Natural Hazards Mitigation Plan

Calumet City, Illinois

1981 Little Cal flood at Schrum Memorial School

Prepared by

Calumet City Floodplain Management Planning Committee

Technical Support From
French & Associates, Ltd.
Park Forest, Illinois

Natural Hazards Mitigation Plan

Calumet City

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Calumet City, Illinois

Natural Hazards Mitigation Plan

Executive Summary

1. Introduction

To address historical and potential flooding problems, the City of Calumet City prepared a *Floodplain Management Plan* in 1999. In 2005, the City decided to update that plan, incorporate other natural hazards, and meet certain criteria for FEMA's Community Rating System and mitigation funding programs. The *Plan* has 10 chapters which are summarized here.

This *Natural Hazards Mitigation Plan* was prepared by a committee that included City staff and a resident from each of the City's wards. The Committee met monthly to review the extent of the problem and the full range of solutions. Maintaining the City's excellent CRS rating of a Class 6 helped guide the planning effort.

2. Problem Description

Eight natural hazards were reviewed.

- Overbank flooding
- Local drainage
- Sewer backup
- Tornadoes
- Winter storms
- Severe storms
- Earthquake
- Extreme heat

For each hazard, the plan summarizes historical events, calculates the frequency of occurrence and the dollar damage to property, and discusses the impact on the economy and the threat to safety and health. Of these eight natural hazards:

- Overbank flooding has the potential to cause the greatest amount of property damage.
- Overbank flooding and tornadoes have the greatest economic impact from a single occurrence. However, over the long run, local drainage problems, winter storms, severe storms, and extreme heat are more economically disruptive.
- Extreme heat poses the greatest threat to life and health in an average year. Winter storms are the second greatest threat.
- Except for overbank flooding, drainage, and sewer backup, the City's exposure to these hazards has not been reduced. A mitigation program should include measures to protect new construction from damage expected from disasters.

1981 Little Calumet River flood scenes

Source: *Jeff Newman*

3. Goals

The following goals statements were adopted by the Planning Committee:

1. Protect the people of Calumet City, their homes and their health, from the dangers of natural hazards.
2. Place a priority on protecting public services, including critical facilities, utilities and schools.
3. Inform residents and businesses about the hazards they face and the ways they can protect themselves and their properties from those hazards.
4. Protect open space, wetlands and natural areas for the public to enjoy and to prevent inappropriate development in hazardous areas.

4. Preventive Measures

The Planning Committee looked at a variety of ways to keep the various problems from getting worse. Because there is little vacant land available for development, the measures that would be most effective in a developed community such as Calumet City are building codes, mobile home regulations, and floodplain regulations. The City is actively administering all three programs.

Some technical changes are needed to the City's floodplain management ordinance. The Committee found that more coordination is needed between those who promote land development and those who are responsible for regulating it.

5. Property Protection

There are several measures that can be taken on a property to protect if from damage. They have been used on homes in the area and have been shown to work. Among the measures reviewed are:

- Acquiring and clearing structures in the floodplain (done on 12 homes in the 1980's),
- Elevating buildings above flood levels,
- Retrofitting buildings to protect them from water, wind, earthquakes, and storms,
- Protecting against sewer backup, and
- Insuring properties with coverage for natural hazards.

This home on Burnham Avenue was retrofitted to protect it from flooding.

Many of the measures can be installed at relatively little cost to the owner. There are a variety of ways the City can assist owners to implement property protection measures, ranging from providing information to helping fund construction under the rebate program.

6. Natural Resource Protection

Protecting natural resources, such as prairie lands and native vegetation, can help reduce flood losses. While Calumet City has recently adopted regulations for protecting many of its natural resources, its wetland regulations may not provide any more protection than the Corps of Engineers' program, which had its jurisdiction reduced by a recent US Supreme Court order.

Trees are the first victims of ice storms and wind, but can be protected with an urban forestry program

There is interest in protecting natural areas and developing connecting greenways. A hazard mitigation program can take advantage of this interest and utilize natural resource protection programs to support mitigation activities, such as keeping floodprone areas open. Urban forestry can help protect against damage to trees and utility lines caused by wind and ice storms, but Calumet City does not have a formal program.

7. Emergency Management

Accurate flood stage and time predictions are available for the Little Calumet River from the nearby Cottage Grove Avenue gage. However, to be useful, the City needs to be able to access the Weather Service predictions and convert the data to sites in Calumet City. The best warning that can be expected for the local drainage and sewer backup flooding, tornadoes, and thunderstorms is a general "watch" issued by the Weather Service.

The City has effective means to disseminate warnings to the general public and has successfully responded to recent disasters, especially floods. However, the Emergency Response Plan does not provide enough specific guidance to qualify for credit under the Community Rating System.

8. Flood Control

The Thornton Transitional Reservoir has had a major impact on Little Calumet River flood levels. The City has benefited greatly from its levee along the Little Calumet River. However, repairs and improvements are needed if the levee is to be depended on when needed.

The Thornton Quarry reservoir is already providing flood protection

There have been successful small scale flood control projects, including the separate sewers and retention basins in the northwestern quarter of the city which have reduced local drainage and sewer backup problems.

The City's channel maintenance program has reduced flooding from smaller, more frequent storms and improves the appearance of the river, all at a relatively low cost. However, more attention is needed toward maintaining retention basins and storm sewer inlets and improving internal coordination of the maintenance activities.

9. Public Information

The City's official floodplain map, the Cook County Flood Insurance Rate Map, is out of date. It is keeping development regulations and the flood insurance purchase requirement in place for thousands of properties in the south suburbs that may no longer be subject to the 100-year flood.

Calumet City Plumbing's booth at the 2003 Flood Awareness Week's open house

The City has implemented a variety of methods of delivering hazard awareness and protection information, including the Calumet City Review, the website, and open houses. The messages should stress ways people can protect themselves and what they can do to reduce the hazards. The more times a message is repeated using different media, the more effective the information strategy.

10. Action Plan

The culmination of the Calumet City *Natural Hazards Mitigation Plan* is the series of 14 action items presented in Chapter 10. An agency is responsible for each one and has been given a deadline. All projects will be completed in five years.

1. The Floodplain management Committee will continue to act as a forum for mitigation issues, monitor implementation of this *Plan*, and report on progress to the City Council.
2. The Department of Inspectional Services will critique and improve its procedures.
3. The Committee will review recommended floodplain and stormwater ordinance amendments.
4. The Department's authority and procedures in mobile home parks will be clarified.
5. Repetitively flooded buildings and critical facilities will be evaluated to determine appropriate hazard protection measures.
6. The sewer backup rebate program will continue.
7. The City will formalize its urban forestry program and become a Tree City USA.
8. The flood response procedures will be improved.
9. Emergency preparedness planning will coordinate better with critical facilities.
10. The levee will be evaluated for improvements after the floodplain map is revised.
11. Drainage system maintenance procedures will be improved and expanded.
12. The Flood Insurance Rate Map will be revised to reflect new flood control projects.
13. The City will improve and conduct a variety of outreach projects.
14. Special public information projects will be conducted with neighboring villages, developers, real estate offices, insurance agents, contractors, home improvement stores, and schools.

Chapter 1. Introduction

1.1. Background

The City of Calumet City, Illinois, has experienced a variety of flooding and drainage problems throughout its history. The worst problem has been overbank flooding from the Little Calumet River, which forms the southern boundary of the city.

In 1999, the City adopted a *Floodplain Management Plan* that explored many ways to protect properties and organized its flood protection activities under a single, coordinated program. That plan set four goals and identified 23 action items that would help prevent or reduce flood losses. The *Floodplain Management Plan* was prepared following a planning process recommended by the Federal Emergency Management Agency's Community Rating System.

In 2000, Calumet City was accepted in the Community Rating System (CRS), which has given flood insurance premium discounts for residents. The CRS is explained in Section 1.4. Continued monitoring of the implementation of the *Plan* is needed to keep it useful and is a CRS requirement. The CRS also requires that every five years an update to the plan be prepared.

While flooding has historically been the natural hazard of greatest interest in Calumet City, the area is subject to the danger and damage caused by other hazards. As seen in the table to the right, Cook County has had 13 Presidential Disaster declarations in the last 40 years due to natural hazards.

Cook County Disaster Declarations

Declaration Date	Type of Disaster
April 25, 1967	Tornado
September 5, 1972	Flood
April 27, 1973	Flood
June 18, 1976	Severe storm, tornado
January 16, 1979	Snow
June 30, 1981	Severe storm, flood
October 7, 1986	Flood
August 21, 1987	Flood
August 27, 1993	Flood
July 25, 1996	Severe storm
September 17, 1997	Severe storm, flood
January 8, 1999	Snow
January 18, 2001	Snow

The Disaster Mitigation Act of 2000 (42 USC 5165) established a multi-hazard mitigation plan as a prerequisite for Federal Emergency Management Agency (FEMA) mitigation funds. That requirement went into effect on November 1, 2004.

Accordingly, the City of Calumet City decided to prepare this natural hazards mitigation plan to meet three objectives:

- Review the goals and activities implemented pursuant to the 1999 *Floodplain Management Plan* and determine if they are still pertinent or should be revised.
- Prepare the five-year update required for continued credit under the Community Rating System.
- Convert the 1999 *Floodplain Management Plan* into a natural hazards mitigation plan to qualify the City for FEMA mitigation funding.

1.2. Mitigation Planning Approach

"Hazard mitigation" does not mean that all hazards are stopped or prevented. It does not suggest complete elimination of the damage or disruption caused by such incidents. Natural forces are powerful and most natural hazards are well beyond our ability to control. Mitigation does not mean quick fixes. It is a long-term approach to reduce a community's vulnerability to the hazards that threaten it.

A plan is the product of a rational thinking process that reviews alternative mitigation measures and selects and designs the ones that will work best for the community. It is the opposite of making quick decisions based on inadequate information. Plans are vital to ensuring that public funds are well spent.

This plan was prepared using a standard planning process that had three key ingredients:

1. *Technical expertise*: The process involved input from City staff, other local agencies and state and federal offices. The lead technical input and plan drafting was provided by French & Associates, Ltd., a hazard mitigation consulting firm in Park Forest.

   The activities reviewed and recommended have been proven to be effective in preventing or reducing damage. The plan notes where many of them have been implemented in other south suburban communities.

2. *Public involvement*: Many of the activities require the cooperation of residents to be effective. Because residents are important to the solution, they were involved in the planning of the solution. Public involvement was provided in two ways: through the City's Floodplain Management Committee and through general outreach projects. The Floodplain Management Committee, created when the 1999 Plan was adopted, was given the assignment to update the Plan and incorporate the other natural hazards. It is composed of City staff from offices involved in hazard-related activities and one resident from each of the City's wards. The members were:

   - Erik Schneider, 1st Ward Representative
   - Irma Milewski, 2nd Ward Representative
   - Charles Pryor, 3rd Ward Representative
   - Stephen B. Sikorski, 5th Ward Representative
   - Jeff L. Newman, 6th Ward Representative
   - Carl M. Sivak, 7th Ward Representative

   - Jim Banasiak, Director, Department of Inspectional Services
   - Elaine Zdunek, Department of Inspectional Services
   - Marvin Skarwecki, Sewer Maintenance Department
   - Len Chiaro, Emergency Services and Disaster Agency
   - Joe Ratkovich, Fire Department

   All City aldermen were ex-officio members and several attended some of the meetings.

Meeting of the Floodplain Management Committee

In preparing the 1999 *Plan*, the City sent questionnaires to floodplain residents and collected public input at several forums. For this 2005 plan update, background information was posted on the City's website and comments and input were invited. The draft of this plan was publicized as available for review and comment. Examples of the public involvement activites are in Appendix A.

3. *Comprehensive review*: Everything that could affect damage from floods and other hazards in Calumet City was considered. The technical experts ensured that time was not wasted on irrelevant activities, but the process was not limited to just a few alternatives. The Committee's work and the subsequent plan document explored six general strategies of hazard mitigation activities. These strategies are the subject of Chapters 4 – 9 in this *Plan*.

   - Preventive – e.g., zoning, building codes, and other development regulations
   - Property protection – e.g., relocation out of harm's way, retrofitting buildings
   - Natural resources protection − e.g., preserving wetlands, minimizing sedimentation
   - Emergency services – e.g., warning, response, evacuation
   - Flood control projects – e.g., levees, reservoirs, channel improvements
   - Public information – e.g., outreach projects, technical assistance to property owners

Together, the consultants and the Committee reviewed existing studies, reports, and other material on the City's hazard vulnerability and activities that can reduce the impact of the hazards. For this update, this was accomplished through a series of planning meetings that were held December 2004 through May 2005.

Each section in this plan was given a detailed review at one or more meetings. The topic was discussed in general, then the Committee reviewed how it applied to Calumet City and what changes should be recommended. After the alternatives were reviewed, the Committee drafted an "action plan" that specifies recommended projects, who is responsible for implementing them, and when they are to be done. The action plan is included as Chapter 10 of this *Hazard Mitigation Plan*.

It should be noted that this *Plan* serves only to recommend mitigation measures. Implementation of these recommendations depends on adoption of this *Plan* by the City Council and implementation by the offices designated in the action plan. It is recommended that the Floodplain Management Committee monitor implementation and report on progress to the City Council and the public.

1.3. Coordination

During the planning process, contacts were made with the following agencies to determine how their programs affect or could support the City's flood protection efforts. Copies of the draft plan's executive summary were also sent to these agencies. They were advised that the full plan could be viewed on the City's website if they wanted to review it and comment on it.

Federal agencies
- Federal Emergency Management Agency, Region V
- National Weather Service
- U.S. Army Corps of Engineers, Chicago District
- U.S. Fish & Wildlife Service
- U.S. Department of Agriculture, Natural Resources Conservation Service

State agencies
- Illinois Department of Natural Resources, Office of Water Resources
- Illinois Emergency Management Agency
- Illinois Environmental Protection Agency
- University of Illinois Extension
- Illinois Geological Survey

Regional agencies
- Calumet Memorial Park District
- Metropolitan Water Reclamation District of Greater Chicago
- Northeastern Illinois Planning Commission
- South Suburban Mayors and Managers Association
- Thornton Fractional School District
- Will-South Cook Soil and Water Conservation District

Organizations
- Calumet City Civic League
- Calumet City Chamber of Commerce
- American Legion Calumet Memorial Post 330
- Veterans of Foreign Wars
- River Oaks Golf Course
- River Oaks Homeowner Association II
- River Oaks Townhouses Co-operative
- Park of River Oaks Homeowner Association
- American Red Cross of Greater Chicago
- Home Builders Association of Greater Chicago
- Open Lands Project

Neighboring communities

- City of Hammond, Indiana
- Cook County Department of Public Health
- Cook County Forest Preserve District
- Cook County Planning and Development
- Village of Burnham
- Village of Dolton
- Village of Lansing
- Village of South Holland
- Village of Thornton

1.4. The Community Rating System

FEMA's National Flood Insurance Program (NFIP) administers the Community Rating System (CRS). Under the CRS, flood insurance premiums for properties in participating communities are reduced to reflect the flood protection activities that are being implemented. This program can have a major influence on the design and implementation of flood mitigation activities, so a brief summary is provided here.

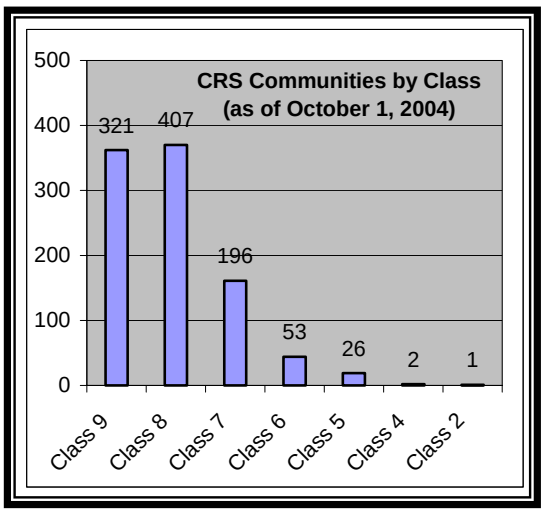
A community receives a CRS classification based upon the credit points it receives for its activities. It can undertake any mix of activities that reduce flood losses through better mapping, regulations, public information, flood damage reduction and/or flood warning and preparedness programs. The CRS provides an incentive not just to start new mitigation programs, but to keep them going.

There are ten CRS classes: class 1 requires the most credit points and gives the largest premium reduction; class 10 receives no premium reduction (see Table). A community that does not apply for the CRS or that does not obtain the minimum number of credit points is a class 10 community.

CRS Premium Reductions

Class	Points	Premium Reduction In Floodplain	Premium Reduction Outside Floodplain
1	4,500+	45%	10%
2	4,000–4,499	40%	10%
3	3,500–3,999	35%	10%
4	3,000–3,499	30%	10%
5	2,500–2,999	25%	10%
6	2,000–2,499	20%	10%
7	1,500–1,999	15%	5%
8	1,000–1,499	10%	5%
9	500– 999	5%	5%
10	0 – 499	0	0

Of the 20,000 communities in the NFIP, just over 1,000 participate in the CRS, 28 in Illinois. Calumet City is a Class 6. As seen in the graph to the right, a Class 6 puts the City in top 10% of CRS communities and the top 1% of NFIP communities in the country.



Calumet City is receiving CRS credit for its 1999 *Floodplain Management Plan* and expects to receive continued credit for this 2005 update and natural hazards mitigation plan. To continue to receive the credit, the City must annually recertify to FEMA that it is continuing to implement its CRS credited activities. Failure to maintain the same level of involvement in flood protection can result in a loss of CRS credit points and a resulting increase in flood insurance rates to residents.

Benefits of CRS participation: There are over 1,600 flood insurance policies in force in Calumet City. By being a CRS Class 6, the City's efforts are giving these policy holders an average reduction of $87 in their insurance premiums. In total, over $140,000 is being saved annually. That's $140,000 that can be spent in Calumet City instead of going to insurance companies.

In addition to the direct financial reward for participating in the Community Rating System, there are many other reasons to participate in the CRS. As FEMA staff often say, "if you are only interested in saving premium dollars, you're in the CRS for the wrong reason."

The other benefits that are more difficult to measure in dollars:

1. The activities credited by the CRS provide direct benefits to residents, including:

   – Enhanced public safety;
   – A reduction in damage to property and public infrastructure;
   – Avoidance of economic disruption and losses;
   – Reduction of human suffering; and
   – Protection of the environment.

2. A community's flood programs are better organized and more formal. Ad hoc activities, such as responding to drainage complaints rather than an inspection program, are conducted on a sounder, more equitable basis.

3. A community can evaluate the effectiveness of its flood program against a nationally recognized benchmark.

4. Technical assistance in designing and implementing a number of activities is available at no charge from the Insurance Services Office.

5. The public information activities build a knowledgeable constituency interested in supporting and improving flood protection measures.

6. A community has an added incentive to maintain its flood programs over the years. The fact that its CRS status could be affected by the elimination of a flood-related activity should be taken into account by the city council when considering such actions.

7. Every time residents pay their insurance premiums, they are reminded that the community is working to protect them from flood losses, even during dry years.

More information on the Community Rating System can be found at http://training.fema.gov/EMIWeb/CRS/

Chapter 2. Problem Description

This chapter reviews the various natural hazards that Calumet City faces:

- Overbank flooding
- Local drainage
- Sewer backup
- Tornadoes
- Winter storms
- Severe storms
- Earthquake
- Extreme heat

2.1. Overbank Flooding

Calumet City is subject to overbank flooding from the Little Calumet and Grand Calumet Rivers. The maps on the next two pages show the approximate extent of the two rivers' floodplains as mapped by FEMA. The "A Zone" is the 100-year floodplain and the "B Zone" is the 500-year floodplain.

Where it enters Illinois at the state line, the Little Calumet River drains approximately 92 square miles of northwestern Indiana. It flows along the southern border of the City, going from east to west. It loops around the suburbs of Dolton and Riverdale and flows back to the east along the northern limits of the City. The Little Cal turns north and at 138th Street on the northern corporate limits of Burnham it joins the Grand Calumet River.

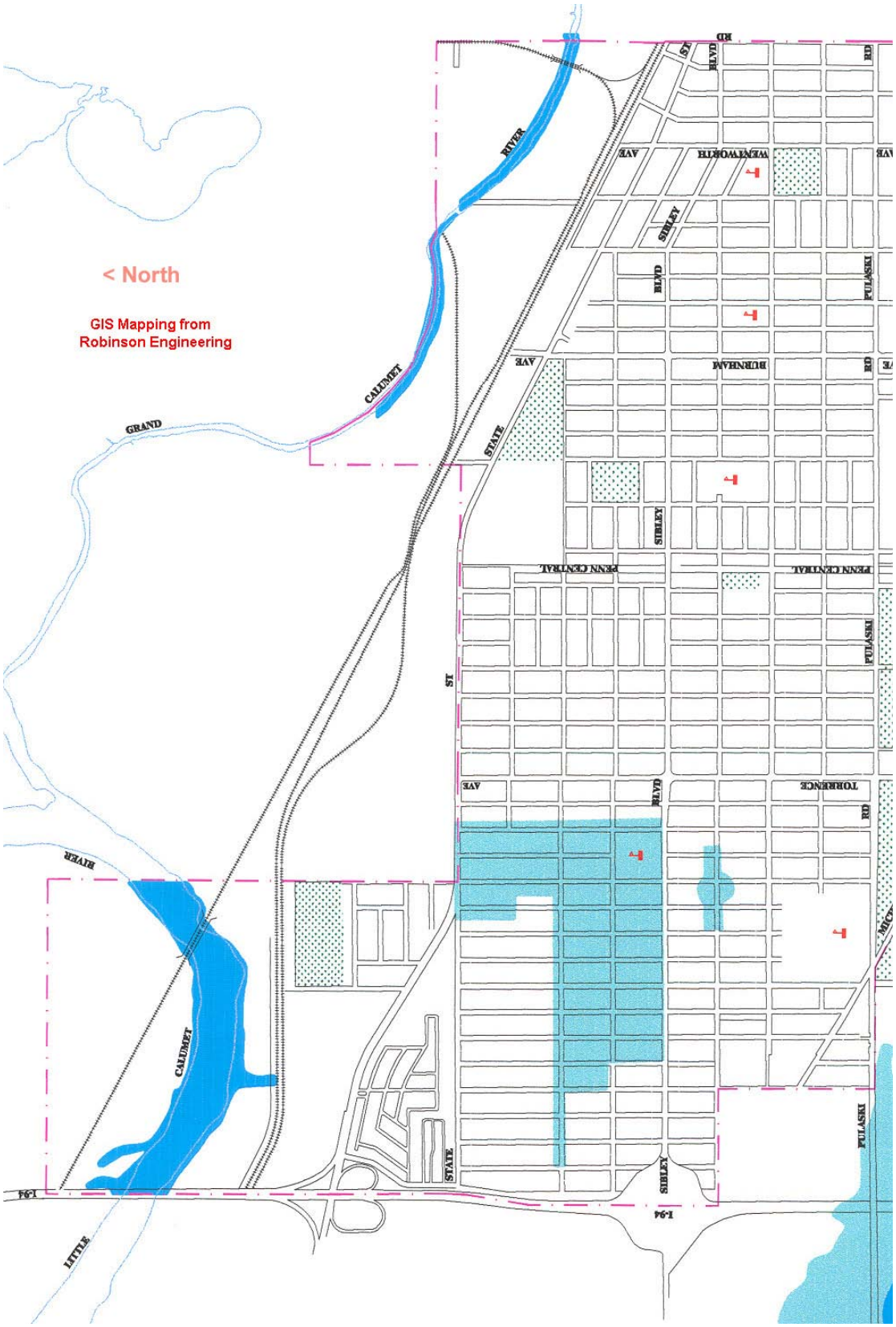
The Grand Calumet River also drains northwestern Indiana. Its drainage area is much smaller, approximately 8 square miles where it enters Calumet City. It flows from the state line to the west and north and into Lake Michigan in Chicago. While smaller than the "Little" Calumet, the "Grand" Calumet is so named because it receives the flows of the other stream.

While the City has three distinct floodplains, only one of them presents an overbank flood problem. The two floodplains on the northern City limits are relatively small and affect essentially vacant land. Therefore, this section focuses on the Little Calumet River floodplain in the south of Calumet City.

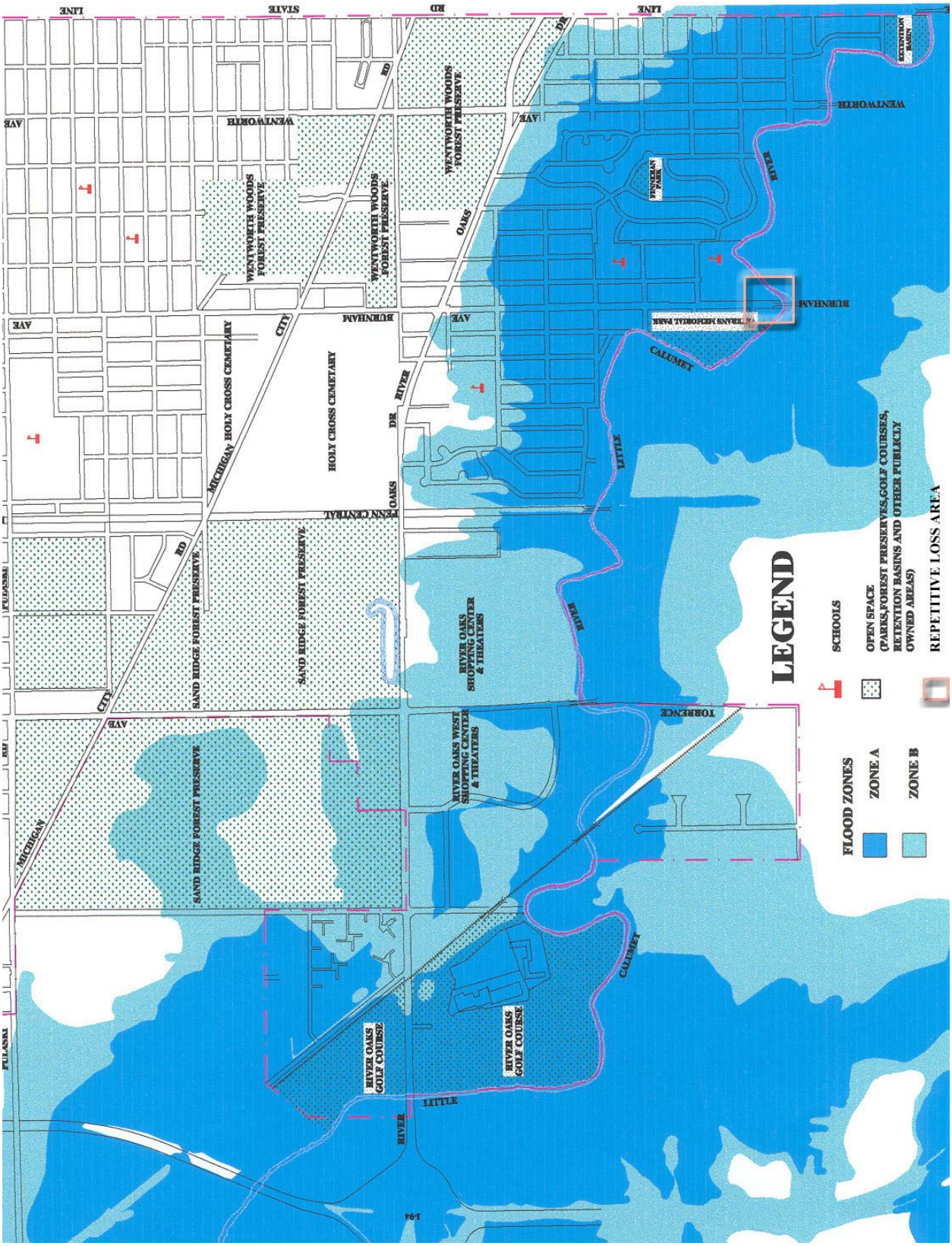
Flooding History: Flooding has occurred on the Little and Grand Calumet Rivers since the last glacier left Illinois. Early settlers avoided building too close to the rivers. As late as the 1940's, large areas of the south suburbs remained vacant, primarily because it was too marshy to build on. These areas were used by the rivers to carry and hold excess rain runoff and snow melt.

Beginning in the late 1940's, this scene changed as the Chicago area's population expanded to the south. Urban development put pressure on the undeveloped land along the rivers. The floodplains were built up during the 1950's and 1960's. It was not until the 1970's that local governments passed floodplain management regulations to require the elevation of new buildings in the floodplain. Since then, floodplain development has slowed down, but developers still fill floodprone areas for new homes or commercial properties.

In the 1920's, the Calumet-Sag Channel was completed and the Little Calumet received an additional outlet at Riverdale. Instead of flowing into the Grand Calumet and Lake Michigan, most of its water now flows west through the Cal-Sag to the Des Plaines River. There are locks on both the Cal-Sag and the Grand Calumet to control low flows. At the other end, Burns Ditch connected the river to Lake Michigan in the 1920's at Burns Harbor, Indiana. During high flows, the Indiana portion of the Little Cal drains east.



Calumet City Floodplains (North)



Calumet City Floodplains (South)

During the growth of the south suburbs and northwestern Indiana, farmlands were replaced with roofs, parking lots, streets, gutters, storm sewers, and more ditches. Under urban development, more rainwater ran off the land and into the rivers and it ran off faster. As with floodplain regulations, it was not until the 1970's that communities began stormwater management regulations that require developments to restrict their runoff.

In short, while the Little and Grand Calumet Rivers flooded in the past, the problem has gotten worse since the 1940's. In July 1957, heavy summer storms caused widespread flooding in northeastern Illinois. The subsequent flood on the nearby Kankakee River was estimated at being a 750-year flood.

The 1957 flood was exceeded in 1981 by another flood caused by summer storms. While there was not as much rain as in 1957, the 1981 flood caused much more damage because there was more development in the floodplain. Because so many homes and businesses were affected, the June 1981 flood resulted in a Presidential Disaster Declaration for the area. Another Presidential declaration followed the December 1982 flood.

1981 Little Calumet River flood scenes

Source: *Jeff Newman*

Calumet City's highest flood on record (so far) occurred in November 1990. Heavy local storms caused the Little Cal to rise higher than before, over half a foot higher than the 1981 record. The July 1996 flood came within inches of the 1981 flood.

These and other historical floods are noted on the graph on the next page, which is for the Little Cal at the official recording gage at Cottage Grove Avenue in South Holland. The elevations for the Cottage Grove gage can be compared to sites in Calumet City in the table below.

Projected Little Calumet River Flood Elevations

River Mile*	Location	10-year	100-year	500-year
6.8	Cottage Grove Avenue (South Holland gage)	594.4	598.0	601.5
8.0	159th Street (western corporate limits)	595.0	598.6	601.5
10.2	Torrence Avenue (River Oaks)	595.1	598.8	601.5
11.7	Burnham Avenue	595.2	599.0	601.8
13.0	State Line Street (eastern corporate limits)	595.5	599.0	601.8

* Miles above confluence with Calumet-Sag Channel

Source: *Cook County Flood Insurance Study, Federal Emergency Management Agency*

Flood Heights: Flood heights have been recorded since 1947 on a river gage that is currently located at the Cottage Grove Avenue bridge over the Little Calumet. Recorded flood heights can be shown in stage or in elevation. Stage is measured in feet above an arbitrary starting point that was set when the gage was installed. Elevations are in feet above sea level. At the Cottage Grove gage, the stage of zero equals elevation 575 feet above sea level.

"Flood stage" is the elevation where flooding starts to cause damage. At the Cottage Grove gage, it is 13 feet (588 feet above sea level), although not much damage is caused at this level. Yards and parks are flooded when the river reaches a stage of approximately 15 feet above sea level. Buildings are affected at roughly 18 feet (elevation 593).

The history of recent flooding is shown graphically to the right. This figure also shows the relation between historic flooding and the projected 10-, 50-, 100-and 500-year floods. For example, the December 1982 flood crested at a stage of 19.6 which is the same as 594.6 feet above sea level, slightly higher than a 10-year flood.

The 100-year flood at Cottage Grove would reach an elevation of 598.0. The 500-year flood is predicted to crest at an elevation of 601.5, 3½ feet higher than the 100-year flood. As the river flows from east to west, flood elevations are higher in the east and lower in the west. The 10-, 100- and 500-year flood elevations for various locations in Calumet City are shown at the bottom of the previous page.

The table on the previous page shows that the Little Calumet River runs 5 miles along the southern boundary of Calumet City. This figure also shows how flat the area is: the Little Cal's 100-year flood drops only one foot over a distance of six miles.

Little Calumet River Stages
Cottage Grove Avenue Gage

Stage	Elevation	Event
26.5	601.5	500-year flood
23.0	598.0	100-year flood
22.0	597.0	50-year flood
20.8	595.5	11/27/90
20.2	595.2	6/14/81
20.1	595.1	7/14/57
20.0	595.0	7/20/96
19.6	594.6	12/3/82
19.4	594.4	10-year flood
19.2	594.2	4/6/47
19.1	594.1	2/21/97
18.6	593.6	6/2/89
18.2	593.3	10/10/54
17.9	592.9	2/24/85
17.7	592.7	12/27/65
17.0	592.0	
16.3	591.3	1/24/99
16.0	591.0	

Real time data from this gage can be accessed via the Internet by going to: http://waterdata.usgs.gov/il/nwis/uv/?site_no=413625087355201&agency_cd=USGS

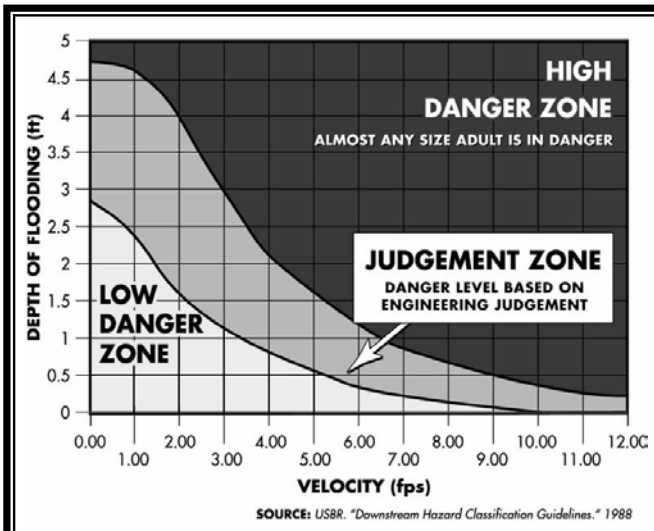
It should be noted that the projected 10-, 50-, 100- and 500-year flood levels are taken from the Cook County Flood Insurance Study, and are based on data from the early 1970's. Watershed development, upstream levees, the Thornton Quarry Reservoir, and floodplain filling have changed flooding conditions since then. Most important is the impact of the reservoir, which is discussed in Chapter 8.

Areas Affected: The areas affected by the 100- and 500-year floods have been mapped on the Cook County Flood Insurance Rate Map (FIRM). These areas are shown approximately as the A Zone and B Zone, respectively, in the maps on pages 2-2 and 2-3.

Frequency: As noted on the graph on the previous page, the 1990 flood approximated a 25-year flood. However, it affected very little of the City because of the levee which was raised and strengthened after the 1982 flood. With the new Thornton Quarry Reservoir, flood heights are expected to be lower. As a result, it is estimated that it would take a 100-year flood to overtop the levees and flood the area mapped on page 2-3. Accordingly, this plan uses a 100-year (1% chance) flood for the risk of future overbank flooding. There are a few areas not protected by the levee that are subject to more frequent flooding.

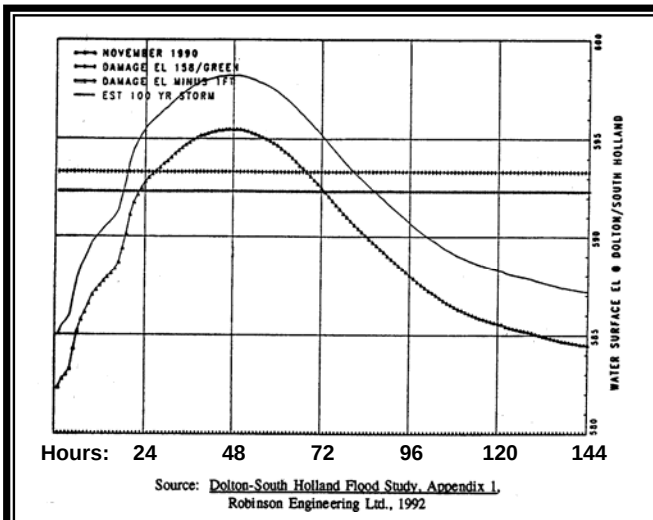
Velocities: Floods move slowly in this flat area. According to the Flood Insurance Study, the highest average floodway velocity on the Little Cal during the 100-year flood is less than 1 foot per second.

While flood velocities in Calumet City are relatively low, velocity as a hazard is related to flood depth. The relationship between depth and velocity is shown in the graph to the right. It doesn't take much depth or velocity to be dangerous. A car will float in less than 2 feet of moving water and can be swept downstream into deeper waters. Floods kill more people trapped in vehicles than anywhere else.



Depth – velocity danger levels for people

Rate of Rise and Duration: Because of the urbanized watershed, stormwater runs off quickly. To the right is a hydrograph of the 1990 flood and the predicted 100-year flood. It shows that the 1990 storm caused overbank flooding to reach buildings in less than 24 hours. The river kept rising for another 24 hours. After the Little Cal crested in 1990, it took 3-4 days to get back in its banks. The river was out of its banks for a total of five days and in buildings for two of those days.



Little Calumet River hydrograph

2.2. Impact of Overbank Flooding

Buildings: A windshield survey by City staff in 1999 identified 2,092 buildings in the Little Cal's 100-year floodplain. The vast majority of them are residential buildings on slab foundations or with floors below ground level. There has been little new construction in the floodplain since the survey, so the general findings are still valid.

1,978	Single family homes		Residential Foundations
37	Multi-family buildings	919	Basement
2,015	Residential buildings	1,006	Slab on grade
		69	Tri-level/split level
67	Industrial/commercial	5	Crawlspace
10	Public buildings	16	Cannot tell from windshield survey
2,092	Total	2,015	Total

Building damage: As of December 31, 2004, FEMA has paid 187 flood insurance claims for Calumet City properties. Here are some statistics:

- 174 of the 187 (93%) were for 1-4 family residences
- 5 (2.6%) were for nonresidential properties
- 172 (92%) were in the mapped 100-year floodplain
- 144 (77%) were for the years 1981 – 1983, before the levee was raised and improved.

While 1982 was a lower flood than 1981, there were three times more claims. This is due to the fact that flood insurance policies were not widely held in 1981. Many people bought policies after that flood and so there were many more policy holders in 1982.

The average claim for 1981 – 1983 was $6,300. When the Little Cal flooded again in 1990, there were only five claims for the few properties on the river not protected by the levee. The average claim was much higher in 1990 ($11,000). It should be noted that the 1990 flood was higher than either 1981 or 1982, yet there were very few claims. This is due to the protection provided by the Calumet City levee that was raised after the 1982 flood.

There should be more damage than shown by claims data because 47% of the policy holders only carried coverage on the buildings. Contents coverage is usually not required by banks as a condition of a mortgage or home improvement loan. Of the properties with both structural and contents claims paid, contents claims accounted for 38% of the total (before 1999). In other words, of the total insurable damage to a building from flooding, 38% of the damage has been to contents and 62% has been to the building's structure.

The average claim for structural damage to single family homes was $4,513. The average claim for contents damage to single family homes (with contents coverage) was $3,231. While a slow moving flood normally causes more damage to contents than to the structure, advance warning time probably allowed many residents to protect their more valuable contents. Using these historical figures for Calumet City, bringing them up to 2005 costs and accounting for contents damage, deductibles, and deeper flooding during a 100-year flood, results in an average building damage figure of $20,000.

This figure accounts for debris removal, cleaning, repairing the floors, and replacing walls, insulation, wooden doors, electrical services, furnace, washer, dryer, and contents. It does not include damage to vehicles, landscaping, swimming pools, and other uninsurable items.

Structural flood damage includes broken walls and damage to insulation and wallboard

Extrapolating on this figure, a 100-year flood would cause $40 million in damage (2005 dollars) to single family homes alone. Damage to commercial properties varies considerably with the type of building and contents, but can be expected to be higher. In short, a 100-year flood of the Little Calumet River could be expected to cause nearly $45 million in direct damage to buildings (2005 dollars).

During the 1999 flood planning effort, a questionnaire was sent to all residents of the City. Of the 490 respondents, 58% had been flooded from one source or another. 77 stated they had been flooded by the Little Calumet River. One half of these (38) listed overbank flooding as the only source of flooding. Only two reported flooding in 1990, confirming the conclusion drawn from the flood insurance data that the levee has provided protection for a large area of the City subject to overbank flooding from smaller floods on the Little Calumet River.

Economic Impacts: Floods cause other problems that aren't so easy to identify or measure. They disrupt businesses which have to be closed when they are flooded, they lose their inventories, people can't get to them or the employees are busy protecting or cleaning up their flooded homes.

While the River Oaks shopping centers have been dry, businesses on Burnham Avenue at the river have been closed and damaged by floods. Besides the property damage and lost income, there are costs to fight the floods, find temporary housing, and clean up. Repetitively flooded areas tend to deteriorate over time and property values go down.

Overall economic impact of a 100-year flood: high.

Safety: There are many noneconomic costs associated with flooding. The most important is the potential for loss of life. While the relatively slow rising and slow moving floodwaters are not generally considered life threatening, in the 1981 and 1982 floods, two young people died in neighboring suburbs trying to cross flooded areas, one on a bicycle and one in a small boat. People are at risk of electrocution when they reenter a flooded house or basement without turning the power off.

Overall safety hazard: Moderate.

Health: Three general types of health problems accompany floods. The first comes from the water itself. Floodwaters carry whatever was on the ground that the stormwater runoff picked up, including dirt, oil, and farm and industrial chemicals. In the 1990 flood, one nearby community found PCBs after the waters receded.

The second type of health problem comes after the water is gone. Stagnant pools become breeding grounds for mosquitoes, and wet areas of a building that have not been cleaned breed mold and mildew (see photo). A building that is not thoroughly and properly cleaned becomes a health hazard, especially for small children and the elderly.

Post-flood silt, mold and mildew

Another health hazard occurs when heating ducts in a forced-air system are not properly cleaned after inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants.

The third problem is the long-term psychological impact of having been through a flood, seeing one's home damaged and irreplaceable keepsakes destroyed. The cost and labor needed to repair a flooded home puts a severe strain on people, especially the unprepared and uninsured.

There is also a long-term problem for those who know that their homes can be flooded again. The resulting strain on floodplain residents takes its toll in the form of aggravated health and mental health problems. Children are particularly susceptible to this post-traumatic stress.

Overall health hazard: Moderate.

Development trends: The major reason why Calumet City has an overbank flooding problem is because of development. Development has filled in much of the floodplain and buildings have been built too close to the channel.

Growth in the watersheds has increased the amount of runoff into the rivers and it, too, is continuing. The tributaries to the Little Calumet River, particularly Thorn and Deer Creeks, have large open watersheds that can be expected to be developed over the next 10 to 20 years. Retention or detention basins are required of most new watershed development, but these regulations are outside the jurisdiction of the City.

Two vacant floodprone areas are still subject to development:

- The area west of Torrence, south and west of River Oaks West, and
- The unincorporated area west of Sand Ridge Forest Preserve and north of the River Oaks Golf Course.

Areas already built up are subject to redevelopment. Businesses and homeowners add on, build new garages, install swimming pools and make other property improvements that, if not protected will increase the dollar value subject to flood damage. Such projects can also create or aggravate drainage problems for the neighbors.

In short, unless properly managed, future development will make overbank flooding worse. On the other hand, the Thornton Quarry Reservoir has reduced flood heights. It is expected that when the Little Calumet basin is remapped, large areas of the City will be removed from the regulatory floodplain. This will likely increase development pressures on the areas still vacant and encourage remodeling and other property improvements without the constraints imposed by floodplain regulations.

2.3. Local Drainage

Calumet City's local drainage problems are primarily due to backed up combined sewers and storm sewers. The sewers are designed to drain streets and ponding areas along with transporting sanitary sewage to treatment facilities. When they are blocked or overloaded by heavy rains, the drainage system is plugged. Stormwater sits for hours or days, waiting for the sewers to clear.

Local drainage problems result where there are low spots that collect stormwater runoff, such as streets and alleys.

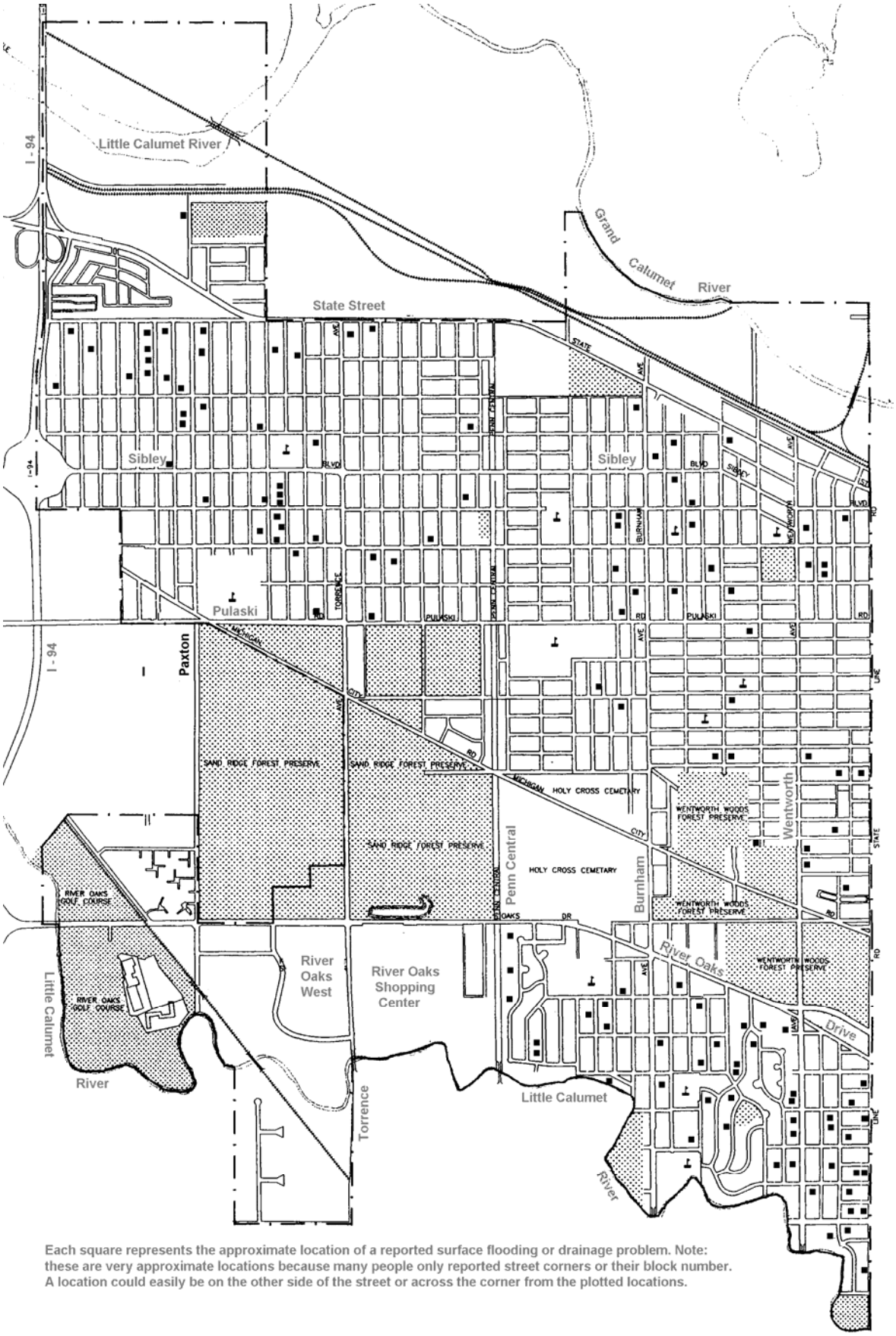
Source: Carl Sivak

Frequency: Storms severe enough to cause property damage occur at least once each year.

Areas Affected: Local drainage problems occur during storms in any part of the City. Historically the worst hit area is in the northwest part of town. To get a better handle on the location and severity of the problem, a questionnaire was sent to all residents of the City when the 1999 *Floodplain Management Plan* was prepared. Of the 490 respondents, 58% had been flooded from one source or another.

Of the respondents who had been flooded, 131 reported being flooded by high ground water and surface water other than the Little Calumet River. The general locations of these properties are plotted on the map on the next page. This map shows that the problem is spread throughout the City, not surprising since the area is so flat.

One area of particular concern is in the northwest portion of Calumet City, north of Sibley Boulevard and west of Torrence. This area had chronic drainage problems when the City's Flood Insurance Rate Map was prepared in the late 1970's. It shows up as a Zone B (shallow) floodplain (see page 2-2). Efforts by the City since 1980 have paid off. While there are still reported scattered problems, there is no concentration in the B Zone between Sibley and Stewart, two blocks north.



Each square represents the approximate location of a reported surface flooding or drainage problem. Note: these are very approximate locations because many people only reported street corners or their block number. A location could easily be on the other side of the street or across the corner from the plotted locations.

Reported Local Drainage Problem Sites

Impact: 91% of the 1999 questionnaire respondents who reported drainage problems had water in their buildings or crawlspaces. Six reported water over their first floors. Of the 9 flood insurance claims for properties outside the mapped floodplain, the average structural claim was $1,600 and the average contents claim was $2,160 (1/3 and 2/3, respectively, of the amount of damage from overbank flooding). Based on these experiences, it is estimated that each building damaged by local drainage suffers $4,500 in structural and contents damage (2005 dollars). It is estimated that in an average year, five properties are damaged and a few streets are closed. The average cost of this is figured at $25,000.

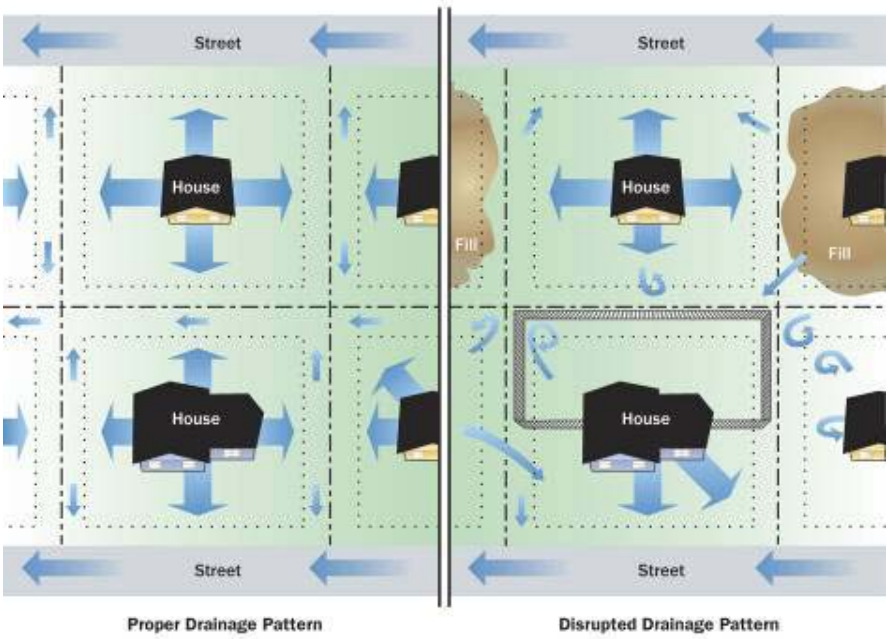
Street ponding is usually not severe enough to close a street to traffic, at least not to emergency vehicles. However, flooded streets and yards can cause or aggravate the health and safety problems and disrupt traffic. It is only a "nuisance" when compared to the extensive damage caused by overbank flooding. The problem can be aggravated when traffic (including emergency vehicles) create waves that increase flood heights. Businesses may be closed for a few hours.

Overall economic impact: Low.

Overall safety and health hazard: Low.

Development trends: Larger development projects, such as shopping centers, are required to manage their stormwater runoff and drainage so that there are no adverse impacts on neighboring properties.

However, there is not such a level of oversight for small projects, such as grading, erecting a fence, or installing a backyard swimming pool. As illustrated here, it is these types of projects that aggravate even well-designed surface drainage systems. Without an informed public and local building regulations, future redevelopment activities could increase local drainage problems.



Unregulated small construction projects can create local drainage problems

Source of graphic: FEMA

2.4. Sewer Backup

There are three types of sewers in Calumet City:

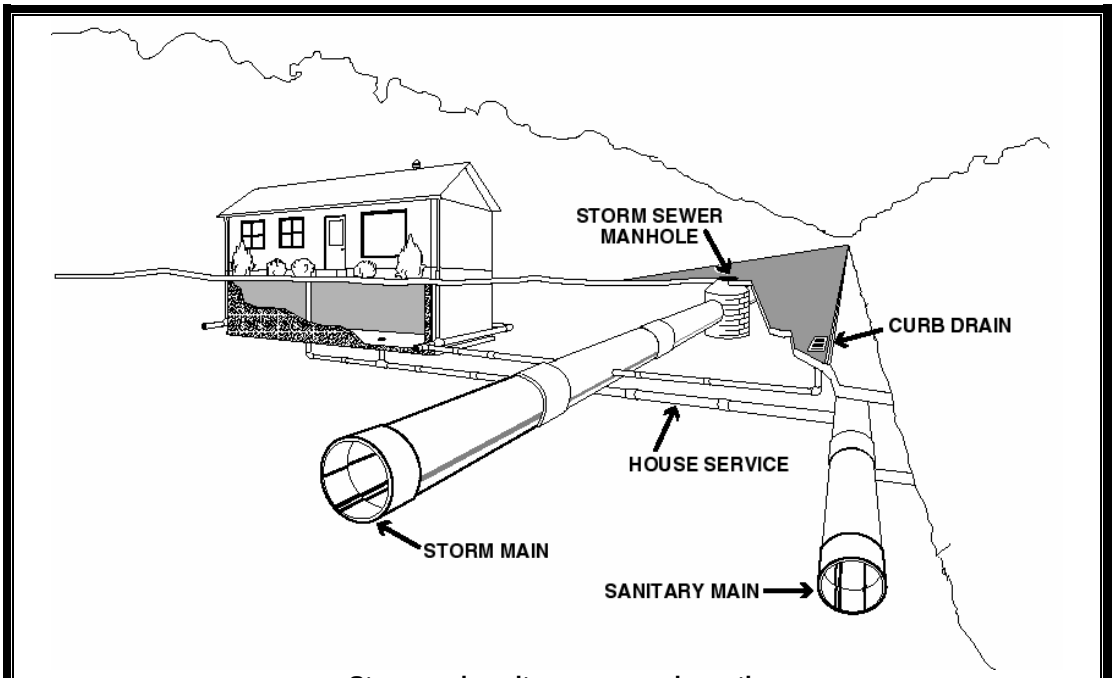
1. Storm sewers that collect surface drainage and direct it to the rivers. When storm sewers work, the streets and yards are drained quickly. Storm sewers won't work if they are overloaded, underdesigned or blocked. Blockages can be caused by a broken pipe, debris or sediment in the pipe, or an outlet or outfall that is underwater.

2. Sanitary sewers that collect sewage from buildings and carry it to wastewater treatment plants. They should not be affected by stormwater because they are separate from the storm sewers. However, there are sometimes cross connections and leaks in sanitary sewer pipes that receive inflows and infiltration which can overload a sanitary line during wet weather.

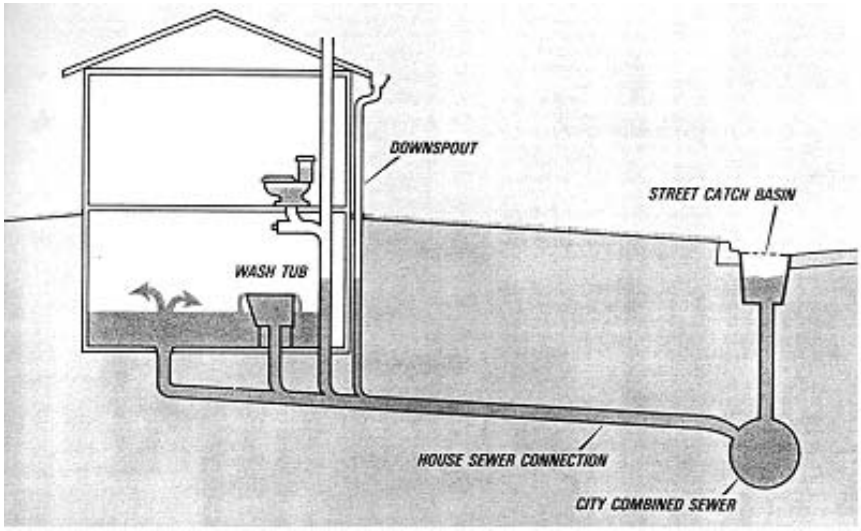
3. Combined sewers that collect both stormwater and sewage and carry it in the same pipe to a treatment plant.

When overloaded with stormwater or snowmelt, sewers back up and flow into the lowest opening in the sewer line. The figure below shows that sanitary sewers back up into basements and storm sewers back up into streets. The figure on the next page shows that overloaded combined sewers back up into basements first and, if the water gets deeper, into streets.

Approximately 85 percent of Calumet City is served by combined storm and sanitary sewer mains. Stormwater is supposed to enter the combined sewers. With the completion of the Deep Tunnel connections in the north part of the City, the combined sewers have been better able to handle their wet weather flows.



Storm and sanitary sewer schematic



Combined sewer backup

Areas Affected: Of the 490 respondents to the Calumet City 1999 planning questionnaire, 171 reported having been flooded by storm or sanitary sewer backup. The general locations of these historical sewer problems are plotted on the map on the next page.

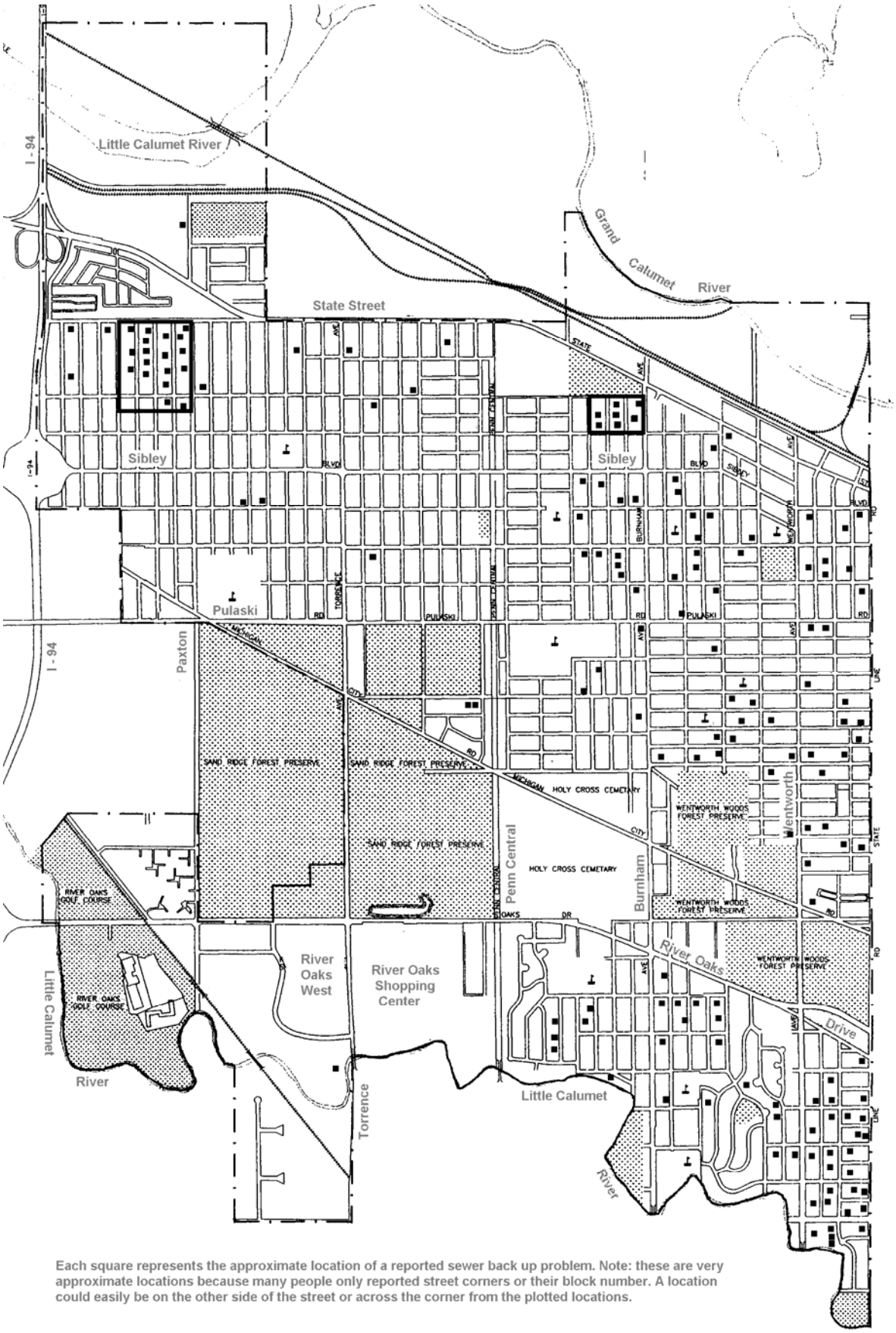
The map shows that in 1999, sewer backups had primarily been a problem in the eastern half of the City. The western half, especially north of Pulaski, has seen a lot of sewer improvement projects and stormwater retention basins funded by the City. Only two concentrations of sewer problems were reported. These are outlined on the map on the next page.

Frequency: It is difficult to base the frequency of future sewer backups on historical experiences since the City's sanitary and combined sewers were connected to the Metropolitan Water Reclamation District's Deep Tunnel. The frequency of backups has greatly diminished. It is now estimated that backups that damage property would occur on an average of once every five years.

Impact: It is difficult to separate storm sewer flooding from surface flooding caused by local drainage problems. Therefore, the impact of storm sewer flooding is incorporated in the previous section and this section focuses on the impact of sanitary and combined sewer backups.

Street flooding with sewer backup (note bubbling from manhole in the street)

A sewer backup flood causes two types of damage. By getting items wet with dirty water, it can effectively destroy many basement contents. Finished basements, with carpeting and furniture, are especially susceptible to damage. Even in unfinished basements, water damages washing machines, dryers, furnaces, water heaters, and utilities.



Each square represents the approximate location of a reported sewer back up problem. Note: these are very approximate locations because many people only reported street corners or their block number. A location could easily be on the other side of the street or across the corner from the plotted locations.

Reported Sewer Backup Sites

Because flood insurance does not cover sewer backup, there are no insurance figures to base the cost of property damage. Such flooding can be shallow or deep and can affect finished or unfinished basements. The same figure for local drainage problems is used for planning purposes, $4,500 per building. Each occurrence is estimated to affect 100 buildings for a cost per occurrence of $450,000 (2005 dollars).

Sewer backup can devastate a finished basement

Sewer backup may close a business for a day or two. Overall economic impact: Low.

Safety and Health: The second type of damage comes from the sewage in the water. Backed up sewers create a significant health problem, even in empty basements. Clean up must be careful and thorough to ensure there are no lingering hazards. The health, mental health, and noneconomic impacts are similar to those described for overbank flooding.

Overall safety hazard: Low.

Overall health hazard: Moderate.

Development trends: Because most of Calumet City is already built up, there will not be much future development to add to the current sewers' load. With the Deep Tunnel connection and public information efforts on sewer backup protection (discussed in Chapter 9), it is not expected that this problem will worsen over time.

2.5. Repetitive Flood Losses

The National Flood Insurance Program (NFIP) provided the City with a list of insurance claims since 1978. As noted earlier, since the June 1981 flood, Calumet City residents have been paid 187 flood insurance claims.

A "repetitive loss property" is one which has received two flood insurance claim payments for at least $1,000 each since 1978. These properties are important to the National Flood Insurance Program because they account for one-third of the country's flood insurance claim payments. Therefore, the Community Rating System encourages communities to identify the causes of their repetitive losses and develop a plan to mitigate the losses.

Calumet City has 21 NFIP designated repetitive loss properties. The addresses and claims history of individual properties is kept confidential under the Privacy Act. However, it can be noted that all 21 are located in the Little Calumet River floodplain in the southeastern corner of the City. They can be summarized under four categories:

- 12 properties are on Shirley Drive in the very southeastern corner of the City. They are located between 167th Street and the retention basin. They were purchased and cleared in the mid 1980's with FEMA funding support. The properties have since been kept vacant.

Vacant lots on Shirley Drive. The lots are owned by the City and must be kept open as a condition of the FEMA mitigation grant.

- Six properties are on Shirley Drive and Lincoln Avenue, within two blocks of the River. These were flooded in June 1981, December 1982 and/or July 1983, but not since then. Because there are no claims on these properties from the higher 1990 and 1996 floods of the Little Calumet River, it is concluded that they are now protected from repetitive flooding by the levee that was raised and strengthened after 1983.

- One property is near the corner of Freeland and 161st Street, near the edge of the 100-year floodplain. This property was flooded in June 1981 and May 1982. Given the dates and the property's location, it was likely not flooded by overbank flooding of the Little Cal. The house is a split level and the current owner has made some grading changes when a new driveway was put in. The property has had flood insurance for at least the last 12 years and has not had any claims since 1982, not even for the 1996 storm. Therefore, it is concluded that the cause of the repetitive flood damage was local drainage and has been corrected.

- The remaining two repetitive loss properties are on Burnham Avenue. They were flooded during the Little Cal floods of 1982, 1990 and 1996. They are not protected by the City's levee. This fourth area is the only remaining repetitive loss area in Calumet City. It is outlined on the map on page 2-3. It consists of three commercial buildings and one residence. The residence has a small floodwall around it.

Commercial properties in the Burnham Avenue repetitive loss area.

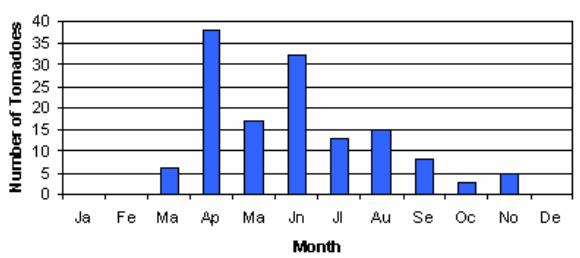
2.6. Tornadoes

A tornado is a swirling column of air extending from a thunderstorm to the ground. Tornadoes can have wind speeds from 40 mph to over 300 mph. A majority of tornadoes have wind speeds of 112 mph or less.

The hazard: Debris hurled by the wind can hit with enough force to penetrate walls. Tornadoes create localized low-pressure areas that can make a building explode. Windows, chimneys and roofs are the most vulnerable parts of buildings to tornado damage.

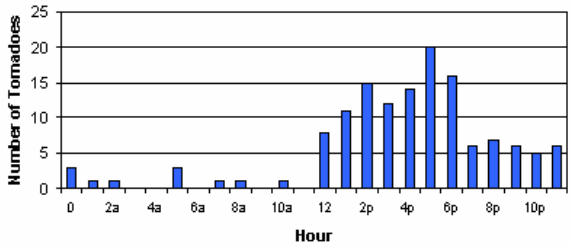
Tornadoes can move forward at up to 70 miles per hour, pause, slow down and change directions. Most have a narrow path, less than a 100 yards wide and couple of miles long. However, damage paths can be more than 1 mile wide and 50 miles long.

Late spring-early summer is the peak of tornado activity in the year. As seen in the chart below left, April, May, and June have the most frequent occurrences of tornadoes in the Chicago area. Tornadoes peak in the afternoon, when convectional heating is at a maximum. As shown in the chart below right, the peak time for tornadoes is at 5:00 p.m.



Chicago Area Tornadoes by Month

Source: Illinois State Water Survey



Chicago Area Tornadoes by Hour

Source: Illinois State Water Survey

Fujita Tornado Scale

F0 Gale tornado 40-72 mph, chimney damage, tree branches broken

F1 Moderate tornado 73-112 mph, mobile homes pushed off foundations or overturned

F2 Significant tornado 113-157 mph, considerable damage, mobile homes demolished, trees uprooted

F3 Severe tornado 158-206 mph, roofs and walls torn down, trains overturned, cars thrown around

F4 Devastating tornado 207-260 mph, well-constructed walls leveled

F5 Incredible tornado 261-318 mph, homes lifted off foundation and carried considerable distances, autos carried as far as 100 meters

Tornadoes are classified as F0 through F5, based on wind speed and damage levels using the Fujita Tornado Scale

Historical Events: In the past fifty years, Cook County has had 44 tornadoes. These are listed in the table to the right.

A detailed study of Chicago area tornadoes was conducted by the University of Chicago. The historical events are shown in the map on the next page. It shows that no area is safe from a twister and that one went through the Calumet City area in 1948. There are no official records available that go that far back, however.

The best known recent tornado in the area was the one that hit northwestern Will County on August 28, 1990. At 3:30 the twister hit Plainfield and the Joliet area. The tornado had winds up to 300 miles per hour, giving it a Fujita rating of F-5 (see box, previous page). It cut a path of destruction 20 miles long and from 200 yards to half a mile wide. Its impacts are highlighted on page 2-21.

Most of the damage was to Will County. More than 1,200 homes and buildings and at least 50 businesses were damaged or destroyed. Damage to three schools in Plainfield left 1,600 students without classrooms. Luckily, the tornado hit after school had been let out, although there were some deaths among participants in after-school activities.

If the August 1990 tornado had struck 35 miles to the east, it would have hit the Calumet City area where the higher concentration of development would probably have meant more deaths and destruction than what occurred in the Plainfield area.

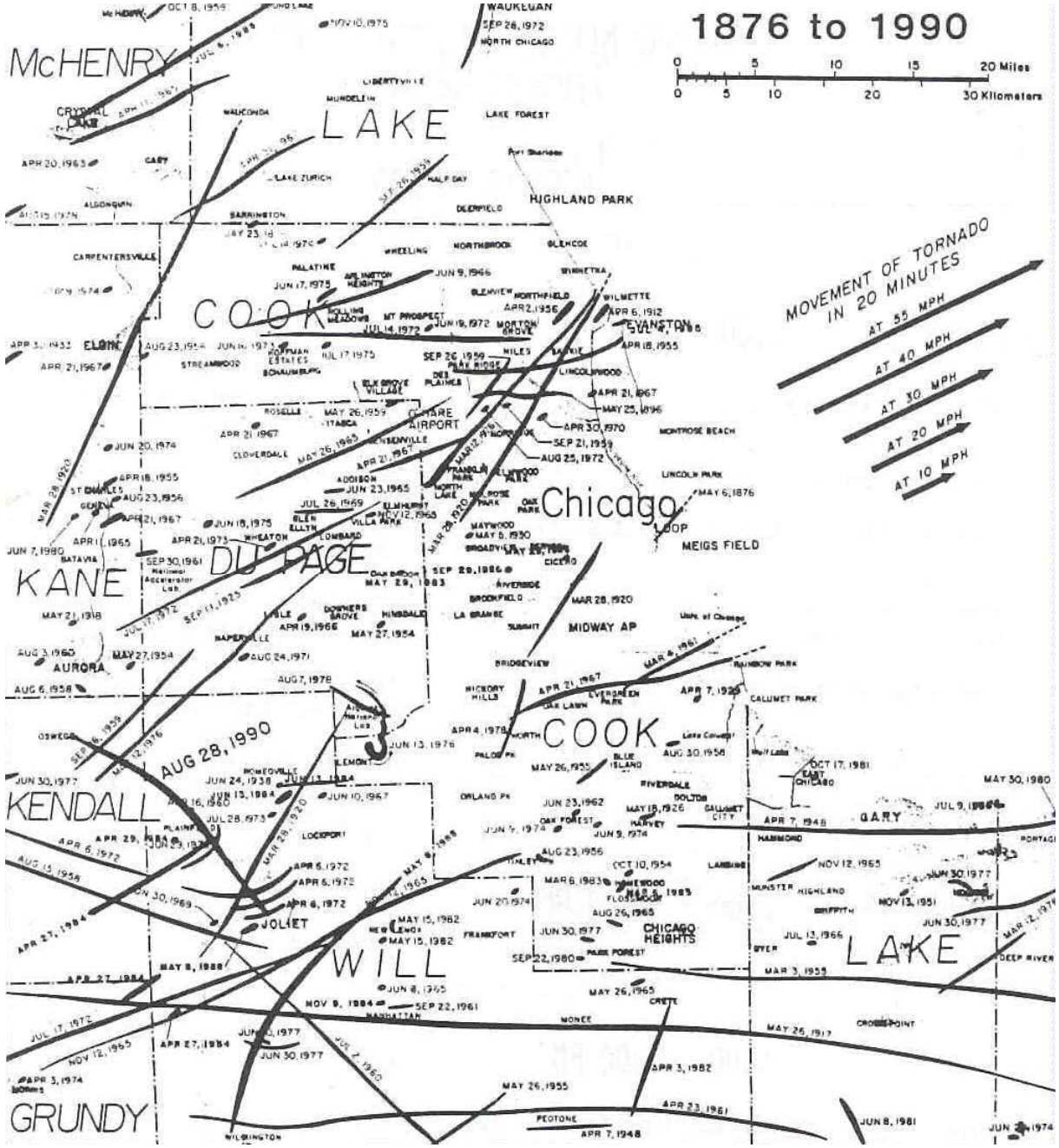
In April, 2004, a tornado hit the small town of Utica, 80 miles west of Calumet City. Older buildings in the downtown were destroyed and eight people were killed (most of them taking shelter in the older buildings). Reconstruction has been complicated by the fact that much of the damaged area is in the regulatory floodplain. New and substantially damaged buildings must be protected from flooding.

Cook County Tornadoes Since 1950

Date	Deaths	Injuries	Fujita
Oct. 10, 1954	0	0	F1
May 26, 1955	0	2	F1
April 2, 1956	0	0	F1
Aug. 23, 1956	0	3	F2
Aug. 30, 1958	0	0	F1
May 26, 1959	0	0	F1
Sept. 21, 1959	0	0	F1
Sept. 26, 1959	0	0	F2
Sept. 26, 1959	0	14	F1
March 4, 1961	1	115	F2
June 23, 1962	0	10	F2
May 26, 1965	0	0	F2
May 26, 1965	0	0	F2
Aug. 26, 1965	0	0	F1
Nov. 12, 1965	0	0	F2
June 9, 1966	0	0	F0
June 9, 1966	0	0	F2
June 9, 1966	1	30	F2
April 21, 1967	0	0	F1
April 21, 1967	33	500	F4
April 21, 1967	0	0	F1
April 30, 1970	0	9	F2
June 19, 1972	0	2	F1
July 14, 1972	0	0	F1
Aug. 25, 1972	0	1	F2
April 21, 1973	0	0	F2
April 21, 1973	0	0	F1
June 16, 1973	0	0	F0
June 20, 1974	0	0	F1
July 14, 1974	0	0	F0
June 17, 1975	0	0	F2
March 12, 1976	2	41	F2
June 13, 1976	2	23	F4
June 30, 1977	0	0	F1
Sept. 7, 1977	0	0	F1
April 18, 1978	0	0	F1
Sept. 22, 1980	0	0	F0
May 29, 1983	0	1	F1
May 29, 1983	0	2	F0
July 4, 1985	0	0	F1
Sept. 29, 1986	0	10	F1
March 27, 1991	0	7	F3
May 5, 1991	0	0	F0
May 30, 2003	0	0	F0

Source: The Tornado Project
www.tornadoproject.com

Chicago Area Tornadoes



Source: Prof. Ted Fujita, University of Chicago

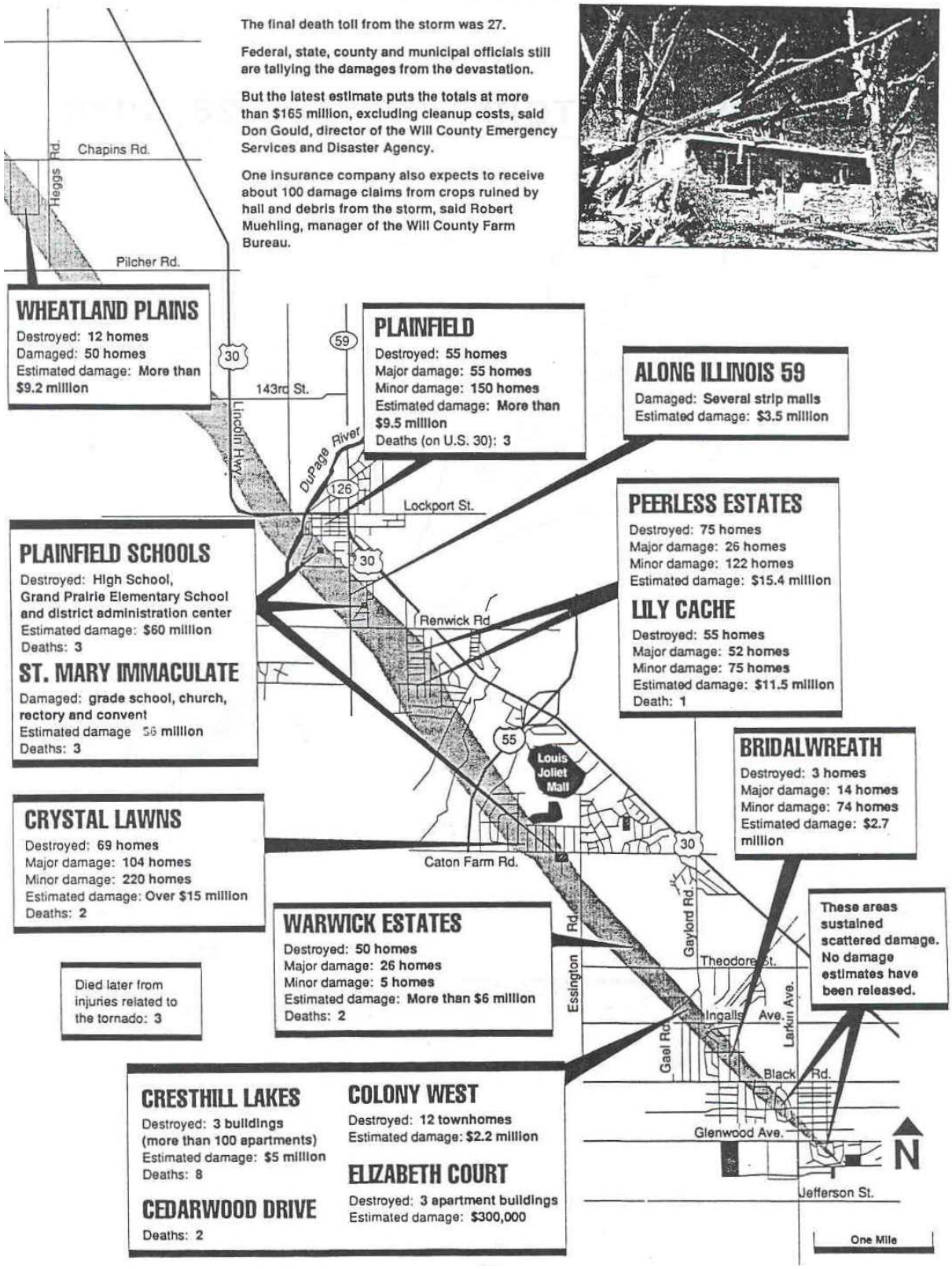
A trail of death and destruction

The final death toll from the storm was 27.

Federal, state, county and municipal officials still are tallying the damages from the devastation.

But the latest estimate puts the totals at more than $165 million, excluding cleanup costs, said Don Gould, director of the Will County Emergency Services and Disaster Agency.

One insurance company also expects to receive about 100 damage claims from crops ruined by hail and debris from the storm, said Robert Muehling, manager of the Will County Farm Bureau.



WHEATLAND PLAINS
Destroyed: 12 homes
Damaged: 50 homes
Estimated damage: More than $9.2 million

PLAINFIELD
Destroyed: 55 homes
Major damage: 55 homes
Minor damage: 150 homes
Estimated damage: More than $9.5 million
Deaths (on U.S. 30): 3

ALONG ILLINOIS 59
Damaged: Several strip malls
Estimated damage: $3.5 million

PEERLESS ESTATES
Destroyed: 75 homes
Major damage: 26 homes
Minor damage: 122 homes
Estimated damage: $15.4 million

LILY CACHE
Destroyed: 55 homes
Major damage: 52 homes
Minor damage: 75 homes
Estimated damage: $11.5 million
Death: 1

PLAINFIELD SCHOOLS
Destroyed: High School, Grand Prairie Elementary School and district administration center
Estimated damage: $60 million
Deaths: 3

ST. MARY IMMACULATE
Damaged: grade school, church, rectory and convent
Estimated damage $6 million
Deaths: 3

BRIDALWREATH
Destroyed: 3 homes
Major damage: 14 homes
Minor damage: 74 homes
Estimated damage: $2.7 million

CRYSTAL LAWNS
Destroyed: 69 homes
Major damage: 104 homes
Minor damage: 220 homes
Estimated damage: Over $15 million
Deaths: 2

WARWICK ESTATES
Destroyed: 50 homes
Major damage: 26 homes
Minor damage: 5 homes
Estimated damage: More than $6 million
Deaths: 2

Died later from injuries related to the tornado: 3

These areas sustained scattered damage. No damage estimates have been released.

CRESTHILL LAKES
Destroyed: 3 buildings (more than 100 apartments)
Estimated damage: $5 million
Deaths: 8

CEDARWOOD DRIVE
Deaths: 2

COLONY WEST
Destroyed: 12 townhomes
Estimated damage: $2.2 million

ELIZABETH COURT
Destroyed: 3 apartment buildings
Estimated damage: $300,000

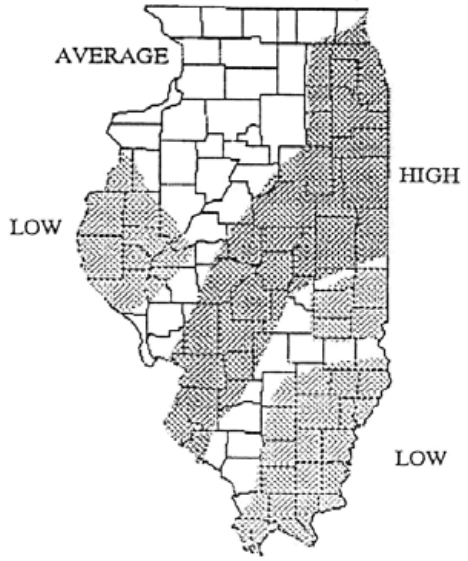
Source: Chicago Tribune, August 28,1990

Frequency: Approximately 1,000 tornadoes occur each year in the United States. Illinois is tied for 7th in the United States with an average of 26 tornadoes per year. Tornadoes are most likely to occur in April through June, but a tornado can occur at any time. Over half hit between 3:00 and 7:00 p.m. There are no official recurrence intervals calculated for tornadoes.

Cook County has had 44 of the 1,472 tornadoes recorded in Illinois between 1950 and 1999. Cook County is classified as having a "High" tornado risk by the Illinois Natural Hazard Mitigation Plan.

With 44 occurrences over 50 years, the likelihood of a tornado hitting somewhere in the county is 0.88 (88%) in any given year. Assuming a tornado affects one square mile and there are 946 square miles in Cook County, the odds of a tornado hitting any of the nine square miles of Calumet City is 0.008%.

Tornado Frequency in Illinois



Source: Illinois Emergency Management Agency

Building damage: Although tornadoes strike at random, making all buildings vulnerable, three types of structures are more likely to suffer damage:

- Mobile homes,
- Homes on crawlspaces (more susceptible to lift), and
- Buildings with large spans, such as shopping malls, gymnasiums and factories.

2004 Tornado damage in Utica, Illinois

Structures within the direct path of a tornado vortex are often reduced to rubble. However structures adjacent to the tornadoes path are often severely damaged by high winds flowing into the tornado vortex, known as inflow winds. It is here, adjacent to the tornado's path where the building type and construction techniques are critical to the structure's survival.

This maintenance garage shows how buildings with long roof spans can be damaged by tornadoes.

Source: FEMA

In 1999, FEMA conducted an extensive damage survey of residential and non-residential buildings in Oklahoma and Kansas following an outbreak of tornadoes on May 3, 1999, which killed 49 people. The assessment found:

- The failure of many residential structures occurred where the framing was attached to the foundation or when nails were the primary connectors between the roofing and the walls. A home in Kansas was lifted from its foundation where the addition of nuts to the bolts anchoring the wood framing to the foundation may have been all that was needed to have kept this from happening.
- Roof geometry also played a significant role in a building's performance.
- Failure of garage doors, commercial overhead doors, residential entry doors or large windows caused a significant number of catastrophic building failures.
- Manufactured homes on permanent foundations were found to perform better than those that were not on solid walls.

Needless to say, a tornado that hit River Oaks Mall would cause more damage, but one that also hit forest preserve areas would cause less. It is estimated that an "average" tornado in Calumet City would cause

- Destruction and damage to 100 homes at an average of $100,000 each
- Destruction and damage to 5 businesses at an average of $200,000 each
- Destruction of utility lines at a cost of $500,000
- For a total dollar damage of $11.5 million.

Economic Impact: The major impact of a tornado on the local economy is damage to businesses and infrastructure. A heavily damaged business, especially one that was barely making a profit, often has to be closed. The 1990 Plainfield tornado post-disaster damage report stated that at least 50 businesses were destroyed.

Tornado damage to downtown Jackson, TN

Source: FEMA

Infrastructure damage is usually limited to above ground utilities, such as power lines. The 1990 tornado knocked out two 345,000 volt transmission towers, leaving 65,000 Com Ed costumers without power. Damage to phone lines left 14,000 customers without service. Damage to utility lines can usually be repaired or replaced relatively quickly.

Damage to roads and railroads is also localized. If it can't be repaired promptly, alternate transportation routes are usually available. Transportation was disrupted when highways were closed during the August 1990 storm due to high winds and debris.

Public expenditures include search and rescue, shelters, and emergency protection measures. The largest expenses are for repairs to public facilities and clean up and disposal of debris. Most public facilities are insured, so the economic impact on the local treasury may well be small. However, some public buildings, such as schools and fire stations, may be particularly susceptible to damage because of their long roof spans.

Clean up and disposal can be a larger problem, especially with limited landfill capacity near the damage site. Preliminary damage assessments for public expenditures after the 1990 tornado totaled $4 million, 2/3 of that for debris clearance.

Memorial to the 8 people killed by the 2004 Utica tornado

Overall economic impact: High

Safety: Although recent tornadoes in Cook County did not kill anyone, tornadoes are still killers. The August 1990 twister caused 28 deaths and the 2004 Utica tornado killed eight people. The table to the right shows recent tornado related fatalities in the United States and where they occurred.

Tornado Fatalities in the United States

Year	Vehicle	Permanent Home	Mobile Home	Other	Total
1995	4	15	8	3	30
1996	2	8	14	1	25
1997	3	38	15	11	67
1998	16	46	64	4	130
1999	6	39	36	13	94
2000	3	6	18	2	29
2002	3	15	17	5	40
Totals	37	167	172	39	415

During this period, four people were killed in Illinois, two in mobile homes and two in vehicles.

Source: National Weather Service

The major hazard from tornadoes is physical injury from flying debris or being in a collapsed building or mobile home. Within a building, flying debris or missiles are generally stopped by interior walls. However, if a building has no partitions any glass, brick or other debris blown into the interior is life threatening.

Based on national statistics for 1970 – 1980, for every person killed by a tornado, 25 people were injured and 1,000 people received some sort of emergency care. The August 1990 twister injured 350 people.

The number of people who live in mobile homes is far smaller than the number who live in permanent homes, however they have practically the same number of deaths. The table shows that the residents in mobile homes are at the greatest risk. There are two mobile home parks within Calumet City, with a capacity of 350 mobile homes.

Overall safety hazard: High

Health: Following a tornado, damaged buildings are a potential health hazard due to instability, electrical system damage, and gas leaks. Sewage and water lines may also be damaged.

Overall health hazard: Low

2.7. Winter Storms

The Illinois Emergency Management Agency defines a severe winter storm as a storm that meets one or more of the following criteria:

- A snowstorm that produces six inches or more of snow within 48 hours or less,
- An ice storm in which 10% of the cooperative National Weather Service stations in Illinois report glaze, and/or
- A snowstorm or ice storm in which deaths, injuries, or property damage occurs.

There are many ways for winter storms to form, but certain key ingredients are needed. First temperatures must be below freezing in the clouds and near the ground. There must be a source of moisture in the form of evaporating water. Then lift in the atmosphere causes the moisture to rise and form clouds of precipitation.

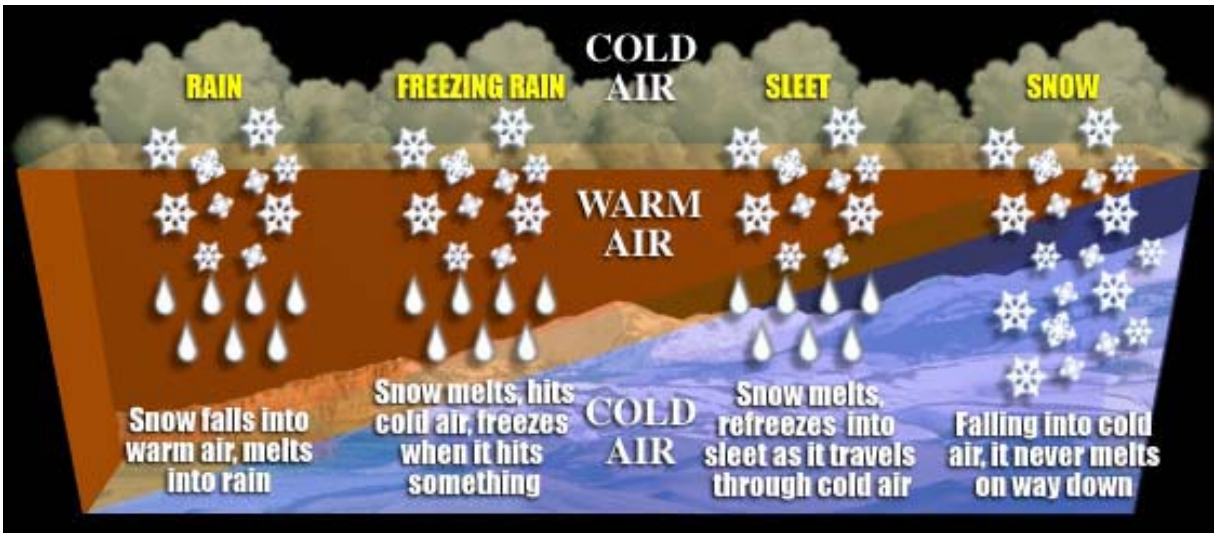
Winter storms in the Midwest are caused by Canadian and Arctic cold fronts that push snow and ice deep into the interior region of the United States. Our area is also subject to lake effect snowstorms that develop from the passage of cold air over the relatively warm surface of Lake Michigan which can cause heavy snowfall and blizzard conditions.

Winter storms can occur as heavy snowfalls, ice storms or extreme cold temperatures. Winter storms can occur as a single event or they can occur in combination which can make an event more severe. For example, a moderate snowfall could create severe conditions if it were followed by freezing rain and subsequent extremely cold temperatures. The aftermath of a winter storm can impact a community or region for weeks, and even months.

Snow: Heavy snowfalls can range from large accumulations of snow over many hours to blizzard conditions with blowing snow that could last several days. The National Weather Service's snow classification is in the table below. In addition to the problems caused by the snow storm is the subsequent melting and possible flooding.

Snow Classifications	
Blizzard	Winds of 35 miles per hour or more with snow and blowing snow reducing visibility to less that ¼ mile for at least 3 hours.
Blowing Snow	Wind-driven snow that reduces visibility. Blowing snow may be falling snow and/or snow on the ground picked up by the wind.
Snow Squalls	Brief, intense snow showers accompanied by strong, gusty winds. Accumulation may be significant.
Snow Showers	Snow falling at varying intensities for brief periods of time. Some accumulation possible.
Snow Flurries	Light snow falling for short duration with little or no accumulation.
	Source: National Weather Service

Ice Storms: An ice storm occurs when freezing rain falls from clouds and freezes immediately upon impact. Freezing rain is found in between sleet and rain. It occurs when the precipitation falls into a large layer of warm air and then does not have time to refreeze in a cold layer (near or below 32°F) before it comes in contact with the surface which is also near or below 32°F, as illustrated below.



Source: University of Nebraska website, http://hpccsun.unl.edu/nebraska/icestorms.html

Historical Events: One of the worst winter storms to impact the State was on January 26-27, 1967, when as much as 23 inches of snow fell on the Chicago area. Travel throughout northern Illinois was curtailed and areas to the south experienced a glaze of ice which made travel virtually impossible until January 29. Fifty deaths were directly attributed to this storm.

In 1979, a Federal snow emergency was declared when the northern third of the State received 6 inches or more of snowfall between January 12 and 14. The heaviest snowfall, up to 20 inches, was recorded in the northeast quarter of the State, where traffic was paralyzed and transportation corridors closed.

The 1999 New Year's Day storm which intensified over the next two days (January 1-3, 1999) resulted in record snowfall across the northern half of the State. High winds and frigid temperatures caused blizzard conditions behind the snowfall which left 21.6 inches in Chicago, second only to the 1967 January storm.

Cook County Winter Storm Events

Date	Type	Deaths
January 26, 1994	Ice Storm	0
December 6, 1994	Winter Storm	0
January 18, 1995	Heavy Snow	0
December 8, 1995	Winter Storm	0
January 9, 1997	Winter Storm	0
January 15, 1997	Winter Storm	5
December 9, 1997	Heavy Snow	0
January 8, 1998	Heavy Snow	0
March 9, 1998	Heavy Snow	0
January 1, 1999	Heavy Snow	1
March 5, 1999	Heavy Snow	0
March 8, 1999	Heavy Snow	0
February 18, 2000	Heavy Snow	0
December 10-31, 2000	Heavy Snow	0
January 30, 2002	Winter Storm	0
March 2, 2002	Winter Storm	0
March 4, 2003	Winter Storm	0
January 4, 2004	Heavy Snow	0

Source: NCDC

From December 10 through December 31, 2000, the cumulative effects of severe winter storms caused extensive road closures, school closings and hazardous road conditions and severely taxed snow removal resources. During this time period, the Chicago area received a record 41.3 inches of snow.

Cook County received Presidential disaster or emergency declarations for the winter storms of 1979, 1999 and 2000.

Frequency: During the 20th century, there were at least two severe winter storms in Illinois each year. Due to the geographic latitude, and its proximity to the Great Lakes, most of these would hit Calumet City, although ice storms are more common in the central part of the state, where temperatures are warmer. Therefore, the odds of a winter storm hitting Calumet City in any given year are 1:1 or a 100% chance.

Buildings: Historically, roofs would collapse due to heavy snow loads, but most buildings in Calumet City are now constructed with low temperatures, snow loads and ice storms in mind. With today's energy consciousness, buildings are much better insulated than they were 50 years ago. Winter storms do not have a major impact on buildings. A dollar figure of $10,000 is used to represent the annual damage from water due to ice seepage and broken water lines.

Economic impact: The major impacts of snow and ice storms on property are to utilities and roads. Power lines and tree limbs can be coated with heavy ice resulting in disrupted power and telephone service. Loss of power means businesses and stores must close down. Loss of access due to snow or ice covered roads has a similar effect.

Above ground lines are especially susceptible to damage by ice storms. The loss of power has a ripple affect to many other properties.

Source: Matthew Masek, University of Nebraska

Being in a Northern climate, most people and businesses in Calumet City are prepared for the average winter storm. However, there is still a hefty public cost for snow removal, which was enough to trigger Presidential emergency declarations for Cook County for the snow storms of 1999 and 2000.

Overall economic impact: Low

Safety: Winter storms bring hazardous driving and walking conditions and heart attacks from shoveling snow. Even small accumulations of ice can be extremely dangerous to motorists and pedestrians. Bridges and overpasses are particularly dangerous because they freeze before other surfaces. About 70% of the injuries caused by snow and ice storms result from vehicle accidents and 25% occur to people caught out in the storm.

The table on page 2-26 shows that six people have been killed by winter storms in Cook County over the last ten years. The table to the right shows that winter storms have led to more deaths in Illinois that any other natural hazard except extreme heat. Certain populations are especially vulnerable to the cold, including the elderly, the homeless, and lower income families with heating problems.

Winter Storm Deaths
Illinois and United States

	Winter Weather		Cold Related		Total	
	IL	US	IL	US	IL	US
1995		11		22	0	33
1996	1	86	5	62	6	148
1997	10	90	8	51	18	141
1998	2	68		11	2	79
1999	2	41	1	7	3	48
2000	1	33		15	1	48
2001		18		4	0	22
Total	16	347	14	172	30	519

Source: National Weather Service.

Overall safety hazard: Moderate

Health: Winter storms bring extreme cold, due to low temperatures and loss of heat during power outages. The effect of cold on people is usually made more severe by the impact of wind chill factors. Wind chill is reported as a temperature, but is not the actual temperature. Rather it is how wind and cold feel on exposed skin. As the wind increases, heat is carried away from the body at an accelerated rate, driving down the body temperature.

Injuries Related to Cold

- 50% happen to people over 60 years old
- More than 75% happen to males
- About 20% happen at home

Extreme cold can result in people and animals suffering from frostbite and hypothermia. Frostbite is damage to tissue caused by the effects of ice crystals in frozen tissue. Extremities (hands, feet, ears, nose) with more circulation difficulties are most frequently affected.

Hypothermia is the lowering of the core body temperature. It is “clinically significant” when the body temperature is below 95°F. Severe hypothermia occurs when the body’s temperature drops below 85°F, resulting in unconsciousness. If help does not come, death follows. Great care is needed to properly rewarm even mild cases.

Overall health hazard: Moderate

2.8. Severe Storms

Severe thunderstorms are most likely to happen in the spring and summer months and during the afternoon and evening hours but can occur year-round and at all hours. Severe storms can bring four hazards:

- Flooding
- Lightning
- High winds, tornadoes and microbursts
- Hail

The National Weather Service classifies a thunderstorm as “severe” if:

- Its winds reach or exceed 58 mph,
- It produces a tornado, or
- It drops surface hail at least 0.75 inch in diameter.

The effects of flooding caused by local storms is covered under the earlier sections on drainage problems and sewer backup.

Lightning, which occurs during all thunderstorms, can strike anywhere. Generated by the buildup of charged ions in a thundercloud, the discharge of a lightning bolt interacts with the best conducting object or surface on the ground. The air in the channel of a lightning strike reaches temperatures higher than 50,000°F. The rapid heating and cooling of the air near the channel causes a shock wave which produces thunder.

Tornadoes are also discussed in a previous section. High winds include downbursts and microbursts. These are strong, concentrated, straight-line winds created by falling rain and sinking air that can reach speeds of 125 mph (200 km/h).

Microbursts are caused by a downward rush of cool descending air from a thunderstorm. The air rushing to the ground may look like a cloud. Once the air strikes the ground at a high speed, the air has to go somewhere which is usually in all directions. The horizontal spreading of this air along the ground is termed straight line winds. These winds may be 100-150 miles per hour which is as strong as an F1 or F2 tornado.

Hailstones are ice crystals that form within a low-pressure front due to warm air rising rapidly into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until, having developed sufficient weight, they fall as precipitation. The size of hailstones is a direct function of the severity and size of the storm. Significant damage does not result until the stones reach 1.5 inches in diameter, which occurs in less than half of all hailstorms. In April 1961, several six inch hail stones were reported in Kankakee.

Compared with other atmospheric hazards such as tropical cyclones and winter low pressure systems, individual thunderstorms affect relatively small geographic areas. The average thunderstorm system is approximately 15 miles in diameter (75 square miles) and typically lasts less than 30 minutes at a single location. However, weather monitoring reports indicate that coherent thunderstorm systems can travel intact for distances in excess of 600 miles.

Historical events: Generally, thunderstorms and their accompanying hazards do not warrant a disaster declaration or a lot of documentation. Storms in July 1993 caused numerous flash flood events. Three to six inches fell over portions of Cook counties on July 18-19. Some 500 residents below an earthen dam were evacuated in McHenry County after officials expressed concerns the dam might break. Fortunately the dam held.

Frequency: The Cook County area averages 60 – 70 thunderstorm events each year (*Multi Hazard Identification and Risk Assessment*, page 31). They average an hour in duration. It is estimated that only five storms each year have the hailstorms and high winds to be considered a severe thunderstorm. Assuming the average severe storm affects 100 square miles, the odds of a severe thunderstorm hitting Calumet City are 1 to 1 or 100%.

Hail has occurred 3,951 times in Illinois since 1950. Storms with hail stones greater than two inches occurred 327 times. That means that just under 1% of the thunderstorms will have hail large enough to cause property damage (*Illinois Hazard Mitigation Plan*, page III-25).

Cook County Lightning Deaths & Injuries

Year	Deaths	Injuries
1993	1	5
1994	1	1
1995	1	2
1996	2	3
1997	0	1
1998	0	0
1999	0	2
2000	0	1
2001	1	1
2002	0	1
2003	0	1
2004	0	0
Totals	6	18

Source: NCDC

Buildings: As with tornadoes, mobile homes are at a high risk to damage from thunderstorms. Wind and water damage can result when windows are broken by flying debris or hail. Lightning can cause direct damage to structures (especially those without lightning protection systems) and can cause fires that damage forests and structures.

Straight line winds will damage roofs, overturn or push mobile homes off foundations, push autos off the road and may destroy attached garages. Straight line winds are the leading cause of wind related damage. Although they do not receive as much recognition as tornado events, high winds cause more damage year-to-year than tornadoes.

Hail can inflict severe damage to roofs, windows and siding, depending on hailstone size and winds. Hail caused property damage over $73 million and crop damage over $5 million in the last 53 years in Illinois (*Illinois Hazard Mitigation Plan*, page III-25).

Windows and cars are especially vulnerable to hail damage

Source: University of Nebraska website

One study of insured losses from hail found that 75% of the dollar damage was to roofing, 12% to awnings, 6% to exterior paint, 4% to glass and 3% to siding (*Hail Loss Potential in the US*, page 2).

During the period 1994 – 2000, the insurance industry paid out $17.5 billion in claims, or an average of $2.5 billion per year. Sixty-six percent of the losses were to personal buildings, 15% to commercial buildings, and 19% to vehicles (IBHS website). Of the nation's "Top Ten" hailstorms between 1994 and 2000, number 4 was the May 18, 2000, storm in the Chicago suburbs. A total of $572 million was paid in property claims.

For this *Plan's* purposes, thunderstorms are estimated to cause $5,000 in damage to 10 buildings each year from wind, hail and lightning. This results in average annual damage of $50,000.

CALUMET CITY − Verna Zarris heard a loud bang as her phone line went dead around 5:15 p.m. Sunday. She walked outside to see a cloud of blue smoke, sparks flying and several downed wires. A lightning bolt had struck a tree in a vacant home next door, causing a large branch to fall and snap a power pole in half.

When the storm cleared around 7 p.m.. 38,410 homes in the southern suburbs were without power, according to a ComEd spokeswoman….

"I was in the house all by myself when the lights went out," Zarris said. "It was kind of frightening. I also had no air conditioning, and I'm asthmatic."…

The Times, August 8, 2000

Economic Impact: Thunderstorms can impact transportation and utilities. Airplanes have crashed when hit by downbursts or lightning. Power lines can be knocked out by lightning or knocked down by wind and debris. Lightning can also cause power surges that damage appliances, electronic equipment and computers. However, many buildings have lightning rods and back up power systems that can recover quickly.

Overall economic impact: Low

Safety: The threat to life varies by the cause of death. Between 1995 and 2000, the National Weather Service reported 20 people in Illinois were killed by flash floods, wind and lightning brought by thunderstorms (see table). Hail rarely causes loss of life.

Thunderstorm Deaths, Illinois and United States

	Lightning		Wind		Flash Flood		Total	
	IL	US	IL	US	IL	US	IL	US
1995	1	85	2	38		60	3	183
1996	2	52		23	2	94	4	169
1997	1	42		37		86	1	165
1998		44		41		118	0	203
1999	2	46		29		60	2	135
2000	0	51	1	25	3	29	4	105
2001	5	44	1	17		35	6	96
Total	11	364	4	210	5	482	20	1,056

Source: National Weather Service.

Most of these deaths can be prevented through safe practices. Much information has come out over the last 20 years about lightning safety, for example. Before 1990, an average of 89 people were killed by lightning each year. By 2000, this number had dropped to 52.

Lighting kills more people than tornadoes or hurricanes. Most lightning fatalities and injuries occur outdoors at recreation events and under or near trees. Nationwide it is estimated that 25 million cloud-to-ground lightning flashes occur each year, 1,000 people are injured, 52 are killed (*Illinois Hazard Mitigation Plan*, page III-25).

In the 10- year period from 1981 to 1990, death tolls from severe winds exceeded tornado deaths for six of these years, and the number of injuries caused by severe wind was greater in three years. (Data from *Storm Data* publication, NOAA/NWS).

Hail occurs frequently in Illinois averaging 74 times a year or 3,951 times since 1950. There have been no deaths, but 23 injuries.

Overall safety hazard: Moderate

Health: No special health problems are attributable to thunderstorms, other than the potential for tetanus and other diseases that arise from injuries and damaged property.

When lightning strikes a human being, serious burns or death are the common outcomes. For those who survive, their injuries can lead to permanent disabilities. 70% of the survivors suffer serious, long-term effects, such as memory loss, sleep disorders, depression, and fatigue.

Overall health hazard: Low

2.9. Earthquakes

Earthquakes are one of nature's most damaging hazards. Earthquakes are caused by the release of strain between or within the Earth's tectonic plates. The severity of an earthquake depends on the amount of strain, or energy, that is released released along a fault of an earthquake. The energy released by an earthquake is sent through the earth to the ground surface.

There are several common measures of earthquakes, including the Richter Scale and the Modified Mercalli Intensity (MMI) scale. The Richter Scale is a measurement of the magnitude, or the amount of energy released by an earthquake. Magnitude is measured by seismographs. The Modified Mercalli Intensity is an observed measurement of the earthquake's intensity felt at the earth's surface. The MMI varies, depending on the observer's location to the earthquake's epicenter.

An earthquake's Intensity (MMI) depends on the geologic makeup of the area and the stability of underlying soils. The effects of an earthquake can be localized near its epicenter or felt significant distances away. For example, a 6.8-magnitude earthquake in the New Madrid Fault in Missouri would have a much wider impact than a comparable event on the California Coast.

Earthquake Measurement Scales

Mercalli	Richter	Felt Intensity
I	0-4.3	Not felt except by a very few people under special conditions. Detected mostly by instruments
II		Felt by a few people, especially those on upper floors of buildings. Suspended objects may swing.
III		Felt noticeably indoors. Standing automobiles may rock slightly.
IV	4.3-4.8	Felt by many people indoors, by a few outdoors. At night, some people are awakened. Dishes, windows, and doors rattle.
V		Felt by nearly everyone. Many People are awakened. Some dishes and windows are broken. Unstable objects are overturned.
VI	4.8-6.2	Felt by everyone. Many people become frightened and run outdoors. Some heavy furniture is moved. Some plaster falls.
VII		Most people are alarmed and run outside. Damage is negligible in buildings of good construction, considerable in buildings of poor construction,
VIII	6.0-7.3	Damage is slight in specially designed structures, considerable in ordinary buildings, great in poorly built structures. Heavy furniture is overturned.
IX		Damage is considerable in specially designed buildings. Buildings shift from their foundations and partly collapse. Underground pipes are broken.
X		Some well-built wooden structures are destroyed. Most masonry structures are destroyed. The ground is badly cracked. Landslides occur on steep slopes.
XI	7.3-8.9	Few, if any, masonry structures remain standing. Rails are bent. Broad fissures appear in the ground.
XII		Virtually total destruction. Waves are seen on the ground surface. Objects are thrown in the air.

Source: *Multi-Hazard Identification and Risk Assessment*

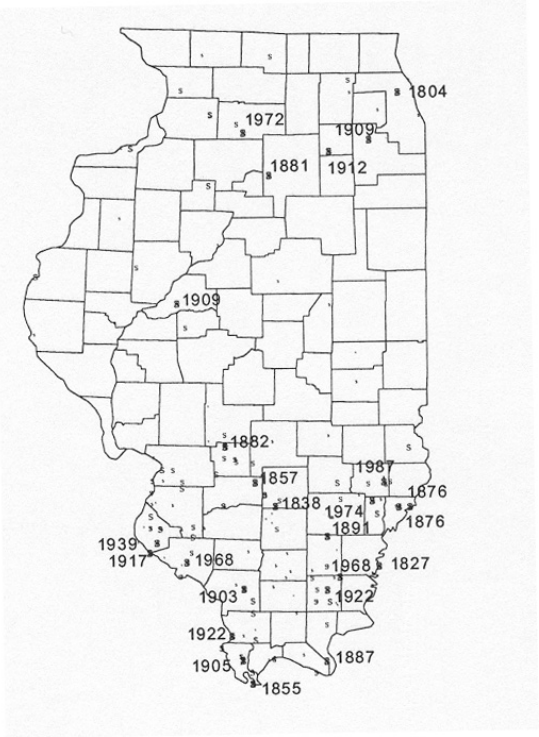
The old flat-lying, intact bedrock of the central United States behaves as good "transmitters" of the earthquake's energy, and tremors can be felt hundreds of miles away. By contrast, the young, broken up bedrock of the West Coast allows the energy to dissipate quickly, which keeps the effects of the earthquake more localized.

Earthquakes can trigger other types of ground failures which could contribute to the damage, such as landslides and liquefaction. In the last situation, shaking can mix groundwater and soil, liquefying and weakening the ground that supports buildings and severing utility lines. This is a special problem in floodplains where the water table is relatively high and the soils are more susceptible to liquefaction.

The Modified Mercalli and Richter Scales are compared in the table on the previous page, but it is important to note that the Mercalli Intensity varies based on the observer's proximity to the epicenter. Using the example of a 6.8-magnitude earthquake event at the New Madrid Fault, the Intensity in St. Louis may be "IX", but in Calumet City the Intensity may be observed as a "VI."

Historical events: In the United States, the most frequent reports of earthquakes come from the West coast, but the largest earthquakes in the ower 48 states occurred in Missouri in 1811 and 1812 along the New Madrid Faults. The Great New Madrid Earthquakes are the benchmarks from which all earthquakes in the Midwest are measured. An important fact is that the earthquakes of 1811 and 1812 were not single events. Rather the earthquakes were a series of over 2,000 shocks in five months.

Six of these quakes were larger than a magnitude of 7 on the Richter Scale and two were near magnitude 8. They totally destroyed the town of New Madrid and caused the land to roll in visible waves. They raised and sank land as much as 20 feet. The tremors of these earthquakes were no doubt felt throughout all of Illinois, since the quakes are said to have rung church bells in New England.



Earthquakes in Illinois 1800 – 2000

Source: Illinois Natural Hazard Mitigation Plan

Earthquakes have occurred throughout Illinois. There was a report of a quake at Fort Dearborn (Chicago) in August 1804. The US Geological Survey website, "Earthquake History of Illinois" provides this account of one of the largest:

> Among the largest earthquakes occurring in Illinois was the May 26, 1909, shock which knocked over many chimneys at Aurora. It was felt over 500,000 square miles and strongly felt in Iowa and Wisconsin. Buildings swayed in Chicago where there was fear that the walls would collapse. Beds moved on their casters…. [G]as line connections broke at Aurora. [The magnitude of this event is estimated at 5.1 and had a reported Intensity of VII.]

Frequency: About 200 earthquakes happen each year in the New Madrid seismic zone, but most are too small to be felt by people. The larger earthquakes felt in Illinois over the last 20 years are listed in the table to the right. None of these caused much damage in the affected areas.

Recent Earthquakes Felt in Illinois

Richter	Date	Epicenter
5.0	June 10, 1987	Near Lawrenceville IL
4.5	Sep. 28, 1989	15 miles south of Cairo, IL
4.7	Apr. 27, 1989	15 miles SW of Caruthersville, MO
4.6	Sep. 26, 1990	10 miles south of Cape Girardeau, MO
4.6	May 3, 1991	10 miles west of New Madrid, MO
4.2	Feb. 5, 1994	Lick Creek-Goreville Area
4.5	June 28, 2004	Ottawa

Source: Illinois Hazard Mitigation Plan

The most significant earthquake to affect Calumet City in the last century was the May 26, 1909 quake described on the previous page. The table to the right shows earthquakes that have been felt in Calumet City have been over the last 25 years. Note how they are all at or below 4.2 on the Richter scale.

Recent Earthquakes Felt in Calumet City

Richter	Date	Distance from CC
4.0	Sept. 15, 1972	95 miles
3.0	Sept. 9, 1985	30 miles
3.5	Dec. 17, 1990	115 miles
3.5	Sept. 2, 1999	100 miles
4.2	June 28, 2004	80 miles

Source: USGS Earthquake Data Base

According to the Central U.S. Earthquake Consortium, Calumet City is in an earthquake Intensity zone of VI (MMI Scale) for a 7.6-magnitude earthquake along the New Madrid Seismic Zone. There is a 19% – 29% chance that Calumet City will be hit with an earthquake with a MMI of VI over the next 35 years. As noted in the table on page 2-32, this level of quake would be felt by everyone, but would cause minor structural damage.

It is important to note that the level of damage is dependent on the location of the earthquake. The location of historical earthquakes in northeastern Illinois and the rest of the state, shows that earthquakes may be much closer to Calumet City than ones associated with the New Madrid Seismic Zone. A smaller earthquake event closer to Calumet City may cause as much damage as a large event in the New Madrid Seismic Zone. On the whole, the probability of a damaging quake hitting Calumet City in any given year is considered at 1% or less.

Building damage: Generally, wood frame buildings and structures on solid ground fare best during an earthquake. Wood frame buildings are flexible enough to withstand some ground shaking and swaying. Evaluations of recent earthquakes found that a greater amount of damage was primarily caused by or attributed to:

- Unreinforced masonry structures
- Buildings without foundation ties
- Older buildings with some degree of deterioration
- Multi-story structures with open or “soft” first floors

Most building codes have standards that related to the first two concerns. This means that the most threatened buildings are older masonry ones (built before current codes) and taller ones with open first floors.

In addition to the building type, damage is related to the underlying soils. Buildings on stiff soils fare better than those on loose or sandy soils which will amplify earthquake shaking. These soils can be found in floodplains. If there is enough water present, the shaking can liquefy the underlying soils, which removes the support under the foundation, causing the building to settle and sometimes settle unevenly.

Given the relatively low threat of a quake at a MMI scale of VII or greater, the threat to buildings in Calumet City would be limited to large, older, unreinforced masonry structures. It is estimated that this low level earthquake would cause $100,000 in damage to these buildings.

The most likely type of earthquake damage in Calumet City would be to masonry buildings and structural overhangs.

Source: FEMA

Economic Impact: As with tornadoes, the major impact of an earthquake on the local economy is damage to businesses and infrastructure. Given the relatively minor amount of damage expected, the overall economic impact is considered: Low.

Safety: "Trauma caused by partial or complete collapse of human-made structures is the overwhelming cause of death and injury in most earthquakes." (*The Public Health Consequences of Disasters, pages 18 – 19.*) Approximately 1,600 people have been killed by earthquakes in the US since colonial times, 1,000 of them were in California and 700 of those were in the 1906 San Francisco quake.

Because the greatest potential for loss of life is to people within a collapsing building or outside where one may be struck by part of a falling wall or chimney, the threat to Calumet City residents is directly related to the condition of the buildings. Other life safety threats include collapsing roads and bridges, fires from ruptured gas lines, and release of hazardous chemicals from broken storage tanks or trucks.

Overall safety hazard: High

Health: The main health concerns from earthquakes arise from sheltering people and caring for injuries. These would be the same as for other quick and destructive hazards, such as tornadoes.

Overall health hazard: Low

2.10. Extreme Heat

Extreme heat for a region is temperatures that hover 10 degrees or more above the average high temperature for several weeks. The human body is very capable of handling extreme temperatures; however, when high humidity accompanies these conditions, it is often too much for the body to handle. The combination of heat and humidity is measured as the heat index

Heat Index/Heat Disorders	
Heat Index	**Possible Heat Disorders (for people in higher risk groups)**
130º or higher	Heat stroke/sun stroke, highly likely with continued exposure
106º - 130º	Sun stroke/heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
90 º -108º	Sun stroke, heat cramps and heat exhaustion possible with prolonged exposure and/or physical activity
80 º - 90º	Fatigue possible with prolonged exposure and/or physical activity
	Source: Heat Wave

Drought often accompanies extended periods of extreme heat. Drought is a period of scarce water supplies and primarily affects agriculture. As Calumet City has an ample supply of Lake Michigan water, drought is not considered a hazard to the City and is not discussed.

Historical events: The most recent example of extreme heat was the summer of 1995. The combination of record or near record high temperatures and high dew point temperatures led to heat indices routinely above the 120 degree mark July 12 − 17. The heat index peaked at 125 degrees on July 14 when the air temperature was 98 degrees and the dew point was 83 degrees. Scattered power outages compounded the problem when Commonwealth Edison and other electric utilities could not keep up with the record demand.

Of the 583 fatalities associated with the 1995 Illinois heat waves, 75 death certificates listed heat as the primary cause, and 508 as the secondary cause. In a sampling of 134 of the heat victims, 61% were over the age of 65, but only 2 of the 134 fatalities (1.5%) were toddlers. 504 of the deaths were in Chicago.

At the time there was a perception that the numbers were inflated, later studies indicated the opposite was true and the heat victims were significantly undercounted. Local officials believed that many of the elderly were scared to come out of their apartments because of high amounts of crime in their neighborhoods. Many were found in their rooms with air temperatures in excess of 120 degrees.

In 1999, Cook County experienced another heat wave that closely matched the 1995 event, but the death toll was greatly reduced. A paper written by the State Water Survey, attributes much of the reduction in deaths to mitigation efforts, such as

> CALUMET CITY − At 9 p.m. Thursday ComEd spokeswoman Kellie Szabo said about 34,000 customers in the south suburbs were still without power. She said some may not have their power restored until today.
>
> Meanwhile, Calumet City Police Chief Pat O'Meara said the city's cooling centers were open to assist residents waiting for their power to be restored.
>
> The cooling centers are located at the Calumet City Public Library, 600 Manistee Ave., and the Calumet City Police Department, 1200 Pulaski Road. Both will remain open until power is restored or until temperatures drop.
>
> Officials urged residents to check on friends, relatives and neighbors − particularly the elderly − during the hot weather.
>
> *The Times*, July 23, 2004

education by the news media and monitoring procedures for the urban elderly. (*Illinois Natural Hazard Mitigation Plan*, page III-66)

Frequency: **"**The time we have until the next heat wave is unknown, but all of the major reports on global warming indicate that an increase in severe heat waves is likely." (*Illinois Natural Hazard Mitigation Plan*, page III-66) As evidenced in the table to the right, there have been cases in eight of the last nine years when extreme heat has killed people in Cook County. Therefore the odds of it occurring in any future year are 0.88.

Deaths Caused by Extreme Heat in Cook County

Year	Deaths
1995	622
1996	7
1997	22
1998	15
1999	21
2000	0
2001	35
2002	40
2003	3

Source: NCDC

Building damage: There is little or no damage to structures caused by high temperatures or humidity.

Economic impact: During a period of extreme heat, there will be a higher demand for water and electricity. Both of these can be supplied in Calumet City with no economic disruption. There may be buckling of street pavements, but these can be fixed relatively quickly.

Overall economic impact: Low

Safety: Heat kills by pushing the human body beyond its limits. Normally the body's internal thermostat produces perspiration that evaporates to cool and regulate the body's temperature to 98.6 degrees. Sweating does nothing to cool the body unless the water is removed by evaporation. High humidity retards this process. Because the body has been robbed of its ability to cool itself, the body must work much harder to maintain a normal temperature in extreme heat and high humidity. A sunburn will slow the skin's ability to release excess heat.

Heat waves kill more people in the United States than all other natural disasters combined (New York Times, August 13, 2002). The article goes on to state that a University of Delaware study indicated that 1,500 American city dwellers die each year because of heat compared with 200 from tornadoes, earthquakes and floods combined. The table above lists deaths caused by heat in Cook County.

Overall safety hazard: High

Health: Young children, the elderly, those who are sick, overweight or have alcohol problems and men in general (because they sweat more and become more quickly dehydrated) are more susceptible to extreme heat. Usually the victims have been overexposed to heat or have over-exercised for their age and physical condition. Stagnant atmospheric (humid and muggy) conditions and poor air quality can induce heat-related illnesses.

In addition to air quality, concrete and asphalt store heat longer and gradually release the heat at night which produces higher nighttime temperatures. Therefore, people living in urban areas, such as Calumet City, may be at a greater risk than people in rural regions.

Overall health hazard: Moderate

2.11. Critical Facilities

When dealing with natural disasters, some development is more important than others. “Critical facilities” are buildings and infrastructure whose exposure or damage can affect the well being of a large group. For example, the impact of a flood or tornado on a hospital is greater than on a home or most businesses.

Generally, critical facilities fall into two categories:

- Buildings or locations vital to public safety and the disaster response and recovery effort, such as police and fire stations and telephone exchanges, and
- Buildings or locations that, if damaged, would create secondary disasters. Examples of such buildings or locations are hazardous materials facilities and nursing homes.

This planning effort identified 34 critical facilities in five general categories, as listed on the next page. Schools are included because they house an especially vulnerable segment of society and they served as shelters following a disaster.

The City’s Police Department office is considered a critical facility

These facilities are equally exposed to all the hazards, except flooding. In addition to the pump stations and bridges, the following are located in the 100-year floodplain shown on page 2-3:

- Center for Academics and Technology
- Schrum Memorial School
- Our Lady of Knock School

The Lincoln and Green Bay sewer pump stations are on the Little Calumet River and are actually protected to the 100-year flood level. The State Street Pump station, located at State and Burnham in the north of the City is not in the floodplain, but is vital for draining the north part of the City during heavy rains.

All four road bridges across the Little Cal would be under water during the 100-year flood. Streets are flooded at many locations, so if the bridges themselves are not under water, their access may be blocked.

While these locations are critical to traffic flows, early warning can result in barricades and traffic control that minimize the actual danger to people and property. On the other hand, blocked streets can prevent access to properties by emergency vehicles, increasing the threat to flooded and isolated properties.

Critical Facilities in Calumet City	
Public Safety	
Calumet City Civil Defense	204 Pulaski Road
Calumet City Fire Department	684 Wentworth Ave
Calumet City Fire Station 2	Marquette & Pulaski
Calumet City Police Department	1200 Pulaski Rd
Hazardous Materials	
Plastics Color Corporation of IL	14201 Paxton Street
Ashland Specialty Chemical Company	142nd Street and Paxton Avenue
Special Populations	
Calumet City Terrace	1380 River Drive
Garden House Senior Center	1350 and 1360 Ring Road
Victory Center	1370 and 1380 Ring Road
Schools	
Beacon Hill Academy	548 Price Street
Caroline Sibley Elementary School	1550 Sibley Blvd
Caroline Sibley Primary School	1550 Sibley Blvd
Center for Academics and Technology	1605 Wentworth Avenue
Christ the Savior School	331 155th Place
Dirksen Middle School	1650 Pulaski Road
Early Learning Center	520 Sibley Blvd
Hoover Elementary School	1259 Superior Avenue
Hoover West Elementary School	1260 Superior Avenue
Kiddy Konnection TLC School Age	668 River Oaks Drive
Lincoln Elementary School	410 157th Street
Our Lade of Knock School	497 163rd Street
Schrum Memorial School	485 165th Street
Thornton Fractional North High School	755 Pulaski Road
Wentworth Intermediate School	530 Superior Avenue
Wentworth Junior High School	560 Superior Avenue
Wilson Elementary School	560 Wentworth Avenue
Infrastructure Affected by Flooding	
Lincoln Pump Station	Lincoln Ave and the River
Green Bay Pump Station	Green Bay Ave and the River
State Street Pump Station	State Street and Burnham Ave
159th Street bridge	159th Street and the River
Torrence Avenue Bridge	Torrence Avenue and the River
Burnham Avenue Bridge	Burnham Avenue and the River
Wentworth Avenue Bridge	Wentworth Avenue and the River

2.12. Summary Tables

This chapter provides information on how natural hazards affect Calumet City in terms of property damage and the threat to people. Property damage is measured in dollars and a subjective measure of the impact on the economy. The threat to people is stated in terms of the safety and health hazards.

It should be noted that the severity of these impacts need to be tempered with their likelihood of occurrence. The odds of an occurrence in any given year can be found in the "Frequency" sections under each hazard.

Property damage: The table below displays the impacts of the hazards on buildings. The property damage figures are multiplied times the annual chance of occurrence to produce a dollar figure for the estimated average annual damage to buildings from that hazard.

Overall Property Damage			
Hazard	**Property Damage Single Occurrence**	**Frequency**	**Average Annual Damage**
100-year flood	$45,000,000	0.010	$450,000
Local drainage	$25,000	1.000	$25,000
Sewer backup	$450,000	0.200	$90,000
Tornadoes	$10,000,000	0.008	$80,000
Winter storms	$10,000	1.000	$10,000
Severe storms	$50,000	1.000	$50,000
Earthquake	$100,000	0.010	$1,000
Extreme heat	$0	0.880	$0
Total			$706,000

Economic impact: In the following table, the subjective measures for overall economic impact of "low," "moderate," and "high" are converted to numerical values of 10, 50 and 100. These are multiplied times the annual chance of occurrence to produce a number that represents the relative impact of that hazard on the City's businesses, transportation and tax base.

Overall Economic Impact				
Hazard	**Overall Impact**		**Frequency**	**Economic Score**
100-year flood	High	100	0.010	1.00
Local drainage	Low	10	1.000	10.00
Sewer backup	Low	10	0.200	2.00
Tornadoes	High	100	0.008	0.80
Winter storms	Low	10	1.000	10.00
Severe storms	Low	10	1.000	10.00
Earthquake	Low	10	0.010	0.10
Extreme heat	Low	10	0.880	8.80

Impact on safety and health: In the following table, the subjective measures for overall safety and health impacts of "low," "moderate," and "high" are converted to numerical values of 10, 50 and 100. These are multiplied times the annual chance of occurrence to produce a number that represents the relative impact of that hazard on people.

Overall Safety and Health Impact									
Hazard	Safety				Health				Combined Score
	Impact		Frequency	Score	Impact		Frequency	Score	
100-year flood	Mod	50	0.010	0.5	Mod	50	0.010	0.5	1.00
Local drainage	Low	10	1.000	10.0	Low	10	1.000	10.0	20.00
Sewer backup	Low	10	0.200	2.0	Mod	50	0.200	10.0	12.00
Tornadoes	High	100	0.008	0.8	Low	10	0.008	0.1	0.88
Winter storms	Mod	50	1.000	50.0	Mod	50	1.000	50.0	100.00
Severe storms	Mod	50	1.000	50.0	Low	10	1.000	10.0	60.00
Earthquake	High	100	0.010	1.0	Low	10	0.010	0.1	1.10
Extreme heat	High	100	0.880	88.0	Mod	50	0.880	44.0	132.00

2.13. Conclusions

1. Of the eight natural hazards faced by Calumet City, the 100-year flood has the potential to cause the greatest amount of property damage over time. Earthquakes and extreme heat pose little threat to structures.

2. The 100-year flood and tornadoes have the greatest economic impact from a single occurrence. However, over the long run, local drainage problems, winter storms, severe storms, and extreme heat are more economically disruptive.

3. Extreme heat poses the greatest threat to life and health in an average year. Winter storms are the second greatest threat.

4. While less frequent, the impact of overbank flooding from the Little Calumet River in the southern portion of the City can have a much greater impact on property and the economy of Calumet City. Although much of the floodplain is protected by a levee, it would be overtopped by a 100-year flood and would cause over $45 million in direct property damage.

5. People have died during area floods and other natural disasters. All of the hazards have short and long-term impacts on health and mental health. A mitigation program should address safety, health and mental health aspects in addition to protecting buildings, streets, and public facilities.

6. Except for overbank flooding and sewer backup, the City's exposure to these hazards has not been reduced. A mitigation program should include measures to protect new construction from increased damage expected from disasters.

2.14. References

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Chapter 3. Goals

3.1. 1999 Plan Goals

In 1999, the Floodplain Management Planning Committee adopted four general goals for Calumet City's flood problems and floodprone areas. They are listed in the Committee's priority order. Each goal had three to five objectives that specified how the goal should be reached.

Goal 1: New development will be protected from flooding. The top priority of the Committee was to keep flooding, drainage and sewer problems from getting worse. Damage-prone development should not be allowed in the most hazardous areas and protection measures should be incorporated into new developments elsewhere.

Goal 2: Existing buildings will be protected from sewer backup and smaller, more frequent flooding. By the year 2013, the Thornton Quarry will protect all but a small portion of the Little Calumet River's 100-year floodplain. In the meantime, it makes sense to address smaller flooding along the Little Calumet River with cost-effective approaches and the local drainage and sewer problems throughout the City.

Goal 3: All residents and businesses will be knowledgeable about the flood hazards they face and the ways they can protect themselves and their properties from those hazards. The City cannot afford to stop all flooding. There will always be problems, even after the major efforts expected over the next several years. Therefore, it is important for individuals and property owners to know what they can do for themselves.

Goal 4: Riverfront open space, wetlands and natural areas will be protected for the public to enjoy. These areas need to be preserved and protected as alternatives to damage-prone residential and commercial development and as community assets that improve recreation and the quality of life in Calumet City.

3.2. Goal Setting Exercise

On February 3, 2005, the Planning Committee conducted an exercise to outline its goals for this multi-hazard mitigation plan. Each member was given the handout that appears on the next page, asking "What would you most like to see in Calumet City's future?"

Planning Committee goals exercise

Committee members wrote down their top five choices on a Post-it card. Each member then posted them on the wall and explained their choices. The cards were then organized by similar topics.
The resulting desires are listed in alphabetical order:

- Better control of development, more open spaces, less traffic congestion
- Economic improvement

Goals Exercise 1.

What would you most like to see in Calumet City's future?

Here are possible answers to this question, listed in alphabetical order. They are just food for thought. Pick the five that you think are most important. You may reword them or add new ones if you want.

You have five cards. Use one card for each of your top five answers.

- Educated children
- Improved air quality
- Improved water quality
- Less new development
- Less traffic congestion
- Improved/more businesses
- Improved/more cultural facilities
- Improved/more housing
- Improved/more public transportation
- Improved/more job opportunities
- Improved/more knowledgeable residents
- Improved/more open space
- Improved/more recreation facilities
- Improved/more shopping
- New development confined to areas already developed
- Preserved historical/cultural sites
- Special attention given to elderly/disabled
- Special attention given to lower income areas
- Special attention given to minority neighborhoods
- Special attention given to newer shopping areas
- Special attention given to older business areas
- Younger people staying/moving into the area
- Other: _____
- Other: _____
- Other: _____

Goals Exercise 2.

What should be the goals of our mitigation program?

Here are possible answers to this question, listed in alphabetical order. They are just food for thought. Pick the five that you think are most important. You may reword them or add new ones if you want.

You have five cards. Use one card for each of your top five answers.

- Help people protect themselves
- Make sure future development doesn't make things worse
- Maximize the share paid by benefiting property owners
- Maximize use of state and federal funds
- Minimize property owners' expenditures
- Minimize public expenditures
- New developments should pay the full cost of protection measures
- Protect businesses from damage
- Protect cars and other vehicles
- Protect centers of employment
- Protect critical facilities
- Protect forests
- Protect homes
- Protect new/future buildings
- Protect people's lives
- Protect power stations and power lines
- Protect public health
- Protect public services (fire, police, etc.)
- Protect repetitively flooded areas
- Protect scenic areas, greenways, etc.
- Protect schools
- Protect shopping areas
- Protect streets
- Protect utilities (power, phone, water, sewer, etc.)
- Protect wetlands/environmentally sensitive areas
- Protect a particular area: _____
- Protect a particular property: _____
- Protect a particular property: _____
- Restrict development in hazardous areas
- Use public/private partnerships
- Other: _____
- Other: _____

- Housing improvement
- Improved water and air quality, less traffic congestion
- More knowledgeable residents and children
- Special attention to the elderly, disabled, and lower income areas
- Special attention to younger people

There was a good amount of consistency in the members' topics. The handout has 22 possible statements, but the members' nominations included fewer than half of them. Several of them were not listed in the handout.

A second exercise was then conducted. Each member was given the handout that appears on page 3-3, asking "What should be the goals of our mitigation program?" Again, Committee members wrote down their top five choices on a Post-it card. Each member then posted them on the wall and explained their choices. The cards were then organized by similar topics. The resulting goals are listed in alphabetical order:

- Make sure development does not make things worse
- Maximize the use of State and Federal funds
- Protect forests, open spaces and wetlands
- Protect homes
- Protect lives and public health
- Protect public services, critical facilities and utilities
- Protect repetitively flooded areas
- Protect schools

The exercise revealed important information to guide the planning effort, both in what was selected from the handout and what was not selected from the handout. For example, members stressed protecting lives, homes, and public services, even though improving the economy was an important part of their vision for the future.

3.3. Goals

Based on the 1999 floodplain management plan's goals and the 2005 goal setting exercise, the following goals statements were adopted by the Planning Committee:

1. Protect the people of Calumet City, their homes and their health, from the dangers of natural hazards.

2. Place a priority on protecting public services, including critical facilities, utilities and schools.

3. Inform residents and businesses about the hazards they face and the ways they can protect themselves and their properties from those hazards.

4. Protect open space, wetlands and natural areas for the public to enjoy and to prevent inappropriate development in hazardous areas.

Chapter 4. Preventive Measures

Preventive measures, in the form of planning and regulations, focus on the future. These measures are designed to keep the problem from getting worse by ensuring that future development does not increase flood damage. Eight types of preventive measures were reviewed:

4.1 Planning and zoning
4.2 Open space preservation
4.3 Subdivision regulations
4.4 Building code
4.5 Mobile home regulations
4.6 Floodplain regulations
4.7 Stormwater management
4.8 Development incentives

One measure of the effectiveness of these activities is their scoring under the Community Rating System (CRS). While the CRS score may not account for special local conditions, it does provide a good measuring stick to compare local programs with national models. The section numbers in the CRS parts of this chapter refer to the 2002 edition of the *CRS Coordinator's Manual*.

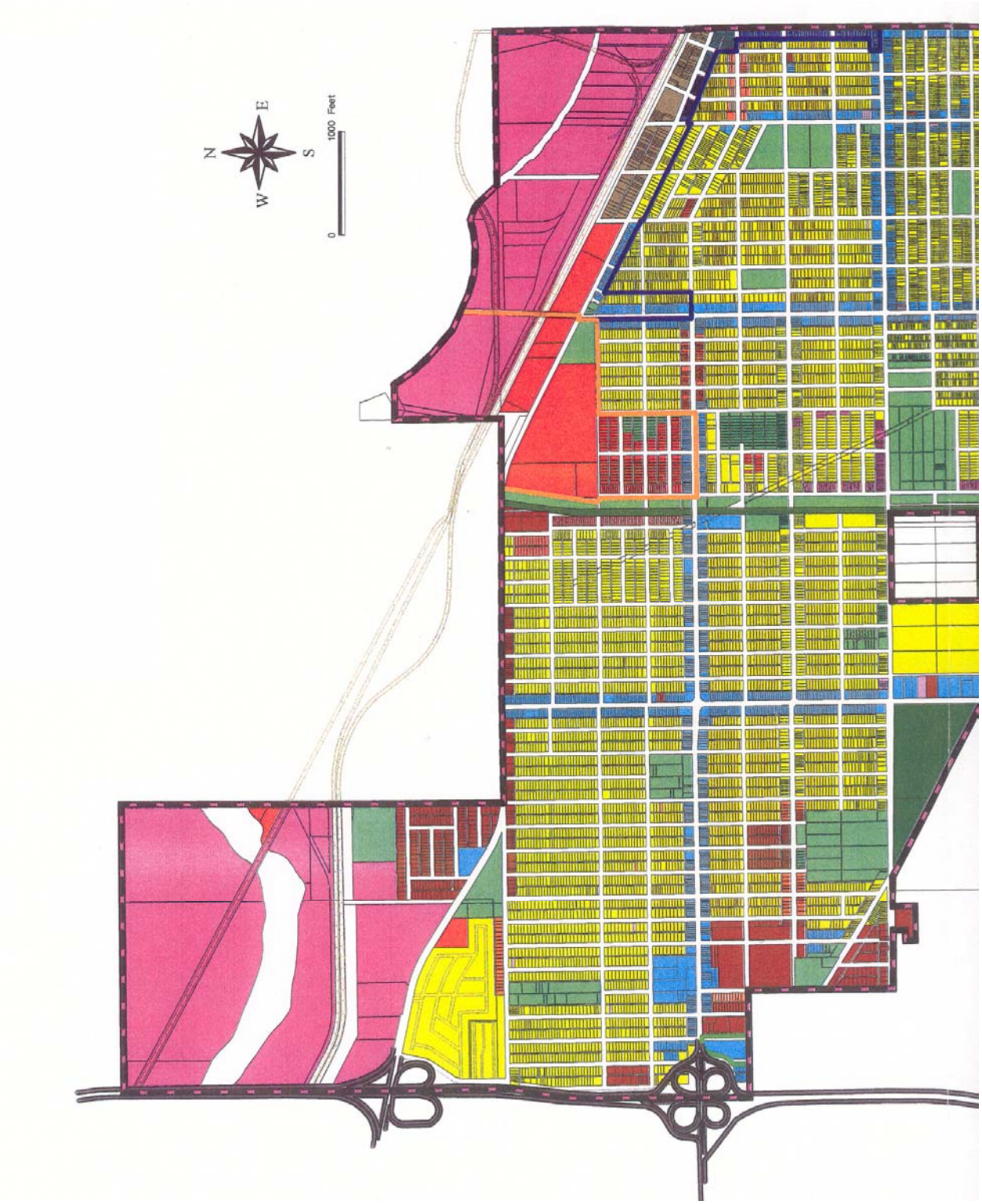
4.1. Planning and Zoning

General: Advance planning can match the land's use with the land's hazards, typically by reserving flood hazard areas for open space, parking lots, backyards, or similar activities with a low potential for damage from flooding. A land use plan proposes appropriate uses. However, it is a plan, i.e., a guide for what the community would like to see. Authority to implement a plan is found in the zoning ordinance, capital improvements program and subdivision ordinance.

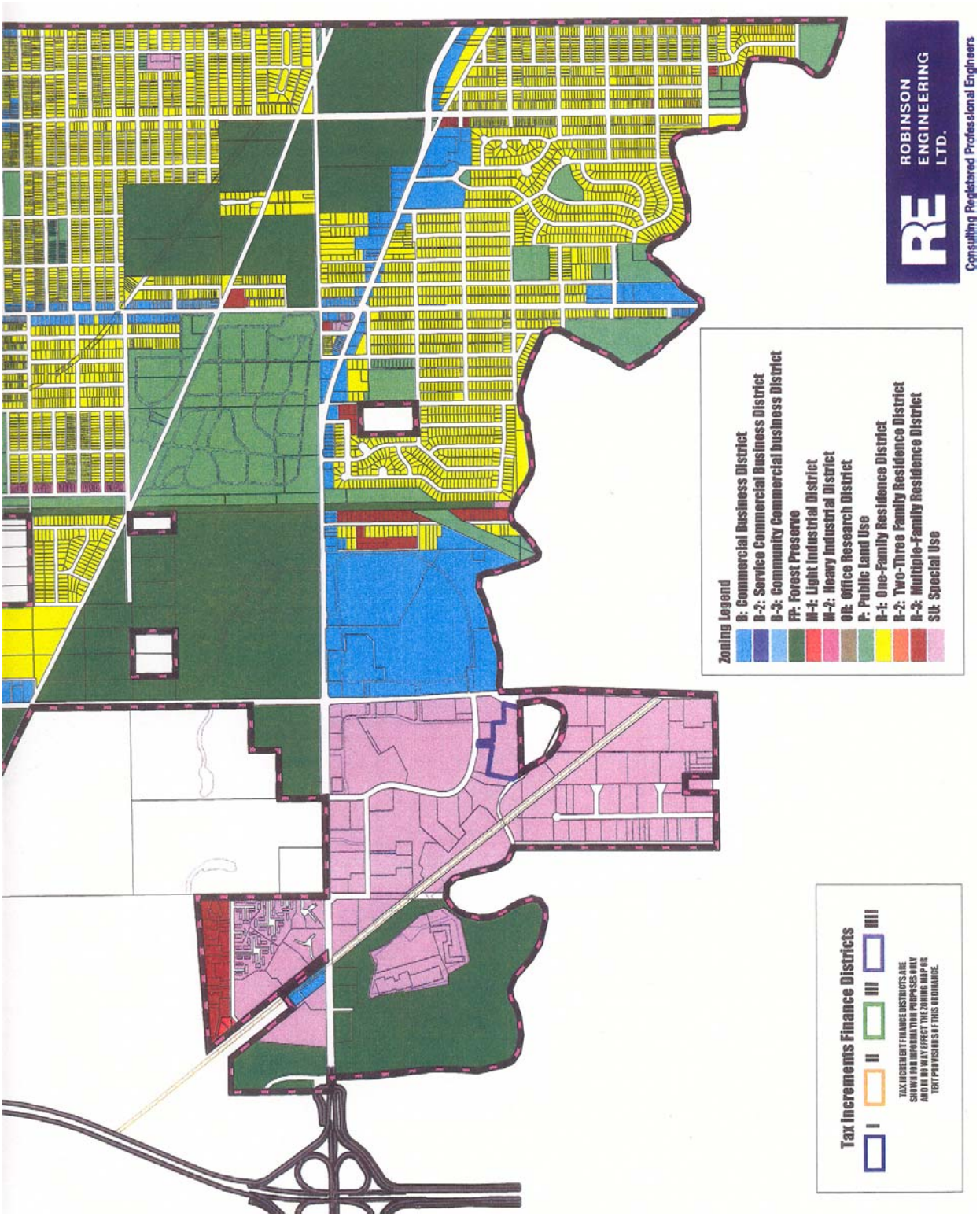
A zoning ordinance regulates development by dividing the community into zoning districts and setting development criteria for each district. Appropriate zoning districts for a floodplain include public use, conservation, agriculture, and low-density residential development. Public use and conservation generally require public ownership of the land to avoid a legal challenge that the restrictions are so severe they amount to a "taking" of the land.

A capital improvements program identifies where major public expenditures will be made over the next 5-20 years. These include acquisition of land for public uses, such as parkland, and extension of roads and utilities. If the long-range plan calls for preserving the floodplain as open space, then the capital improvements program should support the plan by acquiring floodprone areas for park and by not improving or extending roads into the floodplain.

Calumet City's Planning and Zoning: Calumet City's comprehensive plan was adopted in 1980. It sets the stage for the zoning districts, which are shown on the next page. The City's Zoning Ordinance was adopted in 1983 and has been amended since then, mostly by rezoning properties. It is the zoning districts, shown on the next page, that have the regulatory authority to limit development in hazardous areas. In the Little Calumet River floodplain along the southern boundary of the City, the zoning districts match the current land uses. Residential, commercial and publicly owned areas are zoned for residential, commercial and public land uses.



Calumet City Zoning Districts (North)



Calumet City Zoning Districts (South)

Because it guides new development, a zoning ordinance mostly has an impact on vacant areas, not areas already developed. The only undeveloped areas, along Huntington Avenue and in the southern part of River Oaks West, are zoned "Special Use." This is a designation that allows a lot of flexibility. Each development project is approved by the City Council. The two northern floodplains of the City are zoned for industrial and manufacturing use.

There is another open area in the Little Calumet River floodplain. This is an unincorporated area west of the Sand Ridge Forest Preserve (not zoned, because it is outside the city limits). There are some single family homes but the area has the potential for more intensive development.

The Zoning Ordinance can also affect non-flood hazards. For example, it requires underground utilities in nonresidential districts. This can be a very effective way to mitigate the impacts of high winds and ice storms.

CRS Credit: The CRS does not credit a comprehensive plan, zoning ordinance, or capital improvements program. It does credit the products of those tools, such as the amount of open space in the floodplain and capital improvements that address flooding or drainage projects.

The CRS credits low density zoning (Section 430LD). Calumet City's current zoning ordinance would receive no credit. It could if the City rezoned currently vacant floodplains for low density use (e.g., only allowing one building per five acres). Given the relatively small amounts of vacant privately owned floodplain remaining, this approach would provide a minimal CRS score.

4.2. Open Space Preservation

General: Preserving open space in hazardous areas has two benefits: it prevents building of structures which may be damaged and it provides attractive sites for parks and recreation. While this can be expensive, there are sources of financial assistance for park acquisition or development. Many communities have been successful in getting owners to donate land for tax purposes or to ensure it is kept open for future generations to enjoy.

As an alternative to public ownership, an easement can be purchased. With an easement, the owner is able to develop and use his or her private property but is paid to not build on the floodprone part or the part set aside in the easement. In some cases, the owner is allowed to develop the area for low hazard uses or to transfer the right to develop other flood-free parcels (known as "TDR" or transfer of development rights).

Easements do not always have to be purchased. Flood flow, drainage, or maintenance easements can be required of developers as a condition of approval of the development. These are usually linear parcels along property lines or streams. Maintenance easements can also be negotiated with riverside property owners in return for a community channel maintenance program.

Veteran's Park is an excellent example of recreational open space in the floodplain

Calumet City's Open Space: As shown on the maps on pages 2-2, 2-3, and 6-3, some of the City's floodplains and wetlands are in publicly owned open space. These parcels represent 18% of the total floodplain. Preserving more acreage, especially to provide waterfront greenways and trails, has support from both residents and regional plans. The Little Cal is identified in both the *Northeastern Illinois Regional Greenways Plan* and the *Regional Water Trails Plan* as important connection between trails in Indiana and Chicago.

CRS Credit: Calumet City is receiving a score of 138 out of a total possible of 725 points (Section 421.a). The score is based on the percentage of floodplain preserved as open space. (The only way to obtain the maximum score is to preserve the entire floodplain as open space).

The City's score is respectable and is higher than 66% of all the CRS communities in the country. It could be increased if the floodprone portions of vacant lands currently in private ownership were preserved as open space, through acquisition, incentives or restrictive regulatory standards.

Calumet City's CRS open space score could be increased if there were deed restrictions mandating open space preservation in perpetuity (Section 421.b) and if floodplain open space areas were documented as being preserved in their natural state (Section 421.c).

4.3. Subdivision Regulations

General: A subdivision ordinance comes into effect after the zoning ordinance has identified where various land uses are appropriate. If the zoning for a site allows buildings, these regulations set protection standards for the streets, utility lines, and other infrastructure.

Subdivision regulations govern the development of large vacant areas that the developer intends to subdivide into individual lots. They set the construction and location standards for the infrastructure provided by the developer, including the roads, sidewalks, utility lines, storm sewers and drainageways.

A subdivision ordinance can set drainage standards and require streets to be elevated above flood levels.

Subdivision regulations often require that every lot have a buildable area that is entirely above the flood level. If they don't, the building code or a separate floodplain ordinance should provide flood protection standards for building construction. These should include criteria to ensure that the foundation will withstand flood forces and that all damageable portions of the building are above or protected from floodwaters.

Calumet City's Regulations: Because the City is substantially "landlocked," there are few opportunities for new subdivisions of land and this approach can work. The one exception to this is the unincorporated area to the west of the Sand Ridge Forest Preserve.

The City's subdivision regulations are in Appendix A to the Municipal Code. These were adopted in 1960 and have not changed much since then. Appendix A lists infrastructure and utility requirements, but does not specify construction standards. The zoning ordinance has a provision for planned developments, which can set standards for infrastructure for larger development projects.

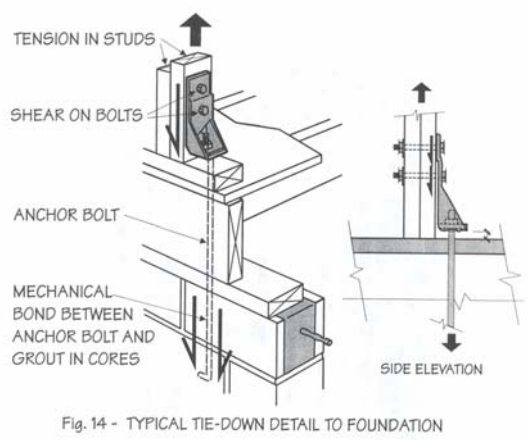
CRS Credit: CRS credit for regulations that set standards for streets, utilities and other infrastructure are covered in the section on floodplain regulations.

4.4. Building Code

Building codes provide one of the best methods of addressing all the hazards in this plan. They are the prime measure to protect new property from damage by earthquakes, tornadoes, high winds, and snow storms. When properly designed and constructed according to code, the average building can withstand the impacts of most of these forces.

Hazard protection standards for all new and improved or repaired buildings can be incorporated into the local building code. Provisions that should be included are:

- Making sure roofing systems will handle high winds and expected snow loads,
- Providing special standards for tying the roof, walls and foundation together to resist the effects of wind (see illustration) and shaking caused by earthquakes,
- Including insulation standards that ensure protection from extreme heat and cold as well as energy efficiency,
- Regulating overhanging masonry elements that can fall during an earthquake,
- Ensuring that foundations are strong enough for earth movement and that all structural elements are properly connected to the foundation, and
- Mandating overhead sewers for all new basements to prevent sewer backup.



Both builders and inspectors need to know the details of proper anchoring to protect new buildings from high winds.

Source: *Windstorm Mitigation Manual for Light Frame Construction*, page 95.

Most communities in Illinois with building codes adopted the National Building Code of the Building Officials and Code Administrators (BOCA) and/or the One and Two Family Dwelling Unit Code published by the Council of American Building Officials (CABO). These standard building codes provide the basis for good building safety programs, especially protection from fire and electrical hazards.

However, the BOCA and CABO codes are not "state of the art" when it comes to addressing natural hazards. They are being replaced by the new International Code series, which is highly recommended by FEMA because it has so many provisions for protection against the forces of natural hazards.

Just as important as the code standards is the enforcement of the code. There were many reports of buildings that lost their roofs during Hurricane Andrew because sloppy construction practices did not put enough nails in them and some nails missed penetrating roof rafters. Adequate inspections are needed during the course of construction to ensure that the builder understands the requirements and is following them. Making sure a structure is properly anchored requires site inspections at each step.

There is a national program that measures local building code natural hazard protection standards and code administration. The Building Code Effectiveness Grading Schedule (BCEGS) is used by the insurance industry to determine how well new construction is protected from wind, earthquake and other non-flood hazards. It is similar to the 15-year old Community Rating System and the century-old fire insurance rating scheme: building permit programs are reviewed and scored, a class 1 community is the best, and a class 10 community has little or no program.

Calumet City's Regulations: The City's Building Code Effectiveness Grading Schedule classification is a Class 5. BCEGS provides up to 100 points under three general activities, as shown below.

Calumet City's BCEGS Scores			
Code Activity	**Score**	**Max**	**Percentage**
Administration of codes			
Adopted code and zoning provisions	16.00	16.0	100%
Staff training/certification/education/experience	11.92	33.5	36%
Administration and enforcement policies/procedures	2.85	4.5	63%
Plan review			
Staff level and experience	6.42	10.5	61%
Procedures	12.0	12.5	96%
Field inspection			
Staff level and experience	11.94	12.0	99%
Procedures	8.75	11.0	80%

The table shows that the City is strongest in the field of adopted code provisions. However, this score decreases over time unless the codes are kept current. Since the classification was prepared in 2001, the City adopted the 2004 edition of the International series' Building and Residential Codes.

The table shows that the City's code enforcement program was weakest in staff training and certification when the scoring was conducted (2001). Since then, the new administration has doubled the budget for staff education for the new International Codes. One staff member has taken the training and test to become a Certified Floodplain Manager. Because of these changes, the BCEGS classification may well be out of date and have underscored the City's program.

CRS Credit: The Community Rating System encourages communities to adopt the International Codes and obtain good BCEGS classifications. The next time it is scored, Calumet City can receive 100 points for the I-Codes and 30 points for its BCEGS grading.

4.5. Mobile Home Regulations

Manufactured or "mobile" homes are usually not regulated by local building codes. They are built in a factory in another state and are shipped to a site. They do have to meet construction standards set by the US Department of Housing and Urban Development. All mobile type homes constructed after June 15, 1976 must comply with HUD's National Manufactured Home Construction and Safety Standards. These standards apply uniformly across the country and it is illegal for a local unit of government to require additional construction requirements. Local jurisdictions may regulate the location to these structures and their on-site installation.

As is well known, the greatest mitigation concern with manufactured housing is protection from damage by wind. The key to local mitigation of wind damage to mobile homes is their installation.

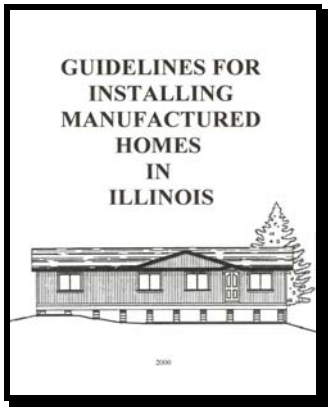
Tornado damage to a mobile home park

Source: FEMA

Following tornadoes in Oklahoma and Kansas, FEMA's Building Performance Assistance Team found that newer manufactured housing that had been anchored to permanent foundations performed better. They also found that newer homes are designed to better transmit wind up-lift and overturning forces to the foundation. Unfortunately, they also found that building officials were often unaware of manufacturer's installation guidelines with respect to permanent foundations.

The Illinois Mobile Home Act and Manufactured Home Tiedown Code are enforced by the Illinois Department of Public Health. The State code includes equipment and installation standards. Installation must be done in accordance with manufacturers' specifications. There is a voluntary program for installers to be trained and certified.

Following the installation of a manufactured home, installers must send the state a certification that they have complied with the State's tiedown code. Inspections are only done if complaints are made regarding an installation.



The State sets minimum standards for installation of manufactured homes.

The Illinois Department of Public Health also regulates mobile home parks, but not in home rule communities. Because of limitations on the Department's authority, it does not inspect or enforce its mobile home park regulations in home rule communities.

In addition to code standards to protect the mobile home from high winds is the need to protect the occupants. There are no state or federal requirements for storm shelters in mobile home parks.

Calumet City's Regulations: There are two mobile home parks in the northeastern part of Calumet City. One has space for 90 units and the other for almost 300. Neither park has a true storm shelter, although the larger park has a brick community building.

Calumet City mobile home park with retention basin

Source: *Charles Pryor*

Both mobile home parks have had some problems, but the Department of Inspectional Services has not had clear authority to enter the land (it's private property) and enforce the codes.

Because the state regulates installation of mobile homes and mobile home parks, many local officials believe that they cannot enforce other ordinances. In fact, as a home rule municipality, Calumet City can enact and enforce regulations on installation of individual units, maintenance of the units, and standards for and maintenance of the mobile home parks. In fact, it did enact an ordinance in the summer of 2005, but the Department of Inspectional Services reports that some changes may be needed.

CRS credit: Because they are not in the floodplain, there would be no CRS credits local regulations for mobile homes and mobile home parks.

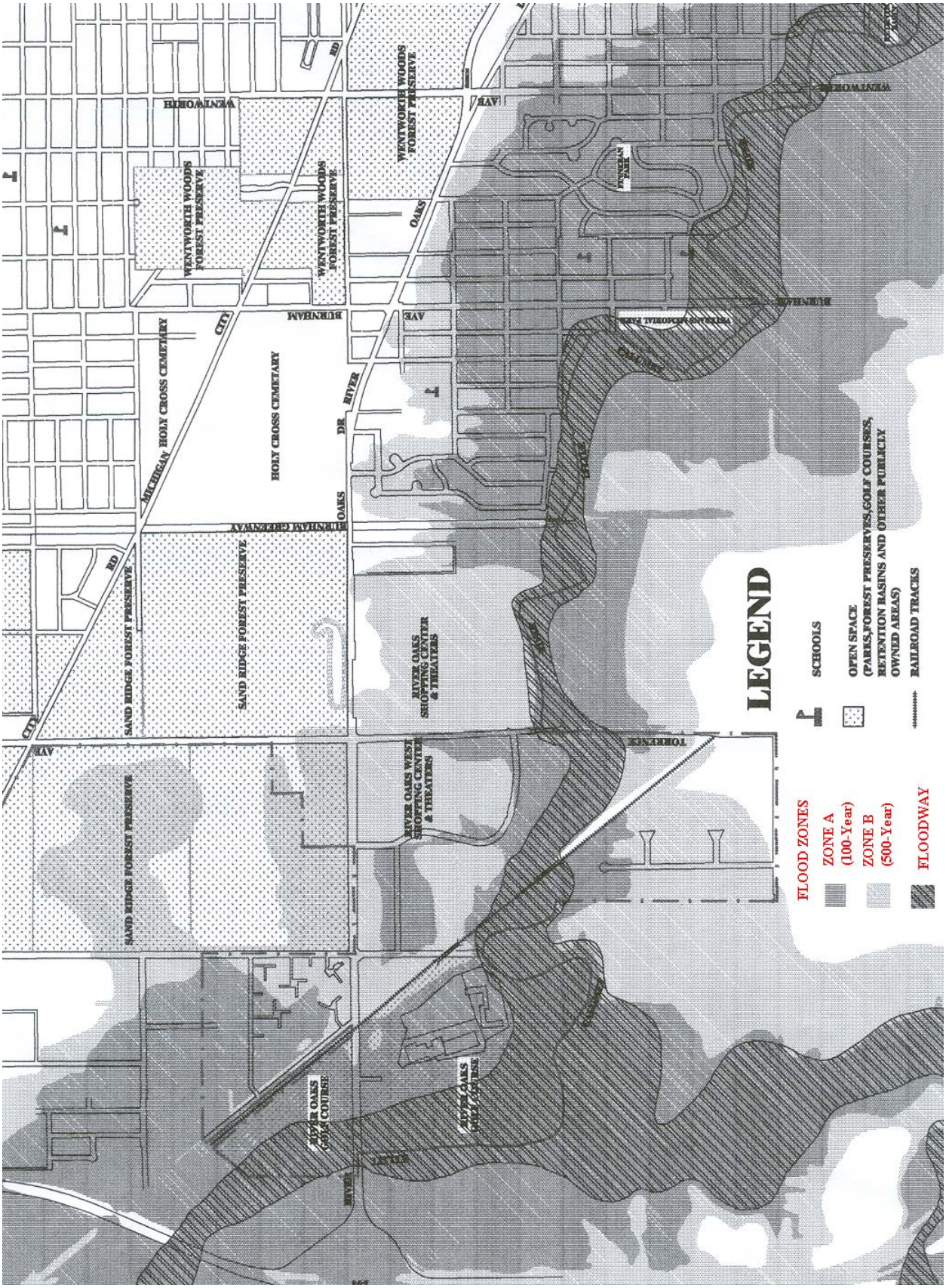
4.6. Floodplain Regulations

Most floodprone communities participate in the National Flood Insurance Program (NFIP) which is administered by the Federal Emergency Management Agency (FEMA). As a condition of making federally supported flood insurance available for their residents, the communities agree to regulate new construction in the base floodplain. These regulations must also meet additional requirements of the Illinois Department of Natural Resources (IDNR).

Calumet City's Regulations: Calumet City's subdivision regulations have no special floodplain management requirements.

As recommended by the 1999 floodplain management plan, in 2000, the City adopted most of the provisions in the new model ordinance prepared and recommended by the South Suburban Mayors and Managers Association. These provisions appear in Chapter 34, Article II of the Municipal Code. They have the following major requirements for new development:

1. All development in the FEMA mapped floodplain must have a permit from the community. "Development" is defined as any man-made change to the land, including new buildings, improvements to buildings, filling, grading, mining, dredging, etc. There are no requirements for properties outside the mapped base floodplain (the A Zone on the map on the next page).


LEGEND
FLOOD ZONES
ZONE A (100-Year)
ZONE B (500-Year)
FLOODWAY
SCHOOLS
OPEN SPACE (PARKS,FOREST PRESERVES,GOLF COURSES, RETENTION BASINS AND OTHER PUBLICLY OWNED AREAS)
RAILROAD TRACKS
WENTWORTH
WENTWORTH WOODS FOREST PRESERVE
WENTWORTH WOODS FOREST PRESERVE
WENTWORTH WOODS FOREST PRESERVE
BLUE ISLAND AVE
OAKS
HOLY CROSS CEMETARY
MICHIGAN
HOLY CROSS CEMETARY
CITY
BLUE ISLAND AVE
RIVER
DR
OAKS
BLUE ISLAND CEMETERY
SAND RIDGE FOREST PRESERVE
SAND RIDGE FOREST PRESERVE
SAND RIDGE FOREST PRESERVE
RIVER OAKS SHOPPING CENTER & THEATERS
RIVER OAKS WEST SHOPPING CENTER & THEATERS
TORRENCE
RIVER OAKS GOLF COURSE
RIVER OAKS GOLF COURSE
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RIVER
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2. Only “appropriate uses” are allowed in the floodway. The floodway is the channel and central portion of the floodplain that is needed to convey the base flood. It is shown on the map on the previous page. Appropriate uses include flood control structures, recreational facilities, detached garages and accessory structures, floodproofing activities, and other minor alterations. They do not include buildings, building additions, fences, or storage of materials.

   Larger projects in the floodway (and projects undertaken by the City) require a permit from IDNR in addition to the City permit. The result of this requirement is that vacant floodways will essentially remain as open space, free of insurable buildings or other obstructions.

3. The volume of flood storage that fill or a structure will displace must be compensated by excavating and removing at least 1.5 times the displaced storage volume caused by that fill or structure.

4. New buildings must be protected from damage by the base flood. A residential building must be elevated so that its lowest floor is above the flood protection elevation, which is one foot above the base flood. A non-residential building must be elevated or floodproofed to flood protection elevation.

   When an addition exceeds 20% of the building’s floor area or an addition, improvement or repair to an existing building is valued at more than 50% of the value of the original building, then it is considered a substantial improvement. Substantial improvements are treated as new buildings and the addition or the building must comply with the previous requirement. In the case of remodeling or repairs, the entire building must be elevated (non-residential buildings may be floodproofed).

The ordinance’s regulatory standards are worthless if they are not properly enforced. FEMA and IDNR conduct periodic “community assistance visits” to determine how well a community is administering its obligation to the NFIP. A visit was conducted of Calumet City in February 1998. It concluded that the Inspectional Services Department was doing an excellent job. The City is due for another visit this year.

Since the floodplain management regulations was enacted in 2000, FEMA has concluded that the South Suburban Mayors and Managers Association model ordinance needs some revisions to correct some typos and clarify some provisions. The City has not yet made these revisions.

CRS Credit: Chapter 34, Article II, receives the following CRS credits. The CRS section numbers are shown in parentheses:

- 81 points for freeboard (requiring buildings to be protected to one foot above the base flood level). Total possible: 243 points for three feet (Section 431.a).
- 16 points for Ordinance 92-16’s fill protection requirements. Total possible: 28 points for requiring engineered fill and foundations (Section 431.b).
- 57 points for the compensatory storage requirement. Total possible: 64 points for prohibiting all filling (Section 431.f).

- 20 points for prohibiting hazardous materials in the floodplain and protecting channel banks and habitats. Total possible: 32 points for (Section 431.g).
- 40 points for restricting enclosures under buildings that are elevated five feet or more in the floodplain. Total possible: 240 for completely prohibiting enclosures (Section 431.h).
- 8 points for requiring streets in new developments to be elevated above the base flood level. Total possible: 8 points (Section 431.i).
- 20 points for the City's Building Code Effectiveness Grading Schedule (BCEGS) classification of 5. Total possible: 50 for a BCEGS classification of 1 (Section 431.m)
- The City will receive 100 points for adopting the International Series of Codes at its next rescoring. Total possible: 100 (Section 431.m) .
- 25 points for having a Certified Floodplain Manager in the Inspectional Services Department and having all permits and certificates of occupancy in the floodplain be reviewed and approved by the CFM. Total possible: 50 points (Section 431.n).

Possible areas where more CRS credit could be obtained include:

- Adopting a higher freeboard standard
- Prohibiting critical facilities from the floodplain
- Obtaining a higher BCEGS classification
- Setting a lowest floor and lowest opening height standard on all new buildings built outside the floodplain

These higher regulatory standards are recommended by both the Northeastern Illinois Planning Commission and the South Suburban Mayors and Managers Association, both of whom have model ordinances.

4.7. Stormwater Management

General: Floodplain regulations address development in the path of flooding. Flooding can also be increased by development outside the floodplain. When an area is urbanized, i.e., converted from farms, forests and fields to buildings and streets, the ground surface becomes more impervious. More stormwater runs off the land instead of soaking in.

At the same time, developers build gutters, sewers, and ditches to move surface water as fast as possible downhill to the river channels. Not only does this aggravate downstream flooding, it often overloads the community's drainage system. The alternative, a stormwater management regulation, requires developers to incorporate retention or detention basins to ensure that the rate of runoff after development is no greater than under pre-development conditions.

Stormwater management requirements for detention are generally found in ordinances governing subdivisions and larger new developments. Many developments utilize wet or dry basins as landscaping amenities. Larger detention basins are more effective than smaller ones, which drain relatively quickly. In some cases, advance community planning identifies the most effective location for a basin and requires developers to contribute funds for it in lieu of constructing on-site detention.

Calumet City's Stormwater Management: Calumet City's subdivision ordinance sets construction standards for storm sewers and the use of streets for local drainage. However, it does not have any requirements for detention of stormwater runoff.

A retention basin holds the runoff from a development and releases it slowly over time.

Detention requirements are set by the Metropolitan Water Reclamation District of Greater Chicago (MWRD). MWRD is concerned about excess stormwater overloading its combined sewers or flooding its wastewater treatment plants. It has had stormwater regulations in effect since the early 1970's. Before a new development can connect to sewers that MWRD serves, it must apply for a permit and show that it meets MWRD's detention standards.

MWRD's regulations only affect single family residential developments equal to or greater than ten acres and other developments equal to or greater than five acres. These developments must restrict the peak discharge from their sites during a base storm to that of a 3-year storm's release under pre-development conditions.

In 2000, the City adopted most of the provisions in the new model floodplain and stormwater management ordinance prepared and recommended by the South Suburban Mayors and Managers Association. These provisions appear in Chapter 34, Article II of the Municipal Code. They strengthen the MWRD requirements.

CRS Credit: The City is receiving 23 points for its retention and detention regulations. These could be increased by bringing smaller developments under the jurisdiction of the ordinance and by requiring that new basins be publicly maintained or enact regulations to allow for public inspection with the authority to order needed maintenance.

4.8. Development Incentives

General: Regulatory approaches react to developers' proposals. They set limits on what private property owners can do, but they do not promote certain types of development. Development incentives are one way a community can take the initiative to encourage appropriate development of floodprone areas.

Various incentives have been devised around the country to encourage developers to settle in a community and/or to exceed minimum zoning ordinance requirements and development regulations. Incentives include tax credits and density trade-offs.

Alternate approaches to stormwater regulations include fee-in-lieu-of detention with fees contributing to a regional or central detention facility. Incentives and alternate approaches can be developed in cooperation with landowners and developers to accomplish mutually supportive objectives.

Calumet City's Incentive Programs: Calumet City has several economic development incentives that can affect businesses. In and near the floodplains in the north part of the City are Tax Increment Financing areas and Enterprise Zones. These are programs designed to encourage commercial and industrial development in the City.

At present these programs do not address flooding or the impact of development on stormwater runoff and flooding. Ways could be explored to tie flood protection or stormwater management measures to the incentives. For example, incentives could be increased for project that avoided the floodprone or wetland portion of a lot.

The City had a problem in 2004 when the economic development office encouraged a development on a site set aside for wetland mitigation. This was cleared up, but it points to the need for close coordination between those staff charged with attracting development and those who regulate it.

CRS Credit: As with comprehensive planning and capital improvements programs, there is no separate credit for economic incentive programs.

4.9. Conclusions

1. Preventive measures are designed to keep the problem from getting worse by ensuring that future development does not increase flood damage. Calumet City utilizes most of the commonly used measures:

    — Zoning
    — Open space preservation
    — Building code
    — Floodplain ordinance
    — Stormwater management regulations

2. The City does not utilize the following measures as hazard prevention tools:

    — Comprehensive plan
    — Capital improvements program
    — Development incentives that reflect the site's hazards

3. Because there is little vacant land available for development, the measures that would be most effective in a developed community such as Calumet City are building codes, mobile home regulations, and floodplain regulations.

4. Calumet City's BCEGS grading has not kept up with the City's improvements in its building code and staff training.

5. Some technical changes are needed to the City's floodplain management ordinance.

6. More coordination is needed between those who promote land development and those who are responsible for regulating it.

4.10. Recommendations

1. The Department of Inspectional Services should continue to enforce the regulatory programs reviewed in this chapter.

2. The City should request a review of its Building Code Effectiveness Grading Schedule classification. This can also have a beneficial impact on the City's CRS score.

3. The City Council should revise the new ordinance granting the Department of Inspectional Services authority to regulate the installation and maintenance of mobile homes and the maintenance of mobile home parks.

4. The City should prepare materials for and meet with real estate agents, economic developers and others involved in land development to ensure that they are familiar with floodplain maps and City, state and federal hazard-related regulations.

4.11. References

- Building Code Effectiveness Grading Schedule report for Calumet City, August 21, 2001
- Chapter 34, Article II of the Municipal Code, Flood Damage Prevention, 2000
- "City of Calumet City Subdivision and Zoning Ordinance," as of September 7, 2004
- Interviews with staff of the Illinois Department of Public Health, Division of Environmental Health, April 28, 2005.
- *Manual of Procedures for the Administration of the Sewer Permit Ordinance,* Metropolitan Water Reclamation District of Greater Chicago, 1992.
- *CRS Coordinator's Manual*, National Flood Insurance Program/Community Rating System, 2002.
- *Northeastern Illinois Regional Greenways Plan*, Northeastern Illinois Planning Commission and Openlands Project, 1992.

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Chapter 5. Property Protection

Property protection measures are those steps taken to protect individual properties, rather than neighborhoods or larger areas. Most property protection measures modify the land or the building so a natural hazard will inflict little or no damage. Property protection measures may be the only feasible flood protection approach in less densely developed areas where a flood control project is not feasible. They are also appropriate as interim measures pending construction of a flood control project.

Property protection measures are normally implemented by the property owner, although in many cases technical and financial assistance can provided by a government agency. This chapter reviews two general types of property protection activities:

Measures that directly protect properties: There are five general types of property protection measures in the first group. There are examples of all of these measures in the south suburbs, some in Calumet City.

5.1 Acquisition and Relocation
5.2 Building elevation
5.3 Retrofitting
5.4 Sewer backup protection
5.5 Insurance

Measures that promote or support protection measures undertaken by property owners. These include activities that provide

5.6 Public information
5.7 Financial assistance
5.8 Other incentives

5.1. Acquisition and Relocation

General: These terms represent the two most common ways of simply removing what will be damaged out of harm's way. Moving a building to higher ground is the surest and safest way to protect it from flooding. While almost any building can be moved, the cost goes up for heavier structures, such as those made of brick, and for large or irregularly shaped buildings. Experienced house movers know how to handle any job.

Like relocation, acquisition ensures that buildings in a hazardous area will cease to be subject to damage. The major difference is that acquisition is undertaken by a government agency, so the cost is not borne by the property owner, and the land is converted to public use, such as a park.

Acquiring and clearing buildings from a hazardous area is not only one of the best protection measure available, it is also a way to convert a problem area into a community asset and obtain environmental benefits. Unlike other property protection measures that leave development exposed to a hazard, it reduces the community's cost of response, the nation's payments for disaster relief, and the owner's cost of insurance.

While relocation and acquisition work against any type of hazard, they are more cost-effective in areas subject to severe flood hazards, where there is repetitive flooding, or where other property protection measures are not feasible. Acquisition, followed by demolition, is most appropriate for buildings that are too expensive to move -- such as larger, slab foundation, or masonry structures -- and for dilapidated structures that are not worth protecting.

Calumet City Examples: The best example in this area was undertaken by the City of Calumet City in the 1980's using a FEMA program for buildings covered by flood insurance. Twelve homes on Shirley Drive just north of the Calumet City Reservoir had been repetitively flooded by the Little Calumet River. They were purchased with FEMA funds and the City cleared the sites. When the Little Cal flooded again in 1990 and 1996, the area's flood damage was substantially reduced because of this action.

Vacant lots on Shirley Drive that once had flooded homes

CRS Credit: The Community Rating System provides the most credit points for acquisition and relocation because this measure permanently removes insurable buildings from the floodplain. However, the score is adjusted based on the number of buildings remaining in the floodplain. A city that acquires 12 out of 100 floodprone buildings will receive a higher score than one that removes 12 out of 1,000.

Calumet City falls under the latter situation with over 2,000 buildings in the mapped floodplain. It receives 60 points under Activity 520 (Acquisition and Relocation).

5.2. Building Elevation

General: Raising a house is the next best property protection method to protect a building from flooding. Water flows under the building, causing little or no damage to the structure or its contents.

Elevating a structure will change its appearance. If the needed degree of flood protection is low, the result is similar to putting a house on a two or three-foot crawlspace (see photo on right).

If the house is raised two feet, the front door would be three steps higher than before. There must be openings in the crawlspace to allow floodwaters to equalize hydrostatic pressure on the walls. If the house is raised eight feet, the lower area can be wet floodproofed for use as a garage and for limited storage of items not subject to flood damage.

This house was elevated one foot above the base flood elevation of the Des Plaines River.

Another alternative is to raise the building and place fill under it before the building is lowered back down. This can minimize the visual effect (see photo), although sometimes buildings on fill look safe and people may feel encouraged to stay in them during a flood.

This house on 158th Street in Dolton was elevated on fill.

Raising a building above the flood level is cheaper than moving it and can be less disruptive to a neighborhood. Commonly practiced in floodprone areas nationwide, this protection technique is required by law for new and substantially damaged residences located in a floodplain. House moving contractors know the techniques to elevate a building.

Calumet City Examples: It is easiest to elevate a building on a crawlspace. Due to the shallow flood depths and predominance of buildings with basements or on slab foundations, there are not many known cases of elevating floodprone buildings (other than for new construction). One house on Price Street in Calumet City's floodplain was elevated after it was substantially damaged by a fire.

CRS Credit: As with acquisition and relocation, the points for elevating buildings under Activity 530 (Retrofitting) are adjusted based on the number of elevated buildings in the floodplain. Elevating a building above the flood level will also reduce the flood insurance premiums on that individual building.

5.3. Retrofitting

General: If a building cannot be removed from or elevated above the hazard, it can be protected on site. A building or yard can be modified or "retrofitted" to minimize or even prevent damage. There are a variety of techniques to do this. This section looks at the measures that can be implemented to protect existing buildings from damage by floods, earthquakes, tornadoes and high winds, and winter storms.

Floods: In areas of low flood threat, such as infrequent low velocity shallow flooding, barriers and dry and wet floodproofing can be efficient approaches. These approaches can also be less disruptive to a neighborhood. However, floodproofing a residential building does not qualify for a flood insurance premium reduction and is not allowed if the project is a substantial improvement or repair of substantial damage.

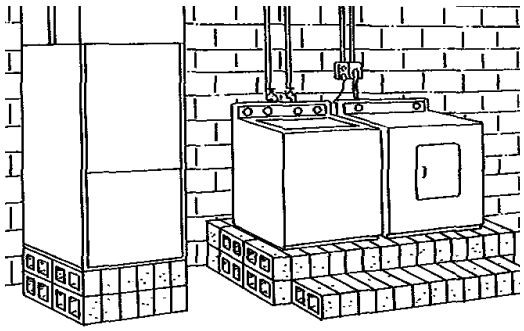
It must be remembered that during a flood, the building may be isolated and without utilities, and therefore unusable. Measures that depend on electricity (e.g., pumps) need a secondary source of power during storms. The streets, utilities and other infrastructure that serve the property will still be exposed to flood damage. This is also a risk to the occupants who may try to get in and out of the building during a flood.

Levees, floodwalls and berms keep floodwaters from reaching a building. They are useful only in areas subject to shallow flooding. They can surround the entire building, tie into high ground, or be as small as a low floodwall built around a stairwell to protect a basement or split-level home.

This home on Burnham Avenue has a barrier to protect it from low level flooding.

Care must be taken in locating barriers. They must be placed so as not to create flooding or drainage problems on neighboring properties. All barriers must be kept out of the regulatory floodway.

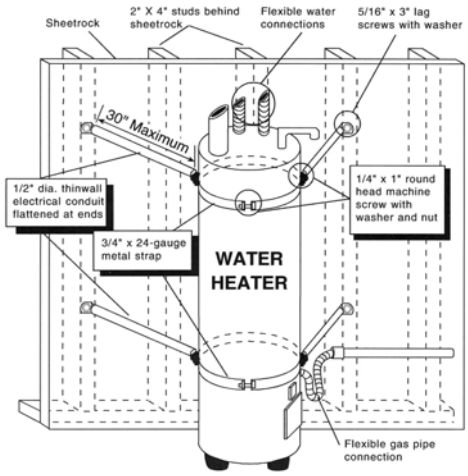
Through dry floodproofing, a building is sealed against floodwaters. All areas below the flood protection level are made watertight. Walls are coated with waterproofing compounds or plastic sheeting. Openings, such as doors, windows, sewer lines and vents, are closed, either permanently with removable shields, or with sandbags. The flood protection level should be no more than 2 or 3 feet above the top of the foundation because the building's walls and floors may not withstand the pressure of deeper water.



Wet floodproofed basement

An alternative to dry floodproofing is wet floodproofing. This approach is usually considered a measure of last resort as floodwaters are intentionally allowed into the building to minimize pressures on the structure. Wet flood-proofing approaches range from moving a few valuable items to rebuilding the floodable area. It is most commonly done for garages, crawlspaces and commercial buildings.

Wet floodproofing has one advantage over the other approaches: No matter how little is done, flood damage will be reduced. Simply moving furniture and electrical appliances out of the floodprone area can prevent thousands of dollars in damage.



Source: The Homeowners Guide to Earthquake Safety

Earthquakes: These measures include removing overhanging masonry features that will fall onto the street during shaking. Bracing the building provides structural stability, but can be very expensive. Less expensive approaches may be more cost-effective for an area like Calumet City that faces a relatively low earthquake threat. These include tying down appli-ances, water heaters, bookcases and fragile furniture so they won't fall over during a quake and installing flexible utility connections.

While these simple and inexpensive measures may be cost effective for a home or business, they may not be sufficient for protection of critical facilities. Fire stations need to be sure that they can open their doors and hospitals must be strong enough to protect vital contents and to continue operating during the shocks and aftershocks. They also need backup utilities in case their main service lines are damaged.

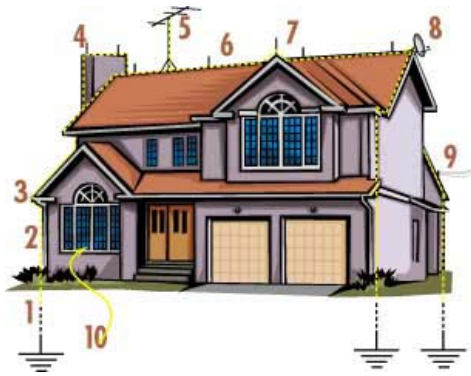
Tornadoes and high winds: Tornado retrofitting measures include constructing an underground shelter or "safe room" to protect the lives of the occupants. Their worth has been proven by recent tornadoes in Oklahoma, as shown in the photo to the right. They can be installed for approximately $3,000 for a single family home.

Interior rooms can be reinforced and retrofitted to be tornado "safe rooms"

Another retrofitting approach for tornadoes and high winds is to secure the roof, walls and foundation with adequate fasteners or tie downs. These help hold the building together when the combination of high wind and pressure differences work to pull the building apart. They also strengthen the structure's ability to resist damage from shaking caused by an earthquake.

A third tornado and high wind protection modification is to strengthening garage doors, windows and other large openings. If winds break the building's "envelope," the pressures on the structure are greatly increased.

Thunderstorms: Retrofitting approaches to protect buildings from the effects of thunderstorms include storm shutters, lightning rods (illustrated to the right), and strengthening connections and tie-downs (similar to tornado retrofitting). Roofs could be replaced with materials less susceptible to damage by hail, such as modified asphalt or formed steel shingles, or other materials recognized as having a high level of impact resistance.



Lightning protection measures

Source: State Farm Insurance

Surge suppressors protect delicate appliances during thunderstorms. Burying utility lines is a retrofitting measure that addresses the winds from tornadoes and thunderstorms and the ice that accompanies winter storms. Installing or incorporating backup power supplies minimizes the effects of power losses caused by downed lines. "Retrofitting" the trees that hang over power lines is discussed in the next chapter under urban forestry.

Winter storms: Winter storm retrofitting measures include improving insulation on older buildings and relocating water lines from outside walls to interior spaces. Windows can be sealed or covered with an extra layer of glass (storm windows) or plastic sheeting. Roofs can be retrofitted to shed heavy loads of snow and prevent ice dams that form when snow melts.

Calumet City Examples: There were 490 respondents to the 1999 Calumet City flood questionnaire. Of those, 106 reported having installed a sump pump or a backup power supply. Seventy reported that they had waterproofed their walls (dry floodproofing) and 52 had moved things out of their basements (wet floodproofing).

In addition to the Burnham Avenue example shown in the photo on page 5-4, there is a good example of a low level barrier at the north end of Veterans Park on 164th Street. The building is owned by the Park District and the berm extends into the park land. The gradual sloping hides the fact that there is a shallow flood protection structure at this location.

There is a dry floodproofed house on a slab foundation on State Line Road shown in the photo on the right. The owner sealed the lower levels of brick, cut plywood shields for the doorways and camouflaged the work with bushes. This effort cost approximately $100 in 1981. It successfully kept water out during the December 1982 flood.

Dry floodproofed house on State Line Road

CRS Credit: Retrofitting does not get the same number of points as elevation, but the credit is figured in the same way in the same activity. The CRS credit would be minimal unless the City can document more examples than the few that are known.

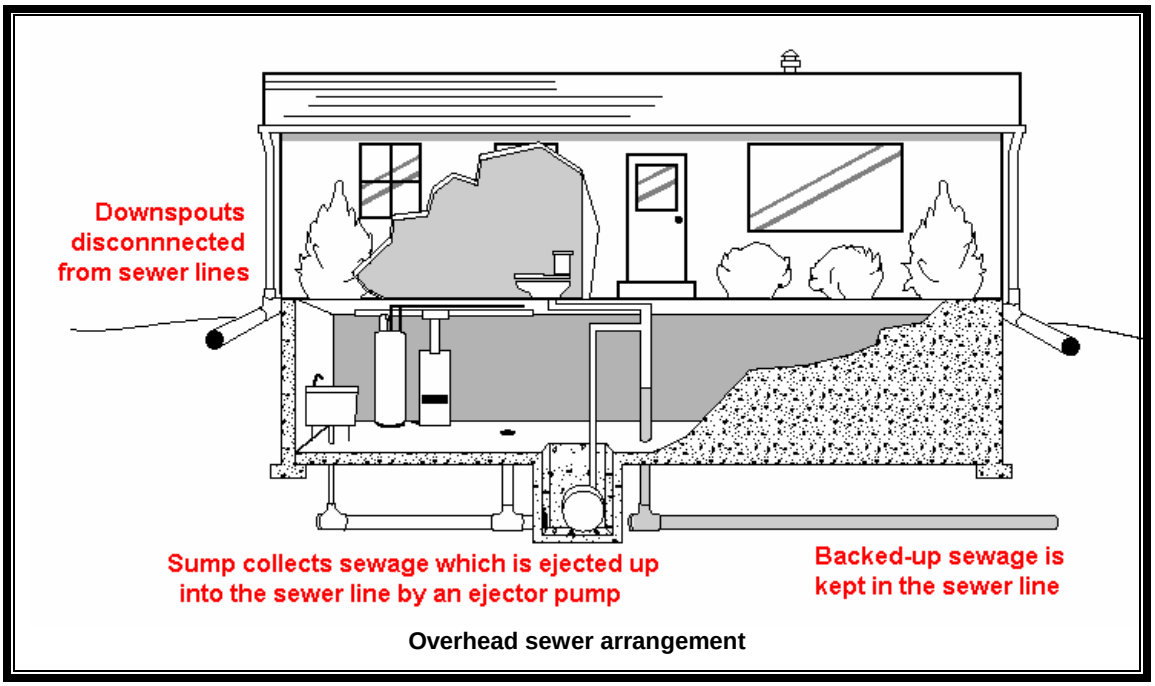
5.4. Sewer Backup Protection

General: As explained in Section 2.4, in areas where sanitary and storm sewers are combined, basement flooding can be caused by stormwater overloading the system and backing up into the basement through the sewer line. In areas where sanitary and storm waters are carried in separate pipes, the same problem can be caused by cross connections between the storm and sanitary sewers or infiltration or inflow into the lines.

Houses which have downspouts, footing drain tile, and/or the sump pump connected to the sanitary sewer service may be inundated when heavy rains overload the system. These should be disconnected. Rain and ground water should be directed out onto the ground, away from the building.

There are four traditional ways to stop sewer backup. The first two devices keep water from flowing out of the lowest opening in the building, the floor drain. They cost less than $25. However, if water becomes deep enough in the sewer system, it can flow out of the next lowest opening, such as a toilet or tub, or it can overwhelm a drain plug by hydrostatic pressure and flow into the building through the floor drain. The other two measures, overhead sewers (shown on the next page) and backflow protection valves keep water in the sewer line during a backup. These are more secure, but more expensive ($3,000-$4,000).

Floor drain plug



Overhead sewer arrangement

South Suburban Examples: Because plugs and standpipes can be purchased anywhere and because they are installed indoors, there is no way to tell how many are in use in Calumet City or the south suburbs. However, many residents are familiar with standpipes and many use them.

There were 490 respondents to the Calumet City flood questionnaire. Of those, 90 use a sewer plug or standpipe and 98 have installed the more expensive overhead sewer or sewer backup valve.

CRS Credit: Sewer backup protection does not get as many points as floodproofing or elevation, but the credit is figured in the same way in the same activity (530 - Retrofitting). The CRS credit is dependent on how many can be documented through permit records. The City is receiving 28 points for sewer backup protection measures, but can receive more at the next rescoring.

5.5. Insurance

General: Technically speaking, insurance does not mitigate damage caused by a natural hazard. However, it does help the owner repair, rebuild and (hopefully) afford to incorporate some of the other mitigation measures in the process.
Insurance has the advantage that, as long as the policy is in force, the property is protected and no human intervention is needed for the measure to work. A standard **homeowner's insurance** policy will cover a property for the hazards of tornado, wind, hail, and winter storms. Separate endorsements are usually needed for earth movement (e.g., earthquake) coverage.

Although most homeowner's insurance policies do not cover a property for flood damage, an owner can insure a building for damage by surface flooding through the National Flood Insurance Program. **Flood insurance** coverage is provided for buildings and their contents damaged by a "general condition of surface flooding" in the area.

Some people have purchased flood insurance because it was required by the bank when they got a mortgage or home improvement loan. Usually these policies just cover the building's structure and not the contents. Renters can buy contents coverage, even if the owner does not buy structural coverage on the building.

There is no coverage for things outside the house, like the driveway and landscaping. Flood insurance does not cover contents in a basement or the finished structural parts of a basement, such as paneling and wall to wall carpeting. Flood insurance only covers damage when there is a general condition of surface flooding in the area.

Several insurance companies have sump pump failure or sewer backup coverage that can be added to a homeowner's insurance policy. Each company has different amounts of coverage, exclusions, deductibles, and arrangements. Most are riders that cost extra. Most exclude damage from surface flooding that would be covered by a National Flood Insurance policy.

Many insurance policies will only pay to repair the damage incurred. If damage is severe enough, the owner may have additional costs to bring your building up to current codes. Flood insurance now covers these costs (up to $30,000) when there is a flood.

Calumet City Examples: As of January 1, 2005, there are 1,633 Calumet City properties with flood insurance. 1,581 (97%) of them are in the mapped floodplain, probably because of the Federal law that mandates insurance as a condition of mortgages and other property loans.

The National Flood Insurance program has paid 184 claims since 1978, 12 of them for properties outside the floodplain. The claims have totaled $850,000.

There is no available data on private insurance coverage or claims.

CRS Credit: There is no CRS credit for purchasing flood or basement insurance, but the Community Rating System reduces the premiums for those people who do buy NFIP coverage. Calumet City residents and businesses are paying over $580,000 in annual premiums. This number would be $146,000 greater if the City were not a CRS class 6.

5.6. Public Information

Providing basic information to property owners is the first step in supporting property protection measures. Owners need general information on what can be done. They need to see examples, preferably from nearby. Public information activities that can promote and support property protection are covered in Chapter 9 of this *Plan*.

5.7. Financial Assistance

Communities can help owners by helping to pay for a retrofitting project, just like they pay for flood control projects. Financial assistance can range from full funding of a project to helping residents find money from other programs. Some communities assume responsibility for sewer backups and other drainage problems that arose from an inadequate public sewer or drain system.

Less expensive community programs include low interest loans and rebates. These approaches don't fully fund the project but they cost the community treasury less and they increase the owner's commitment to the flood protection project. Often, small amounts of money act as a catalyst to pique the owner's interest to get a self-protection project moving.

The more common outside funding sources are listed below. Unfortunately the first five are only available after a flood, not before, when damage could be prevented.

- Flood insurance claims
- The National Flood Insurance Program's Increased Cost of Compliance provision (which increases the claim payment to cover a flood protection project required by code as a condition to rebuild the flooded building)
- FEMA's disaster assistance (for public properties)
- Small Business Administration disaster loans (for non-governmental properties)
- FEMA's Hazard Mitigation Grant Program
- FEMA's Pre-Disaster Mitigation Program
- FEMA's Flood Mitigation Assistance Program
- Cook County's Community Development Block Grant
- Environmental Protection Agency programs (for sewer backup problems)

Calumet City Examples: Calumet City received a FEMA grant in the 1980's under a program that has been replaced by the Flood Mitigation Assistance Program. It was used to purchase flooded buildings on Shirley Drive (see page 5-2).

In 2003, the City implemented the Flood Assistance Rebate Program. This program is designed to help residents living in single-family homes, pay for overhead sewer and sump pump installation. Residents eligible for the program may receive a rebate for 50% of the cost up to a maximum of $2,500. Although a new program, the City's rebates have funded 15 projects, mostly for sewer backup protection.

As stated in the *Calumet City Review:*

> Part of the reason the program is so important to Calumet City is because of the astronomical and unaffordable costs associated with separating the city's storm sewers from its water waste sewers. This was one recommended line of defense from flooding that city engineers estimated could cost over $30 million. While Calumet City currently does not have the budget capacity to support such a project, the Flood Assistance Rebate Program is feasible and more affordable and will protect homes from basement floods.

CRS Credit: There is no CRS credit for providing financial assistance. The CRS credit is based on making technical assistance available to everyone (Activity 360 - Flood Protection Assistance) and on the number of buildings that are protected (Activity 530 - Retrofitting).

5.8. Other Incentives

Sometimes only a little funding is needed to motivate a property owner to implement a retrofitting project. A flood insurance premium reduction will result if a building is elevated above the flood level. This reduction is not enough to take much of a bite out of the cost of the project, but it reassures the owner that he or she is doing the right thing. Other forms of floodproofing are not reflected in the flood insurance rates for residential properties, but they may help with the Community Rating System which provides a premium reduction for all policies in the community.

Mandates are considered a last resort if information and incentives aren't enough to convince a property owner to take protective actions. One precedent for this is the program of mandatory inspections undertaken by most communities to assure disconnection of downspouts connected to sanitary sewer line.

There is a mandate for improvements or repairs made to a building in the mapped floodplain. If the project is worth more than 50% of the value of the original building or increases the first floor area by more than 20%, it is considered a "substantial improvement." The building must then be elevated or otherwise brought up to current flood protection codes.

Another possible mandate is to require less expensive flood protection steps as a condition of a building permit. For example, many communities require upgraded electrical service as a condition of a home improvement project. If a person were to apply for a permit for electrical work, the community could require that the service box be moved above flood level or the installation of separate ground fault interrupter circuits in the basement.

Calumet City Examples: The City's floodplain regulations include the 50%/20% substantial improvement requirement. It has not pursued other non-financial incentives.

CRS Credit: The CRS provides up to 90 points for counting improvements cumulatively or for lowering the threshold for determining substantial improvements below 50%. It also provides up to 25 points for other higher regulatory standards, such as resale inspections, that will accelerate when a building will be mandated to incorporate flood protection measures. These are covered under Activity 430 (Higher Regulatory Standards).

5.9. Conclusions

1. There are a variety of flood protection measures that can be implemented to protect individual buildings from natural hazards, especially from surface flooding and sewer backup. These have been used on homes in the area and have been shown to work. However, many property owners are not aware of their options and opportunities.

2. Many of the measures can be installed by the owner or by a contractor at relatively little cost to the owner.

3. There are a variety of ways the City assists property owners to implement protection measures, ranging from providing information to helping fund the construction under the rebate program.

5.10. Recommendations

1. Property owners should be made aware of how they can retrofit, insure, or otherwise protect their properties from damage by natural hazards and should be advised of local examples of such measures.

2. City-owned properties, critical facilities, and buildings in the repetitive loss area should be reviewed or audited to determine if appropriate property protection measures would be physically and economically feasible.

3. The City should continue its sewer backup rebate program.

4. Department of Inspectional Services staff should provide handouts, advice, encouragement, and rebates for permit applicants and others to incorporate retrofitting measures as part of remodeling or building improvement projects.

5.11. References

- *Disaster Mitigation Guide for Business and Industry*, Federal Emergency Management Agency, FEMA-190, 1990
- *Engineering Principles and Practices for Retrofitting Flood Prone Residential Buildings*, Federal Emergency Management Agency, FEMA-259, 1995.
- *Flood Insurance Agent's Manual*, FEMA, 2004
- Flood insurance data provided by FEMA, 2005.
- *Flood Proofing Techniques, Programs and References*, U.S. Army Corps of Engineers National Flood Proofing Committee, 1991.
- *Floodproof Retrofitting: Homeowner Self-Protective Behavior*, Shirley Bradway Laska, University of Colorado, 1991.
- Floodproofed Sites in Illinois, French & Associates, 1992.
- *Guide to Flood Protection in Northeastern Illinois*, Illinois Association for Floodplain and Stormwater Management, 1997.
- *Homeowner's Guide to Retrofitting: Six Ways to Protect Your House from Flooding.* Federal Emergency Management Agency, FEMA-312, 1998.
- *Ice Storm Mitigation*, FEMA –860-DR-Illinois, Illinois Emergency Management Agency, 1990.
- *Local Flood Proofing Programs*, U.S. Army Corps of Engineers, 1994.
- *Retrofitting Flood-Prone Residential Structures*, Federal Emergency Management Agency, 1986.
- State Farm Insurance website, www.statefarm.com/consumer/lightng.htm
- *Taking Shelter from the Storm: Building a Safe Room Inside Your House*, Federal Emergency Management Agency, FEMA-320, 1998.

- *The Homeowners Guide to Earthquake Safety*, California Seismic Safety Commission, 2000
- *Windstorm Mitigation Manual for Light Frame Construction*, Illinois Emergency Management Agency, 1997.

Chapter 6. Natural Resource Protection

Natural resource protection activities preserve or restore natural areas or natural features. They can reduce flood losses as well as improve water quality and habitats. Historically, parks, recreation, or conservation agencies or organizations have usually implemented these activities. However, the private sector and private landowners can make significant contributions.

There are five general types of activities that work toward protection from natural hazards:

6.1 Preserving and restoring open space to keep the areas in their natural state
6.2 Protecting wetlands
6.3 Implementing "best management practices" to protect water quality
6.4 Regulating dumping of materials into water bodies and wetlands
6.5 Protecting trees through urban forestry programs

In addition to the measures listed here, most of the preventive measures discussed in Chapter 4, such as zoning and open space acquisition also protect natural resources.

6.1. Open Space Preservation and Restoration

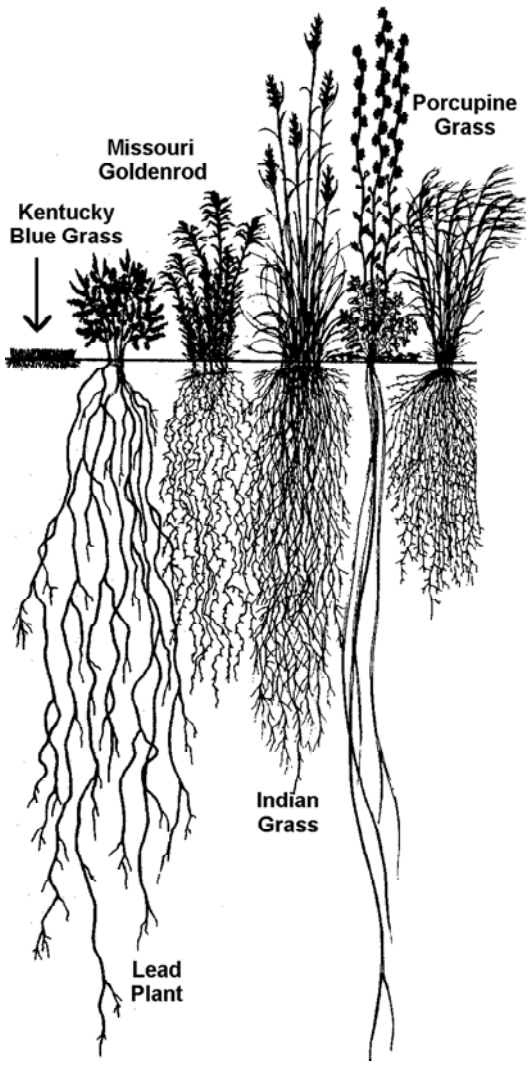
General: Open spaces can be publicly or privately owned. They can include a range of natural landscapes that contribute to water quality, stormwater retention, habitat, biodiversity and quality of life. These include both aquatic open spaces like wetlands, streams, lakes, ponds and groundwater aquifers and what we have come to call "dry land."

Before northeastern Illinois was settled, "dry land" wasn't so dry. Only a small percentage of rainfall on the prairie actually resulted in measurable runoff. Precipitation was able to infiltrate down into the soil. Presettlement streams or rivers meandered and flowed very slowly compared to today's streams or rivers which have been channelized and straightened in order to move stormwater quickly away from where it falls.

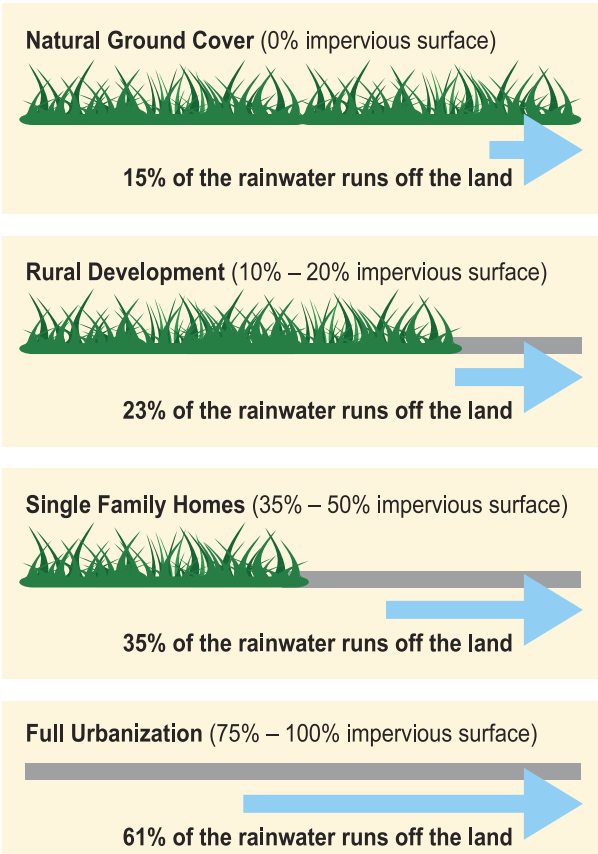
The original prairies, savannas and woodlands absorbed tremendous amounts of stormwater runoff. One study showed that 99% of the total rainfall stayed on a prairie dominated by little bluestem grass. The same area converted to a wheat field held 93% of the water on site.

While it is widely recognized that rooftops and pavements contribute greatly to runoff, so does turf grass. The graphic on the next page compares the root system of Kentucky blue grass with native prairie plants. The value of native ecosystems to absorb and hold stormwater can be a significant tool in reducing floods in urbanized areas so long as adequate open space can be both preserved and restored with native, deep-rooted plants and trees.

Preserving and restoring these areas can have an impact on the amount of rain that runs off the land and into the Little Calumet River. However, other than Federal laws that protect wetlands and endangered species, there are no limits on converting prairie lands into streets, buildings and lawns. Therefore, preserving and restoring open space in its natural state is dependent on the willingness of the owners.



Root systems of prairie plants



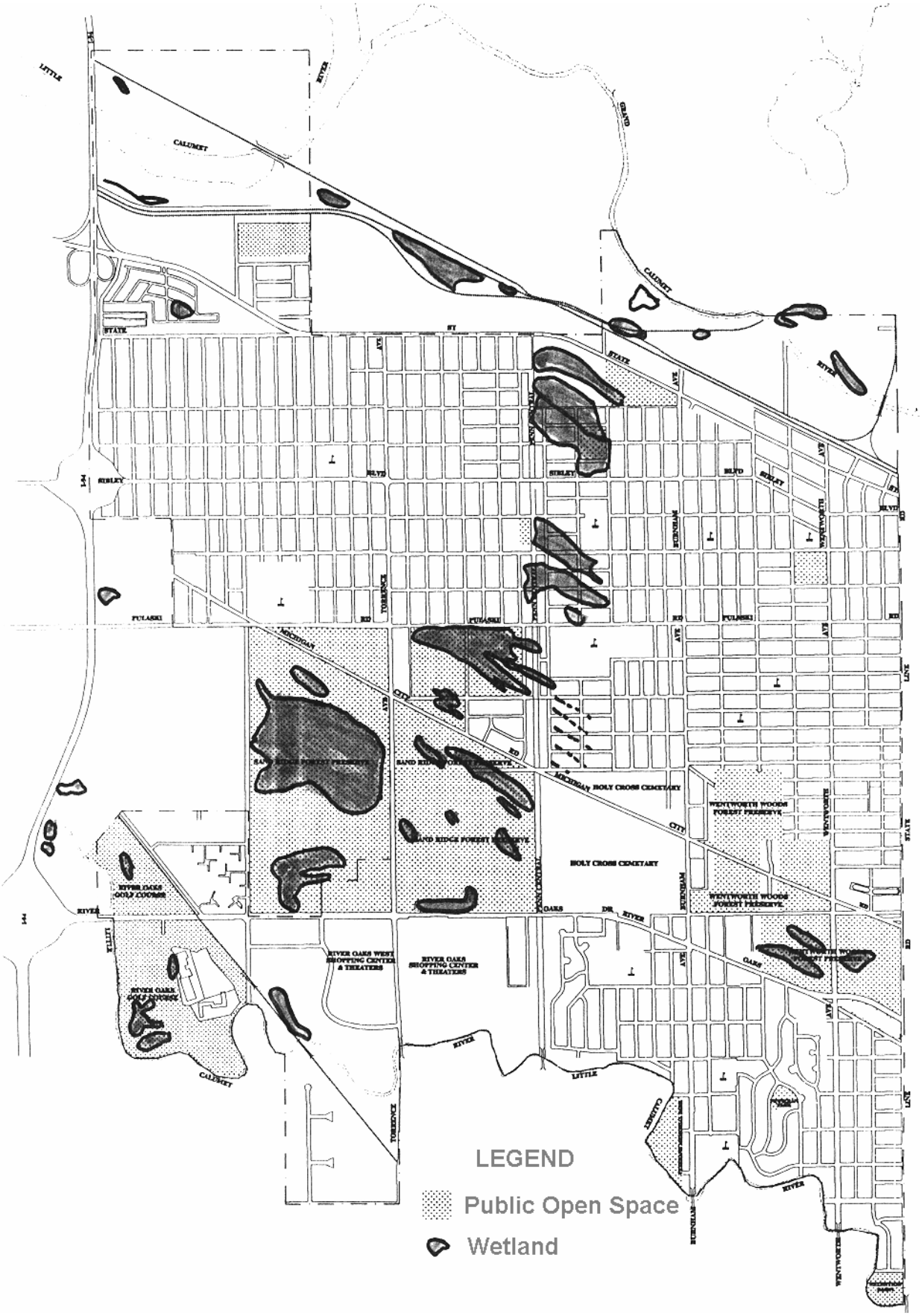
Impact of development on surface runoff

Northeastern Illinois Planning Commission

Calumet City's Natural Open Space: There are two public organizations within Calumet City that have and maintain open spaces, the Calumet Memorial Park District and the Cook County Forest Preserve.

The Forest Preserve manages several large areas within Calumet City which are shown as open space on the map on the next page. These include the Sand Ridge and Wentworth Woods Forest Preserves and the River Oaks Golf Course. These forest preserves are maintained in their natural state and recreation is primarily passive. At Sand Ridge, the District has a facility for environmental educational programs.

The Calumet Memorial Park District operates a number of parks and recreational facilities throughout the City. In the Little Calumet River floodplain, these properties include Veterans and Finneran Parks (see map, next page). The Park District is interested in areas where active recreation can take place. It is not charged with acquiring land for passive use or ecological preservation.



Wetlands and open space in Calumet City

There is a third, private organization that acquires land for the purpose of preservation. CorLands (for "Corporation for Open Lands") acquires land for natural preservation purposes. After acquisition, the organization looks for other organizations, such as forest preserves and park districts, to purchase the land for long-term management. CorLands is mainly interested in undeveloped land due to concerns of potential environmental degradation and liabilities associated with previously developed land.

The Park District, the Forest Preserve District and CorLands have supported the development of the Burnham Bike Trail. This generally follows the railroad right of way which has been abandoned by the Penn Central Railroad. It connects the Little Calumet floodplain with Sand Ridge, wetland areas in the north of the City, and other trails that would run all the way to Chicago.

CRS Credit: The CRS is primarily concerned with protecting insurable buildings. However, it does recognize the benefit of preserving floodplain areas in their natural state. Credit is provided in the form of a multiplier of the open space preservation points (see Section 4.2.). Open space that can be documented as being in or restored to the area's original natural state receive this multiplier credit.

Three areas could qualify as being in such a state: the Sand Ridge and Wentworth Woods Forest Preserves and the wetlands west of State Street at Burnham. However, these areas are not in the floodplain. The golf course and parks in the floodplain have been substantially altered by humans to facilitate recreation. Therefore, there would be no additional CRS credit for the natural open space areas in the floodplain.

6.2. Wetland Protection

Wetlands

- Store large amounts of floodwaters
- Reduce flood velocities and erosion
- Filter water, making it cleaner for those downstream
- Provide habitat for species that cannot live or breed anywhere else

General: Wetlands are usually found in floodplains or depressional areas. They provide numerous natural and beneficial functions that warrant protection.

Many wetlands in northeastern Illinois are subject to the Corps of Engineers' Section 404 regulations. Corps permits are required for projects that will place fill or dredged materials in a wetland. Before a permit is issued, the plans are reviewed by several agencies, including the Illinois Department of Natural Resources, the Natural Resources Conservation Services, the Will South Cook Soil and Water Conservation District and the U.S. Fish and Wildlife Service.

Generally, these agencies want to protect wetlands by preventing development that will adversely affect them. However, sometimes preserving or developing an equivalent or larger wetland on another site can mitigate the negative impact of filling a wetland. Wetland banks are emerging in the Chicago metropolitan region to provide large-scale wetlands that mitigate the loss of smaller areas that are filled to allow development.

Some communities have their own wetland protection programs. Local programs are important for addressing gaps in the federal regulations, particularly for smaller wetlands and unregulated activities.

In many areas, smaller wetlands are not mapped, so projects may be built by owners who don't know the area should be protected. The Corps' authority is generally limited to filling wetlands. Wetlands can be impounded, drained or otherwise damaged without a 404 permit being required. Therefore, communities should consider their own more comprehensive regulations.

Calumet City's Wetlands: Calumet City's wetlands are shown on the map on page 6-3. This information is from the National Wetlands Inventory conducted by the U.S. Department of Interior's Fish and Wildlife Service. It is based on soils data and aerial photographs that were prepared before some of the areas were developed.

Wetland in the southwest part of Calumet City

The vast majority of the City's wetlands are in areas under public ownership, such as Sand Ridge Forest Preserve and the River Oaks Golf Course. These wetlands are protected from adverse development. Much of the remaining wetlands are in areas already developed. Only in the very north part of the City are there vacant lands with identified wetlands.

The City's floodplain regulations (Chapter 34, Article II of the Municipal Code) were adopted in 2000, as recommended by the 1999 floodplain management plan. This ordinance has special provisions for wetland protection. However, they are tied to wetlands under the jurisdiction of the Corps of Engineers and may not provide any more protection than the Corps' 404 program.

CRS Credit: There is no separate CRS credit for wetland protection. The only credit is for preserving open space in its natural state as discussed in the previous section.

6.3. Best Management Practices

General: Best management practices ("BMPs") are state-of-the-art measures that reduce flooding and non-point source pollutants that enter the waterways. Non-point source pollutants are carried by stormwater (point source pollution comes from municipal and industrial wastewater systems). They include sediment, lawn fertilizers, pesticides, farm chemicals, and oils from street surfaces and industrial areas.

BMPs are technologies or engineering approaches that can be incorporated into retention and detention basins, drainageways, and other parts of new developments. They hold and clean stormwater runoff by filtering it or letting pollutants settle to the bottom of a basin before it is drained.

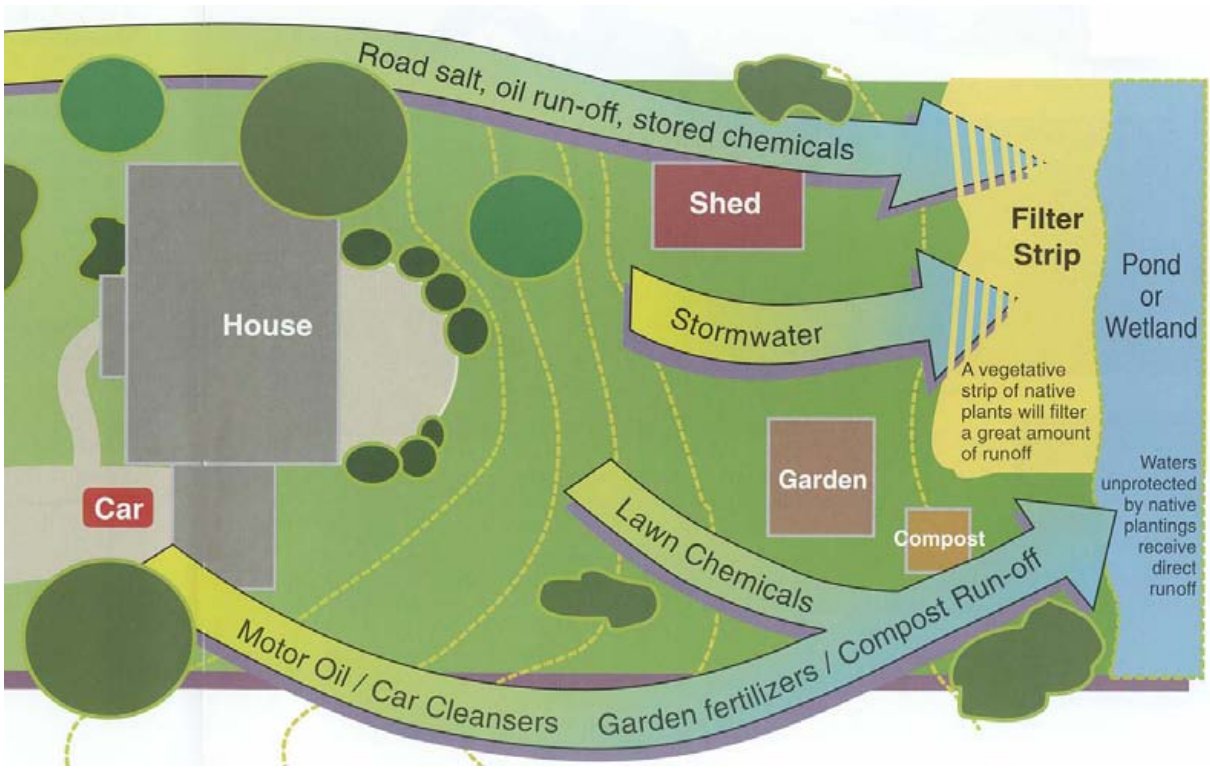
Because of the need to clean up our rivers and lakes, there are several state and federal laws mandating the use of best management practices for new developments and various land uses. Specific BMPs and structural measures may be required on industrial sites, mined lands, construction sites, farms, forested areas, and high use public lands.

The *South Suburban Stormwater Strategy* identified three BMP measures as most important to this area.

Use of Native Vegetation: As noted earlier, native ecosystems – particularly wet prairies, sedge meadows, wetlands, swales, rivers, and streams – show a unique ability to hold vast quantities of water, both rainwater and groundwater. Native root systems can reach up to 15 feet or more into the clay earth. This type of vegetation can store not only water but also filter and hold sediment and pollutants.

The use of this type of vegetation has obvious benefits from the standpoint of water quality and flood mitigation. Native landscapes do not require massive fertilization, herbicide use, or watering to remain viable, like mowed turf grass. Therefore, the nutrient loading of adjacent water bodies is much less from prairies than from a traditional lawn that requires regular fertilizing.

Erosion and sediment control: Because farmland and construction sites are usually bare, stormwater runoff can erode soil, sending sediment into downstream waterways. Sediment tends to settle where the river slows down, such as when it enters a lake. Sedimentation will gradually fill in channels and lakes, reducing their ability to carry or store floodwaters. Not only are the drainage channels less able to do their job, but the sedimentation in the water reduces light, oxygen, and water quality.



BMPs slow stormwater runoff and improve water quality.

Living With Wetlands, A Handbook for Homeowners in Northeastern Illinois

BMPs to reduce erosion and sedimentation have two principal components: minimize erosion with vegetation and capture sediment before it leaves the site. Slowing runoff on the way to a drainage channel increases infiltration into the soil and controls the loss of topsoil from erosion and the resulting sedimentation. Runoff can be slowed down by measures such as vegetation, terraces, sediment fences, hay or straw bales, and impoundments such as sediment basins and wetlands.

Site Design and Retrofit of Development: New development and existing development (via retrofit) can incorporate native vegetation by designing landscape features on-site that can retain and hold water. These features include detention basins that incorporate emergent shoreline plantings and drainage swales using wet prairie species. Proper site design for new development and the retrofitting of existing development can help maximize open space landscapes. Land use planning and site design that considers the natural hydrology of both upland and wetland habitat can improve the ratio of stormwater absorption.

Appropriate plantings can improve water quality and wildlife habitat, reduce erosion, and reduce maintenance costs associated with mowing and fertilizing turf grass. The USDA Natural Resources Conservation Service and other sources estimate that over a ten-year period, the combined costs of installation and maintenance for a natural landscape may be one-fifth of the cost for conventional landscape maintenance.

BMPs in Calumet City: The City's floodplain regulations (Chapter 34, Article II of the Municipal Code) was adopted in 2000 (as recommended by the 1999 floodplain management plan). It has special provisions for incorporating BMPs and other water quality protection measures into stormwater facilities (Section 34-62.g). It requires buffers along channels, but not roadside ditches (Section 34-65). The regulations also require a soil erosion and sediment control plan for new construction ((Section 34-64).

CRS Credit: The CRS provides credit for regulations that protect natural areas, such as stream bank set back requirements, under Activity 430 (Higher Regulatory Standards). The City has received 20 points for such provisions.

Under Activity 450 (Stormwater Management), credit is provided for regulations that affect runoff throughout the City. Up to 25 points are provided for requiring BMPs in new developments and up to 45 points are available for erosion and sediment control regulations. Calumet City's ordinance qualifies for 25 and 35, respectively.

6.4. Dumping Regulations

General: Floodplain regulations and building codes control major development projects. However, debris can be accidentally or intentionally dumped into the channels or wetlands, obstructing even low flows and reducing their ability to retain or clean stormwater.

Dumping regulations are one approach to preventing intentional placement of trash or debris in channels and other water bodies. While many cities have nuisance ordinances that prohibit dumping garbage or other "objectionable waste" on public or private property, some prohibit the discharge of polluted waters into natural outlets or storm sewers. Waterway dumping regulations

need to also apply to "nonobjectionable" materials, such as grass clippings or tree branches which can kill ground cover or cause obstructions in channels.

Many people do not realize the consequences of their actions. They may, for example, fill in the ditch in their front yard not realizing that it is needed to drain street runoff. Similarly, they may not understand how regrading their yard, or discarding leaves or branches in a watercourse can cause a problem. Therefore, a dumping enforcement program should include public information materials, such as signs, that explain the reasons for the rules as well as the penalties.

Stream dumping public notice

Regular inspections to catch violations also should be scheduled. Finding dumped materials is easy; locating the source of the refuse is hard. Usually the owner of property adjacent to a stream is responsible for keeping the stream clean. This may not be fair for sites near bridges and other public access points.

Calumet City's Regulations: As recommended by the 1999 floodplain management plan, the City adopted special regulations on dumping when it adopted its floodplain and stormwater management ordinance (Chapter 34, Article II of the Municipal Code). Section 34-65(f) states:

> No person, firm, corporation or governmental agency shall dispose of or dump grass clippings, brush, fill, trash, debris, or other material that may obstruct the flow or storage of water in any channel, swale, culvert, storm sewer, wetland, storage basin or other natural or manmade watercourse or water body.

CRS Credit: The City receives 30 points for publicizing and enforcing the stream dumping regulations under Activity 540 (Drainage System Maintenance).

6.5. Urban Forestry

General: The major damage caused by wind, ice and snow storms is to trees. Downed trees and branches break utility lines and damage buildings, parked vehicles and anything else that was under them. An urban forestry program can reduce the damage potential of trees. The cities in central Illinois are prone to ice storms and have initiated programs that select species that are resistant to ice and storm damage.

Urban foresters or arborists can select hardier trees which can better withstand high wind and ice accumulation. Only trees that attain a height less than the utility lines should be allowed along the power and telephone line rights-of-way. Just as important as planting the right trees is correct pruning after a storm. If not done right, the damaged tree will not heal properly, decay over the next few years, and cause a hazard in the future. A trained person should review every damaged tree to determine if it should be pruned or removed.

Trees are the first victims of ice storms

By having stronger trees, programs of proper pruning, and on-going evaluation of the trees, communities can prevent serious damage to their tree population. A properly written and enforced urban forestry plan can reduce liability, alleviate the extent of fallen trees and limbs caused by wind and ice build-up, and provide guidance on repairs and pruning after a storm. Such a plan helps a community qualify to be a Tree City USA.

TREE CITY USA.

Tree City USA is a program sponsored by The National Arbor Day Foundation in cooperation with the USDA Forest Service and the National Association of State Foresters. These standards were established to ensure that every qualifying community would have a viable tree management plan and program. They were also designed so that no community would be excluded because of size.

To qualify for Tree City USA, a town or city must meet four standards:

1. A tree board or department – Someone must be legally responsible for the care and management of the community's trees. This may be a professional forester or arborist, an entire forestry department, or a volunteer tree board.

2. A tree care ordinance – The ordinance must designate the establishment of a tree board or forestry department and give this body the responsibility for writing and implementing an annual community forestry work plan.

3. A community forestry program with an annual budget of at least $2 per capita – A little investigation usually reveals that more than this amount is already being spent by the municipality on its trees.

4. An Arbor Day observance and proclamation

Tree Cities in the Calumet City area include Country Club Hills, East Chicago, Gary, Hammond, Hazel Crest, Homewood, and Munster.

Source: www.arborday.org/programs/treecityusa.html

Calumet City's program: Calumet City does not have a forestry program, nor is it participating in "Tree City USA." The City has a tree trimming contractor who provides technical advice, but the program responds to resident complaints about City trees and is not proactive. Commonwealth Edison inspects the utility lines on a rotating schedule and when problems are found.

CRS credit: Being a part of the National Flood Insurance Program, the CRS recognizes only activities that affect flood damage. It does not provide credit for projects or programs that only affect damage from other types of hazards.

6.6. Conclusions

1. Protecting natural resources, such as prairie lands and native vegetation, can help reduce flood losses. These activities can be more important when implemented throughout the watershed than just in the floodplain.

2. While Calumet City has recently adopted regulations for protecting many of these natural resources, its wetland regulations may not provide any more protection than the Corps of Engineers' program, which had its jurisdiction reduced by the recent Court order.

3. There is interest in protecting natural areas and developing connecting greenways. A hazard mitigation program can take advantage of this interest and utilize natural resource protection programs to support mitigation activities, such as keeping floodprone areas open.

4. Urban forestry can help protect against damage to trees and utility lines caused by wind and ice storms, but Calumet City does not have a formal program.

6.7. Recommendations

1. The Department of Inspectional Services should draft regulatory language that clarifies what wetlands are subject to the City's ordinance, rather than tie the regulatory designation to the Corps of Engineers' program.

2. The City should investigate the costs and benefits of becoming a Tree City USA.

3. Property owners should be provided with more information on how they can protect wetlands, natural and beneficial floodplain functions, and trees.

6.8. References

- *Best Management Practice Guidebook for Urban Development*, Northeastern Illinois Planning Commission, 1992
- *CRS Coordinator's Manual*, Community Rating System, FEMA, 2002.
- *Environmental Considerations in Comprehensive Planning*, Northeastern Illinois Planning Commission, 1994
- *Illinois Hazard Mitigation Plan*, Illinois Emergency Management Agency, 2000.
- *Living With Wetlands, A Handbook for Homeowners in Northeastern Illinois*, The Wetlands Initiative, 1998
- *Making our Urban Forests Safer*, Alabama Cooperative Extension Service, 2001.
- *Procedures and Standards for Urban Soil Erosion and Sedimentation Control in Illinois*, Will South Cook Soil and Water Conservation District, 1988
- *Protecting Floodplain Resources: A Guidebook for Communities*, Federal Emergency Management Agency, 1995
- *Protecting Nature in Your Community*, Chicago Wilderness and Northeastern Illinois Planning Commission, 2000.
- *Reducing the Impacts of Urban Runoff – The Advantages of Alternative Site Design Approaches*, Northeastern Illinois Planning Commission, 1997.
- *Restoring and Managing Stream Greenways: A Landowners Handbook*, Northeastern Illinois Planning Commission, 1997
- *Stormwater Detention for Water Quality Benefits*, Northeastern Illinois Planning Commission, 1986
- *Stormwater Management – The Benefits of Alternative Approaches*, South Suburban Mayors and Managers Association, 2000.
- *Stream and Wetland Protection: A Natural Resource Management Priority in Northeastern Illinois*, Northeastern Illinois Planning Commission, 1991.

- *Stream Preservation Handbook*, Illinois Department of Natural Resources, 1994
- Tree City USA and National Arbor Day website, www.arborday.org/programs/treecityusa.html
- *You and Your Land: A Home Owner's Guide*, Will South Cook Soil and Water Conservation District, 1992

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Chapter 7. Emergency Management

As used in this plan, the term "emergency management" means those measures that protect people and property during an emergency, such as a flood or tornado. Calumet City has an *Emergency Operations Plan* which guides the City's emergency management activities before, during, and following an emergency. The *Plan* has annexes which provide the details. Annex Q covers floods and Annex X has procedures for tornadoes and severe thunderstorms.

The City has an Emergency Services and Disaster Agency (ESDA) Director. He has the most responsibilities under the *Emergency Operations Plan*, including advising the Mayor on overall operations during an emergency. It should be noted that the *Emergency Operations Plan* is being updated.

The *Emergency Operations Plan* assigns different departments with primary and support responsibilities for different disaster response duties. These assignments are shown in the table below for each of the main annexes to the plan.

Annex Title	ESDA	Fire	Health	Insp. Svcs	Police	Public Works	Sewer	County Gov't	Red Cross
A. Shelter	S	P							
B. Communications & Warning	P				S				
C. Radiological	P								
D. Damage Assessment	S			P					
E. Evacuation	P				S				S
F. Fire, Search & Rescue	S	P							
H. Law Enforcement					P			S	
I. Health & Medical			P						S
M. Emergency Welfare			P						
N. Public Works						P			
O. Emergency Operating Center	P								
Q. Flood	S			S	S	S	P		
R. Resource Management				S		P			
T. Public Information	S	S	S	S	S	S			
W. Hazardous Materials	S	P							
X. Tornado	P				S	S			

This chapter reviews emergency management activities that relate to natural hazards and identifies how the City addresses these activities. There are four basic parts to emergency management in response to a natural hazard:

7.1 Threat recognition
7.2 Warning
7.3 City response activities
7.4 Critical facilities' response activities

7.1. Threat Recognition

Threat recognition is the key. The first step in responding to a flood, tornado, storm or other natural hazard is knowing when weather conditions are such that an event could occur. With a proper and timely threat recognition system, adequate warnings can be disseminated.

Floods: A flood threat recognition system predicts the time and height of the flood crest. This can be done by measuring rainfall, snow conditions, soil moisture, and stream flows upstream of the community and calculating the impact on the community.

On larger rivers, the measuring and calculating is done by the National Weather Service, which is in the National Oceanic and Atmospheric Administration (NOAA). Flood threat predictions are disseminated on the NOAA Weather Wire or NOAA Weather Radio. Locally established rainfall and river gages are needed to establish a flood threat recognition system on smaller rivers.

If the system inaccurately predicts too high a flood, much energy and resources can be wasted responding to a threat that didn't exist. A false warning provides an added hazard of the “cry wolf syndrome:” people won't listen to the next warning.

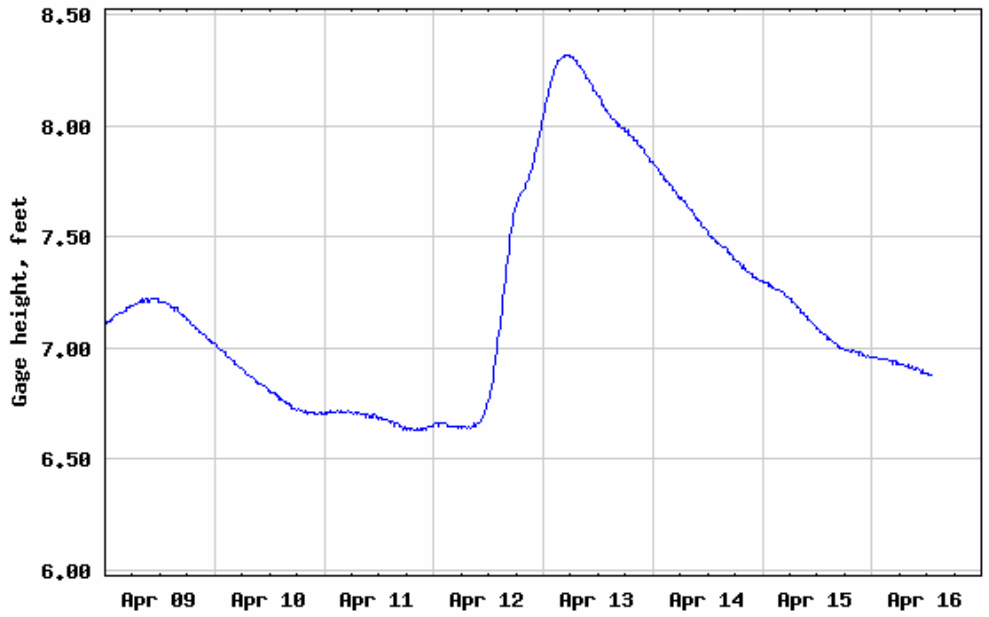
On the other hand, a system that under predicts the hazard can be even worse. The flood will catch the community and its residents unprepared. Much damage will occur, especially to vehicles, contents, and other items, that could have been moved out of harm's way.

Little Calumet Threat Recognition: The National Weather Service's Romeoville, Illinois, office monitors rainfall and river gages on the Little Calumet River and some of its tributaries. Most of these gages are operated by the U.S. Geological Survey (USGS). Anyone can check the *current* gage readings using the Internet link on the City’s website. An example of the gage reading is shown on the next page.

Based on the gage information collected and processed, the National Weather Service issues a flood crest stage and time prediction (how high and when) for the Cottage Grove gage. Sometimes a prediction can be made as long as two days in advance of the crest. The graphic on page 2-5 shows the history of flooding at this gage.

The Village of South Holland has worked closely with the Weather Service and receives the notices over the NOAA Weather Wire in its Police Department. South Holland has found a significant improvement in the accuracy of these predictions over the last five years. They have proven correct to within an accuracy of less than one-half foot. This has greatly helped the Village respond appropriately.

Winter Storms: The National Weather Service is again the prime agency for predicting winter storms. Severe snow storms can often be forecasted days in advance of the expected event, which allows time for warning and preparation. Though more difficult, the National Weather Service can also forecast ice storms.



USGS record for the Little Calumet River gage at Cottage Grove, South Holland

Tornadoes and Thunderstorms: The National Weather Service is the prime agency for detecting meteorological threats, such as tornadoes and thunderstorms. Severe weather warnings are transmitted through the Illinois State Police Law Enforcement Agencies Data System (LEADS) and through the NOAA Weather Radio System. As with floods, the Federal agency can only look at the large scale, e.g., whether conditions are appropriate for formation of a tornado. For tornadoes and thunderstorms, local emergency managers can provide more site-specific and timely recognition by sending out National Weather Service trained spotters to watch the skies when the Weather Service issues a watch or warning.

Calumet City's System: The Calumet City 911 Center monitors LEADS, weather bulletins, and flood watches and warnings. In the event that conditions are likely for a flood, the 911 Center informs the appropriate offices, who monitor the water height in the Little Calumet River, using a staff gauge on the Burnham Avenue bridge. Staff communicate with Lansing, South Holland, and Hammond during a potential flood situation. Trained spotters are sent to watch the sky when tornadoes threaten.

CRS Credit: If the City is tied in to the flood predictions at the Cottage Grove gage and sites in Calumet City, up to the maximum of 40 points could be received. This credit for flood threat recognition is a prerequisite for any other credit under Activity 610 (Flood Warning Program).

7.2. Warning

General: After the threat recognition system tells the ESDA Director that a flood, tornado, thunderstorm, winter storm or other hazard is coming, the next step is to notify the public and staff of other agencies and critical facilities. The earlier and the more specific the warning, the greater the number of people who can implement protection measures.

The National Weather Service issues notices to the public using two levels of notification:

Watch: conditions are right for flooding, thunderstorms, tornadoes or winter storms.

Warning: a flood, tornado, etc. has started or has been observed.

A more specific warning may be disseminated by the community in a variety of ways. The following are the more common methods:

- Outdoor warning sirens
- Sirens on public safety vehicles
- Commercial or public radio or TV stations
- The Weather Channel
- Cable TV emergency news inserts
- Telephone trees/mass telephone notification
- NOAA Weather Radio
- Tone activated receivers in key facilities
- Door-to-door contact
- Mobile public address systems
- E-mail notifications

Multiple or redundant systems are most effective – if people do not hear one warning, they may still get the message from another part of the system. Each has advantages and disadvantages:

- Radio and television provide a lot of information, but people have to know when to turn them on.
- NOAA Weather Radio can provide short messages of any impending weather hazard or emergency and advise people to turn on their radios or televisions, but not everyone has a Weather Radio.
- Outdoor warning sirens can reach many people quickly as long as they are outdoors. They do not reach people in tightly-insulated buildings or those around loud noise, such as at a factory, during a thunderstorm, or in air conditioned homes. They do not explain what hazard is coming, but people should know to turn on a radio or television.
- Automated telephone notification services are also fast, but can be expensive and do not work when phones lines are down. Nor do they work for unlisted numbers and calling screener services, although individuals can sign up for notifications.
- Where a threat has a longer lead time (e.g., flooding along the Little Calumet River), going door-to-door and manual telephone trees can be effective.

Just as important as issuing a warning is telling people what to do. A warning program should have a public information aspect. People need to know the difference between a tornado warning (when they should seek shelter in a basement) and a flood warning (when they should stay out of basements).

StormReady: The National Weather Service established the Storm-Ready program to help local governments improve the timeliness and effectiveness of hazardous weather related warnings for the public. To be officially StormReady, a community must:

- Establish a 24-hour warning point and emergency operations center
- Have more than one way to receive severe weather warnings and forecasts and to alert the public
- Create a system that monitors weather conditions locally
- Promote the importance of public readiness through community seminars
- Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises.

Being designated as a StormReady community by the Weather Service is a good measure of a community's emergency warning program for weather hazards. It is also credited by the Community Rating System.

Calumet City's System: When a flood is threatening, the City advises residents by:

- Community sirens
- Local radio
- Cable TV
- Loud speakers on emergency vehicles

The warning is issued by the ESDA Director or his designee. The sirens have been replaced over the last few years, so the City is being served by the latest equipment.

Because many people are still not familiar with what to do after a warning is issued, the City's public information activities cover appropriate safety precautions. An example from a recent edition of *Calumet City Review*, which is sent to all residents, is on the next page.

Calumet City has not applied for StormReady status. There are 40 StormReady communities in Illinois, including Justice, Chicago Ridge, Bolingbrook, Lemont, and Will County. Newton County is the nearest Indiana StormReady community.

CRS Credit: The CRS encourages redundant systems, so the points are additive, up to a maximum of 60 under Activity 610 (Flood Warning Program). However, the flood warning system must be described in a written and adopted flood response plan that relates predicted flood heights to specific warning actions.

Annex Q, Flood, of the City's *Emergency Operations Plan* does not have the level of detail needed for CRS credit. For example, it does not mention monitoring National Weather Service predictions of flood heights and it leaves the specific actions to be determined later, such as "Establish criteria during event for voluntary and involuntary evacuation."

Summer Flood News

Most of Calumet City's flooding and drainage problems occur during and after heavy storms. These can happen at any time, but are more common during the summer. There are many things that can be done to prepare for the storm and the water problem that may follow.

Here are some things to do:

- Keep ditches, drainage swales, detention basins and storm sewer inlets clear of debris.
- During a rain storm, keep tuned to local radio or television stations to see if there is a tornado or flash flooding hazard.
- Make a record of all your personal property. Go through your basement (if not your whole house) and record what you own. Take photographs or videotapes. Inventory forms are available free from most insurance companies or you can make your own.

FLOOD SAFETY

Do not walk through flowing water. Drowning is the number one cause of flood deaths. Currents can be deceptive; six inches of moving water can knock you off your feet. Use a pole or stick to ensure that the ground is still there before you go through an area where the water is flowing.

Do not drive through a flooded area. More people drown in their cars than anywhere else. Do not drive around road barriers; the road or bridge may be washed out.

Stay away from power lines and electrical wires. The number two flood killer after drowning is electrocution. Electrical current can travel through water. Report downed power lines to Commonwealth Edison at 1-800-334-7661.

Look before you step. After a flood, the ground and floors are covered with debris including broken bottles and nails. Floors and stairs that have been covered with mud can be very slippery.

Be alert for gas leaks. Use a flashlight to inspect for damage. Do nott smoke or use candles, lanterns or open flames unless you know the gas has been turned off and the area has been ventilated. If you have questions on gas, call 1-888-642-6748 (1-888-NICOR4U).

Carbon monoxide exhaust kills. Use a generator or other gasoline-powered machine outdoors. The same goes for camping stoves. Charcoal fumes are especially deadly. Cook with charcoal outdoors.

Clean everything that got wet. Flood waters have picked up sewage and chemicals from roads, farms, factories and storage buildings. Spoiled food, flooded cosmetics, and medicine can be health hazards. When in doubt, throw them out.

Take good care of yourself. Recovering from a flood is a big job. It is tough on both the body and the spirit and the effects a disaster have on you and your family may last a long time. Keep your eyes open for signs of anxiety, stress and fatigue in you and your family.

***Calumet City Review's* page on flood safety precautions**

7.3. City Response Activities

General: The protection of life and property is the foremost important task of emergency responders. Concurrent with threat recognition and issuing warnings, a community should respond with actions that can prevent or reduce damage and injuries. Typical actions and responding parties include the following:

- Activating the emergency operations center (ESDA)
- Closing streets or bridges (police or public works)
- Shutting off power to threatened areas (utility company)
- Passing out sand and sandbags (see photo) (public works)
- Ordering an evacuation (mayor)
- Opening evacuation shelters (Red Cross)
- Holding children at school/releasing children from school (school district)
- Monitoring water levels (engineering)
- Security and other protection measures (police)

Emergency response planning will make flood response activities more efficient

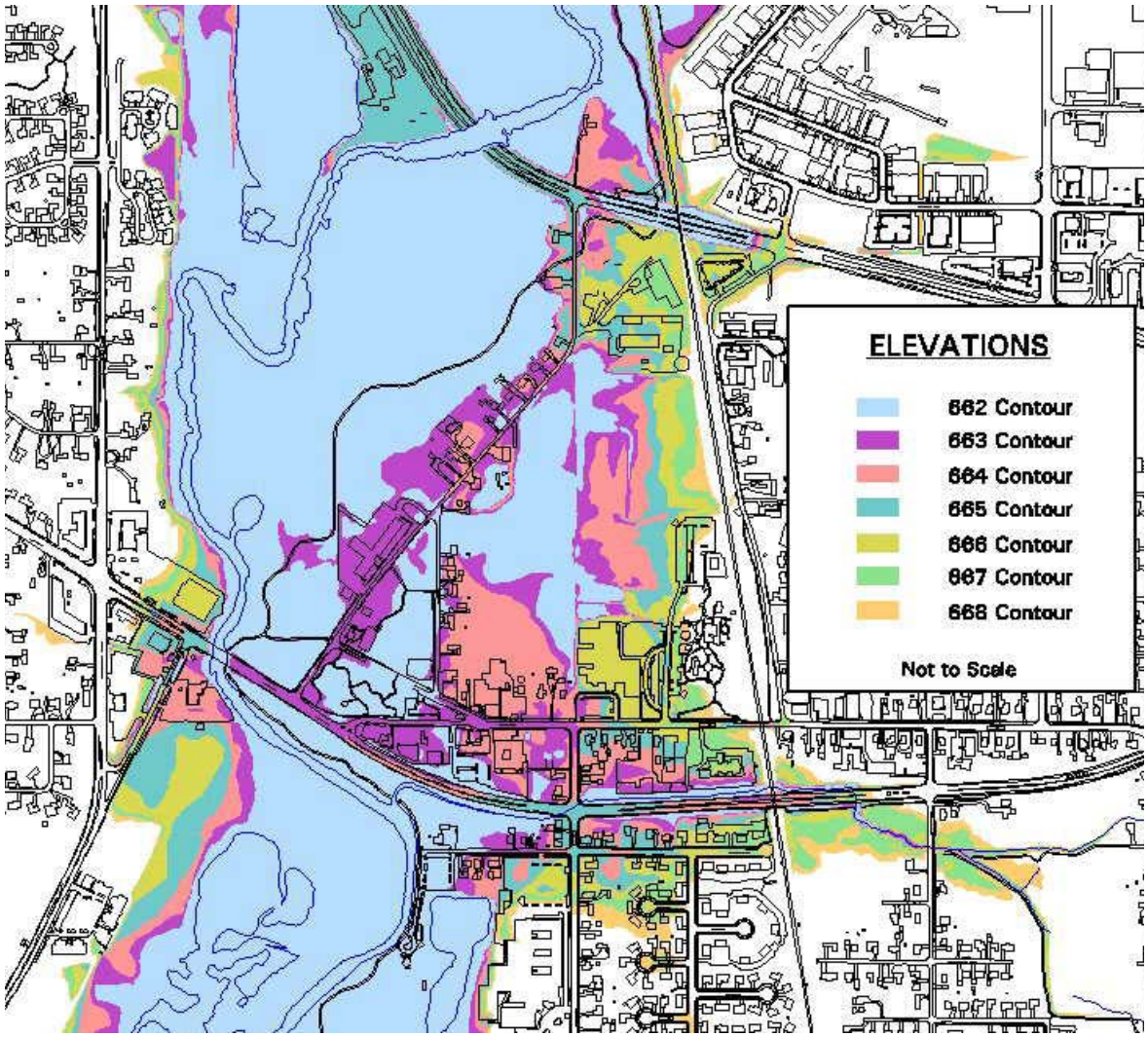
An emergency action plan ensures that all bases are covered and that the response activities are appropriate for the expected threat. These plans are developed in coordination with the agencies or offices that are given various responsibilities.

Planning is best done with adequate data. One of the best tools is a flood stage forecast map that shows what areas would be under water at various flood stages (see example, next page). Emergency management staff can identify the number of properties flooded, which roads will be under water, which critical facilities will be affected, etc.. With this information, an advance plan can be prepared that shows problem sites and determines what resources will be needed to respond to the predicted flood level (see example to the right).

Key Flood Activities That Need to be Monitored

12 Feet	Close off Edgewater Park
13 Feet	Close Grand Avenue between Alexandria Pike & Broadway
	Notify residents along Short Hazlett, 1st & Madison, 2nd & Sycamore, and Riverside Drive to prepare for sandbag operations and to make preparations for possible evacuation *(dependent on forecast and rate of rise)*
14 Feet	Manhole at Athletic Park behind pool starts to overflow
	Killbuck Creek begins to overflow into Aqua Gardens / Shadyside Lake – Close off walking paths around lakes

Flood response plan for Anderson, Indiana, showing specific actions to be implemented at specific flood stage predictions. Preparing this type of plan is based on past experience and a flood stage forecast map.



This Flood Stage Forecast Map was developed for the Des Plaines River. Different flood levels are shown as color coded areas, so the emergency manager can quickly see what will be affected.

Village of Gurnee, Illinois

Emergency response plans should be updated annually to keep contact names and telephone numbers current and to make sure that supplies and equipment that will be needed are still available. They should be critiqued and revised after disasters and exercises to take advantage of the lessons learned and changing conditions. The end result is a coordinated effort implemented by people who have experience working together so that available resources will be used in the most efficient manner.

Calumet City's System: The City's flood response activities involve the police, fire, public works, ESDA and sewer departments. The departments work together to distribute sandbags and loads of sand and gravel to low points along the levee, particularly at the Burnham Avenue Bridge. The City also distributes portable pumps to locations where there is seepage through the levee.

The *Emergency Operations Plan* has a flood annex, but it is relatively generic and does not provide operational details. The City staff responsible for flood response efforts have experience from past floods. In the last 20 years only two flood warnings have been issued and the last evacuation was in 1983. In 1996 the Little Calumet River came close to over topping the levee. The City does conduct an annual emergency response drill.

CRS Credit: The CRS provides up to 50 credit points for a community's flood response efforts. As noted in the previous section, Annex Q, Flood, to the City's Emergency Operations Plan, assigns flood response responsibilities and provides general direction. However, it does not relate actions to predicted flood levels and is not specific enough to qualify for credit. The Anderson, Indiana, example above illustrates the level of detail needed for CRS credit.

7.4. Critical Facilities

General: Protecting critical facilities during a disaster is the responsibility of the facility owner or operator. However, if they are not prepared for an emergency, the rest of the community could be impacted. If a critical facility is damaged, workers and resources may be unnecessarily drawn away from other disaster response efforts. If such a facility is adequately prepared by the owner or operator, it will be better able to support the community's emergency response efforts.

Most critical facilities have full-time professional managers or staff who are responsible for the facility during a disaster. Some have their own emergency response plans. Illinois state law requires hospitals, nursing homes, and other public health facilities to develop such plans. Many facilities would benefit from early warning, response planning, and coordination with community response efforts.

Calumet City's Facilities: Calumet City's **c**ritical facilities are discussed in section 2.11 of this plan. City staff has contact names and telephone numbers for them. Most of them do not have their own response plans.

The City did obtain and distribute NOAA Weather Radios (with battery backup) to all schools and special population facilities, such as nursing homes.

CRS Credit: Calumet City could receive 10 points for having an up to date list of the name and phone numbers of the critical facilities. An additional 40 points is available under Activity 610 (Flood Warning Program) if these facilities developed their own flood response plans and coordinated with the City's response efforts.

Thornton Fractional North High School is a critical facility that was recently given a NOAA Weather Radio

7.5. Conclusions

1. Accurate flood stage and time predictions are available for the Little Calumet River from the nearby Cottage Grove Avenue gage. However, to be useful, the City needs to be able to access the Weather Service predictions and convert the data to sites in Calumet City.

2. The best warning that can be expected for the local drainage and sewer backup flooding, tornadoes, and thunderstorms is a general “watch” issued by the Weather Service.

3. The City has effective means to disseminate warnings to the general public.

4. Calumet City has successfully responded to recent disasters, especially floods. However, the Emergency Response Plan does not provide enough specific guidance to qualify for credit under the Community Rating System.

5. While many critical facilities have been given NOAA Weather Radios, most do not have flood or other emergency response plans that are coordinated with the City's response efforts.

7.6. Recommendations

1. A flood stage forecast map should be prepared using available topographic data. If possible, this should be based on a geographic information system (GIS) to provide real time capabilities.

2. The flood stage forecast map should form the basis for a flood-specific emergency response plan or annex to the City’s new *Emergency Operations Plan* that would qualify for CRS credit.

3. The should qualify for, and apply to be, a StormReady community.

4. The City should work with floodprone critical facilities to develop hazard emergency response plans for each, coordinated with the City’s emergency operations.

5. Residents and businesses should be made aware of the hazard warnings and the appropriate safety precautions that should be taken after a warning.

7.7. References

- *CRS Coordinator’s Manual*, Community Rating System, FEMA, 2002
- *CRS Credit for Flood Warning Programs*, National Flood Insurance Program Community Rating System, 2002.
- *Emergency Operations Plan*, City of Calumet City, March 2001
- *Flood Fighting*, Illinois Department of Transportation, Division of Water Resources, 1985.
- *Guidelines on Community Local Flood Warning and Response Systems*, Federal Interagency Advisory Committee on Water Data, 1985.
- Information on StormReady communities can be found on the National Weather Service website, www.nws.noaa.gov/stormready/

Chapter 8. Flood Control

As noted by their name, flood control measures control floodwaters and keep them from reaching damageable property. They are also called "structural" measures because they involve construction of man-made structures to affect surface water flows. This plan reviewed eight aspects of flood control projects:

8.1 Reservoirs
8.2 Thornton Reservoir
8.3 Levees and floodwalls
8.4 Diversions
8.5 Channel modifications
8.6 Drainage system maintenance
8.7 Drainage improvements
8.8 Sewer improvements

It should be noted that most flood control projects can be very expensive. They have other shortcomings, too:

— They disturb the land and disrupt natural water flows, often destroying habitats.
— They require regular maintenance, which if neglected, can have disastrous consequences.
— They are built to a certain flood protection level that can be exceeded by larger floods, causing extensive damage.
— They can create a false sense of security, as people protected by a project often believe that no flood can ever reach them.

There have been several flood control studies on the Little Calumet River system and on Calumet City's sewer problems. The most important one was the 1975 Little Calumet River *Floodwater Management Plan*, by the Little Calumet River Steering Committee. Most parts of this plan have been or are being implemented.

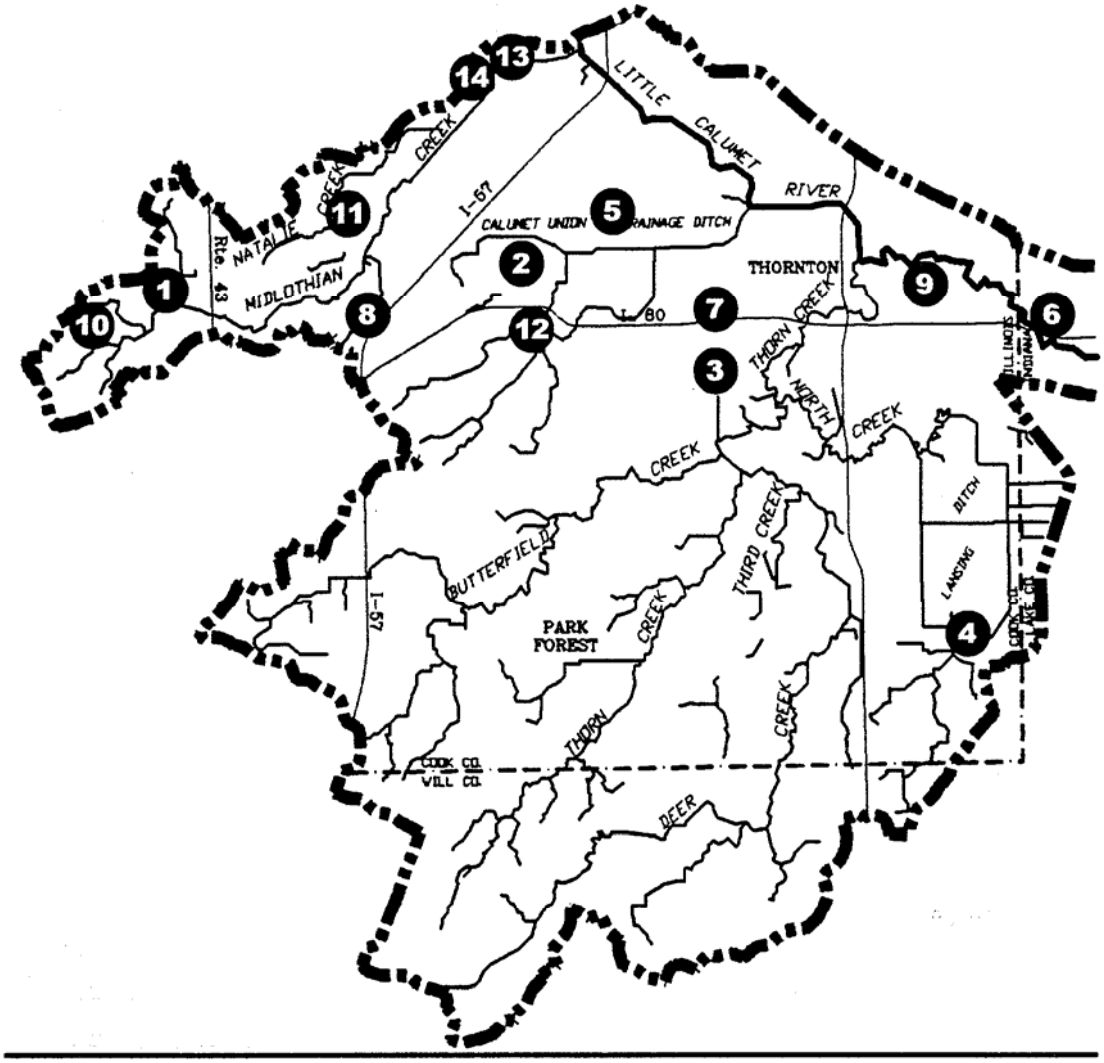
8.1. Reservoirs

General: Reservoirs control flooding by holding high flows behind dams or in basins. After the flood peaks, water is let out slowly at a rate that the river can handle. The lake created may provide recreational or water supply benefits and dry basins can double as parks or other open space uses.

Reservoirs are appropriate for protecting existing development without disrupting it. They are most efficient in deeper valleys where there is more room to store water or on smaller rivers where there is less water to store. They are often infeasible in flat areas because so much land is needed. As with all large flood control projects, reservoirs usually cost so much that they cannot be built without state or federal aid. There are also continued operation and maintenance costs.

Little Cal Plan: The map on the next page shows the major flood control projects proposed by the 1975 Little Calumet Plan. Reservoirs were the most popular recommendation, although most of the projects are downstream from Calumet City. The Dr. Mary Woodland Reservoir (site 4 on the next page) is completed and stores 1,089 acre feet of floodwater from Plum Creek, a tributary to the Little Cal upstream of Calumet City.

Calumet City Reservoir: There is a reservoir in the southeast corner of Calumet City. It actually does not reduce flooding. It was constructed to compensate for the floodwater storage that was lost when the City's levee was constructed.



Natural Resources Conservation Service

1 TINLEY PARK RESERVOIR (TINLEY PARK)
2 EDWARD C. HOWELL RESERVOIR (MARKHAM)
3 THORNTON COMPOSITE RESERVOIR (THORNTON)
4 DR. MARY WOODLAND RESERVOIR (LYNWOOD)
5 CALUMET UNION CHANNEL IMPROVEMENT (HARVEY)

Natural Resources Conservation Service

6 LITTLE CALUMET RIVER INDIANA LEVEES (HAMMOND & MUNSTER)
7 CUP THORNTON COMPOSITE RESERVOIR (CUP)

Office of Water Resources

8 TWIN LAKES RESERVOIR (MIDLOTHIAN)
9 LITTLE CALUMET RIVER DREDGING
10 FERNWAY FLOOD CONTROL PROJECT
11 MIDLOTHIAN RETENTION BASIN

Metropolitan Water Reclamation District

12 CALUMET UNION RESERVOIR (HAZELCREST)
13 MIDLOTHIAN CREEK DIVERSION CHANNEL (ROBBINS)
14 NATALIE CREEK DIVERSION CHANNEL (MIDLOTHIAN)

Little Calumet Plan Project Locations

Our Community and Flooding, 1998, page 38

8.2. Thornton Reservoir

The most important part of the Little Cal plan for Calumet City is the Thornton Reservoir which is located in the north end of the Thornton Quarry (sites 3 and 7 on the map on page 8-2). The cost of a new reservoir is reduced by obtaining a storage basin that has already been dug.

The Thornton Quarry project is being built in several stages by the Metropolitan Water Reclamation District of Greater Chicago (MWRD) with funding support from the Corps of Engineers and the Natural Resources Conservation Service. The first stage (the Transitional Reservoir) stores 9,600 acre feet (3.1 billion gallons) of Thorn Creek floodwater overflow. Under the second phase (the Composite Reservoir), 14,600 additional acre feet will be provided for storage of floodwaters collected by the Deep Tunnel. Phase II is expected to be completed in 2013.

The first stage was completed in 2003. At the Thorn Creek intake structure (see photos, below), high water is diverted to a 24 foot diameter shaft that drops 230 feet. The water then flows through an 8,000 foot long, 22-foot diameter tunnel to the west lobe of the Quarry. During its first eight months of service, the structure was put to use three times. MWRD estimates that it has already prevented $15 million in flood damage.

The intake structure, normal flow on Thorn Creek

The intake structure, high flow on Thorn Creek

The west lobe of the Thornton Quarry, home of the Transitional Reservoir

The west lobe, half full of floodwater in 2003

Photos courtesy of MWRD

CRS Credit: The Community Rating System credits flood control projects that lower the base flood elevation but excludes those areas that are removed from the mapped floodplain. When the Little Calumet River floodplain maps are revised to reflect the Thornton Reservoir, credit can be calculated and applied for (Activity 530 − Flood Protection).

8.3. Levees and Floodwalls

General: Probably the most common flood control measure is to erect a barrier of earth (levee) or concrete (floodwall) between the river and the property to be protected. Levees and walls must be well designed to account for large floods, underground seepage, pumping of internal drainage, and erosion and scour.

Levees and floodwalls are appropriate for protecting existing development without disrupting it. Levees need a lot of room to fit between the river and the area to be protected. If space is a constraint, more expensive floodwalls are used. Both must be set back out of the floodway so they will not push floodwater onto other properties.

Their design also should compensate for the flood storage that they will displace and for access through or over the barrier. When designing levees and floodwalls, special consideration must be taken of storm sewer outfalls and other drainageways that can be negatively impacted by higher stream levels.

Large floods can overtop levees or floodwalls and inundate properties thought to be protected. If a levee or floodwall fails, the sudden rush of floodwater can endanger lives and may cause greater damage than having no flood barrier at all. They can be barriers to access and views, too. There are continued operation and maintenance costs to ensure the pumps work and that the levees do not slump or develop holes from animals or roots.

Little Cal Plan: The 1975 Little Cal plan reviewed the feasibility of levees and floodwalls. It was concluded that they would only be cost effective in Indiana where there was more room between the channel and the buildings (site 6 on page 8-2). The U.S. Army Corps of Engineers has subsequently planned and started construction of 22 miles of levees and floodwalls along the Little Cal to protect Gary, Griffith, Hammond, Highland and Munster. The levees are estimated to cost $157,000,000 when completed.

As noted in Chapter 2, most of the Little Cal's waters on the Indiana side flow east to Lake Michigan. The Indiana levee project focuses on these flood flows. Overbank storage areas and a control structure are to compensate for increases in flood heights caused by the levees. The control structure will be located west of Hart Ditch (called Plum Creek in Illinois), just east of Northcote Avenue. It will be a dam with a square hole in it to restrict the amount of water that flows toward Illinois. As a result of these measures, the 100- and 200-year flood levels will be slightly lower (0.3 foot) at the state line after the Indiana levee project is completed.

Lansing: In the mid to late 1980's, Lansing constructed a levee and floodwall system on the Little Cal to protect properties from the 25 - 50-year flood. It was successful during the 1990 flood, although there were reports of some water splashing over the top.

Dolton: The Illinois Department of Natural Resources, Office of Water Resources, developed a plan to assist Dolton with raising an abandoned railroad embankment. The result will act as a levee and protect 80 homes on the Little Calumet River. As with the Lansing levee, this one would not provide 100-year flood protection.

Calumet City Levee: After the flood in 1982, Calumet City improved and raised an existing earthen levee along the Little Calumet River from the Illinois-Indiana state line to the Burnham Greenway (shown as the Penn Central tracks on the maps). Development in Calumet City had occurred up to the river and the majority of the land is privately owned. This kept the levee small (a levee needs 6 feet of width at the ground for every foot in height).

The Calumet City levee was constructed for a 25 - 50-year flood, the same height as Lansing's levee and floodwall. Both systems proved their worth by protecting hundreds of homes from the floods of 1990 and 1996. However, Calumet City's levee has a variety of problems:

- There has been seepage through the levee during periods of high water, flooding yards but not flooding any homes or businesses.
- There has been settlement in some areas. The City has had to put out sandbags at low points along the levee.
- There are gophers burrowing into the levee, creating tunnels that can act as pipes for flooding during high water.
- Beavers have moved back into the area and create their own maintenance problems by building small dams.

Animal burrows in the Calumet City Levee

Source: *Jeff Newman*

A 1993 inspection by the Corps of Engineers reported that the levee was "determined to have serious maintenance deficiencies such as denuded riverside slopes, animal burrows, extensive large tree growth, low spots in the levee crest and inoperable check valves for some of the existing interior drainage culverts."

In an October 1998 report to the City Council, Robinson Engineering stated, "the earthen dike that was built by the city was a temporary measure due to the limited funds that the city had on hand. The dike now is eroding and with the rapidly moving waters, burrowing animals, and erosion at the curves, deterioration is a constant maintenance problem. The original solution recommended in the 80's, as well as the solution recommended today, is to replace the earthen dike with a concrete dike along the same limits as described above. The dike would also be constructed to the same height as the earthen dike."

Accordingly, the City Council authorized Robinson to proceed with plans and specifications. If accepted by the Council, the concrete floodwall was estimated to cost $4 to $5 million. However, funding limitations prevented this project from starting.

The Sewer Department has taken over the responsibility for maintenance. In November of 1998 the Department began a formal monthly inspection of the levee and a regular maintenance

program. The Department is in the process of replacing the drain valves in the levee with more secure valves.

CRS Credit: The CRS does not credit construction of new levees. However it does credit *maintaining* levees that are not large enough to be reflected on flood maps (i.e., that provide less than 100-year flood protection). However, for this CRS credit, the levee must be at least three feet higher than the 25-year flood level. The crown of the Calumet City levee is less than two feet above the 25-year flood level, too low to be recognized by the CRS. After the floodplain is remapped to reflect the Thornton Transitional Reservoir, the Little Calumet River flood levels will drop and the levee may qualify for CRS credit at that time.

8.4. Diversions

General: A diversion is simply a new channel that sends water to a different location. Where a stream runs near a large body of water, such as a lake or a larger river, a diversion of high flows to that body can be a cost effective flood control measure. Diversions can be surface channels, overflow weirs, or tunnels.

Diversions are limited by topography; they won't work everywhere. The receiving body has to be relatively close to the river and the land in between should be low and vacant. Otherwise, the cost can be prohibitive. Where topography and land use are not favorable, a more expensive tunnel is needed.

Little Cal Plan: The South Suburbs' flatness and numerous ditches make diversions feasible. The 1975 Little Calumet plan included two diversion channels to connect ditches to the Cal-Sag channel (sites 13 and 14 on page 8-2). These were later replaced by larger storm sewer projects.

In 1992, Robinson Engineering studied the feasibility of a diversion tunnel for the Village of South Holland. It would convey floodwaters from the Little Cal to the Grand Calumet north of Calumet City. The tunnel would be 12,000 feet long, 75 feet deep and 25 feet in diameter. It would carry 5,000 cubic feet of floodwater per second.

The proposed diversion tunnel would provide protection to Calumet City, Dolton, and Lansing as well as South Holland. Its major disadvantage was the cost. Alternative approaches were estimated at $19,570,000 and $22,060,000. The project had a variety of problems, including the need for all benefiting communities to contribute, permits needed from many agencies, the effects of diverting floodwaters to another area, and the impact on the economic justification for the Quarry. It would only be worthwhile if the Thornton Quarry was not operational before 2010. Given all these shortcomings, the project was dropped by South Holland's Village Board.

The Thornton Transitional Reservoir has an intake structure that is called a diversion. Water is diverted from Thorn Creek to the quarry reservoir and later pumped through the deep tunnels to a wastewater treatment plant.

CRS Credit: The Community Rating System does not credit construction of diversion channels. However, such flood control projects result in flood map revisions which reduce the flood insurance premiums for affected properties.

8.5. Channel Modifications

General: A channel can be made wider, deeper, straighter, or smoother so it will carry more water and/or carry it downstream faster. Some smaller channels can be lined with concrete or even put in underground pipes. Channel modifications are appropriate for smaller streams and ditches in developed areas, particularly if there is no room for a levee.

Channel modification project

Dredging is one form of channel maintenance. It is usually cost prohibitive because the dredged material must be disposed of somewhere and the river will usually fill back in with sediment in a few years. Dredging is usually conducted only to maintain a navigation channel.

Culvert and bridge modifications include the replacement, enlargement or removal of existing culverts at roadway and railway crossings. Often, existing culverts and bridges are not large enough to pass flood flows, resulting in floodwaters backing up upstream of the culvert. Floods and accidents can damage a culvert inlet or debris can block the inlet, which reduces the culvert capacity.

The removal of culverts or bridges at abandoned roads or railways can reduce flood heights in that location, but it can also transfer the flood problem downstream. Culvert or bridge enlargement projects can produce the same effect. As with all flood control measures, careful study of the project impacts is required along with the necessary permitting by regulatory agencies.

Channel modifications and their continual maintenance can be expensive. They can damage or destroy wildlife habitats and create new erosion problems. Straightening a stream is only temporary because it tries to eliminate meanders and other features that nature will continually work to recreate. Sending water faster downstream may aggravate a flood problem downstream.

Little Cal Plan: Channel modifications have been implemented on the Little Calumet system since the 1930's. Projects have included dredging various sections of the Little Cal and widening its receiving stream, the Calumet-Sag Channel. While helpful, the benefits from these projects were relatively short-lived as debris and sediment returned to the channel over the years.

The 1975 Little Calumet plan proposed two channel modification projects. The first involved two miles of the Calumet Union Drainage ditch, 1.75 miles of channel improvements and 0.25 miles of concrete lining (site 5 on page 8-2). This project was completed in 1988 at a cost of $4.4 million.

The other project was a proposal to clear debris and snags and dredge 4.5 miles of the Little Calumet River in Lansing and Calumet City (site 9 on page 8-2). It would have cost up to $2 million in state funds.

The dredging project was designed primarily for environmental and aesthetic improvements. The 1986 "Final Project Planning Report" stated "The permitted action will have only a minimal effect (in general, less than 0.3 feet) on lowering flood elevations in the Little Calumet River. The largest reductions in flood elevations were simulated to occur in floods of a two-year recurrence interval or less. Larger floods showed a smaller reduction in flood elevations." (page VI-6) After many years of attempting to obtain rights of way from adjacent property owners, the project was dropped.

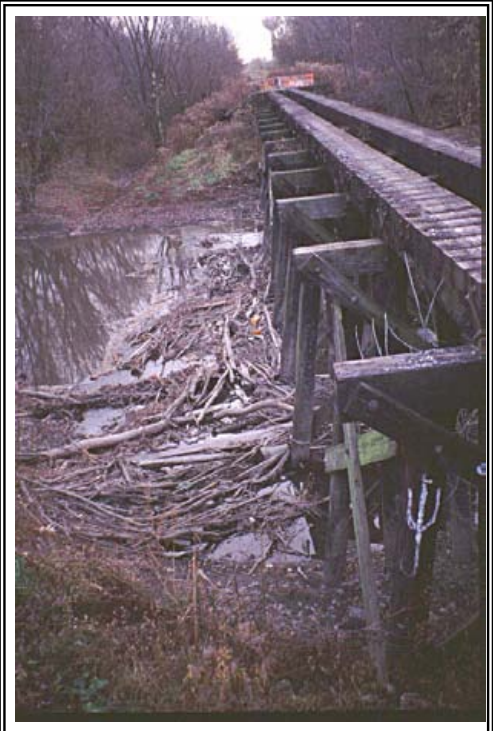
Corps of Engineers' Clearing and Snagging: The U.S. Army Corps of Engineers' looked into interim solutions to help alleviate flooding until the Thornton Quarry is operational. It proposed a "clearing and snagging" project on the Little Calumet River between Thorn Creek and Harvey. The project was to remove sediment that has collected under bridges and debris that has collected in the channel and along the banks.

During the planning process it was found that the sediment contained materials that would have to be hauled to a special landfill. This increased the project's costs so that they outweighed the benefits. Because of this, the Corps has had to stop its involvement in the project.

Channel Modifications in Calumet City: There are four street and two railroad bridges over the Little Calumet River. They do catch debris, which complicates channel maintenance. However, a review of the flood profiles from the FEMA Flood Insurance Study shows that none of them have an impact on flood levels, even for the 10-year flood.

One of the railroad bridges is part of the abandoned Penn Central right of way. It had been a major collector of debris and logs (see photo). Several trestle supports have been removed to eliminate this choke point. However, the debris will still be in the channel.

CRS Credit: A regularly funded capital improvements program to modify channels to reduce debris catchers and other maintenance problems would receive 50 points (Section 541.a.3). Calumet City does not currently have such a program.



Debris at Penn Central Bridge (1999)

8.6. Drainage System Maintenance

While channel improvements are one-time projects, channel maintenance is an ongoing program to clean out blockages caused by overgrowth or debris. This work is usually done by a community's public works crew. A proper maintenance program does more than just pick up debris. It should also work to eliminate recurrent problems. One way this is done is through "riparian restoration," i.e., by removing non-native growth. By planting native grasses and plants, there are fewer sources of logs and woody debris, soils are better stabilized, bank erosion is reduced and habitat is improved.

Little Cal Plan: As a participant in the Little Calumet plan, Calumet City signed a "stream preservation" agreement with the Illinois Department of Transportation, Division of Water Resources in 1984. Under the agreement the City was to inspect and maintain the channels to reduce flooding and enhance the appearance of the streams.

Calumet City's Program: The Little Calumet River runs in a very well-defined channel, similar to the "bottomland" of other large streams. In most areas, the channel is out of sight from sites back from the bottomland's banks, especially where the levee also blocks one's view. Therefore, most people do not notice the debris and branches that have fallen into the channel.

Pursuant to the 1999 floodplain management plan, the City has implemented a formal stream preservation program. The Sewer Department conducts regular inspections and works hand in hand with Lansing on maintenance of the Little Calumet River. Problems like the log jam shown on the previous page are now prevented.

However, it has been noted that while most attention has traditionally been given to channels, two other parts of the drainage system need maintenance, too. Retention and detention basins can silt in and their inlets and outlets can become blocked with debris. Storm sewer catch basins become clogged with leaves or trash and have caused street flooding. Much work would be alleviated if the owners of facilities took better care of them and if people looked out for the inlets in front of their homes.

Another problem is that one City office, the Sewer Department, maintains the Little Cal channel and levee, while another office, the Department of Inspectional Services, inspects retention basins, receives complaints, and is responsible for providing the needed records for Community Rating System credit. The Sewer Departments' work records are not always supplied to DIS.

CRS Credit: The City's maintenance program receives 250 points under the Community Rating System (Section 541.a). However, the CRS credit is for maintenance of open channels and retention basins and does not require attention to storm sewers and inlets.

8.7. Drainage Improvements

General: Some properties, especially those outside the mapped floodplain, are subject to very shallow surface flows. These flows may just be the runoff from the neighbors' yards, but they can cause significant damage to a basement or lower area.

Often the local drainage problem can be corrected with a little work to redirect the flows or install a tile to drain a chronically wet area. Sometimes this work simply restores the yard drainage system to its originally intended state, before unknowing owners put up fences or other obstructions to surface drainage. This is one solution that owners may take upon themselves. All that may be needed is a shovel and some care taken to ensure that flows aren't diverted into someone else's building.

Calumet City Program: There were 490 respondents to the 1999 flood questionnaire. Of those, 40 reported that they have installed drain tiles or regraded their yards to keep water away from their buildings. There are likely more cases of this type of work, but often permits are not obtained so there is no record of owner-constructed drainage improvements.

8.8. Sewer Improvements

General: As discussed in Chapter 2, many Calumet City buildings suffer from sewer backup. There are four basic ways to correct this problem but each has its own shortcomings.

1. Make the sewers large enough to handle the excess flows
2. Provide safe storage for overflows
3. Plug the leaks that let stormwater into the sanitary system
4. Prevent overloaded sewers from backing up into basements.

This last approach has been implemented by individual property owners through backup valves, overhead sewers, and standpipes. This approach is discussed in more detail in Chapter 4. Property Protection.

The common problem with all four approaches is the expense. To dig up the many miles of a community's sewers and replace them with larger pipes can be a tremendous cost. Storing the excess flows and plugging the leaks are also very expensive alternatives. However, the Deep Tunnel was seen as a feasible way to carry and store excess stormwater in the sewer system.

The Deep Tunnel: The Deep Tunnel is a regional project undertaken by the MWRD. The purpose of the tunnel is to provide storage capacity for the regional sewer system during times of heavy rainfall and flooding. It was connected in 1996 and has had an impact on Calumet City. Areas in the City that experienced street flooding and sewer backups have not had any incidents since the completion of the tunnel.

MWRD is naturally greatly concerned with infiltration and inflow ("I/I") into its sewer lines. MWRD has required its communities to participate in an I/I Corrective Action Program, known as "ICAP." A limit of 150 gallons per capita per day was set for the sanitary sewer lines. Anything over that is considered excessive I/I.

Calumet City's Program: Calumet City has undertaken numerous sewer improvement projects since the early 1980's. These have included relief sewers, pump station improvements, and retention ponds to hold the excess water and let it drain through the sewers more slowly.

The City inspected its sewers under ICAP, one section of town at a time. The work included televising sewer mains, using dye to check for downspout connections, and even digging up the lines to see what the problems were.

In the area between the western city limits and Burnham Avenue and north of Sibley Avenue the City installed separate sanitary and storm sewers (see B Zone on the map on page 2-2). The purpose was to alleviate street flooding and sewer backups in this area. As part of this project two retention basins have been constructed, the Yates Retention basin and the Superior Detention Pond. These basins were complete around 1993 and 1994. Since the completion of these projects there has not been flooding in this area.

To prevent backflow of floodwaters into the sewer system, Calumet City has valves or flap gates on all outfall pipes draining into the Little Calumet River. To move water faster in this flat area, there are three sewer pump stations, two on the Little Cal at Lincoln and Green Bay Avenues, and one at State and Burnham in the north of the City. These stations are so important to drainage during rains that they are designated as critical facilities in this plan on page 2-39.

Lincoln Ave Pump Station Flap gates

The City established a sewer user charge to finance sewer maintenance in the City. In November 1998, the Sewer Department began to keep a phone log of calls to track problems and complaints. The Department also has a vacuum truck to clean clogs in the lines.

CRS Credit: A regularly funded program to improve sewers to reduce drainage maintenance problems would receive 50 points. Sewer maintenance could also be credited under this activity (540 − Drainage System Maintenance).

8.9. Conclusions

1. Structural flood control projects are expensive, can be disruptive to the environment and can give residents a false sense of security. Several projects, such as the diversion tunnel, dredging the Little Cal, and the Corps' clearing and snagging, have not been pursued for these reasons.

2. The Thornton Transitional Reservoir has had a major impact on Little Calumet River flood levels. It will have a slightly greater impact when the flood control projects in Indiana and the north lobe project (the Thornton Composite Reservoir) are completed.

3. Calumet City has benefited greatly from its levee along the Little Calumet River. However, repairs and improvements are needed if the levee is to be depended on when needed.

4. Other successful small scale flood control projects include the separate sewers and retention basins in the northwestern quarter of the city which have reduced local drainage and sewer backup problems.

5. The City's channel maintenance program has reduced overbank flooding from smaller, more frequent storms and improves the appearance of the river, all at a relatively low cost. However, more attention is needed toward maintaining retention basins and storm sewer inlets and improving internal coordination of the maintenance activities.

8.10. Recommendations

1. An evaluation should be conducted to determine the costs and benefits of upgrading the levee along the Little Calumet River. The study should be conducted after the official floodplain mapping program determines the impact the Thornton Transitional Reservoir has on 100-year flood levels.

2. Until the evaluation is completed, the City should continue to maintain the levee and fix problems that cause imminent threats to its stability.

3. The City should continue its program of sewer improvements and drainage improvements.

4. The City's channel and retention basin maintenance programs should be expanded to cover storm sewer inlets and a single set of procedures and records should be developed. Inspection and maintenance records for Sewer Department work need to be submitted to the Department of Inspectional Services, the official CRS record keeping and reporting office.

5. A variety of measures should be used to advise property owners of their drainage maintenance responsibilities, such as signs and one-on-one talks with City staff during their inspections.

8.11. References

- Correspondence from Robinson Engineering, Ltd. to the Calumet City City Council.
- *CRS Credit for Drainage System Maintenance*, National Flood Insurance Program/Community Rating System, 2002.
- *Dolton Levee Project*, IDOT-Division of Water Resources, 1992.
- *Dolton-South Holland Flood Study*, Robinson Engineering, Ltd. 1992.
- *Feature Design Memorandum 5 - West Reach Levee System, Little Calumet River, Indiana, Local Flood Protection and Recreation*, U.S. Army Corps of Engineers, 1994
- *Final Project Planning Report, Little Calumet River Dredging Project*, TenEch Engineering, Inc., 1986.
- *Flood Insurance Study, Cook County, Illinois*, FEMA, November 8, 2000.
- *Floodwater Management Plan and Environmental Assessment, Little Calumet River*, Little Calumet River Steering Committee, 1975.
- *Managing and Resorting Stream Greenways: A Landowner's Handbook*, Northeastern Illinois Planning Commission, 1998.
- "Memorandum of Cooperation and Understanding Regarding Stream Preservation on the Little Calumet River Watershed" between the City of Calumet City and the Illinois Department of Transportation, Division of Water Resources, 1984.
- *Our Community and Flooding*, Resource Coordination Policy Committee, 1998.
- Presentations to the planning committee by representatives of the Corps of Engineers and the Metropolitan Water Reclamation District.

Chapter 9. Public Information

A successful flood management program involves both the public and private sectors. Through public information activities property owners, renters, businesses and local officials are advised about the hazards and ways to protect people and property from the hazards. They can also motivate people to take flood protection steps and protect the natural and beneficial functions of floodplains and watersheds.

There are five general public information activities reviewed in this chapter:

9.1 Flood hazard mapping
9.2 Outreach projects
9.3 Technical information
9.4 Technical assistance
9.5 Real estate disclosure

To help determine which types of activities and what messages should be used in Calumet City, a survey was conducted. The results of this survey are reviewed in section 9.6 Public Information Survey.

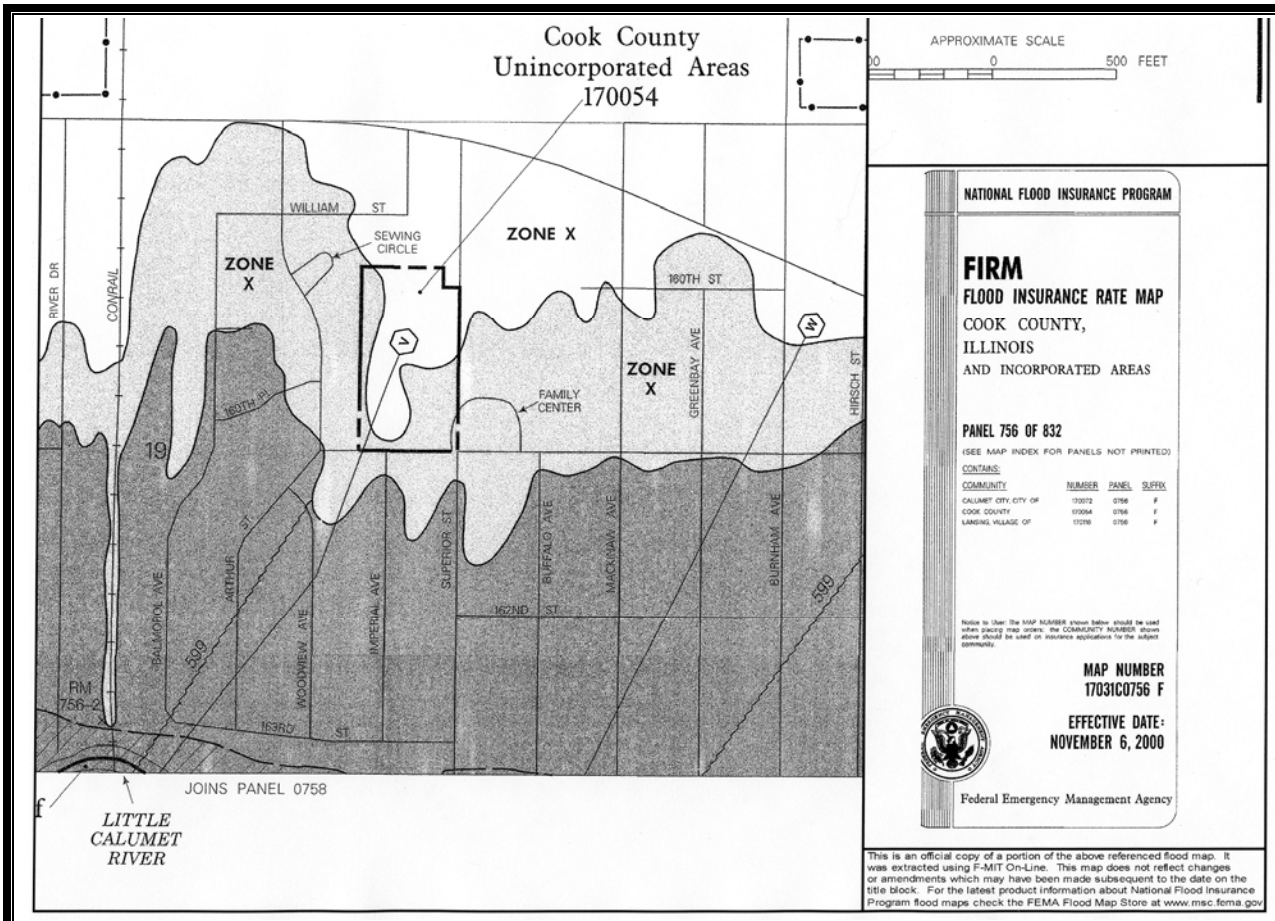
9.1. Flood Hazard Mapping

General: Many benefits stem from providing information on hazardous locations to inquirers. Residents and businesses who are aware of the potential hazards can take steps to avoid problems and/or reduce their exposure to that hazard. Real estate agents and house hunters can find out if a property is floodprone and whether flood insurance may be required.

Flood maps have a wealth of information about past and potential flood hazards. However, to be helpful, flood maps must be (1) accurate and (2) easy to use. Therefore, communities that work to improve their maps and provide map information to their citizens provide a valuable public information service. Communities may also assist residents in submitting requests for map amendments and revisions when they are needed to either correct the map or show that a building is outside the mapped floodplain.

Users and inquirers need to remember that maps are not perfect − they only display the larger floodprone areas that have been studied. Some maps are based on data that are more than 20 years old. In some areas, watershed developments make even recent maps outdated. Inquirers should be advised of known flood problem areas that do not show on a published map.

The Cook County FIRM: Calumet City's official floodplain map is the Cook County Flood Insurance Rate Map (FIRM). The City appears on nine different panels. An example appears on the next page. The Cook County FIRM was published in 2000. However, the Little Calumet River floodplain portion is based on a study conducted in the early 1970's and does not reflect the flood control benefits of the Thornton Transitional Reservoir. A draft profile of flood elevations produced by the Corps of Engineers shows the "after project" 100-year flood level up to three feet lower than the currently published elevations. It is expected that most of the area shown as floodplain in the map on the next page is no longer subject to the 100-year flood.



The Cook County Flood Insurance Rate Map (FIRM) shows the official floodplain boundary for the City

The fact that the FIRM does not accurately portray flood levels has caused concern throughout the area. The South Suburban Mayors and Managers Association prepared a background paper in 2003, which states:

> The south suburbs of Cook County will realize significant benefits with the operation of the Thornton Quarry Reservoir. This area of Cook County has probably the largest concentration of floodprone properties in Illinois. These communities have more than 5,000 flood insurance policy holders who are paying well over $2.4 million in flood insurance premiums each year. These residents and businesses will continue to pay these premiums and floodplain development regulations will stay in effect after the reservoir goes on-line until the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps are revised.
>
> The existing floodplain maps for the Little Calumet River, and most of its tributaries, are based on studies that are nearly 30 years old. Despite being reproduced as digital countywide maps in 2000, the Federal Emergency Management Agency's Flood Insurance Rate Maps are developed based on hydrologic (rainfall and land conditions) and hydraulic (stream and floodplain conditions) data collected around 1971. To properly revise the maps, new studies that include all of the constructed reservoirs and that use current engineering standards and the latest hydrologic data and topographic mapping, are required.
>
> The Illinois Department of Natural Resources, Office of Water Resources (IDNR/OWR), has been revising the floodplain maps of some tributaries in the watershed, as funding has become available. At the current rate of funding and involvement, it will take at least another 10 years to study the entire watershed. It is estimated that it will cost approximately $1 million for topographic mapping, surveying and modeling of flood flows for the development of new floodplain maps. For comparison, the cost of the study is less than half of the expected *annual savings* to flood insurance policy holders.

Accordingly, Calumet City and other communities that benefit from the Thornton Transitional Reservoir have placed revising the Cook County FIRM as a priority project.

The second concern with a floodplain map is ease of use. The 2000 FIRM has three shortcomings here:

- It is on several different paper panels, so staff must shuffle from panel to panel to use the map.
- The FIRM shows only a few ground features, such as streets and channels. This makes it difficult to determine if a building on a lot on the borderline is in the floodplain.
- It is not easy to keep a large paper map up to date to reflect new streets, annexations, and FEMA's individual letters of map revision and map amendment.

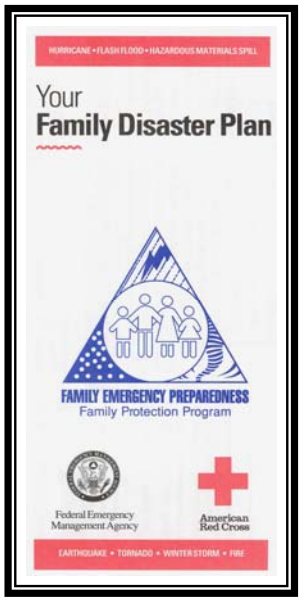
The Department of Inspectional Services has overcome the first problem. It uses its own map with the FIRM floodplain on it to check permit applications. This map must be kept up to date to reflect corporate limits changes and map revisions.

All three shortcomings would be addressed if the FIRM were on a computer-based geographic information system (GIS). A GIS would allow overlaying the floodplain boundaries on an aerial photo base map, for example, that would show building outlines and current streets. It would also be much easier to keep updated.

The 2000 FIRM's floodplain boundaries have been put into a GIS by the City's consulting engineers. However, Department computers have not been able to use the system. Under FEMA's Map Modernization program, the next version of the FIRM will use GIS as its primary system.

The City's FIRM is available for public review at the Inspectional Services Office and the Public Library. The Department answers calls from people wanting to know if they are in the floodplain.

CRS Credit: Under Activity 320 (Map Information), the City receives 140 points for reading the FIRM for inquirers. This credit is dependent on the City keeping the FIRM up to date and publicizing this service.



9.2. Outreach Projects

General: Hazard information is are not of much use if no one knows they exist. An outreach project can remedy this. Sending notices to property owners can help introduce the idea of property protection and identify sources of assistance.

Outreach projects are the first step in the process of orienting property owners to property protection and assisting them in designing and implementing a project. They are designed to encourage people to seek out more information in order to take steps to protect themselves and their properties.

The most effective types of outreach projects are mailed or distributed to everyone in the community or, in the case of flood hazards, to floodplain property owners.

Research has proven that outreach projects work. However, awareness of the hazard is not enough; people need to be told what they can do about the hazard, so projects should include information on safety, health and property protection measures. Research has also shown that a properly run local information program is more effective than national advertising or publicity campaigns. Therefore, outreach projects should be locally designed and tailored to meet local conditions. A third research lesson learned is that repetition and variety are needed. A Red Cross study concluded that a message needs to be heard more than 20 times for it to sink in.

Local newspapers can be strong allies in efforts to inform the public. Press releases and story ideas may be all that's needed to whet their interest. After a tornado in another community, people and the media become interested in their tornado hazard and how to protect themselves and their property. Local radio stations and cable TV channels can also help. These media offer interview formats and cable may be willing to broadcast videos on the hazards.

Examples of other approaches include:

- Articles and special sections in newspapers
- Brochures available in municipal buildings and libraries
- Displays in public buildings or shopping malls
- Elementary school curriculum on hazard preparedness and safety
- Flood protection video for cable TV programs or to loan to organizations
- Presentations at meetings of neighborhood, civic or business groups,
- Signs in parks, along trails and on waterfronts that explain the natural features (such as the river) and their relation to hazards (such as floods),
- Special meetings such as open houses.

Calumet City Examples: Calumet City has a regular newsletter that is mailed to all citizens in the City, the *Calumet City Review*. Flood information has been included in the newsletter. An example is on page 7-6. The City sends a letter on flood protection to all 2,000 floodprone properties each year.

The Fire Department has a "smoke trailer" which can simulate a tornado, earthquake or fire. The Department use this to teach school children how to safely respond to these hazards.

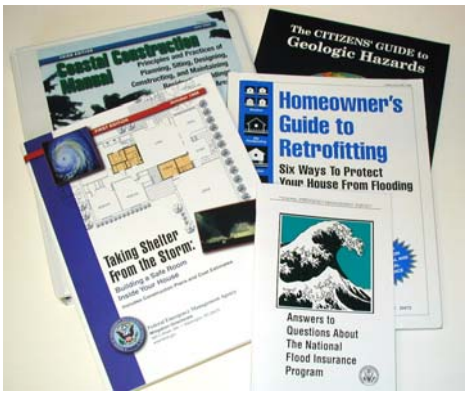
In the last few years, Calumet City has conducted a Flood Awareness Week in conjunction with the Villages of Lansing and South Holland. This has included extra publicity about flooding, a breakfast and briefing for businesses, and a floodproofing open house for residents. This joint action helped produce a flood protection video prepared by the South Suburban College. It has been shown on the City's cable access channel.

Calumet City Plumbing's booth at the 2003 Flood Awareness Week's open house

CRS Credit: For its outreach projects, the City is receiving 273 points out of a maximum possible of 290 points under Activity 330 (Outreach Projects).

9.3. Technical Information

General: The community library and local websites are obvious places for residents to seek information on hazards, hazard protection, and protecting natural resources. Books and pamphlets on hazard mitigation can be given to libraries, many of them obtained free from state and federal agencies. Libraries also have their own public information campaigns with displays, lectures, and other projects, which can augment the activities of the local government.



There are many hazard protection references that can be put in libraries

Most references that are available are intended to be useful nationwide. Therefore, they cover many topics that are not appropriate to Calumet City, such as how to deal with coastal storms and alluvial fan flooding. Some are too technical for most property owners and some may recommend measures that are contrary to Calumet City's floodplain regulations.

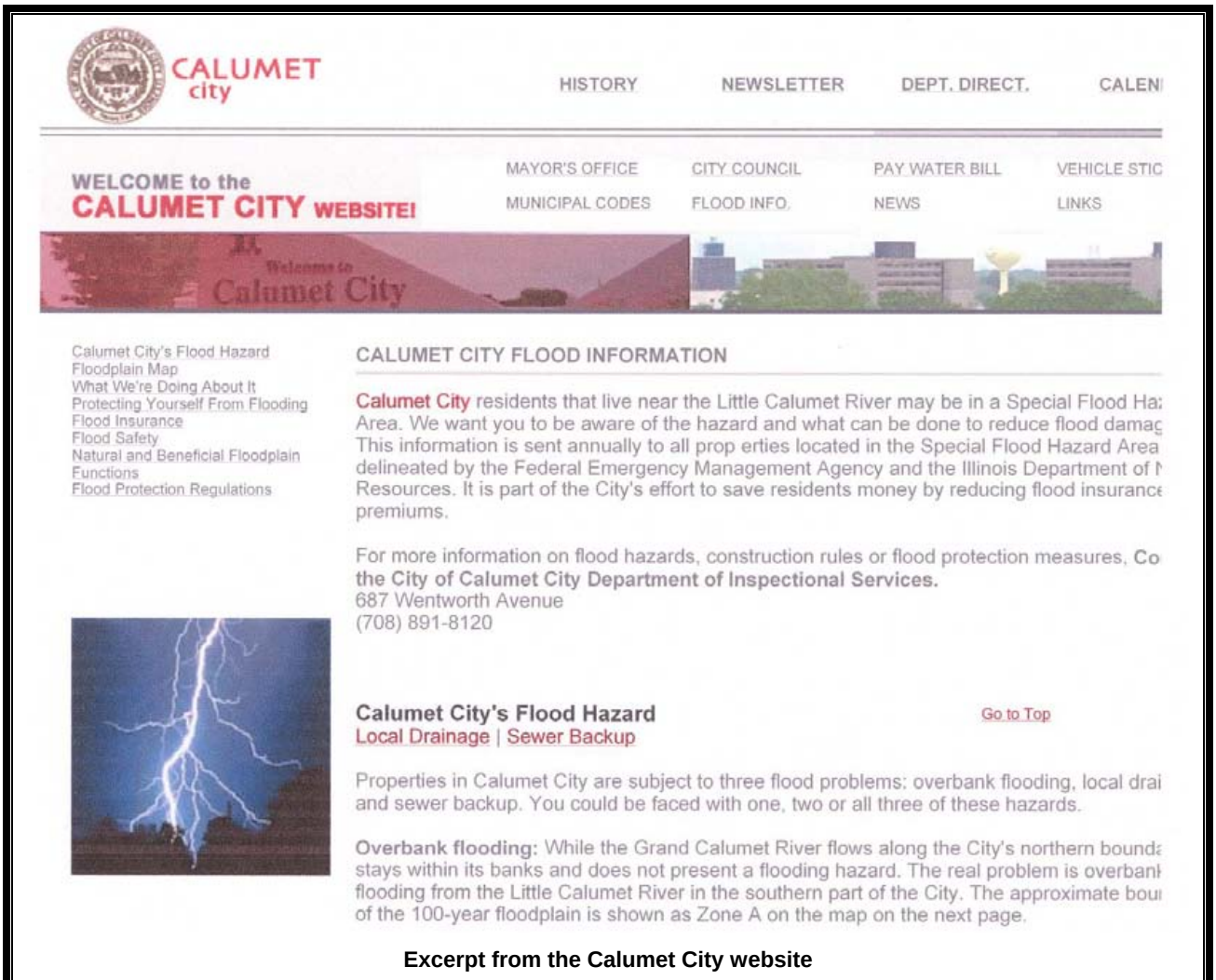
Research has shown that a publication tailored to local conditions, especially one that is seen as written for the reader's situation, is more effective than a general reference. The reader can identify with the situation and may have personally seen some of the examples. As a result, readers of such localized books are more likely to implement a property protection project.

Today, websites are becoming more popular as sources of technical information. They provide quick access to a wealth of public and private sites. Through links to other web sties, there is almost no limit to the amount of up to date information that can be accessed by the user. For example, a site can link to information for homeowners on how to retrofit for tornadoes, earthquakes and floods and a "FEMA for Kids" site. This website teaches children how to protect their home and what to have in a family disaster kit.

Calumet City Examples: Calumet City has established a flood information collection at the Public Library. These are primarily state and federal publications. The Library also maintains clipping files of newspaper articles of stories related to Calumet City. The City has also developed is own handbook for residents.

Calumet City's website has a wealth of information on flooding and flood protection. It can be found at www.calumetcity.org and by clicking on the "flood info" link. An excerpt is shown on the next page.

CRS Credit: The City is receiving the maximum possible 30 points for its references in the public library under Activity 350 (Flood Protection Library). The website was created since the last CRS visit. At the next visit, it should receive at least 50 points.



CALUMET city

HISTORY NEWSLETTER DEPT. DIRECT. CALEN

WELCOME to the CALUMET CITY WEBSITE!

MAYOR'S OFFICE CITY COUNCIL PAY WATER BILL VEHICLE STIC
MUNICIPAL CODES FLOOD INFO. NEWS LINKS

Welcome to Calumet City

Calumet City's Flood Hazard
Floodplain Map
What We're Doing About It
Protecting Yourself From Flooding
Flood Insurance
Flood Safety
Natural and Beneficial Floodplain Functions
Flood Protection Regulations

CALUMET CITY FLOOD INFORMATION

Calumet City residents that live near the Little Calumet River may be in a Special Flood Ha: Area. We want you to be aware of the hazard and what can be done to reduce flood damag This information is sent annually to all prop erties located in the Special Flood Hazard Area delineated by the Federal Emergency Management Agency and the Illinois Department of N Resources. It is part of the City's effort to save residents money by reducing flood insurance premiums.

For more information on flood hazards, construction rules or flood protection measures, Co **the City of Calumet City Department of Inspectional Services.**
687 Wentworth Avenue
(708) 891-8120

Calumet City's Flood Hazard Go to Top
Local Drainage | Sewer Backup

Properties in Calumet City are subject to three flood problems: overbank flooding, local drai and sewer backup. You could be faced with one, two or all three of these hazards.

Overbank flooding: While the Grand Calumet River flows along the City's northern bound stays within its banks and does not present a flooding hazard. The real problem is overbank flooding from the Little Calumet River in the southern part of the City. The approximate bou of the 100-year floodplain is shown as Zone A on the map on the next page.

Excerpt from the Calumet City website

9.4. Technical Assistance

General: While general information helps, most property owners do not feel ready to retrofit their buildings without some help or guidance. Local building department staff are experts in construction. They can provide free advice, not necessarily to design a protection measure, but to steer the owner onto the right track.

Technical assistance can be provided in one-on-one sessions with property owners. Some building department or public works staff visit properties and offer suggestions. Most can recommend or identify qualified or licensed companies, an activity that is especially appreciated by owners who are unsure of the project or the contractor.

Calumet City Examples: As recommended by the 1999 floodplain management plan, Calumet City Department of Inspectional Services staff answer questions. This service is publicized through the newsletter and other media.

CRS Credit: Under Activity 360 (Flood Protection Assistance) the City receives 66 points for providing site-specific advice to inquirers on the following topics:

- Property protection techniques
- Site-specific flood data, such as floor elevations and historical flooding
- Names of knowledgeable contractors and consultants
- How to select a qualified contractor and what to do if dissatisfied
- Making site visits to review problems and providing advice to the owner

9.5. Real Estate Disclosure

General: Many times after a flood, people say they would have taken steps to protect themselves if only they had known they had purchased a floodprone property. Federally regulated lending institutions must advise applicants for a mortgage or other loan that is to be secured by a building that the property is in a floodplain as shown on the FIRM. Because this requirement has to be met only ten days before closing, often the applicant is already committed to purchasing the property when he or she first learns of the flood hazard.

Calumet City, 1981 flood

Source: *Jeff Newman*

There are two state laws that address disclosure. *Illinois Compiled Statutes*, Chapter 55, Section 5/3-5029 requires that all subdivision plats must show whether any part of the subdivision is located in a Special Flood Hazard Area. This information is of limited use, as most buyers do not check a plat and most of Calumet City was subdivided before this law went into effect.

The *Illinois Residential Real Property Disclosure Act* requires a seller to tell a potential buyer if the seller is aware of any flooding or basement leakage problem, if the property is located in a floodplain, or if the seller has flood insurance. The information is based on the seller's general knowledge and experience; no special study is needed. This means, for example, that the seller does not have to check a Flood Insurance Rate Map to determine if the property could flood.

In short, home buyers may be told what the seller knows about a property's flood history. However, only knowledgeable buyers will discover whether a property is in or out of the mapped floodplain, unless they have a federally funded or federally insured loan.

The Village of South Holland's *Floodplain Management Plan* recommended that the Village work with area real estate offices to initiate a voluntary disclosure program that filled the gaps of the current laws. After several meetings, it was concluded that such an effort at the municipal level was not workable. A disclosure program would need to cover the entire region, so all communities and sellers would be treated the same.

Calumet City example: There are no special disclosure activities, other than the map information service conducted by the Department of Inspectional Services.

CRS Credit: Under Activity 340 (Flood Hazard Disclosure), the City automatically receives 10 points for the two state laws.

9.6. Public Information Survey

To guide selection of appropriate media and messages, the 1999 Floodplain Management Planning Committee conducted a survey. It went to Committee members and to 150 people who had responded to the flood questionnaire discussed on page 2-8. These 150 had answered "yes" to the question "Do you want information on protecting your house from flooding or sewer backup?" Since they wanted more information, it was appropriate to ask them what subject matters should be covered and how should the information be delivered.

The results of this survey are shown in the tables below and on the next page. It can be seen that most of the responses from the Committee members were the same as the public responses. There were some expected differences. For example, the public ranked "how to get out of buying flood insurance" much higher than the Committee members did.

Survey Responses: Preferred Media

	Media	Overall Score	Committee Score	Public Score
1.	City-wide newsletter	5.00	6.78	3.22
2.	Homeowner's flood protection manual	4.39	4.11	4.67
3.	Utility bill stuffers	2.89	3.89	1.89
4.	Cable TV notices	2.50	3.89	1.11
5.	Floodproofing open houses	2.50	2.00	3.00
6.	References available in the library	2.17	2.33	2.00
7.	Newspaper supplements	2.17	3.00	1.33
8.	Presentations to contractors	1.94	1.78	2.11
9.	Educational programs in high schools	1.83	0.78	2.89
10.	Presentations at neighborhood meeting	1.72	3.00	0.44
11.	Special events (e.g., "Flood Week")	1.72	1.89	1.56
12.	Handouts/flyers at public places	1.67	2.33	1.00
13.	Technical advice from City staff	1.56	1.89	1.22
14.	Videos/Cable TV programs	1.50	1.78	1.22
15.	Educational programs in grade schools	1.44	0.67	2.22
16.	Presentations to banks and lenders	1.33	1.11	1.56
17.	Park district educational programs	1.28	1.11	1.44
18.	Presentations to real estate agents	1.28	1.11	1.44
19.	Shopping mall displays	1.22	1.56	0.89
20.	Visits to a home by City staff	1.22	1.44	1.00
21.	Educational programs in junior high	1.17	0.78	1.56
22.	Presentations to organizations or clubs	1.17	1.44	0.89
23.	Displays in home improvement stores	1.17	1.33	1.00
24.	Presentations to insurance agents	1.00	1.44	0.56

These scores are based on the responses from 18 Floodplain Management Planning Committee members and 18 residents who responded to the survey. The scores reflect the respondents' ranking of messages in order of importance.

Survey Responses: Preferred Messages				
	Message	**Overall Score**	**Committee Score**	**Public Score**
1.	Floodproofing a house	4.56	4.78	4.33
2.	Emergency flood protection measures	3.67	3.67	3.67
3.	Sewer backup protection measures	2.94	2.56	3.33
4.	What Calumet City is doing	2.72	3.78	1.67
5.	Flood Insurance Rate Maps	2.50	2.44	2.56
6.	Preserving and protecting wetlands	2.28	2.56	2.00
7.	Sources of assistance	2.11	1.56	2.67
8.	Why sewer backup occurs	2.00	1.78	2.22
9.	Status of flood control projects	1.94	1.44	2.44
10.	Making sure your yard drains	1.94	1.11	2.78
11.	Flood warning signals	1.89	2.56	1.22
12.	Thornton Quarry	1.83	1.89	1.78
13.	How to get out of buying flood insurance	1.83	0.89	2.78
14.	Protecting water quality	1.72	1.56	1.89
15.	Why it floods	1.67	1.67	1.67
16.	Why channel maintenance is important	1.61	1.44	1.78
17.	Safety hazards during floods	1.56	2.33	0.78
18.	Rules against dumping in the river	1.50	1.67	1.33
19.	Health hazards during floods	1.50	1.33	1.67
20.	What a flood insurance policy covers	1.50	0.89	2.11
21.	When flood insurance must be purchased	1.44	1.22	1.67
22.	Rules on building in the floodplain	1.44	1.89	1.00
23.	Dealing with contractors	1.39	1.67	1.11
24.	Benefits of open space	1.39	1.33	1.44
25.	Who is responsible for flooding	1.28	1.33	1.22
26.	Sewer backup insurance	1.28	0.78	1.78
27.	Local drainage protection	1.22	1.33	1.11
28.	Reporting dumping violations	1.22	1.00	1.44
29.	Past floods in Calumet City	1.22	0.78	1.67
30.	What's going on in Indiana	1.11	1.33	0.89
31.	What other agencies are doing	1.06	1.00	1.11
32.	Floodproofing a business	1.00	1.67	0.33
33.	How to evacuate during a flood	0.94	1.22	0.67
34.	Safety in buildings	0.89	1.00	0.78
35.	Reporting construction violations	0.78	0.56	1.00
36.	Safety in vehicles	0.67	0.56	0.78

These scores are based on the responses from 18 Floodplain Management Planning Committee members and 18 residents who responded to the survey. The scores reflect the respondents' ranking of messages in order of importance.

9.7. Conclusions

1. The City's official floodplain map, the Cook County Flood Insurance Rate Map is out of date and keeps development regulations and the flood insurance purchase requirement in place for thousands of properties in the south suburbs that may no longer be subject to the 100-year flood.

2. There are many ways that public information programs can be used so that people and businesses will be more aware of the hazards they face and how they can protect themselves.

3. Some of the public information activities are best done on a regional level, such as real estate disclosure and developing school curricula. Others have been successfully implemented in cooperation with neighboring communities.

4. Some of the public information activities can be prepared and implemented by the City and, being tailored to meet local needs, such activities would be more effective.

5. Calumet City survey findings show that residents would benefit from a variety of methods of delivering hazard awareness and protection information. The messages should stress ways people can protect themselves and what they can do to reduce the hazards. The more times a message is repeated using different media, the more effective the information strategy.

9.8. Recommendations

The following recommendations are based on the findings in this chapter, the public information survey, and the recommendations from the earlier chapters.

1. The Cook County Flood Insurance Rate Map should be revised as soon as possible to reflect current conditions, especially the flood protection provided by the Thornton Transitional Reservoir.

2. Public information activities in Calumet City should cover the following flood protection topics. The numbers refer to the topics in the messages in the table on page 9-9.

   - Causes and extent of flooding (Messages 5, 8, 15, 25, 29)
   - What is being done about flooding (Messages 4, 7, 9, 12, 30, 31)
   - How people can protect their homes and businesses (Messages 1, 3, 10, 23, 27, 32 and recommended in Chapter 5, Property Protection)
   - Where to get help from the City and other resources (Messages 4, 7)
   - Hazard warnings and the appropriate safety precautions that should be taken after a warning (Messages 2, 11, 17, 19, 33, 34, 36 and recommended in Chapter 7, Emergency Management)
   - How people can protect wetlands, natural and beneficial floodplain functions, and trees (Messages 6, 14, 24 and recommended in Chapter 6, Natural Resource Protection)
   - Insurance (Messages 13, 20, 21, 26 and recommended in Chapter 5, Property Protection)
   - Maintenance of channels, retention basins, and storm sewer inlets (Messages 16, 18, 28 and recommended in Chapter 8, Flood Control)

- Construction regulations (Messages 22, 35 and recommended in Chapter 4, Prevention)
- Things to look for when buying property (Messages 21, 22, 29 and recommended in Chapter 4, Prevention)

3. The City should implement and publicize the following services that will inform and assist property owners who want to protect themselves from flooding. These services are noted as items 6, 13 and 20 in the table on page 9-8 and they receive CRS credit.

   - Reading FIRMs for inquirers
   - Providing site-specific flood data
   - Providing the names of licensed contractors and consultants
   - Providing information on dealing with contractors
   - Making site visits to review problems and providing advice to the owner
   - Making hazard protection references available in the library

4. The following projects should be implemented to disseminate the messages on hazard protection and City services. The numbers refer to the media in the table on page 9-8.

   - The City newsletter should include regular articles on flooding and other hazards (1)
   - Short messages should be included in utility bills and on cable television (3, 4)
   - As staff interact with the public, such as during building permit applications and drainage inspections, they should remind people of their responsibilities and opportunities (13, 20)

5. Meetings with selected groups should be held to make their members familiar with natural hazards, protection measures, natural floodplain and wetland functions, and City services. The following groups should be contacted. The numbers refer to the media in the table on page 9-8.

   - School teachers (9, 15, 21)
   - Neighborhood organizations (10)
   - Bankers and lenders (16)
   - Park and Forest Preserve District staff (17)
   - Real estate agents and property developers (18 and recommended in Chapter 4, Prevention)
   - Organizations and civic clubs (22)

6. The City should continue to work with the Villages of Lansing and South Holland to prepare or promote joint public information activities that would benefit both community's residents and be conducted at less cost to each community. These could include the following projects, although each year's program should reflect lessons learned in previous years and could be different. The numbers refer to the media in the table on page 9-8.

   - Conduct a floodproofing open house (5)
   - Meet with contractors and home improvement stores and explain property protection measures and construction regulations (8, 23)
   - Conduct a flood insurance agents workshop (24)

9.9. References

- *Answers to Questions about the National Flood Insurance Program*, Federal Emergency Management Agency, FIA-2, 1997
- *Are You Ready? A guide to Citizen Preparedness*, FEMA, 2002.
- *CRS Coordinator's Manual, Community Rating System*, FEMA, 2002.
- *CRS Credit for Outreach Projects*, Federal Emergency Management Agency, 2002.
- *Floodproof Retrofitting: Homeowner Self-Protective Behavior*, Shirley Bradway Laska, University of Colorado, 1991.
- *Guide to Flood Protection in Northeastern Illinois (Homeowner's booklet)*, Illinois Association for Floodplain and Stormwater Management, 1997
- *How to Conduct a Floodproofing Open House*, Illinois Association for Floodplain and Stormwater Management, 1993
- *Little Calumet River Floodplain Mapping*, South Suburban Mayors and Managers Association, January 28, 2003.
- *Stormwater Management Public Information Resource Guide*, South Suburban Mayors and Managers Association, 1999

A complete list of references recommended for local libraries is found in Section 354 in the *CRS Coordinator's Manual*, Federal Emergency Management Agency, 2002

Chapter 10. Implementation

10.1. Background

The culmination of the Calumet City *Natural Hazards Mitigation Plan* is the series of action items presented in this chapter. The goals and priorities of the overall program are outlined here. Specific activities pursuant to the goals and priorities are detailed in Sections 10.2 and 10.3. These sections assign recommended projects and deadlines to the appropriate City offices.

Goals: The overall directions can be summarized under the four goals established by the Planning Committee and listed in Chapter 3:

1. Protect the people of Calumet City, their homes and their health, from the dangers of natural hazards.

2. Place a priority on protecting public services, including critical facilities, utilities and schools.

3. Inform residents and businesses about the hazards they face and the ways they can protect themselves and their properties from those hazards.

4. Protect open space, wetlands and natural areas for the public to enjoy and to prevent inappropriate development in hazardous areas.

General recommendations appear at the end of Chapters 4 – 9 for each of the six mitigation strategies. This chapter converts those general recommendations to specific action items, for the most part following the same order as Chapters 4 – 9.

Priorities: The Planning Committee reviewed and discussed many things that can be done to protect people and property from the natural hazards introduced in Chapter 2. It was recognized that priorities must be set so the City's resources can focus on those activities that will do the most good. Accordingly, four factors were used to prioritize what should be pursued:

1. **The greatest threats:** Efforts should focus on those hazards that present the greatest threats to the City. Chapter 2 reviewed the City's vulnerability to the eight hazards and concluded in section 2.13:

    a. Of the eight natural hazards faced by Calumet City, the 100-year flood has the potential to cause the greatest amount of property damage over time. Earthquakes and extreme heat pose little threat to structures.

    b. The 100-year flood and tornadoes have the greatest economic impact from a single occurrence. However, over the long run, local drainage problems, winter storms, severe storms, and extreme heat are more economically disruptive.

    c. Extreme heat poses the greatest threat to life and health in an average year. Winter storms are the second greatest threat.

d. While less frequent, the impact of overbank flooding from the Little Calumet River in the southern portion of the City can have a much greater impact on property and the economy of Calumet City. Although much of the floodplain is protected by a levee, it would be overtopped by a 100-year flood and would cause over $45 million in direct property damage.

e. People have died during area floods and other natural disasters. All of the hazards have short and long-term impacts on health and mental health. A mitigation program should address safety, health and mental health aspects in addition to protecting buildings, streets, and public facilities.

f. Except for overbank flooding and sewer backup, the City's exposure to these hazards has not been reduced. A mitigation program should include measures to protect new construction from increased damage expected from disasters.

2. **Appropriate measures:** The recommended action items need to be appropriate for the type of threat presented. For example, Chapter 2's analysis notes that the major threat presented by floods is property damage, so property protection and preventive measures, such as retrofitting and code enforcement should be directed toward those hazards.

   On the other hand, the threat presented by heat and winter storms is a life safety one. Appropriate measures for life safety threats are emergency warning and public information activities.

3. **Costs and benefits:** The Committee considered the costs and relative benefits of alternative measures. These factors are listed in the description of each action item. It is desirable to list costs in terms of dollars, but most of the recommendations involve staff time rather than the purchase of equipment or services that can be readily measured in dollars.

   In many cases, benefits, such as lives saved or future damage prevented, are hard to measure in dollars, so narrative discussions are provided. In all cases, the Committee concluded that the benefits (in terms of reduced property damage, economic harm prevented, lives saved, and/or health problems averted) outweighed the costs for the recommended action items.

4. **Affordability:** Not only must the benefits exceed the costs, the projects must be affordable given the City's available resources and staffing. Projects such as acquiring and clearing large floodprone areas were discarded because they did not meet these criteria.

Based on these factors, the Committee prioritized the possible activities that could be pursued. Some possible projects, such as replacing the Little Calumet River levee with a higher concrete floodwall, were not pursued because they did not meet the above criteria. The result is 14 action items that address the major hazards, are appropriate for those hazards, are cost-effective, and are affordable.

Action items: Fourteen action items are recommended in the following pages. Each action item starts with a short description. The next four subheadings identify

- the agency responsible for implementing the action item,
- the deadline for accomplishing the action item,
- the cost of implementation, and
- the benefits of implementing the action item.

All of the action items can be tied to the above listed goals and the recommendations in Chapters 4 – 9. These relationships are shown in the table on the next page. The recommendations and the discussions in the earlier chapters provide more background and direction on each action item.

Section 10.2 addresses general program items and projects. Section 10.3 lists the public information action items that form the public information program strategy credited separately by the Community Rating System.

Many action items that were in the 1999 floodplain management plan are not included here because they have been completed, such as drafting the stream dumping ordinance and applying to the Community Rating System. Some action items from 1999 are still relevant, including the flood response plan and the levee evaluation.

Floodplain Management Committee: Several action items refer to the Floodplain Management Committee. A plan is worthless if there is no instrument for ensuring that it is carried out. Accordingly, the Floodplain Management Committee should continue to monitor the implementation of this *Plan*, as it did with the 1999 floodplain management plan. The Committee is to report to the City Council on implementation and recommend revisions to this *Plan* as needed.

10.2. Program Action Items

1. Floodplain Management Committee: The Floodplain Management Committee will continue its work as a permanent advisory body to the City Council. It will:

- Act as a forum for hazard mitigation issues,
- Disseminate hazard mitigation ideas and activities to all participants,
- Review proposed changes to ordinances and mitigation programs,
- Monitor implementation of this *Plan*, and
- Report on progress and recommended changes to the City Council.

The Committee's primary duty is to collect information and report to the City Council, the participating offices, and the public on how well this *Plan* is being implemented. The Floodplain Management Committee will be, in effect, Calumet City's hazard mitigation conscience, reminding the staff and City Council that they are all stakeholders in the plan's success. The 1999 resolution creating the Committee charges it with seeing the *Plan* carried out and recommending changes that may be needed. While it has no formal powers, its work should act as a strong incentive for the offices responsible for the action items to meet their deadlines. It will meet up to three times a year, more frequently when the next five year update is due.

Action Items, Goals, and Recommendations						
Action Item	Goal 1. Protect people, homes and health	Goal 2. Protect public services an d utilities	Goal 3. Inform residents and businesses	Goal 4. Protect natural areas	Chapter – Recommendation	Deadline
10.2. Program Action Items						
1. Floodplain Management Committee	X	X	X	X		Annual report
2. Program Reviews	X	X			4-1, 4-2	December 2005
3. Floodplain Regulations	X	X		X	4-1, 6-1	After FEMA CAV
4. Mobile Home Regulations	X				4-3	December 2005
5. Mitigation Audits	X	X	X		5-2	July 2006
6. Mitigation Rebates	X				5-3	Ongoing
7. Urban Forestry	X	X	X	X	6-2	After FY06 budget
8. Flood Response Plan	X	X			7-1, 7-2	After new FIRM
9. Critical Facilities Response Plans	X	X			7-3	July 2006
10. Levee Evaluation	X	X			8-1	After new FIRM
11. Drainage System Maintenance	X	X		X	8-2, 8-3, 8-4	July 2006
10.3. Public Information Action Items						
12. Flood Insurance Rate Map	X	X	X		7-1, 8-1, 9-1	Ongoing
13. Outreach Projects	X	X	X	X	5-1, 5-4, 6-3, 7-4, 8-5, 9-2, 9-3, 9-4	Ongoing
14. Special Public Information Projects	X		X	X	4-4, 5-1, 9-5, 9-6	Annual report

This table relates the 14 action items to the 4 goals of this *Plan*. The goals are stated in full on pages 3-4 and 10-1. The table also shows the relation between the action items and the recommendations at the end of chapters 4 – 9. For example action item 2, Program Reviews, supports recommendations 1 and 2 at the end of chapter 4. It is scheduled to be initiated by December 2005.

Responsible office: Staff support for the Committee will be provided by the Department of Inspectional Services.

Deadline: The progress reports are due on the anniversary of the date this *Plan* is adopted by the City Council. An annual evaluation of the plan's implementation is required for credit under the Community Rating System. A five year update is required for continuing credit of this *Plan* under the Community Rating System and FEMA's mitigation funding programs.

Cost: Staff time

Benefits: Those responsible for implementing the various recommendations have many other jobs to do. A monitoring system helps ensure that they don't forget their assignments or fall behind in working on them. The *Plan* will be evaluated in light of progress, changed conditions, and new opportunities.

2. Program Reviews: The Department of Inspectional Services will undergo three reviews of its hazard mitigation activities over the next few years:

- A review of its building code program to improve its BCEGS classification,
- A community assistance visit (CAV) by FEMA, and
- The cycle verification visit for the Community Rating System.

Each of these visits will evaluate regulatory language and procedures followed to manage new construction, building additions and improvements, and development in the floodplain. The results of the reviews are to be reported to the Floodplain Management Committee. The Department will also provide its conclusions and recommendations for changes based on the reviews.

Responsible office: Department of Inspectional Services

Deadline: Request the BCEGS visit by December 2005. The timing of other two visits are set by FEMA.

Cost: Staff time

Benefits: These third party evaluations of the City's activities identify where changes in standards and procedures are needed and provide ideas for improvement. The City's program will be strengthened and the cost of property insurance in Calumet City may be reduced through better BCEGS and/or CRS classifications.

3. Floodplain Regulations: The Floodplain Management Committee will review changes in the floodplain and stormwater management ordinances proposed by FEMA after its program review and will consider revising the wetlands jurisdiction with input from the Department of Inspectional Services. Recommendations will be made to the City Council for adoption.

Responsible office: Floodplain Management Committee, Department of Inspectional Services

Deadline: Within six months of FEMA's community assistance visit.

Cost: Staff time

Benefits: This will bring the City's floodplain management regulations into compliance with FEMA criteria, an important step to getting a new Flood Insurance Rate Map adopted. The wetlands revision will remove confusion over the City's jurisdiction, as was experienced recently.

4. Mobile Home Regulations: The Department of Inspectional Services will draft appropriate procedures and possibly new regulatory language to give staff clear authority over mobile home installation and mobile home and mobile home park maintenance. The language should specify any additional requirements (above state standards) that the City should include.

Responsible office: Department of Inspectional Services

Deadline: December 2005

Cost: Staff time. As the City already has a rental reinspection program, this clarification will not add much to existing workloads. The City could charge a fee for inspections, such as when a mobile home is resold or rented to a new tenant, to cover some or all of the inspection costs.

Benefits: This regulatory revision will keep City staff abreast of new installations and will allow the City to act quickly when there are problems with new or existing homes.

5. Mitigation Audits: The Department of Inspectional Services will visit selected properties, conduct a review of the hazards they are exposed to, and recommend appropriate property protection measures. Short reports will be provided to the property owners. The priority properties to be reviewed are (in order):

- Buildings in the repetitive loss area,
- City owned properties, and
- Interested critical facilities.

Responsible office: Department of Inspectional Services, with support from the floodplain management consultant.

Deadline: Review the repetitive loss area by July 2006. Critique and revise the procedures before visiting other sites.

Cost: Staff time

Benefits: Reducing repetitive losses is important to prevent deterioration of the repetitively flooded neighborhood and is a priority for FEMA to help stabilize the National Flood Insurance Program. Keeping City buildings and critical facilities operational during and after a natural disaster is vital to public health and safety.

This action item would provide a summary for each facility on its exposure to damage by natural hazards and a general blueprint of what could be done to reduce that exposure. It is hard to put a dollar value on potential damage averted, but damage to even one facility could exceed $100,000 in repair costs and have a ripple effect on other people and property.

6. Mitigation Rebates: The Department of Inspectional Services will continue to administer the rebate program to encourage and assist property owners with protecting their properties from sewer backup.

Responsible office: Department of Inspectional Services

Deadline: The current rebate program is ongoing. The review by the Committee will be included in the 2006 annual progress report.

Cost: The City should continue to budget $30,000 for the rebate program.

Benefits: Under the current 50% rebate level, for every dollar spent by the City, $2 will be spent to protect a property from damage. Other communities have found this approach to be a real cost saver compared to public works projects to control drainage or replace sewer pipes.

7. Urban Forestry: The City will investigate starting a formal urban forestry program that qualifies Calumet City to become a Tree City USA. To qualify for Tree City USA, the City must meet four standards, which are explained in more detail on page 6-9:

- A tree board or department
- A tree care ordinance
- A community forestry program with an annual budget of at least $2 per capita
- An Arbor Day observance and proclamation

Responsible agency: Department of Public Works

Deadline: Incorporate the expense into the fiscal year 2006 budget and apply after the budget is approved.

Cost: $2 per capita, i.e., $70,000. Note that this is not all new money as some of this amount is already spent each year on tree maintenance.

Benefits: In addition to improving the City's appearance, an active urban forestry program will address the major problems caused by winter storms and high winds – loss of power, telephone and cable services and damage to vehicles and buildings due to falling trees or limbs.

8. Flood Response Plan: With support from the City Engineer and the floodplain management consultant, the ESDA Coordinator will prepare a flood stage forecast map and new flood response procedures. The procedures will identify specific actions to be taken at different predicted flood levels of the Little Calumet River.

Responsible office: ESDA Coordinator

Deadline: A flood stage forecast map will be prepared within six months of a locally available GIS system that includes flood levels and topography (see action item #12). The flood response plan will be prepared within 12 months of having an accurate and effective flood stage forecast map.

Cost: Staff time

Benefits: A flood response plan that has been carefully prepared, that utilizes all available data on the hazard and its potential impact, and that is regularly exercised will greatly improve local disaster response capabilities. The result will be a lowered threat to people and property.

9. Critical Facilities Response Plans: The ESDA Coordinator will work with the managers of interested critical facilities to provide advice and assistance on developing emergency response plans for the appropriate hazards. This work will also include City-owned properties and those repetitive loss properties where the audits (action item #5) determine that a flood response plan would be beneficial.

Responsible office: ESDA Coordinator

Deadline: Offers to help facilities will be sent out by July 2006. Work for floodprone facilities should wait until the flood stage forecast map and flood response procedures are completed(action item #8).

Cost: Staff time

Benefits: As with the audits and the flood response plan, this work will better prepare the facilities to avoid damage from natural hazards. By focusing on the critical and public facilities, properties that are vital for life safety are given priority for protection assistance.

10. Levee Evaluation: The City Engineer will review the condition of the Little Calumet River levee and identify what is needed to bring it up to its design protection level. He will also compare the protection level with the new post-Thornton Transitional Reservoir flood elevations to see if the levee can be improved to a level recognized by the Flood Insurance Rate Map or the Community Rating System.

Responsible office: City Engineer

Deadline: Within one year of release of new flood elevations by FEMA.

Cost: Staff time

Benefits: Should the revised FEMA flood elevations leave areas of the City subject to the 100-year flood, this evaluation will determine whether and how the levee system should be repaired and improved to protect these areas. The City should not spend funds to do more than maintain the current levee until it is determined whether it is needed and the costs and benefits of an improvement project can be measured.

11. Drainage System Maintenance: The Sewer Department will continue to maintain the drainage channels and the Little Calumet River levee. The Sewer Department and the Department of Inspectional Services will review maintenance procedures and identify how retention basins and storm sewer inlets can best be maintained and how to best remove and prevent animals that burrow into the levee. The Departments will develop a program that includes inspections, enforcement, maintenance, animal control, record keeping, reporting, and public information activities that will receive the maximum possible CRS credit for drainage maintenance.

Responsible offices: The Sewer Department and the Department of Inspectional Services will prepare the procedures.

Deadline: The Departments will submit their recommendations to the Floodplain Management Committee by July 2006.

Cost: Staff time

Benefits: A plugged culvert or storm sewer inlet can result in flooding during a small rainstorm. By inspecting and maintaining the drainage system, potential flood problems can be identified and corrected before the next big rain. By incorporating an effective public information program, much preventive maintenance can be done by property owners at no direct expense to the City. A proactive activity like this can prevent $1,000's in flood damage, closed streets and threat to people.

10.3. Public Information Action Items

These action items focus on public information activities that support all mitigation measures and help Calumet City's residents and businesses know how to protect themselves.

12. Flood Insurance Rate Map: The City will work with FEMA, the Illinois Department of Natural Resources, and other local agencies and communities to have a revised Cook County Flood Insurance Rate Map reflect the Thornton Transitional Reservoir. Once it is prepared, the Department of Inspectional Services will make sure that it can use its GIS capabilities and will provide improved map information services for the City's regulatory, public information, and emergency management programs.

Responsible offices: Department of Inspectional Services, City Engineer

Deadline: Ongoing

Cost: Staff time

Benefits: An accurate, up to date FIRM is a prerequisite for other action items, including the levee evaluation, flood stage forecast map, flood response plan, and providing map information to citizens. As noted by the South Suburban Mayors and Managers Association (page 9-2), the cost of preparing the map is less than half the flood insurance premiums that can be saved each year after the map is published.

13. Outreach Projects: The City will continue to implement the following projects and receive CRS credit for them.

- Articles in the *Calumet City Review* on hazards and protection and mitigation measures
- An annual mailing on flood protection to all residents of the floodplain
- Appropriate handouts at the Department of Inspectional Services for permit applicants and other interested parties
- References in the Calumet City Public Library
- Information and links on the City's website
- Helping people obtain information from the Flood Insurance Rate Map
- Providing technical advice to people interested in retrofitting
- Advising people during permit review, field inspections, and other times staff comes in contact with the public
- Making site visits to review drainage and other problems facing a property
- Notices on the cable television public access channel
- Showing the flood protection video on the cable television public access channel

These projects will convey the messages identified in section 9.8.2 of Chapter 9, i.e.:

- Hazard warnings and the appropriate safety precautions that should be taken after a warning
- How people can protect their homes and businesses
- Where to get advice and assistance
- Causes, extent, and what is being done about flooding
- How people can protect wetlands, natural and beneficial floodplain functions, and trees
- Insurance
- Maintenance of channels, retention basins, and storm sewer inlets
- Construction regulations
- Working with mitigation contractors
- Things to look for when buying property

Responsible office: Department of Inspectional Services

Deadline: Ongoing

Cost: Staff time

Benefits: There are many benefits to having a well-informed public. For example, deaths from lightning have steadily decreased over the years because people are more aware of what they should and should not do. More self-help and self-protection measures will be implemented if people know about them and are motivated to pursue them.

14. Special Public Information Projects: The Floodplain Management Committee will propose additional public information projects each year. These may vary from year to year and each year's activities will be evaluated before the next year's projects are proposed. They will include:

- An annual meeting with Lansing and South Holland to decide on joint flood awareness week activities.
- Preparation of materials and meetings with real estate agents, lenders, and private and public land developers to inform them of the flood hazard areas and pertinent hazard mitigation development regulations.
- A meeting with insurance agents on the impact of the new FIRM and how to encourage residents to purchase and keep appropriate hazard insurance (including low cost flood insurance for non-floodplain areas).
- Meetings with contractors and home improvement stores to explain property protection measures, the rebate program, and construction regulations and to investigate coordinated public information efforts.
- A meeting with the school districts to explore hazard protection activities appropriate for elementary and high school students.

Responsible office: Department of Inspectional Services, Floodplain Management Committee

Deadline: Each year's annual progress report from the Floodplain Management Committee to the City Council will include the recommended special projects for the following year.

Cost: Staff time

Benefits: Each project will have different benefits. Some will result in more effective programs to reach property owners and some will advise all citizens of safety and health precautions. The work with real estate agents and land developers may prevent loss of time and money for developers wanting to improve Calumet City. Projects for school children will focus on life safety issues and may save a life someday.

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Appendix A. Public Involvement Activities

As noted in Chapter 1, many of the mitigation activities that were reviewed and some that were recommended require the cooperation of residents to be effective. Because residents are important to the solution, they were involved in the mitigation planning effort. Public involvement was provided in three ways: through the City's Floodplain Management Committee, general outreach projects, and the City's website.

A.1. Floodplain Management Committee

The Floodplain Management Committee was created when the 1999 Plan was adopted. It was given the assignment to update that Plan and incorporate the other natural hazards. It is composed of City staff from offices involved in hazard-related activities and one resident from each of the City's wards. The members were:

- Erik Schneider, 1st Ward Representative
- Irma Milewski, 2nd Ward Representative
- Charles Pryor, 3rd Ward Representative
- Stephen B. Sikorski, 5th Ward Representative
- Jeff L. Newman, 6th Ward Representative
- Carl M. Sivak, 7th Ward Representative

- Jim Banasiak, Director, Department of Inspectional Services
- Elaine Zdunek, Department of Inspectional Services
- Marvin Skarwecki, Sewer Maintenance Department
- Len Chiaro, Emergency Services and Disaster Agency
- Joe Ratkovich, Fire Department

All City aldermen were ex-officio members and several attended some of the meetings.

The Committee held five meetings, each devoted to a part of the planning process:

December 2, 2004: Organization of the planning effort, setting meeting dates and places, determining which hazards to address, selecting public involvement activities and agencies and organizations to coordinate with.

February 3, 2005: Hazard assessment: review of chapters 1, 2 and 3 on the hazard profile and vulnerability assessment. Goal setting through an exercise explained in Chapter 3.

February 3 Committee Meeting's goal setting exercise

April 23, 2005: Mitigation strategy: an all-day meeting to review chapters 4 − 9 and take a field trip to see mitigation issues and examples in the field. The following sites were visited:

- Trailer parks in northeast part of City (wind protection and retention basin concerns)
- Floodproofing on 158th (property protection examples)
- Wetland mitigation site (natural resource protection and preventive measures)
- Compensatory storage site on Cunningham Drive (preventive measures)
- Technical Center at Wentworth and the River (preventive measures)
- Floodproofing on State Line Road (property protection examples)
- Shirley Drive acquisition (property protection examples)
- Retention basin on Shirley Drive (flood control)
- Repetitive loss area on Burnham Avenue
- Veteran's Park and small berm (property protection examples)
- Walk the levee at Veteran's Park (flood control)
- Discuss channel maintenance (flood control)
- Discuss the operation of the levees in Indiana with a representative of the US Army Corps of Engineers (flood control)
- Site visit to Thornton Quarry Reservoir intakes at the Lincoln Oasis and discussion of the operation with representatives of the Metropolitan Water Reclamation District

April 23 field trip to the Thornton Quarry Reservoir intake structure

May 16: Plan review: double check of Chapters 1– 9 and agreement on the action items in Chapter 10.

July 19: Public meeting and review of all comments. Decision on final plan to be recommended to the City Council.

A.2. Outreach Activities

The general public was advised of the mitigation planning effort through news releases, articles in the City's newsletter, and information and links on the City's website. The Calumet City Review is a quarterly newsletter that goes to all residents of the City. Its Spring 2005 edition carried the following article.

On the next page is an article printed in the *Northwest Indiana Times*, the main newspaper that covers Calumet City. It was taken from the City's news release.

Calumet City Review

COMMUNITY CALENDAR BEGINS ON PAGE 9

SPRING 2005 — VOLUME 7, NUMBER 1

THE CALUMET CITY REVIEW is published quarterly by the City of Calumet City.

Michelle Markiewicz Qualkinbush, Mayor
Gloria L. Dooley, City Clerk
Michael J. Zimmerman, City Treasurer
Edward Gonzalez, Alderman, 1st Ward
Magdalena J. Woszczynski, Alderman, 2nd Ward
Thaddeus Jones, Alderman, 3rd Ward
Brian Wilson, Alderman, 4th Ward
Gerald A. Tarka, Alderman, 5th Ward
Nick Manousopoulos, Alderman, 6th Ward
Cindi Pallick, Alderman, 7th Ward

www.calumetcity.org

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5 Treasurer's Update
6 Senior Bus Service
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8 Floodplain Info.
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A Message From Mayor Michelle
What's Happening Around Town

I would like to first take this opportunity to thank residents for their vote of confidence in letting me serve as your Mayor for the next four years. The City Council and my entire administration is looking forward to our future outlook and the plans we have to bring harmony, prosperity and stability to our city.

NOW OPEN! The location of the old Kmart building underwent an incredible transformation in order to provide a multi-unit storefront for businesses that are currently open, including Michael's, Petco, Bed, Bath & Beyond; and, coming soon...Old Navy. This project was a $20 million investment that created new jobs and added revenue. This was also one of over $75 million in new economic development in Calumet City over the last year and a half.

Residents who utilize Pace buses will notice that there are about a dozen new bus shelters at various locations throughout the city. Remodeling and/or adding over 20 more shelters is in the planning stage. The shelters were installed by Pace in coordination with Viacom Media at no cost to taxpayers.

Floodplain Management Planning Committee Reviews Safety Measures

Mayor Michelle Markiewicz Qualkinbush has initiated a mitigation planning effort for Calumet City. From December 2004 through June 2005, the Floodplain Management Planning Committee will meet to review what can be done to reduce the safety hazards and property damage caused by floods, tornadoes, winter storms, earthquakes and thunderstorms. The Committee will produce a Hazard Mitigation Plan to guide Calumet City's hazard mitigation efforts.

The effort is being led by the Department of Inspectional Services. The Committee's members include a representative from each of the City's seven wards and offices that are involved in hazard mitigation, including Inspectional Services, Fire, Sewer and Emergency Services.

The Committee will review a variety of mitigation measures, organized under six general strategies:

- Preventive-e.g., zoning, building codes and other developmental regulations
- Property Protection-e.g., relocation out of harm's way, retrofitting buildings, insurance
- Natural Resource Protection-e.g., preserving wetlands, minimizing sedimentation
- Emergency Services-e.g., warning, sandbagging, evacuation
- Flood Control Project-e.g., levees, reservoirs, stormwater management
- Public Information-e.g., outreach projects, technical assistance to property owners

The Planning Committee's schedule is posted at www.calumetcity.org/mitigation.html. The meetings are open to the public. The draft plan is expected to be ready for public review in May.

Calumet City residents are encouraged to learn more about the natural hazards they face and ways they can protect themselves. For more information, see the City's website as noted above. Otherwise, you may contact James Banasiak, Inspectional Services Director at (708)891-8120.

Calumet City Review, Spring 2005, page 8

Flood planning could increase grants

New Cal City committee could reduce homeowners' insurance rates

BY MEMA AYI
mayi@nwitimes.com
219.933.3241

This story ran on nwitimes.com on Thursday, February 3, 2005 12:38 AM CST

CALUMET CITY | Over the next six months, a new Calumet City committee will aim to reduce property damage, as well safety and health during natural disasters.

The Hazard Mitigations Planning Committee, led by the city's Department of Inspectional Services, will provide the city with a plan in the case of flooding, tornadoes, winter storms, earthquakes and thunderstorms.

Preparing for such disasters could make the city more qualified for state and federal grant funding and reduce flood insurance rates for homeowners, Mayor Michelle Markiewicz Qualkinbush said.

The committee -- made up of aldermen, Inspectional Services Director James Banasiak and city engineers -- also is looking for volunteers who have experienced floods, she said.

One of the committee's goals is to notify all residents in the flood plain on how to prepare their homes for rising water.

"We just want to make sure we have a process in place, but I believe the efforts of the Metropolitan Water Reclamation District with the Deep Tunnel Project (are) already helping residents located in the flood plain," Qualkinbush said.

Additionally, a plan for disasters could reduce flood insurance ratings established by the Federal Emergency Management Agency, she said.

She expects the federal agency will reassess flood ratings in all the communities expected to benefit from the Deep Tunnel Project.

The committee's first meeting will be held at 7 p.m. tonight in the City Council Chambers at City Hall.

For more information on the planning effort, visit www.calumetcity.org or call Banasiak at (708) 891-8120.

<< Previous Story: News briefs || Next Story: Former police officer charged with lying to FBI >>

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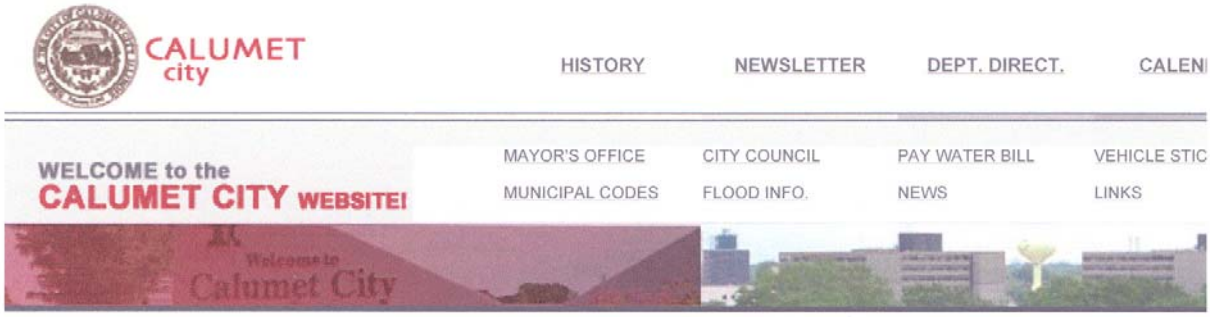
A.3. Website

The City's website, www.CalumetCity.org. included a page on the planning effort, with links to other hazard mitigation sites that may interest a property owner.



Planning Committee
Hazard Mitigation Links

MITIGATION PLANNING FOR CALUMET CITY

Mayor Michelle Markiewicz Qualkinbush has initiated a mitigation planning effort for Calume City. From December 2004 through June 2005, the Floodplain Management Planning Committee will meet to review what can be done to reduce the safety hazards, health hazards, and property damage caused by floods, tornadoes, winter storms, earthquakes an thunderstorms. The Committee will produce a Hazard Mitigation Plan to guide City hazard mitigation efforts.

The effort is being led by the City's Department of Inspectional Services. The Committee's members include a representative from each of the City's seven wards and City offices that are involved in hazard mitigation (Inspectional Services, Fire, Sewer, and Emergency Services).

The committee will review a variety of mitigation measures, organized under six general strategies:

- Preventive--e.g., zoning, building codes, and other developmental regulations
- Property protection--e.g., relocation out of harm's way, retrofitting buildings, insurance
- Natural resource protection--e.g., preserving wetlands, minimizing sedimentation
- Emergency services--e.g., warning, sandbagging, evacuation
- Flood control project--e.g., levees, reservoirs, stormwater management
- Public information--e.g., outreach projects, technical assistance to property owners

The Planning Committee's schedule is posted at <<link>>. The meetings are open to the public. The draft plan is expected to be ready for public review in May.

Calumet City residents are encouraged to learn more about the natural hazards they face a ways they can protect themselves. For more information: <<link>>.

For more information contact James Banasiak, Director of Calumet City's Department of Inspectional Services, at 708/891-8120.

Planning Committee

Go to Top

Calumet City's hazard mitigation plan is being prepared under the guidance of the City's Floodplain Management Planning Committee. The Committee's members include a representative from each of the City's seven wards and four City offices

that are involved in hazard mitigation:

- Department of Inspectional Services
- Sewer Department
- Emergency Services and Disaster Agency
- Fire Department

The committee held its first meeting on December 2 at City Hall. At that meeting, the members reviewed the planning process, how the public would be involved, and what offices should be coordinated with.

The next meeting will be February 3, 2005. At that meeting, the future meeting schedule will be decided. The Committee will also review the hazards facing the City and set goals on how the Plan should address them.

The draft plan is expected to be ready for public review in May. At that time, it will be posted on this website and there will be a public meeting to receive comments on it.

All meetings are at the City Council Chambers at City Hall and are open to the public.

For more information contact James Banasiak, Director of Calumet City's Department of Inspectional Services, at 708/891-8120.

Hazard Mitigation Links

Go to Top

For more information on natural hazards and ways to protect against them, check the following websites:

General
The Red Cross has emergency protection measures: Link
The Red Cross' family disaster plan: Link

Little Calumet River flood heights
For real time readings on the height of the Little Calumet River: Link

Flood protection
FEMA's *Homeowner's Guide to Retrofitting: Six Ways to protect Your House from Flooding* is on FEMA's website: Link
FEMA's recent *Protecting Building Utilities From Flood Damage*: Link
FEMA has a variety of fact sheets on flood protection: Link

Flood insurance
FEMA has the latest information at: Link 1 Link 2

Tornadoes
Link

Thunderstorms and lightning
Link

Winter storms
Link

Earthquakes
Link 1 Link 2

Recovery
The Red Cross/FEMA flyer on recovering from a flood is at: Link
The full book, "Repairing Your Flooded Home," is at: Link

A.4. Public Meeting

A public meeting on the draft plan was held on July 19, 2005. A news release was issued and the article below was published in the City's newsletter, the *Calumet City Review*.

Calumet City Review

COMMUNITY CALENDAR BEGINS ON PAGE 8

Message from Mayor Michelle

Summer Projects Focus on Development, Infrastructure, Safety & Youth

ECONOMIC DEVELOPMENT

Mr. Submarine: The old Kentucky Fried Chicken restaurant on River Oaks Drive was demolished and a newly constructed facility is almost complete for the opening of Mr. Submarine.

Conversion of old Frank's Nursery Building: The old Frank's Nursery building on River Oaks Drive will undergo extensive remodeling in order to open three new storefronts. In addition, another building will be constructed with two new storefronts. Bank One is slated to move into one of the units, as well as other nationally known businesses.

Andy's Hot Dogs: The old Burger King restaurant on River Oaks Drive will be remodeled to house this 1950s style hot dog and ice cream malt diner.

Old Navy: Is scheduled for completion sometime in July. It is located at the newly renovated site of the old Kmart building on Torrence Avenue in the River Oaks West mall area.

Marshall's: The retail store will build a new facade to match the recently opened multi-unit storefront development where the old Kmart building was located.

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CALUMET CITY ANNOUNCES COMPLETION OF PLAN TO REDUCE HAZARDS FROM NATURAL DISASTERS

The City of Calumet City Floodplain Management Committee, made up of members from city offices, other municipalities, property owner associations, public organizations and concerned citizens, announced the completion of its Natural Hazards Mitigation Plan. This has been a seven month effort that reviewed the major hazards to which Calumet City is exposed, including:

- Overbank flooding
- Local drainage
- Sewer backup
- Tornadoes
- Winter storms
- Severe storms
- Earthquakes
- Extreme heat

The Committee evaluated a variety of measures that can reduce exposure to the dangers and damage posed by the hazards and selected 14 action items to mitigate their effects. The resulting Plan (including an Executive Summary) is available for review at the Calumet City Hall, 204 Pulaski Road; Public Library, 660 Manistee; and, on the city's website: www.calumetcity.org .

A public meeting will be held at 7:00 p.m., Tuesday, July 19, 2005, at the Calumet City Hall Council Chambers. Comments may be submitted at the public meeting or to:

James Banasiak, Director
Department of Inspectional Services
687 Wentworth Ave., Calumet City, IL 60409
(708) 891-8120
(708) 891-8117 fax
or email: dis@calumetcity.org

The Floodplain Management Committee will meet after the public meeting, review any desired changes, and recommend a mitigation plan for adoption by the City Council.

6 CALUMET CITY REVIEW SUMMER 2005

For a month before the final public meeting, the home page on the City's website had a notice about the meeting (below) and a link to a page that explained the plan and the public meeting and provided links to each chapter in the draft plan (in the left margin on the next page).

CALUMET city

HISTORY NEWSLETTER DEPT. DIRECT. CALEN

WELCOME to the CALUMET CITY WEBSITE!

MAYOR'S OFFICE CITY COUNCIL PAY WATER BILL VEHICLE STIC
MUNICIPAL CODES FLOOD INFO. NEWS LINKS

Calumet City, facing the future with a fresh, new and energetic vision.

LISTEN to the mayors personal welcome message here!

As Calumet City enters the new century, it is only fitting that we reflect on its rich history, continued progress and hope for future successes.

The region's earliest inhabitants, the Indians, were a semi-nomadic people who came from Asia across the land bridge now drowned by the Bering Strait. These pre-historic Indians were known to have passed through the region in order to migrate to warmer climates. Even today, objects and artifacts such as arrowheads are found in the Green Lake Woods, across from River Oaks Mall, as well as in the Wentworth Woods.

Memories of the "Village of West Hammond," as Calumet City used to be known, include everything from...
Read our full history here...

Calumet City's Natural Hazards Mitigation Plan is drafted and posted for public review and comment. To view the plan, Click here

Mayor Michelle Markiewicz Qualkinbush has initiated a mitigation planning effort for Calumet City. Click here **to learn more about this important information!**

CALUMET CITY PUBLIC LIBRARY

CITY HIGHLIGHTS

Economic Opportunities & City Pr
See the Calumet City economic opportunities and city progress at here.

Parks & Recreation
Calumet City is host to many park recreation, Click here to view sites you.

Senior Living Facilities
Click here to view the listing of Ca Cities Senior Living Facilities.

Calumet City's Rich History
Click here to view the details of Ca City's great history.

Things to do in Calumet City
For a list of just some of the things Calumet City, click here.

If you are interested in researching any current law c information relative to the City, this is where your rec (FOI) is submitted.

City Council Meeting Agendas Click here.
City Council Meeting Minutes Click here.

CALUMET city

HISTORY NEWSLETTER DEPT. DIRECT. CALEN

WELCOME to the CALUMET CITY WEBSITE!

MAYOR'S OFFICE CITY COUNCIL PAY WATER BILL VEHICLE STIC
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MITIGATION PLANNING FOR CALUMET CITY

Press Release June 10, 2005
The Calumet City Floodplain Management Committee announces the completion of its *Natural Hazards Mitigation Plan.* This has been a seven month effort that reviewed the maj hazards to which Calumet City is exposed:

-Overbank flooding
-Sewer backup
-Local drainage
-Tornadoes
-Winter storms
-Severe storms
-Earthquake
-Extreme heat

The Committee evaluated a variety of measures that can reduce exposure to the dangers a damage posed by the hazards and selected 14 action items to mitigate their efforts. The resulting *Plan* (including an executive summary) is available for review at City Hall, the Calumet City Public Library, and on this website.

A public meeting will be held at 7:00 p.m., Tuesday, July 19, 2005, at the Calumet City Hall Council Chambers, 204 Pulaski Road. Comments may be submitted at the public meeting or to:
James Banasiak, Director
Dept. of Inspectional Services
687 Wentworth Ave., Calumet City, IL 60409
(708)891-8120
(708)891-8117 fax
or Email Inspectional Services

The Floodplain Management Committee will meet after the public meeting, review any desi changes, and recommend a mitigation plan for adoption by the Calumet City Council.

Press Release Jan. 31, 2005
Mayor Michelle Markiewicz Qualkinbush has initiated a mitigation planning effort for Calume City. From December 2004 through June 2005, the Floodplain Management Planning Committee will meet to review what can be done to reduce the safety hazards, health hazards, and property damage caused by floods, tornadoes, winter storms, earthquakes an thunderstorms. The Committee will produce a Hazard Mitigation Plan to guide City hazard mitigation efforts.

The effort is being led by the City's Department of Inspectional Services. The Committee's members include a representative from each of the City's seven wards and City offices that are involved in hazard mitigation (Inspectional Services, Fire, Sewer, and Emergency Services).

The committee will review a variety of mitigation measures, organized under six general strategies:

- Preventive--e.g., zoning, building codes, and other developmental regulations

The following article in the *Times* covered the public meeting.

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FEMA remap could reduce flood insurance rates

CALUMET CITY: New maps expected in 2-3 years.

BY MEMA AYI
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This story ran on nwitimes.com on Thursday, July 21, 2005 12:36 AM CDT3

CALUMET CITY | Some homeowners in the floodplain may find they are no longer required to pay for flood insurance, and others could see their flood insurance dramatically reduced once the Federal Emergency Management Agency updates its floodplain maps.

Calumet City's Hazard Mitigation Planning Committee presented its five-year disaster plan to the public Tuesday and will submit it to the City Council for approval. The council has to agree to the plan -- which FEMA requires be updated every five years -- before the federal agency gives its final approval.

The plan includes a suggestion that the city's flood plain could be amended to include only structures closest to the Calumet River, according to French Wetmore, the committee's consultant.

The impact of potential flooding is less severe than it used to be due to the installation of the Thornton Quarry Reservoir, Wetmore said.

A U.S. Army Corps of Engineers map that incorporates the reservoir improvements reduces the area of the floodplain, he said.

The current floodplain includes the area east of River Oaks Mall to State Line Road and River Oaks Drive south to the river, Wetmore said.

"A key part of this is to get the (FEMA) maps changed. If (the floodplain) were mapped showing the area with the Thornton quarry work, about 90 percent of the area would be out of the flood plain," Wetmore said.

Updating the map to include reduced flood risk due to the Thornton quarry work and the Metropolitan Water Reclamation District's Deep Tunnel Project will cost FEMA about $1 million and will likely not be completed for two to three years, Wetmore said.

The committee's multi-hazard plan updated the city's five-year flood plan to include other hazards, including sewer backup, winter storms, earthquakes, local drainage, tornadoes, severe storms and extreme heat.

The city formed the committee to address historical and potential flooding problems in 1999. Updating the plan keeps the city's FEMA rating in good standing, which will be considered when the city applies for grant funding from the agency, Wetmore said.

"The bottom line is to make the community a better place," he said.

The committee's plan includes monitoring the implementation of its recommendations and submitting a report to the City Council once a year. The plan encouraged the city to continue its sewer backup rebate program, improve emergency preparedness planning to coordinate better with critical facilities and departments and to evaluate the levee after FEMA updates the floodplain map.