did that through the generosity of our community. We had construction people and electricians that all pitched in that weren't even from the same company. Drywallers worked in the day; electricians at night. We were able to get in there first day of school. It wasn't perfect, but it was better than a lot of portable buildings."



Waverly's Southeast Elementary School is now protected by a 4.5 foot flood wall.

THE EFFECTS

“Irving was in the floodway — running water. That water can break walls and move foundations. All told, there was 18 feet of water in the building. We had to tear it down.

“Southeast Elementary is 2 feet above the 100-year floodplain. We built a 4.5-foot water-resistant wall around it that has metal gates that snap in place. It should be safe.

“Before the flood, we were talking about what to do with our 86-year-old junior high. We’ve kept it up, but it wasn’t doing as well as it could. We’d started the discussion with the community about replacing it in five years or so. But the flood added a sense of urgency.

“We said, ‘We have to make very tough decisions, but let’s not make them short-sighted. We know we’re going to recover from this flood, but what can we do to mitigate future damage and to prepare better for our kids 40 years down the road?’ Sixty-eight percent of the community supported a bond measure, and it passed.” FEMA and State of Iowa money provided the rest of the funding.

THE RECOVERY

“The flood impacted the community deeply. Many homes were bought out. I had people’s belongings in my garage for three months while they fixed their houses. That happened all over the community. You can’t take dozens of homes out of a community of our size and not notice an impact. There’s going to be a lot more green space in town.

“But you would be very hard-pressed to drive through downtown Waverly and say, ‘Oh, there’s been a flood here.’ You can’t tell it by the businesses — they’ve all been repaired. There is a lot of pride in our downtown. City officials have done an excellent job. The walls of the City Council chambers are now covered with huge floodplain and planning maps. The river dictates where you are going to go; you plan accordingly. Everyone, myself included, has more respect for the river.

“Statewide, recovery has gone very well. I’ve done my share of speaking with state and federal officials, and they’re doing everything they can. Overall, I’d give them an A. There’s red tape, and for three years I fought through it. I have a stack of three-ring binders that are all about the flood. But we do what it takes, and they do what it takes, too.

“I learned early on: People come together to help one another. I didn’t even have to call. People came up saying, ‘What do you need?’”

INFLATABLE DAM

After a 100-year flood hit in 1999, the city commissioned an engineering study to explore what steps it could take to mitigate flooding. The study offered two options: build levees — the conventional solution — or remove the existing dam and install an inflatable dam in its place.

“Surprisingly, at public forums the inflatable dam concept held the popular appeal with residents,” wrote engineers Mike Cherry and Martin Weber in a July 2012 article in *Public Works* magazine. At the time, Cherry was Waverly’s Public Works Director and City Engineer and Weber was a project manager for Stanley Consultants Inc., the firm that performed the engineering study.

“Despite the hardship it has caused, most embrace the Cedar River as a recreational and aesthetic asset and feel their city should be ‘one with the river.’ They considered levees to be the equivalent of turning their back on this resource and creating a visual obstruction that would put the community at odds with it. An inflatable dam, on the other hand, would maintain recreational opportunities and hydroelectric functions while also preserving the community’s historical look and feel.”



Waverly's inflatable dam, completed in 2011, automatically adjusts its height to maintain a set water elevation.

Inflatable dams are a relatively new flood mitigation tool. They've been around since the 1960s and have proved remarkably effective. The name may imply a barrier that inflates to turn back floodwaters, but that's not the case.

The top of the dam is formed by a series of large metal plates with a hinge at their upstream ends. There is a series of heavy-duty, inflatable rubber bladders, one under each plate. When the bladders are inflated, the plates swing upward, holding back water. When deflated, the plates, called "crest gates," lower, allowing water to flow over the gates.

The advantage to such a dam is that, because water can flow over the entire top of the dam, it's less likely to be blocked by debris or ice. Unlike conventional dams, there is no operator's bridge or top-mounted hoist system — expensive, unattractive elements that can also trap ice and debris and block river flow.

The biggest advantage: the dam can maintain a set water elevation by automatically adjusting the height of the crest gates to varying river flows. In the dry season, when the flow is low, the crest gates are raised, spilling just enough water over the tops to maintain the desired river height. As flows increase, the crest gates automatically lower, spilling more water but maintaining the same water level. Sensors above the dam monitor the water level, and a computer-controlled air compressor inflates the dam's air bladders with the correct amount of air pressure to maintain the water level.

The result: flooding upstream of the dam is virtually eliminated. The scenic and recreational value of the pool is retained and the dam's precise control of the hydroelectric plant's supply of water allows the plant to run under a wider range of flow rates than previously.

The *Public Works* article continues: "Construction of the new dam began in October 2010 and continued through the winter of 2010-11, when the river is historically at its lowest flow rate. The east half was completed and operational by May 2011, at which point the city was already benefiting from the enhanced flood protection. Work on the west half began in June 2011 and was completed and operational by October 2011.

"In spring 2011, while the east half was finished and completely operational and a cofferdam was protecting the work zone on the west half of the river, river flows increased from approximately 1,000 cubic feet per second to 9,000 cubic feet per second. This typically would have produced a 3-foot rise in the river immediately upstream and potentially washed away the cofferdam. Instead, even with just half the new dam operating, the water level upstream remained level.

"Now fully operational, the dam protects hundreds of homes and businesses from a 100-year flood, preserves power generation at Iowa's oldest operating hydroelectric facility, and enhances recreational opportunities by maintaining a consistent pool elevation upstream of the dam."

"We are able to keep the recreation, keep the electric power generation, and also provide flood protection for the city," said Waverly City Administrator Richard Crayne in a November 2011 KWWL broadcast.

Crayne said that, in the event of a 100-year flood, the dam will protect more than 400 homes and businesses. He added that the dam was tested in 2013, when the Cedar River crested at 13 feet. The dam "worked just as it was supposed to, and it prevented a fair amount of flooding in northwest Waverly" by dropping the level of the Cedar River by 5.5 feet immediately upstream, he said in a June 2013 article in *The Courier*. The dam does not increase flood protection for properties downstream of the dam site.

WHERE THE MONEY WENT -DOWNLOAD
iowaeconomicdevelopment.com/userdocs/ModuleResources/WaverlyMoney.pdf

BUYOUTS AND INFRASTRUCTURE

Nearly 98 percent of CDGB funding spent in Waverly went to property buyouts — most non-FEMA match. About one percent each went to historic planning grants for section 106 and for grant administration.

HOUSING

CDBG funding was used to construct or repair/rehab 33 housing units in Waverly following the floods. About 55 percent of those were new multifamily units. Another roughly 40 percent were new single-family homes. In addition, one single-family home was repaired/rehabbed with the help of CDBG funding, and one homeowner received interim mortgage assistance.