Mitigation Strategies for Federally Declared Disasters:

Federal Disaster #4121: 2013 Central and Southern Michigan Flooding
Federal Disaster #1777: 2008 Severe Storms and Flooding
Federal Disaster #1527: 2004 Southern Michigan Severe Storms and Flooding
Federal Disaster #1413: 2002 Central and Western Upper Peninsula Flooding
Federal Disaster #1346: 2000 Detroit Area Urban Flooding
Federal Disaster #1237: 1998 Detroit Area Windstorm
Federal Disaster #1226: 1998 West Michigan Windstorm
Federal Disaster #1181: 1997 Southeast Michigan Tornadoes and Flooding
Federal Disaster #1128: 1996 East Michigan Tornado and Flooding
Federal Disaster #1028: 1994 Northern Michigan Deep Freeze
Federal Disaster #774: 1986 Central Michigan Flooding

Hazard Mitigation Strategy for Federal Disaster #4121: 2013 Central and Southern Michigan Flooding

Joint Hazard Mitigation Strategy
4121-DR-MI

July 24, 2013

DECLARATION

On June 18, 2013, President Barack Obama issued a Major Presidential Disaster Declaration (4121-DR-MI) for the State of Michigan resulting in federal disaster assistance to eligible applicants in sixteen counties designated for FEMA Public Assistance (PA) for flood damage that occurred between April 16 and May 14, 2013, and for Hazard Mitigation (HM) assistance throughout the state. The designated counties are Allegan, Baraga, Barry, Gogebic, Houghton, Ionia, Kent, Keweenaw, Marquette, Midland, Muskegon, Newaygo, Ontonagon, Osceola, Ottawa, and Saginaw Counties. Hazard Mitigation Grant Program (HMGP) assistance was declared state wide. On June 29, 2013, a FEMA/Michigan Joint Field Office (JFO) was established in Kentwood (Kent County), and declared operational as of July 1, 2013

BACKGROUND OF EVENT

Beginning on April 16, 2013, a low pressure system moved eastward across the Great Lakes, bringing showers, thunderstorms, and three to five inches of rain to various parts of Michigan. On April 18, 2013 at 10:30pm, approximately 26,858 customers in Michigan were without power, reaching a 24-hour peak of 76,519 customers without power. The rain continued into Friday April 19, 2013, with a two-day precipitation total of five inches. Substantial rises in river levels across Michigan resulted from this rainfall and rapidly melting snow, particularly in western portions of the Upper Peninsula, where the frozen ground prevented precipitation and melting snowpack from being absorbed, exacerbating the event.

Numerous flood warnings were issued in the State of Michigan, specifically in the west and central portions of the state. Six counties and several cities issued Emergency Declarations. No mandatory evacuations were implemented, but numerous voluntary evacuations did occur across the State.

Some rivers continued to rise above record flood levels causing the counties to take emergency actions. The Grand River in the Grand Rapids area surged to historic levels and sandbagging operations were required for protection. The Grand River crested in the evening of April 21, 2013, in downtown Grand Rapids and Comstock Park. Around 10:00 pm it peaked at 21.85 feet in downtown Grand Rapids, breaking the record of 19.64 feet set in 1985. In Comstock Park, the river crested at 17.8 feet around the same time, surpassing the 65-year-old record of 17.75 feet set in 1948. Businesses and building owners along the river shored up their properties as much as possible and local officials had to close the Fulton Street Bridge because of a high-voltage power line threatened by the rising river. Although most rivers began to recede during the following week, there were some lingering floodwaters that continued to affect various areas of the state.

The event was determined to be beyond the capabilities of the State and the affected local governments. Governor Rick Snyder submitted a request to the President on June 7, 2013, to declare a major disaster for the State of Michigan. This request was responded to with the disaster declaration described above.

PURPOSE

This Hazard Mitigation Strategy identifies objectives and actions describing how mitigation activities will be accomplished. The tasks listed here are consistent with the Michigan Hazard Mitigation Plan and will be implemented as needed to achieve the desired results.

STRATEGIC GOALS

HM goals and objectives have been established for this disaster and are based on the current Michigan Hazard Mitigation Plan and the priorities of the State Coordinating Officer (SCO) and Federal Coordinating Officer (FCO), as follows:

GOAL 1:	Support efforts to update state and local (HM) plans where these plans have expired or are nearing expiration, and support efforts to complete plans in local communities that do not yet have them
GOAL 2:	Assist the State and local communities in promoting and successfully implementing hazard mitigation projects
GOAL 3:	Promote effective Floodplain Management through community education, outreach and training, and the provision of technical assistance to the State
GOAL 4:	Provide support and advocacy to Public Assistance (PA) to ensure the implementation of Section 406 HM measures on all appropriate PA projects.

RESOURCE AND STAFFING

Mitigation staffing for this disaster will be composed of limited JFO staff and Regional/State support staff who have been working virtually out of the FEMA Region V Chicago office and the Michigan State Police Emergency Management and Homeland Security Division (MSP/EMHSD) in Lansing. A satellite JFO has opened in Negaunee. Anticipated JFO staffing needs include an HM Group Supervisor to serve as the Mitigation Branch lead, two (2) Hazard and Performance Analysis (HPA) Specialists, a Best Practices Writer, and an Insurance Specialist. The Region V mitigation point of contact for this disaster had initially been deployed to initiate operations, ensure close coordination with the State, and finalize the Hazard Mitigation Strategy. Virtual support will be used for Hazard Mitigation Grant Program coordination, planning technical assistance, floodplain management technical assistance, and Section 406 HM technical assistance. All training identified in this Strategy will be implemented by Region V staff in conjunction with designated State personnel, and will require short deployments directly to the training locations. HM support will be focused on the declared counties due to limited resources.

HAZARD MITIGATION OBJECTIVES AND TASKS

I. HAZARD MITIGATION GRANTS AND PLANNING

Objective #1: Provide value-added technical assistance (actions coded A, D, F, and P below).

LINKS TO GOAL #1: Support efforts to update state and local hazard mitigation (HM) plans where these plans have expired or are nearing expiration, and support efforts to complete plans in local communities that do not yet have them. See below.

County	2010 Population	Plan Status	Expiration Date	Planning Grant?	Date of Grant	Type of Action
Allegan	111,408	Expired	4/25/2012	Yes	2012	D, F
Baraga	8,860	Expired	6/2/2011	Yes	2010	D, F
Barry	59,173	Expired	3/10/2011	No	N/A	P
Gogebic	16,427	Expired	6/2/2011	Yes	2010	D, F
Houghton	36,628	Expired	3/24/2011	Yes	2010	D, F
Ionia	63,905	No approved Plan	N/A	No*	N/A	A, D
Kent	602,622	Fully approved	5/22/2017	No	N/A	D
Keweenaw	2,156	Expired	4/19/2010	Yes	2010	D, F
Marquette	67,077	Expired	1/28/2013	Yes	2011	D, F
Midland	83,629	Fully approved	11/28/2013	No	N/A	D, F, P
Muskegon	172,188	Expired	6/2/2011	Yes	2011	D, F
Newaygo	48,460	Expired	6/30/2013	Yes	2011	D, F
Ontonagon	6,780	Expired	3/7/2011	Yes	2010	D, F
Osceola	23,528	No Approved Plan	N/A	No*	N/A	A, D
Ottawa	263,801	Fully approved	7/12/2017	No	N/A	D
Saginaw	200,169	Expired	5/27/2013	No	N/A	P

* MSP/EMHSD staff are providing direct assistance to these communities' planning efforts.

Key to "Type of Action" abbreviations:
A: State to provide direct planning assistance to help develop a local hazard mitigation plan for those communities not using planning grant funds.
D: Discuss potential hazard mitigation projects and grant application strategies.
F: Provide feedback to planning offices on their draft hazard mitigation plans/materials developed for the local communities.
P: Discuss planning grant application procedures and prospects.

Planning support will be a collaborative effort including training provided by qualified Region V Planning Specialists and the MSP Planning Specialists in Lansing. This work will emphasize remote methods of support (through the use of telecommunication technologies), with only limited travel expenditures for face-to-face meetings with communities, as the need arises.

Priority Tasks 1, 5, 21, 22, 23, have been selected by the State to be accomplished with support from FEMA. The remaining tasks will be scheduled as resources and time permits. The Priority Tasks are annotated with their description highlighted in gray.

TASK/ACTION	RESPONSIBLE AGENCIES	SCHEDULE	Task Number
(A, D) Provide technical assistance on Local Hazard Mitigation Planning. Outreach to potential HMGP sub-applicant communities whose HM plans have expired or will expire.	MSP/EMHSD; FEMA	Ongoing	1
Expedite any pending FEMA reviews of Local Hazard Mitigation Plans. (F)	FEMA	Ongoing	2
(P) The State may use up to 7% of HMGP funds for local hazard mitigation planning grants, and will assist communities with application development. FEMA will work with the State to expedite Local Hazard Mitigation Planning Grant awards.	MSP/EMHSD; FEMA	Ongoing	3
Coordinate with GIS to review and validate geospatial and attribute data for State-owned critical facilities.	FEMA/ Michigan Dept. of Technology, Management and Budget/MSP/EMHSD	On Going	4

Objective #2: Provide technical assistance to the State in the administration of HMGP.

LINKS TO GOAL #2: Assist the State and local communities in promoting and successfully implementing HM projects.

Grants Management training is an important task in support of HMGP under this disaster. Per the State's request, Region V certified trainers will present part of the full suite of HM Assistance courses. The courses are appropriate for State, local and FEMA personnel involved in applying for, reviewing, implementing or administering grants. These training opportunities will result in more complete HMGP applications and thus quicker review and approval. The timing of the courses will be determined in collaboration with the State to maximize attendance of the target audiences. The courses will generally be offered twice, once in the

Lower Peninsula and once in the Upper Peninsula, provided there is sufficient demand to warrant two separate sessions. Two FEMA Region V staff will deploy to teach each class.

TASK	RESPONSIBLE AGENCIES	SCHEDULE	TASK NUMBER
Resolve NEMIS access issue for the State, install most current NEMIS software, and provide refresher on NEMIS data entry	FEMA IT/FEMA HMA	July 2013	5
Coordinate the delivery of L276 Benefit Cost Analysis, a 2-day training session for local community, State and FEMA staff.	FEMA; MSP/EMHSD	TBD	6
Coordinate the delivery of L212 Unified Hazard Mitigation Assistance (HMA): Developing Quality Application Elements, a 3-day training session for local community, State and FEMA staff.	FEMA; MSP/EMHSD	TBD	7
Coordinate the delivery of L214 Unified HMA: Project Implementation and Programmatic Closeout, a 2-day training session for local community, State and FEMA staff.	FEMA; MSP/EMHSD	TBD	8
Provide technical assistance to State and local communities regarding Sandy Reform and Improvement Act (SRIA) policy changes and HMA Guidance.	MSP/EMHSD; FEMA	Ongoing	9
Solicit and review HMGP pre-applications.	MSP/EMHSD	Ongoing	10

TASK	RESPONSIBLE AGENCIES	SCHEDULE	TASK NUMBER
Update HMGP State Administrative Plan to reflect current policies and procedures and to ensure compliance with 206.437 for DR-4121-MI.	MSP/EMHSD	July 2013	11
FEMA review and approval of HMGP State Administrative Plan	FEMA	July 2013	12
Provide State with an initial estimate of Management Costs in accordance with 44 CFR 207.	FEMA	July 2013	13
Coordinate with GIS to review and validate geospatial and attribute data for State-owned critical facilities.	FEMA/ Michigan Department of Technology, Management and Budget/MSP/EMHSD	On Going	14

II. FLOODPLAIN MANAGEMENT AND INSURANCE

Objective #1: Provide technical assistance to the State relating to floodplain management and insurance.

LINKS TO GOAL #3: Promote effective Floodplain Management through community education, outreach and training, and the provision of technical assistance to the State.

An Insurance Specialist will deploy to the JFO for approximately three weeks to complete these tasks. This person will also be a resource for answering flood insurance questions that arise at the JFO.

One Region V staff member will deploy directly to the field to conduct training sessions in up to eight locations throughout Michigan. The locations and dates will be coordinated with Michigan Department of Environmental Quality (MDEQ).

TASK	RESPONSIBLE AGENCIES	SCHEDULE	TASK NUMBER
Identify and contact non-participating and sanctioned communities using letters and materials that encourage participation in the NFIP	FEMA	July 2013	15
Write letters to affected communities on Substantial Damage provisions.	FEMA	July 2013	16
Provide outreach to insurance agents to promote a better understanding of the NFIP	FEMA	July 2013	17
Provide outreach to Tribes in Michigan to promote hazard mitigation plans and NFIP participation.	FEMA	July 2013	18
Provide two advanced floodplain training modules: Post-disaster Responsibilities, and Substantial Improvement, Substantial Damage to MI Districts.	MDEQ/FEMA	July – August 2013	19
Encourage local officials from declared counties to participate in Emergency Management Institute course, *L273: Managing Floodplain Development Through the National Flood Insurance Program*.	MDEQ/FEMA	July – August 2013	20

III. COMMUNITY EDUCATION AND OUTREACH (CEO)

Objective #1: Develop and Disseminate Hazard Mitigation Success Stories for Stakeholder Outreach on the efficacy of coordinated mitigation planning.

LINKS TO GOAL #1: Support efforts to update state and local hazard mitigation (HM) plans where these plans have expired or are nearing expiration, and support efforts to complete plans in local communities that do not yet have them.

LINKS TO GOAL #2: Assist the State and local communities in promoting and successfully implementing HM projects.

The development and dissemination of HM success stories is identified as an objective in the Michigan Hazard Mitigation Plan (HM objective 4.12, p. 600). That objective includes the eventual update of Publication 106a, Michigan Hazard Mitigation Success Stories, which currently documents their mitigation successes from 1998 through 2011.

A Community Education & Outreach (CEO) writer will be deployed to document hazard mitigation success stories the State has identified, including several storm water management projects in the declared disaster area that are reported to have performed well during the April/May 2013 floods. The stories will be published in the FEMA best practices library and in the second edition of the MSP/EMHSD Publication 106a, Michigan Hazard Mitigation Success Stories (located on the MSP/EMHSD website). The State will also use these products for public information purposes, in presentations and other forms of training, and for consideration in updates of the Michigan Hazard Mitigation Plan.

TASK	RESPONSIBLE AGENCIES	SCHEDULE	TASK NUMBER
Develop best practice stories on successful projects in the declared disaster area.	FEMA; MSP/EMHSD	August 2013	21

IV. HAZARD PERFORMANCE and ANALYSIS (HPA)

Objective #1: Promote effective HM through quantitative analysis of past projects.

LINK TO GOAL #2: Assist the State and its local communities in promoting and successfully implementing HM projects.

HPA will utilize quantitative methodology to produce a loss avoidance report concerning completed mitigated properties. This report will demonstrate the value inherent in flood mitigation involving either elevation or acquisition of flood-prone structures. MSP has

identified several projects in the declared area to investigate for inclusion in the study: Robinson Township, Ottawa County (9 homes acquired); Plainfield Township, Kent County (9 homes acquired); City of Wyoming, Kent County (3 homes acquired); and Ada Township, Kent County (1 home acquired). A FEMA Reservist will be deployed to complete this task.

TASK	RESPONSIBLE AGENCIES	SCHEDULE	TASK NUMBER
Develop loss avoidance reports for identified communities in the declared area using Region V benefit-cost methodology.	FEMA; MSP/EMHSD	August 30, 2013	22

Objective #2: Provide technical assistance to the State as required regarding the application of Section 406 mitigation measures on PA projects.

LINKS TO GOAL #4: Provide support and advocacy to PA to ensure the implementation of Section 406 HM measures on all appropriate PA projects

TASK	RESPONSIBLE AGENCIES	SCHEDULE	
Provide 406 technical assistance and/or training, upon request, to maximize hazard mitigation opportunities	FEMA	Ongoing	23
Provide limited support for event frequency assessments (primarily of rural streams) at the request of PA , to assist BCA computations	FEMA; MDEQ USGS	August-September 2013	24

SUMMARY

The hazard mitigation objectives and tasks identified in this Hazard Mitigation Strategy will be implemented through a robust FEMA/State partnership dedicated to preventing loss of life and property to the residents of Michigan. JFO staff will be augmented with Region V staff and the functions included in this strategy will ultimately be transferred to FEMA Region V. Depending on the needs of its State partners, all tasks identified but not completed prior to the demobilization of the Mitigation Branch will transition back to the State or Region for oversight and monitoring.

Hazard Mitigation Working Group

Matt Schnepp	MSP/EMHSD	State Hazard Mitigation Officer
Joel Pepper	MSP/EMHSD	Assistant State Hazard Mitigation Officer
Doran Duckworth	MSP/EMHSD	State Support Unit Manager / State Planner
Mike Sobocinski	MSP/EMHSD	Hazard Mitigation Planner
Mitch Graham	MSP/EMHSD	Hazard Mitigation Planner
Les Thomas	Michigan DEQ	State NFIP Coordinator
Byron Lane	Michigan DEQ	Chief, Hydrologic Studies & Dam Safety Unit
Catrina Covino	FEMA RV	HM FPM&I Specialist
Ken Hinterlong	FEMA RV	HM HPA Specialist
Rick Foody	FEMA RV	HM Grants Specialist
Kirstin Kuenzi	FEMA RV	HM Planner
Ray Morgan	FEMA	HM Group Supervisor

Attachments

1. Declared Counties Map and program availability for the disaster

Mark Neveau

Mark Neveau
Federal Coordinating Officer
FEMA-DR-4121-MI

7-25-13
Date

Chris A. Kelenske

Capt. Chris Kelenske, State Coordinating Officer
FEMA-DR-4121-MI
Michigan Department of State Police
Emergency Management and Homeland Security Division

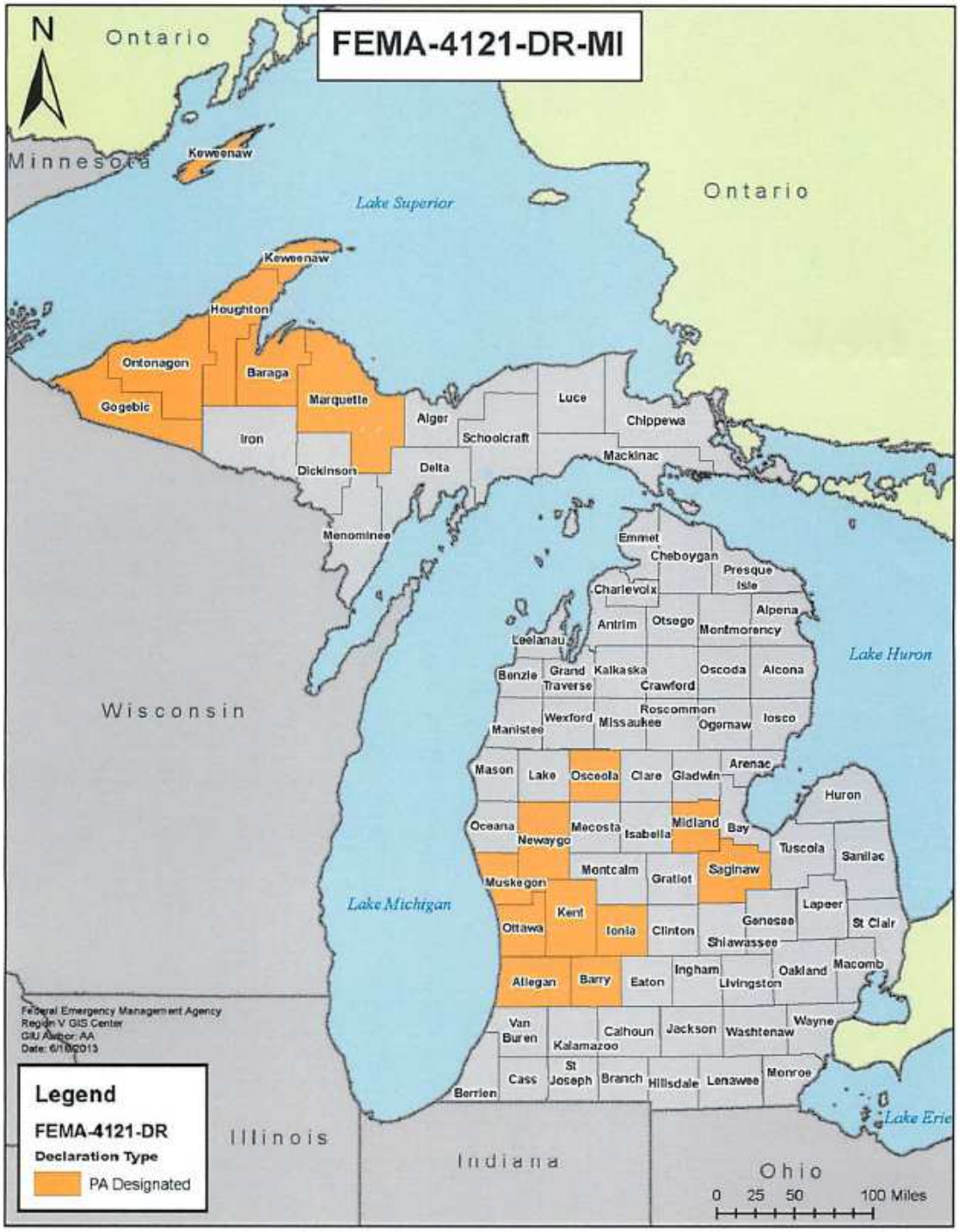
8/7/13
Date

Christine Stack

Christine Stack, Mitigation Division Director
U.S. Department of Homeland Security
FEMA Region V

7-29-13
Date

ATTACHMENT 1 - Declared Counties Map



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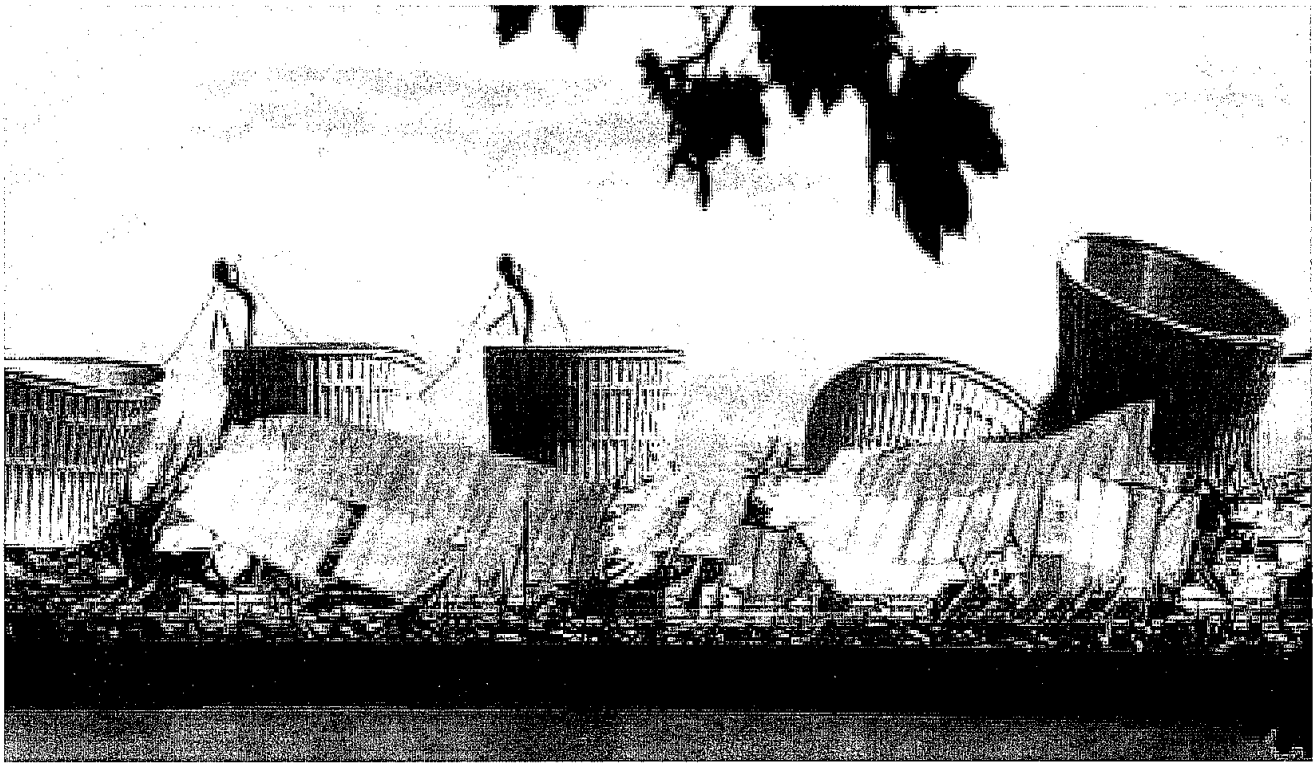
Hazard Mitigation Strategy for Federal Disaster #1777: 2008 Severe Storms and Flooding



FEMA-1777-DR-MI

Mitigation Action Plan

Declared July 14, 2008 for Allegan, Barry, Eaton, Ingham, Lake, Manistee, Mason, Missaukee, Osceola, Ottawa, and Wexford County in the State of Michigan

FEMA

Michigan State Police
Emergency Management and
Homeland Security Division

Mitigation Action Plan
OBJECTIVES AND PRIORITIES
FEMA-1777-DR-MI
Declared July 14, 2008

Background of Storm Event

Beginning on June 6, severe weather impacted twelve counties and two major population centers in southwest and central Michigan. Impacted counties include Allegan, Barry, Eaton, Ingham, Lake, Manistee, Mason, Missaukee, Osceola, Ottawa, Saginaw and Wexford. The National Weather Service in Grand Rapids reported two flash floods that exceeded the 100 year threshold, confirmed three F1 (73 – 112 mph) tornadoes, and severe thunderstorms with winds in excess of 100 mph. Rainfall totals were estimated between seven and twelve inches by the National Weather Service. Rainfall occurred in less than six hours exceeding the 100 year rainfall values of 3.5 inches in the affected area. Flash flooding washed out roads, flooded crops, and caused moderate flooding on local rivers and streams. Subsequently, this weather pattern produced additional severe weather that impacted the same counties. The NWS confirmed that three tornadoes impacted the area during this event. On June 8, a tornado with up to 100 mph winds formed over north-central Eaton County and moved into the west side of Lansing (Ingham County) before lifting. This tornado destroyed a cooling tower at a power plant in Ingham County and significantly damaged another one. Severe thunderstorm winds of up to 80 mph caused significant damage in East Lansing. A second tornado with winds of 100 mph occurred on the same day and tracked for about eight miles across Osceola County affecting Reed City and the Town of Evart. A third tornado touched down several times with winds of 100 mph in Mason and Manistee Counties on June 12, preceding flash flooding in the same areas. Severe thunderstorms produced wind bursts of 80 to 110 mph on June 6, 2008. On June 7, storms produced 80 to 100 mph downburst winds over two counties including the State Capitol building, and the City of Lansing. A large severe thunderstorm squall line affected all of the southwest Michigan on June 8, with four counties affected by squalls of 75 to 100 mph (see Attachment A).

On July 7, 2008, Governor Jennifer Granholm requested a Federal Major Disaster Declaration for the 12 affected counties within the State of Michigan. On July 14, 2008, President George W. Bush designated the following counties eligible for Public Assistance (PA) under FEMA-1777-DR-MI: Allegan, Barry, Eaton, Ingham, Lake, Manistee, Mason, Missaukee, Osceola, Ottawa, and Wexford and statewide eligibility for the Hazard Mitigation Grant Program (HMGP).

Mitigation Objectives and Priorities

The objective of mitigation is to reduce future disaster losses through acquisition and relocation of hazard-prone structures, structural retrofitting, mitigation education of community officials and residents, wise land use and development practices, prudent use of resources and funding, and encouragement of National Flood Insurance Program (NFIP) implementation and compliance, among other measures. Mitigation measures can also be implemented on public facilities through the use of Section 406 mitigation under the PA program.

This Hazard Mitigation Action Plan lists specific objectives and priorities that are divided into four categories: Hazard Mitigation Grant Program; Promotion of Section 406 mitigation through the PA Program; Promotion of Local Mitigation Planning; and Outreach/Best Practices.

Hazard Mitigation Grant Program

Michigan's priority for the HMGP is two-fold. First, the State would like to fund several projects that were not funded during the Fiscal Year 2008 grant cycle under the Pre-Disaster Mitigation (PDM) Program. These projects involve mitigation planning and activities to reduce future flood damages (such as acquisition and removal of flood prone structures from the floodplain). Supporting mitigation planning efforts and removing flood prone structures from floodplains is consistent with priorities in the Michigan State Hazard Mitigation Plan. Additionally, selecting these projects benefits the 1777-DR-MI HMGP in that the projects are already developed which will allow for quicker implementation of the program. The second State priority for the HMGP is to provide the declared counties and local communities with the opportunity to mitigate losses or potential future losses. If an insufficient number of eligible, cost-effective projects are identified within the affected counties to utilize the remaining funds, other applications from throughout the state will be considered for funding.

Mitigation opportunities within the declared area are of critical importance. Even though the projects outlined under the first priority may not be from the declared area, there are ample mitigation resources available to the declared counties. Prior to the initiation of the HMGP, declared counties will benefit from mitigation actions taken under the Section 406 mitigation under the PA program (which will be discussed later in this document). Also, the Fiscal Year 2009 Hazard Mitigation Assistance (HMA) application period is currently open. Applicants from the declared counties will be able to submit applications for funding under the various Hazard Mitigation Assistance programs (also discussed later in this document), likely in advance of the 1777-DR-MI HMGP open application period.

Given that a significant portion of the damage associated with 1777-DR-MI resulted from tornadoes, Michigan may choose to exercise the option to increase the HMGP five percent initiative to ten percent for tornado safety related projects, according to the Michael Armstrong Policy Memo dated August 18, 1998 (Attachment B). Ultimately,

the Michigan Citizen-Community Emergency Response Coordinating Council (MCCERCC) will determine priorities for the 1777-DR-MI HMGP funding and may elect to maximize the available funding for this group of projects.

The state does not plan on expediting the HMGP application process. HMGP processing will take place within the state and regional office. The state must submit its HMGP application within 12 months of the disaster declaration.

Action	Lead Agency	Date Due
Prioritize and select projects that meet the goals and requirements of the HMGP for 1) non-funded Fiscal Year 2008 PDM projects and 2) the declared counties 3) non-declared counties.	MSP	7/14/2009
FEMA will provide technical assistance on HMGP applications throughout the grant application cycle.	FEMA	7/14/2009
State mitigation staff will update the State Administrative Plan for 1777-DR-MI in accordance with new FEMA management cost rules.	MSP	9/30/2008
Brief the MCCERCC on the proposed HMGP strategy and seek approval of the proposed priorities.	MSP	8/19/2008

Hazard Mitigation Assistance Non-disaster Grant Programs

Under the Pre-Disaster Mitigation Program (PDM), Flood Mitigation Assistance program (FMA), Repetitive Flood Claim program (RFC), and Severe Repetitve Loss program (SRL) funding opportunities may be available to support mitigation efforts in the declared counties and elsewhere in the State of Michigan. The Michigan State Police Emergency Management and Homeland Security Division (MSP/EMHSD) will promote the program throughout the state and solicit applications. Applications will be reviewed and prioritized by the MSP/EMHSD and MCCERCC and forwarded to FEMA for funding consideration. Fiscal Year 2009 FEMA deadline for PDM grant applications is December 19, 2008.

Section 406 Mitigation Coordination with Public Assistance Program

Under the Robert T. Stafford Disaster Relief and Emergency Assistance Act, FEMA has the authority to fund the restoration of eligible public facilities that have sustained damages due to a Presidentially declared disaster. In Region V, Public Assistance is the lead division for all Section 406 mitigation measures but the Mitigation Division will support all PA 406 mitigation opportunities within the declared areas. Section 406 of the Stafford Act contains a provision for the consideration of funding additional measures that will enhance a facility's ability to resist similar damage to future events. The mitigation measures must be related to eligible disaster-related damages and must directly reduce the potential for future, similar disaster damages to the eligible facility. Mitigation measures must be determined to be cost-effective through any of these three measures: 1) mitigation measures may be to up to 15 percent of the total eligible cost of the repair work on a particular project; 2) certain mitigation measures have been determined to be cost effective, as long as the mitigation measure does not exceed 100 percent of the eligible cost of the repair work on the project; or 3) for measures that exceed the above costs, a FEMA approved benefit/cost module may be used. Michigan would like to promote Section 406 mitigation on every Project Worksheet where there is an opportunity.

Action	Lead Agency	Date Due
Promotion of Section 406 mitigation throughout affected counties through community outreach at Applicant Briefings and community questions to lead agencies	MSP/FEMA	ongoing
The Mitigation Branch will provide technical guidance to the PA Branch as requested for Section 406 Mitigation Issues	FEMA	ongoing

Promotion of Local Hazard Mitigation Planning

The State Standard Hazard Mitigation Plan was approved on March 27, 2008. The State is eligible to receive HMGP funds based on 15 percent of the total estimated eligible Stafford Act disaster assistance. The Governor has requested that the HMGP be made available statewide. Local communities can choose to participate within a multi-jurisdictional plan or county plan. After FEMA approval, each community within the multi-jurisdictional plan must adopt the plan before they are eligible for HMGP project grants. Within the 11 declared counties, 7 counties (Allegan, Barry, Eaton, Ingham, Mason, Missaukee, and Ottawa) have approved and adopted local mitigation plans, 3 counties (Lake, Manistee, and Wexford) have plans that meet requirements but either have never been formally adopted or have been adopted with documentation submission and FEMA acceptance still in process, and 1 county (Osceola) has a plan that has been in revision since 2005 (See Attachment C). Counties in Attachment C can be listed in both the approved and adopted category and the plans pending adoption category depending on whether the local communities have adopted the multi-jurisdictional county plan.

Action	Lead Agency	Date Due
Promote adoption of Local Mitigation Plans (LMP) in affected communities that meet requirements but have not been formally adopted through community outreach	MSP	12/31/2008
Promote adoption of LMPs throughout State of Michigan	MSP	12/31/2008
Analyze the necessity of updates to LMPs in counties with plans expiring within the next two years	MSP	12/31/2008
Meet with Osceola County to facilitate the completion of their local hazard mitigation plan.	MSP	8/1/2008
Provide technical / direct planning assistance to Osceola County, as required, to aid in the completion of a federally-approvable and DMA 2000 compliant hazard mitigation plan for the county.	MSP	12/31/2008

Outreach/Best Practices

When disasters occur, local officials and citizens have heightened awareness of the need to protect people and property from devastating losses. By highlighting how mitigation can provide additional protection against future risk and losses, individual citizens, businesses, and government leaders may be inspired to take positive action. Outreach activities and the promotion of mitigation "best practices" can increase awareness and enhance the likelihood of the success of mitigation measures.

Action	Lead Agency	Date Due
Coordinate mitigation activities with on-going External Affairs Outreach Program	FEMA	On-going
Document success stories, as requested by the state, to promote mitigation activities.	FEMA	12/15/2008

National Flood Insurance Program (NFIP) Coordination

The FEMA Floodplain Management and Insurance Branch (FM&I) and the Michigan Department of Environmental Quality (MDEQ) coordinated to determine the appropriate level of NFIP field-driven tasks. Given the nature of the event, subsequent preliminary damage assessments, and the delineated floodplains within the declared counties an agreement was reached that adequate follow-up could be achieved through combined efforts directed from the respective Federal and State offices. FM&I and MDEQ will support disaster activities through existing networks with no staff deployment at the Joint Field Office or participation in the Mitigation Action Plan.

Mitigation Action Plan Team Members

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State Support Unit Manager and State Planner

Matt Schnepp
State Hazard Mitigation Officer

Joel Pepper
Assistant State Hazard Mitigation Officer

Mike Sobocinski
Hazard Mitigation Planner

Federal Emergency Management Agency:
Norbert Schwartz
Mitigation Division Director

Anna Pudlo
Hazard Mitigation Assistance Branch Chief

Nicholas Mueller
Hazard Mitigation Officer

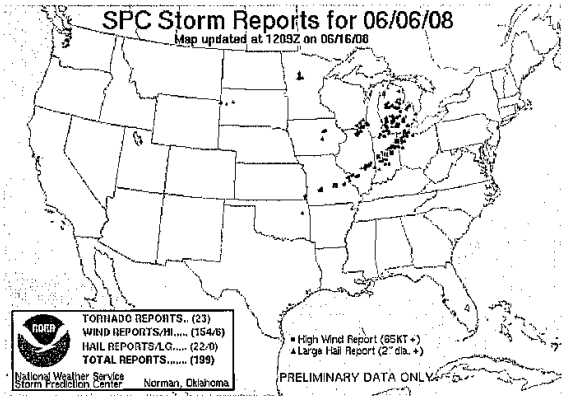
Heidi Kirkman
Hazard Mitigation Officer

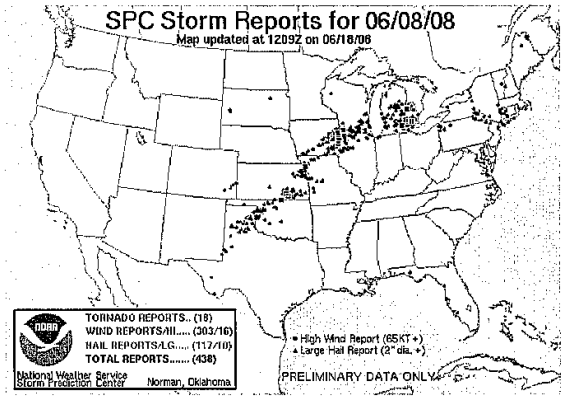
William Moore
Federal Coordinating Officer

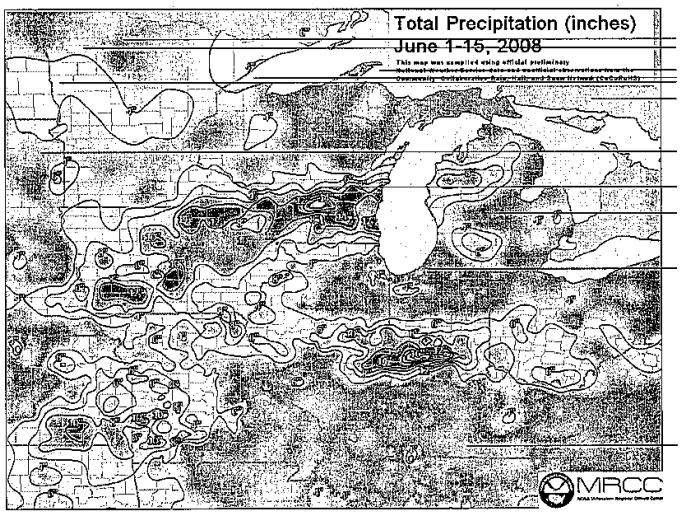
Ralph Hohrat FOR APK
Anthony P. Katarsky
State Coordinating Officer

Photo on Cover- 6/08/2008 Lansing, Michigan- Storm damaged cooling towers at the Board of Water and Light's Eckert's Power Station near Moore's River Drive. Lansing State Journal.

Attachment A
NOAA Weather Reports for Incident Period 6/6/2008 – 6/13/2008







Attachment B

File

Federal Emergency Management Agency

Washington, D.C. 20472

AUG 18 1998

EL-19

MEMORANDUM FOR: Regional Directors
Regions I-X

ATTENTION: Mitigation Division Directors

FROM: Michael J. Armstrong
Associate Director for Mitigation

SUBJECT: Use of Hazard Mitigation Grant Program (HMGP) for Measures to address Tornado Safety

The high incidence of tornadic activity associated with the 1997/1998 El Nino weather pattern has led to unusual loss of life and property damage. These recent disasters have made apparent the need for additional funding for warning systems that cannot be accommodated by existing programs.

While the Federal government cannot indefinitely support warning system acquisition, I want to be responsive to these unusual needs and I will allow States that have received a Presidential disaster declaration for tornadoes to use up to 10% of the total available HMGP funding, at their discretion, for hazard mitigation measures to address the unique hazards posed by tornadoes. This policy essentially increases the 5% set-aside initiative funding by an additional 5% to allow for tornado-related projects.

To qualify, States must develop a comprehensive plan to address warning of citizens (ensuring 90% coverage), furthering the "safe room" concept in construction or rehabilitation of residences or commercial structures, and address the issue of sheltering in mobile home parks. The plan must also have a component addressing how the State will implement an ongoing public education program so that citizens are aware of warning systems and their meaning (including the availability of in-home shelter designs).

FEMA also encourages the use of the NOAA weather radio system as a reliable and cost-effective means of providing timely warning to the public. Additionally, NOAA has agreed to maintain transmission points. Maintenance of warning systems will not be an eligible expense.

As with standard HMGP projects, a project type to be funded from the 10% portion of the HMGP must be identified in the State's hazard mitigation plan and fulfill the goal of the program, that is, to reduce or prevent future damage to property and to reduce or prevent loss of life or injury from tornadoes. However, tornado mitigation projects or measures, such as warning systems, eligible within this 10% portion of the HMGP are often difficult to evaluate against traditional quantitative program cost effectiveness and eligibility criteria. Consequently, in lieu of a benefit-cost analysis, the State should include a narrative that identifies the

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mitigation benefits and indicates that there is a reasonable expectation that future damage or loss of life or injury will be reduced or prevented. Finally, these projects will have to be reviewed for compliance under the National Environmental Policy Act and other federal environmentally-related laws.

In the interest of expediting the closeout of older disasters, this policy applies to all open disasters of any kind declared prior to Fiscal Year 1998. It also applies to all Fiscal Year 1998 and future declarations in which tornadoes or high winds played a role. This policy will terminate upon FEMA's adoption of HMGP regulatory changes published as a proposed rule in the Federal Register on May 1, 1998, which states that warning systems may only be funded from the 5% Initiative. We anticipate that this rule will be finalized by the end of the calendar year. New disaster declarations after the effective date of the Final Rule will operate under the original 5% Initiative guidelines.

Attached for your convenience is a sample letter conveying this policy to the State Directors. If you have any questions, please call Robert F. Shea at (202) 646-3619 or Donna M. Dannels at (202) 646-3662.

Attachment

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Attachment C
Local Mitigation Plan Status

Approved and Adopted	Plans Pending Adoption	Plans in Revision
Allegan County	**Allegan County**	**Osceola County**
Allegan County	Allegan, City	
Dorr Township	Casco Township	
Douglas, City of	Cheshire Township	
Laketown Township	Fennville, City of	
Monterey Township	Fillmore Township	
Otsego, City of	Ganges Township	
Overisel Township	Gun Plain Township	
Salem Township	Heath Township	
Saugatuck, City	Holland, City of	
Saugatuck Township	Hopkins Township	
Watson Township	Hopkins, Village	
Barry County	Lee Township	
Barry County	Leighton Township	
Hastings, City of	Manlius Township (sanctioned)	
Hope Township	Martin Township	
Thornapple Township	Martin Village	
Eaton Co.	Otsego Township	
Bellevue Township	Plainwell, City of	
Benton Township	Trowbridge Township	
Brookfield Township	Valley Township	
Carmel Township	Wayland City of	
Chester Township	Wayland Township	
Delta Township	**Barry County**	
Eaton Township	Assyria Township	
Eaton Rapids Township	Baltimore Township	
Hamlin Township	Barry Township	
Kalamo Township	Cariton Township	
Lansing City of	Castleton Township	
Roxand Township	Freeport, Village of	
Sunfield Township	Hastings Township	
Vermontville Township	Irving Township	
Walton Township	Johnstown Township	
Ingham County	Maple Grove Township	
Lansing, City of	Middleville, Village of	
Mason County	Nashville, Village of	
Mason County	Orangeville Township	
Amber Township	Prairieville Township	
Branch Township	Rutland Charter Township	
Custer Township	Woodland, Village of	
Custer, Village of	Woodland Township	
Eden Township	Yankee Springs Township	

Fountain, Village of
Free Soil Township
Free Soil, Village of
Hamlin Township
Ludington, City of
Meade Township
Pere Marquette Township
Riverton Township
Scottville, City of
Sheridan Township
Sherman Township
Summit Township
Victory Township

Missaukee County

Ottawa County

Ottawa County
Chester Township
Ferrysburg, City of
Grand Haven Township
Grand Haven, City of
Holland Township
Hudsonville, City of
Jamestown Township
Polkton, Charter Township
Port Sheldon Township
Wright Township
Zeeland, City of

Eaton County

Bellevue, Village of
Charlotte, City of
Dimondale, Village of
Eaton Rapids, City of
Grand Ledge, City of
Mulliken, Village of
Olivet, City of
Oneida Township
Potterville, City of
Sunfield, Village of
Vermontville, Village of
Windsor Township

Ingham County

Alaiedon Township
Aurelius Township
Bunker Hill Township
Dansville, Village of
Delhi Township
East Lansing, City of
Ingham Township
Lansing Township
Leroy Township
Leslie Township
Leslie, City of
Locke Township
Mason, City of
Meridian Township
Onondaga Township
Stockbridge Township
Stockbridge, Village of
Vevay Township
Webberville, Village of
Wheatfield Township
White Oak Township
Williamston Township
Williamston, City of

Lake County

Baldwin, Village of
Chase Township
Cherry Valley Township
Dover Township
Eden Township
Elk Township
Ellsworth Township
Lake Township
Luther, Village of
Newkirk Township
Peacock Township
Pinora Township

Pleasant Plains Township
Sauble Township
Sweetwater Township
Webber Township
Yates Township

Manistee County

Manistee County
Arcadia Township
Bear Lake Township
Bear Lake, City of
Brown Township
Cleon Township
Copemish Township
Dickson Township
East Lake, village
Filer Township
Kaleva, Village
Manistee Township
Manistee, City of
Maple Grove Township
Marilla Township
Norman Township
Onekama Township
Onekama, City of
Pleasanton Township
Springdale Township
Stronach Township

Mason County

Logan Twp (Suspended Community)

Missaukee County

Aetna Township
Bloomfield Township
Butterfield Township
Caldwell Township
Clam Union Township
Enterprise Township
Forest Township
Holland Township
Lake City, City
Lake Township
McBain, City
Norwich Township
Pioneer Township
Reeder Township
Richland Township
Riverside Township
West Branch Township

Ottawa Co

Allendale, Charter Township
Blendon Township

Coopersville, Village of
Crockery Township
Georgetown Township
Holland, City of
Olive Township
Park Township
Robinson Township
Spring Lake Township
Spring Lake, Village of
Tallmadge Township
Zeeland, Charter Township

Wexford County

Antioch Township
Boon Township
Buckley, Village of
Cadillac, City of
Cedar Creek,Township
Cherry Grove Township
Clam Lake Township
Colfax Township
Greenwood Township
Hanover Township
Haring Township
Harrietta, Village of
Henderson Township
Liberty Township
Mesick, Village of
Selma Township
Slagle Township
South Branch Township
Springville Township
Wexford Township

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Hazard Mitigation Strategy for Federal Disaster #1527: 2004 Southern Michigan Severe Storms / Flooding

FEMA-1527-DR-MI

Hazard Mitigation Strategy

Declared June 30, 2004 for Barry, Berrien, Cass, Eaton, Genesee, Gladwin, Ingham, Ionia, Jackson, Kent, Livingston, Macomb, Mecosta, Muskegon, Oakland, Ottawa, Saginaw, Sanilac, Shiawassee, St. Clair, St. Joseph, Washtenaw and Wayne Counties in Michigan

MITIGATION STRATEGY - FEMA-1527-DR-MI
State of Michigan

OBJECTIVE

The objective of mitigation is to reduce future disaster losses through acquisition and relocation of hazard-prone property, structural retrofitting, mitigation education of community officials and residents, wise land use and land development practices, prudent use of resources and funding, and encouragement of National Flood Insurance Program (NFIP) implementation and compliance, to name just a few measures that have been successful. To assist communities in Michigan with mitigation efforts so that the environment is safer and has a reduced risk from disaster damage, the following objectives must be accomplished:

1. Mitigation opportunities will be identified, prioritized and selected for implementation:

   - The initial mitigation opportunities and recommendations identified during the damage assessment process in many of the affected communities include the following (not listed in any particular order):

     A. Acquisition and relocation or retrofitting and floodproofing (including elevation) of substantially damaged structures located in flood prone areas.
     B. Applying the best methods to properly anchor and/or elevate or flood proof fuel oil tanks or propane gas tanks at homes and businesses.
     C. Floodproofing roads, bridges, culverts and other public facilities located in floodplains or other floodprone areas.
     D. Armoring erosion prone stream banks to prevent sedimentation and to otherwise ensure maximum hydraulic capacity is maintained.
     E. Community outreach and education to promote flood proofing methods in residential and commercial structures, focusing on elevation and/or relocation of utilities and mechanical systems in basements or other vulnerable areas. Resource packets of information about flood mitigation will be put together and mailed out to 858 state and university libraries in Michigan. The information packets will be publicized by press release so that the public knows the information is available for review. Additionally, a FEMA flood proofing flyer will be posted on the Emergency Management Division web site with a link to additional information on FEMA's web site.
     F. Completion of all-hazard mitigation plans as required under the federal Disaster Mitigation Act of 2000.
     G. Retrofitting of public and private facilities to reduce future wind damage through the application of proper structural wind engineering measures or construction of "safe rooms" and shelters.
     H. Vegetation management, with an emphasis on the establishment and/or improvement of community urban forestry measures.
     I. Community outreach and education to promote wind resistant building practices, the construction of "safe rooms" and community shelters, and proper urban forestry techniques and practices. Resource packets of information about wind mitigation will be put together and mailed out to 858 state and university libraries in Michigan. The information packets will be publicized by press release so that the public knows the information is available for review.

2. Financial resources, including disaster assistance programs such as the HMGP, and funds from other state and federal programs, will be maximized:

   - If the minimum threshold for the Federal Highway Administration (FHWA) Emergency Relief Program is met, inspectors will make every effort to include appropriate mitigation measures in restoring damaged Federal-Aid roads and bridges.

   - Under the Small Business Administration (SBA) disaster loan program, low interest loans will be made available for repairs and mitigation upgrades to damaged structures.

   - Under the Natural Resource Conservation Service (NRCS) Emergency Watershed Protection Program, appropriate mitigation measures will be implemented to remove any and all threats (urgent and compelling) resulting from sudden watershed impairment. In addition, supplemental funding will be requested to implement appropriate mitigation measures at other damaged, impacted or threatened sites (not considered urgent and compelling) in the absence of funding under the FEMA Public Assistance Grant Program.

- Under the U.S. Army Corps of Engineers (USACE), Continuing Authorities Program (CAP) and other post-flood damage and shoreline erosion (Section 14) mitigation/protection authorities and programs, appropriate mitigation may be implemented to assist the affected local governments in reducing or eliminating future damage and impacts caused by flooding and/or shoreline erosion.

- At the State's discretion, up to seven percent (7%) of available HMGP funds will be earmarked to facilitate the development of local hazard mitigation plans in the declared disaster area and in other communities in the region.

- Under the HMGP, funds will be earmarked as appropriate to acquire / relocate substantially damaged structures located in flood prone areas.

- Under the Pre-Disaster Mitigation Program – Competitive (PDMP-C), funding opportunities may be made available to support mitigation efforts in the declared area and elsewhere throughout the State of Michigan. Once FEMA announces the combined FY04 and FY05 PDM-C, the EMD/MSP will promote the program throughout the state and solicit applications. Received applications will be reviewed by the EMD/MSP, prioritized and forwarded to FEMA for funding consideration.

- Under the Flood Mitigation Assistance Program (FMAP), funds will be made available to eligible applicants as appropriate (at the discretion of the State) to support mitigation planning as well as projects designed to acquire and demolish / relocate repetitive flood loss structures under the National Flood Insurance Program (NFIP).

- Voluntary organizations (i.e., Red Cross, Salvation Army, etc.) will be requested to provide (as appropriate and in keeping with their organizational mission) financial and other resources to promote and facilitate the implementation of mitigation measures in individual damaged homes.

3. Long-term mitigation will be ensured through comprehensive and prudent public health and safety measures (i.e., floodproofing utilities, mechanical systems, and fuel oil / propane tanks at residences and businesses), local building practices, and floodplain management.

STRATEGY

The mitigation strategy for promoting and achieving hazard mitigation in this disaster will be focused on the following areas (not listed in any particular order):

- Public health and safety measures.
- Coordination with the FEMA HMGP and ONA, the FHWA Emergency Relief Program, the NRCS Emergency Watershed Protection Program, and the USACE Advance Measures Program and other flood repair and mitigation authorities.
- Community administered floodproofing measures.
- Mitigation project development.
- National Flood Insurance Program promotion and flood hazard identification.
- Promoting disaster resistant communities through the Pre-Disaster Mitigation Program, Flood Mitigation Assistance Program, the NFIP Community Rating System, and through local mitigation plan development.
- Community mitigation education and outreach.

Public health and safety measures

- Assist community officials and residents in identifying appropriate floodproofing solutions for furnaces, water heaters, fuel oil and propane tanks, utilities and other mechanical systems that will ensure public health, safety and general welfare. FEMA Mitigation Disaster Assistance Employees (DAEs) can provide written guidance materials directly to individual homeowners through community outreach at Disaster Recovery Centers (DRCs), through the media, through the dissemination of information packets being made available at 858 Michigan libraries, or through other appropriate avenues. (8/31/04)

- Assist community officials and residents in identifying appropriate structural wind engineering and vegetation management solutions that will reduce future wind damage to homes, businesses and community facilities. FEMA Mitigation DAEs can provide written guidance materials directly to individual homeowners through community outreach at Disaster Recovery Centers (DRCs), through the media, through the dissemination of information packets being made available at 858 Michigan libraries, or through other appropriate avenues. (8/31/04)

- The MHMCC will meet on August 18, 2004 to discuss issues associated with this disaster and possible opportunities to mitigate threats to public health and safety through the grant programs administered by the EMD/MSP. The MHMCC has a

representative from the Michigan Department of Environmental Quality (MDEQ) floodplain management program. Public health and safety issues pertaining to the flood damages in individual homes and businesses related to this disaster can be discussed and suggestions taken from the MDEQ representative. The MHMCC has a representative from the Michigan Department of Natural Resources (MDNR), which administers the statewide urban forestry program. Public safety issues related to tree damage within public rights-of-way from this disaster can be discussed and suggestions taken from the MDNR representative. The MHMCC can also solicit suggestions pertaining to structural wind engineering measures from the Michigan Department of Labor and Economic Growth (MDLEG), which oversees the statewide implementation of the State Construction Code.

Coordination with the other active relief programs

THE FIRST TWO BULLETS OF THIS SECTION CONSTITUTED PART OF THE STATE'S ORIGINAL STRATEGY FOR THIS DISASTER. UNFORTUNATELY, DUE TO PROGRAM ISSUES AND CONSTRANTS, MITIGATION FUNDING UNDER THE INDIVIDUAL HOUSING PROGRAM, OTHER NEEDS ASSISTANCE (ONA) WAS NOT INCLUDED WITH THIS DISASTER. THEREFORE, THESE TACTICS WERE UNABLE TO BE CARRIED OUT. THEY ARE BEING LEFT IN THE STRATEGY FOR HISTORICAL PERSEPCTIVE WITH REGARD TO MICHIGAN'S STATE HAZARD MITIGATION PLAN.

- FEMA Mitigation DAEs will provide guidance to ONA applicants (through DRCs, the media and other appropriate avenues) that promotes mitigation measures for individual homes and businesses and specifies the types of measures that are potentially eligible for funding under the ONA (i.e., back flow prevention devices, sump pumps, etc.). (8/31/04)

- Coordinate with FEMA ONA inspectors to ensure that appropriate mitigation measures are allowed and specified for damaged homes. This is best achieved by the FCO placing a high priority on ONA mitigation activities and conveying that priority to inspectors in the field via the IA Inspection Services Coordinator. Inspectors in the field must be provided with appropriate guidance about eligible mitigation costs that should be included in inspection reports. The FEMA Deputy Coordinating Officer (FCO) for Mitigation should also review the ONA inspection report trends (i.e., the percent of all ONA applicants that have specified mitigation measures) to ensure that mitigation measures are being specified in all appropriate circumstances and for all appropriate types of damage. (7/30/04)

- Coordinate with FHWA inspectors to ensure that appropriate mitigation measures are being considered for damaged Federal-Aid roads and bridges being repaired under the FHWA Emergency Relief Program. This is best achieved by having the Michigan Department of Transportation (MDOT) Emergency Manager monitor and evaluate the decisions being made by FHWA inspectors in the field. If mitigation measures are not being considered, the FEMA Deputy FCO for Mitigation should contact the FHWA and request that mitigation be considered where appropriate and cost-effective. (8/31/04)

- Coordinate with NRCS inspectors to ensure that appropriate mitigation measures are being considered on all sites being restored under the NRCS Emergency Watershed Protection Program and other activated programs. This is best achieved by having state mitigation staff monitor and evaluate the decisions being made by NRCS inspectors in the field and central office program staff in Lansing. If mitigation measures are not being considered, the FEMA Deputy FCO for Hazard Mitigation should contact the NRCS and request that mitigation be considered where appropriate and cost-effective. (8/31/04)

- Coordinate with the U.S. Army Corp of Engineers (USACE) on the possible development of flood control projects within or benefiting the declared area. (8/31/04)

Community-administered floodproofing and structural retrofitting measures

- Invite communities to establish and administer a locally based floodproofing program that would provide public education on proper floodproofing techniques, and provide grants to individual home and business owners wishing to retrofit their structures to reduce future flood damage. This is best achieved by encouraging communities to develop such a program by participation in the local hazard mitigation planning process. Appropriate projects identified in the plan (or in some instances, for participation in 1527-DR-MI HMGP, FY04 FMAP, or FY04/05 PDM-C, before the plan is complete) may be proposed under future grant cycles of the HMGP, FMAP, and PDM-C. The program could be implemented and administered by an existing local department, such as the building, planning or public works department, who would be responsible for disbursing grants, monitoring work, providing technical assistance, and providing program status to the State. (8/31/04)

Note: floodproofing methods could include but are not limited to the following:

- ✓ Acquisition and demolition / relocation of floodprone structures.
- ✓ Elevation of floodprone structures above the base flood level (100-year flood).
- ✓ Elevation and secure mounting (as appropriate) of basement fuel oil tanks to prevent tank ruptures during flooding.
- ✓ Elevation and secure mounting (as appropriate) of backyard propane tanks to prevent tank ruptures during flooding.
- ✓ Installation of standpipes, sewer backflow (check) valves, or revised plumbing to include an ejector or sump pump for basements.
- ✓ Elevation of electrical system components including service panels, meters, switches, and outlets that may easily be damaged by floodwater.
- ✓ Elevation or relocation of HVAC equipment, water heater, and washer / dryer.

- Invite communities to establish and administer a locally based structural retrofitting program that would provide public education on proper wind engineering techniques and components, and provide grants to individual home and business owners wishing to retrofit their structures to reduce future wind damage. This is best achieved by encouraging communities to develop such a program by participation in the local hazard mitigation planning process. Appropriate projects identified in the plan (or in some instances, for participation in 1527-DR-MI HMGP, FY04 FMAP, or FY04/05 PDM-C, before the plan is complete) may be proposed under future grant cycles of the HMGP, FMAP, and PDM-C. The program could be implemented and administered by an existing local department, such as the building, planning or public works department, who would be responsible for disbursing grants, monitoring work, providing technical assistance, and providing program status to the State. (8/31/04)

Mitigation project development

Information from the PDA, the Michigan Hazard Mitigation Plan (MHMP) and local mitigation plans (completed or partially-completed), the NFIP, and other state agencies (with substantial development interests in the declared area) will be used to help identify the communities that should be contacted concerning the possibility of mitigation opportunities under the HMGP and other state and federal programs. (8/31/04)

- FEMA Mitigation DAEs will review the PDA damaged structure inventory to identify structures that may have been substantially damaged. Those structures will be (at the State's discretion) specifically targeted for mitigation assistance. (7/30/04)

- Acquisition of substantially damaged structures will be the top priority mitigation project type under the HMGP for this disaster. Based on information provided by local units of government on substantially damaged structures, state mitigation staff and/or FEMA Mitigation DAEs will coordinate with communities to determine interest in the HMGP and, where appropriate, help to develop project applications for acquisition of substantially damaged structures. The MHMCC and state mitigation staff will immediately review and evaluate proposed mitigation projects for the acquisition of substantially damaged structures and submit them to FEMA for funding consideration under the HMGP for this disaster. (8/31/04)

- The MHMCC will coordinate with the Michigan Economic Development Corporation, the Michigan State Housing Development Authority, and other appropriate state agencies concerning communities with a substantial investment of state financial resources, in order to determine if additional mitigation partnering opportunities are available. (Ongoing)

- Whenever possible, mitigation projects will be incorporated into larger, ongoing or planned community projects (as long as the larger project will be completed in a timely manner and mitigation benefits can be fully retained). (Ongoing)

- Upon identification of communities particularly suitable for mitigation, federal and state time and resources permitting, local officials will be contacted to determine the level of local interest in developing a partnership to reduce the community's future risk from flooding and severe storms. FEMA Mitigation DAEs and/or state mitigation staff will conduct site visits with interested communities, at the State's discretion and within available personnel resources, to gain commitment in developing projects and implementing appropriate mitigation measures. The DAEs and/or state mitigation staff will function as a technical resource to the community to help identify problems that should be addressed by each mitigation measure, and financial assistance opportunities through federal, state and private sector programs. (8/31/04)

- For HMGP funds not allocated to projects for the acquisition of substantially damaged structures, the MHMCC and state mitigation staff will review, evaluate, and prioritize proposed mitigation projects and select those projects that will be submitted to FEMA for funding consideration under the HMGP for this disaster. (12/31/04)

- To ensure that the State has appropriate administrative mechanisms in place to implement the HMGP in a timely manner, FEMA will make an initial review of Michigan's existing HMGP State Administrative Plan (approved for 1413-DR-MI) to identify areas that may require an update due to recent changes in federal laws, regulations, rules, policies, and program guidance. FEMA should also consider recent audit findings within the region that may be important to consider during the plan update. (7/30/04)

- State mitigation staff will update the HMGP State Administrative Plan for 1527-DR-MI in accordance with the FEMA plan review. (8/31/04)

NFIP promotion and flood hazard identification

- FEMA Mitigation DAEs and the Michigan Department of Environmental Quality (MDEQ) will review the NFIP participation status of the declared counties in order to determine if additional NFIP promotion opportunities exist. (7/30/04)

  (Note: As the table on the following page indicates, in the 19-county declared area there currently are a total of 283 NFIP participating communities and 15,704 NFIP policies in effect, providing in excess of $2 billion in coverage.)

Flood Insurance Coverage in Affected Counties

COUNTY	Number of NFIP Policies in Effect	Number of NFIP Participating Communities	Approximate Number of Communities in County*	Total NFIP Coverage (in $)
Barry	159	10	21	15,291,900
Berrien	346	27	39	42,847,300
Cass	8	3	20	991,200
Genesee	461	24	32	62,989,700
Gladwin	25	2	17	2,566,800
Ingham	920	14	24	130,577,200
Ionia	101	8	26	8,868,600
Jackson	151	8	27	24,167,900
Kent	659	15	35	96,236,400
Livingston	320	7	20	51,743,200
Macomb	3,690	19	26	485,325,600
Mecosta	38	5	20	3,908,300
Oakland	1,717	41	58	291,410,100
Ottawa	318	19	24	51,444,100
Sanilac	22	8	39	2,847,800
Shiawassee	353	10	27	27,388,900
St. Clair	1,526	18	31	203,377,500
St. Joseph	124	9	24	14,393,700
Wayne	4,766	36	41	491,737,400
TOTALS:	**15,704**	**283**	**551**	**2,008,113,600**

*Note: the number of communities is considered "approximate" because some communities lie in more than one county. Therefore, some were classified in one declared county rather than another (for example, Grosse Pointe Shores was counted in Wayne County but not Macomb), and communities situated in both declared and non-declared counties were included in the declared county totals above.

- Six of the listed affected counties (Berrien, Kent, Macomb, Oakland, Ottawa, and Wayne) are currently undergoing county wide flood insurance map reviews for updating and new map production under Michigan's business plan for the current FEMA Map Modernization initiative. Six other affected counties (Cass, Genesee, Livingston, Sanilac, St. Clair, and St. Joseph) are identified as priority counties for conducting flood insurance reviews, studies and updates. Agency coordination will occur through consultation with the NFIP State coordinator when flood damaged areas are identified and that information should be considered during the current and future county wide studies under the Map Modernization initiative. Additional coordination between FEMA and the state will occur when flood damaged areas are identified and need to be considered during plan development activities under the federal Disaster Mitigation Act of 2000, project development activities under the HMGP, FMAP, and PDMP-C, and disaster rebuilding efforts that comply with minimum state and federal flood damage prevention standards. (10/1/04)

- MDEQ staff will provide technical assistance to local floodplain administrators as needed. (Ongoing)

- MDEQ staff will, as needed, conduct NFIP briefings to inform local floodplain administrators of NFIP responsibilities. (Ongoing)

- FEMA will mail letters to affected communities regarding immediate substantial damage determinations. (Ongoing)

- FEMA will identify (with MDEQ input) priorities for possible enforcement actions regarding floodplain management under the NFIP. (Ongoing)

- MDEQ, EMD/MSP and FEMA will review repetitive flood loss data for potential acquisition, elevation or floodproofing sites. (7/30/04)

- There are four communities located in the 19-county disaster area that have special flood hazard areas identified but either have withdrawn from or are not participating in the NFIP. Those communities are: Village of Stevensville (Berrien County); Township of LaGrange (Cass County) – withdrawn from program; Village of Silver Creek (Cass County) – withdrawn from program; Village of New Lothrop (Shiawassee County). The FEMA Mitigation DAEs and the MDEQ will contact these communities to inquire about their interest in joining the NFIP.

Promoting disaster resistant communities through the PDMP-C, FMAP, CRS and mitigation plan development

- State mitigation staff and the MHMCC will coordinate the use of PDMP-C funds, as appropriate, to promote mitigation plan development and project development in the declared counties to reduce future risk from flooding and severe storms. (12/31/04)

- State mitigation staff and the MHMCC will coordinate the use of FMAP funds, as appropriate, to promote mitigation plan development and project development in the declared counties to reduce future risk from flooding. (12/31/04)

- The MDEQ will coordinate and promote community participation in the NFIP Community Rating System program to reduce future risk from flooding. (Ongoing)

- State mitigation staff and the MHMCC will coordinate and promote the development of local mitigation plans (that are compliant with the federal Disaster Mitigation Act of 2000 and the FMAP) to reduce future risk from flooding and severe storms. (Ongoing)

- State mitigation staff and the MHMCC will coordinate the development of the Michigan Hazard Mitigation Plan (MHMP) and ensure that it is compliant with the federal Disaster Mitigation Act of 2000 to reduce the State's overall risk from flooding, severe storms and other natural hazards. (11/1/04)

- As staff time, resources, and DAE expertise allows, FEMA Mitigation DAEs will support the state and local mitigation planning efforts by collecting / compiling risk assessment data for flooding and severe storm hazards for the 19-county declared area, sufficient to meet the risk assessment planning requirements for state mitigation plans found in Sections 201.4 / c / 2 / ii and iii of the Disaster Mitigation Act of 2000. (8/31/04)

- For the purposes of promoting hazard mitigation in general, FEMA Mitigation DAEs will develop mitigation "success stories" associated with this disaster. The FEMA Mitigation DAEs will work with state mitigation staff to identify communities in the declared area that have implemented mitigation measures in the past which may have prevented damage during this disaster. The DAEs will then interview local officials and/or visit those communities to collect relevant information and write success stories about the mitigation activities. (8/31/04)

Community mitigation education and outreach

- FEMA Mitigation DAEs should consider partnering with the SBA to provide information on the NFIP and appropriate floodproofing techniques for residential and commercial structures. This could be done at the DFO and/or through one-on-one meetings with applicants and community officials. (7/30/04)

- State mitigation staff and the MHMCC will continue to conduct coordination meetings and provide technical assistance on the federal Disaster Mitigation Act of 2000 planning requirements and mitigation plan development with regional and local planning agencies. (Ongoing)

- If a mitigation component is established within the Disaster Field Office (DFO), the EMD/MSP will supply staff, as appropriate and within personnel limitations, to support the DFO mitigation efforts and to monitor disaster-related mitigation activities. (Ongoing)

STATE PRIORITIES FOR FEMA

The State of Michigan recommends the following work priorities for the FEMA Mitigation DAEs assigned to this disaster (listed in order of priority):

Immediate Priorities (to be completed or substantially completed by 7/30/04)

- Review the PDA damaged structure inventory to identify structures that may have been substantially damaged. Mail letters to those affected communities regarding immediate substantial damage determinations.

- Review Michigan's existing HMGP State Administrative Plan (approved for 1413-DR-MI) to identify areas that may require an update due to recent changes in federal laws, regulations, rules, policies, and program guidance. FEMA should also consider recent audit findings within the region that may be important to consider during the plan update.

- Develop mitigation "success stories" associated with this disaster.

High Priorities (to be completed or substantially completed by 8/31/04, after the Immediate Priorities have been addressed)

- Provide guidance to applicants, other community residents, and community officials (through DRCs, the media and other appropriate avenues) that identifies and promotes mitigation measures for individual homes, businesses and community facilities to reduce or eliminate future flood and wind damage. Topics should include:

  - ✓ Appropriate floodproofing solutions for furnaces, water heaters, fuel oil and propane tanks, utilities and other mechanical systems.
  - ✓ Appropriate structural wind engineering and vegetation management solutions to reduce wind damage.

- If possible, collect / compile risk assessment data for flooding and severe storm hazards for the 19-county declared area, sufficient to meet the risk assessment planning requirements for state mitigation plans found in Sections 201.4 / c / 2 / ii and iii of the Disaster Mitigation Act of 2000.

- Upon identification of communities particularly suitable for mitigation, contact local officials to determine the level of local interest in developing a partnership to reduce the community's future risk from flooding and severe storms. Conduct site visits with interested communities to gain commitment in developing projects and implementing appropriate mitigation measures.

- With the assistance of the Michigan Department of Environmental Quality, promote NFIP participation among non-participating communities located within the declared area.

MITIGATION STRATEGY TEAM MEMBERS

STATE OF MICHIGAN:

Doran Duckworth, EMD/MSP
State Planning Unit Manager

Matt Schnepp, EMD/MSP
State Hazard Mitigation Officer

Joel Pepper, EMD/MSP
Assistant State Hazard Mitigation Officer

Lyell Thomas
MDEQ / National Flood Insurance Program Coordinator

Tim Jones

Mike Sobocinski, EMD/MSP
Local Hazard Mitigation Planner

Karen Totzke, EMD/MSP
Project Impact / PDMP-C / MHMCC Coordinator

Jonathan Marsch, EMD/MSP
Local Hazard Mitigation Planner

Bruce Menerey, P.E.
MDEQ / Floodplain Management Specialist

Sandy Glazier, EMD/MSP

MDOT Emergency Management Coordinator

F/Lt. Ralph Hobrat, EMD/MSP
Individual Assistance Officer

Public Assistance Officer

Abigail Eaton, P.E.
MDA / Environmental Stewardship Division

MICHIGAN HAZARD MITIGATION COORDINATING COUNCIL (MHMCC) members:

Captain John Ort, Chair
EMD/MSP

Insp. Kriste Etue, Vice-Chair
EMD/MSP

Ms. Mindy Koch
MI Department of Natural Resources,
Forest, Mineral and Fire Management Division

Vacant (Replacement Pending)
MI Department of Agriculture,
Marketing and Communications Division

Mr. Tony Sanfilippo
MI Department of Consumer and Industry Services,
Office of Fire Safety

Ms. Eileen Phifer, PEM
MI Department of Transportation
Maintenance Division

Mr. Okey Eneli
MI Department of Management and Budget,
Office of Design and Construction

Kevin Thomason
Property and Casualty Insurance Representative
State Farm Insurance Company

Dr. William D. Wagoner
Livingston County Emergency Management

William Smith, Ottawa County Emergency Manager
Local Emergency Management Representative

Mr. Lyell Thomas
MI Department of Environmental Quality
Geological and Land Management Division

FEDERAL EMERGENCY MANAGEMENT AGENCY:

Susan Cosier
Federal Hazard Mitigation Officer (DFO)

Christine Stack
Community Mitigation Programs Branch Chief (Chicago)

Maxine Kinikin
NFIP Specialist (Chicago)

Terry Reuss Fell
Hazard Identification and Risk Assessment Branch Chief
(Chicago)

Norbert Schwartz
Deputy Federal Coordinating Officer
For Hazard Mitigation (Chicago)

OTHER FEDERAL AGENCIES:

Sean Duffey
Natural Resource Conservation Service (Lansing, MI)
U.S. Department of Agriculture

Jerry Doline
U.S. Army Corp of Engineers
Detroit District

SIGNED:

(signed on 7/23/04)
SUSAN COSIER, FEMA V
FEDERAL HAZARD MITIGATION OFFICER

(signed on 7/23/04)
MATT SCHNEPP, EMD/MSP
STATE HAZARD MITIGATION OFFICER

ADDENDUM TO THE MICHIGAN HAZARD MITIGATION PLAN FOR FEDERAL DISASTER 1527-DR-MI, DECLARED JUNE 30, 2004

DISASTER HISTORY

Federal Disaster 1527-DR-MI was caused by a series of rain-laden thunderstorms that moved in procession across southern and central Lower Michigan during the period from May 20-24, 2004, which resulted in severe urban and riverine flooding in many areas, but particularly so in southeast Michigan and along the Grand River and its tributaries in central and western Michigan. The severe flooding continued until June 8, when the last remaining flood warning was cancelled by the National Weather Service. The strong storms also caused severe wind damage in several southern Lower Michigan counties. At the height of this disaster, a total of 573,000 American Electrical Power, Consumers Energy, and DTE Energy electrical customers (roughly 6 percent of the State's population) experienced power outages due to wind damage to power lines and other electrical infrastructure. All totaled, nearly 5,000 homes and businesses incurred in excess of $32 million in damage from the flooding and storms. One hundred sixty seven (167) homes and one business incurred major damage. Public damage was also significant in many areas, totaling nearly $7.4 million statewide. However, in the counties of Arenac, Berrien, Barry, Cass, Gladwin, St. Clair and St. Joseph, public damage losses were particularly high.

In response to the storms, Governor Jennifer Granholm ordered the State Emergency Operations Center (SEOC) partially activated on May 21, 2004 to monitor the situation and collect / compile damage and impact assessment information. On May 25, Governor Granholm and Lt. Governor Cherry toured affected areas in Ionia County and Macomb County to review the damage firsthand. On June 3, Governor Granholm declared a State of Disaster, pursuant to 390 PA 1976, as amended, for the following 23 affected Michigan counties: Arenac; Barry; Berrien; Cass; Genesee; Gladwin; Ingham; Ionia; Jackson; Kent; Livingston; Macomb; Mecosta; Newaygo; Oakland; Ottawa; Saginaw; St. Clair; St. Joseph; Sanilac; Shiawassee; Van Buren; and Wayne. State agencies were directed to provide whatever assistance they could to assist the 23 affected counties in responding to and recovering from the flooding and storm damage.

On May 28, 2004 Governor Granholm and the Emergency Management Division of the Michigan State Police (EMD/MSP) requested the Federal Emergency Management Agency (FEMA) and U.S. Small Business Administration (SBA) to conduct a joint federal / state / local Preliminary Damage Assessment (PDA) of the damaged areas in order to document the nature, scope, magnitude and recovery costs of the disaster. The PDA was conducted on June 2-5 by a total of eight survey teams – four examining damage to individuals and businesses, and four examining damage to public facilities and infrastructure.

The PDA individual assistance teams determined that the most severe impacts to individuals and businesses occurred in the counties of Barry, Berrien, Jackson, Kent, Livingston, Macomb, Oakland, St. Clair and Wayne, which collectively had nearly 94 percent of the major damage and 96 percent of the minor damage to structures. The PDA teams estimated that 163 homeowners will require rental assistance for up to two months at a total cost of nearly $235,000. Repair assistance for 2,539 homeowners is estimated to cost in excess of $6.5 million, while home replacement costs for five homeowners are estimated at an additional $51,000. All totaled, the teams identified 2,637 homeowners that will require federal housing assistance in the aftermath of this disaster, at a total cost of $6.8 million. The teams also identified over $1.6 million in "Other Needs Assistance (ONA)" for 644 homeowners, which will cover the replacement of essential household items that were damaged or destroyed by the flooding and storms. The combined housing assistance needs and ONA exceed $8.4 million, which equates to more than $3,000 per affected homeowner. The remainder of the $32 million in home and business damage will likely be covered by SBA low-interest disaster loans.

The damage to public facilities was equally widespread and severe. The PDA teams identified nearly $7.4 million in public damage costs, the majority of which ($4.7 million) was for Category A (debris removal) and Category C (roads and bridges) work under the federal Public Assistance Grant Program. The teams also identified $916,255 in Category B work (emergency protective measures), while Category D, E, F and G damages totaled another $1,743,200. One-third of the public damage occurred in the counties of St. Clair, Cass and Berrien, although damage was fairly uniformly spread throughout the affected area. All but three of the affected counties had public damage in excess of $100,000, and most had damage in excess of $250,000.

On June 18, 2004 Governor Granholm submitted her letter of request to the President for federal disaster relief assistance for the affected counties. On June 30, 2004, President Bush granted that request and declared a Major Disaster for the counties of Barry, Berrien, Cass, Genesee, Gladwin, Ingham, Ionia, Jackson, Kent, Livingston, Macomb, Mecosta, Oakland, Ottawa, Sanilac, Shiawassee, St. Clair, St. Joseph and Wayne. (The counties of Arenac, Newaygo, Saginaw and Van Buren, which were included in Governor Granholm's initial request, were not included in the President's Declaration.) On July 22, 2004, a request by the state for an additional four counties to be included in the declaration was granted, making Eaton, Muskegon, Saginaw and Washtenaw counties all eligible for federal disaster relief assistance.

The President's Declaration makes available Individual Assistance and Hazard Mitigation Assistance, but not Public Assistance. (The Individual Assistance will be limited to the 23 declared counties, while the Hazard Mitigation Assistance

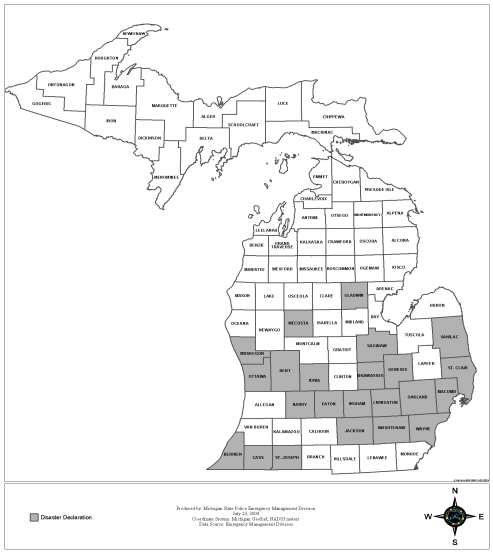
will be available on a statewide basis in accordance with existing federal and state policy.) On June 30, 2004, the Small Business Administration also issued a Disaster Declaration for the counties of Barry, Berrien, Cass, Eaton, Genesee, Gladwin, Ingham, Ionia, Jackson, Kent, Livingston, Macomb, Mecosta, Muskegon, Oakland, Ottawa, Saginaw, Sanilac, Shiawassee, St. Clair, St. Joseph, Washtenaw, and Wayne, which makes low-interest disaster loans available to affected residents in those nineteen counties as well as the contiguous counties of Allegan, Arenac, Bay, Branch, Calhoun, Clare, Clinton, Eaton, Gratiot, Hillsdale, Huron, Isabella, Kalamazoo, Lake, Lapeer, Lenawee, Midland, Monroe, Montcalm, Muskegon, Newaygo, Ogemaw, Osceola, Roscommon, Saginaw, Tuscola, Van Buren, and Washtenaw.

AREA AFFECTED

The Presidential Major Disaster Declaration includes the following 23 Michigan counties: Barry, Berrien, Cass, Eaton, Genesee, Gladwin, Ingham, Ionia, Jackson, Kent, Livingston, Macomb, Mecosta, Muskegon, Oakland, Ottawa, Saginaw, Sanilac, Shiawassee, St. Clair, St. Joseph, Washtenaw, and Wayne. As indicated in the "Disaster History" section above, the PDA findings indicate that the most serious damage to homes / businesses occurred in the counties of Barry, Berrien, Jackson, Kent, Livingston, Macomb, Oakland, St. Clair and Wayne. The counties of Wayne and Macomb were particularly hard hit, with 73 and 39 homes, respectively, with major damage. Those two counties combined also had a total of 2,948 homes with minor damage. The counties of Barry and St. Clair also had high numbers of homes with major damage (27 and 28, respectively). In Berrien County, 11 homes and six businesses had major damage.

Map of Declared Area

Declared Counties - May 20-24, 2004 Severe Weather



MITIGATION STRATEGY

The Federal Emergency Management Agency (FEMA) and the Emergency Management Division of the Michigan State Police (EMD/MSP) jointly developed a Mitigation Strategy for this Major Disaster Declaration that addresses the mitigation problems and opportunities unique to this event. (See attached Strategy.)

HMGP PROCEDURES

The Hazard Mitigation Grant Program (HMGP) has been activated for Federal Disaster 1527-DR-MI. The procedures outlined in the State of Michigan Administrative Plan for the Hazard Mitigation Grant Program will be followed in the implementation and administration of the program. In accordance with the HMGP State Administrative Plan provisions and Michigan Executive Order 1998-5, the EMD/MSP and the Michigan Hazard Mitigation Coordinating Council (MHMCC) will jointly carry out the HMGP project identification, prioritization, and selection processes.

Hazard Mitigation Strategy for Federal Disaster #1413: 2002 Central and Western Upper Peninsula Flooding

ADDENDUM TO THE MICHIGAN HAZARD MITIGATION PLAN FOR FEDERAL DISASTER 1413-DR-MI, DECLARED MAY 6, 2002

DISASTER HISTORY

Federal Disaster 1413-DR-MI was caused by the combined forces of unseasonably warm temperatures, rainfall, ice jams and an all-time record snowpack in the central and western Upper Peninsula. These forces collided on the weekend of April 13-14, 2002, causing rivers and streams throughout the area to swell out of their banks, flooding many areas in the five-county region over the course of the following week. All-time flood levels were recorded on several rivers and streams in the area. Gogebic County was particularly hard hit, especially in and around Ironwood, Wakefield, and Marenisco. The counties of Baraga, Houghton, Marquette and Ontonagon also sustained heavy damage to roads, bridges and other public facilities.

In response to the flooding, Governor John Engler declared a State of Disaster for Gogebic County on April 16, 2002 and activated the Michigan National Guard and numerous other state agencies to assist Gogebic County and other affected areas in responding to and recovering from the disaster. The Governor's State of Disaster Declaration was amended on April 30, 2002 to include the counties of Baraga, Houghton, Marquette and Ontonagon.

A joint federal/state/local Preliminary Damage Assessment (PDA) was conducted on April 22-24. That PDA indicated that the most severe impacts were to the cities of Ironwood and Wakefield in Gogebic County, and to the counties of Baraga and Marquette, although considerable flood damages were experienced in all five declared counties. The PDA teams identified 170 homes and businesses that incurred flood damage in the cities of Ironwood and Wakefield – 25 of which incurred major damage and likely will be eligible for SBA Disaster Loans. All totaled, the PDA teams identified over $1.2 million in damages and impacts to individuals and homes/businesses, most of which occurred in the cities of Ironwood and Wakefield.

The PDA teams identified nearly $11 million in damages and impacts to roads, bridges, culverts and other public facilities and services in the five-county impact area. Gogebic County incurred nearly $7.8 million in public damage, the vast majority of which ($6.7 million) was to roads and bridges. Marquette County had $928,000 in public damage, of which $739,000 was to roads and bridges. All of Baraga County's $569,250 in public damage was to roads and bridges. Houghton County had over $200,000 in road and bridge damage, and Ontonagon County had nearly $70,000. These individual county figures do not include the damages to Federal-Aid roads and bridges, which totaled $1 million for the five-county area.

On April 30, 2002, Governor John Engler submitted his letter of request to the President for federal disaster relief assistance for the affected counties. On May 6, 2002, President Bush granted that request and declared a Major Disaster for the counties of Baraga, Gogebic, Houghton, Marquette and Ontonagon. The President's Declaration made available Public Assistance and Hazard Mitigation Assistance, but not Individual Assistance. On May 8, Governor John Engler formally requested that the Small Business Administration (SBA) issue a Disaster Declaration for Gogebic County and activate its Disaster Loan Program for the residents of the county that incurred major flood damage. That declaration was granted by the SBA on May 10. The SBA Declaration for Gogebic County also makes low interest disaster loans available to affected residents in the contiguous counties of Iron and Ontonagon.

On May 10, 2002, Governor John Engler approved the addition of Iron County to his earlier State of Disaster Declarations issued on April 16 and April 30. On May 24, 2002, Iron County and the Keweenaw Bay Indian Community were added to the Presidential Major Disaster Declaration for Public Assistance at the request of the State of Michigan, and upon concurrence of FEMA.

AREA AFFECTED

The Presidential Major Disaster Declaration includes the counties of Baraga, Gogebic, Houghton, Iron, Marquette and Ontonagon, and the Keweenaw Bay Indian Community. The most serious impacts to individuals and homes/businesses occurred in the cities of Ironwood and Wakefield in Gogebic County. The most heavily impacted areas for public damages were the counties of Gogebic, Marquette and Baraga. In Gogebic County, the majority of the public damages occurred in or around the cities of Ironwood, Wakefield and Marenisco.

MITIGATION STRATEGY

The Federal Emergency Management Agency (FEMA) and the Emergency Management Division of the Michigan State Police (EMD/MSP) jointly developed a Mitigation Strategy for this Major Disaster Declaration that addresses the mitigation problems and opportunities unique to this event. (See attached Strategy.)

HMGP PROCEDURES

The Hazard Mitigation Grant Program (HMGP) has been activated for Federal Disaster 1413. The procedures outlined in the State of Michigan Administrative Plan for the Hazard Mitigation Grant Program will be followed in the implementation and administration of the program. In accordance with the HMGP State Administrative Plan provisions and Michigan Executive Order 1998-5, the EMD/MSP and the Michigan Hazard Mitigation Coordinating Council (MHMCC) will jointly carry out the HMGP project identification, prioritization, and selection processes.

Michigan has been a "Managing State" for the HMGP since October 2000. The FEMA and EMD/MSP have signed a joint Memorandum of Understanding outlining each party's responsibilities in implementing and administering the HMGP in Michigan subsequent to a federally-declared disaster. The provisions of that MOU were incorporated into the State Administrative Plan for the HMGP and will be followed for Federal Disaster 1413.

MITIGATION STRATEGY - FEMA-1413-DR-MI
State of Michigan

OBJECTIVE

The objective of mitigation is to reduce future disaster losses through acquisition and relocation of hazard-prone property, structural retrofitting, mitigation education of community officials and residents, wise land use and land development practices, prudent use of resources and funding, and encouragement of National Flood Insurance Program (NFIP) implementation and compliance, to name just a few measures that have been successful. To assist communities in Michigan with mitigation efforts, so that the environment is safer and has a reduced risk from disaster damage, the following objectives must be accomplished:

4. Mitigation opportunities will be identified and selected:

   - The initial mitigation opportunities and recommendations identified during the damage assessment process in many of the affected communities include the following:

     A. Acquisition and relocation or retrofitting and flood proofing (including elevation) of substantially damaged structures located in flood prone areas.
     B. Community outreach and education to promote flood proofing methods in residential and commercial structures, focusing on elevation and/or relocation of utilities and mechanical systems in basements or other vulnerable areas.
     E. Applying the best methods to properly anchor and/or elevate or floodproof fuel oil tanks in home basements.
     F. Floodproofing roads, bridges, culverts and other public facilities located in floodplains or other floodprone areas.
     G. Armoring erosion prone streambanks to prevent sedimentation and to otherwise ensure maximum hydraulic capacity is maintained.
     H. Assessing the need for initial or revised flood hazard mapping in selected communities.

5. Financial resources, including disaster assistance programs such as the HMGP and PAGP, and the funds from other state and federal programs, will be maximized:

   - Under the Public Assistance Grant Program, inspectors will make <u>every effort</u> to include appropriate mitigation measures in restoring damaged public facilities (<u>on every project</u>) – including the removal of disaster-caused debris from culverts and streambeds to ensure maximum hydraulic capacity.

   - Under the Federal Highway Administration (FHWA) Emergency Relief Program, inspectors will make every effort to include appropriate mitigation measures in restoring damaged Federal-Aid roads and bridges.

   - Under the Small Business Administration, low interest loans can be acquired for repairs and mitigation upgrades to damaged structures.

- Under the Natural Resource Conservation Service (NRCS) Emergency Watershed Program, appropriate mitigation measures will be implemented to remove any and all threats (urgent and compelling) resulting from sudden watershed impairment. In addition, supplemental funding will be requested to implement appropriate mitigation measures at other damaged, impacted or threatened sites (not considered urgent and compelling) that do not fall under the purview of the FEMA Public Assistance Grant Program or other programs.

- The maximum seven-percent (7%) allotment of available HMGP funds will be earmarked by the State to facilitate the development of local hazard mitigation plans in the declared disaster area and in other communities in the region.

- Under the HMGP, funds will be earmarked to acquire/relocate substantially damaged structures located in flood prone areas. In addition, FEMA will be requested to make available PAGP funds to cover the demolition and debris removal costs associated with these acquisitions.

- Under the Pre-Disaster Mitigation Program (PDMP), funds will be made available as appropriate (at the discretion of the State) to support mitigation planning efforts in the declared area.

- Voluntary organizations (i.e., Red Cross, Salvation Army, etc.) will be requested to provide (as appropriate and in keeping with their organizational mission) financial and other resources to promote and facilitate the implementation of mitigation measures in individual damaged homes.

6. Long-term mitigation will be ensured through comprehensive and prudent public health and safety measures (i.e., floodproofing utilities, mechanical systems, and basement fuel oil tanks in residences and businesses), local building practices, and floodplain management.

STRATEGY

The mitigation strategy for promoting and achieving hazard mitigation in this disaster will be focused on the following areas:

- Public health and safety measures.
- Community mitigation education and outreach.
- Coordination with the FEMA PAGP, the FHWA Emergency Relief Program, and the NRCS Emergency Watershed Program.
- Community administered floodproofing measures.
- Mitigation project development.
- National Flood Insurance Program promotion and flood hazard identification.
- Promoting disaster resistant communities through the Pre-Disaster Mitigation Program and through local mitigation plan development.

Public health and safety measures

- Assist community officials and residents in identifying appropriate floodproofing solutions for basement fuel oil tanks, utilities and other mechanical systems that will ensure public health and safety. The Michigan Hazard Mitigation Coordinating Council has a representative from the Michigan Department of Environmental Quality (MDEQ). Public health and safety issues pertaining to the flood damages in individual homes and businesses related to this disaster can be discussed at an upcoming MHMCC meeting and suggestions taken from the MDEQ representative. In addition, FEMA Disaster Assistance Employees (DAEs) can provide written guidance materials directly to individual homeowners through community outreach at a Disaster Recovery Center (DRC), through the media, or through other appropriate avenues. (6/19/02)

Community mitigation education and outreach

- Coordinate with public and private agencies in the development of flood resistant building practices and a multi-hazard mitigation plan for each declared county. (12/27/02 – to initiate plan development discussions)

- FEMA should consider partnering with the SBA to provide information on the National Flood Insurance Program (NFIP) and floodproofing techniques for residential and commercial structures. This could be done at the SBA's Loan Assistance Office at the DFO and/or through one-on-one meetings with applicants and community officials. (5/31/02)

- Conduct workshops on the DMA 2000 planning requirements and mitigation plan development with regional and local planning agencies. (5/31/02)

Coordination with the Public Assistance Grant Program and other active relief programs

- Provide guidance to PAGP applicants that promotes mitigation and specifies the types of measures that are potentially eligible for funding under the PAGP. (5/17/02)

- Coordinate with FEMA PAGP inspectors to ensure that appropriate mitigation measures are allowed and specified for damaged roads, bridges, culverts and other public facilities – including the removal of disaster-caused debris from culverts and streambeds to ensure maximum hydraulic capacity. This is best achieved by having FEMA Mitigation DAEs (preferably) and/or state mitigation staff (as a backup) be part of the PAGP inspection teams sent out to survey damaged sites. In addition, FEMA Mitigation DAEs (preferably) and/or state mitigation and PAGP staff should review each damage report written by the PAGP inspectors to ensure that mitigation measures have been considered on every project. The FEMA Deputy Coordinating Officer (FCO) for Mitigation should also review the PAGP inspection report trends (i.e., the percent of all PAGP projects that have specified mitigation measures) to ensure that mitigation measures are being specified in all appropriate circumstances and for all appropriate types of projects. (5/31/02)

- Coordinate with FHWA inspectors to ensure that appropriate mitigation measures are being considered for damaged Federal-Aid roads and bridges being repaired under the FHWA Emergency Relief Program. This is best achieved by having the Michigan Department of Transportation (MDOT) representative in (or reporting to) the DFO to monitor and evaluate the decisions being made by FHWA inspectors in the field. If mitigation measures are not being considered, the FEMA Deputy FCO for Mitigation should contact the FHWA and request that mitigation be considered where appropriate and cost-effective. (5/31/02)

- Coordinate with NRCS inspectors to ensure that appropriate mitigation measures are being considered on all sites being restored under the NRCS Emergency Watershed Program and other activated programs. This is best achieved by having state mitigation staff monitor and evaluate the decisions being made by NRCS inspectors in the field and central office program staff in Lansing. If mitigation measures are not being considered, the FEMA Deputy FCO for Hazard Mitigation should contact the NRCS and request that mitigation be considered where appropriate and cost-effective. (5/31/02)

- Coordinate with the U.S. Army Corp of Engineers (USACE) on the possible development of flood control projects within or benefiting the declared area. (5/31/02)

Community-administered floodproofing measures

- Invite communities to establish and administer a locally based floodproofing program that would provide public education on proper floodproofing techniques, and provide grants to individual home and business owners wishing to retrofit their structures to reduce flood damage. The program could be implemented and administered by an existing local department, such as the building, planning or public works department, who would be responsible for disbursing grants, monitoring work, providing technical assistance, and providing program status to the State. (8/30/02)

  Note: floodproofing methods could include the following:
  - Acquire and demolish/relocate floodprone structures.
  - Elevate floodprone structures above the base flood level (100-year flood).
  - Securely mount basement fuel oil tanks to prevent tank ruptures during flooding.
  - Installation of standpipes, sewer backflow (check) valves, or revised plumbing to include an ejector or sump pump for basements.
  - Raise electrical system components including service panels, meters, switches, and outlets that may easily be damaged by floodwater.
  - Raise or relocate HVAC equipment, water heater, and washer/dryer.

Mitigation project development

- Information from the Preliminary Damage Assessment (PDA) will be used to help identify the communities that should be contacted concerning the possibility of mitigation opportunities under the Hazard Mitigation Grant Program (HMGP) and other state and federal programs. (8/30/02)

- Review the potentially damaged structure inventory from the PDA, concentrating primarily on structures that may have been substantially damaged. (5/31/02)

- Review the NFIP State Coordinator's information concerning the flood hazard identification and participation status of communities in the NFIP. (5/31/02) (Note: The NFIP State Coordinator has already provided this information to the EMD/MSP. As the table below indicates, in the five-county declared area there are a total of 12 NFIP participating communities and 105 NFIP policies in effect, totaling $9.7 million in coverage.)

Flood Insurance Coverage in Affected Counties

COUNTY	Number of NFIP Policies in Effect	Number of NFIP Participating Communities	Total NFIP Coverage
Gogebic	12	3	$ 994,700
Ontonagon	23	3	$1,473,300
Baraga	20	2	$1,785,700
Houghton	1	1	$ 31,600
Marquette	49	3	$5,448,600
TOTALS:	**105**	**12**	**$9,733,900**

- Coordinate with the Michigan Economic Development Corporation, Michigan Department of Career Development, Michigan State Housing Development Authority, and other appropriate state agencies concerning communities with a substantial investment of state financial resources. (11/01/02)

- Whenever possible, incorporate mitigation projects into larger, ongoing or planned community projects (as long as the larger project will be completed in a timely manner and mitigation benefits can be fully retained). (Ongoing)

- Upon identification of communities suitable for mitigation, local officials will be contacted to determine the level of local interest in partnering towards recovery that will reduce the community's risk to future flooding. The Mitigation Team will be activated and conduct site visits with communities, as necessary, to gain commitment in developing projects and implementing appropriate mitigation measures. The Mitigation Team will function as a technical resource to the community to help identify problems that should be addressed by the mitigation measure and identify financial assistance opportunities through federal, state and private sector programs.

- If a mitigation component is established within the Disaster Field Office (DFO), the EMD/MSP will supply staff, as appropriate, to support the DFO mitigation efforts.

- The mitigation team will evaluate the mitigation projects proposed within Michigan and select those projects that will be funded under the Hazard Mitigation Grant Program. (8/30/02)

NFIP promotion and flood hazard identification

- FEMA will collect and assess flood map upgrade needs data using the NFIP's Map Needs Update Support System database. Where no NFIP maps are available, the map needs data collection process shall include a community-wide assessment of flood damage potential according to NFIP standards. FEMA shall coordinate with the United States Geological Survey (USGS), the MDEQ, and the NFIP Regional Engineer to determine the need for collection of high water data. In addition, FEMA shall coordinate with PAGP inspection staff to determine where floodplain map data would enhance benefit-cost analysis for potential mitigation-induced project enhancements and prepare hydrologic and hydraulic analyses as required. Working in consultation with the NFIP State Coordinator, FEMA will identify areas where flood damage has occurred to residential or commercial building stock and prepare flood recovery maps as required to assist in rebuilding efforts that comply with minimum state and federal flood damage prevention standards. (12/27/02)

- MDEQ staff will provide technical assistance to local floodplain administrators as needed. (Ongoing)

- MDEQ staff will, as needed, conduct NFIP briefings to inform local floodplain administrators of NFIP responsibilities. (Ongoing)

- FEMA will mail letters to affected communities regarding immediate substantial damage determinations. (Ongoing)

- FEMA will identify (with MDEQ input) priorities for possible enforcement actions. (Ongoing)

- MDEQ, EMD/MSP and FEMA will review repetitive loss data for potential acquisition, elevation or floodproofing sites. (6/14/02)

- There is one NFIP sanctioned community (L'Anse Township) in the five-county disaster area. This community has applied to join the NFIP and should be eligible shortly.

Promoting disaster resistant communities through the Pre-Disaster Mitigation Program and through local mitigation plan development

- Coordinate the use of PDMP funds, as appropriate, to promote mitigation plan development to ensure less disaster damage in the future. (12/00)

MITIGATION STRATEGY TEAM MEMBERS

STATE OF MICHIGAN:

Doran Duckworth, EMD/MSP
Mitigation staff Supervisor

Matt Schnepp, EMD/MSP
Assistant State Hazard Mitigation Officer

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National Flood Insurance Program Coordinator

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MDOT Maintenance Division
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Public Assistance Officer

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Dawn Schulert, EMD/MSP
State Hazard Mitigation Officer
(available after July 8, 2002)

Bethany Hall, EMD/MSP
Manager, Mitigation and Recovery Section

MICHIGAN HAZARD MITIGATION COORDINATING COUNCIL (MHMCC) members:

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MI Department of State Police,
Emergency Management Division

Mr. Edward Hagan
MI Department of Natural Resources,
Forest Management Division

Mr. Tony Sanfilippo
MI Department of Consumer and Industry Services,
Office of Fire Safety

Mr. Okey Eneli
MI Department of Management and Budget,
Office of Design and Construction

Dr. William D. Wagoner
Livingston County Emergency Management

Mr. George Hosek
MI Department of Environmental Quality,
Land and Water Management Division

Mr. Robert Tarrant (Appointment Pending)
MI Department of Agriculture,
Marketing and Communications Division

Ms. Eileen Phifer, PEM
MI Department of Transportation
Maintenance Division

Kevin Thomason
Property and Casualty Insurance Representative
State Farm Insurance Company

William Smith, Ottawa County Emergency Manager
Local Emergency Management Representative

FEDERAL EMERGENCY MANAGEMENT AGENCY:

Andrew Vlack
Federal Hazard Mitigation Officer (DFO)

Pat Glithero
Federal Hazard Mitigation Officer (Chicago)

Norbert Schwartz
Deputy Federal Coordinating Officer
For Hazard Mitigation (Chicago)

OTHER FEDERAL AGENCIES:

Al Herceg
Natural Resource Conservation Service (Lansing, MI)
U.S. Department of Agriculture

Sean Duffey
Natural Resource Conservation Service (Lansing, MI)
U.S. Department of Agriculture

Bernie Huetter
Natural Resource Conservation Service (Marquette, MI)
U.S. Department of Agriculture

Jerry Doline
U.S. Army Corp of Engineers
Detroit District

SIGNED:

(signed)
NORBERT SCHWARTZ, FEMA V
DEPUTY FCO FOR MITIGATION

(signed)
DORAN DUCKWORTH, EMD/MSP
ACTING STATE HAZARD MITIGATION OFFICER

DATE

DATE

Hazard Mitigation Strategy for Federal Disaster #1346: 2000 Detroit Area Urban Flooding

ADDENDUM TO THE MICHIGAN HAZARD MITIGATION PLAN FOR FEDERAL DISASTER 1346, DECLARED OCTOBER 17, 2000

DISASTER HISTORY

Federal Disaster 1346 was caused by unusually heavy rainfall that occurred in Wayne County on September 10 and 11, 2000. The rain-laden thunderstorms that moved across the southern tier of counties in Michigan on those two days hit Wayne County particularly hard. The National Weather Service indicated that up to four inches of rain fell in parts of Wayne County on Sunday, September 10. An additional two to four inches of rain fell over the same areas on Monday, September 11. Detroit Metropolitan Airport recorded 3.71 inches of rain on September 11, eclipsing the previous record for the day of 1.72 inches set back in 1947. The 3.71 inches of rain also broke the one-day rainfall total for any day in September in Wayne County (3.21 inches) set on September 3, 1879, and was the fifth wettest day ever in the Detroit area.

The cumulative effect of the two storms overwhelmed many storm sewers and sewage treatment plants, causing raw sewage to back up into homes and businesses and sending untreated waste into rivers and streams. The storms left nearly 35,000 utility customers without power and stranded more than 17,000 air passengers at Detroit Metropolitan Airport. Numerous roads, bridges, and highway underpasses were flooded and had to be closed, which limited the ability of emergency service vehicles to reach many areas in a timely manner.

According to figures compiled by the affected local communities and Preliminary Damage Assessment (PDA) teams coordinated by the Federal Emergency Management Agency, the excessive rainfall caused flooding in 3,211 private residences and businesses. Some of the flooding was caused by water moving over land from swollen streams, creeks, and retention ponds. However, the vast majority of the damage was due to sewer backups into homes and businesses caused by power failures at pumping stations and/or the capacity of the storm water collection system being overwhelmed. Sewage depths in basements ranged from several inches up to several feet or more. In some cases, the water depths entered the first floor of the structure, causing major damage to living quarters.

Thousands of homes had primary mechanical systems such as the furnace, water heater, and electrical service damaged from floodwater infiltration. Many of these systems will require major repairs or have to be replaced. In addition, many homeowners incurred damage to clothes washers and dryers, freezers, power machinery, and other appliances commonly found in basement utility spaces. A large number of homes had finished living spaces in their basements. The flooding, in many cases, destroyed the furnishings, carpeting, wall paneling, and personal items in those living spaces. Several business owners incurred significant losses in appliances, cabinetry, carpeting, and inventory items that were stored in basements and ground floor storage spaces.

AREA AFFECTED

The primary areas affected by this disaster are the Wayne County communities of Allen Park, Dearborn, Dearborn Heights, Ecorse, Lincoln Park, Riverview, Southgate, Taylor, Van Buren Township, Wyandotte, and the city of Wayne. The city of Southgate was particularly hard hit, suffering damage to 3,340 homes and businesses alone. Allen Park had flooding damage to 2,500 homes and businesses. In Wyandotte, more than 1,300 structures flooded. Dearborn, Dearborn Heights, Ecorse, Lincoln Park, and Taylor each had several hundred homes and businesses flooded.

MITIGATION STRATEGY

The Federal Emergency Management Agency (FEMA) and the Emergency Management Division of the Michigan State Police (EMD/MSP) jointly developed a Mitigation Strategy for this Major Disaster Declaration that addresses the mitigation problems and opportunities unique to this event. (See attached Strategy.)

HMGP PROCEDURES

The Hazard Mitigation Grant Program (HMGP) has been activated for Federal Disaster 1346. The procedures outlined in the State of Michigan Administrative Plan for the Hazard Mitigation Grant Program will be followed in the implementation and administration of the program. In accordance with the HMGP State Administrative Plan provisions and Michigan Executive Order 1998-5, the EMD/MSP and the Michigan Hazard Mitigation Coordinating Council (MHMCC) will jointly carry out the HMGP project identification, prioritization, and selection processes.

Michigan was recently designated as a "Managing State" for the HMGP. The FEMA and EMD/MSP have jointly developed a draft Memorandum of Understanding outlining each party's responsibilities in implementing and administering the HMGP in Michigan subsequent to a federally-declared disaster. The provisions of that MOU will be incorporated into the State Administrative Plan for the HMGP and will be followed for Federal Disaster 1346.

MITIGATION STRATEGY
FEMA-1346-DR-MI
State of Michigan

OBJECTIVE

The objective of mitigation is to reduce future disaster losses through acquisition and relocation of hazard-prone property, structural retrofitting, mitigation education of community officials and residents, wise land use and land development practices, prudent use of resources and funding, and encouragement of National Flood Insurance Program (NFIP) implementation and compliance, to name just a few measures that have been successful. To assist communities in Michigan with mitigative efforts, so that the environment is safer and has a reduced risk from disaster damage, the following objectives must be accomplished:

7. Mitigation opportunities will be identified and selected:

   - The initial mitigation opportunities and recommendations identified during the damage assessment process in many of the affected communities include the following:

     A. Apply the best methods to reduce or eliminate sewer backup incidents.
     B. Community outreach and education to promote flood proofing methods.
     C. Acquisition and relocation or retrofitting and flood proofing (including elevation) of substantially damaged structures located in flood prone areas.

8. Financial resources, including disaster assistance programs such as the HMGP, PAGP and IFGP, and the funds from other state and federal programs, will be maximized:

   - Under the Individual and Family Grant Program and Temporary Housing Minimal Repair Program, inspectors will make every effort to include mitigation measures in restoring damaged properties.

   - Under the Small Business Administration, low interest loans can be acquired for repairs and mitigation upgrades to damaged structures.

9. Long-term mitigation will be ensured through comprehensive and prudent life saving measures (i.e., restoring and floodproofing basement utilities and mechanical systems, preventing sewer backups), local building practices, and floodplain management.

STRATEGY

The mitigation strategy for promoting and achieving hazard mitigation in this disaster will be focused on the following areas:

- Life safety measures.
- Community mitigation education and outreach.
- Coordination with the Individual and Family Grant Program and the Temporary Housing Minimal Repair Program.
- Community-administered flood proofing measures.
- Mitigation project development.
- National Flood Insurance Program mitigation opportunities and promotion.
- Promoting disaster resistant communities through Project Impact.

Life safety measures

- Assist community officials in identifying deficiencies in storm sewer design and develop solutions that will ensure public health and safety. The Michigan Hazard Mitigation Coordinating Council has a representative from the Michigan Department of Environmental Quality (MDEQ). Issues pertaining to this disaster will be discussed by the MHMCC and suggestions taken from the MDEQ representative. (11/17/00)

Community mitigation education and outreach

- Coordinate with public and private agencies in the development of flood resistant building practices. (11/17/00)
- Two Disaster Recovery Centers (DRCs) have been opened for this disaster – one in Taylor and one in Dearborn. The DRCs are staffed by FEMA-trained Disaster Assistance Employees (DAEs) knowledgeable of the NFIP and mitigation of sewer backups. (Note: The DRCs are scheduled to close 11/3/00.)

Coordination with the Individual and Family Grant Program

- Coordinate with the Individual and Family Grant Program and the Temporary Housing Minimal Repair Program staff to ensure that appropriate flood proofing measures are allowed and specified for homes, businesses, and infrastructure being restored under these two programs. (12/00)

Community-administered floodproofing measures

- Invite communities to establish and administer a locally-based floodproofing program that would provide public education on proper floodproofing techniques, and provide grants to individual home and business owners wishing to retrofit their structures to reduce flood damage. The program could be implemented and administered by an existing local department, such as the building, planning or public works department, which would be responsible for disbursing grants, monitoring work, providing technical assistance, and providing program status to the State. (12/00)

- Flood proofing methods could include the following:
  - Installation of standpipes, sewer backflow (check) valves, or revised plumbing to include an ejector or sump pump for basements.
  - Raise electrical system components including service panels, meters, switches, and outlets that may easily be damaged by floodwaters.
  - Raise or relocate HVAC equipment, water heater, and washer/dryer.

Mitigation project development

- Information from the Preliminary Damage Assessment (PDA) will be used to help identify the communities that should be contacted concerning the possibility of mitigation opportunities under the Hazard Mitigation Grant Program (HMGP) and other state and federal programs. (12/00)
- Review the potentially damaged structure inventory from the PDA, concentrating primarily on structures that may have been substantially damaged. (12/00)
- Review the NFIP State Coordinator's information concerning the flood hazard identification and participation status of communities in the NFIP. (12/00) (Note: The NFIP State Coordinator has indicated that the Village of Lake Angelus in Oakland County is the only NFIP sanctioned community in the two-county disaster area.)
- Coordinate with the Michigan Economic Development Corporation, Michigan Department of Career Development, Michigan State Housing Development Authority, and other appropriate state agencies concerning communities with a substantial investment of state financial resources. (12/00)
- Whenever possible, incorporate mitigation projects into larger, ongoing or planned community projects (as long as the larger project will be completed in a timely manner and mitigation benefits can be fully retained). (Ongoing)
- Upon identification of communities suitable for mitigation, local officials will be contacted to determine the level of local interest in partnering towards recovery that will reduce the community's risk to future severe storms and flooding. The Mitigation Team will be activated and conduct site visits with communities, as necessary, to gain commitment in developing projects and implementing appropriate mitigation measures. The Mitigation Team will function as a technical resource to the community to help identify problems that should be addressed by the mitigation measure and identify financial assistance opportunities through federal, state and private sector programs.
- If a mitigation component is established within the Disaster Field Office (DFO), the EMD/MSP will supply staff, as appropriate, to support the DFO mitigation efforts.
- The Mitigation Team will evaluate the mitigation projects proposed within Michigan and select those projects that will be funded under the Hazard Mitigation Grant Program. (3/01)

NFIP mitigation opportunities and promotion

- MDEQ staff will provide technical assistance to local floodplain administrators as needed. (Ongoing)
- MDEQ staff will, as needed, conduct NFIP briefings to inform local floodplain administrators of NFIP responsibilities. (Ongoing)
- FEMA has ordered three sets of NFIP maps for the declared area.
- FEMA will mail letters to affected communities regarding immediate substantial damage determinations. (Ongoing)
- FEMA will identify priorities for possible enforcement actions. (Ongoing)
- MDEQ, EMD/MSP, and FEMA will review repetitive loss data for potential acquisition, elevation or flood proofing sites. (12/00)
- The NFIP State Coordinator has indicated that the Village of Lake Angelus in Oakland County is the only NFIP sanctioned community in the two-county disaster area.

Promoting disaster resistant communities through Project Impact

- Coordinate with Michigan Project Impact communities in promoting mitigation projects to ensure less disaster damage in the future. (12/00)

MITIGATION STRATEGY TEAM MEMBERS

STATE OF MICHIGAN:

Doran Duckworth
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Dawn Schulert
Hazard Mitigation Officer

Matt Schnepp
Assistant Grants Manager

Karen Totzke
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Mitigation Administrative Assistant

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Land and Water Management Division

Mr. Edward Hagan
MI Department of Natural Resources,
Forest Management Division

Mr. P. David Charney
MI Department of Agriculture,
Marketing and Communications Division

Mr. Craig Newell
MI Department of Consumer and Industry Services,
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Ms. Eileen Phifer
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Dr. William D. Wagoner
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FEDERAL EMERGENCY MANAGEMENT AGENCY:

Pat Glithero
Hazard Mitigation Officer

Andrew Vlack
Disaster Recovery and Operations Specialist

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Hazard Mitigation Strategy for Federal Disaster #1237: 1998 Detroit Area Windstorm

MITIGATION STRATEGY
FEMA-1237-DR-MI
State of Michigan

OBJECTIVE

The objective of mitigation is to reduce future disaster losses through acquisition and relocation of hazard-prone property, structural retrofitting, mitigation education of community officials and residents, wise land use and land development practices, prudent use of resources and funding, and encouragement of National Flood Insurance Program (NFIP) implementation and compliance, to name just a few measures that have been successful. To assist communities in Michigan in their recovery from the straight-line winds and rain storms that struck Wayne and Macomb Counties on July 21-22, 1998, so that the rebuilt environment is safer and has a reduced risk from wind and flood damage, the following objectives must be accomplished:

1. Mitigation opportunities will be identified and selected:

   *The initial mitigation opportunities and recommendations identified during the damage assessment process in many of the affected communities include the following:

   a. A rebate program for local residents to buy NOAA weather radios.
   b. Community outreach and education to promote urban forestry practices.
   c. Community outreach to promote wind resistant construction techniques.
   d. Burying utility lines where appropriate and technically feasible.
   e. Building code enforcement.
   f. Acquisition and relocation or retrofitting and flood proofing (including elevation) of substantially damaged structures located in special flood hazard areas.

2. Financial resources, including disaster assistance programs such as the HMGP, PAGP and IFGP, and the funds from other state and federal programs, will be maximized:

   - Under the Public Assistance Grant Program, inspectors will make every effort to include mitigation efforts in reconstructing damaged properties and tree debris clearance.

3. Long-term mitigation will be ensured through comprehensive and prudent life saving measures (i.e., enhancement of early warning capability), urban forestry practices, local building practices, and floodplain management.

STRATEGY

The mitigation strategy for promoting and achieving mitigation of the hazards from this disaster will be focused in the following areas:

- Life safety measures.
- Community mitigation education and outreach.
- Coordination with the Public Assistance Grant Program.
- Community-administered structural retrofitting education and grant programs.
- Enhancement of urban forestry programs and practices.
- Mitigation project development.
- National Flood Insurance Program mitigation opportunities and promotion.
- Building and Infrastructure Design and Construction.

Life safety measures

- Assist community officials in identifying deficiencies in weather warning systems and come up with solutions that will ensure public safety is enhanced. (11/98)

Community mitigation education and outreach

- Coordinate with professional associations for groups such as building code officials and insurance companies for development of wind resistant building codes and practices. (11/98)

Coordination with the Public Assistance Grant Program

- Coordinate with the Public Assistance Grant Program (PAPG) staff to ensure that appropriate structural wind engineering and flood proofing measures are allowed and specified for public buildings and infrastructure being repaired under the Public Assistance Grant Program. (11/98)
- Coordinate with the Public Assistance Grant Program staff in creating mitigation measures that will reduce debris clearance. (11/98)

Community-administered structural retrofitting education and grant program

- Invite communities to establish and administer a locally-based structural retrofitting program that would provide public education on proper wind engineering techniques and components, and provide grants to individual home and business owners wishing to retrofit their structures to reduce future wind damage. The program could be implemented and administered by an existing local department, such as the building, planning or public works department, which would be responsible for disbursing grants, monitoring work, providing technical assistance, and providing program status to the State. (11/98)

Enhancement of urban forestry programs and practices

- Develop and provide guidance materials to forestry, public works, utility and other appropriate local departments on proper urban forestry techniques and practices. (11/98).
- Conduct workshops for home and business owners, design professionals and other interested parties, on proper tree selection and urban forestry techniques and practices. (11/98)
- In communities without an urban forestry program, encourage local officials to establish a program. (11/98)

Mitigation project development

- Information from the Preliminary Damage Assessment (PDA) will be used to help identify and select the communities which should be contacted concerning the possibility of mitigation opportunities under the Hazard Mitigation Grant Program (HMGP) (8/98) and other state and federal programs (9/98).
- Review the potentially damaged structure inventory from the PDA, concentrating primarily on structures that may have been substantially damaged. (9/98)
- Review the NFIP State Coordinator's information concerning the flood hazard identification and participation status of communities in the NFIP. (9/98)
- Coordinate with the Michigan Jobs Commission, the Michigan State Housing Development Authority, and other appropriate state agencies concerning communities with a substantial investment of state financial resources. (9/98)
- Whenever possible, incorporate mitigation projects into larger, ongoing or planned community projects (as long as the larger project will be completed in a timely manner and mitigation benefits can be fully retained). (Ongoing)

*Upon identification of communities suitable for mitigation, local officials will be contacted to determine the level of local interest in partnering toward recovery that will reduce the community's risk to future severe storms and flooding. The Mitigation Team will be activated and conduct site visits with communities to gain commitment in developing projects and implement appropriate mitigation measures. The Mitigation Team will function as a technical resource to the community to help identify the problem that should be addressed by the mitigation measure and identify financial assistance opportunities through federal, state and private sector programs.

NFIP mitigation opportunities and promotion

- MDEQ staff will provide technical assistance to local floodplain administrators as needed. (Ongoing)
- MDEQ staff will, as needed, conduct NFIP briefings to inform local floodplain administrators of NFIP responsibilities. (Ongoing)
- FEMA will mail letters to affected communities regarding immediate substantial damage determinations. (Not applicable for this disaster.)
- FEMA will identify priorities for possible enforcement actions. (Ongoing)
- MDEQ, EMD/MSP, and FEMA will review repetitive loss data for potential acquisition, elevation or flood proofing sites. (11/98)

*Even though this was primarily a wind disaster, flood mitigation objectives are included in this strategy as outlined in the Michigan Hazard Mitigation Plan.

Building and Infrastructure Design and Construction

- Enhance building codes to ensure public and private structures are more structurally sound to handle severe wind events. (11/98)
- Promote burying of utility lines in communities where it is appropriate and technically feasible. (Only public and non-profit utility companies are eligible for grant funding.) (11/98)

MITIGATION STRATEGY TEAM MEMBERS

STATE OF MICHIGAN

Doran Duckworth
Hazard Mitigation Coordinator

Dawn Schulert
Hazard Mitigation Officer

George Hosek
National Flood Insurance Program Coordinator

Tom Newell
State Warning and Communications Officer

Cara Boucher
Urban and Community Forester

FEDERAL EMERGENCY MANAGEMENT AGENCY

Dante Roveda
Hazard Mitigation Officer

Terrill Barnes
Preliminary Damage Assessment

Laura Knitt
Preliminary Damage Assessment

Hazard Mitigation Strategy for Federal Disaster #1226: 1998 West Michigan Windstorm

MITIGATION STRATEGY
FEMA-1226-DR-MI
State of Michigan

OBJECTIVE

The objective of mitigation is to reduce future disaster losses through acquisition and relocation of hazard-prone property, structural retrofitting, mitigation education of community officials and residents, wise land use and land development practices, prudent use of resources and funding, and encouragement of National Flood Insurance Program (NFIP) implementation and compliance, to name just a few measures that have been successful To assist communities in Michigan in their recovery from the straight-line winds that struck across Michigan on May 31, 1998, so that the rebuilt environment is safer and has a reduced risk from wind and flood damage, the following objectives must be accomplished:

1. Mitigation opportunities will be identified and selected:

   - The initial mitigation opportunities and recommendations identified during the damage assessment process in many of the affected communities include: retrofitting of wind-damaged structures with wind clips, fasteners and other bracing materials; urban forestry education; building code enforcement; acquisition and relocation or retrofitting and floodproofing (including elevation) of substantially-damaged structures located in special flood hazard areas; and structural modifications to water and sewer infrastructure to prevent flood damage.

2. Implementation of appropriate mitigation measures (projects) will be expedited:

   - Due to the nature of the damage and the obvious need to rebuild private residences and public facilities in a timely manner, there is a very narrow window of opportunity for achieving meaningful mitigation in the area of structural wind engineering (for damaged structures). Those projects and measures that relate to structural retrofitting of wind-damaged structures should be quickly approved so that these opportunities are not lost. This opportunity may be narrowed even further because most retrofitting may not be cost effective.

3. Financial resources, including disaster assistance programs such as the HMGP, PAGP and IFGP, and the funds from other state and federal programs, will be maximized:

   - Under the Public Assistance Grant Program, inspectors will make every effort to include mitigation efforts in reconstructing damaged properties, roads and drains. In addition, home and business owners should be strongly encouraged to use the available funding under the Small Business Administration's Disaster Loan Program to incorporate structural wind mitigation measures in the repair/reconstruction of their damaged structures. These programs have the ability to institute immediate, permanent mitigation measures on damaged structures and public infrastructure.

4. Long-term mitigation will be ensured through comprehensive and prudent life saving measures (i.e., enhancement of early warning capability), urban forestry practices, local building practices, and floodplain management.

STRATEGY

The mitigation strategy for promoting and achieving mitigation of the hazards from this disaster will be focused in the following areas:

- Life safety measures.
- Community mitigation education and outreach.
- Coordination with other disaster assistance programs.
- Community-administered structural retrofitting education and grant programs.
- Enhancement of urban forestry programs and practices.

- Mitigation project development.
- National Flood Insurance Program mitigation opportunities and promotion.

Life Safety Measures

- Assist community officials in identifying deficiencies in weather warning systems and come up with solutions that will ensure public safety is enhanced. (9/98)

Community mitigation education and outreach

- Coordinate with professional associations for groups such as building code officials and insurance companies for development of wind resistant building codes. (9/98)

Coordination with other disaster assistance programs

- Coordinate with SBA staff to ensure that appropriate structural wind engineering measures are allowed and specified for homes being repaired under the SBA Disaster Loan Program (using the 20% mitigation provision). (8/98)
- Coordinate with appropriate state and local officials to ensure that structural wind engineering measures are allowed and being implemented for homes being repaired under voluntary agency disaster relief and recovery programs.
- Coordinate with Public Assistance Grant Program (PAGP) staff to ensure that appropriate structural wind engineering and floodproofing measures are allowed and specified for public buildings and infrastructure being repaired under the PAGP. (8/98)

Community-administered structural retrofitting education and grant program

- Invite communities to establish and administer a locally-based structural retrofitting program that would provide public education on proper wind engineering techniques and components, and provide grants to individual home and business owners wishing to retrofit their structures to reduce future wind damage. The program could be implemented and administered by an existing local department, such as the building, planning or public works department, which would be responsible for disbursing grants, monitoring work, providing technical assistance, and prorating on program status to the State. (8/98)

Enhancement of urban forestry programs and practices

- Develop and provide guidance materials to forestry, public works, utility and other appropriate local departments on proper urban forestry techniques and practices. (9/98)
- Conduct workshops for home and business owners, design professionals and other interested parties, on proper tree selection and urban forestry techniques and practices. (9/98)
- In communities without an urban forestry program, encourage local officials to establish a program. (9/98)

Mitigation project development

- Information from the Preliminary Damage Assessment (PDA) will be used to help identify and select the communities that should be contacted concerning the possibility of mitigation opportunities under the Hazard Mitigation Grant Program (HMGP) and other state and federal programs. (7/98)
- Review the potentially damaged structure inventory from the PDA, concentrating primarily on those structures that may have been substantially damaged. (7/98)
- Review the NFIP State Coordinator's information concerning the flood hazard identification and participation status of communities in the NFIP. (7/98)
- Coordinate with the Michigan Jobs Commission and other appropriate state agencies concerning communities with a substantial investment of state financial resources. (8/98)
- Whenever possible, incorporate mitigation projects into larger, ongoing or planned community projects (as long as the larger project will be completed in a timely manner and mitigation benefits can be fully retained). (Ongoing)
- Upon identification of communities suitable for mitigation, local officials will be contacted to determine the level of local interest in partnering toward recovery that will reduce the community's risk to future sever storms and flooding. The Mitigation Team will be activated and conduct site visits with communities the commit to development of projects and implementation of appropriate mitigation measures. The Mitigation Team will function as a technical

resource to the community to help identify the problem that should be addressed by the mitigation measure and identify financial assistance opportunities through federal, state and private sector programs.

NFIP Mitigation Opportunities and Promotion

- MDEQ staff will provide technical assistance to local floodplain administrators as needed. (Ongoing)
- MDEQ staff will, as needed, conduct NFIP briefings to inform local floodplain administrators of NFIP responsibilities. (Ongoing)
- FEMA will mail letters to affected communities regarding immediate substantial damage determinations. (Not applicable for this disaster.)
- FEMA will identify priorities for possible enforcement actions. (Ongoing)
- MDEQ, EMD/MSP, and FEMA will review repetitive loss data for potential acquisition sites. (9/98)

*Even though this was primarily a wind disaster, flood mitigation objectives are included in this strategy as outlined in the Michigan Hazard Mitigation Plan.

MITIGATION STRATEGY TEAM MEMBERS

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Hazard Mitigation Coordinator

Dawn Schulert
Hazard Mitigation Officer

George Hosek
National Flood Insurance Program Coordinator

FEDERAL EMERGENCY MANAGEMENT AGENCY
Dante Roveda
Hazard Mitigation Officer

Hazard Mitigation Strategy for Federal Disaster #1181: 1997 Southeast Michigan Tornadoes and Flooding

MITIGATION STRATEGY
FEMA-1181-DR-MI
State of Michigan

OBJECTIVE

The objective of mitigation is to reduce future disaster losses through acquisition and relocation of hazard-prone property, structural retrofitting, mitigation education of community officials and residents, wise land use and land development practices, prudent use of resources and funding, and encouragement of National Flood Insurance Program (NFIP) implementation and compliance, to name just a few measures that have been successful. To assist communities in southeast Michigan in their recovery from the severe storms that struck the area on July 2, 1997, so that the rebuilt environment is safer and has a reduced risk from wind and flood damage, the following objectives must be accomplished:

1. Mitigation opportunities will be identified and selected:

   - The initial mitigation opportunities and recommendations identified during the damage assessment process in many of the affected communities include: acquisition and relocation or retrofitting and floodproofing (including elevation) of substantially-damaged structures located in special flood hazard areas; structural retrofitting of wind-damaged structures with wind clips, fasteners and other bracing materials; structural modifications to water and sewer infrastructure to prevent flood damage; and urban forestry education.

2. Implementation of appropriate mitigation measures (projects) will be expedited:

   - Due to the nature of the damage and the obvious need to rebuild private residences in a timely manner, there is a very narrow window of opportunity for achieving meaningful mitigation in the area of structural wind engineering (for damaged homes). Those projects and measures that relate to structural retrofitting of wind-damaged structures should be quickly approved so that these opportunities are not lost.

3. Financial resources, including disaster assistance programs such as the HMGP, PAGP and IFGP, and the funds from other state and federal programs, will be maximized:

   - Every effort should be made to include structural wind retrofitting in the repairs and reconstruction done under the Temporary Housing Program (Minimal Repairs), the Individual and Family Grant Program, and the Public Assistance Grant Program. In addition, home and business owners should be strongly encouraged to use the available funding under the Small Business Administration's Disaster Loan Program to incorporate structural wind mitigation measures in the repair/reconstruction of their damaged structures. Appropriate flood mitigation measures should also be undertaken on those public facilities and infrastructure that incurred damage from flooding. All of these programs have the ability to institute immediate, permanent mitigation measures on damaged structures and public infrastructure.

4. Long-term mitigation will be ensured through comprehensive and prudent public health and safety measures (i.e., enhancement of early warning capability), floodplain management, urban forestry practices, and local building practices.

STRATEGY

The mitigation strategy for promoting and achieving mitigation of the hazards from this disaster will be focused in the following areas:

- Community mitigation education and outreach.
- Coordination with other disaster assistance programs.
- Community-administered structural retrofitting education and grant programs.
- Enhancement of urban forestry programs and practices.
- Mitigation project development.
- National Flood Insurance Program mitigation opportunities and promotion.

Community mitigation education and outreach

- Provide mitigation information in Disaster Recovery Information Centers. (7/21 till at least 8/1)
- Provide mitigation information by mail (upon request) as a follow-up to the Disaster Recovery Information Centers.
- Coordinate mitigation activities with the ongoing Community Relations Outreach Program.

Coordination with other disaster assistance programs

- Coordinate with Individual Assistance (IA) Program staff to ensure that appropriate structural wind engineering measures are allowed and specified for homes being repaired under the Minimal Repair Program.
- Coordinate with IA Program staff to ensure that appropriate mitigation measures are allowed and specified for recipients of IFG grants to prevent further damage to their homes from wind (such as removing trees that are in danger of falling onto the structure, providing additional bracing or tarping for damaged roofs and walls, etc.).
- Coordinate with SBA staff to ensure that appropriate structural wind engineering measures are allowed and specified for homes being repaired under the SBA Disaster Loan Program (using the 20% mitigation provision).
- Coordinate with IA Program staff to ensure that appropriate structural wind engineering measures are allowed and being implemented for homes being repaired under the American Red Cross and other voluntary agency disaster relief and recovery programs.
- Coordinate with Public Assistance Grant Program (PAGP) staff to ensure that appropriate structural wind engineering and floodproofing measures are allowed and specified for public buildings and infrastructure being repaired under the PAGP.

Community-administered structural retrofitting education and grant program

- Provide a block-grant to participating communities to establish and administer a locally-based structural retrofitting program that would provide public education on proper wind engineering techniques and components, and provide grants to individual home and business owners wishing to retrofit their structures to reduce future wind damage. The program would be implemented and administered by an existing local department, such as the building, planning or public works department, which would be responsible for disbursing grants, monitoring work, providing technical assistance, and reporting on program status to the State.

Enhancement of urban forestry programs and practices

- Develop and provide guidance materials to forestry, public works, utility and other appropriate local departments on proper urban forestry techniques and practices.
- Conduct workshops for home and business owners, design professionals and other interested parties, on proper tree selection and urban forestry techniques and practices.
- In communities without an urban forestry program, encourage local officials to establish a program.

Mitigation project development

- Information from the Preliminary Damage Assessment (PDA) will be used to help identify and select the communities that should be contacted concerning the possibility of mitigation opportunities under the Hazard Mitigation Grant Program (HMGP) and other state and federal programs.
- Review the potentially damaged structure inventory from the PDA, concentrating primarily on those structures that may have been substantially damaged.
- Review the NFIP State Coordinator's information concerning the flood hazard identification and participation status of communities in the NFIP.
- Coordinate with the Michigan Jobs Commission and other appropriate state agencies concerning communities with a substantial investment of state financial resources.
- Whenever possible, incorporate mitigation projects into larger, ongoing or planned community projects (as long as the larger project will be completed in a timely manner and mitigation benefits can be fully retained).
- Upon identification of communities suitable for mitigation, local officials will be contacted to determine the level of local interest in partnering toward recovery that will reduce the community's risk to future severe storms and flooding. The Mitigation Team will be activated and conduct site visits with communities that commit to development of projects and implementation of appropriate mitigation measures. The Mitigation Team will function as a technical resource to the community to help identify the problem that should be addressed by the mitigation measure, and identify financial assistance opportunities through federal, state and private sector programs.

NFIP Mitigation Opportunities and Promotion

- MDEQ staff will provide technical assistance to local floodplain administrators as needed.
- MDEQ staff will, as needed, conduct NFIP briefings to inform local floodplain administrators of NFIP responsibilities.
- FEMA will mail letters to affected communities regarding immediate substantial damage determinations.
- FEMA will identify priorities for possible enforcement actions.

Hazard Mitigation Strategy for Federal Disaster #1128: 1996 East Michigan Tornado and Flooding

DR-1128-MI

INTERAGENCY HAZARD MITIGATION TEAM REPORT

(Electronically reformatted version of original scanned document.)

[redacted]

Covering the Counties of: Bay, Lapeer, Saginaw, Sanilac, St. Clair, Tuscola and Midland

REGION V INTERAGENCY HAZARD MITIGATION TEAM MEETING REPORT

[redacted] [redacted]

August 27, 1996

in response to:

The June 21, 1996
Disaster Declaration for the State of
Michigan

FEMA-DR-1128-MI

Covering the Counties of: Bay, Lapeer, Saginaw, Sanilac, St. Clair, Tuscola and Midland

[redacted]

For additional information or additional copies of this report please write to:

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Photographs courtesy of Hazel Bright PIO, Tuscola County Drain Commission, Tuscola County Sheriff Department, Tri City Times, and Frankenmuth News

EXECUTIVE SUMMARY

On July 23, 1996, President Clinton declared that six counties, Bay, Lapeer, Saginaw, Sanilac, St. Clair, and Tuscola, were eligible for disaster assistance (FEMA -1128-DR-MI) in the State of Michigan due to widespread flooding caused by heavy rain. Midland County was added on July 31, 1996. All seven counties are eligible for Public Assistance, Hazard Mitigation, and as of August 15, 1996 Individual Assistance.

Prior to the declaration, in conjunction with local officials and the Michigan Department of State Police/Emergency Management Division (MDSP/EMD), the Federal Emergency Management Agency (FEMA) conducted Preliminary Damage Assessments (PDA) in the affected counties to document damages, identify possible mitigation measures and coordinate with local and state government officials. The result of the PDA indicated the damage to public infrastructure was in excess of $10,000,000.

Severe storms and torrential rainfall occurred from June 21 to June 23, 1996, with some areas receiving over five inches of rain in a 4 to 5 hour period, causing widespread flooding. On the evening of June 21, 1996, a tornado struck the City of Frankenmuth in Saginaw County.

An Interagency Hazard Mitigation Team meeting (IHMT) was held on August 8, 1996, in Bay City, Michigan, in order to develop appropriate mitigation strategies and recommendations with respect to this flooding event. The recommendations noted in this report extend from the IHMT meeting and are based on site visits, interviews with local officials, and information provided by other Federal and State agencies. The areas identified for mitigation are:

I. Planning and Land Use Management
II. Flood Insurance and Real Estate
III. Flood Proofing Existing Structures
IV. Drainage System Design, Construction and Maintenance
V. Road Design, Construction and Maintenance
VI. Forecasting and Emergency Response
VII. FEMA Flood Insurance Issue

Doran Duckworth
State Hazard Mitigation Officer

[redacted]

Part 1: Background Information

DISASTER DECLARATION

On July 23, 1996, President Clinton declared a major disaster (FEMA-DR-1128-MI) for Public Assistance and Hazard Mitigation in the State of Michigan due to severe storms. A Preliminary Damage Assessment (PDA) was conducted with the help of local jurisdictions, Michigan Emergency Management Division (MI EMD) and the Federal Emergency Management Agency (FEMA). The estimated public and private damage for this disaster exceeded $10 million.

Upon declaration, sections of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288, as amended, also known as the Stafford Act), took effect and provided for implementation of Federal disaster assistance programs.

Under Section 409 of the Stafford Act, an up-to-date State Hazard Mitigation Plan is required as a condition for Federal Disaster Assistance. This Interagency Hazard Mitigation Team Report and recommendations will serve as the foundation for updating the State Mitigation Plan. After further analysis, and with the full coordination of all affected state and local agencies, additional mitigation measures will likely be identified in the State Mitigation Plan.

PURPOSE OF THE REPORT

An Interagency Hazard Mitigation Team (IHMT) meeting was held on August 8, 1996, at the Bay City, Michigan, City Hall in order to develop appropriate mitigation strategies and recommendations with respect to this flooding event. This report is intended to outline opportunities for mitigating future losses for the seven Michigan counties which experienced severe storms, and heavy rains, a tornado and flooding during the period of June 21 to July 1, 1996. The declared counties are: Bay, Lapeer, Saginaw, Sanilac, Saint Clair, Tuscola and Midland. The recommendations noted in this report were developed at the IHMT meeting and are based on site visits, interviews with local public officials and information provided by other Federal and State agencies.

DESCRIPTION OF THE EVENT

A storm system moved through Michigan on a south easterly path during the end of June causing flooding in a large part of the state. (See Appendix B for a detailed description. See Appendix H and I for the National Weather Service (NWS) description of the weather event and Heavy Rainfall Events information.)

SUMMARY OF DAMAGES

FEMA Region I Federal / State teams were deployed to the field on August 23, 1996, as a result of a request for a Preliminary Damage Assessment from Governor Engler of Michigan. These teams surveyed the impact on public facilities and infrastructure as well as damage to private property. Most of the dollar value estimate of damages was to road systems and water control facilities drainage systems. A summary of the damage estimates, for category, that are eligible for assistance through Infrastructure Support, follows:

CATEGORY	FEMA/MEMD DAMAGE ESTIMATE ($)
Debris Clearance	272,900
Emergency Protective Measures	203,465
Road Systems / Non-Federal	3,722,325
Water Control Facilities	4,195,181
Public Buildings and Equipment	460,065
Public Utilities	64,950
Recreation and Other	561,150
TOTAL	**9,480,036**

The disaster declaration for the State of Michigan was requested as a result of damage to public facilities, private homes and businesses in several counties and cities in east-central Michigan. Severe storms and torrential rainfall occurred from June 21 to June 23, 1996, with some areas receiving over five inches of rain in a 4 to 5 hour period causing widespread flooding. The volume of water exceeded the capacity of the public drainage and sewer systems. Widespread flash flooding caused numerous road and bridge washouts, culvert failures, damage to drainage channels and flooding in homes in seven affected counties. In addition to the flooding, a tornado struck the City of Frankenmuth in Saginaw County on the evening of June 21. This tornado destroyed six homes and damaged 108 others, destroyed one business (a brewery that is critical to the town's tourism economy), damaged nine other businesses in the downtown area, and tore the roof off the public library. Debris was spread over several miles of city streets. Widespread power outages and natural gas leaks were reported. Two deaths and five injuries were directly attributed to the effects of severe weather.

Public Assistance

Preliminary Damage Assessments (PDA) conducted June 27 to June 29, 1996, indicated the most severe impacts were to roads, bridges, and drainage culverts and channels in Bay, Lapeer and Tuscola Counties. Tuscola County was particularly hard hit, with damages estimated to be over $4.5 million. Lapeer County suffered nearly $3 million in public damage, most of which was for washed out roads and bridges. Bay County had significant road damage estimated at nearly $1 million. Total public damage to date in the seven affected counties is $10,158,800. Of that amount, $8.8 million is for damage to roads, bridges, culverts and drainage channels. Over $700,000 has been spent on debris removal. Costs for emergency protective measures total nearly $340,000.

These figures are in addition to $1 million in damage to the Federal Aid System roads and bridges that will be covered under the Federal Highway Administration's emergency repair and reconstruction program.

Individual Assistance

Flooded home at northwest end of Cat Lake in Mayville, MI 6/22/96

Flooded home at east side of Cat Lake in Mayville, MI 6/22/96

On August 5, teams began collecting additional disaster survey information associated with private property losses. The flooding also caused widespread and significant damage to private homes and businesses throughout the area. In the City of Midland, in Midland County, over 960 homes were flooded, resulting in significant damage to mechanical systems and appliances in the basements. In St. Clair County over 650 homes received similar damage. In Bay County nearly 500 homes were damaged. In the seven county area, over 40 businesses were damaged by flooding. Many suffered major losses of inventory and equipment, in addition to the physical damage to their structures. Combined with the ten businesses that were damaged in the Frankenmuth tornado, the region suffered significant economic impact. The Individual Assistance Teams identified 2,860 homes that had been damaged by the flood and the tornado with a total damage of $15.3 million. On August 15, 1996, the President approved Individual Assistance (IA) for all seven counties.

(Note: Due to the IA declaration being declared several weeks into the PA disaster declaration, and the need to produce this report on a timely basis the final figures for IA are not entered in this report. As of September 12th over 3000 IA claims have been filed for the counties listed.)

Part 2: Past Recommendations and Mitigation Opportunities

STATE OF MICHIGAN HAZARD MITIGATION ACTIONS

National Mitigation Strategy

During the past four decades, the United States has experienced many natural disasters resulting in loss of life, injury and property damage. Public and private resources for recovery have been stretched to their limits. The nation is actively seeking ways to prevent or minimize damages caused by future natural hazard events.

In conjunction with its federal, state and local partners, as well as the private sector, FEMA has developed a National Mitigation Strategy which by the year 2010 aims to: 1) reduce significantly loss of life, injuries, economic costs and destruction of natural and cultural resources that result from natural hazards; and, 2) engender fundamental changes in perception so that the public demands safer communities in which to live and work.

Hazard Mitigation in the Stafford Act

Senator Robert T. Stafford saw the need to break the cycle of damage-repair-damage and sponsored an amendment to the Federal Disaster Relief Act (PL 93-288), the Stafford Act, to include mitigation as an integral part of federal disaster relief. Passed in 1988, the Stafford Act allowed FEMA to provide additional funding for hazard mitigation in the repair of permanent public facilities under its Public Assistance program (Section 406); and provide grants to state and local governments, eligible private non-profit organizations and Indian Tribes to implement additional hazard mitigation projects (Section 404). As a result, FEMA and the State of Michigan have developed a partnership with local communities, the private sector, universities and individual citizens to bread the damage-repair-damage cycle.

Michigan's Hazard Mitigation Plan

A statewide Hazard Mitigation Plan was developed after the Presidential declaration for flooding in 1986. The plan describes the State's vulnerability to natural disasters. Mitigation strategies to reduce or eliminate future damage in vulnerable areas are determined in order of priority by Michigan Emergency Management Division (MEMD), with assistance from FEMA and other Federal agencies. The State of Michigan has been engaged in implementation of this hazard mitigation strategy. That plan describes the measures that Federal and State agencies have undertaken to promote mitigation and presents a set of recommendations which are the basic for the State's mitigation efforts.

Breaking the Damage-Repair-Damage Cycle:

HAZARD MITIGATION STRATEGY FOR DR-1128-MI

August 5, 1996

The following strategy was developed as a guide for hazard mitigation planning for consideration from preliminary information compiled prior to the IHMTM, and projects associated with the Michigan disaster declaration DR-1128-MI. It forms an overall framework for more detailed recommendations and ultimately hazard mitigation projects that can be funded through the Hazard Mitigation Grant Program and other funding sources.

Education: Improved construction and maintenance practices

1. Prepare a Construction and Maintenance Manual for road and drainage construction and maintenance personnel. A suggested name for the publication could be Drainage Options Guide ("DOG"). This Manual will be designed for use by the Michigan Department of Transportation, Michigan County Road Association, Michigan River Basin Association; and County Drain Commissioners, and contain the following.

- Construction standards and simplified details for sizing, design of facilities, materials, installation methods for culverts, drainage ditches and bridges.
- Maintenance techniques and maintenance scheduling methods (planning for maintenance, funding issues, personnel issues, managing costs, etc.).

2. Hold training workshops to explain the use of the Construction and Maintenance Manual and, schedule workshops on an annual cycle for current and new personnel. Target the following groups for workshops: drainage district commissioners, road maintenance people (Department of Public Works etc.), contractors, farmers. The workshops could be associated with existing Michigan Department of Transportation (MDOT) training sessions.

Education: Land use planning and building permitting for hazard mitigation

1. Develop a Hazard Mitigation Planning Manual containing a description of planning procedures and model text that addresses hazard mitigation principles associated with land use planning and building inspection in the State of Michigan. Master planning and zoning opportunities for hazard mitigation would also be discussed. Emphasis should be placed on drainage issues and proper design for subdivisions and individual development sites. The manual would be useful to local planning officials, regional planning staffs and consultants offering architectural, engineering, landscape architectural and planning services.

Education: National Flood Insurance Program (NFIP) education opportunities for all those associated with the insurance aspect of floodplain management

1. Hold Insurance Agent workshops sponsored by the Michigan Department of Environmental Quality to provide information regarding program details, benefits of purchasing insurance, and the mandatory land management and building permit requirements associated with flood insurance availability. Computer Sciences Corporation (CSC), the NFIP insurance contractor for lenders and insurance agents, will be requested to hold additional training seminars in the declared area of the State of Michigan, in addition to the regularly scheduled sessions. The training will address all aspects of the NFIP.

Immediate and Short-term Initiatives

1. Hold an Interagency Hazard Mitigation Team meeting to further detail the mitigation opportunities outlined in the Strategy Report. ***(Note: This meeting was held on August 8, 1996.)***

2. The MEMD will coordinate with FEMA and use the available model document to prepare the hazard mitigation plan for FEMA's approval.

3. Pursue the development of projects for 404 funding through correspondence, meetings and phone calls.

- The State will notify local governments in writing of the availability of Section 404 hazard mitigation funds. Potential projects will be identified from information gathered by the State Hazard Mitigation Team as well as from PA inspectors and Damage Survey Report records. Communities and townships having unique hazard mitigation opportunities will be notified separately.

- The State should apply for administration funding to hire staff for the implementation of mitigation activities and to complete projects with 404 funding. The EMD will be responsible for soliciting and assisting applicants with the development of Section 404 projects.

4. Coordinate with Public Assistance (Infrastructure Support) to review Damage Survey Reports for mitigation opportunities. Encourage the development of mitigation projects associated with the Section 404 and 406 Programs. The State Hazard Mitigation Officer (SHMO) will coordinate with the State PA Officer to ensure that mitigation is stressed during briefings with public officials. The SHMO and State PA Officer may assist in the review of damage survey reports (DSRs) for mitigation opportunities.

- Areas of possible concern are drainage canals, water and waste treatment plants, and other governmental facilities and infrastructure. State Hazard Mitigation staff will work closely with FEMA and State Public Assistance (PA) staff to ensure that all eligible opportunities are explored and funded if possible.

Flood hazard reduction through acquisition, elevation and minimization

1. Promote the acquisition of repetitively flooded and substantially damaged properties through a voluntary flood-damaged property acquisition program. One of the few mitigation options available for this type of situation is to buy out the owners and remove the structures from the floodplain. Property acquisition programs are complex; information presented to affected individuals must be accurate and understandable.

2. Many areas experienced broad scale flooding (particularly Tuscola and Lapeer Counties); many structures may be situated where elevation of the building could be effective in reducing future flood losses. The elevation of utilities and appliances (minimization) can also be an effective mitigation technique for communities where broad scale flooding occurred in developed areas, i.e.: Midland, Port Huron, Bangor and Vassar.

Section 406 Hazard Mitigation Program: Incorporating Mitigation into Infrastructure Repairs

1. Following all Public Assistance (Infrastructure Support) Presidential disaster declarations, FEMA Region V produces hazard mitigation work sheets and guidance for field inspectors conducting Damage Survey Reports (DSR), so that mitigation will be considered for all Section 406 permanent public facility repairs. As a result of this proactive strategy, losses incurred in this severe storm and flooding event were greatly reduced.

MITIGATION OPPORTUNITIES

The FEMA Infrastructure Support programs, formerly Public Assistance (PA), now includes a mitigation component. Under this disaster recovery effort, Infrastructure inspectors are instructed to include mitigation measures in their Damage Survey Reports (DSRs) if appropriate and cost-effective. At the Applicant Briefings, local officials were encouraged to recommend mitigation projects to FEMA inspectors. If approved in the DSR, these mitigation measures are funded by the Section 406 program monies and state and local cost matches.

In addition to the Section 406 mitigation effort, Section 404 mitigation in this disaster declaration, DR-1128-MI, will provide an estimated $1,500,000 about 15% in Hazard Mitigation Grant Program (HMGP) funds to be matched on a 75% Federal/25% Applicant cost basis. FEMA will assist state and local officials in using these funds to implement new HMGP projects that are cost-effective and environmentally beneficial and will reduce or eliminate repetitive threats to citizens and their property. The HMGP in Michigan is managed by the Michigan State Police Emergency Management Division.

The June 21 to July 1, 1996 storm event resulted in the identification of seven areas of mitigation opportunities:

I. Planning and Land Use Management

II. Flood Insurance and Real Estate

III. Floodproofing Existing Structures

IV. Drainage System Design, Construction and Maintenance

V. Road Design, Construction and Maintenance

VI. Forecasting and Emergency Response

VII. FEMA Flood Insurance Issue

Utility Truck fording flood waters in Tuscola County

Note: These identified areas are discussed separately in the following pages, beginning with a statement of issues relative to the defined area, a description of background information, recommendations for further action, and lead and support agencies.

Michigan Mitigation Success Story

The South Branch of the Cass River Intercounty Drain is a 96,000 acre watershed in Lapeer and Sanilac counties. The Drain was originally established in 1901, and 28 miles were reconstructed in 1965 with the cooperation of Natural Resource Conservation Service (formerly SCS). The drain ranges in bottom width from 6 feet wide at the upstream end to over 50 feet wide in the downstream reaches, and the depth averages 12 feet. Minor maintenance and vegetation control was routinely done since the reconstruction. The state legislature raised the maintenance limit in the Michigan Drain Code in 1989 from an amount equal to $800 per mile of drain to $2,500 per mile of drain. Five years ago the drainage board authorized a complete physical inventory of the drain. Approximately $300,000 has been spent over the last five years for engineering and major maintenance. Landowners in the district report that flooding has been less and the length of inundation has been reduced. Landowners were extremely pleased with the drains performance at the end of June 1996. Water was out of bank as expected as a result of heavy rains, but flow returned within the banks within 48 hours and the system returned to normal flows within a week.

HAZARD MITIGATION ISSUES AND RECOMMENDATIONS

I. PLANNING AND LAND USE MANAGEMENT

ISSUE: Hazard mitigation opportunities are not included in local land use decisions.

BACKGROUND: State enabling legislation does not reference hazard mitigation as one of the objectives to be achieved through land use planning and management. In addition, community comprehensive land use plans generally do not address hazard mitigation issues and solutions. Comprehensive plans ordinarily address subjects that relate to the physical development of the community; there are no uniform required elements for comprehensive plans among the four basic planning enabling laws in Michigan. The content of most comprehensive plans developed for Michigan local governments is determined by the various planning commissions or the professional staff hired by the commission to develop the plan. Since mitigation is not a common topic, zoning and subdivision provisions do not invoke hazard mitigation opportunities during the review of development proposals at the local level.

RECOMMENDATION #1: LEGISLATION. Amend the Michigan State Enabling Legislation to incorporate "hazard mitigation" within the list of elements that comprise a comprehensive plan.

LEAD AGENCY: Hazard Mitigation Section, Emergency Management Division Michigan State Police.

SUPPORT AGENCIES: Michigan Department of Environmental Quality, Michigan Chapter of the American Planning Association, Michigan Society of Planning Officials, Michigan Department of Natural Resources.

ISSUE: Local development plans are approved without adequate consideration given to the drainage implications posed by the impervious soil surface coverage and/or by the existing upstream runoff.

BACKGROUND: The Michigan Planning Enabling Legislation provides that proposed subdivisions shall be reviewed by the County Drain Commissioner. The legislation, however, does not require a similar review of other types of land use change. This results in the construction of major impervious surfaces (roofs, parking lots) with very limited or uninformed review during the permit process. Since the County Drain Commissioner has knowledge of the culvert and bridge sizing, the Commissioner's office is a valuable step in the review process to monitor drain capacities and to set or approve culvert and bridge sizes. Also, through the use of hydrologic studies, the Commissioner can play an important role in minimizing flood damages when heavy runoff occurs. Excluding the Commissioner from a review role results in shortsighted decisions and a greater frequency of flooding, erosion and washout problems.

RECOMMENDATION #2: LEGISLATION: Amend the State Enabling Legislation to require that the County Drain Commission be included in the review and approval or disapproval of all land use change proposals as an integral step in the land development process for the State of Michigan. This review will include condominiums, development site plans and mobile home parks in addition to the existing review requirement for land subdivisions.

LEAD AGENCY: Michigan Department of Environmental Quality, Michigan Association of County Drain Commissioners (MACDC) and (MAC).

SUPPORT AGENCIES: Michigan Department of Agriculture, Emergency Management Division Michigan State Police and, Michigan Association of Conservation Districts.

ISSUE: Coordination of zoning for hazard mitigation to properly regulate land uses and structures in hazardous areas is lacking in many counties in Michigan.

BACKGROUND: State enabling legislation does not require coordination of zoning across local jurisdictions in order to perfect coordination of land use decisions affecting hazard mitigation. County zoning *per se* is permitted in Michigan, however, where municipal and township zoning is in effect county zoning *per se* is preempted. In this case, coordinated zoning across local jurisdictions is almost impossible without some sort of superimposed or overlay zoning. County zoning *per se,* or in the case where county zoning is preempted by municipalities and townships, county overlay zoning can achieve hazard mitigation objectives, as for example: building setback requirements and floodplain management in designated hazardous river and stream corridors, land use and traffic controls in designated hazardous transportation corridors, and land use and building construction controls in designated intercommunity hazardous areas.

RECOMMENDATION #3: LEGISLATION: Amend the Michigan county, municipal and township zoning enabling legislation to permit county overlay zoning of designated hazardous river and stream corridors, hazardous transportation corridors, and intercommunity hazardous areas.

ISSUE: The State of Michigan Hazard Mitigation Plan is being updated by the Hazard Mitigation Officer, Emergency Management Division, Michigan State Police. An update is required following every Presidentially declared disaster. The Michigan Hazard Mitigation Plan has not been updated since 1987. Updating the multi-hazard Michigan Plan will be a positive step as well as a valuable management tool for reducing damage resulting from future natural hazard events.

BACKGROUND: The importance of land use planning is recognized by the State of Michigan and is an important element in the preliminary Hazard Mitigation Strategy Report (see Appendix) developed prior to the Hazard Mitigation Team Meeting by FEMA Region V and the State Hazard Mitigation Officer. (The Hazard Mitigation Plan focuses on long term mitigation activity that would be most appropriate through an emphasis on planning). The plan describes existing activities related to hazard mitigation and legislation that establishes the foundation for management methods. Many recommendations are set forth to strengthen the role and awareness of hazard mitigation in planning activities; emphasis is placed on the integration of hazard mitigation into:

- basic land use/development regulatory mechanisms;
- state building codes;
- comprehensive planning process;
- model zoning text;
- subdivision control act;
- curriculum elements for urban regional planning students;
- training programs;
- future land use plans; and
- new land use legislation.

The Plan also recommends communication between local development regulators, planners and the Emergency Management Division.

RECOMMENDATION #4: PLAN IMPLEMENTATION. The Emergency Management Division should establish and coordinate a State Hazard Mitigation Council to address the mitigation recommendations found in the Michigan Hazard Mitigation Plan and to assure that the plan will be carried out in a coordinated and effective manner. This action is a recommendation in the State plan and should be designated as a high priority for implementation.

LEAD AGENCY: Emergency Management Division Michigan State Police.

SUPPORT AGENCIES: Local, state and federal agencies.

RECOMMENDATION #5: MITIGATION FUNDING. Establish a "State Hazard Mitigation Fund" to address the mitigation opportunities that are identified during flood events. The low interest loan program that was used to elevate floodprone structures along the Great Lakes shoreline in 1985 and 1986 should be reenacted and considered for use on a statewide basis. The State should accept some of the burden for flood loss mitigation, rather than rely solely on Federal assistance to correct flood problems.

LEAD AGENCY: Emergency Management Division Michigan State Police.

SUPPORT AGENCIES: Michigan Department of Environmental Quality, MDOT, and Consumer and Industry Services.

RECOMMENDATION #6: PROJECT LIST. Develop a list of potential mitigation projects within the State of Michigan. There is a general idea of the problem areas; however, communities, counties, and emergency managers should be contacted to obtain specific areas of concern. The contact would be made in the form of a

questionnaire or survey to gather input on potential projects, estimated costs and the benefits. The list would be prioritized based on cost/benefit, permit feasibility and funding.

SUPPORT AGENCY: Emergency Management Division of the Michigan State Police.

ISSUE: County hazard mitigation plans can complement the State of Michigan Hazard Mitigation Plan.

BACKGROUND: Not all the counties in Michigan have established county planning commissions to prepare county comprehensive plans in order to address hazard mitigation. To complement the State of Michigan Hazard Mitigation Plan, all Michigan counties should prepare hazard mitigation plans. These plans should be prepared as subcomponents of the state plan. County hazard mitigation plans can then be used to engage the counties in the coordination and implementation of state and county hazard mitigation strategies. The county hazard mitigation plans can also be used by county planning commissions as components of county comprehensive plans, thereby providing justification and validity for zoning and other controls for hazard mitigation.

RECOMMENDATION #7: PLAN IMPLEMENTATION. The Emergency Management Division of the Michigan Department of State Police should require and coordinate the preparation of county hazard mitigation plans as subcomponents of the State of Michigan Hazard Mitigation Plan. These county plans can also serve as components of county comprehensive plans for those counties that have established county planning commissions.

ISSUE: Local lay planners (Planning Commissioners) do not consider hazard mitigation when preparing community plans or when they review proposed development applications. New development occurs without evaluation of the potential danger or loss that could result when that new land use is affected by a natural hazard event.

BACKGROUND: Although local planning commissioners are encouraged to attend seminars and educational workshops given by the Michigan Chapter of the American Planning Association and the Michigan Society of Planning Officials, the current curriculum does not include hazard mitigation planning. This group of lay planners as well as building officials, community officials, emergency managers, developers, engineers, architects, and surveyors, should receive training in the considerations and benefits associated with planning for hazards. This issue is also addressed in the State Hazard Mitigation Plan that is referenced and endorsed elsewhere in this report.

RECOMMENDATION #8A: EDUCATION. Prepare a handbook for planning commissioners addressing the process for hazard mitigation planning at the local level. The handbook would be used as the text for training courses given on an annual basis.

LEAD AGENCY: Emergency Management Division, Michigan State Police.

SUPPORT AGENCIES: Michigan Department of Environmental Quality, other agencies and groups associated with land use management, MDA, and MACDC and Department of Consumer & Industry Services.

RECOMMENDATION #8B: EDUCATION: Initiate and or expand the training programs for planners to include hazard mitigation planning as a component of local comprehensive plans. This initiative would be sponsored and coordinated through the Michigan Society of Planning Officials with educational sessions and materials distributed through the professional and trade associations encompassing land change activity in Michigan. A partial list includes:

- **Michigan Townships Association**
- **Michigan Municipal League**
- **Michigan Association of Counties**
- **Michigan Chapter of the American Planning Association**
- **Michigan Society of Planning Officials**

- **Michigan Emergency Managers Association**
- **Michigan Association of County Drain Commissioners**

LEAD AGENCY: Michigan Department of Environmental Quality.

SUPPORT AGENCIES: Emergency Management Division Michigan State Police, and MDA.

II. FLOOD INSURANCE AND REAL ESTATE

ISSUE: Many home purchasers do not realize that their new property is prone to flooding.

BACKGROUND: The current disclosure laws in Michigan involving real estate transactions are vague, and provide little protection for the consumer.

RECOMMENDATION #9: LEGISLATION. Establish a provision in State law that requires the disclosure of floodprone areas as a step in real estate transactions. This should be mandatory regardless of the method of financing or financing institution.

LEAD AGENCY: Michigan Department of Environmental Quality.

SUPPORT AGENCIES: Emergency Management Division of the Michigan State Police.

ISSUE: There is a lack of information at all levels of the insurance industry about the National Flood Insurance Program (NFIP).

BACKGROUND: There is an on-going need to educate the realty, lending and insurance industry regarding flood hazards in general, and specifically the National Flood Insurance Program. Misinformation is being provided to property owners and buyers. Real estate, insurance and property inspection professionals need to be better educated about the NFIP program and its requirements.

RECOMMENDATION #10A: EDUCATION. Create improved instructional information for the National Flood Insurance Program. A revised NFIP booklet and other simple and effective communication materials are needed for the public as well as those who work closely with the program including insurance people, banking institutions/lenders, building inspectors and local planning officials. Other State handbooks could also be upgraded to include current floodplain management guidelines. The "Local Officials Handbook" prepared by the Department of Environmental Quality should include NFIP information.

LEAD AGENCY: Michigan Department of Environmental Quality.

SUPPORT AGENCIES: FEMA, NFIP Coordinator, Emergency Management Division Michigan State Police, State Insurance Industry, State Insurance Bureau.

RECOMMENDATION #10B: EXAMINATION. Flood insurance questions should be added to insurance qualification tests for agents and real estate personnel.

LEAD AGENCY: NFIP Coordinator, MDEQ, Department of Consumer & Industry Services.

SUPPORT AGENCY: FEMA, Michigan Emergency Management Division, Insurance Industry, Insurance Associations, State Insurance Bureau.

ISSUE: The public lacks knowledge of alternative insurance programs to assist them in recovering from a disaster.

BACKGROUND: The Michigan NFIP Coordinator's office has indicated that insurance agencies neglect to fully explain alternative insurance coverage that protects their clients from damage related costs after a disaster. The particular clients affected are in selected Michigan communities having a municipal sanitation and waste system. These systems historically have not kept up with the flow demand during disaster events. An insurance policy addressing sewage backup (policy attachment) would protect those homes in communities with waste treatment systems.

RECOMMENDATION #11: EDUCATION. An educational program for Insurance Agents should be initiated to address the need for selling specific policies for reimbursement of disaster costs.

LEAD AGENCY: NFIP Coordinator, Michigan Department of Environmental Quality.

SUPPORT AGENCIES: FEMA, Emergency Management Division Michigan State Police, Insurance Industry, Insurance Associations, State Insurance Bureau.

ISSUE: A number of structures in Michigan are located in flood prone areas and frequently experience damage during periods of high water.

BACKGROUND: Structures experiencing repetitive loss should be identified so that plans can be designed to reduce the recovery expense, and prevent future damages. The addresses of repetitive loss structures covered under the National Flood Insurance Program can be provided by FEMA. A method for addressing the losses would involve several steps: education for property owners, obtaining elevation information, and developing action plans for the properties.

RECOMMENDATION #12: REPETITIVE LOSS. Identify properties experiencing repetitive loss in Michigan. Priority projects for action that are identified through the property inventory will require additional funding either through a "State Hazard Mitigation Fund," Flood Mitigation Assistance Program funds or community funding.

LEAD AGENCY: Michigan Department of Environmental Quality.

SUPPORT AGENCIES: Emergency Management Division Michigan State Police, FEMA, US Army Corps of Engineers, Association of State Floodplain Managers, and the communities.

ISSUE: There is a need to update the floodplain maps that have been developed under the National Flood Insurance Program, and to have more communities in Michigan participate in the NFIP.

BACKGROUND: Many Michigan communities having significant floodplains do not have detailed floodplain maps. Others are in need of map revisions to identify development that has occurred since the maps were originally prepared. A priority listing is maintained which identifies the mapping needs by community. Current budgets at the Federal and State levels are not adequate to address the mapping needs in Michigan. Only about 40% of the communities in Michigan have been mapped for the NFIP. Only about 40% of the communities in Michigan (696 of 1776) are participating in the NFIP.

RECOMMENDATION #13: **FLOODPLAIN MAPPING. Mapping needs should be identified and prioritized. The Michigan Department of Environmental Quality (MDEQ) should develop a listing of unmapped communities and continue to identify floodprone areas. FEMA will continue to develop countywide maps within Michigan, following the priority listing developed by the MDEQ.**

LEAD AGENCY: Michigan Department of Environmental Quality.

SUPPORT AGENCIES: FEMA, US Army Corps of Engineers (USACE), Natural Resources Conservation Service, DNR, MDA, MACDC and MACD.

ISSUE: Orthophoto quadrangle maps and flood insurance maps can be digitized and overlaid providing an accurate depiction of the floodprone area.

BACKGROUND: The Michigan Department of Natural Resources is currently involved in a pilot program of overlaying digitized flood insurance rate maps onto digitized orthophoto quadrangle maps for Monroe County.

RECOMMENDATION #14: MAP OVERLAYS. The results of the digitizing program should be reviewed to determine its applicability to flood preparedness and mitigation. If the program is worthwhile, it should be expanded to the rest of the State.

LEAD AGENCY: Michigan Department of Natural Resources.

SUPPORT AGENCIES: Department of Environmental Quality, Emergency Management Division Michigan State Police, FEMA, MDA, MACDC, MACD, DNR.

III. FLOOD PROOFING EXISTING STRUCTURES

ISSUE: The general public has not been adequately informed of flood mitigation methods for existing structures. There are many opportunities for retrofitting homes and businesses in flood prone areas.

BACKGROUND: In many cases the general public learns about mitigation through retrofitting their homes following a disaster. Educational materials (handouts, public service notices and instructional courses) used in Disaster Recovery Centers for counseling disaster victims are an example of an effective means to inform the public. This information should be provided to the public prior to a disaster event.

RECOMMENDATION #15: EDUCATION. A public education program should be developed for retrofitting structures in flood prone areas. This information should be disseminated before a disaster occurs.

LEAD AGENCY: Emergency Management Division Michigan State Police.

SUPPORT AGENCIES: FEMA, MDEQ, NFIP Area Coordinators, County Emergency Management Coordinators, State Insurance Bureau, Insurance Associations, MSU Extension Service, Soil Conservation Districts.

IV. DRAINAGE SYSTEM DESIGN, CONSTRUCTION AND MAINTENANCE

ISSUE: Drainage ditches become damaged because of bank erosion and the lack of land use standards in the drainage corridors.

BACKGROUND: In order to maximize production, farmers commonly cultivate their land to the edge of the drain network. This practice weakens the banks and allows erosion to take place. Consequently the eroded material constricts the drainage system during a heavy rain event. By establishing a greenbelt of uncultivated land, a filter strip is created that can prevent bank erosion and excessive runoff from fields and crops. The green belt could be established through a "state setback standard" or the acquisition of a buffer on either side of drainage ditches.

RECOMMENDATION #16: LEGISLATION. Legislation is needed to establish a setback requirement for agricultural drainage ditches.

LEAD AGENCY: Michigan Department of Agriculture.

SUPPORT AGENCIES: Emergency Management Division of the Michigan State Police, Michigan Department of Environmental Quality.

ISSUE: Sediment deposition from surface water runoff and, more importantly, wind erosion, are major factors that reduce drainage system capacity. Reduced capacity contributes to the magnitude of the damage associated with a flood event. There are no state-wide standards to protect drainage systems.

BACKGROUND: Agricultural land suffers from wind and to a lesser degree, water erosion. As a result, sediment accumulates in the drainage system. The United States Department of Agriculture currently has two programs that address this problem. The Conservation Reserve Program and the PL-566 Land Treatment Watershed Program emphasize filter strips as a high priority. The 15-30 foot wide filter strips for water erosion can be grass that is mowed annually. Programs providing for a 15-30 foot wide natural buffer for wind erosion prohibit the operation of all machinery in the protected area. These programs pay the owner an annual maintenance fee. The programs require a minimum of 3 years and a maximum of 10 years for enrollment.

RECOMMENDATION #17: DRAIN BUFFERS. All drains in Michigan should be evaluated for the degree of sedimentation. Establish filter strips within the drain easement where impacted drains are identified. An effort should be made to determine if the effectiveness of the filter strips could be improved with an increase in width. Other strategies to increase the use, extent, effectiveness and permanence of the filter strips could include: 1) tax incentives, 2) direct payment, 3) reduced flood insurance premium, and 4) land acquisition by the drain commission.

LEAD AGENCY: Michigan Department of Agriculture.

SUPPORT AGENCIES: Association of County Drain Commissioners, Natural Resource Conservation Service, Local Conservation Districts.

ISSUE: Flood damage following heavy rains is becoming more common even though drains and drainage structures have been engineered using accepted runoff formulas.

BACKGROUND: When new development occurs, the runoff characteristics of the original parcel are changed due to the addition of impervious surfaces. This alteration increases stormwater runoff and the flow through drains, culverts and bridges. Adequately sized drains can, over time, become undersized due to the more rapid and increased flow caused by watershed development. No study exists to set standards for sizing structures and to limit site coverage for runoff management in the east central Michigan environment of dense soils and flat topography.

RECOMMENDATION #18A: SITE RUNOFF STUDY. Conduct a study of Michigan land character and its influence on storm water runoff. This pilot study will be a first step in the development of a land coverage formula for the State of Michigan based on soil character. The study should be designed with the objective to establish a formula for calculating the maximum land coverage for impervious surfaces. Soil characteristics, slopes and vegetation types will be considerations in the development of the maximum lot coverage methodology. This procedure would be used by engineers, land planners and local planning officials in the design and review of new development. Managing the impervious surface coverage of development parcels will help to reduce the high flow regimen in drainage structures and thus preserve the efficiency of the drainage system during major storm. The study should consider the feasibility of establishing a requirement that any land use change will be designed to assure that no net increase in runoff will occur as a result of the proposed land development.

LEAD AGENCY: Michigan Department of Agriculture.

SUPPORT AGENCIES: Michigan Department of Environmental Quality, Michigan Chapter of the American Planning Association, Michigan Society of Planning Officials, possibly other township, municipal and county associations, MACDC and MACD.

RECOMMENDATION #18B: LEGISLATION. Amend the Planning Enabling Legislation to require that development proposals include an analysis of runoff potential and soil characteristics to establish a maximum property coverage for impervious surfaces. This requirement must be based on accepted standards developed through a study of Michigan land and runoff characteristics. (see Issue and Background #17A as related).

LEAD AGENCY: Michigan Department of Environmental Quality.

SUPPORT AGENCIES: Michigan Department of Agriculture, MACDC and MACD Michigan Department of Environmental Quality, Michigan Chapter of the American Planning Association, Michigan Society of Planning Officials, possibly other township, municipal and county associations, MACDC and MACD.

ISSUE: Segments of the watershed are managed individually with minimal coordination between upstream and downstream watershed legal entities. Unanticipated flooding occurs due to upstream development and the resultant rapid run-off. Hydrologic information is not created or shared between counties to assist in the design of community infrastructure.

BACKGROUND: It is difficult to predict future flow requirements in a downstream county. Unplanned development may occur in upstream locations that results in increased storm water runoff beyond the calculated and anticipated normal flow rate. In addition, many counties do not have current hydrologic studies that would predict the runoff leaving a particular area given a designated storm event. This information would be very valuable for the construction of bridges, culverts and drains (ditches). Currently, standard sizing formulas are used to design new structures. Unfortunately, storms can overtop new structures due to the larger than anticipated runoff from upstream locations and from the lack of coordination between upstream and downstream watershed locations.

RECOMMENDATION #19: LEGISLATION: Amend the Michigan State Planning Enabling Legislation to require cross jurisdictional hydrologic planning between legal entities within watershed units (counties, cities, townships, villages, drainage districts). Designate this coordinated planning as a prerequisite for accepting State funds in the State's jurisdictions.

LEAD AGENCY: Michigan Department of Environmental Quality, Land & Water Management Division.

SUPPORT AGENCIES: Michigan Department of Natural Resources, Emergency Management Division Michigan State Police, and MDA.

ISSUE: Increasing flood damage results from upstream land development. Drainage districts do not have a program that evaluates the adequacy of current drain structures and establishes a plan and schedule for upgrading drainage structures.

BACKGROUND: Over time, as development and the addition of impervious surfaces occurs in the watershed, runoff increases. Adequately designed drains, culverts and bridges are unable to accommodate the increased flow that results during a storm. Hydrologic studies that calculate watershed runoff have not been completed and therefore cannot be used by the counties and Planning Commissions.

RECOMMENDATION #20: WATERSHED STUDY. Conduct a watershed hydrologic analysis to determine the adequacy of the existing drain capacity given the development pattern and a series of standard storm events. Also

conduct the watershed hydrologic analysis using a land buildout scenario developed through the distribution of the currently allowed zoning ordinance densities. With this information in hand a capital improvement program could be formulated to upgrade the existing infrastructure and establish a schedule for future upgraded replacement of drain structures. Replacement projects can be coordinated with the progress of watershed development.

LEAD AGENCY: Michigan Department of Agriculture.

SUPPORT AGENCIES: Michigan Department of Environmental Quality, Michigan Association of Drain Commissioners.

ISSUE: There is a lack of specific drainage design standards that are tailored for use in each of the Michigan drainage jurisdictions. Because of the variability in soil type and upstream runoff conditions, and since funding for research is limited, only broad standards exist for guiding drainage engineering and subsequent construction.

BACKGROUND: The current drainage system has evolved since its original construction in the 1800s. Because of watershed development, the original drain system may not be adequate to handle current flood events. Repairs and maintenance, when necessary, have been limited to restoring the drain network to its original construction specifications. Drain improvements require a petition to the Drain Commissioner and partial funding by the abutters. There seems to be adequate funding available for regular maintenance of drains once they have been brought up to the currently accepted standards. Drain design standards that are recognized by all drainage districts have not been developed and adopted. There is a lack of coordination between the various agencies that impact the drain systems.

RECOMMENDATION #21: DRAIN DESIGN STANDARDS AND EDUCATION. Develop and adopt minimum standards for drain design and construction. A state-wide watershed management standard must be adopted in order to apply a uniform specification for drain design and installation throughout the watershed. This standard must be developed to address peak flow rates and peak volumes. Develop a mechanism to coordinate all agencies that impact the drain system. A drainage design and maintenance course should be created for Drain Commissioners and their staffs based on the established drain standards. This training can be combined with the construction and maintenance handbook and the education program described in Recommendation #25.

LEAD AGENCY: Michigan Department of Agriculture.

SUPPORT AGENCIES: Association of County Drain Commissioners, Natural Resource Conservation Service, Michigan Department of Environmental Quality.

V. ROAD DESIGN, CONSTRUCTION AND MAINTENANCE

ISSUE: Serious and repetitive damage is occurring to roads because of a lack of universally accepted road design and construction standard.

BACKGROUND: The road system currently has several jurisdictions. The Interstate System is designed for flow rates to the 100 year event. Some officials responsible for local road construction are inadequately trained. There currently exists statewide training workshops for road commissioners, drain commissioners, construction and maintenance staff of counties, cities and towns, and Michigan Department of Transportation (MDOT) personnel. This training is provided through the County Road Association of Michigan (CRAM). CRAM promotes higher efficiency in the operation of the county road systems in Michigan by fostering the education of the membership and the general public.

- CRAM conducts annual meetings and conferences, schools and study courses for the discussion of county road matters.
- CRAM maintains a central bureau of information and research for the collection, analysis and dissemination of

information pertinent to county road matters through the publication and circulation of bulletins, papers and articles of interest and benefit to the membership.

- CRAM encourages legislation beneficial to the county road commissions of Michigan and the traveling public.
- CRAM furnishes consultant services and advice on all phases of county road activities.

The training is provided by the Michigan Technological University (MTU) and its affiliate: "T-Square;" the Local Technical Assistance Program in Houghton, Michigan. T-Square sends out a quarterly newsletter, maintains a video library, and holds educational workshops throughout the State.

RECOMMENDATION #22: ROAD DESIGN STANDARDS AND EDUCATION. Prepare a construction and maintenance manual for road and drainage construction personnel. The manual could be named "Drainage Options Guide" (DOG). A mandatory annual training program for all road construction and maintenance officials should be established, using the DOG manual as a text. All Road Commissioners should be required to design and construct their roads based on the Michigan Department of Environmental Quality (MDEQ) standards. The workshops should also incorporate the recommendations made by the Road Infrastructure Mitigation Committee following the 1986 flood disaster. The manual should emphasize that the key to reducing serious repetitive flood damage to the local, county and state transportation infrastructure is through a cooperative, innovative and coordinated effort at all levels of government. The design standards of county drain commissioners, the county road commissions, MDOT, and MDEQ are not necessarily the same. These standards must be spelled out in the manual to reduce the confusion among the transportation agencies and the public in general. The manual should also emphasize that MDEQ permits are needed for road crossings of all watercourses including designated county drains.

LEAD AGENCY: Michigan Department of Transportation, Michigan Department of Environmental Quality and Michigan Department of Agriculture.

SUPPORT AGENCIES: Training organizations: CRAM, MTU, T-Square.

VI. FORECASTING AND EMERGENCY RESPONSE

ISSUE: County drain commissioners lack information about proper emergency procedures.

BACKGROUND: An effective coordination of emergency response efforts between the County Emergency Management Coordinator and the County Drain Commissioners does not exist in all areas of Michigan. The drainage commissioners often lack specific emergency information and strategies that may be of some benefit during a flood event.

RECOMMENDATION #23: EDUCATION. Develop a training program for drain commissioners addressing their role in a flood emergency situation. Establish a mechanism to encourage the cooperation of County Emergency Management Coordinators with the County Drain Commissioners, i.e. an annual exercise between County Emergency Management Personnel and the County Drain Commissioners. Establish a training program for Drain Commissioners and their staffs.

LEAD AGENCY: Emergency Management Division Michigan State Police.

SUPPORT AGENCIES: Michigan Association of County Drain Commissioners and MDA.

ISSUE: There is a lack of real-time rainfall and river flow gage data in the areas of recent flooding and in Michigan in general. This has hindered the development of an effective flood warning system for Michigan.

BACKGROUND: At present, much of the precipitation data available to NOAA is gathered by volunteers. During the recent storm, rainfall reports were received only once every 24 hours or when a volunteer observed "significant" rainfall.

This system limited the effectiveness of flood forecasting. Many rain events occur at night when volunteer observers are not reporting rainfall data. This storm occurred during the hours of 9 pm and 3 am, June 21-22.

NOAA indicates that forecasting and providing warnings for floods is greatly hindered by the lack of automated real-time rainfall data. To forecast a flood it is vital to obtain rainfall intensity data in real-time, to ascertain rainfall rates per hour. Current 24 hour period readings are useful for long-term climatic studies, but do not help NOAA predict and warn when a flood is imminent.

Real-time data, that is, data that NOAA can receive as it is actually being collected, is essential for flood forecasting. Rain gages can be outfitted with a transmitter that will send data directly to NOAA via telephone modem or a device that transmits data via a radio or satellite connection. Hourly data is necessary to broadcast accurate flash flood warnings.

Presently there are no automated river gages in Michigan other than those located at airports. NOAA is planning to install one automated river gage in Midland in a secure area owned by Dow Corning. NOAA and the National Weather Service are being funded to install new state-of-the-art forecasting equipment, but do not have funds for data collecting equipment that would provide data for more accurate flash flood forecasting.

During the 1986 flood, concerns were raised regarding the coordination of flood warning information, and the lack of information. Michigan still does not have an effective flood warning system.

RECOMMENDATION #24: WARNING PLAN. Identify funding sources and take the necessary steps to install real-time rain and flow gages in Central Michigan. Develop an action plan that establishes an effective flood warning system for Central Michigan.

LEAD AGENCY: Michigan Department of Environmental Quality.

SUPPORT AGENCIES: NOAA National Weather Service, US Geological Survey, Emergency Management Division Michigan State Police, County and local emergency coordinators, dam owners, volunteer, media and MDA.
ISSUE: The migration of hazardous materials following a spill is difficult to predict since the location of flow routes has not been recorded and distributed to local emergency officials.

BACKGROUND: The extensive network of drains throughout the declared counties allows pollutants to flow for long distances within and between jurisdictions. When a pollutant enters the drainage system it is difficult for local officials to predict the downstream impacts of a migrating pollutant charge. No single document has been prepared showing the location and flow direction of the drain network in Michigan. Having the map available could assist in warning property owners and communities downstream (down drainage) that a hazardous charge was flowing toward a specific location or general area. A map would also improve the efficient interception of pollutants so that the hazardous materials could be removed.

RECOMMENDATION #25: MAPPING FOR DISASTER RESPONSE. Prepare and distribute detailed maps showing drains and their flow direction as well as transportation routes to assist with disaster response actions associated with liquid pollutants. Drain routes should be part of the county road maps provided by each road commission. They should be incorporated into county land use and zoning maps.

LEAD AGENCY: Emergency Management Division Michigan State Police.

SUPPORT AGENCIES: Michigan Department of Agriculture, Michigan Department of Environmental Quality.

VII. FLOOD INSURANCE ISSUES

ISSUE: There is a need to address the problems of agricultural losses due to flooding damage. The lack of adequate crop insurance alternatives for farm businesses is another problem that affects Michigan farmers.

BACKGROUND: Farmers have experienced damage and loss to crops due to flooding for many years. The 1993 Midwest floods caused the federal government to recognize the need to redesign the agricultural crop insurance program. In the past, for agricultural disasters, the federal government provided two separate programs - the federal crop insurance program and ad hoc disaster payments. Neither program worked well for farmers.

The new law, the Federal Crop Insurance Reform Act of 1994, combines the old USDA crop insurance program and the disaster assistance programs administered by the Agricultural Stabilization and Conservation Service (ASCS) into one program. Under the new law, farmers are required to obtain at least the catastrophic level of crop insurance coverage to participate in other USDA programs. Farmers may purchase "additional" crop insurance coverage with greater levels of protection against crop loss from private insurance agents.

Although these new programs are inexpensive, farmers and agricultural professionals feel that because of the yield formulas and price levels set for crops, farmers are not getting adequate insurance coverage although the policies are affordable. It is estimated that these policies will cover about 40% of a crop loss.

Currently, the NFIP program does not consider a farm crop an eligible item for insurance coverage. Reconsideration of this policy and inclusion of crops under the NFIP program would greatly assist the recovery of the agricultural industry following a flood.

RECOMMENDATION #26: LEGISLATION. The FEMA Region V Mitigation Division and the Michigan State Flood Insurance Coordinator should develop a written request to the Federal Insurance Administration suggesting that they consider initiating a program for flood insurance coverage for farm crops. The justification for the need for such coverage should be documented in the request or the ASCS Crop Insurance Program should be expanded to help rectify this situation.

LEAD AGENCY: FEMA or USDA.

SUPPORT AGENCIES: State legislators, MDEQ, NFIP Coordinators, Michigan Insurance Industry, Michigan Insurance Bureau, Farmers Association, Michigan Department of Agriculture.

ISSUE: Land use regulations do not restrict development below dam sites.

BACKGROUND: Current building code and NFIP requirements do not consider the "hydraulic shadow" of a dam failure when determining the flood hazard impacts. A dam failure can produce flood elevations and velocities that are considerably higher than naturally occurring flows.

RECOMMENDATION #27: POLICY. A nationwide policy addressing development downstream of dams should be drafted and incorporated into the NFIP regulations.

LEAD AGENCY: Michigan Department of Environmental Quality.

SUPPORT AGENCIES: Emergency Management Division Michigan State Police, FEMA, Association of State Floodplain Managers, Association of State Dam Safety Officials.

ISSUE: There is continual improvement of structures in the floodway that perpetuates a hazardous condition.

BACKGROUND: There is a need to obtain the opinion of the Michigan Attorney General on the phrase "assure that the channels and the portions of the floodplains that are the floodways are not inhabited". The current interpretation is that the improvement does not represent a new occupation of the floodway. Further, there is some question as to the definition of "inhabited."

RECOMMENDATION #28: LEGAL OPINION. Obtain the Michigan Attorney General's legal opinion of the Michigan state regulations pertaining to floodway habitation. If a more stringent interpretation is provided, develop a strategy for administering the updated directive.

LEAD AGENCY: Michigan Department of Environmental Quality.

SUPPORT AGENCIES: FEMA.

ISSUE: There are a number of unfunded mitigation opportunities from previously declared disasters.

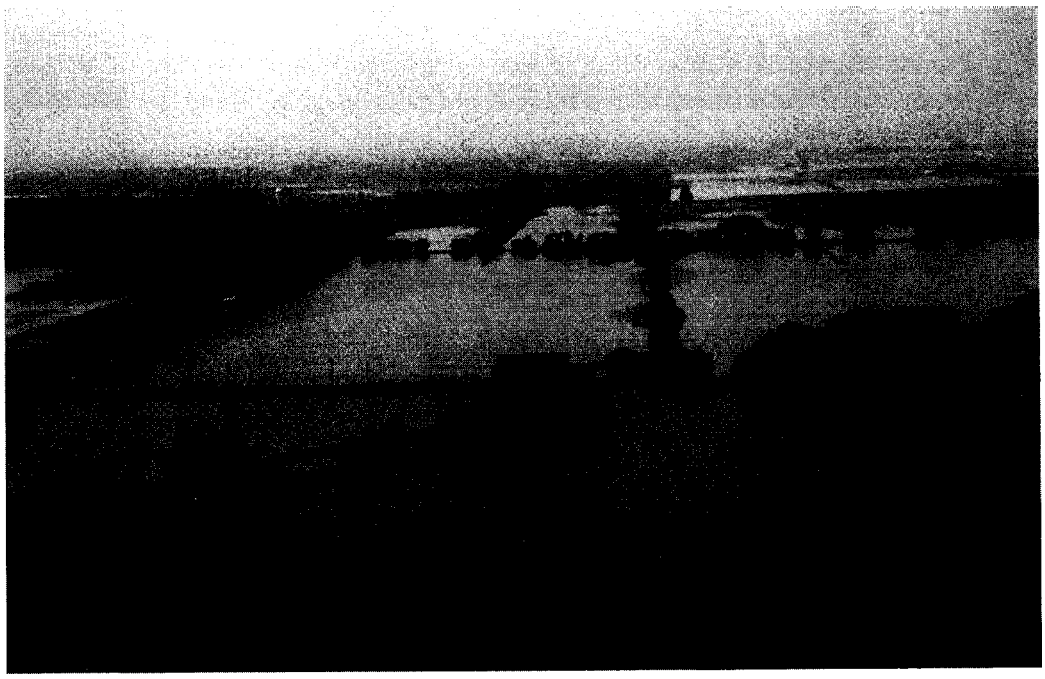
Note: See Appendix A for review of previous disaster recommendations.

BACKGROUND: Several initiatives suggested in previous hazard mitigation strategies/plans remain unfunded or still to be implemented. Acquisition and relocation of many structures in the City of Vassar is an example of an earlier recommendation that has not been fully completed because of inadequate funds and a lower community priority.

RECOMMENDATION #29: PAST MITIGATION PROJECTS. The Vassar project and other potential hazard mitigation projects should be reviewed for action and, if appropriate, incorporated into the Michigan Hazard Mitigation Plan. See the Appendix A for issues and recommendations from the 1986 Disaster Plan that should be evaluated for implementation.

LEAD AGENCY: Michigan Department of Environmental Quality.

SUPPORT AGENCIES: Emergency Management Division Michigan State Police.



Flooding in Tuscola County Agricultural Area

APPENDIX A
1986 Mitigation Recommendations

Appendix A is an excerpt from the Report following the September 1986 flood disaster (FEMA DR-774-MI). It is included in this report as part of the background for recommendation #29.

D. FLOODPLAIN MANAGEMENT

As is often the case, information is lacking pertaining to the wise use of floodplains and coastal flood zones, the availability and coverage of Federal flood insurance, the implications and implementation of local floodplain management ordinances, and the use of maps, where available. These recommendations are offered in order to improve the awareness of available information and programs.

8. Work Element: Increase public awareness of the NFIP.

Background: In many instances, local officials, insurance agents, and community residents were unaware or misinformed about the NFIP. Workshops should be held to describe the NFIP, including eligibility requirements and availability of flood insurance, and the existence of flood insurance maps and their interpretation. For insurance agents, the existing program needs to be reviewed and updated to better inform insurance agents about the NFIP. Flood insurance questions should be added to insurance agent qualification tests. A program should also be developed to review and monitor federally regulated lenders to ensure that flood insurance is purchased and maintained for identified floodprone properties.

Lead Agency: FEMA, MDNR, MDSP-EMD, and the banking industry

Financing: FEMA and MDNR

Schedule: 180 days

10. Work Element: The State of Michigan should sponsor an annual "Flood Awareness Week."

(NOTE: Work Element Number 10 has been done.)

Background: The Michigan Department of State Police, Emergency Services Division has established tornado and winter storm awareness weeks. The events of this disaster indicate the need for a statewide public education campaign for floods. This program should include wide distribution of maps identifying those areas susceptible to flooding.

Lead Agency: MDSP-EMD and NWS

Financing: Existing budget

Schedule: 180 days

E. AGRICULTURE

Agriculture is an appropriate use of the floodplain, however, significant losses frequently occur which can be reduced. This event in Michigan is no different except that the cumulative losses are staggering: in excess of $250 million and rising. Continual, extensive, excessive rainfall has saturated the ground resulting in standing water occurring in areas miles from identified floodplains. Crops, ready for harvest, are not accessible and are rotting in the fields. Farmers, already battling a difficult economic environment, are left with loans from spring planting with no yield to balance their

debt. This may be the last financial catastrophe many can endure. As many as 22% of the farmers in the declared counties are expected to declare bankruptcy.

As a follow-up to an Interagency Hazard Mitigation Team Report in South Dakota (FEMA-717-DR-SD, June 1984), a state by state investigation was made of existing programs to reduce agricultural farm losses. While some measures can be taken (crop selection, storage sites, and insurance) to reduce losses from low magnitude, frequent events, nothing could be found to be effective given the current meteorological situation in Michigan. The Team offers these recommendations in hopes of reducing future agricultural losses from lesser events.

11. Work Element: The State of Michigan should establish design, construction, and maintenance guidelines for dikes and levees protecting agricultural land.

Background: The Team visited several sites where agricultural levees failed. It appeared that privately owned dikes and levees were improperly located and poorly designed, constructed, and maintained. While designed to protect from lesser magnitude floods, the Team noticed that many may have failed in any event. Developed guidelines should include the following considerations: foundation, structural, embankment, hydraulics and hydrology, interior drainage, storm design frequency, construction inspection, operations, and maintenance with special attention to tree and brush removal.

Lead Agency: MDNR and Michigan Department of Agriculture (MDA) with technical assistance from USACE and SCS.

Financing: Legislature Schedule: 90 days

12. Work Element: Review mechanisms available for providing technical assistance in non-project areas for farmsteads located in the 100-year floodplain for floodproofing (e.g., ring dikes and elevated structures).

Background: Not only were there extensive crop losses throughout the declared disaster area, over 1,200 farm houses and other structures were flooded. The Team felt that a review of existing programs might identify additional potential financial assistance. Policies might be changed where necessary, and increased education of program delivery agencies and local participants could lead to the availability of greater protection.

Lead agency: USDA, FEMA (on national level), Agricultural Stabilization and Conservation Service (ASCS), Farmers Home Administration (FmHA) SCS, MDA, and MDNR.

Financing: To be determined Schedule: 180 days

13. Work Element: Review existing programs to revise or redirect ongoing assistance efforts to adequately provide disaster coverage to the farm community and to incorporate mitigation measures.

Background: The Team felt that existing emergency programs do not adequately assist farmers during major disaster declarations, and that they do not address mitigation measures such as protection or loss reduction.

Lead Agency: USDA, extension services, Farm Bureau, National Milk Producers Association, and National Farm Organization.

Financing: None required Schedule: 180 days

F. ADDITIONAL RECOMMENDATIONS

In addition to the recommendations offered thus far, the Team recognized several areas that with some attention could greatly reduce the impacts of a similar event. Specifically, the protection of sewage treatment facilities, enforcement of existing codes, and the review of certain design standards are addressed in this section. Each topic is addressed by a single recommendation, though there are myriad components to each suggestion.

13. Work Element: Create a multi-disciplinary task force to evaluate flood damage to and caused by the failure of sewage handling systems.

Background: Throughout the disaster area, flooding caused damage to sewage handling systems, which in turn caused additional damages. This task force should review existing guidelines and revise/develop new ones, as necessary. These should address, at a minimum, the following functional areas:

- auxiliary power for lift stations and treatment facilities
- site locations and related floodproofing requirements
- adequacy/necessity of storage/holding basins and related design criteria
- minimizing infiltration and/or inflow, including separation of stormwater and sanitary systems, disallowing footing and roof drains to empty into sanitary systems, and identifying building code changes where appropriate
- criteria for determining optimum level of floodproofing/protection in relation to storm frequency/cost effectiveness
- maintenance, operations and emergency plans to minimize flood damage
- post-flood recovery operations plans and policies.

Lead Agency: MDNR, MDSP-EMD, Michigan Public Health, EPA, EDA, FEMA, and USAGE.

Financing: Initially within existing budgets Schedule: 90 days

15. Work Element: Increase awareness of floodplain management code standards, ordinances, and procedures with local elected officials, building code officials, and floodplain residents.

Background: As Interagency Teams have identified nationwide, and almost continually, lack of enforcement of existing codes and regulations often leads to a significantly greater exposure to flood hazards. In Michigan, awareness of the NFIP minimum requirements and building code requirements needs to be strengthened. Confusion and lack of knowledge of floodplain elevations, floodway designations. And procedures necessary to enforce code requirements (e.g., substantial improvements) is inhibition loss reduction mechanisms in some flood damaged areas. Among the suggestions put forth toward, improving enforcement were:

- evaluate resource requirements for NFIP enforcement
- expand local building inspector training awareness programs
- develop procedures and definitions to clarify the enforcement of substantial improvement requirements
- propose legislation to require identification of floodprone parcels on title abstracts (public disclosure)

Lead Agency: FEMA-Federal Insurance Administration, MDNR, MDSP-EMD, Michigan Department of Labor-Construction Code Division and Code Officials Association

Financing: Operating budgets Schedule: 90 days

APPENDIX B

DESCRIPTION O F THE EVENT

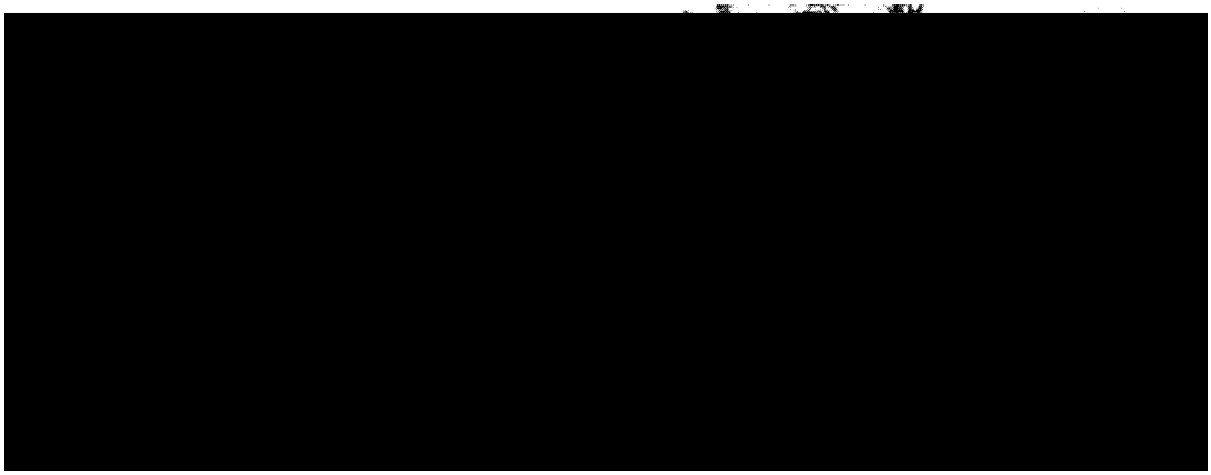
During the day on Friday June 21, 1996, an east-west front across southern Lower Michigan slowly advanced north. Showers and strong to severe thunderstorms were occurring across Wisconsin. A severe thunderstorm watch was issued for most of southern Michigan for the afternoon and into the evening. The storms over Wisconsin were moving

southeast but continued to dissipate as they moved into Michigan. The watch was eventually canceled around 6 PM based on a lack of any significant weather.

By 8 PM, the warm front extended southeast across central Lower Michigan from a low pressure center in northeast Wisconsin. The front was approximately positioned across Mason, Lake, Mecosta, Isabella, Midland, Saginaw, Genesee, Lapeer and St. Clair Counties. It continued to move slowly north. No precipitation was detected by radar across this area between 6 PM and 9PM. Just after 9 PM, a thunderstorm developed along the warm front over Osceola County. As the storm moved southeast along the warm front, additional storms developed into a multiple storm complex that was approximately 70 miles long and 30 miles wide. The storms intensified over Isabella County and continued moving southeast.

Numerous funnel clouds were reported with these storms with two confirmed tornadoes, one in Frankenmuth in Saginaw County and one north of Yale in St. Clair County. These storms also produced torrential rains falling at the rate of 1 to 3 inches per hour. A 15 mile wide band of three to five inches of rainfall extended from approximately the City of Midland to Bay City then southeast through Vassar in Tuscola County into northeast Lapeer County and than St. Clair County. The 3 hour flash flood guidance, which is a number produced by the river forecast center in Minneapolis that represents an average amount of rainfall needed to initiate flash flooding, ranged from 2.0 inches in St. Clair County to 2.7 inches in Tuscola County. Most of this heavy rain fell in a 2 to 3 hour time period.

A flash flood watch was issued for the area in question around 9:30 PM, June 21. The whole storm event occurred between 9 PM and 3 AM. Also, river flood warnings for the Cass River at Frankenmuth and the Saginaw River at Saginaw continued from rains which occurred earlier in the week. New flood warnings were issued for the Cass River at Vassar and the Flint River at Flint that night.



Tornado Damaged Streets in Frankenmuth

Hazard Mitigation Strategy for Federal Disaster #1028: 1994 Northern Michigan Deep Freeze

Hazard Mitigation Plan for

1994 Northern Michigan Severe Cold Weather Infrastructure Disaster (FEMA 1028-DR-MI)

Covering the Counties of:
Charlevoix
Cheboygan
Chippewa
Delta
Gogebic
Houghton
Mackinac
Marquette
Ontonagon
Schoolcraft

Prepared by:

Emergency Management Division
Department of State Police
(Doran B. Duckworth, State Hazard Mitigation Officer)

with assistance from

Division of Upper Peninsula / Division of Water Supply – Michigan Department of Public Health

Surface Water Quality Division – Michigan Department of Natural Resources

Office of Federal Grants / Community Development Block Grant Program – Michigan Department of Commerce

[redacted]

[redacted]

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I. INTRODUCTION

A. Authority. This hazard mitigation plan has been prepared by the Michigan Department of State Police, Emergency Management Division (EMD), to fulfill the State of Michigan's responsibilities under Section 409 of P.L. 93-288, as amended (The Robert T. Stafford Disaster Relief and Emergency Assistance Act). This plan has been developed as the result of the May 10, 1994 Major Disaster Declaration by the President (FEMA-1028-DR-MI) covering the following 10 counties: Charlevoix; Cheboygan; Chippewa; Delta; Gogebic; Houghton; Mackinac; Marquette; Ontonagon; and Schoolcraft.

B. Purpose. The purpose of this plan is to outline opportunities to reduce or mitigate the potential for future cold weather-related infrastructure damage and losses in the areas covered by the Disaster Declaration. Some aspects of the plan go beyond the declared area by pointing out problems that are statewide in nature. The uniqueness of this disaster and the possibility that a similar event could occur in other cold weather states suggests that some issues could be addressed at the national level as well.

C. Scope. This plan will describe the infrastructure disaster, damages caused, costs incurred, problems identified, existing mitigation measures in the affected area, and mitigation opportunities. The mitigation opportunities include the opportunities identified in the Hazard Mitigation Survey Report, as well as those identified after the report was published.

D. Goals and Objectives. Mitigation goals for this disaster, as stated in the Hazard Mitigation Survey Report, are as follows:

1. Improve state and local ability to reduce threats to life and safety posed by severe cold weather.

2. Reduce the vulnerability of existing utility systems to severe cold weather.

3. Avoid damage to future public utility systems.

Specific objectives to be achieved for these goals are as follows:

- Improve capabilities to predict severe cold weather periods which may hamper operation of water and sewer systems, and to take appropriate actions to prevent system freeze ups and damage.

- Ensure all future construction, alterations and repairs to water and sewer systems adhere to state codes and standards and system master plans.

- Integrate mitigation into long-range capital improvements planning to identify and implement preventive measures for vulnerable system components.

- Where appropriate, improve state codes and standards to better address the problems associated with frost damage caused by severe cold weather.

II. BACKGROUND

A. Description of Disaster. The severe cold weather infrastructure disaster occurred as the result of a combination of record low temperatures (beginning in December 1993 and extending through mid-February 1994), and the lack of snowfall on the ground in many areas that traditionally serves as **a** natural insulator to buried water and sewer lines. The severe cold weather that the region experienced was caused by a jet stream pattern going from north of Alaska, back south through the Great Plains, to the Gulf Coast. This allowed Arctic air masses that normally remain over Hudson Bay to move across the Great Lakes Region and prolong the sub-zero temperatures.

These conditions caused unusually deep frost to permeate the ground, which froze and/or broke over 3,200 water and sewer lines and disrupted water and sewer service to approximately 18,700 homes and businesses. Thousands of residents had to keep water running in order to prevent pipes from freezing and bursting. In some locations in the Upper Peninsula, the frost line was **as deep as 96 inches**. Normally, the frost line depth ranges from 52-66 inches during the period **in** which the damage occurred. Typically, municipalities in the affected region have their water lines buried at an average depth of 72 inches (6 feet).

The freezing conditions, which began in early December, continued through the first week of May. Even when the air temperatures reached above freezing, the frost did not leave the ground at the depths of the water and sewer pipes in some areas until late May or early June. The type of soil, amount of snow cover, amount of sunshine reaching the soil, and the location of pipes caused some variation in this condition.

Frozen water and sewer lines and low water pressure caused public health and safety concerns throughout the declared area. Frozen/broken water lines left many residents without **an** adequate and reliable source of safe water for drinking and household uses. Many residents were without normal water supply for various periods of time ranging from a day or two to several weeks. Temporary measures such as the use of water tankers, pipes laid on the ground, and garden hoses between homes were used to distribute water in those areas where water mains or lateral lines to residences could not be thawed. Frozen/broken water lines and low water pressure also severely hampered firefighting capability, leaving many communities without adequate fire protection for several weeks. Several homes were destroyed by fire during this period of low water pressure. Low or negative water pressure also increased the possibility of water line contamination, resulting in boil water orders being issued on several occasions as a safety measure.

B. **Cost of Disaster.** In addition to the significant infrastructure damage and public health/safety impacts, this disaster placed a tremendous financial burden on the affected communities. None of the hardest hit communities had the financial resources necessary to repair or reconstruct the damaged infrastructure. Several communities faced severe cash-flow problems due to the disaster. Public works departments had to rent or buy specialized equipment, such as backhoes with special buckets, high amperage welding machines, thawing machines, jackhammers, generators, air compressors, etc., to thaw and repair frozen or broken lines. Communities also had to replace pumps and pipes much sooner than originally scheduled. In addition, many of the smaller public works departments had to contract for the specialized technical engineering expertise needed to effectively cope with the disaster conditions and necessary repair/mitigation efforts.

Initial damage estimates by the affected communities indicated approximately $7 million in total damage to public infrastructure. Table 1 provides a breakdown of initial public damage estimates by type of damage:

Table 1

	Initial Estimates of Public Damage (by type of damage)	**Totals**
A	Debris Removal	$7,000
B	Emergency Protective Measures	$1,635,000
C	Road Systems	$355,000
D	Water Control Facilities	$0
E	Public Buildings/Related Equipment	$26,000
F	Public Utilities	$5,071,000
G	Other	$0
	TOTALS	**$7,094,000**

As of the end of June, 1994, actual Public Assistance Grant Program (PAGP) funds expended under Section 406 of the Stafford Act are summarized in Table 2:

Table 2

	Public Assistance Funds Expended (by type of damage)	**Totals**
A	Debris Removal	$0
B	Emergency Protective Measures	$1,955,714
C	Road Systems	$320,740
D	Water Control Facilities	$53,429
E	Public Buildings/Related Equipment	$2,067
F	Public Utilities	$3,043,594
G	Other	$0
	TOTALS	**$5,375,544**

Included in the Table 2 totals are funds for mitigation measures required as a condition of receiving public assistance funds. The majority of these measures involved insulating repaired/replaced lines, and replacing vulnerable system components with stronger or better-designed components. Mitigation measures not funded under the Public Assistance Grant Program may be eligible for funding under the Hazard Mitigation Grant Program (HMGP). See Section V (A) (1).

III. PROBLEM IDENTIFICATION

A. Cause of Damage. The infrastructure damage in northern Michigan was caused by a combination of factors, including: unusually long sub-zero freezing weather conditions; lack of insulating snowfall in some areas which allowed frost to permeate the ground to record depths; and vulnerable water and sewer system components due to age, system design, type of material used, depth and location of lines, lack of insulation, or a combination of these factors.

Frozen and broken water/sewer lines were the primary problem in this disaster. Typically, when water and sewer lines are installed, they are buried at a depth that falls below the normal frost line for the area in question. In northern Michigan, most communities have their water lines buried at an average depth of 6 feet (72 inches). Normally, that depth is adequate to prevent lines from freezing on such a wide-scale basis.

However, the record depth frosts experienced from December 1993 to May 1994 caused lines that would normally be safe to freeze. As water freezes within the line, it expands and cracks the pipe, causing leaks, reduced water pressure, and possible contamination. The cracked pipe must then be repaired with a sleeve device or, if the damage is severe enough, replaced in its entirety.

Many communities in the northern United States experience frozen and/or broken infrastructure components every winter; however, the widespread and severe nature of this situation - the fact that whole systems were affected - makes this not only a unique disaster, but also a difficult one to mitigate.

B. Reason for Damage. The main reason for the damage was the record frost depths that caused water and sewer lines to freeze and break. This resulted in over 3,200 frozen and/or broken lines across the affected area. In most cases, the depth that the lines were buried was adequate and up to current standards. It is not economically feasible to retrofit entire existing water and sewer systems against this type of situation. If the right combination of weather conditions occur again, it is likely that an infrastructure disaster similar to this one may also occur again. Frost depths of 96 inches, in this area of the country, are unprecedented. It would be both technically difficult and extremely expensive to require water and sewer lines to be buried below that depth.

However, it is both feasible and prudent to protect those vulnerable components of a system that, because of their location, size, or material, are more prone to freezing and breaking than others. Also, replacements and new additions to a system should be done in accordance with state codes and standards, and be consistent with approved system master plans.

C. Potential for Future Damage. As stated above, similar weather conditions, resulting in similar frost depths, would probably result in similar types of damage. Obviously, this would depend on a number of factors. However, because of the knowledge gained from this unique disaster, it is doubtful that a similar disaster of this magnitude would occur. Preventive steps, such as letting water run from the onset of extended freezing conditions and keeping pipes thawed, would hopefully prevent such a widespread and severe impact. It would be difficult, if not impossible, as well as economically infeasible, to protect entire water and sewer systems from this type of damage. Vulnerable system components, however, can be strengthened and protected.

IV. EXISTING MITIGATION MEASURES

A. Federal Measures. Michigan's public water supplies are regulated under the Federal Safe Drinking Water Act (P.L. 93-523, as amended), and rules contained in 40 CFR Parts 141 and 142. The Michigan Department of Public Health (MDPH), as a primacy agency for the Federal government, provides supervision and control of Michigan's public water supplies, including their operation and physical improvements, under the Michigan Safe Drinking Water Act (Act 399, P.A. 1976).

Although the regulation, construction and operation of municipal sewerage systems is a state function in Michigan, the U.S. Environmental Protection Agency (USEPA) provides an important service via their Technology Transfer Program. Design manuals, operation manuals, and handbooks have been developed for the entire spectrum of wastewater treatment and collection system components and provided to states for their use. The publications are used by the Michigan Department of Natural Resources (MDNR), Surface Water Quality Division, to develop design review and operation procedures for their municipal wastewater

program. The regulatory aspects of the Federal Clean Water Act that pertain to municipalities have also been delegated to the MDNR. The National Pollutant Discharge Elimination System (NPDES) provides the regulatory authority under the Act and results in the issuance of comprehensive operating permits for all facilities that discharge to surface waters.

B. **State Measures.** The Michigan Department of Public Health, Bureau of Environmental and Occupational Health/Water Supply Division, regulates', through a permit process, the design, construction and alteration of public water supply systems. Water supply construction must be conducted within the framework of the Michigan Safe Drinking Water Act, and Public Act 240, P.A. 1937 (Architecture, Professional Engineering, and Land Surveying Act), which requires professional engineering preparation of construction documents for water works construction costing over $15,000. Most communities in the affected area have water system master plans that have been developed in coordination with MDPH.

The Michigan Department of Natural Resources, Surface Water Quality Division, assists communities with the development and maintenance of their wastewater treatment systems. The MDNR monitors and regulates these systems to ensure pollution abatement and health conditions are met for the communities these systems serve. The MDNR also administers a program of project review and permitting for the construction of sewerage systems, pursuant to Act 98, P.A. 1918, as amended.

C. **Local Measures.** All communities are required to adhere to state codes and standards governing the design, construction and alteration of water and sewer systems. Through the permitting process, the Michigan Department of Public Health reviews plans for altering community water systems, and the Michigan Department of Natural Resources reviews plans for altering community sewer systems.

Most communities have developed, and must adhere to, a water system master plan developed in coordination with the MDPH. All replacements and alterations to a community water system must conform to this plan, unless MDPH grants an exemption. For those communities that have not yet developed a water system master plan, MDPH will review proposed changes and make a determination for permit approval or denial based on established codes and standards, and generally accepted engineering practice.

For this disaster, both departments will assist communities with questions regarding permits, facility standards, proper sizing of lines, and techniques that will help resist frost damage in the future.

V. PROPOSED MITIGATION ACTIVITIES

A. Mitigation Measures in Declared Area.

1. Work Element: Decrease the vulnerability of those system components not directly affected by the disaster, or which were damaged but not covered under the Public Assistance Grant Program, but nonetheless could be susceptible to frost damage from a similar event in the future.

Background: In many communities, certain components of their water and sewer systems are vulnerable to frost damage, even though they were not damaged in this disaster. In addition, some components, even if damaged by the frost, did not meet the eligibility criteria for funding under the Public Assistance Grant Program. These projects should be considered for funding under the Hazard Mitigation Grant Program. HMGP funds can be combined with Community Development Block Grant (CDBG) or other sources of funds, through a community's capital improvements program, to implement preventive measures.

Lead Agency: Michigan Department of State Police/Emergency Management Division.

Financing: Hazard Mitigation Grant Program; existing budgets.

Schedule: Jurisdictions had until July 15, 1994, to submit Pre-Application Forms for proposed mitigation measures to EMD. A total of 62 project proposals were received, with funding requests totaling nearly $5.7 million dollars. FEMA set the total amount of available HMGP funding for this disaster at $669,539. On July 20, 1994, a State Selection Panel was convened to review, prioritize and approve project proposals for funding under the HMGP. A total of 21 projects were selected by the Panel for funding consideration. Applicants whose projects were chosen have until August 15, 1994, to submit a formal application to EMD. EMD will then submit a State Grant Application to FEMA, with the individual project applications attached. FEMA will review the individual project applications and provide a grant to the State for disbursement to those applicants whose projects are approved. In most situations, the grant process takes several months to complete. Any problems encountered with individual project applications (i.e., environmental concerns, questions

regarding cost-effectiveness of project, problem with required permits, etc.) will require additional time to resolve.

2. **Work Element:** Increase awareness of community officials about state codes and standards for water and sewer systems, and the permit processes for system alterations.

   Background: Increasing awareness of public works officials of MDPH/MDNR codes and standards for water/sewer systems, and the requirements for permits, will enhance future mitigation opportunities for frost-related system damage. By being familiar with the codes and standards and permit processes, local officials can work more cooperatively with MDPH/MDNR staff in designing alterations that are consistent with their system master plans (or if a master plan has not been developed, that meet current codes and standards) and better able to withstand frost damage.

   Lead Agency: Michigan Department of Public Health; Michigan Department of Natural Resources.

   Financing: Existing programs/budgets.

   Schedule: The MDPH has agreed to re-issue guidance to local communities specifying codes and standards that have to be met, permit requirements, and how those requirements may tie into potential mitigation measures for frost damage.

3. **Work Element:** Develop water system master plans for those communities that don't presently have one.

   Background: A water system master plan can help communities determine both short and long-range capital improvements priorities, and implement preventive measures for frost-related damage.

   Lead Agency: Michigan Department of Public Health.

   Financing: Existing programs/budgets.

   Schedule: Not determined.

4. **Work Element:** Provide technical assistance and encouragement to communities to apply for and use Community Development Block Grant funds for implementing mitigation measures.

   Background: The Michigan Department of Commerce (MDOC) administers the Community Development Block Grant Program for non-entitlement communities. One of MDOC's programs, the Rebuild Michigan Program, is directed towards renewing community infrastructure. This program may be available for restoring damaged water and sewer systems. A community may use these funds to help restore and upgrade those components of their system which are not being repaired under the Public Assistance Grant Program. In addition, these funds may serve as the local match for Hazard Mitigation Grant Program funds.

   Lead *Agency:* Michigan Department of Commerce; Michigan Department of State Police/Emergency Management Division.

   Financing: Community Development Block Grant Program for Rebuild Michigan Public Infrastructure.

   Schedule: The deadline for submitting applications to the MDOC Office of Federal Grants for 1994 projects is August 15, 1994. Funding decisions will be made by September 2, 1994. Information pertaining to 1995 funding will be sent out sometime in early 1995.

5. **Work Element:** Ensure that all water/sewer system repairs and mitigation measures funded under the PAGP and HMGP use appropriate cold weather engineering practices, and are consistent with state codes and standards.

   Background: *All* repairs and replacements funded under the PAGP for this disaster have been made, wherever possible, in accordance with state codes and standards and appropriate cold weather engineering practices. In addition, the MDPH and MDNR will review mitigation measures proposed for funding under the HMGP to ensure that they meet codes and standards and are consistent with approved system master plans.

   Lead Agency: Michigan Department of Public Health; Michigan Department of Natural Resources; Michigan Department of State Police/Emergency Management Division.

Financing: Existing programs/budget.

Schedule: Jurisdictions had until July 15, 1994, to submit Pre-Application Forms for proposed mitigation measures to EMD. A total of 62 project proposals were received, with funding requests totaling nearly $5.7 million dollars. FEMA set the total amount of available HMGP funding for this disaster at $669,539. On July 20, 1994, a State Selection Panel was convened to review, prioritize and approve project proposals for funding under the HMGP. A total of 21 projects were selected by the Panel for funding consideration. Applicants whose projects were chosen have until August 15, 1994, to submit a formal application to EMD. EMD will then submit a State Grant Application to FEMA, with the individual project applications attached. FEMA will review the individual project applications and provide a grant to the State for disbursement to those applicants whose projects are approved. In most situations, the grant process takes several months to complete. Any problems encountered with individual project applications (i.e., environmental concerns, questions regarding cost-effectiveness of project, problem with required permits, etc.) will require additional time to resolve.

6. Work Element: Increase awareness of community officials about state codes and standards for water and sewer systems, and the permit processes for system alterations.

Background: Increasing awareness of public works officials of MDPH/MDNR codes and standards for water/sewer systems, and the requirements for permits, will enhance future mitigation opportunities for frost-related system damage. By being familiar with the codes and standards and permit processes, local officials can work more cooperatively with MDPH/MDNR staff in designing alterations that are consistent with their system master plans (or if a master plan has not been developed, that meet current codes and standards) and better able to withstand frost damage.

Lead Agency: Michigan Department of Public Health; Michigan Department of Natural Resources.

Financing: Existing programs/budgets.

Schedule: The MDPH has agreed to re-issue guidance to local communities specifying codes and standards that have to be met, permit requirements, and how those requirements may tie into potential mitigation measures for frost damage.

7. Work Element: Develop water system master plans for those communities that don't presently have one.

Background: **A** water system master plan can help communities determine both short and long-range capital improvements priorities, and implement preventive measures for frost-related damage.

Lead Agency: Michigan Department of Public Health.

Financing: Existing programs/budgets.

Schedule: Not determined.

8. Work Element: Provide technical assistance and encouragement to communities to apply for and use Community Development Block Grant funds for implementing mitigation measures.

Background: The Michigan Department of Commerce (MDOC) administers the Community Development Block Grant Program for non-entitlement communities. One of MDOC's programs, the Rebuild Michigan Program, is directed towards renewing community infrastructure. This program may be available for restoring damaged water and sewer systems. A community may use these funds to help restore and upgrade those components of their system which are not being repaired under the Public Assistance Grant Program. In addition, these funds may serve as the local match for Hazard Mitigation Grant Program funds.

Lead Agency: Michigan Department of Commerce; Michigan Department of State Police/Emergency Management Division.

Financing: Community Development Block Grant Program for Rebuild Michigan Public Infrastructure.

Schedule: The deadline for submitting applications to the MDOC Office of Federal Grants for 1994 projects is August 15, 1994. Funding decisions will be made by September 2, 1994. Information pertaining to 1995 funding will be sent out sometime in early 1995.

9. **Work Element:** Ensure that all water/sewer system repairs and mitigation measures funded under the PAGP and HMGP use appropriate cold weather engineering practices, and are consistent with state codes and standards.

Background: All repairs and replacements funded under the PAGP for this disaster have been made, wherever possible, in accordance with state codes and standards and appropriate cold weather engineering practices. In addition, the MDPH and MDNR will review mitigation measures proposed for funding under the HMGP to ensure that they meet codes and standards and are consistent with approved system master plans.

Lead Agency: Michigan Department of Public Health; Michigan Department of Natural Resources; Michigan Department of State Police/Emergency Management Division.

Financing: Existing programs/budget.

Schedule: Representatives from the MDPH and MDNR were part of the State Selection Panel which prioritized and selected projects for funding under the HMGP. A technical review of all proposed mitigation projects was made by MDPH/MDNR as part of the selection process. Projects that are not consistent with state codes and standards and appropriate cold weather engineering practices will not be funded under the HMGP.

B. <u>Statewide Mitigation Measures</u>.

1. **Work Element:** Incorporate appropriate cold weather engineering practices into state codes and standards for the design, construction and alteration of public water and sewer systems throughout the state.

Background: Although this disaster affected only portions of northern Michigan, any community in the state could potentially be affected by a similar event. Therefore, state codes and standards for water and sewer systems should be revised as needed to incorporate appropriate cold weather engineering practices.

Lead Agency: Michigan Department of Public Health; Michigan Department of Natural Resources.

Financing: Existing programs/budget.

Schedule: The MDPH and MDNR will review existing water and sewer system codes and standards to determine adequacy of cold weather provisions. A result of this review may be a revision to the codes and standards.

2. **Work Element:** Establish formal "let run" policies and procedures to keep water moving through a community's system to prevent freezing during periods of extended or extreme cold weather.

Background: Letting water run continuously through a community's water system can be an effective tool in preventing widespread water and sewer line freezeups. However, the state does not have a formal policy or procedures for initiating "let run" actions. As it stands now, each community can initiate and terminate its own "let run" actions. These actions can vary greatly from community to community. Development of formal policies and procedures by the MDPH/MDNR would provide communities with some guidelines for "let run" situations, and help ensure that "let-runs" do not adversely impact water and wastewater treatment operations.

Lead Agency: Michigan Department of Public Health; Michigan Department of Natural Resources.

Financing: Existing programs/budget.

Schedule: This project should be done in conjunction with item B 1 above.

3. **Work Element:** Work with the National Weather Service, Army Corps of Engineers Cold Regions Research and Engineering Laboratory, and other appropriate agencies to better identify periods of extended sub-zero weather which could lead to widespread water and sewer system freeze ups.

Background: Identifying periods in which widespread water and sewer system freeze ups are possible is the first step that must be taken to initiate "let runs" and other preventive actions. Research must be done to determine the combination of temperature range and duration that may lead to widespread water and sewer system freeze ups. Obviously, this will depend on a number of factors such as the

type, depth and location of pipe, soil conditions, temperature of water in pipes, etc. However, it may be possible to identify a set of conditions (similar to a weather watch) in which the likelihood of system-wide freeze ups in certain localities is greatly increased. Public works crews could then monitor frost levels more closely and the affected community, in conjunction with MDPH/MDNR and other appropriate agencies, could initiate appropriate preventive actions if line freeze ups appear likely.

Lead Agency: National Weather Service; Army Corps of Engineers/Cold Regions Research and Engineering Laboratory; Michigan Department of Public Health; Michigan Department of Natural Resources; Michigan Department of State Police/Emergency Management Division.

Financing: Existing programs/budgets, or possible Hazard Mitigation Assistance (HMA) funds.

Schedule: Not determined.

VI. PLAN IMPLEMENTATION/MAINTENANCE

A. <u>Implementation and Monitoring</u>. Responsibility for implementation and monitoring of this plan ultimately rests with the Commanding Officer of EMD, who is also designated as State Coordinating Officer for all disaster response, recovery and mitigation activities.

The State Hazard Mitigation Officer (SHMO) is responsible for coordinating and managing the day-to-day activities related to plan implementation, including working directly with other lead state agencies assigned tasks in this plan. Specific responsibilities of the SHMO and lead state agencies are outlined in items 1 and 2 below:

1. **Role of State Hazard Mitigation Officer.** Implementation of this plan involves coordination by the SHMO with those Federal, state and local agencies that have been designated as having responsibilities for implementing specific recommendations. The SHMO will assist the lead agencies in identifying, coordinating and obtaining the necessary resources required to implement each recommendation. This may involve conducting meetings or training sessions, assisting in background research, developing guidance or correspondence, making telephone calls, etc. The purpose of these efforts will be to stimulate interest and support for mitigation activities, and to solidify the involvement and commitment of the parties involved in implementation of the recommendation.

   The SHMO may request technical assistance and support from the Federal Hazard Mitigation officer or other agencies or organizations with expertise in the situation, to assist the State in carrying out its hazard mitigation responsibilities.

2. **Responsibilities of Lead Agencies.** Lead agencies are responsible for four main activities that can contribute to implementation of plan recommendations. These are:

   a. Educate colleagues within their respective agencies as to how the recommendations were formulated and why they are important. This may involve post-disaster meetings and/or training sessions with involved staff, creation of special task forces to address specific issues, development of specific guidance materials tailored to the agency and its role, or other similar activities.

   b. Identify and coordinate the technical, material and financial resources available from within their agencies or from other sources, necessary for implementation activities.

   c. Integrate implementation activities into work programs and schedules.

   d. Report to the SHMO on a quarterly basis regarding the status of activities undertaken or scheduled, resources committed, milestones achieved, areas of concern or barriers to progress, etc.

3. **Reporting Requirements.** Lead agencies will report to the SHMO, per item *2* (d) above. Each agency will have an individual designated for this purpose. The SHMO, in turn, will share this information with other involved agencies to keep them informed and involved in the process. The SHMO will monitor progress through phone calls, personal visits, meetings, written correspondence and other appropriate means. The SHMO will (as appropriate) submit an annual progress report on the status of plan implementation to the Federal Hazard Mitigation Officer. This progress report will indicate the status of each mitigation recommendation contained in the plan, describe any problems or issues that have developed, and include recommendations for additional, modified, or no action. Copies of the report will be provided to all involved agencies and officials.

B. **Evaluation.** The SHMO and involved agencies will evaluate the plan on at least an annual basis to determine the effectiveness of the plan recommendations, and to ensure that implementation has occurred as planned.

1. **Goals and Objectives.** Goals and objectives will be reviewed to determine if they are still applicable, and if they still correspond with state priorities. If not, they will be modified to reflect current conditions, capabilities, problems, resources, etc.

2. **Effectiveness of Mitigation Strategies and Measures.** Mitigation recommendations and strategies will be reviewed to determine if the desired outcomes have occurred as planned.. If not, the recommendation or strategy may have to be modified to reflect changes in capabilities, resources, or other factors pertinent to implementation. If agency coordination is a problem, the SHMO will attempt to meet with the appropriate officials to resolve coordination problems and improve lines of communication.

C. **Maintenance.** The SHMO will maintain this plan and make any necessary modifications.

1. **Plan Updates.** If additional mitigation recommendations are developed, or if revisions to any part of the plan are necessary, the SHMO will develop and distribute plan updates to all plan holders of record.

2. **Plan Expansion.** The SHMO is in the process of developing a generic all-hazards mitigation plan as part of the State's ongoing mitigation efforts. The plan is being developed as a work product under the Disaster Preparedness Improvement Grant (DPIG) Program funded through the Comprehensive Cooperative Agreement with FEMA. The plan is being jointly developed by the SHMO and the State Hazard Mitigation Team. Completion is expected in early 1995.

   This disaster-specific Section 409 hazard mitigation plan will be incorporated into the generic, all-hazard plan as an attachment. At the time of the next Presidential disaster declaration for Michigan, it is anticipated that the generic, all-hazard mitigation plan will only require minor modifications to meet the planning requirements of Section 409 of the Stafford Act. A supplemental report will be developed to address new hazard mitigation needs or issues, reprioritize existing recommendations, or expand the plan to address new/additional hazards.

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Hazard Mitigation Strategy for Federal Disaster #774: 1986 Central Michigan Flooding

MICHIGAN FLOOD HAZARD MITIGATION PLAN

September 1986 Flood Disaster

Prepared by

Land & Water Management Division
Department of Natural Resources
and
Emergency Management Division
Department of State Police

APRIL 1987

Flood Hazard Mitigation Plan for

September 1986 Flood Disaster (FEMA 774-DR-MI)

Covering the Counties of
Allegan, Arenac, Bay, Clare, Clinton, Genesee, Gladwin,
Gratiot, Huron, Ionia, Isabella, Kent, Lake,
Lapeer, Macomb, Manistee, Mason, Mecosta, Midland,
Montcalm, Muskegon, Newaygo, Oceana, Osceola,
Ottawa, Saginaw, Sanilac, Shiawassee, Tuscola,
and Van Buren

Prepared By
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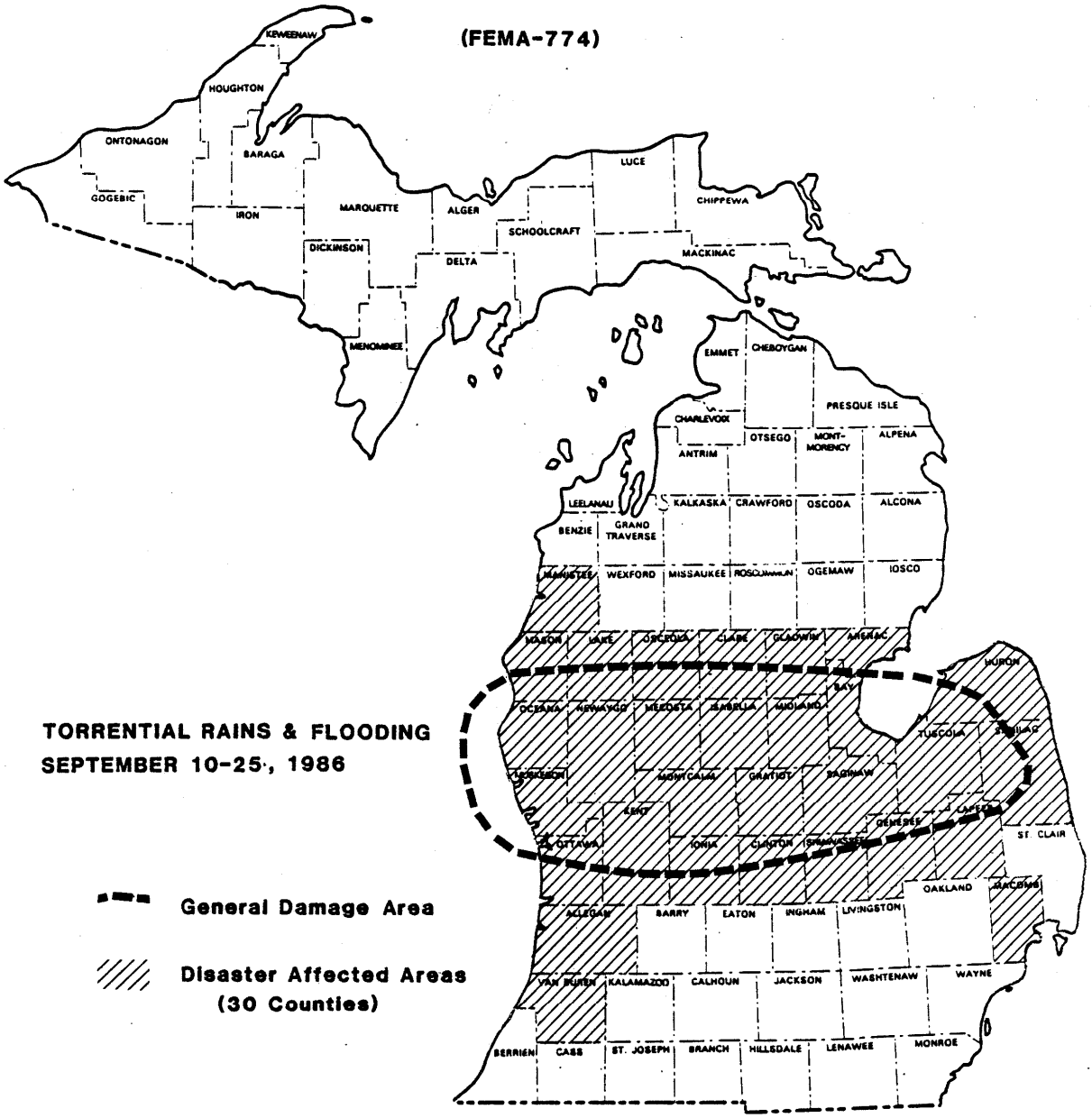
April 1987

(Note: Reformatted version of scanned copy of original document – August 2004.)

MICHIGAN
Flood Disaster Area Map



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VII. PLAN AUTHENTICATION

I. INTRODUCTION

A. Authorities - This flood hazard mitigation plan has been prepared by the Michigan Department's of Natural Resources and State Police to fulfill the State of Michigan's responsibilities under Section 406 of P.L. 93-288 (Disaster Relief Act of 1974). The Section 406 Plan was in response to the September 18, 1986 Disaster Declaration (FEMA-774-DR-MI) covering the 30 counties of Allegan, Arenac, Bay, Clare, Clinton, Genesee, Gladwin, Gratiot, Huron, Ionia, Isabella, Kent, Lake, Lapeer, Macomb, Manistee, Mason, Mecosta, Midland, Montcalm, Muskegon, Newaygo, Oceana, Osceola, Ottawa, Saginaw, Sanilac, Shiawassee, Tuscola, and Van Buren.

B. Purpose - The purpose of this plan is to outline opportunities to reduce or mitigate the potential for future flood losses in the areas covered by the disaster declaration. Some aspects of the plan go beyond the covered area by pointing out problems that are statewide in nature.

As noted in the Interagency Hazard Mitigation Report, the damage that occurred in many areas was the result of flooding that exceeded the 100-year event. Accordingly, mitigation opportunities were not considered in some cases, since it is not economically feasible to design all facilities for such a rare event. Care should be taken to prevent "over-designing" a facility in response to this disaster.

The focus of this report ranges from local and statewide opportunities to needs at the national level.

C. Scope - The mitigation plan will describe the flooding event, damages caused, flood history, problem identification, existing mitigation measures, and mitigation opportunities. The mitigation opportunities include the opportunities contained in the Interagency Hazard Mitigation Report, with an update on implementation possibilities in addition to opportunities that surfaced after the Interagency Report was published.

II. BACKGROUND

A. Previous flood disasters - The State of Michigan has experienced three federally declared flood disasters in the last five years. The two previous disasters, March 1982 flood in Berrien and Monroe counties with estimated flood damages of $12 million and September 1985 flood in Alcona, Saginaw, Genesee and Lapeer counties with estimated flood damages of $63 million both required the development of State Hazard Mitigation reports. These mitigation reports noted specific measures to respond to the particular flooded areas and statewide measures where it was found that the flooding potential could be reduced by statewide actions. Several actions have been completed and several actions are ongoing. The major cause for not completing tasks is lack of resources, both funding and personnel.

Of significant note are the following successful actions: 1) The City of Niles improved flood fighting procedures after the 1982 flood on the St. Joseph River. The procedure worked in 1985 when flood waters rose to 1982 levels. Flood damages were avoided in 10 blocks of commercial property preventing several hundred thousand dollars worth of damage. 2) Flint Township in Genesee County is proceeding to clear 16 flood prone homes along the Flint River using National Flood Insurance Program's Section 1362 purchase and clearing program. This action was recommended after the 1985 flood. 3) The completion of a generic flood warning/flood fighting evacuation standard operating procedure by the Department of State Police Emergency Management Division. This procedure was used by several communities, including Genesee County, after the 1985 flood to update their standard operation procedure. 4) The drafting of proposed comprehensive flood damage reduction legislation for Michigan. Draft legislation may be introduced this year. 5) Pre-mitigation along our Great Lakes shoreline, offering low interest loans for moving or elevating homes, community grants for shoreline protection and appropriation of state funds to pay the local share for Corps of Engineers advanced measures flood protection projects.

Many other actions are in the process of being evaluated or completed as time permits. Of significant note is the federal agencies efforts in completion of recommended mitigation opportunities. It appears that personnel and funds for mitigation purposes are very limited at the federal level, so much so, that initiation of recommended projects has not been a priority once the required 15 day report is completed.

B. Description of the flood - The flood disaster of September 1986, in central Michigan was the result of extremely heavy rainfall starting on September 10, 1986. The storm system measured approximately 180 miles east to west, and 60 miles north to south, and dumped rainfall amounts ranging between 8 and 14 inches. The 100-year, 24-hour rainfall in Michigan is about 5 inches. Intense rainfall of this magnitude has occurred before in Michigan, however, it has been widely scattered, as a result of locally severe thunderstorms.

In addition to the intense rainfall on September 10-12, central Michigan also received 26 consecutive days of rainfall. Some areas received over 19 inches of rain for the month of September. The continual rainfall amplified the already severe damages and hampered the recovery effort.

On September 24 and 25, 1986, southwestern Michigan was hit with an intense rainstorm that produced 24-hour rainfalls of 4 to 6 inches. This rainfall resulted in Allegan and Van Buren counties being added to the disaster declaration. Following is a listing of monthly and daily rainfall at selected stations affected by the storm.

Rainfall, Inches*

Location	County	1986 Monthly Total	Previous Monthly Record	1986 Greatest Day	Previous Greatest Day Record	Sept. 10-12 Storm
Big Rapids	Mecosta	19.05	11.32	7.64	4.43	13.13
Alma	Gratiot	16.31	8.72	9.33	5.50	10.76
Midland	Midland	18.35	12.76	8.05	4.31	11.78
Mt. Pleasant	Isabella	15.42	10.50	9.35	4.25	10.78
Saginaw	Saginaw	17.48	10.22	7.90	4.58	11.35
Caro	Tuscola	18.16	8.19	7.28	3.20	11.51
Hart	Oceana	11.44	11.61	5.43	4.83	7.69

*From NOAA Climatological Data for Michigan

The record rainfall resulted in record stages on numerous rivers throughout the state. Following is a listing of 1986 peak flows and the estimated 100-year flow prior to the 1986 peak:

Watercourse	Location	1986 Peak (cfs)	100-Year Flood (cfs)*
Maple River	Maple Rapids	7,920	8,880
Flat River	Smyrna	4,700	3,340
Rogue River	Rockford	6,000	4,200
Little Muskegon River	Morley	2,300	1,390
Muskegon River	Newaygo	23,200	14,400
Pere Marquette River	Scottville	6,340	3,660
Cass River	Cass City	12,500	11,000
Cass River	Frankenmuth	22,600	21,400
Chippewa River	Mt. Pleasant	6,660	6,150
Pine River	Alma	5,220	5,040
Pine River	Midland	9,360	6,560
Tittabawassee River	Midland	42,000	47,000
Saginaw River	Saginaw	54,000	68,000

*Not including 1986 flood peak

The frequency of the 1986 flood flows ranged from in excess of a 500-year event on the Pere Marquette to about a 25-year event on the Saginaw River. Only a portion of the Saginaw River basin (6060 square miles received the intense rainfall. As a result, record flood flows did not occur at Saginaw, even though some tributaries to the Saginaw River experienced record stages.

C. Cost of Disaster – The cost of the disaster 774-DR broken down by type was estimated to be:

Private	$137,900,000
Agricultural	$300,000,000
Public Facilities	$ 67,300,000

TOTAL **$505,200,000**

As of February 1987, disaster funds expended broken down by types:

Public Assistance	$11,900,000
Temporary Housing	$ 4,800,000
Individual and Family Grants	$ 4,300,000
Disaster Unemployment	$ 5,000,000
SBA Home Loans	$26,200,000
SBA Business Loans	$ 5,800,000
TOTAL	**$58,000,000**

D. Description of Previous Events – The September 1986 flood was a widespread event affecting most river basins across central Michigan. The majority of the river basins are rural, with land use ranging from cultivated to forested. Most major floods in these basins occur in March or April, as a result of spring rains and/or snow melt. Occasionally, thunderstorms may cause flooding during the summer or fall. However, the thunderstorms tend to have more impact on watercourses with smaller drainage areas.

The following is a listing of major floods of record for various drainage basins across central Michigan:

Date	Gage Height (feet)	Peak Discharge (cfs)	Rainfall (inches)
Saginaw River at Saginaw (Drainage Area = 6,060 sq mi)			
24-29 March 1904	24.9	68,000	1.5
10-15 September 1986	24.2	54,000	8
17-22 March 1918	23.5	51,700	Trace
Tittabawassee River at Midland (Drainage Area = 2,400 sq mi)			
10-14 September 1986	34.1	42,000	9
24-28 March 1916	29.7	34,800	1.4
17-21 March 1948	29.5	34,000	2.4
Cass River at Vassar (Drainage Area = 710 sq mi)			
10-15 September 1986	24.0	20,000	11
17-21 March 1948	20.8	18,000	2.2
28 March-1 April 1904	19.0	N/A	1.5
Chippewa River at Mt. Pleasant (Drainage Area = 416 sq mi)			
10-13 September 1986	15.6	6,600	11
5-8 March 1946	12.8	4,960	1.0
17-20 March 1948	12.3	4,460	2.0
Pine River at Alma (Drainage Area = 288 sq mi)			
10-13 September 1986	12.8	5,220	11
17-19 March 1948	10.8	4,400	2.0
4-6 February 1938	10.4	4,070	1.5
Muskegon River at Newaygo (Drainage Area = 2,350 sq mi)			
10-12 September 1986	19.6	23,100	10.5
23-25 March 1913	N/A	14,950	N/A
31 May-1 June 1945	13.8	11,600	4.2
Rogue River near Rockford (Drainage Area = 234 sq mi)			
10-13 September 1986	12.0	6,000	12
2-7 March 1976	9.3	3,540	4
28-31 March 1960	8.6	2,080	.6
Pere Marquette River at Scottville (Drainage Area = 681 sq mi)			
10-13 September 1986	8.1	6,340	9.5
26 June-1 July 1969	6.3	2,970	5
2-7 March 1976	6.2	2,940	3.9
Flat River at Smyrna (Drainage Area = 528 sq mi)			
10-13 September 1986	9.0	4,700	10
17-22 April 1967	7.3	3,100	4.8
9-12 April 1965	7.2	3,020	.7
Maple River at Maple Rapids (Drainage Area = 434 sq mi)			
23-26 March 1904	13.8	N/A	2.5
10-13 September 1986	12.3	7,920	8
17-21 March 1948	11.2	6,500	2.3

III. PROBLEM IDENTIFICATION

A. Cause of Damage - The damage that occurred in Central Michigan was the result of record rainfalls that could not be handled by the existing drainage systems. Rivers and streams throughout the disaster area experienced extreme flooding with most of them reaching their highest recorded flood levels. Damage occurred to homes, business, crops and public facilities.

B. Description of the Damage - Throughout the 30 counties, people were evacuated and about 30,000 homes suffered first floor and/or basement damage. Hundreds of millions of dollars of damage was sustained by crops in Mid-Michigan.

About 3,600 miles of roadways were impassable as a result of the failure of 4 primary road bridges and hundreds of secondary road bridges and culverts. The heavy rainfall resulted in 11 dam failures and 19 others threatened with failure.

C. Reason for Damage - The main reason for the damage was the existing drainage systems not being able to handle the runoff from the record rainfalls. This resulted in overland and riverine flooding that inundated homes and business in low lying areas, washed out road crossings, damaged sanitary sewer systems, and caused severe crop damage. It is not economically feasible to try to design highway culverts, storm sewers, or agricultural dikes to handle the rainfall that occurred in 1986, which was far in excess of the 100-year event in many areas.

Within the disaster area there are existing business and residential developments that have received damage from flooding in the past. The majority of such developments have occurred prior to state and local floodplain regulations and have not been adequately elevated or flood proofed. In some instances, even structures constructed according to NFIP regulations were flooded because of the extreme nature of the event. In addition, some structures not within identified flood hazard areas were flooded or suffered basement damage as a result of storm sewer backup.

The failure of highway bridges and culverts resulted from the design capacity of the structure being exceeded. In some cases, high road embankments resulted in extensive back water, failure of the structure, and costly repairs. The more desirable design included low road embankment at the stream crossings that allowed water to flow over the roadway. The resulting erosion of the roadway embankment is a relatively inexpensive failure to repair.

The failure and threatened failure of numerous dams was primarily the result of inadequate spillway capacity. The majority of the dams were constructed without an emergency spillway, or an adequate inspection/maintenance program. The excessive rainfall resulted in the design capacity of the dam being exceeded, causing failure of the dam or intentional breaching of the embankment to save the structure.

The crop losses were the result of several problems. The amount and the intensity of the rainfall exceeded the drainage capacity of the farm drains, which resulted in ponding of water on the crops. In addition, rainfall throughout the month of September kept the fields wet and prevented harvesting. Many acres of farmland in the Saginaw River basin are in the floodplain, and are among the most productive in Michigan. In many instances, private dikes have been constructed in an effort to prevent flood damage. However, typically these dikes are neither designed nor constructed properly and can aggravate the flooding situation.

IV. EXISTING MITIGATION MEASURES

A. Federal - Within the Saginaw River Basin there has been considerable activity pertaining to proposed flood control projects and floodplain management activities. Flood control projects have been active since 1954. The remaining river basins within the disaster area are more rural and activity has been limited to floodplain management activities at the state and local level.

1. A survey report was prepared by the Detroit District, Corps of Engineers in January 1954, which involved a study of the entire Saginaw River Basin. (The major tributaries within the basin include the Tittabawassee, Cass, Pine, Shiawassee, and the Flint Rivers) This report identified several areas where serious flood problems existed and where flood control and drainage improvements would be economically feasible. The recommendation called for flood protection projects to be constructed at Frankenmuth, Vassar, Flint, Corunna, Owosso, Midland and Shiawassee Flats.

2. The Flood Control Project for the City of Frankenmuth was constructed, and significantly reduced the flood damage within the city.

3. A December 1982 Flood Control Project for the City of Vassar was approved, but unfunded. The project consisted of the construction of flood walls and levees, bridge improvements, drainage structures, and the diversion of Moore Drain. The U. S. Army Corps of Engineers indicates that the project would have contained the 1986 flood. The benefit cost ratio for the authorized plan was 1.06. Using current interest rates, the project would not be economically justified.

4. In April 1975, the Corps of Engineers prepared a Flood Control Project Design Memorandum for the City of Midland. The project involved dike and flood wall, construction and enlargement of the Tittabawassee River. The city rejected the structural approach, in favor of a nonstructural project. The January 1977 Flood Control Project Design Memorandum at Midland provided for permanent evacuation, floodplain regulation and recreational development. This particular project was not implemented; however, the city is purchasing flood prone parcels as they become available.

5. The November 1982 Flood Control Project at the Shiawassee Flats proposed construction of new levees, drainage and control structures, channel improvement, relocation of buildings, and raising bridges. The project would have provided 2-5-year protection. Local support was not available for the project.

6. The July 1975 Rogue River Watershed Plan was prepared by the U. S. Department of Agriculture, Soil Conservation Service for the upper portion of the Rogue River in Kent County. The plan involved channel modification, water level control structures, and sediment traps. The project provides protection against flooding up to a ten year frequency event. This project had minimal impact on flood stages and flood damage resulting from the September 1986 flood.

7. The 1960 Misteguay Creek watershed project designed by the U.S. Department of Agriculture, Soil Conservation Service consisted of 3 flood water retarding structures, 43.4 miles of channel work, and 5.7 miles of levees. The project was completed in the 1960's, and has had a very significant effect in the reduction of flood damages in the watershed. As a result of the 1985 and 1986 floods, the Soil Conservation Service has begun to repair and redesign portions of the project.

B. State - A major area of nonstructural flood hazard mitigation is the system of local and state regulations that govern building and rebuilding in the floodplain. Both the local and state provisions serve as continuing flood hazard mitigation tools. They become particularly important during the recovery phase of a flood disaster.

State Regulations Dealing with Floodplain Development

a) The Floodplain Regulatory Authority (P.A. 245 of 1929, as amended by P.A. 167 of 1968) - provides the Michigan Department of Natural Resources with regulatory authority regarding the alteration, occupation or filling of a floodplain.

b) The Subdivision Control Act (P.A. 288 of 1967) - vests in the Michigan Department of Natural Resources (DNR) regulatory authority over proposed subdivisions abutting a watercourse for review and establishment of the 100-year floodplain limits.

c) The Shorelands Protection and Management Act (P.A. 245 of 1970, as amended) - requires a permit from the Department of Natural Resources prior to construction in coastal flood risk areas as designated by the Department. Local units of government can take over administration by adopting a department approved floodplain management ordinance.

d) Wetland Protection Act (P.A. 203 of 1979) - land owners are required to obtain a permit from the Michigan Department of Natural Resources for construction, dredging, draining or the filling of wetlands.

e) The Inland Lakes and Streams Act (1972 P.A. 346, as amended) regulates the dredging, filling, or occupation of bottomland.

f) The Soil Erosion and Sedimentation Control Act (1972 P.A. 347) regulates construction practices to minimize soil erosion.

g) The Condominium Act (1978 P.A. 59, as amended by 1982 P.A. 538 and 1983 P.A. 113) - states that new condominium developments shall not be constructed where it may be reasonably anticipated that the structures will be damaged by flooding.

h) The Governor's Executive Order 1977-4 requires state agencies to take flood hazards into account when planning new facilities, repairing flood damaged buildings, disposing of lands and evaluating land use plans.

i) The Mobile Home Commission Rules (R 125.1602(g) (7) (8)) states; "(7) Mobile homes shall not be placed in a designated floodway, as determined by the Michigan Department of Natural Resources. (8) Mobile homes which are sited within a floodplain shall have installed an anchoring system in compliance with R 125.1605 to R 125.1608. R125.1908 requires that the 100-year floodplain contour be shown on the mobile home park, and that the pads be placed above the 100-year floodplain elevation.

j) The State Construction Code consists of the BOCA Basic/National Building Code/1984 edition with Amendments. Section 1313.0 of that code requires review of "all buildings or structures located in areas prone to flooding" to see that they "shall be flood proofed in accordance with provisions of this section."

C. Local

1. Local Regulations Dealing with Floodplain Development - the communities involved in this disaster declaration have various levels of floodplain management regulations. They vary from none to more stringent than state or federal regulations. Local enforcement of more stringent ordinances than required can result in more restrictive floodplain land use and increased flood loss mitigation. A local governmental agency can, for example, prohibit floodplain development or can add additional elevation requirements. At minimum, officials need to enforce flood hazard provisions of the building code and be aware of and support state and federal floodplain requirements.

The effectiveness of a floodplain management program is very dependent upon the effectiveness of the enforcement (building and zoning inspection) at the local level. If the building inspector or zoning administrator is not aware, or does not enforce the building code pertaining to developments or improvements in the floodplain, flood losses will continue to rise.

Individually, the state or local controls are not as comprehensive as desirable for proper floodplain management; however, when used together, the controls are fairly effective. The local unit of government has authority to enact and enforce comprehensive floodplain management by going beyond the state and National Flood Insurance Program minimum regulations. To do this, local officials must have floodplain management firmly in mind when developing land use plans.

2. Specific Local Mitigation Activities

a) The City of Midland has been purchasing flood prone property with help from a grant by The Herbert H. and Grace A. Dow Foundation. The purchase is made on a voluntary basis and the land is set aside for open-space use.

b) During the 1986 flood, the City of Zilwaukee used a volunteer sandbagging effort to reduce the flood damages from the Saginaw River. The decision to sandbag was based upon the National Weather Service's River Forecast Center flood forecast.

V. RELATIONSHIP BETWEEN EXISTING MEASURES AND DAMAGES

Existing mitigation measures are reducing flood damages. This is evident in Frankenmuth in which the construction of a Corps of Engineers Flood Control Project prevented flood damage during the 1986 flood.

The City of Midland has purchased and removed homes within the floodplain/floodway of' the Tittabawassee River. The purchase is done solely on a voluntary basis, as money becomes available.

Bridgeport Township facilities constructed above the 100-year flood elevation were severely damaged by this flood, which points out the fact that protection to the 100-year flood level is not a complete solution to avoiding damages.

There are also areas in which improvements to mitigation measures could further reduce the damages. The recommendations listed in the following section indicate opportunities for improving existing measures as well as implementing new measures.

VI. IMPLEMENTATION MEASURES

The flooding of September 1986, covered such a wide spread area, it was not possible for the Interagency Hazard Mitigation Team (IHMT) to visit every site to develop its recommendations. In many instances, a recommendation developed for one community or agency would be applicable to others. As a result, recommendations were made which apply statewide. The recommendations are grouped into the following categories.

A. Specific Measures to Respond to 1986 Flood

1. Muskegon River, Newaygo County
2. City of Vassar, Tuscola County
3. Other flood stricken communities

B. State-wide Measures

1. Relocation and Acquisition
2. Warnings/Emergency Plans
3. Dam Safety/Operations
4. Floodplain Management
5. Agriculture
6. Infrastructure
7. State Flood Hazard Mitigation Planning
8. Legislative Needs

The following agency designations are used in the elements.

IHMT	Interagency Hazard Mitigation Team
FEMA	Federal Emergency Management Agency
MDNR	Michigan Department of Natural Resources
SBA	Small Business Administration
SCS	Soil Conservation Service
NWS	National Weather Service
MDA	Michigan Department of Agriculture
MSP-EMD	Michigan State Police Emergency Management Division
USACE	U. S. Army Corps of Engineers
USGS	U. S. Geological Survey
MDOC	Michigan Department of Commerce

A. Specific Measures to Respond to 1986 Flood

1. Work Element: Provide local units of government with technical expertise and encouragement to develop a relocation/acquisition plan for damaged buildings that lie within the floodway of the Muskegon River in Newaygo County. To provide the technical assistance, it is necessary to determine the floodway of the Muskegon River within Ashland, Bridgeton, Brooks, and Garfield Townships. All available options and necessary resources need to be defined for state and local officials to aid in the decision process. Acquired lands should be dedicated to public open space with restrictive covenants prohibiting future redevelopment.

Background: Sixty-four homes were flooded in Garfield Township's Old Woman's Bend and Anderson Flats developments. As many as thirty homes were essentially destroyed. Old Woman's Bend Subdivision has flooded in the past, though not with the magnitude of this event. All of the Old Woman's Bend subdivision lies within the floodway. Redevelopment of these substantially damaged homes could cause serious health and safety problems, may violate State and local codes, and may cause the loss of the availability of Federally subsidized flood insurance within the entire community. Homes not relocated should be elevated above flood levels.

Lead Agency: FEMA (Public Assistance, Individual Family Grant, and Temporary Housing programs), HUD, SBA, MDNR, MSP-EMD, MDOC, and Newaygo County and affected townships (Brooks, Garfield, Bridgeton and Ashland).

Schedule: Garfield Township has applied to the Michigan Department of Commerce for a one million dollar Community Development Block Grant under the Michigan Small Cities Program, to be used for the relocation/acquisition of flood prone structures within the Township. The block grant has been awarded and the project should be completed in September 1987.

The Michigan Department of Natural Resources has prepared a floodplain/floodway analysis for the Muskegon River from Bridgeton to Newaygo. This information defines the floodway limits and establishes the 100-year floodplain elevations. It was determined that the majority of Old Woman's Bend, Anderson Flats and portions of other developments lie within the floodway of the Muskegon River. The information has been provided to FEMA to be used in the preparation of a Flood Insurance Study.

Additional river cross sectional information is needed to extend the study upstream through Devils Hole (Brooks Township) and downstream through Bridgeton Township. This information is tentatively scheduled to be obtained in the summer of 1987 with results available in January 1988.

2. Work Element: Provide technical expertise and encouragement to the City of Vassar officials to define available options for handling the severely flood damaged buildings in the city. The Flood Insurance Study for the City should be revised to reflect current 100-year flood discharge estimates, and to better define the 100-year flood elevation. Structural flood protection projects as well as nonstructural measures, including acquisition, relocation, and floodproofing, should be considered.

In addition to the USACE defining available options, other resources should be identified that could support relocation/acquisition as an alternative to USACE structural/proposals.

Background: The City of Vassar suffered extensive damage during this event. A large portion of the central business district was inundated by eight feet of water for three days. Forty-two homes have been prevented from being reoccupied pending repairs. The sewage treatment plant and power substation were both rendered inoperative during the flood. Vassar has been repetitively flooded, but never to this magnitude.

There exists an approved, but unfunded, USACE protection project for Vassar. The USACE believes that had this project, primarily levees, been in place, it would have contained this flood. This project has been deferred as it fails to meet budget criteria of the current administration.

Lead Agency: FEMA, SBA, City of Vassar, MSP-EMD, MDNR, MDOC and USACE.

Financing: Community Development Block Grant, SBA, NFIP 1362 Program.

Schedule: A task force (MDNR, MDOC, MSP-EMD, FEMA, SBA) met with a committee formed by the City of Vassar, and provided guidance in applying for SBA loans, FEMA 1362 relocation funds and a Community Development Block Grant. The City desires to relocate the downtown business district and residential areas to locations outside of the 100-year floodplain.

The city developed priorities for purchasing homes in the floodway with a Community Development Block Grant and 1362 funds and is encouraging citizens to apply for SBA loans. Initial purchases of homes with Community Development Block Grant funds should be completed by September 1987.

The MDNR is in the process of preparing a revision to the Flood Insurance Study (FIS) for the City, to reflect current

100-year flood discharge estimates. Preliminary results indicate a profile about 2 to 3 feet above the stages shown in the FIS. The revision is scheduled to be submitted to FEMA by July 1987.

3. Work Element: Provide technical expertise and encouragement to flood stricken communities to help define available mitigation projects that could be funded with Community Development Block Grant funds.

Background: The Interagency Hazard Mitigation Team could visit and make mitigation recommendations to only a few of the heavily damaged communities throughout the state. With the publishing of the 15 day report, there remained many mitigation opportunities across the state that had not been addressed.

The Department of Commerce developed an Emergency Community Assistance Fund using $6,000,000 of Community Development Block Grant funds. Application procedures were announced and applications sent to interested communities.

Lead Agency: MDOC, MSP-EMD and MDNR

Financing: Community Development Block Grant, Small Cities Program

Schedule: A review committee from MDOC Office of Grant Management; MSP Emergency Management Division; and MDNR - Flood Hazard Management Program reviewed applications, met with communities to define projects and recommended acceptable projects for funding. Fifteen have been approved to receive funds for projects that include relocation of existing structures, clearing of the floodway, relocation of sanitary sewage facilities, protective diking and elevation of buildings above the 100-year flood level. The communities include: the Cities of Alma, Hart, Newaygo, St. Louis, Vassar, and White Cloud; the Townships of Bangor, Bridgeport, Everett, Garfield, and Midland; the Villages of Elsie, Pentwater, and St. Charles; and the County of Mecosta.

B. Statewide Measures

1. RELOCATION AND ACQUISITION

Average annual losses from flooding in Michigan are estimated to be from 60 to 100 million dollars. These figures point out the tremendous need to provide options to repairing and reoccupying heavily damaged flood prone, structures. Continuing to reestablish these structures is questionable from a standpoint of public safety and public expense.

Work Element: Develop a realistic Federal, State, and/or local program to relocate or flood proof flood damaged structures.

Background: Existing floodprone structures need to be addressed to break the flood-rebuild-flood-rebuild cycle. A recent Federal Emergency Management Agency study suggests that over 200,000 Michigan buildings are prone to flooding. The impetus to remove floodprone structures from the floodplain has to come from the local level. The state and federal government can provide technical support and funding but the decision to clear flood prone structures is primarily local.

Several examples where State and local government have implemented measures to reduce the vulnerability of structures to flooding include: (1) The City of Midland has an ongoing acquisition program for property in flood prone areas. (2) The City of Owosso just completed removing 40 structures from the floodplain as part of a redevelopment project. (3) In 1986, the state had a loan subsidy program for relocation or floodproofing along Lakes Michigan, Huron, St. Clair, Erie, and Superior. (4) In 1986, the state also implemented a shoreline protection program which made grants of up to $30,000 available to Great Lakes jurisdictions for shoreline protection or hazard mitigation measures. These programs should be reviewed and evaluated as models to aid in the development of additional programs.

Lead Agency: MDNR, MSP-EMD, MDOC, City of Midland, and City of Owosso.

Financing: State and local appropriation corporate match programs, USACE, FEMA, and Community Development Block Grant and Land and Water Conservation programs.

Schedule: The Michigan Department of Commerce has made about 6 million dollars of Community Development

Block Grant funds available to communities for flood hazard mitigation purposes to aid in recovery from the September 1986 flood. The block grant is based upon urgent need and is limited to one million dollars per community. The program promises to be very effective and was the first major effort on post flood mitigation in the State of Michigan. Continuation of an Emergency Community Assistance Fund in a post disaster context is a very important part of breaking the flood-rebuild cycle.

The state needs to continue looking at financial incentives to move or elevate structures in hazard areas in a pre-flood disaster format. A version of the low interest loan program offered by the state in 1986 should be considered on a statewide basis and as a permanent program. Draft legislation is presently being considered.

2. WARNINGS/EMERGENCY PLANS

Many of the problems encountered by the IHMT were a result of a lack of information, failure to coordinate information, or the misunderstanding of information. The recommendations in the following section are aimed at eliminating similar future incidents.

a) Work Element: Develop and test river basin warning/communication networks, as monies become available.

Background: Throughout this event, coordination of all available information was lacking. Local communities were unaware of the role they could play in data collection for River Forecast Centers. The existing gage at Midland overturned and provided NWS with •inaccurate data. The City of Midland was forced to manually measure flood heights and inform NWS. Without accurate data, the prediction capabilities of the Forecast Center were severely limited, which led to media confusion or inaction in dissemination of information.

An improved system should be developed which will require: (1) a network of rainfall measuring devices, (2) additional river stage gages to be placed upstream of vulnerable communities; (3) a network of volunteers to read the rain gages and river gages and report the results to a central location, and (4) a central collection point to provide the NWS River Forecast Center with data.

It is recommended that all Emergency Services Directors and media both have access to the National Weather Service Wire and also monitor the National Oceanic and Atmospheric Administration Weather Radio.

Lead Agency: NWS, USGS, MDNR, MSP-EMD, county emergency coordinators, local law enforcement agencies, dam owners, volunteers, and radio/television stations.

Financing: USGS, USACE, and local governments; mostly existing budgets.

Schedule: There are very few sources of funding to develop River Basin Warning/Communication networks. The NWS is planning some new forecast points on the Flint River Basin, but volunteers will be needed to monitor these gages. Funds are not available for gages accessed by telephone (Telemark). USGS installs gages for the NWS, but has no funding of its own to independently place new gages.

A combination of private and FEMA funds were utilized to develop a flood forecasting model for the Grand River Basin. The model incorporates input from Telemark Gaging Stations and dam operators to forecast flood stages in the basin. Federal, State, or private funds will be needed to develop similar models for other major rivers in the state.

The City of Midland is currently evaluating several different types of gages to determine what equipment best fits their needs. Once the review process is completed, they plan to identify a funding source for implementation.

b) Work Element: Review and update local Emergency Operation Plans (EOP).

Background: Current EOPs should be reviewed in light of the recent disaster. Nationally, coordination of reliable information appears to be one of the major short falls in emergency operations. Michigan EOPs should be reviewed to insure a reliable coordination system for proper emergency response is delineated. The EOPs should include role and responsibility assignments to eliminate confusion. Emphasis should be placed on direction and control, warning, communication, assessment and public information annexes. The EOPs should address multi-jurisdictional and

multi-sector planning and coordination, identify an official spokesperson for dissemination of information to media outlets, and include an after-action review. The plan should be reviewed annually by those who use it for changes in conditions and personnel to ensure proper delineation of roles and responsibilities. The MSP-EMD has developed guidelines and a format for local government use and is capable of providing necessary technical assistance.

Lead Agency: MSP-EMD, MDNR, and FEMA.

Financing: Existing programs.

Schedule: The Planning Section of MSP-EMD has developed a guidance workbook for jurisdictions with Emergency Management Programs, to follow in developing an Emergency Operations Plan (EOP). The workbook provides an outline format, asks questions and includes sample language which meets minimum criteria for a good EOP. The suggested format includes a basic plan and the following annexes: Direction and control, warning, communications, assessment, public information, law enforcement, fire services, public works, health services, and human services.

At the request of a local jurisdiction and as existing priorities allow, the Planning Section provides technical plan writing assistance to the entire State. In 1986, 16 local jurisdictions were assisted in revising and updating their EOP. Ten jurisdictions in the disaster area were assisted: counties of Genesee, Isabella, Kent, Midland, Muskegon, and Saginaw; and the cities of Flint, Bay City, Midland, and Mt. Pleasant. In addition to the Planning Section's efforts, the Training Section conducts a week long Emergency Planning Course several times each year to further assist local jurisdictions who are interested in improving their plans. FEMA requires local EOPs to be reviewed and updated every three years and MSP-EMD requires local EOPs to be revised every two years.

The MDNR is under contract with FEMA to develop a manual discussing and illustrating flood fighting techniques and pre-flood mitigation activities. The manual will be used in two pilot communities to develop a community wide pre-flood mitigation plan. The manual will be distributed statewide to Great Lakes communities and National Flood Insurance Program (NFIP) communities.

3. DAM SAFETY/OPERATIONS

During the 1986 flood, there were eleven dams which either failed due to inadequate spillway capacity or were breached in order to control the release of water to save the threatened structure. This number suggests that investigations and improvements to Michigan's regulation of dams is necessary. Additionally, there needs to be an improvement in the coordination of information concerning water released or passed through dams.

a) Work Element: Adopt State legislation that effectively addresses dam safety issues, including periodic inspections, maintenance standards, emergency action plans, and impoundment regulations.

Background: While inspecting damage representative of the numerous breaches/failures, many questions concerning normal maintenance and operations procedures arose. While the State of Michigan inspects dams during construction, there is currently no ongoing inspection/maintenance program, no requirement for developing emergency action plans for high water situations, as well as failure, and no regulation of impounded water levels.

The MDNR sponsored dam safety workshops across the State in early 1986 and has developed draft legislation to address these issues. This legislation needs to be sponsored and introduced to the 1987 legislative session for adoption.

Lead Agency: MDNR, MSP-EMD, Governor's Office and FEMA.

Financing: None required for adoption; legislative appropriation for program.

Schedule: The draft legislation has been prepared and is planned to be introduced in the 1987 legislative session.

b) Work Element: Expand emergency action plans for dams to include notification and warning procedures for the occasional unusual increase in flow release.

Background: Several communities in this disaster related that actions of upstream dam owners were not well understood by localities that were subject to the impact of increased flow releases. This increased the problems of predicting local flood stage levels. Current dam emergency action plans contain only notification and warning procedures for imminent failure conditions. These plans should be expanded to include such actions for the more frequent event of unusual increased flow releases. These plans should then be coordinated with the NWS, local emergency planners, and law enforcement officials. These requirements should be included in the proposed legislation discussed in Work Element 3a and the regional warning systems discussed in Work Element 2a. The implications for safety are significant if not undertaken.

Lead Agency: MDNR, MSP-EMD, Public Service Commission, appropriate power companies, Federal Energy Regulatory Commission, FEMA, NWS, USGS, USACE (in advising capacity), and local governments.

Financing: Legislative appropriation for proposed dam safety program.

Schedule: Upon adoption, the proposed dam safety legislation would require dam owners to prepare and keep current emergency action plans. These plans address actions to be taken prior to and/or following an impending or actual sudden release of water.

4. FLOODPLAIN MANAGEMENT

As is often the case, information is lacking pertaining to the wise use of floodplains and coastal flood zones, the availability and coverage of Federal flood insurance, the implications and implementation of local floodplain management ordinances, and the use of maps, where available. These recommendations are offered in order to improve the awareness of available information and programs.

a) Work Element: Increase public awareness of the NFIP.

Background: In many instances, local officials, insurance agents, and community residents were unaware or misinformed about the National Flood Insurance Program (NFIP). Workshops should be held to describe the NFIP, including eligibility requirements and availability of flood insurance, and the existence of flood insurance maps and their interpretation. For insurance agents, the existing program needs to be reviewed and updated to better inform insurance agents about the NFIP. Flood insurance questions should be added to insurance agent qualification tests.

A program should also be developed to review and monitor Federally regulated lenders to ensure that flood insurance is purchased and maintained for structures within identified floodprone properties.

Lead Agency: FEMA, MDNR, MSP-EMD, and the banking industry.

Financing: FEMA and MDNR.

Schedule: The MDNR has scheduled six floodplain management informational meetings throughout the state for late April and early May 1987. It is hoped that these meetings-will initiate the organization of a State Floodplain Manager's Association. This organization could be a major step in increasing local awareness. The MDNR has also met with the Michigan Insurance Agents Association to discuss the problems, and to increase awareness of the program. The contact should be made on a regular basis.

At the request of MSP-EMD, the Department of Licensing and Regulation will add several NFIP questions to its licensing examination for insurance agents. This should increase agents' level of knowledge and decrease the number of incidents where residents are improperly advised that they can not purchase flood insurance.

The Michigan Department of Commerce's Financial Institution Bureau (FIB) regulates State chartered institutions and requires each institution to have floodplain maps for its geographical lending area. The FIB randomly audits institutions for compliance with NFIP requirements.

The MSP-EMD hosted a FEMA teleconference on flood insurance issues for insurance agents at its training academy. Even though the teleconference was promoted statewide, attendance was low.

b) ***Work Element:*** Map areas susceptible to flooding and include best available elevation data on existing floodplain maps.

Background: Unmapped communities that experienced significant damage from this flood need to be mapped. Even though this disaster exceeded the 100-year flood in many places, determining floodprone areas will be helpful for responding to future flooding events.

Current Flood Insurance Rate Maps (FIRM) developed from Flood Hazard Boundary Maps (FHBM) do not contain flood elevation information which-would be helpful to a community for floodplain management. In the case of this event, it would have helped identify areas susceptible to flooding. A public review process needs to be reintroduced so that when best available data, including elevations, is provided to FEMA it is included on maps.

Lead Agency: FEMA, MDNR, MSP-EMD, SCS USAGE, and USGS.

Financing: FEMA and MDNR.

Schedule: By February 1988, communities within the disaster area will be contacted to determine the need for floodplain maps, and to check existing floodplain maps. For those communities expressing the need for a map or changes to existing maps, the MDNR will provide assistance.

There is still a need to include best available data on Flood Hazard Boundary Maps and FIRMs, which will require a procedural change at the Federal level.

c) ***Work Element:*** The State of Michigan should sponsor an annual "Flood Awareness Week".

Background: The Michigan Department of State Police, Emergency Services Division, has established tornado and winter storm awareness weeks. The events of this disaster indicate the need for a statewide public education campaign for floods. This program should include wide distribution of maps identifying those areas susceptible to flooding.

Lead Agency: MSP-EMD and NWS.

Financing: Existing budget.

Schedule: The MSP-EMD is planning to conduct a spring Flood Awareness Week during the month of May with an emphasis on flood awareness and safety. This will include a Governors' proclamation, and substantial media support is planned. Flood safety pamphlets, posters, and articles are going to be widely distributed to heighten the public awareness of flood safety and mitigation measures.

d) ***Work Element:*** Increase awareness of hazard provisions in building code standards, ordinances, and procedures with local elected officials, building code officials, and floodplain residents.

Background: As Interagency Teams have identified nationwide, and almost continually, lack of enforcement of existing codes and regulations often leads to a significantly greater exposure to flood hazards. In Michigan, awareness of the NFIP minimum requirements and building code requirements needs to be strengthened. Confusion and lack of knowledge of floodplain elevations, floodway designations, and procedures necessary to enforce code requirements (e.g., substantial improvements) is inhibiting loss reduction mechanisms in some flood damaged areas. Among the suggestions put forth toward improving enforcement were:

- evaluate resource requirements for NFIP enforcement.
- expand local building inspector training awareness programs.
- develop procedures and definitions to clarify the enforcement of substantial improvement requirements.
- propose legislation to require identification of floodprone parcels on title abstracts (public disclosure).

Lead Agency: FEMA-Federal Insurance Administration, MDNR, MSP-EMD, Michigan Department of Labor-Construction Code Division, and Code Officials Association.

Financing: Operating budgets.

Schedule: The MDNR is continuing to provide training to local officials and building inspectors to increase awareness of floodplain management. Under contract with FEMA, the following activities will be undertaken during 1987: MDNR will provide three five-hour workshops covering the NFIP requirements and administration, Building Code requirements and Community Program requirements. These workshops should contact between 60 to 100 communities.

The MDNR will be developing four newsletters to be mailed to flood prone communities in Michigan, counties, townships, drain commissioners, regional planning agencies and citizens. The newsletters will provide a continual flow of information on the NFIP which is necessary to maintain community awareness.

The MDNR will conduct 14 community visits to evaluate NFIP compliance and to review requirements with local officials.

5. AGRICULTURE

Agriculture is an appropriate use of the floodplain; however, significant losses frequently occur which can be reduced. This event in Michigan is no different except that the cumulative losses are staggering: about $300 million. Continual, excessive rainfall saturated the ground resulting in the occurrence of standing water in areas miles from identified floodplains. Crops, ready for harvest, were not accessible and rotted in the fields. Farmers, already battling a difficult economic environment, were left with loans from spring planting with no yield to balance their debt. This may be the last financial catastrophe many can endure. Many of the farmers in the declared counties are expected to declare bankruptcy.

As a follow up to an Interagency Hazard Mitigation Team Report in South Dakota (FEMA-717-DR-SD, June 1984), a state by state investigation was made of existing programs to reduce agricultural farm losses. While some measures can be taken (crop selection, storage sites, and insurance) to reduce losses from low magnitude, frequent events, few measures would have been effective during the 1986 flood.

The following recommendations were developed in hopes of reducing future agricultural losses from lesser events.

a) Work Element: The State of Michigan should establish design, construction, and maintenance guidelines for dikes and levees protecting agricultural land.

Background: The Team visited several sites where agricultural levees failed. It appeared that privately owned dikes and levees were improperly located and poorly designed, constructed,' and maintained. While designed to protect from lesser magnitude floods, the Team noticed that many *may* have failed in any event. Guidelines developed should include the following considerations: foundation, structural, embankment, hydraulics and hydrology, interior drainage, storm design frequency, construction inspection, operations, and maintenance with special attention to trees and brush removal.

Lead Agency: MDNR and Michigan Department of Agriculture (MDA) with technical assistance from USACE and SCS.

Financing: Legislature.

Schedule: A schedule and procedure for accomplishing this work element has not been developed. It is still believed to be desirable and will be followed up as schedules permit.

b) Work Element: Review the programs available for providing floodproofing technical assistance in non-project areas for farmsteads located in the 100-year floodplain (e.g., ring dikes and elevated structures).

Background: Not only were there extensive crop losses throughout the declared disaster area, over 1,200 farm houses and other structures were flooded. The Hazard Mitigation Team felt that a review of existing programs might identify additional financial assistance. Policies might be changed where necessary, and increased education of program delivery agencies and local participation could lead to the availability of greater protection.

Lead Agency: USDA, FEMA (on national level), Agricultural Stabilization and Conservation Service (ASCS), Farmers Home Administration (FmHA), SCS, MDA, and MDNR.

Financing: To be determined.

Schedule: The MDNR has been working with the Flint River Dike Committee to develop a dike design that will provide protection to crops, while maintaining the flow carrying capacity of the river. A dike configuration has been developed; however, funding has not been obtained for construction.

c) Work Element: Review existing programs to revise or redirect ongoing assistance efforts to adequately provide disaster coverage to the farm community and to incorporate mitigation measures.

Background: The Team felt that existing emergency programs do not adequately assist farmers during major disaster declarations, and that they do not address mitigation measures such as protection or loss reduction.

Lead Agency: USDA, extension services, Farm Bureau, National Milk Producers Association, and National Farm Organization.

Financing: None required.

Schedule: The lead agencies for this work element are Federal/National Organizations, but Michigan has done several programmatic things to assist farmers. In response to criticism that many farmers were already deeply in debt and did not need another Small Business Administration (SBA) Loan, the Governor and Legislature established an interest free loan program for farmers who suffered serious crop losses. A total of $100 million is being made available through State Chartered financial institutions.

At the request of the Governor and Michigan's congressional contingent, the eligibility criteria for disaster unemployment benefits were reinterpreted to qualify 5,800 farmers for assistance ranging from $54 to $197 per week based on previous year earnings.

6. INFRASTRUCTURE

The intense rainfall and record flood stages resulted in many sewer systems being over-loaded, and many river crossing failures. This section addresses the protection of sewage treatment facilities, enforcement of existing codes, and a review of design standards.

a) Work Element: Create a multi-disciplinary task force to evaluate flood damage to and caused by the failure of sewage handling systems.

Background: Throughout the disaster area, flooding caused damage to sewage handling systems, which in turn, caused additional damages. This task force should review existing guidelines and revise/develop new ones, as necessary. These should address, at a minimum, the following functional areas:

- auxiliary power for lift stations and treatment facilities.
- site locations and related floodproofing requirements.
- adequacy/necessity of storage/holding basins and related design criteria.
- minimizing infiltration and/or inflow, including separation of storm water and sanitary systems, prohibiting footing and roof drains emptying into sanitary systems, and identifying building code changes where appropriate.
- criteria for determining optimum level of floodproofing/protection in relation to storm frequency/cost effectiveness.
- maintenance, operations, and emergency plans to minimize flood damage.
- post-flood recovery operations plans and policies.

Lead Agency: MDNR, MSP-EMD, Michigan Public Health, EPA, EDA, FEMA, and USACE.

Financing: Initially within existing budgets.

Schedule: The Surface Water Quality Division (SWQD) of the MNDR is in the process of reviewing the recommendations developed by the Flood Hazard Mitigation Team. The City of Vassar's new sewage treatment facility will be relocated outside of the 100-year floodway. The proposed new facility for the City of Newaygo will be located outside of the floodplain.

b) Work Element: Create a task force to evaluate the hydraulic design of roads, bridges and culverts.

Background: In many instances, it was noted that roadway overtopping prevented the failure of the bridge/culvert while others with high road fills were destroyed. The design of the facility should achieve a balance between cost, and the needs, risks, and hazards associated with the site.

Lead Agency: FHWA, MDOT, MDNR, County Road Commission.

Schedule: The MDOT and MDNR will be reviewing the causes of failure for many of the stream crossings. A result of the review may be a revision to the design standards for bridges and culverts.

7. STATE HAZARD MITIGATION PLANNING

As a condition for receiving future Federal disaster assistance, States are required to develop and implement a hazard mitigation plan for those areas where grants and loans are made available.

This plan and the 406 Plan developed after last year's Presidential disaster declaration for Flint and the surrounding area (FEMA-744-DR-MI), were developed to aggressively address problems which created the need for federal assistance. However, to address ongoing and changing problems, the state needs to continually review hazard mitigation opportunities.

a) Work Element: Create a State Hazard Mitigation Team with representation from *key* State agencies.

Background: An Interagency Agreement between 12 Federal agencies requires that a hazard mitigation report be developed following Presidential declarations of a major disaster area that are a result of flooding. These interagency team reports, which emphasize nonstructural loss reduction techniques, have been very successful; but the approach requires the participation and coordination of many disciplines.

Since the statutes and regulations that directly or indirectly impact the State's ability to protect the public health, safety, and general welfare from natural and technological hazards are distributed among the various State agencies, a team needs to be created to identify and coordinate existing activities and programs, and to develop a strategy that will continue to reduce Michigan's vulnerability to damages from flooding and other hazards. Other States have initiated State Hazard Mitigation Teams by Executive Order. This has allowed for effective mitigation measures on a continual basis, not just following Presidential disaster declarations.

A State Team strategy would identify and minimize funding of activities in hazard areas and assist in reducing the exposure of State investments to hazards.

Lead Agency: MSP-EMD, MDNR, and Governor's Office.

Financing: None required.

Schedule: Governor James Blanchard has supported the concept of a State Hazard Mitigation Team and will sign an Executive Order to formally create the team. Therefore, the MSP-EMD, in cooperation with the MDNR, will host a training session for all State Department Emergency Coordinators to introduce and explain the concepts of a State Hazard Mitigation Team. The seminar will train departmental coordinators to look for mitigation opportunities that their departments may assist with during their normal regulatory functions. A questionnaire will be distributed to each department which once completed will identify the department's role and capability to impact mitigation issues. The departments which have key mitigation roles will be invited to form a State Mitigation Team and assist

in the development of a Generic Mitigation Plan for all categories of mitigation hazards.

Completion of this work element is projected to take 12-18 months. A tentative schedule is offered below:

DRAFT - GENERIC HAZARD MITIGATION - DRAFT

A. Develop Executive Order (30 days)
- Obtain Governor's signature

B. Hazard Analysis (30 days)
- Review existing document

C. State Capability Assessment (90 days)
- State Department Coordinators meeting/training

Questionnaire and response

D. Identification of Key State Agencies (30 days)
- Select hazard mitigation team

E. Develop Draft of Mitigation Plan (180 days)
- Assign portions of plan to team members
- Meet regularly to monitor progress and critique
- Submit draft 'to state agencies, FEMA, Governor, and key local representatives

F. Review and Publish Plan (90 days)

G. Review Plan Annually/or After Next Disaster

b) Work Element: MSP-EMD should reprioritize their training and education needs to include the training of State agency personnel identified to serve on the State Hazard Mitigation Team proposed in Work Element 7A.

Background: FEMA has just completed the development of a training course specifically designed for State hazard mitigation officers to train members of State hazard mitigation teams in state of the art concepts and techniques in planning and implementing hazard reduction policies. If MSP-EMD agrees to readjust their training and education program for by offering to sponsor this course, FEMA Region V can provide the technical and financial resources necessary.

Lead Agency: MSP-EMD and FEMA.

Financing: Existing Training and Education budget.

Schedule: The MSP-EMD training schedule for 1987 was published in the fall of 1986. At this late date, it is not possible to reschedule the courses to include flood hazard mitigation training.

On March 9-11, 1987, MSP-EMP and MDNR staff attended FEMA Region V's pilot presentation of the mitigation training course to evaluate its appropriateness for Michigan and found it to be an excellent training tool.

If FEMA approves this course in Michigan's Comprehensive Cooperative Agreement for FY88, the course will be included on MSP-EMD FY88 training schedule.

8. LEGISLATIVE NEEDS

a) Work Element: The Michigan legislature should adopt the drafted legislation, entitled "Flood Damage Reduction Act".

Background: This legislation was presented and discussed in the 406 Plan (pages 17-18 and Attachment 1) developed following FEMA-744-DR-MI). This legislation should be reviewed in light of the current disaster, updated where necessary, and brought to the upcoming session of the legislature.

Lead Agency: MNR, MSP-EMD, and Governor's Office.

Financing: None required for adoption; legislative appropriation for programs.

Schedule: The draft legislation was reviewed by MDNR, modified slightly to address needs that became apparent from the September 1986 flood and sent to legislature for adoption. A formal sponsor of this:' legislation will be sought.

b) Work Element: The State of Michigan should review existing legislation and regulations addressing storage of hazardous materials in floodprone areas for adequacy and/or enforcement.

Background: Field investigations indicate containers of hazardous materials (polychlorinated biphenyls - PCBs) were floating in the Tittabawassee and Saginaw Rivers. In Garfield Township, Newaygo County, inadequately secured containers caused the loss of at least 30 propane/LPG tanks. As a result, these containers were floated from their storage sites and carried downstream by flood currents, posing a health and fire hazard. These types of hazard have become increasingly frequent nationwide.

Lead Agency: MDNR, MSP-Fire Marshal, and EPA.

Financing: None.

Schedule: In response to the Superfund Amendments and Reauthorization Act of 1986 (SARA) (PL99-499), Governor James J. Blanchard has established an Emergency Planning and Community Right to Know Commission and has designated the Director of the Department of Natural Resources as Chairman of the Commission. The Commission's duties include responsibility for monitoring the development of local hazardous materials response plans required by the Title III provisions of SARA. Those plans may address the safe storage of hazardous material and at least partially resolve this issue for facilities which are subject to SARA requirements.

Michigan's administrative rules (1984) for Liquefied Petroleum Gases (LPG) requires containers to be securely anchored (3-2.2.5 (g)). The administrative rules for storage of flammable and combustible liquids (1983) also require tanks to be securely anchored (2-5.6.1). The MSP Fire Marshal and Michigan Department of Natural Resources do not have adequate inspection staffs to properly enforce those regulations. Local Building Inspectors or Fire Department Inspectors should place a greater emphasis on enforcement of this area.

VII. PLAN AUTHENTICATION

A. This State Flood Hazard Mitigation Plan has been developed as a result of the Presidentially Declared Disaster, FEMA-774-DR-MI, in accordance with Public Law 93-288, Section 406 and the Federal/State agreements for the disaster.

The purpose of the plan is to outline opportunities to reduce or mitigate the potential for future losses in the disaster area and elsewhere in the state. The plan has been reviewed by each state agency which has assumed roles as lead agencies in implementing this plan.

The Commander of the Emergency Management Division, Department of State Police, is assigned the role of plan coordinator and will be responsible for the follow up to assure implementation where possible.

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