



When It Rains, It Pours: Blocking Rainwater and Preventing Sewer Backup

Full Mitigation Best Practice Story

Cook County, Illinois



Chicago, IL - Looking out the window as one flies into O'Hare airport, a sea of rooftops fills the Chicago landscape. And off those rooftops, much rain does run - straight into the city's sewer system.

With an abundance of buildings, streets and parking lots, urban areas have very little green space to absorb or slow down the onslaught of water in a heavy rain. It's especially a problem in the City of Chicago, a city built on a swamp. The high water table contributes to slower absorption rates and more water flowing overland to fill the city's sewers - an interconnected system carrying both storm runoff and sanitary sewer waste.

Chicago's long and colorful history includes troublesome tales of flooded homes filled with five feet of contaminated, bacteria-carrying water from sewer backup. Residents have had to clear muck, throw out possessions and redo their basements - time and time again. It's no wonder that a solution is top priority for these urban citizens.

After the flood of 1997 caused hardship and property loss for some 35,000 residents of its close to 3 million population, city officials took action. They first asked themselves, 'How do we prevent the system from reaching maximum capacity?' The answer was slowing the heavy inflow of rainwater into the sewer system at the peak of the storm.

To accomplish this, City officials formulated a two-pronged strategy: install mechanical devices called inlet restrictor valves and promote downspout disconnection by homeowners citywide. Purchase and installation cost \$75 million. This was about a quarter of what traditional sewer system improvements would have cost. Near Chicago, the City of Evanston has installed a similar valve system that has helped reduce basement backup.

A \$7.8 million grant from the Federal Emergency Management Agency Hazard Mitigation Grant Program (HMGP) jumpstarted the Chicago project in 1998 by funding a pilot program in three areas of the city that were repetitively hit with basement flooding. John Roberson, Chicago Sewer Department Commissioner, said, "In every subsequent rain that we've had since the pilot program was implemented, the pilot areas have not experienced the type of flooding they normally would have."

Chicago initiated its inlet control valve system (called the "Rainblocker" program) as one facet of a multi-dimension concept. When the restrictor valve is installed in the storm water catch basin in the street, the device, in essence, shrinks the pipe to funnel and regulate the water from the street to the main sewer line. During a heavy rain event, the smaller opening allows less water into the sewer system. The streets act as temporary holding areas for the rainfall. Surplus water in the system will not be forcing contaminated water back through homeowners' private lines and into the home's lowest spot - the basement. The street ponding buys time for the system to catch up.

The second part to the city's basement flooding solution is simple - inexpensive disconnection of home and apartment building downspouts. Downspouts act as an expressway carrying clean rainwater from roofs into the homeowner's private sewer line and then into the main sewer system, overloading the sewers in a heavy rain. The collective effect of a whole neighborhood disconnecting all the downspouts can play a tremendous role in lessening the amount of water entering the sewer system.

Disconnecting the downspout is a simple procedure, but a very important step in keeping sewers from backing up into basements. For more information on disconnecting your downspout or to ask for a copy of a city-produced, how-to video, call 312.747.7030. You may also find information on the cityofchicago.org website under the Department of Sewers.

The question is this: can any system be designed for a city as large as Chicago to prevent sewer backup when a storm cloud releases tremendous amounts of water on the city within only a few hours? Flood control is a major issue for governments and property owners.

The morning commute on August 2, 2001, was brought to a standstill as a record 3.56 inches of rain fell over portions of the city during rush hour. The deluge, termed by the Illinois State Water Survey as an 80-year-storm event, caused flash flooding in some areas of the city. Ponding water in the streets indicated that the valves were doing their job of slowing the flow of storm water into the main sewer system.

"The system acted the way it was designed to," said John Roberson. "We would have had 14,000 to 16,000 calls on basements without the 'Rainblocker' installed. This time we had five to six thousand calls. The restrictor did its job. There isn't a sewer system big enough to handle what we faced with the three to four inches of rain in little over an hour."

The city is the first to recognize flooding problems still exist. Flooded streets, a problem deemed preferable to flooded basements, are an acknowledged byproduct of the valve system because of the restricted flow of water into the sewers. In the recent rains, some residents reported only a couple of inches of water where in previous storms their basements had held over a foot of water. In some instances, however, homes that had never been flooded before were flooded in this last event due to ponded runoff entering basement windows and doors.

When Mother Nature decides to dump four inches of rain in little over an hour, it's difficult for any man-made system to handle such a rain event. Private lines may be blocked or damaged. Downspouts add millions of gallons of clean water to the sewers. Streets fill up and water flows overland, sometimes causing flooding.

The "Rainblocker" program is clearly a work in progress, but if basement backup has been minimized each time it rains, then it appears the city is headed in the right direction. This system requires combined efforts from city officials and all impacted citizens. In the next phase of resolving bottlenecks in the system, the Chicago Sewer Department is working with City officials to identify over-the-curb flooding of homes and to evaluate areas that continue to experience basement flooding.

Activity/Project Location

Geographical Area: **Single County in a State**

FEMA Region: **Region V**

State: **Illinois**

County: **Cook County**

City/Community: **Chicago**

Key Activity/Project Information

Sector: **Public**

Hazard Type: **Severe Storm; Flooding**

Activity/Project Type: **Flood-proofing; Flood Control**

Activity/Project Start Date: **01/1998**

Activity/Project End Date: **Ongoing**

Funding Source: **Hazard Mitigation Grant Program (HMGP)**

Funding Recipient: **Local Government**

Activity/Project Economic Analysis

Cost: **Amount Not Available**

Non FEMA Cost:

Activity/Project Disaster Information

Mitigation Resulted From Federal
Disaster? **Yes**

Federal Disaster #: **1170 , 03/21/1997**

Value Tested By Disaster? **Yes**

Tested By Federal Disaster #: **No Federal Disaster specified**

Year First Tested: **2001**

Repetitive Loss Property? **Unknown**

Reference URLs

Reference URL 1: <http://www.floodsmart.gov/>

Reference URL 2: <http://www.cookcountysheriff.com/ema/>

Main Points

- Residents have had to clear muck, throw out possessions and redo their basements - time and time again. It's no wonder that a solution is top priority for these urban citizens.
- After the flood of 1997 caused hardship and property loss for some 35,000 residents of its close to three million population, city officials took action.
- To accomplish this, city officials formulated a two-pronged strategy: install mechanical devices called inlet restrictor valves and promote downspout disconnection by homeowners citywide.
- A \$7.8 million grant from the Federal Emergency Management Agency Hazard Mitigation Grant Program (HMGP) jumpstarted the Chicago project in 1998 by funding a pilot program in three areas of the city that were repetitively hit with basement flooding.
- The morning commute on August 2, 2001, was brought to a standstill as a record 3.56 inches of rain fell over portions of the city during rush hour. The deluge, termed by the Illinois State Water Survey as an 80-year-storm event, caused flash flooding in some areas of the city. Ponding water in the streets indicated that the valves were doing their job of slowing the flow of storm water into the main sewer system.