

Fargo Works to Build a Disaster-Resistant City

When a devastating flood hit Fargo, North Dakota, in 1969, it left a pretty strong calling card.

The message on that card was clear. Either give up your city to nature's whims or find a way to coexist with an often unpredictable river.

Fargo city officials weren't about to give in. Instead, they looked at the problem in earnest and set off on a journey that's been going strong for more than 30 years.



Piece by piece, Fargo has been building a defense to keep the Red River at bay during times of flooding. One day, city officials say, the river will just pass them by. FEMA photo by Andrea Booher.



Their quest is to build a disaster-resistant city—a place where citizens and businesses not only can survive but thrive, even when Mother Nature has different ideas.

The city has accomplished a lot in that period of time. Flood-control systems have been put in the place. The city's infrastructure has been shored up, rebuilt and newly built. Building codes have been upgraded. Residential structures in harm's way have been removed. Risk assessments and disaster planning have been continually refined. Public education about disasters and damage prevention is ongoing.

Step by step, piece by piece, Fargo is doing more than standing its ground. In many ways, the city is on the leading edge of smart growth and community viability.

What is perhaps most noteworthy about Fargo's efforts is the sheer tenacity the city has displayed in the face of repeated disasters. While the 1969 flood was one of the worst on record (the oldest was in 1882), it hasn't been the last. The city was hit again by river flooding in 1975, 1978, 1979, 1984, 1989, 1993 and 1997.

There have been other disasters, too. Eight blizzards and five winter storms in 1996–97 dumped a whopping 117 inches of snow on the city, contributing to its highest river level yet. On the Fourth of July 1999, damaging straight-line winds left tornado-like destruction in residential and commercial

areas. In June 2000, about 7 inches of rain fell in seven hours, producing localized flooding. Fargo's annual rainfall is about 20 inches; a 100-year rain event is 5.5 inches in 24 hours.

It's enough to leave any city reeling. And yet, after each disaster, city officials have faced the good and the bad head-on. They've learned lessons and adjusted their short- and long-range strategies—all with the end goal of creating a safe and prosperous community.

The Problem

Fargo was born with some inherent challenges. It is located on the banks of the Red River, a northward-flowing river that begins in the southeastern corner of the state and ends in Lake Winnipeg, Canada. The river basin actually is some 45,000 square miles—47 percent of which is in North Dakota.

When winter comes, the river freezes. When spring arrives, the river's headwaters in the south melt first. Because the northern reaches of the state thaw later, the river melts flows head-on into still-frozen conditions. When the river hits that ice barrier, it can overflow its banks and spread out for miles.

Secondly, Fargo was built on what was once the bottom of Lake Agassiz, an ancient glacial lake that encompassed much of North Dakota and some of Minnesota and South Dakota during the Ice Age. As a result, the city's terrain is flat—in fact, really flat. From the north edge of Fargo to its southern end—about 13 miles—there is only about a 10-foot difference in the elevation. Consequently, natural runoff is inhibited.

Spring snowmelt accounts for much of the rise in the Red River, which also is fed by a number of smaller tributaries. Also, heavy rains can quickly trigger localized flooding, which is exacerbated by the level land and by impervious clay soils.

So what does a city do when factors this big are relatively impossible to change? It finds ways to work with the hand it's been dealt. Here's a look at some of what Fargo has done to fortify itself against the effects of disasters.

The Solutions

Fargo has put in a number of structural and non-structural measures that work both singly and collectively to help the city reduce the impact of disasters.

◆ Permanent Flood Control Structures

Creating flood barriers is one of Fargo's most important floodfighting weapons, given that the flat terrain can cause 1 foot of water to spread a mile. Therefore, it is imperative to guard the city's perimeter against advancing floodwaters.

Fargo built one of its first lines of defense—a dike—in the mid-1960s. First constructed near the downtown business district as a floodfighting measure, the city has worked to make the mile-long earthen structure a certified and permanent means of protection.

Since then, the city has constructed additional flood-control barriers whenever and wherever possible. The barriers include floodwalls, more earthen dikes and a residential landscaping program where homeowners along the river get a financial incentive to raise their backyards to a level even with another nearby city dike.

Now, a large portion of the city's boundary is protected by some kind of flood-control structure. The result has been better-protected homes, businesses and critical facilities, like the city's \$68 million water treatment plant, as well as reduced floodfighting costs.

◆ Property Acquisition

Fargo had a number of homes along the river and, predictably, they flooded over and over again. Many of them were either adjacent to a floodway or in an area that couldn't be defended.

After the 1997 event, residents in five flood-damaged neighborhoods were given the option to voluntarily sell their properties to the city. Fargo purchased 82 properties at a cost of about \$6.2 million and demolished the structures. (In 1997 alone, those properties had sustained about \$2.1 million in damages. About half that cost, or approximately \$1 million was spent on the more than 3 million sandbags that were used to fight the flood).

Now, those properties are open space and most are permanently deed-restricted to prevent future building. Since the acquisition program began, the city has purchased 88 flood-prone properties, saving homeowners emotional and financial costs, and the city repeated floodfighting costs.

Also, the city is negotiating with the owners of high-risk properties who didn't want a buyout to obtain a right-of-first-refusal. That would give the city first option to buy the property whenever it's offered for sale. In those cases, too, the structure(s) would be demolished, creating more open space. To date, the city has recommended purchase agreements on 20 properties.

◆ Infrastructure Improvements

The city's **storm sewer system** has been improved to ensure that it remains operational during floods. To do this, the city has installed protective gates to prevent backup, and built 10 new lift stations to improve pumping capacity. The city now has a total of 56 such lift stations, 20 of which are directly related to flood prevention.

Normally, rain and snowmelt run off into the sewer system and gravity flows to outlets that discharge into the river. When the river level gets higher than the outlet, stormwater can't drain out. The lift stations then take over and actually pump or "lift" the water through pipes to a higher outlet that empties into the river. The protective gates automatically close when the river level meets the outlet, preventing the Red from backing up into the system and causing an overload.

Backup electrical generators have been installed at six of 19 sanitary lift stations and four key city facilities to provide uninterrupted service if Fargo's power supply is compromised for any reason. Portable generator units or emergency pumps are available for those lift stations that do not have permanent generator backup power. The diesel-powered units, initially added in 1999 to handle any Y2K-related emergencies, ensure that the lift stations will continue pumping sewage to the city's treatment facility (without that capacity, the sewage could back up into basements). The four facilities—city hall; the Fargo police station, which also houses the 911 Center; the city's central public works garage; and the water treatment plant—now can continue providing critical services even in the face of disaster.

Fargo has built **stormwater retention basins** throughout much of the city to augment the storm sewer capacity during heavy rains. The basins, built below street level, collect and hold water until storm sewer drains can catch up in removing the additional water volume.



A backup generator enables this lift station (brick building) to operate during a power outage.

Living snow fences have been planted to help protect key areas during blizzards and winter storms. These fences actually are strategically planted rows of trees and shrubs that act as a filter to catch and drop blowing snow before it gets to roadways and other critical areas such as airports. Fargo built its first snow fence in 1986 on the north and south sides of the city's airport. Airport officials report that the fence has reduced drifting by about 70 percent. The city, in partnership with the state department of transportation, has planted a number of other fences in problem areas along its two interstates and highways.

◆ **Flood Insurance**

In 1971, Fargo became the first city in North Dakota to join the National Flood Insurance Program (NFIP). As a result, residents and business owners have been able to buy flood insurance to financially cover flood-damaged structures and personal property. To participate in the NFIP, a governmental entity must adopt and enforce sound floodplain management ordinances. As of Jan. 1, 2001, there were 325 policies worth \$54,394,900 in effect throughout the city.

◆ **Upgraded Building Codes**

After the 1997 flood, city officials upgraded local building codes to better protect new construction in and around the floodplain. The changes require the lowest floor of newly built structures to be 2.5 feet above the base flood elevation (BFE). Previously, the lowest floor only had to be 1 foot above BFE. The change applies to new structures both inside and within 150 feet of the floodplain.

◆ **Digital Mapping**

The city is enhancing its floodfighting capabilities through the use of digital orthoimagery, a specialized system that takes aerial photographs of the city's topography. City engineers can use the photographs and related contour elevation maps to identify low areas that need to be built up during floods to hold back water.



Fargo Public Works Director Dennis Walaker stands among newly planted trees, designed to grow into a living snow fence. The natural fences are built by planting rows of trees and shrubs that, when mature, will reduce drifting and blowing snow from piling on nearby roads. For more than 30 years, Walaker has helped guide the city's efforts to become more resistant to many kinds of disasters. FEMA photo by Andrea Booher.

◆ *Project Impact: Building Disaster Resistant Communities*

Fargo is bolstering its efforts to reduce the effects of disasters by becoming part of *Project Impact: Building Disaster Resistant Communities*. Launched in 1997 by Federal Emergency Management Agency (FEMA) Director James Lee Witt, *Project Impact* promotes taking action to reduce or prevent damage before disaster strikes. Nationwide, about 250 communities and more than 2,500 businesses are not only participating in *Project Impact* but are reporting positive results in subsequent disasters.

The Future

As city growth continues, so will Fargo's efforts to build a safer, more disaster-resistant community, city officials say.

Already, about \$20 million has been spent on the structural projects outlined. Much of the money has come from the Hazard Mitigation Grant Program, administered by the State of North Dakota and funded, in large part, by the Federal Emergency Management Agency.

The program helps pay for projects throughout the state that will reduce or prevent future disaster damages. Up to 75 percent of the project costs come from FEMA, the remaining 25 percent must come from non-federal sources such as state, local or private funds.

Other funds have come from the State of North Dakota, city coffers, Community Development Block Grants, private money and insurance proceeds for repairing disaster damages.

There is no shortage of ideas for Fargo's wish list of projects that will keep nature's impact at bay. And if history is any indication, there will be a great deal more to this story in another 30 years.

Fargo Public Works Director Dennis Walaker, who's helped guide the city's disaster-resistance efforts since 1974, believes there is a light at the end of the tunnel.

"We have reduced our flood risk tremendously in Fargo," Walaker said. "The whole flood problem is like a log chain with a lot of little links. Every link we get eventually becomes a big chain until one day, we will be able to watch the river go by."

