

Still reeling from the heartache of a city devastated to its core, Grand Forks leaders and residents made the decision in 1997 to fight back against the forces of nature. So they set out to rebuild their city with idea of better protecting it in the future from the tragedy of the past.

Mitigation – techniques that reduce or prevent future disaster damages – was incorporated throughout the city, from public buildings to houses and private businesses. Here are some examples of how Grand Forks has rebuilt itself safer and stronger:

Securing the Future
New Permanent Levee Now in Place

For 115 years, Grand Forks has embraced and fought the Red River of the North. Known to reach mammoth proportions from snowmelt and heavy rains, the river many times has forced the city to use both permanent and temporary levees to protect itself from floods.

But the epic '97 flood proved that even the best efforts weren't enough. Fortunately, the city already was several years into a U.S. Army Corps of Engineers study to evaluate flood-protection systems. Engineers were able to accelerate the study and design a new permanent flood-protection project that will serve Grand Forks well into the future.



To make way for the \$409 million project, the city acquired land and homes near the river. Construction began in 2001 and was completed in 2007. Now, the city has a sophisticated protection system that includes water diversion, a larger, higher earthen levee system and 2,200 acres of open greenway.



Home Away from Home ... and the River...
brings Peace of Mind

Cliff and Eleanora Arntz had lived in their Grand Forks home for 43 years. They had raised their six children there. But when the 1997 flood devastated their city ... and their house ... the couple knew they could never return.



Not wanting to leave Grand Forks, the Arntz' voluntarily sold their flood-ravaged home to the city and moved to the west edge of town -- far from the river that swallowed their entire neighborhood. Now, the couple says, they feel safer because they no longer live in harm's way.



*Don't Ask this Guy to Design an Unsafe Building...
Architect Bill Schoen Takes the High Ground on Disaster Prevention*

Since 1997, local architect Bill Schoen has been changing the face of Grand Forks building by building. Schoen himself was a victim of the great flood - not once, but *five* times.



His house and the four commercial properties he owned all flooded. By the time Schoen, now 55, repays his Small Business Administration flood-repair loans, he'll be 75 years old.

The experience changed Schoen for life. Now he's on a mission ... to design safer buildings that will withstand the effects of flooding and other disasters.

Schoen now incorporates disaster-resistance features such as eliminating basements, elevating utilities, and incorporating waterproof membranes in both the public and private buildings he's designed. He has taken steps to protect his own properties as well.



Safer, Drier, Higher... Grand Forks County Office Building

Record flooding in Grand Forks in 1997 devastated the city's downtown retail and business district. Among the casualties was the Grand Forks County Office Building, which sustained about \$2.4 million in damage. Two nearby buildings, also housing county agencies, were damaged as well.

When county officials chose to construct a new building, they looked for ways to build it better and minimize damage from another flood. In



keeping with local floodplain ordinances, the building site was elevated 4 feet before the structure was built. A special "penthouse" level was added to house the building's mechanical and electrical systems to keep them high and dry as well. The new \$19 million structure was completed in January 2000.



Historic Building Booms Again

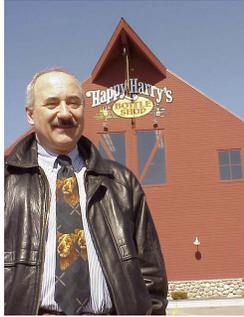
For more than three years, the "Boomtown Building" patiently waited for a new home. Once located on the banks of the Red River, it had to move to make way for a new \$409-million dike that will protect Grand Forks from future floods. The problem was where to put the circa-1888 building, named for its rectangular "boomtown" façade.

Urban development and historic preservation officials worked tirelessly to find a solution that would preserve and protect one of the city's oldest and historically important structures. Ultimately, they were able to move it across and down the street from its original location. The building still is in a floodplain, but officials were able to site it on a new foundation without a basement to help lessen water damage and still preserve its historic designation.



Mind Your Business...

North Dakota Entrepreneur Embraces Disaster-Resistance Measures



In 1997, Hal Gershman became a quick study in natural disasters when floodwaters invaded his business warehouse and stopped a mere six inches from going inside his liquor store and ruining about \$100,000 in inventory.

Determined to not be a victim again, Gershman built a new store and adjoining plaza on a site that he first elevated about 5 feet to keep the buildings high and dry. That move had aesthetic benefits and has provided critical flood protection for his business as well the plaza's tenants.



Gershman was so sold on mitigation that he elevated the site of a new store he built in 2000 in Fargo, 75 miles south of Grand Forks and on the same unpredictable river. In the midst of construction, torrential rains flooded much of the city, including the corner intersection around Gershman's store. Because of the site elevation, the property and structure escaped flood damage, proving that his mitigation investment had paid off.



Building the Ground Up at Alerus Center

In 1995, the city of Grand Forks decided to build a state-of-art arena and convention center. Two years later when the flood brought the city to its knees, officials decided to re-evaluate the project which was still in the contract document stage. They found a potential problem. The main event space, originally designed to be recessed 14 feet, could be vulnerable in a future flood – especially given that most belowground spaces in Grand Forks had filled with floodwaters in 1997. City leaders opted to raise the main event space to ground level in an effort to reduce the impact of any future flooding.



The Alerus, which opened in February 2001, normally is used for athletic events, concerts and trade shows. Since then the center – considered an ideal disaster-staging area because of its size, ground-level access and distance from the river – has been used several times as an emergency shelter during severe storms.



Downtown Corporate Center - A Vision and One Bold Step for Grand Forks

With a downtown in shambles after an epic flood and fire, Grand Forks leaders knew they needed to take a bold step to show that their city could come back.

So the city built a two-building corporate center to replace the burned-out office space and to provide a downtown anchor that would spur other rebuilding. To protect their investment and reduce possible future damages, the buildings are encircled by special concrete flood walls hidden behind the facades; waterproof membranes have been installed to prevent seepage; utilities have been elevated; special flood-protection barriers have been custom-made for all ground-level doorways, and an emergency generator has been upgraded and relocated to the roof to keep it well above floodwaters.



***A Flood Won't Stop These Presses ...
Grand Forks Herald Builds Back Better***

The *Grand Forks Herald* newspaper fascinated the nation in 1997 when it valiantly continued to publish daily even when its offices and printing plant were under siege by flood and fire. When it was over, the *Herald* had lost the irreplaceable -- 118 years of photographs, almost as many years of news clippings, and many historic books and documents. Newspaper executives vowed to rebuild -- and better.



Today, the *Herald's* office building sits 1 foot above the base flood elevation. Mechanical and electrical systems are located on an upper floor to keep them high and dry. Newspapers and some photographs now are electronically archived and stored remotely out of state. The paper's printing operation was relocated to a new 50,000-square-foot-building on the western side of the city, far from the river that claimed it once before. The *Herald* earned the 1998 Pulitzer Prize for public service, which recognizes excellence in community journalism, for its daily coverage of the flood despite the loss of its facility.



***Keeping Disasters in Check ...
A Strong Defense for New Hockey Arena***

When University of North Dakota benefactor Ralph Engelstad decided to build the school a new hockey arena, he wanted a state-of-the-art facility that would rival the best professional arenas in the country.

That meant providing a stunning design, the best equipment, quality materials and one more key factor: disaster-resistant features. The new \$100

million arena is located in Grand Forks, a city that in 1997 was ravaged by blizzards, flood and fire.

To ensure that the facility better weathers future storms, Engelstad and his architects provided built-in protection from three common events in North Dakota -- blizzards, floods and wind.

To minimize flood damage, an elaborate dewatering system was installed beneath the facility's 100,000-square-foot foundation that will intercept and carry off groundwater before it reaches the structure. Also, a waterproof membrane has been added to the foundation walls to further protect against seepage. In the event of overland flooding, custom-made metal panels can be inserted into footings to keep water from running down the facility's lower-level ramp.

For added wind resistance, a heavier metal was used for the roof to minimize the chance of high winds. And to handle the big snowfalls common in North Dakota, a snow fence and electrical melting system has been added at the roof level to catch sliding snow, melt it and drain it through the building's gutter system.



Disaster Resistance...

Grand Forks Water Treatment Plant Leads the Way



When an April 1997 flood hit Grand Forks, it spelled disaster for the city's infrastructure. Hard hit was the municipal water treatment plant which, despite valiant efforts, flooded from both the inside and the outside. As a result, the city was without drinkable water for 23 long days.

Determined to avoid that kind of impact again, the plant has been fortified to better withstand a future flood. Much of the facility's key infrastructure has been elevated to levels above the record '97 flood, such as the transformer, shown below.

Special flood shields, which can be attached if a flood is forecasted, have been made to fit over the ground-level doors and windows. Crucial air compressors and important records have been relocated to upper floors. An extensive flood emergency operations plan has been written to provide critical floodfighting maneuvers in a future event. And finally, the city already has begun work to gradually move the facility off the banks of the river and into an area that is at a lower risk for flooding to ensure a safer, long-term solution.



New Twist on an Old Tale...

Historic Phoenix Building Rises from the Flood

In 1897, the Phoenix building in downtown Grand Forks was rebuilt after a devastating fire the year before.



In 1997, a devastating flood nearly wiped it out again. But thanks to the efforts of four local businessmen, the historic building has been given new life...yet again. This time, it has been better protected to withstand future flooding.

The building is one of three historic structures, hidden by a mid-1970s mall façade, that have been renovated as part of Grand Forks' flood recovery.

To reduce future flood damages, the owners have filled in all but one of the basements (the remaining basement has been kept intact to serve as a storm shelter), elevated the utilities, installed a waterproof membrane to prevent groundwater seepage, and

creating indoor parking spaces. The measures are designed to meet local floodplain ordinances governing historic structures in a floodplain. The buildings feature commercial spaces on the ground levels and spacious apartments on the upper floors.



Steaming Ahead with Disaster-Resistant Measures

The 1997 flood left little in the city of Grand Forks untouched. At the University of North Dakota, the toll to the school's buildings and equipment was about \$40 million. Among those staggering financial losses was the university's 11-mile steam line system, which heats the entire campus, 18 other buildings and the city's hospital/medical complex. The system was so damaged it was literally blowing up in places, forcing school officials to replace the entire system.

To protect the \$25 million replacement cost and minimize future service disruption, disaster-resistant features have been added to keep dry the mineral wool insulation that surrounds and protects the steam lines from the intense radiant heat given off under normal conditions. Now, new manhole stations sit a foot or more above ground level to keep out surface water. From there, curved vent pipes extend another 12 to 18 inches to further thwart water from getting to the lines. There are additional shutoff valves and floor drains. And each manhole station has been surrounded by an impervious sealant to prevent belowground seepage.



Celebrating the Past, the Present and the Future The Grand Forks Town Square

As Grand Forks began post-flood rebuilding in 1997, residents envisioned a new downtown that would include open, positive spaces.

Urban planners on loan to the city to help with the flood recovery suggested a town square where the community could come year-round to enjoy a variety of activities. That vision led to the construction of Grand Forks' new Town Square on a prime downtown corner, which also serves as the city's gateway from neighboring Minnesota.

The project is ideal in that it replaces flood-damaged buildings with open space, a better use for area that is in a 100-year floodplain.



The square itself, which features vendor-style concrete booths, an elevated stage, a children's play area and a large, open center space, was constructed using flood-resistant materials and providing opportunity for water to flow right through so that both maintenance and potential damage would be minimal.

Since its completion in the fall of 2001, the square has been home to ice skating, open-air concerts, city celebrations, a spring-summer Farmer's Market and an annual regional art festival.

Story Sources: 1) *Journeys, North Dakota's Trail Towards Disaster Resistance*, published by the Federal Emergency Management Agency, and available online at www.fema.gov; 2) City of Grand Forks