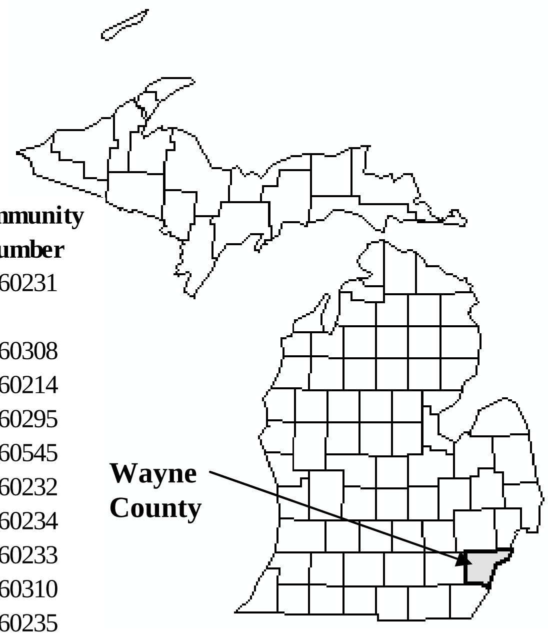
FLOOD INSURANCE STUDY

VOLUME 1 OF 4

WAYNE COUNTY, MICHIGAN

(ALL JURISDICTIONS)



Community Name	Community Number
Allen Park, City of	260217
Belleville, City of	260544
Brownstown, Charter Township of	260218
Canton, Township of	260219
Dearborn, City of	260220
Dearborn Heights, City of	260221
Detroit, City of	260222
Ecorse, City of	260223
Flat Rock, City of	260224
* Garden City, City of	260225
Gibraltar, City of	260226
Grosse Ile, Township of	260227
Grosse Pointe, City of	260228
Grosse Pointe Farms, City of	260229
Grosse Pointe Park, City of	260230
Grosse Pointe Shores, A Michigan City, Village of (Macomb and Wayne Counties)	260250
* Grosse Pointe Woods, City of	260231
* Hamtramck, City of	260308
* Harper Woods, City of	260214
* Highland Park, City of	260295
Huron, Township of	260545
Inkster, City of	260232
Lincoln Park, City of	260234
Livonia, City of	260233
Melvindale, City of	260310
Northville, City of (Oakland and Wayne Counties)	260235
Northville, Township of	260669
Plymouth, Charter Township of	260237
Plymouth, City of	260236
Redford, Township of	260238
River Rouge, City of	260239
Riverview, City of	260240
Rockwood, City of	260241
Romulus, City of	260381
Southgate, City of	260242
Sumpter, Township of	260243
Taylor, City of	260728
Trenton, City of	260244
Van Buren, Township of	260546
Wayne, City of	260245
Westland, City of	260739
Woodhaven, City of	260730
Wyandotte, City of	260246

* No Special Flood Hazard Areas identified

EFFECTIVE:
February 2, 2012

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
26163CV001A

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) report may not contain all data available within the Community Map Repository. It is advisable to contact the Community Map Repository for any additional data.

Part or all of this Flood Insurance Study may be revised and republished at any time. In addition, part of this Flood Insurance Study may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the Flood Insurance Study. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current Flood Insurance Study components.

Selected Flood Insurance Rate Map panels for this community contain information that was previously shown separately on the corresponding Flood Boundary and Floodway Map panels (e.g., floodways, cross sections). In addition, former flood hazard zone designations have been changed as follows:

Old Zones	New Zone
A1 through A30	AE
B	X
C	X

Initial Countywide FIS Effective Date: February 2, 2012

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Exhibits – Volume 3 *(continued)*

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EXHIBITS *(continued)*

Exhibits – Volume 4 *(continued)*

FLOOD INSURANCE STUDY

WAYNE COUNTY, MICHIGAN (ALL JURISDICTIONS)

1.0 INTRODUCTION

1.1 Purpose of Study

This countywide Flood Insurance Study (FIS) revises and supersedes the FIS reports, Flood Insurance Rate Maps (FIRMs), and/or Flood Boundary and Floodway Maps (FBFMs) in the geographic area of Wayne County, including the Charter Townships of Brownstown and Plymouth; the Cities of Allen Park, Belleville, Dearborn, Dearborn Heights, Detroit, Ecorse, Flat Rock, Garden City, Gibraltar, Grosse Pointe, Grosse Pointe Farms, Grosse Pointe Park, Grosse Pointe Woods, Hamtramck, Harper Woods, Highland Park, Inkster, Lincoln Park, Livonia, Melvindale, Northville, Plymouth, River Rouge, Riverview, Rockwood, Romulus, Southgate, Taylor, Trenton, Wayne, Westland, Woodhaven, and Wyandotte; the Townships Canton, Grosse Ile, Huron, Northville, Redford, Sumpter, and Van Buren; and the Village of Grosse Pointe Shores, A Michigan City, (hereinafter referred to collectively as Wayne County,) and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Please note that the Cities of Garden City, Grosse Pointe Woods, Hamtramck, Harper Woods, and Highland Park have no Special Flood Hazard Areas (SFHAs) identified. The City of Northville is located in both Oakland and Wayne Counties. The Village of Grosse Pointe Shores, A Michigan City, is located in both Macomb and Wayne Counties. Both the City of Northville and the Village of Grosse Pointe Shores, A Michigan City, are included in their entirety this countywide study. Also note that the Village of Grosse Pointe Shores, A Michigan City, was previously referred to as the Village of Grosse Pointe Shores. This study has developed flood-risk data for various areas of the community that will be used to establish actuarial flood insurance rates. This information will also be used by Wayne County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP) and to assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the NFIP are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

The Digital Flood Insurance Rate Map (DFIRM) and FIS Report for this countywide study have been produced in digital format. Flood hazard information was converted to meet the Federal Emergency Management Agency (FEMA) DFIRM database specifications and Geographic Information System (GIS) format requirements. The flood hazard information was created and is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community.

1.2 Authority and Acknowledgments

The sources of authority for this countywide FIS are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

Information on the authority and acknowledgments for each of the previously printed FISs and FIRMs for communities within Wayne County was compiled and is shown below.

Allen Park, City of	The hydrologic and hydraulic analyses for the August 1981 study for the City of Allen Park were performed by Wade, Trim, and Associates, Inc., for FEMA, under Contract No. H-4542. The analysis for this study was completed in April 1980. The hydrologic and hydraulic analyses for the May 1996 revision for North Branch Ecorse Creek were performed by Dewberry & Davis. Technical information for the revised hydrologic and hydraulic analyses was provided by the U.S. Army Corps of Engineers (USACE), Detroit District; the Michigan Department of Natural Resources (MDNR); and the City of Dearborn Engineering Department. The analysis for this study was completed in September 1992 (Reference 1).
Brownstown, Charter Township of	The hydrologic and hydraulic analyses for the February 1982 study for the Charter Township of Brownstown were performed by Wade, Trim, and Associates, Inc., for the Federal Insurance Administration (FIA), under Contract No. H-4542. The analysis for this study was completed in April 1980 (Reference 2).
Canton, Township of	The hydrologic and hydraulic analyses for the March 1981 study for the Township of Canton were performed by Wade, Trim, and Associates, Inc., for the FIA, under Contract No. H-4542. The analysis for this study was completed in November 1979 (Reference 3).
Dearborn, City of	The hydrologic and hydraulic analyses for the May 1996 study for the City of Dearborn were performed by the USACE, Detroit District, for FEMA, under the Inter-Agency Agreement No. EWM-91-E-3529, Project Order Nos. 4A and 4B. This analysis was completed in September 1992. The hydrologic and hydraulic analyses for revisions to North Branch Ecorse Creek were taken from the May 1996 FIS for the City of Dearborn Heights (Reference 4).
Dearborn Heights, City of	The hydrologic and hydraulic analyses for the November 1982 study for the City of Dearborn Heights were performed by Wade, Trim, and Associates, Inc., for the FIA, under Contract No. H-4542. The analysis for this

study was completed in November 1982. The hydrologic and hydraulic analyses for the May 1996 revision for North Branch Ecorse Creek were performed by Dewberry & Davis. Technical information for the revised hydrologic and hydraulic analyses was provided by the USACE, Detroit District; MDNR; and the City of Dearborn Engineering Department. The analysis for this study was completed in September 1992 (Reference 5).

Detroit, City of	The hydrologic and hydraulic analyses for the April 1984 study for the City of Detroit was performed by Wade, Trim, and Associates, Inc., for the FIA, under Contract No. H-4542. The analysis for this study was completed in November 1978 (Reference 6).
Ecorse, City of	The hydrologic and hydraulic analyses for the November 1977 study for the City of Ecorse were performed by Johnson & Anderson, Inc., for the FIA, under Contract No. H-3816. The analysis for this study was completed in February 1977 (Reference 7).
Flat Rock, City of	The hydrologic and hydraulic analyses for the June 1981 study for the City of Flat Rock were performed by Wade, Trim, and Associates, Inc., for the FIA, under Contract No. H-4542. The analysis for this study was completed in March 1980 (Reference 8).
Gibraltar, City of	The hydrologic and hydraulic analyses for the December 1978 study for the City of Gibraltar were performed by Johnson & Anderson, Inc., for the FIA, under Contract No. H-3816. The analysis for this study was completed in September 1977 (Reference 9).
Grosse Ile, Township of	The hydrologic and hydraulic analyses for the February 1980 study for the Township of Grosse Ile were performed by Wade, Trim, and Associates, Inc., for the FIA, under Contract No. H-4542. The analysis for this study was completed in January 1979 (Reference 10).
Grosse Pointe Park, City of	The hydrologic and hydraulic analyses for the July 1978 study for the City of Grosse Pointe Park were performed by the National Oceanic and Atmospheric Administration (NOAA), for the FIA, under Inter-Agency Agreement No. IAA-H-21-74, Project No. 2. The analysis for this study was completed in November 1976 (Reference 11).
Grosse Pointe Shores, A Michigan City, Village of	The hydrologic and hydraulic analyses for the July 1978 study for the Village of Grosse Pointe Shores were performed by NOAA, for the FIA, under Inter-Agency Agreement No. IAA-H-21-74, Project Order No. 2. The

analysis for this study was completed in November 1976 (Reference 12).

Huron, Township of	The hydrologic and hydraulic analyses for the October 1986 study for the Township of Huron were performed by the USACE, Detroit District, for FEMA, under Inter-Agency Agreement No. EWM-84-E-1506, Project Order No. 1, Amendment 3. The analysis for this study was completed in March 1985 (Reference 13).
Lincoln Park, City of	The hydrologic and hydraulic analyses for the May 1981 study for the City of Lincoln Park were performed by Wade, Trim, and Associates, Inc., for the FIA, under Contract No. H-4542. The analysis for this study was completed in December 1979 (Reference 14).
Livonia, City of	The hydrologic and hydraulic analyses for the May 1981 study for the City of Livonia were performed by Wade, Trim, and Associates, Inc., for the FIA, under Contract No. H-4542. The analysis for this study was completed in October 1979 (Reference 15).
Northville, City of	The hydrologic and hydraulic analyses for the March 1981 study for the City of Northville were performed by Wade, Trim, and Associates, Inc., for the FIA, under Contract No. H-4542. This study was completed in November 1979. The hydrologic and hydraulic analyses for the December 1999 revision for a portion of Middle River Rouge on the upstream side of Eight Mile Road were performed by JCK & Associates, Inc. Also included in this revision were two LOMRs, which were prepared by McNeely & Lincoln Associates, Inc., and Seiber, Keast & Associates, Inc., with Dewberry & Davis. The analysis for this study was completed in May 1998. The digital base mapping information was provided by MDNR in Lansing, Michigan. Files were compiled from aerial photos and US Geological Survey (USGS) 7.5-minute topographic quadrangle maps with a scale of 1:24,000. Data was produced in Universal Transverse Mercator coordinates referenced to the North American Vertical Datum of 1927 (NAVD27) and the Clarke 1866 spheroid (Reference 17).
Northville, Township of	The hydrologic and hydraulic analyses for the March 1981 study for the Township of Northville were performed by Wade, Trim, and Associates, Inc., for the FIA, under Contract No. H-4542. The analysis for this study was completed in October 1979 (Reference 16).

Plymouth, Charter Township of	The hydrologic and hydraulic analyses for the September 1980 study for the Charter Township of Plymouth were performed by Wade, Trim, and Associates, Inc., for the FIA, under Contract No. H-4542. This analysis was completed in August 1979. For the January 1996 revision, the hydrologic and hydraulic analyses were performed by the USACE, Detroit District, for FEMA, under Inter-Agency Agreement No. EMW-91-E-3529. The analysis for this study was completed in September 1992 (Reference 19).
Plymouth, City of	The hydrologic and hydraulic analyses for the August 1980 study for the City of Plymouth were performed by Wade, Trim, and Associates, Inc., for the FIA, under Contract No. H-4542. The analysis for this study was completed in May 1979. For the January 1996 revision, the hydrologic and hydraulic analyses were performed by the USACE, Detroit District, for FEMA, under Inter-Agency Agreement No. EMW-91-E-3529. The analysis for this study was completed in September 1992 (Reference 18).
Redford, Township of	The hydrologic and hydraulic analyses for the September 1980 study for the Township of Redford were performed by Hubbel, Roth, and Clark, Inc. The analysis for this study was completed in February 1978. The FIS was performed by the USACE, Detroit District, for the FIA, under Inter-Agency Agreement Nos. IAA-H-2-73, Project Order No. 2, amended by IAA-H-7-76, Project No. 29, and IAA-H-10-77, Project Order No. 16, Amendment No. 4 (Reference 20).
River Rouge, City of	The hydrologic and hydraulic analyses for the March 1977 study for the City of River Rouge were performed by Johnson & Anderson, Inc., for the FIA, under Contract No. H-3816. The analysis for this study was completed in November 1976 (Reference 21).
Riverview, City of	The hydrologic and hydraulic analyses for the March 1981 study for the City of Riverview were performed by Wade, Trim, and Associates, Inc., for the FIA, under Contract No. H-4542. The analysis for this study was completed in January 1979 (Reference 22).
Rockwood, City of	The hydrologic and hydraulic analyses for the December 1978 study for the City of Rockwood were performed by Johnson & Anderson, Inc., for the FIA, under Contract No. H-3816. The analysis for this study was completed in September 1977 (Reference 23).

Southgate, City of	The hydrologic and hydraulic analyses for the March 1978 study for the City of Southgate were performed by Johnson & Anderson, Inc., for the FIA, under Contract No. H-3816. The analysis for this study was completed in May 1977 (Reference 24).
Sumpter, Township of	The hydrologic and hydraulic analyses for the November 1980 study for the Township of Sumpter were performed by McNamee, Porter & Seeley/Smith, Hinchman, and Grylls, for the FIA, under Contract No. H-4705. The analysis for this study was completed in November 1979 (Reference 25).
Taylor, City of	The hydrologic and hydraulic analyses for the October 1986 study for the City of Taylor were performed by the USACE, Detroit District, for FEMA, under Inter-Agency Agreement No. EWM-E-0941. The analysis for this study was completed in October 1984. For the May 1996 revision, the hydrologic and hydraulic analyses were performed by Dewberry & Davis for FEMA. Technical information was provided by USACE, Detroit District; the MDNR; and the City of Dearborn Engineering Department (Reference 26).
Trenton, City of	The hydrologic and hydraulic analyses for the June 1985 study for the City of Trenton were performed by Wade, Trim, and Associates, Inc., for the FIA, under Contract No. H-4542. The analysis for this study was completed in December 1978 (Reference 27).
Wayne, City of	The hydrologic and hydraulic analyses for the February 1980 study for the City of Wayne were performed by Wade, Trim, and Associates, Inc., for the FIA, under Contract No. H-4542. The analysis for this study was completed in October 1978 (Reference 28).
Westland, City of	The hydrologic and hydraulic analyses for the July 1984 study for the City of Westland was taken from a June 1978 Soil Conservation Service (SCS) report entitled "Flood Hazard Analyses: Tonquish Creek and Tributaries" (Reference 29).
Woodhaven, City of	The hydrologic and hydraulic analyses for the October 1986 study for the City of Woodhaven were performed by the USACE, Detroit District, for the FIA, under Inter-Agency Agreement No. EWM-E-0941. The analysis for this study was completed in February 1984 (Reference 30).
Wyandotte, City of	The hydrologic and hydraulic analyses for the November 1977 study for the City of Wyandotte were performed by

Johnson & Anderson, Inc., for the FIA, under Contract No. H-3816. The analysis for this study was completed in February 1977 (Reference 31).

There are no previously published FIS reports for the Cities of Belleville, Garden City, Grosse Pointe, Grosse Pointe Farms, Grosse Point Woods, Hamtramck, Harper Woods, Highland Park, Inkster, Melvindale, Romulus, and Wyandotte or the Township of Van Buren.

New and restudied detailed hydrologic and hydraulic analyses for this study were performed by the USACE, Detroit District, for FEMA under Inter-Agency Agreement Nos. EMW-96-IA-0294, Project Order No. 3; EMW-1999-IA-0234, Project Order No.2; and EMC-2003-IA-0032, Project Order No. C268476. The work covered under the first two agreements was completed in April 2003; work covered under the third agreement was completed in August 2005.

The revised analysis for the Detroit River was performed by Applied Science, Inc., for the City of Wyandotte as part of an appeal. This work was completed in November 2009.

New hydrologic and hydraulic analyses for McClaughrey Drain were performed by Applied Sciences, Inc., as part of an appeal. This work was completed in September 2009.

The approximate hydrologic and hydraulic analyses for this countywide FIS were performed by Stantec Consulting Services, Inc., (Stantec) for FEMA under Contract Nos. EMC-2001-CO-005 and HSFE05-05-D-0026. This work was completed in April 2006.

In addition to incorporating the existing FISs for 31 communities within Wayne County, this countywide FIS includes additional approximate studies, new and restudied detailed study areas, redelineation of all other effective profiles, and incorporation of approved Letters of Map Change (LOMCs). The vertical datum was shifted to North American Vertical Datum of 1988 (NAVD88). The digital floodplain data was merged into a single, updated DFIRM. The DFIRM includes 2001 digital orthophotography, 2-foot contours, topographic break lines and spot elevations, political boundaries, road centerlines with street names, railroads with names, airports, rivers, lakes, streams, bridges and other hydraulic structures, and elevation reference marks. This work covered unprotected flooding sources affecting Wayne County.

The digital base mapping information was provided by the Wayne County Department of Technology, located at 415 Clifford Street, 2nd Floor, Detroit, Michigan, 48226. Further information about the base mapping is available by contacting the Department of Technology. These files were compiled by photogrammetric methods and meet or exceed National Map Accuracy Standards at the original compilation scale of 1:7,920. The coordinate system used for the production of this FIRM is Michigan State Plane Zone 6401, North American Datum of 1983. Differences in the datum used in the production of FIRMs for adjacent counties may result in slight positional differences in map features at the county boundaries. These differences do not affect the accuracy of information shown on this FIRM.

1.3 Coordination

The purpose of an initial Consultation Coordination Officer's (CCO's) meeting is to discuss the scope of the FIS. A final CCO meeting is held to review the results of the study. The dates of the initial and final CCO meeting held for the previous FISs for the incorporated communities within Wayne County's boundaries are shown in TABLE 1 (References 1–31).

TABLE 1 – Wayne County CCO Meetings

Community Name	Initial CCO Date	Final CCO Date
Allen Park, City of	December 7, 1977	January 21, 1981
revised FIS	April 18, 1991	not published
Brownstown, Charter Township of	February 16, 1978	January 21, 1981
Canton, Township of	May 10, 1977	October 9, 1980
Dearborn, City of	April 18, 1991	October 13, 1993
Dearborn Heights, City of	April, 1977	May 3, 1982
revised FIS	September 14, 1994	not published
Detroit, City of	not published	July 30, 1980
Ecorse, City of	February, 1976	April 25, 1977
Flat Rock, City of	February 1, 1978	January 22, 1981
Gibraltar, City of	September 3 & 24, 1975	June 20, 1978
Grosse Ile, Township of	November 22, 1977	June 12, 1979
Grosse Pointe Park, City of	not published	January 24, 1978
Grosse Pointe Shores, A Michigan City, Village of (Macomb and Wayne Counties)	not published	January 24, 1978
Huron, Township of	March, 1984	December 2, 1985
Lincoln Park, City of	December 7, 1977	December 4, 1980
Livonia, City of	December 12, 1977	November 25, 1980
Northville, City of (Oakland and Wayne Counties)	January 4, 1978	October 21, 1980
Northville, Township of	November 12, 1997	not published
revised FIS	January 4, 1978	October 21, 1980
Plymouth, City of	January 4, 1978	March 13, 1980
revised FIS	December 18, 1992	December 21, 1994
Plymouth, Charter Township of	January 4, 1978	March 13, 1980
revised FIS	December 18, 1992	December 21, 1994
Redford, Township of	not published	April 24, 1980
River Rouge, City of	February, 1976	December 14, 1976
Riverview, City of	January 6, 1978	May 21, 1980
Rockwood, City of	September, 1975	June 20, 1978
Southgate, City of	February, 1976	August 11, 1977
Sumpter, Township of	March, 1978	May 12, 1980

TABLE 1 – Wayne County CCO Meetings *(continued)*

Community Name	Initial CCO Date	Final CCO Date
Taylor, City of	May 19, 1982	December 3, 1985
revised FIS	September 14, 1994	not published
Trenton, City of	not published	February 20, 1980
Wayne, City of	May 11, 1977	June 11, 1979
Westland, City of	not published	January 6, 1984
Woodhaven, City of	August 13, 1982	March 1, 1985
Wyandotte, City of	February, 1976	March 3, 1977

Results of the technical aspects of this study were coordinated with, reviewed, and approved by the Michigan Department of Environmental Quality (MDEQ), the state coordinating agency.

On September 18, 1995, an initial CCO meeting was held concerning detailed studies performed by the USACE. This meeting was attended by representatives of FEMA; MDEQ; Wayne County; the Charter Township of Brownstown; the Cities of Allen Park, Dearborn, Detroit, Flat Rock, Inkster, Lincoln Park, Livonia, Melvindale, Plymouth, Southgate, Trenton, Wayne, Westland, and Wyandotte; the Townships of Canton, Huron, Northville, and Sumpter; and Stantec. A number of engineering consultants for various communities were also present.

On October 7, 2005, an initial CCO meeting was held concerning this countywide FIS. This meeting was attended by representatives of FEMA, MDEQ, and Wayne County. On July 20, 2006, a Draft Preliminary DFIRM Coordination Meeting was held concerning this countywide FIS. This meeting was attended by representatives of FEMA, MDEQ, Wayne County, and Stantec.

The results of this study were reviewed at final CCO meetings held on February 18, 2009, in the City of Wyandotte and on February 19, 2009, in the City of Livonia. The February 18 meeting was attended by representatives of the Cities of Dearborn Heights, Detroit, Flat Rock, Melvindale, Taylor, Trenton, and Wyandotte; FEMA; MDEQ; and Stantec. The February 19 meeting was attended by representatives of the Cities of Allen Park, Dearborn, Detroit, Flat Rock, Gross Pointe Farms, Livonia, Northville, Plymouth, Romulus, and Wayne; the Townships of Canton, Northville, Plymouth, and Redford; FEMA; MDEQ; Stantec; and Wayne County. All problems raised at these meetings have been addressed in this study.

2.0 AREA STUDIED

2.1 Scope of Study

This countywide FIS covers the geographic area of Wayne County, Michigan, as well as the portion of the City of Northville located in Oakland County and the portion of the Village of Grosse Pointe Shores, A Michigan City, located in Macomb County.

The flooding sources studied by detailed methods for the previously published FISs that have been incorporated into this countywide FIS are shown in TABLE 2.

TABLE 2 – Limits of Previous Detailed Studies

Flooding Source	Limits of Detailed Study
Ashcroft-Sherwood Drain	From the City of Detroit/Township of Redford corporate limits to Telegraph Road
Beitz Drain	From the confluence with Bell Branch to Curtis Road
Bell Branch	From the confluence with Upper River Rouge to 5 Mile Road
Bingell Drain	From the confluence with Lower River Rouge to the City of Wayne/Township of Canton corporate limits
Blakely Drain	From King Road to a point approximately 1,000 feet downstream of Inkster Road
Brighton Drain	From the confluence with Sexton-Kilfoil Drain to a point approximately 250 feet upstream of Williams Road
Brownstown Creek	From the confluence with the Detroit River to the City of Woodhaven/Charter Township of Brownstown corporate limits
Clee Drain East	From the confluence with Brownstown Creek to a point approximately 1,900 feet upstream of Van Horn Road
Clee Drain West	From the confluence with Brownstown Creek to a point approximately 0.9 mile upstream
Cook and Gladding Drain	From the confluence with Huron River to the City of Flat Rock/Township of Huron corporate limits
Division A	From the confluence with Brownstown Creek to the divergence from Frank and Poet Drain
Division B	From the confluence with Brownstown Creek to the divergence from Frank and Poet Drain
Ecorse Creek	From the confluence with the Detroit River to the confluence with North and South Branch Ecorse Creek
Frank and Poet Drain	From the confluence with the Detroit River to King Road and from Pennsylvania Road to Allen Road
Frenchman Creek	From the confluence with the Detroit River to a point approximately 1.9 miles upstream
Hand Drain	From the confluence with Silver Creek to Versailles Lane
Huntington Creek	From the confluence with Trenton Channel to Electric Avenue
Huron River	From the mouth at Lake Erie to the City of Flat Rock/ Township of Huron corporate limits
Jefferson Avenue Diversion	From the confluence with Trenton Channel to a point approximately 1,450 feet upstream
Lower River Rouge	From the confluence with the River Rouge to the City of Dearborn/City of Dearborn Heights corporate limits

TABLE 2 – Limits of Previous Detailed Studies *(continued)*

Flooding Source	Limits of Detailed Study
Marsh Creek	From the confluence with Brownstown Creek to King Road
Middle River Rouge	From the confluence with River Rouge to the City of Dearborn Heights/City of Westland corporate limits and from the City of Livonia/Township of Plymouth corporate limits to the City of Northville/City of Novi corporate limits
Morrison Drain	From the confluence with Silver Creek to the Charter Township of Brownstown/City of Gibraltar corporate limits
North Branch Ecorse Creek	From the confluence with Ecorse Creek to Inkster Road
North Branch Swan Creek	From the Monroe/Wayne County boundary to Willow Road and from Judd Road to Elwell Road
Randolph Street Drain	From the confluence with Middle River Rouge to the City of Northville/City of Novi corporate limits
River Rouge	From the confluence with the Detroit River to the City of River Rouge/City of Detroit corporate limits and from Evergreen Road to the City of Dearborn/City of Dearborn Heights corporate limits
Sexton-Kilfoil Drain	From the City of Allen Park/City of Taylor corporate limits to a point approximately 1,500 feet upstream of Holland Road
Short Cut Canal	From the confluence with the Detroit River to the confluence with River Rouge
Silver Creek	From a point approximately 0.8 mile upstream of the confluence with the Huron River to Van Horn Road
Silver Creek Diversion to Smith Creek	From a point approximately 1,100 feet upstream of Smith Creek to the divergence from Silver Creek
Smith Creek	From the City of Flat Rock/Charter Township of Brownstown corporate limits to Inkster Road
Smith Creek/Silver Creek Overflow	From the Charter Township of Brownstown/City of Rockwood corporate limits to the divergence from Silver Creek
South Branch Ecorse Creek	From the confluence with North Branch Ecorse Creek to the City of Lincoln Park/City of Allen Park corporate limits
Sutliff and Kenope Drain	From Northline Road to Inkster Road
Tarabusi Creek	From the confluence with Bell Branch to the Wayne/ Oakland County boundary
Thorofare Canal	From the confluence with the Detroit River to the confluence with Trenton Channel

TABLE 2 – Limits of Previous Detailed Studies *(continued)*

Flooding Source	Limits of Detailed Study
Tonquish Creek	From the confluence with Middle River Rouge to the City of Westland/Township of Canton corporate limits and from a point approximately 100 feet downstream of Territorial Road to a point approximately 110 feet upstream of Territorial Road
Tributary No. 1	From the confluence with Bell Branch to a point approximately 0.9 mile upstream of Six Mile Road
Upper River Rouge	From the Township of Redford/City of Livonia corporate limits to the Wayne/Oakland County boundary
Willow Creek	From the confluence with Tonquish Creek to the City of Westland/Township of Canton corporate limits

The flooding sources restudied in detail as part of this study are shown in TABLE 3.

TABLE 3 – Limits of Restudied Detailed Studies

Flooding Source	Limits of Detailed Study
Bell Branch	From the confluence with Patter Drain to Newburgh Road
Detroit River	From the mouth at Lake Erie to the outlet of Lake St. Clair
Fellows Creek	From Palmer Road to Canton Center Road
Frank and Poet Drain	From Allen Road to Inkster Road
Green Meadows Drain	From the confluence with Tonquish Creek to a point approximately 865 feet upstream of Morton Taylor Road
Johnson Drain	From 5 Mile Road to the Wayne/Washtenaw County boundary
South Branch Tonquish Creek	From the confluence with Tonquish Creek to Beck Road
Tonquish Creek	From the City of Weston/Township of Canton corporate limits to a point approximately 100 feet downstream of Territorial Road
Trenton Channel	From the confluence with the Detroit River to the divergence from the Detroit River
Upper River Rouge	From the City of Detroit/Township of Redford corporate limits to Inkster Road
Willow Creek	From the City of Westland/Township of Canton corporate limits to Canton Center Road

Lakes

Lake Erie   Lake St. Clare

New detailed studies were performed on the flooding sources shown in TABLE 4 as part of this study.

TABLE 4 – Limits of New Detailed Studies

Flooding Source	Limits of Detailed Study
Bakewell Tile Extension	From the confluence with Bell Branch to a point approximately 1,140 feet upstream
Bird Marsh Drain	From the confluence with Bradshaw Drain to Judd Road
Bradshaw Drain	From Oakville-Waltz Road to Rawsonville Road
Branch No.1 Mosquito Drain	From the confluence with Mosquito Drain to Willow Road
Brooks Drain	From the confluence with the Huron River to Haggerty Road
Brownstown Creek	From the City of Woodhaven/Charter Township of Brownstown corporate limits to a point approximately 1,700 feet upstream of Penn Central Railway
Carroll Drain	From confluence with Burnap Drain to Martinville Road
Clark-Morey Drain	From confluence with Lords Drain to Arkona Road
Day and Cutter Drain	From confluence with Bradshaw Drain to Judd Road
Desbrow Drain	From Oakville-Waltz Road to Judd Road
Head Drain	From Bemis Road to Lohr Road
Johnson Drain	From 7 Mile Road to 5 Mile Road
Johnson Drain Tributary	From confluence with Johnson Drain to a point approximately 0.5 mile upstream of 7 Mile Road
King Drain	From confluence with North Branch Swan Creek to a point approximately 0.6 mile upstream
Lamke Drain	From confluence with Bradshaw Drain to Sherwood Road
Lords Drain	From confluence with Desbrow Drain to Sumpter Road
Lower River Rouge	From a point just downstream of Hannan Road to a point just upstream of Ridge Road
McClaughrey Drain	From Van Born Road to Interstate 275
Mosquito Drain	From Clark Road to Haggerty Road
No.1 Drain	From confluence with North Branch Swan Creek to Willis Road
No.3 Drain	From confluence with North Branch Swan Creek to Clay Road
North Branch Swan Creek	From Clark Road to Judd Road and from Willis Road to Rawsonville Road
Sines Drain	From confluence with Lower River Rouge to Mott Road

TABLE 4 – Limits of New Detailed Studies *(continued)*

Flooding Source	Limits of Detailed Study
Smith Creek	From West Road to Inkster Road
Unnamed Drain 1 to Brownstown Creek	From confluence with Brownstown Creek to a point approximately 1,800 feet upstream of Bredow Avenue
Unnamed Drain 2 to Brownstown Creek	From confluence with Brownstown Creek to a point approximately 600 feet upstream of Prairie Boulevard

Lake
Belleville Lake

Approximate analyses are usually used to study areas having a low development potential or minimal flood hazards. In 2006, additional approximate analyses were performed to update existing approximate study areas and to identify flood hazards not previously identified. Portions of the streams listed in TABLE 5 were studied by approximate methods as a part of this study.

TABLE 5 – Streams Studied by Approximate Methods

Blakely Drain	McClaughrey Drain	RR Canal
Brighton Drain	Middle River Rouge	Sexton and Kilfoil Drain
Fellows Creek	No. 1 Drain	Silver Creek
Fowler Creek	North Branch Ecorse Creek	Smith Creek
Frank and Poet Drain	Randell Drain	Townline Drain
Huron River	River Rouge	Wright Drain
Lower River Rouge		

Streams previously studied by approximate methods and not restudied as a part of this study have also been integrated into this countywide FIS.

Please note that several streams are referred to by names in this countywide FIS that differ from those used in previous FISs. These streams are listed in TABLE 6.

TABLE 6 – Stream Name Changes

Community	Old Name	New Name
Ecorse, City of	North Ecorse Creek	North Branch Ecorse Creek
Grosse Ile, Township of	Thoroughfare Canal	Thorofare Canal
Sumpter, Township of	Disbrow Drain	Desbrow Drain

This countywide FIS also incorporates the determination of letters issued by FEMA resulting in map revisions (Letters of Map Revision (LOMRs)), as shown in TABLE 7.

TABLE 7 – Letters of Map Changes

Community	Case Number	Type	Flood Source(s)	Determination Date
Brownstown, Charter Township of	98-05-091P	LOMR	Smith Creek	July 20, 1998
Brownstown, Charter Township of	04-05-2330P	LOMR	Bramer Drain and Smith Creek	May 12, 2004
Brownstown, Charter Township of	05-05-0096P	LOMR	Brownstown Creek	October 26, 2005
Brownstown, Charter Township of	05-05-2504P	LOMR	Brownstown Creek	October 26, 2005
Canton, Township of	94-05-073P	102A	Rich Drain	May 10, 1994
Canton, Township of	97-05-113P	LOMR	Rich Ditch	August 5, 1997
Canton, Township of	97-05-205P	LOMR	Wiles Drain	August 17, 1997
Canton, Township of	03-05-1836P	LOMR	Wiles Drain	July 8, 2003
Canton, Township of	03-05-3992P	LOMR	Wiles Drain	August 26, 2004
Grosse Pointe Park, City of	97-05-191P	LOMR	Lake St. Clair	May 18, 1988
Woodhaven, City of	99-05-030P	LOMR	Brownstown Creek	December 15, 1999
Woodhaven, City of	04-05-2327P	LOMR	Unnamed Tributary to Marsh Creek	November 8, 2004
Woodhaven, City of	06-05-A706P	LOMR	Clee Drain East	December 12, 2005

Letters of Map Amendment (LOMAs) incorporated for this study are summarized in the Summary of Map Actions (SOMA) included in the Technical Support Data Notebook (TSDN) associated with this FIS update. Copies of the SOMA may be obtained from the Community Map Repository. Copies of the TSDN may be obtained from FEMA.

2.2 Community Description

Wayne County is located in the southeastern portion of the lower peninsula of Michigan and encompasses the City of Detroit. It is bordered on the north by Oakland and Macomb Counties; on the east by Lake St. Clair, the Detroit River, and Lake Erie; on the south by Monroe County; and on the west by Washtenaw County. The major transportation arteries of Wayne County include Interstates 75, 94, 96, and 275; U.S. Highways 10 and 24; and Michigan Highways 12, 15, 14, and 24. The county is also served by Amtrak rail service, Detroit City Airport, Detroit Metropolitan Airport, and Willow Run Airport.

According to U.S. Census Bureau figures, the April 1, 2000, population of Wayne County was reported to be 2,061,162. The estimated July 1, 2009 population was 1,925,848, a decrease of 6.6 percent from the April 1, 2000 population figure. The county seat is the City of Detroit, which is home to approximately 47 percent of the population of Wayne County (Reference 33).

As with most of the state of Michigan, the climate of Wayne County is affected by the moderating influence of the Great Lakes. The heat storage capacity of the lakes tends to dampen climatic extremes and delay seasonal changes. Lake breezes can lower daily maximum temperatures by as much as 15 degrees Fahrenheit (F). The large urban industrial area of the county also affects the climate, by creating urban “heat islands.” The difference in minimum temperatures between urban and rural areas can exceed 10 degrees F under extreme conditions (Reference 34).

On average, the warmest month is July, with average maximum temperatures varying only slightly: 83.4 degrees F at Detroit Metro WSO AP, 84.5 degrees F at Detroit City AP, 85.7 degrees F at Dearborn, and 83.3 degrees F at Grosse Point Farms. The lowest average daily minimum temperature occurs in January and ranges from 17.8 degrees F at Detroit Metro WSO AP and 16.1 degrees F at Dearborn in the west to 19.8 degrees F at Detroit City AP and 18.8 degrees F at Grosse Point Farms in the east. The average total annual precipitation is approximately 33 inches, with a majority of this occurring in the summer months. Average annual snowfall varies from about 28 inches in the eastern portion of the county to 43.5 inches in the western portion of the county (Reference 35).

Wayne County is drained by the tributaries of four major river systems. River Rouge drains over one-third of the county, including most of the northern half, and empties into the Detroit River. A small portion of northeastern Wayne County is drained by the Clinton River watershed. Several small tributaries in this area drain directly into Lake St. Clair and the Detroit River. A small portion of the southern half of the county is drained by the Huron River before, which empties into Lake Erie. The remaining portion of the southern half is drained by several tributaries to the Detroit River and Lake Erie. The largest of these tributaries is Ecorse Creek.

There are approximately 27 different types of soil found in Wayne County. Large portions of the county, including nearly the entire eastern half, have industrial and urban development. Much of the soil in these areas has been disturbed by earthmoving activities or is covered by buildings, streets, or parking lots. In general, the soils in the eastern portion of the county and along the Detroit River and Lake Erie are of fine to moderately-course texture and are somewhat poorly to very poorly drained. The surface layer is generally loam, which overlays firm silty clay loam or firm clay. The western portion of the county is somewhat poorly drained. The surface is sandy loam and the subsoil ranges from fine sand to silty clay. In the extreme northwest, where the topography is gently to strongly sloped, the soils are moderately to well drained loam underlain by firm clay (Reference 34).

A layer of glacial drift ranging in thickness from a few feet to as much as 330 feet overlies the bedrock in Wayne County. These deposits cover all of the Detroit area except for a small outcrop of bedrock in the southeastern part. The glacial deposits are thinnest near the mouth of the Detroit River and, in general, thicken gradually toward the west and more rapidly toward the northwest. Most of the county lays on an old, relatively flat glacial lake plain. A series of sand and gravel ridges, some as high as 25 to 30 feet, rest on the clay plain. These hills and ridges formed as beaches, terraces, and river deltas during the closing part of the glacial epoch. The northwest corner of the county is part of the down slope of the Irish Hills area, a glacial end moraine located to the west and northwest of the county which rises to a relative height of 500 to 600 feet above the level of the Detroit River and Lake Erie at the eastern boundary (Reference 34).

Although large parts of Wayne County are industrial and urban, much of the western half of the county is still undeveloped. The City of Detroit is one of the largest industrial centers in the Midwest and is the headquarters for the U.S. auto industry. The economy is predominately service/sales oriented, accounting for approximately 65 percent of the jobs in the county, while approximately 20 percent of the jobs are in manufacturing. The predominate land use in Wayne County is residential, which was accounted for approximately 42 percent of the land area in 2000. Cultivated and undeveloped land, which includes woodland, shrub, grassland, and wetland, account for approximately 26 percent; commercial/industrial land use accounts for approximately 19 percent (Reference 32).

2.3 Principal Flood Problems

Flooding may occur at any time of the year in Wayne County as a result of melting snow, long-duration rainstorms, or locally-intense thunderstorm activity. Since the area experiences an average of 60 days per season with at least one inch of snow on the ground, snowmelt is often a factor in the severity of flooding events.

For the portion of the county that borders the Detroit River, Lake Erie, and Lake St. Clair, a combination of high lake and river levels along with easterly winds produces conditions favorable for flooding. Historically, the most damaging floods have occurred as a result of this combination. Severe flooding occurred along this shoreline in 1954, 1973, 1985, and 1986 (References 38 and 39). Storms on March 31, 1985, and April 4 and 6, 1985, along with high easterly and northeasterly winds, drove the already high waters of Lake Erie and Lake St. Clair on shore, inundating several communities along the shoreline. This included portions of the Charter Township of Brownstown; the Cities of Ecorse, Gibraltar, Grosse Pointe, and Grosse Pointe Park; the Township of Grosse Ile; and the extreme northeastern portion of the City of Detroit.

Some of the worst recorded flooding damage occurred in 1985 when water flowed through gaps in dikes that had been built by the USACE under Operation Foresight in 1973 and 1974. In many locations, these dikes had been lowered or removed by individual residents in the late 1970s to facilitate access to Lake Erie. The storms on March 31, 1985, and April 4 and 6, 1985, collectively caused about $2 million in damages in Wayne County, with approximately 1,300 homes reporting flood damages (Reference 39).

Inland, flooding is caused primarily by locally-intense thundershowers during the spring and summer. Floods may occur at other times of the year as a result of long-duration rainstorms and/or runoff from frozen ground. Based on stream flow gage records within the county and in surrounding areas, the greatest regional flood recorded occurred in April 1947. Another regional flood, which ranks as the second largest in many communities, occurred in June 1968 (Reference 36).

Major flooding events affecting Wayne County have been recorded in April 1947, May 1948, April 1950, June 1968, and October 1981 (References 35–37). High water levels were recorded along the Detroit River in 1973, 1985, and 1986 (Reference 40). These water levels reflect lake set-up, but not wave run-up during a storm. TABLE 8 shows high-water marks from these past flooding events.

TABLE 8 – High-Water Marks

Flooding Source & Location	Date	Elevation (ft NAVD88)	Flow (cfs)
Detroit River			
Near Grandview Drive and Lowell Street in the City of Gibraltar (NOAA Station ID 9044020)	Jun. 1973	577.0	*
	Mar. 1985	577.0	*
	Feb. 1986	576.7	*
Near Elm Street and Van Alsyne Boulevard in the City of Wyandotte (NOAA Station ID 9044030)	Jun. 1973	577.3	*
	Mar. 1985	577.2	*
	Feb. 1986	576.9	*
At Fort Wayne in the City of Detroit (NOAA Station ID 9044036)	Jun. 1973	576.6	*
	Mar. 1985	576.6	*
	Dec. 1986	576.8	*
At Windmill Pointe Park in the City of Detroit (NOAA Station ID 9044049)	Mar. 1973	577.6	*
	Mar, 1985	577.5	*
	Oct. 1986	577.8	*
Lower River Rouge			
Downstream of John Daly Road (USGS gage no. 04168000)	Apr. 4, 1950	605.0	3,120
	Mar. 26, 1954	605.0	2,790
	Jun. 26, 1968	606.2	3,600
	Apr. 14, 1979	605.0	2,700
Middle River Rouge			
Downstream of Inkster Road (USGS gage no. 04167000)	Jun. 26, 1968	610.9	2,330
	Oct. 1, 1981	610.6	1,970
	May 2, 1983	610.8	1,930
River Rouge			
Upstream of Plymouth Road in the City of Detroit (USGS gage no. 04166500)	Apr. 5, 1947	*	13,000
	May 10, 1948	*	6,130
	Jun. 26, 1968	604.9	7,300
	Oct. 1, 1981	604.6	6,830

* Data not available

2.4 Flood Protection Measures

A combination of structural and nonstructural measures have been utilized in Wayne County to prevent or reduce potential flooding damages. In early 1973, the USACE initiated Operation Foresight to provide interim protection against flooding along the shores of the Great Lakes (Reference 38). In Wayne County, these protection measures consisted of earthen dikes and sand or rock filled cribs in Charter Township of Brownstown and the Cities of Detroit, Ecorse, Gibraltar, Grosse Ile, Grosse Point, and Grosse Point Park. This program was a cooperative effort between federal, state, and local governments. The protection measures were constructed to meet immediate flood threats and were not considered to be permanent. In 1985, as part of the USACE Advance Measures initiative (Reference 39), additional clay dikes and sand filled cribs where constructed in the Charter Township of Brownstown. In response to flooding in

1985 and 1986, the City of Detroit made substantial modifications to sheet piling in the vicinity of Fox Creek in the late 1980s. Numerous residential, commercial, and industrial areas along the shore have employed flood protection measures such as the filling of lower areas or the installation of sheet piling for bank stabilization and shore protection.

Two major channel improvements have been made to River Rouge. A 3-mile navigation channel was constructed from the confluence with the Detroit River upstream to the Turning Basin. From the Turning Basin upstream approximately 4.2 miles to Michigan Avenue, a grassed and concrete-lined flood control channel was constructed.

Brighton Drain, Frank and Poet Drain, and Sexton-Kilfoil Drain have been widened and cleaned within the City of Taylor. Frank and Poet Drain has also been widened and cleaned within the Township of Sumpter. Sutliff-Kenope Drain has been enclosed for approximately 4.5 miles from the confluence with Frank and Poet Drain upstream to Northline Road.

Nonstructural measures of flood protection are also being utilized to aid in prevention of further damage. These are in the form of land use regulations adopted from the Code of Federal Regulations which controls building within areas that have a high risk of flooding (Reference 41). In Michigan, under the state's Floodplain Regulatory Authority, found in Part 31 of the Natural Resources and Environmental Protection Act, 1994 PA 451, (Reference 42), encroachment in the floodplain is limited to that which will cause only insignificant increases in flood heights.

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood that equals or exceeds the 1-percent-annual-chance (100-year) flood in any 50-year period is approximately 40 percent (4 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by detailed methods affecting the community. The information provided in this section was obtained from previously published FIS reports as well as new information. Unless indicated otherwise, the information provided in this section was obtained from the previously published FIS reports for Wayne County.

The drainage basin for Ashcroft-Sherwood Drain has been nearly completely developed and most of the drainage is carried through enclosed storm drains. The discharges expected on Ashcroft-Sherwood Drain were estimated by using rainfall information and the triangular hydrograph method described in the U.S. Department of the Interior publication entitled Design of Small Dams (Reference 48).

The SCS method was used to estimate peak discharges for Bakewell Tile Extension. The SCS method uses precipitation, drainage area, time of concentration, soil types, land use, and, where appropriate, storage routing to estimate runoff hydrographs. The runoff hydrographs were computed using USACE's Hydrologic Modeling System (HEC-HMS) computer program (Reference 56). Loss rates were calculated using the SCS method. The Clark Method was used to calculate transformations. The HEC-HMS meteorological model used the SCS hypothetical storm with a Type II distribution. Precipitation was taken from Bulletin 71: Rainfall Frequency Atlas of the Midwest (Reference 53). Subbasin drainage areas were determined using USGS 7.5-minute topographic quadrangle maps. Times of concentration and SCS curve numbers were determined using the methods described in Computing Flood Discharges for Small Ungaged Watersheds (Reference 86). The kinematic routing reach parameters were determined based on topographic maps and field observations.

The flood-frequency discharge relationship for Beitz Drain was developed by the USACE during preparation of the report entitled Flood Plain Information Report: Upper River Rouge, Minnow Pond Drain, Bell Branch, and Tarabusi Creek (Reference 47).

The flood-frequency discharge relationship for Bell Branch downstream of Ellen Drive was developed by the USACE during preparation of the report entitled Flood Plain Information Report: Upper River Rouge, Minnow Pond Drain, Bell Branch, and Tarabusi Creek (Reference 47). Upstream of Ellen Drive, the SCS method was used to estimate peak discharges.

The SCS UD-21 method developed for MDNR (Reference 49) was used to estimate discharges for Bingell Drain.

The SCS method was used to estimate peak discharges for Bird Marsh Drain.

Flood-frequency discharge data for Blakely Drain was estimated by utilizing the unit hydrograph method developed by Brater (Reference 43). With this method, runoff hydrographs in both urbanized and rural areas are developed considering a number of factors, including population density, infiltration capacity, and rainfall intensity-duration patterns.

The SCS method was used to estimate peak discharges for Bradshaw Drain.

The SCS method was used to estimate peak discharges for Branch No. 1 Mosquito Drain.

The Kinematic Wave Method with a storage-discharge routing was used to estimate the runoff relationships for Brighton Drain. The normal depth routing method was used for the channel routing.

The SCS method was used to estimate peak discharges for Brooks Drain.

Peak discharge estimates for Brownstown Creek downstream of the City of Woodhaven/Charter Township of Brownstown corporate limits were based on an analysis utilizing the unit hydrograph method developed by Brater (Reference 43). An iterative procedure combining flood routing and backwater analysis was used to account for the following: (1) The storage effects between Conrail Railroad Bridge No. 1 and Conrail Bridge No. 2; (2) the diversion of flow from Frank and Poet Drain to Brownstown Creek at the upstream side of Conrail Bridge No. 1 and between Conrail Bridge No. 1 and the Detroit and Toledo Shore Line Railroad; and (3) the diversion of flow from Brownstown Creek to Frank and Poet Drain downstream of Middle Gibraltar Road. Upstream of the City of Woodhaven/Charter Township of Brownstown corporate limits, the USACE HEC-1 computer program (Reference 51) was used to estimate peak discharges.

The SCS method was used to estimate peak discharges for Carroll Drain.

The SCS method was used to estimate peak discharges for Clark-Morey Drain.

Peak discharges for Clee Drain East and Clee Drain West were estimated by utilizing the unit hydrograph method developed by Brater (Reference 43).

The SCS UD-21 method developed for MDNR (Reference 49) was used to estimate discharges for Cook and Gladding Drain.

The SCS method was used to estimate peak discharges for Day and Cutter Drain.

The SCS method was used to estimate peak discharges for Desbrow Drain.

An iterative procedure was used to estimate peak discharges for Division A and Division B. This procedure used flood routing and backwater analyses to determine the flow between Brownstown Creek and Frank and Poet Drain. The initial discharge estimates for Brownstown Creek and Frank and Poet Drain which were used for this procedure were based on an analysis utilizing the unit hydrograph method developed by Brater (Reference 43).

Discharge estimates for Ecorse Creek were based on an analysis of the drainage area, utilizing techniques outlined in SCS Technical Report No. 20 (TR-20), SCS Technical Report No. 55 (TR-55), and the National Engineering Handbook (References 44–46) in conjunction with the unit hydrograph method developed by Brater (Reference 43).

The SCS method was used to estimate peak discharges for Fellows Creek.

Peak discharge estimates for Frank and Poet Drain downstream of Vreeland Road were based on an analysis utilizing the unit hydrograph method developed by Brater (Reference 43). An iterative procedure combining flood routing and backwater analysis was used to account for the following: (1) The storage effect beyond Vreeland Road, which has an impoundment effect, thus causing a decrease in discharge downstream; (2) the diversion of flow from Frank and Poet Drain to Brownstown Creek at the upstream side of Conrail Bridge No. 1 and between Conrail Bridge No. 1 and the Detroit and Toledo Shore Line Railroad; and (3) the diversion of flow from Brownstown Creek to Frank and Poet Drain downstream of Middle Gibraltar Road. For the reach upstream of Vreeland Road but downstream of King Road, the techniques described in SCS TR-20 (Reference 44) were used. For the reach upstream of Pennsylvania Avenue but downstream of Allen Road, discharge estimates were based on an analysis of the drainage area, utilizing techniques outlined in SCS TR-20, SCS TR-55, and the National Engineering Handbook (References 44–46) in conjunction with the unit hydrograph method developed by Brater (Reference 43). Upstream of Allen Road, initial discharge estimates were calculated using the SCS method. The EPA-SWMM computer program (Reference 59) was then used to perform stage routings in order to develop final estimates.

When Frenchman Creek was studied as a part of the 1980 Township of Grosse Ile FIS, it was determined that the tidal effect of the Detroit River resulted in higher water-surface elevations than those calculated by backwater analysis. As a result, no peak discharges were published (Reference 10).

The SCS method was used to estimate peak discharges for Green Meadows Drain.

Discharge estimates for Hand Drain were based on an analysis of the drainage area, utilizing techniques outlined in TR-20, TR-55, and the National Engineering Handbook (References 44–46) in conjunction with the unit hydrograph method developed by Brater (Reference 43).

The SCS method was used to estimate peak discharges for Head Drain.

Peak discharges for Huntington Creek were estimated by utilizing the unit hydrograph method developed by Brater (Reference 43).

The peak discharges for the Huron River downstream of the City of Rockwood/City of Flat Rock corporate limits were based on a gage analysis using the log-Pearson Type III distribution (Reference 50). Seventy-three years of discharge data from the Ann Arbor gaging station (USGS gage no. 04174500) was used. Hydrographs at the Ann Arbor gage were generated using the unit hydrograph method to match the peak discharges obtained by the log-Pearson Type III analysis. By utilizing techniques outlined by TR-20, TR-55, and the National Engineering Handbook (References 44–46), the flows at the study area were then determined by routing the hydrographs at the gage through Geddes Dam, Peninsula Paper Company Dam, Ford Lake Dam, Edison Lake Dam, and Flat Rock Dam and adding the local hydrographs developed using the unit hydrograph method developed by Brater. Operating policies and established lake levels were also taken into consideration in the analyses. Upstream of the City of Rockwood/City of Flat Rock corporate limits, the SCS TR-20 flood-routing method (Reference 44) was used to obtain discharge estimates.

Jefferson Avenue Diversion was studied as a part of the 1981 City of Riverview FIS. No peak discharge estimates were published in the City of Riverview report (Reference 22).

For Johnson Drain downstream of 5 Mile Road, peak discharges were estimated using the USGS regression equation method. This method is based on procedures described in Statistical Models for Estimating Flow Characteristics of Michigan Streams (Reference 54). Variables used in the equation include soil type, contributing drainage area, a regional factor, precipitation, channel slope, basin slenderness ratio, and the percentage of main-channel length that passes through swamp, lake, or pond. This information was obtained from USGS 7.5-minute topographic quadrangle maps, geographical maps, and the report itself. Upstream of 5 Mile Road, the SCS UD-21 method developed for MDNR (Reference 49) was used.

Peak discharges for Johnson Drain Tributary were estimated by utilizing the unit hydrograph method developed by Brater (Reference 43).

The SCS method was used to estimate peak discharges for King Drain.

The SCS method was used to estimate peak discharges for Lamke Drain.

The SCS method was used to estimate peak discharges for Lords Drain.

Discharge estimates for Lower River Rouge were based on frequency analyses of data collected at the stream gage located on Lower River Rouge at John Daly Road (USGS gage no. 04168000). Downstream of Gully Road, a log-Pearson Type III analysis was performed using the USACE Flood Frequency Analysis (HEC-FFA) computer program (Reference 87). The period of record was from 1931 to 1990. A generalized skew coefficient of -0.050 was used. Discharges upstream of Hannan Road were estimated by performing a gage analysis in conjunction with an SCS analysis. This gage analysis was performed using the HEC-FFA computer program (Reference 87). A drainage area ratio with an exponent of 0.9 was used to weight the discharges and compute discharge estimates upstream of the gage.

The flood-frequency discharge relationship for Marsh Creek was obtained from the 1978 City of Gibraltar FIS (Reference 9). No information on the hydrologic analyses performed for this stream was available for this report.

The flood-frequency discharge relationship for McClaughrey Drain was developed by Applied Science, Inc., as part of an appeal. Runoff hydrographs were computed using the HEC-HMS computer program (Reference 56). The HEC-HMS meteorological model used the SCS hypothetical storm with a Type II distribution. Subbasin drainage areas were determined using USGS 7.5-minute topographic quadrangle maps and modified base on aerial photography of recent development. Times of concentration and SCS curve numbers were determined using the methods described in Computing Flood Discharges for Small Ungaged Watersheds (Reference 86). The computed hydrographs were input into an unsteady-state HEC-RAS (Reference 58) model in order to account for floodplain storage and the timing of the inflow hydrograph peaks. The mean of the attenuated discharges was also calculated within each subbasin for use in calculating the regulatory floodway. Both the peak attenuated discharges and the mean of the attenuated peak discharges for each subbasin are reported in TABLE 9.

The SCS method was used to estimate peak discharges for Mosquito Drain.

The peak discharge estimates for Middle River Rouge at Inkster Road were computed by performing a frequency analysis on 34 years of peak discharge records available through 1982 from the gage at Inkster Road (USGS gage no. 04167000). Upstream of the City of Plymouth/Township of Plymouth corporate limits, flood-frequency discharge information contained in an USCE report (Reference 88) was used. The discharge estimates in the USACE report were based on 21 years of record from the gage at Inkster Road and used the TR-20 computer program (Reference 44). Flood hydrographs were developed and flood routing analyses through Ford Pond, Mill Pond, Phoenix Lake, and Waterford Pond were performed. The flood routing method utilized inflow hydrographs, reservoir geometry, and outlet capacity.

The SCS UD-21 method developed for MDNR (Reference 49) was used to estimate discharges for Morrison Drain.

The SCS method was used to estimate peak discharges for Mosquito Drain.

The SCS method was used to estimate peak discharges for No. 1 Drain and No. 3 Drain.

Downstream of the City of Lincoln Park/City of Melvindale corporate limits, peak discharge estimates were calculated using the methods described in TR-20 (Reference 44). For the reach upstream of the City of Lincoln Park/City of Melvindale corporate limits, the HEC-1 computer program (Reference 51) was used. Input parameters included total rainfall volume associated with the 1-percent-annual-chance storm and individual subbasin characteristics such as runoff curve numbers, basin area, overland flow length, roughness coefficients, and representative slopes. A combination of normal depth channel routing and modified Puls storage routing was used in the HEC-1 model to account for extensive overbank flow in the highly residential areas found in the City of Dearborn Heights.

Discharge estimates for North Branch Swan Creek downstream of the confluence with Townline Drain were based on an analysis of the drainage area utilizing techniques outlined in TR-20, TR-55, and the National Engineering Handbook (References 44–46) in conjunction with the unit hydrograph method developed by Brater (Reference 43). For the reach upstream of Clark Road but downstream of Judd Road, the SCS method was used to estimate peak discharges. Upstream of Judd Road, flood-frequency discharge data was estimated by utilizing the unit hydrograph method developed by Brater (Reference 43).

Randolph Street Drain was originally studied as a part of the 1981 City of Northville FIS and was restudied as part of the 1999 City of Northville FIS (Reference 17). Peak discharges from the 1981 study were updated for the 1999 study using HEC-2 (Reference 80). Due to the parameters of this study, information regarding the analyses performed in the 1981 study was unavailable.

Discharge estimates for River Rouge at Plymouth Road were based on frequency analyses performed on data collected at the stream gage located on River Rouge at Plymouth Road in the City of Detroit (USGS gage no. 04166500). A log-Pearson Type III analysis was performed using the HEC-FFA computer program (Reference 87). The period of record was from 1931 to 1990. A generalized skew coefficient of -0.030 was used. Downstream of the confluence with Lower River Rouge, the discharge estimates for River Rouge calculated for Lower River Rouge at the stream gage at John Daly Road (USGS gage no. 04168000) were combined with those calculated for River Rouge at the stream gage at Plymouth Road (USGS gage no. 04166500).

Discharge estimates for Sexton-Kilfoil Drain were based on an analysis of the drainage area, utilizing techniques outlined in TR-20, TR-55, and the National Engineering Handbook (References 44–46) in conjunction with the unit hydrograph method developed by Brater (Reference 43).

Short Cut Canal was studied as a part of the 1977 City of River Rouge FIS. It was determined in the City of River Rouge FIS that flood elevations along the entire length of Short Cut Canal controlled by backwater from the Detroit River. As a result, no peak discharges were published (Reference 21).

Peak discharges for Silver Creek were estimated by utilizing the TR-20 flood routing model (Reference 44). Consideration was given to the storage effects of the areas upstream of the restrictive Detroit, Toledo, and Ironton Railroad crossing and upstream of the Interstate 75 bridge.

Peak discharges for Silver Creek Diversion to Smith Creek were estimated using the TR-20 flood routing model (Reference 44). The storage effect of the area upstream of the restrictive Detroit, Toledo, and Ironton Railroad crossing was considered in this analysis. This analysis showed that the 10-percent-annual-chance flood would not result in stream flow being diverted from Silver Creek to Smith Creek.

Peak discharges and peak discharge hydrographs for Sines Drain were initially estimated by utilizing the unit hydrograph method developed by Brater (Reference 43). These initial estimates were routed through portions of Sines Drain using stage-storage relationships determined from a preliminary HEC-2 (Reference 80) model to obtain the final discharges.

Peak discharges estimates for Smith Creek downstream of the City of Flat Rock/Charter Township of Brownstown corporate limits and upstream of West Road were calculated using the SCS method described above for Bakewell Tile Extension. Within the City of Flat Rock, a diversion into the Smith Creek drainage basin from Silver Creek was included in the analysis. This diversion was quantified in the study of Silver Creek in the 1981 City of Flat Rock FIS (Reference 8). Additionally, a storage routing was done through the Irontown railroad complex. For the reach upstream of the City of Flat Rock/Charter Township of Brownstown corporate limits but downstream of West Road, discharge estimates were based on an analysis of the drainage area utilizing techniques outlined in TR-20 (Reference 44).

Peak discharge estimates for Smith Creek/Silver Creek Overflow were calculated utilizing techniques outlined in TR-20, TR-55, and the National Engineering Handbook (References 44–46). Please note that the drainage area presented in TABLE 9 for Smith Creek/Silver Creek Overflow at its divergence from Silver Creek is shown as zero because the flood discharges are the result of overbank flooding from Silver Creek.

Discharge estimates for South Branch Ecorse Creek/Sexton-Kilfoil Drain were based on an analysis of the drainage area utilizing techniques outlined in TR-20, TR-55, and the National Engineering Handbook (References 44–46) in conjunction with the unit hydrograph method developed by Brater (Reference 43). A decrease in discharge occurs in the downstream direction due to significant channel and overbank storage areas.

The SCS method was used to estimate peak discharges for South Branch Tonquish Creek.

The Kinematic Wave Method with a storage-discharge routing was used to estimate runoff relationships for Sutliff and Kenope Drain. For the channel routing, the normal depth routing method was used.

The flood-frequency discharge relationship for Tarabusi Creek was developed by the USACE during preparation of the report entitled Flood Plain Information Report: Upper River Rouge, Minnow Pond Drain, Bell Branch, and Tarabusi Creek (Reference 47).

When Thorofare Canal was studied as a part of the 1980 Township of Grosse Ile FIS, it was determined that the tidal effect of the Detroit River resulted in higher water-surface elevations than those calculated by backwater analysis. As a result, no peak discharges were published (Reference 10).

Peak discharge estimates for Tonquish Creek downstream of the City of Westland/Township of Canton corporate limits and upstream of Territorial Road were computed using the TR-20 computer program (Reference 44). For the reach between the City of Westland/Township of Canton corporate limits and Territorial Road, the SCS method was used.

The flood-frequency discharge relationship for Tributary No. 1 was developed by the USACE during preparation of the report entitled Flood Plain Information Report: Upper River Rouge, Minnow Pond Drain, Bell Branch, and Tarabusi Creek (Reference 47).
Peak discharges for Unnamed Drain 1 to Brownstown Creek and Unnamed Drain 2 to Brownstown Creek were obtained from a LOMR. Due to the parameters of this study, information regarding the analysis methods was obtained only from the source reports and any other readily available sources. No information on the hydrologic analyses performed for these streams was available for this report.

The flood-frequency discharge relationship for Upper River Rouge was obtained from a USACE report entitled Flood Plain Information Report: Upper River Rouge, Minnow Pond Drain, Bell Branch, and Tarabusi Creek (Reference 47). The discharge estimates upstream of the confluences with Bell Branch and Smith Drain were increased to reflect the basin development that had occurred at the time the 1980 Township of Redford FIS (Reference 20) was completed.

Peak discharge estimates for Willow Creek downstream of the City of Westland/Township of Canton corporate limits were computed using the TR-20 computer program (Reference 44). Upstream of the City of Westland/Township of Canton corporate limits, the SCS method described above for Bakewell Tile Extension was used.

Peak discharge-drainage area relationships for the 10-, 2-, 1-, and 0.2-percent-annual-chance flood events of the flooding sources studied in detail are shown in TABLE 9.

TABLE 9 – Summary of Peak Discharges

		Peak Discharges (cfs)			
Flooding Source and Location	Drainage Area (Sq. Miles)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Ashcroft-Sherwood Drain					
At the City of Detroit/Township of Redford corporate limits	2.90	950	4,520	1,800	2,400

TABLE 9 – Summary of Peak Discharges *(continued)*

Flooding Source and Location	Drainage Area (Sq. Miles)	Peak Discharges (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Bakewell Tile Extension					
Upstream of confluence with Bell Branch	1.62	*	*	260	350
Beitz Drain					
Upstream of confluence with Bell Branch	3.00	180	310	380	560
Bell Branch					
Upstream of confluence with Upper River Rouge	41.50	1,840	3,100	4,000	9,400
Approximately 700 feet downstream of Five Mile Road	33.40	1,650	2,950	3,600	8,460
Upstream of Inkster Road	33.00	1,650	2,900	3,600	5,500
Upstream of confluence with Tarabusi Creek	21.00	1,110	1,720	2,120	3,120
Upstream of confluence with Beitz Drain	15.00	800	1,410	1,740	2,610
Upstream of confluence with Tributary No. 1	7.50	500	890	1,100	1,550
At confluence with Patter Drain	5.00	400	710	880	1,230
Upstream of confluence with Patter Drain	2.48	*	*	700	900
Upstream of confluence with Bakewell Tile Extension	1.95	*	*	360	490
Bingell Drain					
Upstream of confluence with Lower River Rouge	2.40	140	250	300	430
Bird Marsh Drain					
Upstream of confluence with Day and Cutter Drain	1.03	*	*	70	90
Blakely Drain					
Upstream of King Road	19.50	780	1,176	1,360	1,730
Upstream of the Detroit, Toledo, and Ironton Railroad	16.50	738	1,152	1,360	1,870
Bradshaw Drain					
Downstream of confluence with Lamke Drain	9.95	*	*	500	700
Upstream of confluence with Lamke Drain	8.50	*	*	420	600
Downstream of confluence with Day and Cutter Drain	6.49	*	*	330	460

* Data not available

TABLE 9 – Summary of Peak Discharges *(continued)*

Flooding Source and Location	Drainage Area (Sq. Miles)	Peak Discharges (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Bradshaw Drain *(continued)*					
Upstream of confluence with Day and Cutter Drain	4.13	*	*	220	300
Branch No. 1 Mosquito Drain					
Downstream of Arkona Road	0.63	*	*	50	50
Upstream of Arkona Road	0.63	*	*	70	80
Upstream of Ash Road	0.39	*	*	90	110
Brighton Drain					
Upstream of confluence with Sexton-Kilfoil Drain	0.98	254	315	360	487
Brooks Drain					
Upstream of confluence with Huron River	1.75	*	*	240	340
Upstream of confluence with unnamed tributary	1.05	*	*	150	210
Brownstown Creek					
Upstream of South Gibraltar Road	31.87	1,080	1,290	1,345	1,455
Downstream of Middle Gibraltar Road, after the flow division	31.55	1,085	1,295	1,350	1,460
Upstream of Middle Gibraltar Road	31.55	1,090	1,590	1,770	2,225
At Detroit and Toledo Shore Line Railroad	31.36	1,090	1,590	1,770	2,225
At Conrail Bridge No.1	31.36	960	1,355	1,520	1,960
After the flow division, above the storage area	31.36	1,015	1,405	1,580	2,060
Upstream of Conrail Bridge No. 1, above the drainage division	31.36	1,015	1,370	1,465	1,700
Upstream of confluence with Marsh Creek	31.18	1,015	1,370	1,465	1,700
Upstream of Fort Street	8.00	480	650	710	860
Just downstream of confluence with Clee Drain East	6.58	480	650	710	860
At the City of Woodhaven/ Charter Township of Brownstown corporate limits	3.10	*	*	460	686
Upstream of confluence with unnamed drain, west of Dix-Toledo Road	2.40	*	*	381	574

* Data not available

TABLE 9 – Summary of Peak Discharges *(continued)*

		Peak Discharges (cfs)			
Flooding Source and Location	Drainage Area (Sq. Miles)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Brownstown Creek *(continued)*					
Upstream of confluence with unnamed drain, west of King Road	1.30	*	*	206	324
Downstream of Penn Central Railroad	0.30	*	*	73	120
Carroll Drain					
At a point approximately 1,725 feet downstream of confluence with Smith Drain	1.45	*	*	150	210
Upstream of confluence with Burnap Drain	1.03	*	*	240	320
Clark-Morey Drain					
Upstream of confluence with Lords Drain	2.66	*	*	220	300
Upstream of Sumpter Road	1.50	*	*	110	150
Clee Drain East					
Upstream of confluence with Brownstown Creek	0.97	165	240	280	390
Clee Drain West					
Upstream of confluence with Brownstown Creek	1.13	180	285	350	470
Cook and Gladding Drain					
Upstream of confluence with Huron River	1.00	50	75	85	120
Day and Cutter Drain					
Upstream of confluence with Bradshaw Drain	2.36	*	*	140	200
Upstream of confluence with Bird Marsh Drain	1.33	*	*	70	110
Desbrow Drain					
Upstream of Oakville Waltz Road	9.00	*	*	600	800
Downstream of confluence with Lords Drain	8.61	*	*	550	750
Upstream of confluence with Lords Drain	4.05	*	*	230	320
Upstream of Crosswinds Marsh	3.62	*	*	270	380
Upstream of confluence with Northrup Drain	2.05	*	*	160	220

* Data not available

TABLE 9 – Summary of Peak Discharges *(continued)*

Flooding Source and Location	Drainage Area (Sq. Miles)	Peak Discharges (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Division A					
Between Conrail Bridge No. 1 and the Detroit and Toledo Line Railroad	*	145	235	255	270
Above Conrail Bridge No. 1	*	23	155	220	435
Division B					
Upstream of confluence with Brownstown Creek	*	5	300	425	765
Ecorse Creek					
Upstream of confluence with Detroit River	50.09	3,165	4,100	4,410	5,160
Fellows Creek					
Upstream of Palmer Road	16.00	*	*	200	1,600
Upstream of confluence with unnamed tributary located approximately 530 feet downstream of Cherry Hill Road	12.20	*	*	850	1,100
Upstream of confluence with Green Drain	10.20	*	*	700	950
Upstream of confluence with North Branch Fellows Creek	7.20	*	*	490	650
Frank and Poet Drain					
Upstream of South Gibraltar Road	25.40	580	885	1,020	1,385
Downstream of North Gibraltar Road	25.14	580	885	1,020	1,385
Upstream of North Gibraltar Road	25.14	580	610	615	635
At Detroit and Toledo Shore Line Railroad	24.67	595	620	625	650
Upstream of Detroit and Toledo Shore Line Railroad	24.67	740	855	880	915
At Conrail Bridge No. 1	24.67	740	855	880	915
Upstream of Conrail Bridge No. 1	24.67	765	1,005	1,100	1,350
Upstream of Vreeland Road	24.50	770	1,015	1,105	1,365
Upstream of Conrail Bridge	24.50	1,250	1,700	1,840	2,260
Upstream of West Road	23.80	1,240	1,680	1,820	2,230
At King Road	23.00	1,220	1,660	1,800	2,200
Upstream of Pennsylvania Avenue	18.91	1,100	1,510	1,640	1,980

* Data not available

TABLE 9 – Summary of Peak Discharges *(continued)*

Flooding Source and Location	Drainage Area (Sq. Miles)	Peak Discharges (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Frank and Poet Drain *(continued)*					
Upstream of confluence with Sutliff and Kenope Drain	13.22	730	990	1,080	1,310
Upstream of Allen Road	10.60	*	*	1,100	*
Upstream of Interstate 75	10.10	*	*	1,100	*
Upstream of Eureka Road	9.20	*	*	700	*
Upstream of Syracuse Road	8.90	*	*	650	*
Upstream of West Lake Road	8.20	*	*	1,000	*
Upstream of confluence with Packard Drain	7.10	*	*	700	*
Upstream of Beech Daly Road	7.10	*	*	750	*
Green Meadows Drain					
Above Tonquish Creek	1.38	*	*	210	280
Hand Drain					
Upstream of confluence with Silver Creek	1.20	80	130	150	190
Head Drain					
Upstream of Bemis Road	1.59	*	*	160	210
Huntington Creek					
Upstream of confluence with Trenton Channel of Detroit River	2.60	535	725	860	1,140
Upstream of divergence of Jefferson Avenue Diversion	2.60	575	885	1,060	1,460
Huron River					
At mouth at Lake Erie	901.20	7,230	10,590	11,980	14,800
Upstream of confluence with Silver Creek	875.20	6,490	9,390	10,610	13,080
Upstream of the City of Rockwood/City of Flat Rock corporate limits	864.00	6,480	8,750	10,390	12,100
Johnson Drain					
Upstream of the City of Northville/Township of Northville corporate limits	24.50	*	*	1,140	1,340
Upstream of confluence with Johnson Drain Tributary	22.30	*	*	1,060	1,290
Upstream of confluence with Sump Drain	17.20	*	*	850	1,070

* Data not available

TABLE 9 – Summary of Peak Discharges *(continued)*

Flooding Source and Location	Drainage Area (Sq. Miles)	Peak Discharges (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Johnson Drain Tributary					
Upstream of confluence with Johnson Drain	1.60	*	*	368	472
At mouth of west branch	0.80	*	*	219	284
At mouth of east branch	0.50	*	*	194	255
King Drain					
Upstream of confluence with North Branch Swan Creek	0.91	*	*	110	160
Lamke Drain					
Upstream of confluence with Bradshaw Drain	1.45	*	*	100	140
Lords Drain					
Upstream of confluence with Desbrow Drain	4.56	*	*	370	500
Upstream of confluence with Clark-Morey Drain	1.58	*	*	150	200
Lower River Rouge					
Upstream of confluence with River Rouge	92.30	*	*	4,530	*
At John Daly Road	83.20	*	*	4,130	*
Downstream of confluence with Fellows Creek	54.50	*	*	3,000	4,000
Downstream of confluence with McKinstry Drain	37.70	*	*	2,200	2,900
Downstream of confluence with Sines Drain	31.74	*	*	1,900	2,500
Downstream of confluence with Mott Drain	24.37	*	*	1,600	2,100
Downstream of confluence with Fowler Creek	20.65	*	*	1,400	1,900
Upstream of confluence with Fowler Creek	7.62	*	*	800	1,100
Marsh Creek					
Upstream of confluence with Brownstown Creek	23.26	760	1,015	1,095	1,260
At Conrail Bridge No. 2	22.95	760	1,015	1,095	1,260
Upstream of Conrail Bridge No. 2	22.95	810	1,100	1,210	1,450

* Data not available

TABLE 9 – Summary of Peak Discharges *(continued)*

Flooding Source and Location	Drainage Area (Sq. Miles)	Peak Discharges (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
McClaughrey Drain					
Upstream of Van Born Road	6.26	*	*	444/431[1]	656[2]
Upstream of Cogswell Road	4.90	*	*	359/363[1]	515[2]
Upstream of Hannan Road	4.27	*	*	349/346[1]	489[2]
Upstream of Interstate 275	3.52	*	*	304/297[1]	407[2]
Middle River Rouge					
At Inkster Road	99.90	2,000	3,350	4,100	6,280
At Haggerty Road	60.70	*	*	2,140	*
Upstream of Phoenix Lake	51.30	2,570	3,590	4,190	5,780
Upstream of Waterford Pond	48.70	2,420	3,380	3,950	5,470
Downstream of Johnson Drive	45.80	2,270	2,170	3,680	5,090
Upstream of Johnson Drain	19.70	1,040	1,610	1,850	2,490
Upstream of confluence with Randolph Street Drain	17.70	1,040	1,590	1,820	2,460
Morrison Drain					
Upstream of confluence with Silver Creek	1.50	110	175	200	270
Mosquito Drain					
Upstream of Clark Road	2.31	*	*	240	330
Downstream of confluence with Branch No. 1	2.08	*	*	210	290
Portion of stream parallel to Branch No. 1 Mosquito Drain	1.45	*	*	220	280
Upstream of confluence with Manke Drain	1.03	*	*	130	180
Upstream of confluence with tributary west of Carlton West Road	0.44	*	*	90	120
No. 1 Drain					
Upstream of confluence with North Branch Swan Creek	0.96	*	*	140	190
No. 3 Drain					
Upstream of confluence with North Branch Swan Creek	0.94	*	*	110	150
North Branch Ecorse Creek					
Upstream of confluence with Ecorse Creek	17.13	1,500	1,950	2,100	2,430
Upstream of confluence with South Branch Ecorse Creek	17.10	1,500	1,950	2,100	2,495

* Data not available
1 Peak routed discharge within subbasin/Mean of peak routed discharges within subbasin
2 Peak routed discharge within subbasin

TABLE 9 – Summary of Peak Discharges *(continued)*

Flooding Source and Location	Drainage Area (Sq. Miles)	Peak Discharges (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
North Branch Ecorse Creek *(continued)*					
At the City of Ecorse/City of Lincoln Park corporate limits	16.20	980	1,345	1,480	1,710
Upstream of Interstate 75	15.50	960	1,325	1,490	1,730
Upstream of Ethel Street	15.46	1,650	2,150	2,335	2,730
Upstream of Allen Road	14.25	*	*	715	830
Upstream of Southfield Freeway	12.45	*	*	775	1,030
Upstream of Monroe Boulevard	11.53	*	*	1,300	1,570
Upstream of Telegraph Road	10.20	815	1,205	1,370	1,760
Upstream of Beech Daily Road	8.80	760	1,235	1,430	1,900
Upstream of Butler Drain	6.80	495	930	1,160	1,600
North Branch Swan Creek					
Upstream of Will Carleton Drive	18.50	565	855	960	1,170
Upstream of Clark Street	14.20	*	*	1,000	1,400
Upstream of confluence with Carroll Drain	10.90	*	*	750	1,000
Upstream of confluence with Weightman Drain	8.40	*	*	500	700
Upstream of Elwell Road	4.00	*	*	200	260
Upstream of Norfolk Southern Railroad	2.00	*	*	60	70
Randolph Street Drain					
Upstream of confluence with Middle River Rouge	1.90	430	660	770	1,070
Upstream of Lexington Boulevard	1.03	215	363	433	541
Upstream of Coldspring Drive	0.97	207	356	433	532
At a point approximately 900 feet upstream of Coldspring Drive	0.74	159	265	323	407
Just downstream of outlet of the 60-inch culvert	0.38	110	161	180	232
At 8 Mile Road	0.32	73	106	139	207
River Rouge					
Downstream of confluence with Lower River Rouge	308.00	*	*	16,020	*
At USGS gage upstream of Plymouth Road (USGS gage no. 04166500)	187.00	*	*	10,300	*
Silver Creek					
Upstream of confluence with Huron River	24.70	1,490	1,940	2,090	2,320

* Data not available

TABLE 9 – Summary of Peak Discharges *(continued)*

Flooding Source and Location	Drainage Area (Sq. Miles)	Peak Discharges (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Silver Creek *(continued)*					
Upstream of confluence with Morrison Drain	21.60	1,340	1,730	1,860	2,060
Upstream of confluence with Smith Creek	9.80	300	415	460	520
Upstream of divergence of Silver Creek Overflow	9.80	580	740	775	820
Upstream of Interstate 75	9.30	530	675	705	735
Upstream of Woodruff Road	8.00	545	695	730	785
Downstream of Detroit, Toledo, and Ironton Railroad	7.00	470	600	625	665
Upstream of Detroit, Toledo, and Ironton Railroad	7.00	455	665	735	840
Silver Creek Diversion to Smith Creek					
At divergence from Silver Creek	7.00	*	200	300	400
Sines Drain					
Upstream of confluence with Lower River Rouge	8.30	*	*	890	1,090
Upstream of confluence with Rich Drain	7.90	*	*	880	1,090
Upstream of confluence with Apple Run Drain	1.40	*	*	270	350
Smith Creek					
Upstream of confluence with Olmstead Drain	8.70	*	*	540	610
Upstream of Gibraltar Road	8.70	*	*	670	920
Upstream of Vreeland Road	5.50	*	*	480	690
Upstream of Deer Creek Drive	5.50	*	*	530	780
Upstream of confluence with Reh Drain	5.00	125	245	300	440
At a point approximately 0.5 mile downstream of West Road	4.00	85	180	235	365
Upstream of West Road	2.50	55	110	140	215
Upstream of Beech Daly Road	2.00	*	*	140	240
Downstream of Penn Central Railroad	1.50	*	*	110	180
Upstream of confluence with Sherman Drain	0.40	*	*	60	100
Smith Creek/Silver Creek Overflow					
At divergence from Silver Creek	0.00	280	325	315	300

* Data not available

TABLE 9 – Summary of Peak Discharges *(continued)*

		Peak Discharges (cfs)			
Flooding Source and Location	Drainage Area (Sq. Miles)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
South Branch Ecorse Creek/Sexton-Kilfoil Drain					
Upstream of confluence with North Branch Ecorse Drain	11.54	1,120	1,620	1,760	2,055
Upstream of Fort Street	10.82	1,260	1,845	2,020	2,400
Upstream of confluence with Bondie Drain	7.51	831	1,129	1,312	1,872
Upstream of confluence with Brighton Drain	6.37	792	1,080	1,231	1,657
South Branch Tonquish Creek					
Upstream of confluence with Tonquish Creek	2.66	*	*	460	600
Upstream of Canton Center Road	1.84	*	*	240	380
Downstream of Plymouth Park Reservoir	1.50	*	*	220	340
Upstream of Plymouth Park Reservoir	1.50	*	*	310	400
Sutliff and Kenope Drain					
Upstream of Telegraph Road	1.50	335	515	610	870
Tarabusi Creek					
Upstream of confluence with Bell Branch	7.00	1,070	1,560	1,770	2,060
Upstream of Merriman Road	6.00	960	1,410	1,590	1,860
Upstream of Farmington Road	5.00	820	1,200	1,350	1,580
At 8 Mile Road	4.50	730	1,070	1,210	1,410
Tonquish Creek					
Upstream of confluence with Middle River Rouge	24.40	1,430	2,010	2,290	2,890
At the City of Westland/ Township of Canton corporate limits	11.48	*	*	2,100	2,800
Downstream of confluence with unnamed drain downstream of Lilly Road	9.23	*	*	1,900	2,400
Upstream of confluence with Green Meadow Drain	6.66	*	*	1,400	1,900
Upstream of confluence with South Branch Tonquish Creek	4.00	*	*	950	1,300
Upstream of Beacon Hill Drive	2.24	*	*	550	700
Upstream of Territorial Road	2.10	250	380	450	610

* Data not available

TABLE 9 – Summary of Peak Discharges *(continued)*

Flooding Source and Location	Drainage Area (Sq. Miles)	Peak Discharges (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Tributary No. 1					
Upstream of confluence with Bell Branch	7.00	310	520	640	930
Upstream of confluence with West Tributary	5.00	210	370	460	680
Unnamed Drain 1 to Brownstown Creek					
At a point approximately 615 feet upstream of confluence with Brownstown Creek	0.26	*	*	48	61
At a point approximately 0.7 mile upstream of confluence with Brownstown Creek	0.11	*	*	31	44
Unnamed Drain 2 to Brownstown Creek					
Just downstream of Prairie Boulevard	0.02	*	*	5	7
At a point approximately 0.4 mile upstream of confluence with Brownstown Creek	0.01	*	*	3	5
Upper River Rouge					
Upstream of Telegraph Road	67.50	*	*	6,350	14,900
Upstream of Graham Street	25.60	*	*	3,100	5,500
Upstream of Kinloch Street	22.20	*	*	2,690	5,500
Upstream of Inkster Road	21.00	1,160	2,160	2,690	4,200
Upstream of confluence with Clarenceville Drain	19.50	1,150	2,050	2,550	3,900
Willow Creek					
Upstream of confluence with Tonquish Creek	6.91	420	540	550	600
At a point approximately 1,300 feet downstream of Lotz Road	5.98	*	*	800	1,000
Upstream of the southbound Interstate 275 exit ramp	4.67	*	*	650	800
Upstream of confluence with Travis Drain	2.58	*	*	370	480

* Data not available

No peak discharge estimates were calculated for the Detroit River. As a connecting channel between Lake Erie and Lake St. Clair, water-surface elevations along the Detroit River may be affected by many factors, including variability of the discharge rate, the water-surface elevations of Lake Erie and Lake St. Clair, and the extent of ice buildup. The effects of these factors were implicitly included by performing frequency analyses using peak-annual water-surface elevations recorded at the Gibraltar, Wyandotte, Fort Wayne, and Windmill Point water-level gages. This analysis was performed in 2009 by

Applied Science, Inc. The lengths of the peak-annual water-surface elevation records available for this analysis ranged from 51 years at the Wyandotte gage to 94 years at the Fort Wayne gage. Frequency analyses performed on data available from the four gages resulted in flood-elevation estimates that produced a flood profile that stepped up and down, rather than gradually decreasing in the downstream direction as one would expect. This was believed to be due to the differences in the period of record available for each gage. In order to account for this, Applied Science, Inc., performed linear regressions to determine the relationships between the peak-annual water-surface elevations recorded at the Gibraltar, Wyandotte, and Windmill Creek gages to those recorded at the Fort Wayne gage. These linear relationships were used to estimate peak-annual water-surface elevations at each of the shorter-term gages based upon the peak-annual water-surface elevations recorded at the Fort Wayne gage. The peak-annual water-surface elevations estimated for the shorter-term gages were then combined with the recorded peak-annual water-surface elevations so that a period of record of 1915 through 2008 was available at each gage. Log-Pearson Type III analyses were performed using these extended periods of record in order to estimate the flood elevations at each location. The resulting peak flood elevations for the 10-, 2-, 1-, and 0.2-percent-annual-chance flood events at the Detroit River gages are shown in TABLE 10 (Reference 93).

TABLE 10 – Detroit River Flood Elevations

	Peak Elevation (feet NAVD88)			
Flooding Source and Location	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Detroit River				
Gibraltar, MI	575.7	576.5	577.0	577.6
Wyandotte, MI	576.1	576.9	577.4	578.1
Fort Wayne, Detroit, MI	576.2	577.0	577.5	578.1
Windmill Point, Detroit, MI	576.7	577.6	578.1	578.7

A mean monthly discharge rate of 196,000 cfs was estimated for the Detroit River by the USACE, Detroit District, so that a water-surface profile could be developed to be used as an aid in interpolating the peak flood elevations shown in TABLE 10. This discharge was calculated from a flow-duration curve based upon the open-water season (May through November) monthly mean flows. These monthly mean flows were derived by routing the 1900 through 1986 net basin supplies through the Great Lakes under the diversion and outlet conditions present in 1988. This analysis was published in a report entitled Revised Report on Great Lakes Open-Coast Flood Levels: Phase II in 1988 (Reference 61).

The 1-percent-annual-chance peak flood water-surface elevation for Belleville Lake was obtained from a database provided by MDEQ (Reference 90). No information regarding the hydrologic analysis performed to obtain this elevation was available for this study.

In 1974, FEMA contracted the USACE to determine the 1-percent-annual-chance flood levels for the Great Lakes along the U.S. shoreline. The USACE performed log-Pearson Type III analyses on peak-annual water-surface elevations recorded by water level gages to estimate the peak flood water-surface elevations. Both the long-term and short-term lake level fluctuations were considered when estimating the water-surface elevations.

The influence of seiche, wind tides, and storm surges were accounted for, while wave run-up was not. The results of this study were published in 1977 in a report entitled Report on Great Lakes Open-Coast Flood Levels. In the mid-1980s, the Great Lakes experienced record high water levels, which in some locations equaled or exceeded the levels published in the 1977 report. In 1987, FEMA contracted the USACE to update the 1977 study by incorporating the additional water level data collected from 1975 through 1987. The results of the updated study were published in Revised Report on Great Lakes Open-Coast Flood Levels: Phase I and Revised Report on Great Lakes Open-Coast Flood Levels: Phase II in 1988 (References 60 and 61). The flood-elevation estimates for Lake Erie were obtained from Revised Report on Great Lakes Open-Coast Flood Levels: Phase I.

In 2007, the USACE, Detroit District, revised the flood-elevation estimates for Lake St. Clair and Anchor Bay. These revised elevations were published in a report entitled Flood Level Restudy of Lake St. Clair and Anchor Bay, which was used to obtain the stillwater elevations for Lake St. Clair (Reference 83).

Peak stillwater elevations for the 10-, 2-, 1-, and 0.2-percent-annual-chance flood events for Belleville Lake, Lake Erie, and Lake St. Clair are shown in TABLE 11.

TABLE 11 – Summary of Stillwater Elevations

	Peak Elevation (feet NAVD88)			
Flooding Source and Location	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Belleville Lake				
City of Belleville and Township of Van Buren	*	*	652.8	*
Lake Erie				
Fermi Power Plant (Stony Point)	576.7	577.8	578.3	579.2
Lake St. Clair				
City of St. Clair Shores	577.2	578.2	578.6	579.4

* Data not available

Hydrologic calculations were performed using approximate methods for each of the streams listed in TABLE 5. Discharge estimates for Blakely Drain, North Branch Ecorse Creek, and Silver Creek were provided by MDEQ. Discharge estimates for Brighton Drain, Fellows Creek, Fowler Creek, Frank and Poet Drain, the Huron River, Lower River Rouge, McClaughrey Drain, Middle River Rouge, No. 1 Drain, Randell Drain, River Rouge, RR Canal, Sexton and Kilfoil Drain, Smith Creek, Townline Drain, and Wright Drain were obtained using several methods. Estimates were obtained at various locations along the streams from MDEQ or the USACE, or were computed using the National Flood Frequency (NFF) computer program (Reference 84), the USGS PeakFQ computer program (Reference 85), or the methodology described in Computing Flood Discharges for Small Ungaged Watersheds (Reference 86). Subbasins were delineated by MDEQ for each stream. The discharges obtained by the above methods were weighted based on drainage area in order to provide estimates of the 1-percent-annual-chance discharges at the outlet of each subbasin.

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Users should be aware that flood elevations shown on the FIRM represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data tables in the FIS report. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS report in conjunction with the data shown on the FIRM.

Cross section data used in the riverine hydraulic models are described in TABLE 12. Due to the parameters of this study, limited information regarding cross section data is available. When available, the methods used to obtain cross section data for each hydraulic study are listed.

TABLE 12 – Cross Section Data

Flooding Source	Location	Description
Ashcroft-Sherwood Drain	Township of Redford	Cross sections for backwater analysis were obtained by field survey. Cross sections were located at close intervals near bridges and culverts.
Bakewell Tile Extension	City of Livonia	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Beitz Drain	City of Livonia	Cross sections for backwater analysis were obtained by field survey and supplemented with USGS Quad Maps with a scale of 1:24,000 and a contour interval of 10 feet and topographic maps with a scale of 1:4,800 and a contour interval of 5 feet.
Bell Branch	Township of Redford	Cross sections for backwater analysis were obtained by field survey in 2003. Cross sections were located at close intervals near bridges and culverts.
	City of Livonia, downstream of Ellen Drive	Cross sections for backwater analysis were obtained by field survey and supplemented with USGS Quad Maps with a scale of 1:24,000 and a contour interval of 10 feet, topographic maps with a scale of 1:4,800 and a contour interval of 5 feet, and USACE surveys (Reference 47).

TABLE 12 – Cross Section Data *(continued)*

Flooding Source	Location	Description
Bell Branch *(continued)*	City of Livonia, upstream of Ellen Drive	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Bingell Drain	City of Wayne	Cross sections for backwater analysis were obtained by field survey in 1978 and supplemented with USGS Quad Maps with a scale of 1:24,000 and a contour interval of 5 feet.
Bird Marsh Drain	Township of Sumpter	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Blakely Drain	City of Taylor	Cross sections for backwater analysis were obtained by field survey in 1982 and 1983. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
	Charter Township of Brownstown	Cross sections for backwater analysis were obtained by field survey in 1978 and supplemented with USGS Quad Maps with a scale of 1:24,000 and a contour interval of 5 feet.
Bradshaw Drain	Township of Sumpter	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Branch No. 1 Mosquito Drain	Township of Sumpter	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Brighton Drain	City of Taylor	Cross sections for backwater analysis were obtained by field survey in 1982 and 1983. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.

TABLE 12 – Cross Section Data *(continued)*

Flooding Source	Location	Description
Brooks Drain	Township of Sumpter	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Brownstown Creek	City of Gibraltar	Cross sections for backwater analysis were obtained from topographic maps with a scale of 1:1,200 and a contour interval of 2 feet. All bridge and culvert elevation data and structural geometry was either field surveyed, extracted from design data, or taken from a report by Wade, Trim & Associates.
	City of Woodhaven	Cross sections for backwater analysis were obtained by field survey in 1982.
	Charter Township of Brownstown	Cross sections for backwater analysis were obtained by field survey and were supplemented with USGS Quad Maps with a scale of 1:24,000 and a contour interval of 5 feet.
Carroll Drain	Township of Sumpter	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Clark-Morey Drain	Township of Sumpter	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Clee Drain East	City of Woodhaven	Cross sections for backwater analysis were obtained by field survey in 1982.
Clee Drain West	City of Woodhaven	Cross sections for backwater analysis were obtained from detailed city drain maps. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Cook and Gladding Drain	City of Flat Rock	Cross sections for backwater analysis were obtained by field survey in 1978 and supplemented with USGS Quad Maps with a scale of 1:24,000 and a contour interval of 5 feet.

TABLE 12 – Cross Section Data *(continued)*

Flooding Source	Location	Description
Day and Cutter Drain	Township of Sumpter	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Desbrow Drain	Township of Sumpter	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Division A	City of Gibraltar	not available
Division B	City of Gibraltar	not available
Ecorse Creek	Cities of Ecorse and Wyandotte	Cross sections for backwater analysis were obtained by field survey in 1975. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Fellows Creek	Township of Canton	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Frank and Poet Drain	City of Gibraltar	Cross sections for backwater analysis were obtained from topographic maps with a scale of 1:1,200 and a contour interval of 2 feet. Elevation data and structural geometry for all bridges and culverts was either field surveyed, extracted from design data, or taken from a report by Wade, Trim & Associates.
	City of Southgate	Cross sections for backwater analysis were obtained by field survey in 1976. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
	City of Taylor	Cross sections for backwater analysis were obtained by field survey and supplemented with topographic maps with a scale of 24,000 and a contour interval of 5 feet. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.

TABLE 12 – Cross Section Data *(continued)*

Flooding Source	Location	Description
Frank and Poet Drain *(continued)*	City of Trenton	Cross sections for backwater analysis were obtained by field survey in 1978 and supplemented with topographic maps with a scale of 1:24,000 and a contour interval of 5 feet.
Frenchman Creek	Township of Grosse Ile	Cross sections for backwater analysis were obtained by field survey.
Green Meadows Drain	Township of Canton	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Hand Drain	Township of Huron	Cross sections for backwater analysis were obtained by field survey in 1984. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Head Drain	Township of Sumpter	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Huntington Creek	City of Riverview	Cross sections for backwater analysis were obtained by field survey in 1978 and supplemented with USGS Quad Maps with a scale of 1:2,400 and a contour interval of 5 feet.
Huron River	City of Flat Rock	Cross sections for backwater analysis were obtained from a USACE study and supplemented with topographic maps with a scale of 1:24,000 and a contour interval of 5 feet.
	City of Rockwood	Cross sections for backwater analysis were obtained by field survey in 1975. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
	Charter Township of Brownstown	Cross sections for backwater analysis were obtained by field survey in 1975.
Jefferson Avenue Diversion	City of Riverview	Cross sections for backwater analysis were obtained by field survey in 1978 and supplemented with USGS Quad Maps with a scale of 1:2,400 and a contour interval of 5 feet.

TABLE 12 – Cross Section Data *(continued)*

Flooding Source	Location	Description
Johnson Drain	Townships of Northville and Plymouth	Cross sections for backwater analysis were obtained by field survey and supplemented with topographic maps with a scale of 24,000 and a contour interval of 10 feet. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Johnson Drain Tributary	Township of Northville	Cross sections for backwater analysis were obtained by field survey and supplemented with topographic maps with a scale of 24,000 and a contour interval of 10 feet. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
King Drain	Township of Sumpter	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Lamke Drain	Township of Sumpter	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Lords Drain	Township of Sumpter	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Lower River Rouge	City of Dearborn	not available
	Township of Canton	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Marsh Creek	City of Woodhaven	Cross sections for backwater analysis were obtained by field survey in 1982.
	Charter Township of Brownstown	Cross sections for backwater analysis were obtained by field survey in 1978 and supplemented by USGS Quad Maps with a scale of 1:24,000 and a contour interval of 5 feet.

TABLE 12 – Cross Section Data *(continued)*

Flooding Source	Location	Description
McClaughrey Drain	City of Romulus and Township of Van Buren	Cross sections for backwater analysis were obtained by field survey and supplemented with topographic maps with a scale of 24,000 and a contour interval of 5 feet. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Middle River Rouge	City of Dearborn Heights	Cross sections for backwater analysis were obtained by field survey and supplemented with topographic maps with a scale of 1:24,000 and a contour interval of 5 feet. One bridge cross section was obtained from the USACE.
	City and Township of Northville	Cross sections for backwater analysis were obtained from the USACE and supplemented by USGS Quad Maps with a scale of 1:24,000 and a contour interval of 10 feet.
	City and Township of Plymouth	Cross sections for backwater analysis were obtained by field survey and supplemented with topographic maps with a scale of 1:4,800 and a contour interval of 2 feet.
Morrison Drain	Charter Township of Brownstown	Cross sections for backwater analysis were obtained by field survey in 1978 and supplemented with USGS Quad Maps with a scale of 1:24,000 and a contour interval of 5 feet.
Mosquito Drain	Township of Sumpter	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
No. 1 Drain	Township of Sumpter	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
No. 3 Drain	Township of Sumpter	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.

TABLE 12 – Cross Section Data *(continued)*

Flooding Source	Location	Description
North Branch Ecorse Creek	City of Allen Park	Cross sections for backwater analysis were obtained using a topographic map with a scale of 1:4,800 and a contour interval of 2 feet. All bridges and culverts were field surveyed to obtain elevation data and structural data.
	Cities of Dearborn and Dearborn Heights	Cross sections for backwater analysis were obtained by field survey and supplemented with USGS Quad Maps with a scale of 1:24,000. Four bridge cross sections were obtained from community street improvement plans. All other bridges, culverts, and structures were field surveyed to obtain elevation data and structural geometry. Valley cross sectional data was estimated based on visual comparisons and rough measurements.
	City of Ecorse	Cross sections for backwater analysis were obtained by field survey in 1975. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
	City of Lincoln Park	Cross sections for backwater analysis were obtained by field survey and supplemented with two USGS Quad Maps with scales of 1:2,400 and 1:24,000 and a contour interval of 5 feet.
	City of Taylor	Cross sections for backwater analysis were obtained by field survey in 1982 and 1983. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
North Branch Swan Creek	Township of Huron	Cross sections for backwater analysis were obtained by field survey in 1984. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
	Township of Sumpter	Cross sections for backwater analysis were obtained by field survey and supplemented with topographic maps with a scale of 24,000 and a contour interval of 5 feet. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.

TABLE 12 – Cross Section Data *(continued)*

Flooding Source	Location	Description
Randolph Street Drain	City of Northville, downstream of Lexington Boulevard	Cross sections for backwater analysis were obtained from plans by Johnson and Anderson, Inc., for improvements to the drain and supplemented by topographic maps with a scale of 1:24,000 and a contour interval of 10 feet.
	City of Northville, upstream of Lexington Boulevard	Cross sections for backwater analysis were obtained by field survey.
River Rouge	City of Dearborn	not available
	City of River Rouge	Cross sections for backwater analysis were obtained by extracting depth information from USACE dredging charts.
Sexton-Kilfoil Drain	City of Taylor	Cross sections for backwater analysis were obtained by field survey in 1982 and 1983. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Short Cut Canal	City of River Rouge	Cross sections for backwater analysis were obtained by extracting depth information from USACE dredging charts.
Silver Creek	City of Flat Rock	Cross sections for backwater analysis were obtained by field survey in 1978 and supplemented with USGS Quad Maps with a scale of 1:24,000 and a contour interval of 5 feet.
	City of Rockwood	Cross sections for backwater analysis were obtained by field survey in 1975. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
	Charter Township of Brownstown	Cross sections for backwater analysis were obtained by field survey in 1978 and supplemented with USGS Quad Maps with a scale of 1:24,000.
Silver Creek Diversion to Smith Creek	City of Flat Rock	Cross sections for backwater analysis were obtained by field survey in 1978 and supplemented with USGS Quad Maps with a scale of 1:24,000 and a contour interval of 5 feet.
Sines Drain	Township of Canton	Cross sections for backwater analysis were obtained by field survey and supplemented with topographic maps with a coutour interval of 5 feet. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.

TABLE 12 – Cross Section Data *(continued)*

Flooding Source	Location	Description
Smith Creek	City of Flat Rock	Cross sections for backwater analysis were obtained by field survey and supplemented with topographic maps with a coutour interval of 5 feet. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
	Charter Township of Brownstown, downstream of West Road	Cross sections for backwater analysis were obtained by field survey in 1978 and were supplemented with USGS Quad Maps with a scale of 1:24,000 and a contour interval of 5 feet.
	Charter Township of Brownstown, upstream of West Road	Cross sections for backwater analysis were obtained by field survey and supplemented with topographic maps with a coutour interval of 5 feet. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Smith Creek/Silver Creek Overflow	City of Rockwood	Cross sections for backwater analysis were obtained by field survey in 1975. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
South Branch Ecorse Creek	Cities of Lincoln Park and Wyandotte	Cross sections for backwater analysis were obtained by field survey and supplemented with two USGS Quad Maps with scales of 1:2,400 and 1:24,000 and a contour interval of 5 feet. One bridge cross section obtained from construction plans.
South Branch Tonquish Creek	City and Township of Plymouth	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Sutliff and Kenope Drain	City of Taylor	Cross sections for backwater analysis were obtained by field survey in 1982 and 1983. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Tarabusi Creek	City of Livonia	Cross sections for backwater analysis were obtained by field survey and supplemented with USGS Quad Maps with a scale of 1:24,000 and a contour interval of 10 feet, topographic maps with a scale of 1:4,800 and a contour interval of 5 feet, and USACE surveys (Reference 47).

TABLE 12 – Cross Section Data *(continued)*

Flooding Source	Location	Description
Thorofare Canal	Township of Grosse Ile	Cross sections for backwater analysis were obtained by field survey.
Tonquish Creek	City of Plymouth and Townships of Canton and Plymouth	Cross sections for backwater analysis for the portion downstream of a point located approximately 100 feet downstream of Territorial Road were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. Upstream of this point, cross sections were obtained from an SCS study published in 1968 (Reference 91). All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
	City of Westland	not available
Tributary No. 1	City of Livonia	Cross sections for backwater analysis were obtained by field survey and supplemented with USGS Quad Maps with a scale of 1:24,000 and a contour interval of 10 feet and topographic maps with a scale of 1:4,800 and a contour interval of 5 feet.
Upper River Rouge	City of Livonia	Cross sections for backwater analysis were obtained by field survey and supplemented with USGS Quad Maps with a scale of 1:24,000 and a contour interval of 10 feet and topographic maps with a scale of 1:4,800 and a contour interval of 5 feet.
	Township of Redford	Cross sections for backwater analysis were obtained by field survey and supplemented with topographic maps with a coutour interval of 5 feet. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.
Willow Creek	City of Willow	not available
	Township of Canton	Cross sections for backwater analysis were obtained by field survey in 2005 and supplemented with digital topographic data provided by Wayne County. All bridges and culverts were field surveyed to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the FIRM.

Water-surface elevations for the stream studied by detailed methods were calculated using either the USACE HEC-2 step-backwater computer program (Reference 80), the USACE HEC-RAS step-backwater computer program (Reference 58), or the SCS WSP-2 computer program (Reference 62). HEC-2 and HEC-RAS calculate water-surface elevations by solving the one-dimensional energy equation. Energy losses are evaluated by friction and through contraction and expansion losses. WSP-2 calculates water-surface elevations using the step method to solve the Bernoulli equation and the Bureau of Public Roads bridge loss procedures.

HEC-2 was used to compute water-surface elevations for Ashcroft-Sherwood Drain, Beitz Drain, Bell Branch downstream of Ellen Drive, Bingell Drain, Blakely Drain, Brighton Drain, Brownstown Creek in the Cities of Gibraltar and Woodhaven, Clee Drain East, Clee Drain West, Cook and Gladding Drain, Division A, Division B, Ecorse Creek, Frank and Poet Drain, Frenchman Creek, Hand Drain, Huntington Creek, the Huron River, Jefferson Avenue Diversion, Johnson Drain, Johnson Drain Tributary, Lower River Rouge in the City of Dearborn, Marsh Creek, Middle River Rouge, Morrison Drain, North Branch Ecorse Creek, North Branch Swan Creek, Randolph Street Drain, River Rouge, Sexton-Kilfoil Drain, Short Cut Canal, Silver Creek, Silver Creek Diversion to Smith Creek, Sines Drain, Smith Creek, Smith Creek/Silver Creek Overflow, South Branch Ecorse Creek, Sutliff and Kenope Drain, Tarabusi Creek, Tributary No. 1, Upper River Rouge, and Willow Creek in the Township of Canton.

HEC-RAS was used to compute water-surface elevations for Bakewell Tile Extension, Bell Branch upstream of Ellen Drive, Bird Marsh Drain, Bradshaw Drain, Branch No. 1 Mosquito Drain, Brooks Drain, Brownstown Creek within the Charter Township of Brownstown, Carroll Drain, Clark-Morey Drain, Day and Cutter Drain, Desbrow Drain, Fellows Creek, Green Meadows Drain, Head Drain, King Drain, Lamke Drain, Lords Drain, Lower River Rouge within the Township of Canton, McClaughrey Drain, Mosquito Drain, No. 1 Drain, No. 3 Drain, South Branch Tonquish Creek, and Tonquish Creek from the City of Westland/Township of Canton corporate limits to a point located approximately 100 feet downstream of Territorial Road.

WSP-2 was used to compute water-surface elevations for Tonquish Creek both within the City of Westland and upstream of a point located approximately 100 feet downstream of Territorial Road and Willow Creek within the City of Westland.

The methods for determining starting water-surface elevations used in each hydraulic model are described in TABLE 13.

TABLE 13 – Starting Water-Surface Elevations

Flooding Source	Location	Method for Determining Starting WSE
Ashcroft-Sherwood Drain	Township of Redford	Slope-area method (normal depth)
Bakewell Tile Extension	City of Livonia	Obtained from flood elevations of Bell Branch at the confluence
Beitz Drain	City of Livonia	Assumed to be the mean annual water-surface elevation of Bell Branch at the confluence

TABLE 13 – Starting Water-Surface Elevations *(continued)*

Flooding Source	Location	Method for Determining Starting WSE
Bell Branch	Township of Redford	Slope-area method (normal depth)
Bingell Drain	City of Wayne	Critical depth
Bird Marsh Drain	Township of Sumpter	Obtained from flood elevations of Day and Cutter Drain at the confluence
Blakely Drain	Charter Township of Brownstown	Slope-area method (normal depth)
Bradshaw Drain	Charter Township of Brownstown	Slope-area method (normal depth)
Branch No. 1 Mosquito Drain	Township of Sumpter	Obtained from flood elevations of Mosquito Drain at the confluence
Brighton Drain	City of Taylor	Slope-area method (normal depth)
Brooks Drain	Township of Sumpter	Slope-area method (normal depth)
Brownstown Creek	City of Gibraltar	Assumed to be the mean flood (50-percent-annual-chance event) elevation of Lake Erie
Carroll Drain	Township of Sumpter	Obtained from flood elevations of Burnap Drain at the confluence
Clark-Morey Drain	Township of Sumpter	Obtained from flood elevations of Lords Drain at the confluence
Clee Drain East	City of Woodhaven	Obtained from flood elevations of Brownstown Creek at the confluence
Clee Drain West	City of Woodhaven	Obtained from flood elevations of Brownstown Creek at the confluence
Cook and Gladding Drain	City of Flat Rock	Obtained from flood elevations of the Huron River at the confluence
Day and Cutter Drain	Township of Sumpter	Obtained from flood elevations of Bradshaw Drain at the confluence
Desbrow Drain	Township of Sumpter	Slope-area method (normal depth)
Division A	City of Gibraltar	not available
Division B	City of Gibraltar	not available
Ecorse Creek	City of Wyandotte	Assumed to be the mean flood elevation of the Detroit River at the mouth of Ecorse Creek
Fellows Creek	Township of Canton	Slope-area method (normal depth)
Frank and Poet Drain	City of Gibraltar	Assumed to be the mean flood (50-percent-annual-chance event) elevation of Lake Erie
	City of Southgate	Slope-area method (normal depth)
Frenchman Creek	Township of Grosse Ile	Assumed to be the mean water-surface elevation of the Detroit River at the mouth of Frenchman Creek
Green Meadows Drain	Township of Canton	Obtained from flood elevations of Tonquish Creek at the confluence

TABLE 13 – Starting Water-Surface Elevations *(continued)*

Flooding Source	Location	Method for Determining Starting WSE
Hand Drain	Township of Huron	Obtained from flood elevations of Silver Creek at the confluence
Head Drain	Township of Sumpter	Slope-area method (normal depth)
Huntington Creek	City of Riverview	Assumed to be the mean water-surface elevation of the Detroit River at the mouth of Huntington Creek
Huron River	Charter Township of Brownstown	Assumed to be the mean flood (50-percent-annual-chance event) elevation of Lake Erie
Jefferson Avenue Diversion	City of Riverview	Assumed to be the mean water-surface elevation of the Detroit River at the mouth of Huntington Creek
Johnson Drain	Township of Northville	Slope-area method (normal depth)
Johnson Drain Tributary	Township of Northville	Slope-area method (normal depth)
King Drain	Township of Sumpter	Slope-area method (normal depth)
Lamke Drain	Charter Township of Brownstown	Obtained from flood elevations of Bradshaw Drain at the confluence
Lords Drain	Township of Sumpter	Obtained from flood elevations of Desbrow Drain at the confluence
Lower River Rouge	City of Dearborn	Obtained from flood elevations of River Rouge at the confluence
	Township of Canton	High-water mark from the flood of 1968
Marsh Creek	City of Gibraltar	Obtained from flood elevations of Brownstown Creek at the confluence
McClaughrey Drain	City of Wayne	Slope-area method (normal depth)
Middle River Rouge	City of Dearborn Heights	Assumed to be the mean flood elevation of River Rouge at the confluence
	City and Township of Northville	Obtained from flood routing analyses performed on Middle River Rouge at Phoenix Lake
	Township of Plymouth	Based on information from <u>National Dam Safety Program Inspection Report: Middle River Rouge Basin, Newburgh Dam, Wayne County, Michigan</u> (Reference 72)
Morrison Drain	Charter Township of Brownstown	Obtained from <u>Revised Report on Great Lakes Open-Coast Flood Levels: Phase II</u> and an unpublished profile for the Detroit River (Reference 73)
Mosquito Drain	Township of Sumpter	Slope-area method (normal depth)
No. 1 Drain	Township of Sumpter	Slope-area method (normal depth)
No. 3 Drain	Township of Sumpter	Slope-area method (normal depth)

TABLE 13 – Starting Water-Surface Elevations *(continued)*

Flooding Source	Location	Method for Determining Starting WSE
North Branch Ecorse Creek	City of Allen Park	Slope-area method (normal depth)
	City of Ecorse	Obtained from flood elevations of Ecorse Creek at the confluence
North Branch Swan Creek	Township of Huron	Taken from the 1982 Township of Ash (Monroe County, MI) FIS
	Township of Sumpter	Slope-area method (normal depth)
Randolph Street Drain	City of Northville	Critical depth
River Rouge	City of Dearborn	High-water mark from the flood of 1968
	City of Rouge River	Obtained from gage analyses for the Detroit River
Sexton-Kilfoil Drain	City of Taylor	Slope-area method (normal depth)
Short Cut Canal	City of Rouge River	Obtained from gage analyses for the Detroit River
Silver Creek	City of Rockwood	Obtained by a convergence technique by commencing 6,900 feet downstream of Streicher Road Bridge over Smith Creek and converging to normal depth near the Streicher Road bridge
Silver Creek Diversion to Smith Creek	City of Flat Rock	Obtained from a 1-percent-annual-chance rating curve developed for Smith Creek
Sines Drain	Township of Canton	Slope-area method (normal depth)
Smith Creek	City of Flat Rock	Slope-area method (normal depth)
	Charter Township of Brownstown	Obtained from Smith Creek Flood Plain Study (Reference 75)
Smith Creek/Silver Creek Overflow	City of Rockwood	Obtained by a convergence technique by commencing 6,900 feet downstream of Streicher Road Bridge over Smith Creek and converging to normal depth near the Streicher Road bridge
South Branch Ecorse Creek	City of Wyandotte	Obtained from flood elevations of Ecorse Creek at the confluence
South Branch Tonquish Creek	City of Plymouth	Obtained from Flood Hazard Analyses: Tonquish Creek and Tributaries, Wayne County, Michigan (Reference 76)

TABLE 13 – Starting Water-Surface Elevations *(continued)*

Flooding Source	Location	Method for Determining Starting WSE
Sutliff and Kenope Drain	City of Taylor	For the 10- and 2-percent-annual chance discharges, the slope-area method (normal depth) was used. For the 1- and 0.2-percent-annual-chance discharges, the enclosed drain located just downstream of the study was assumed to be just at the point of full flowing at its downstream end and the required surcharge was calculated. The surcharge elevation was added to the pipe crown at the enclosure's entrance to determine the starting water-surface elevation.
Tarabusi Creek	City of Livonia	Assumed to be the mean annual water-surface elevation of Bell Branch at the confluence
Thorofare Canal	Township of Grosse Ile	Assumed to be the mean water-surface elevation of the Detroit River at the mouth of Frenchman Creek
Tonquish Creek	City of Westland	not available
Tributary No. 1	City of Livonia	Assumed to be the mean annual water-surface elevation of Bell Branch at the confluence
Upper River Rouge	Township of Redford	Slope-area method (normal depth)
Willow Creek	City of Westland	not available

Roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and based on field observation, photographs (References 65–69), methods used by Chow (Reference 70), and the descriptions presented in USGS Water-Supply Paper 1849 (Reference 71). TABLE 14 shows the channel and overbank "n" values used in the hydraulic calculations for streams studied by detailed methods.

TABLE 14 – Manning's "n" Values

Flooding Source	Channel "n" Values	Overbank "n" Values
Ashcroft-Sherwood Drain	0.040–0.078	0.013–0.100
Bakewell Tile Extension	0.035–0.040	0.030–0.080
Beitz Drain	0.020–0.035	0.060–0.120
Bell Branch	0.030–0.040	0.030–0.120
Bingell Drain	0.035–0.060	0.020–0.120
Bird Marsh Drain	0.030–0.073	0.030–0.100
Blakely Drain	0.030–0.035	0.060–0.120
Bradshaw Drain	0.030–0.059	0.020–0.100
Branch No.1 Mosiquito	0.045–0.050	0.030–0.045

TABLE 14 – Manning's "n" Values *(continued)*

Flooding Source	Channel "n" Values	Overbank "n" Values
Brighton Drain	0.027–0.030	0.050–0.080
Brooks Drain	0.035	0.040–0.060
Brownstown Creek	0.030–0.040	0.030–0.100
Carroll Drain	0.041–0.070	0.030–0.250
Clark-Morey Drain	0.020–0.050	0.040–0.080
Clee Drain East	0.035	0.070
Clee Drain West	0.035	0.070
Cook and Gladding Drain	0.015–0.060	0.060–0.120
Day and Cutter Drain	0.030–0.069	0.030–0.100
Desbrow Drain	0.020–0.050	0.030–0.085
Division A	0.030–0.040	0.045–0.080
Division B	0.030–0.040	0.045–0.080
Ecorse Creek	0.032–0.035	0.035–0.060
Fellows Creek	0.025–0.045	0.030–0.120
Frank and Poet Drain	0.015–0.045	0.025–0.120
Frenchman Creek	0.025–0.040	0.060–0.150
Green Meadows Drain	0.030–0.040	0.030–0.085
Hand Drain	0.030–0.035	0.030–0.040
Head Drain	0.040–0.050	0.030–0.080
Huntington Creek	0.013–0.035	0.060–0.100
Huron River	0.020–0.050	0.035–0.120
Jefferson Avenue Diversion	not published	not published
Johnson Drain	0.035–0.045	0.030–0.100
Johnson Drain Tributary	0.030–0.045	0.030–0.080
King Drain	0.040	0.040–0.100
Lamke Drain	0.030–0.040	0.030–0.100
Lords Drain	0.040–0.050	0.030–0.085
Lower River Rouge	0.035–0.045	0.035–0.120
Marsh Creek	0.030–0.040	0.045–0.120
McClaughrey Drain	0.035–0.045	0.030–0.080
Middle River Rouge	0.020–0.050	0.030–0.150
Morrison Drain	0.030–0.040	0.040–0.070
Mosquito Drain	0.040–0.050	0.030–0.070
No.1 Drain	0.030–0.080	0.033–0.100
No.3 Drain	0.040–0.045	0.030–0.085
North Branch Ecorse Creek	0.020–0.070	0.020–0.100
North Branch Swan Creek	0.035–0.050	0.030–0.095

TABLE 14 – Manning's "n" Values *(continued)*

Flooding Source	Channel "n" Values	Overbank "n" Values
Randolph Street Drain	0.013–0.035	0.050–0.120
Rouge River	0.040[1]	0.070[1]
Sexton-Kilfoil Drain	0.030–0.035	0.035–0.070
Short Cut Canal		
Silver Creek	0.015–0.045	0.018–0.120
Silver Creek Diversion to Smith Creek	0.015–0.040	0.018–0.120
Sines Drain	0.030–0.052	0.035–0.150
Smith Creek	0.020–0.045	0.030–0.100
Smith Creek/Silver Creek Overflow	0.030–0.045	0.040–0.100
South Branch Ecorse Creek	not published	not published
South Branch Tonquish Creek	0.024–0.060	0.030–0.125
Sutliff and Kenope Drain	0.030–0.040	0.070
Tarabusi Creek	0.030–0.050	0.050–0.150
Thorofare Canal	not published	not published
Tonquish Creek	0.013–0.060	0.050–0.125
Tributary No.1	0.025–0.040	0.060–0.120
Upper River Rouge	0.023–0.040	0.015–0.100
Willow Creek	0.024–0.056	0.030–0.100

[1] The Manning's "n" values presented for River Rouge are for the reach within the City of Dearborn. Manning's "n" values for the reach within the City of River Rouge are not available.

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations as shown on the profiles (Exhibit 1) are, therefore, considered valid only if hydraulic structures, in general, remain unobstructed and if channel and overbank conditions remain essentially the same as ascertained during this study.

The hydrologic and hydraulic analyses in the City of Gibraltar are dependent upon the assumptions that the areas along the Conrail and the Detroit and Toledo Shore Line Railroads and the area bounded by Middle Gibraltar Road, West Jefferson Avenue, and Brownstown Creek remain unobstructed and that a waterway capable of conveying the 1-percent-annual-chance discharge remains as development continues. The waterway would be essential for conveyance of flow crossover between Frank and Poet Drain and Brownstown Creek (Reference 9).

Two anomalous flooding situations occur on Ashcroft-Sherwood Drain. The first concerns a low, valley-shaped depression between Telegraph Road and Brady Street. This area is affected by shallow ponding due to backwater from Ashcroft-Sherwood Drain, which changes from an underground system to an open stream channel at Telegraph Road. The backwater elevation was computed from the HEC-2 model for Ashcroft-Sherwood Drain. The second anomaly occurs downstream of Telegraph Road. Flooding overtops the left bank of the drain just downstream of Telegraph Road and passes behind and around the Temple Baptist Church parking lot as sheet flow before returning to the drain several hundred feet downstream. The depth of this flow was determined by the HEC-2 model to be approximately 2 feet (Reference 20).

A divided flow condition occurs on Huntington Creek when the headwater elevations upstream of the second railroad bridge crossing exceed the elevation of West Jefferson Avenue. This results in flow being diverted across West Jefferson Avenue north of the industrial complex to Jefferson Avenue Diversion. To evaluate this divided flow condition, individual backwater analyses were performed for Huntington Creek and Jefferson Avenue Diversion. A review of these analyses indicates that the 2-, 1-, and 0.2-percent-annual-chance flood elevations upstream of the second railroad bridge would be high enough that flow could be diverted. The Jefferson Avenue Diversion section was evaluated as a typical valley section as well as a weir section. The valley section analysis proved to be the most conservative insofar as flood discharges for a given elevation were concerned. Based on results of this analysis, it was determined that the 2-, 1-, and 0.2-percent-annual-chance flood flows along Huntington Creek are reduced downstream of cross section I due to the diversion of flow to Jefferson Avenue Diversion. The analysis also indicated that the 1-percent-annual-chance flood elevations along Huntington Creek are approximately 0.6 foot lower than when diversion of flow at West Jefferson Avenue is neglected. Consequently, the floodway is divided between Huntington Creek and Jefferson Avenue Diversion (Reference 22).

An unsteady-state HEC-RAS model was used to compute the 1- and 0.2-percent-annual-chance water-surface elevations for McClaughrey Drain. Lateral inflow hydrographs calculated using HEC-HMS were entered at the upstream end of each of the four subbasins delineated during the hydrology phase. This allowed for floodplain storage and timing of the stream flow to be accounted for within the HEC-RAS model. A separate steady-state HEC-RAS model was prepared for calculating regulatory floodways. The mean of the attenuated discharges calculated within each subbasin and reported in TABLE 9 were applied at the upstream most cross section within each subbasin (Reference 92).

Sutliff and Kenope Drain is enclosed from the City of Southgate/City of Taylor corporate limits to just upstream of North Line Road. The enclosed drain is a 10-foot concrete pipe from the inlet just upstream of North Line Road to a point approximately 0.57 mile downstream. From this point to the corporate limits, twin 10-foot concrete pipes are used. For the 10- and 2-percent-annual-chance discharges, normal depths in the pipes were used as the starting water-surface elevations. These normal depths were compared to the elevation required to pass over a sill that is part of the pipe inlet structure. For the 1- and 0.2-percent-annual-chance discharges, the amount of surcharging required to pass the additional flow above the full flowing capacity of the 10-foot pipe was calculated based on the assumption that the 10-foot pipe was just at the point of full flowing at its downstream end. The surcharge elevation was added to the pipe crown at its inlet to determine the starting water-surface elevations (Reference 26).

Thorofare Canal was initially to be studied in detail as a stream. However, after the field survey was completed and the data analyzed, it became apparent that the water-surface elevations calculated by backwater analysis would be lower than flood elevations determined for the Detroit River for the selected flood events (Reference 10).

No hydraulic analyses were performed to provide estimates of the elevations of floods of the selected recurrence intervals along the Detroit River. As a connecting channel between Lake Erie and Lake St. Clair, water-surface elevations along the Detroit River may be affected by many factors, including variability of the discharge rate, the water-surface elevations of Lake Erie and Lake St. Clair, and the extent of ice buildup. Elevations for the 0.2-, 1-, 2-, and 10-percent-annual-chance floods were instead estimated at four water-level gage stations by performing frequency analyses, as discussed above in Section 3.1. A hydraulic analysis was performed by the USACE, Detroit District, to estimate the mean water-surface profile for the channel in order to aid in interpolating flood elevations between the gages. This hydraulic model used the mean monthly discharge rate for the open-water season (May through November) along with the channel for the conditions present in 1970. The results of this analysis were published in Revised Report on Great Lakes Open-Coast Flood Levels: Phase II (Reference 61).

Flood profiles were drawn showing the computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals. In cases where two or more profiles are close together, due to limitations of the profile scale, only the higher profile has been shown.

Detail-studied streams that were not restudied as part of this map update may include a "profile base line" on the maps. This "profile base line" provides a link to the flood profiles included in this FIS. The detail-studied stream centerline may have been digitized or redelineated as part of this revision. The "profile base lines" for these streams were based on the best available data at the time of their study and are depicted as they were on the previous FIRMs. In some cases where improved topographic data was used to redelineate floodplain boundaries, the "profile base line" may deviate significantly from the channel centerline or may be outside the SFHA.

Water-surface elevations for the 1-percent-annual-chance flood for the streams listed in TABLE 5 were computed using simplified HEC-RAS models. These models contained unsurveyed cross sections with an average spacing between 1,000 and 3,000 feet. Cross section geometry data was obtained from 2-foot contours created from TIN data provided by Wayne County. A single representative Manning's roughness coefficient was selected for the channel and overbank areas for each study reach based on visual observations and standard accepted values published in Open-Channel Hydraulics by V.T. Chow (Reference 70). Flow changes were located at the upstream most cross section of each reach and at each subbasin location. Downstream reach boundary conditions were either a known water-surface elevation or normal depth. No structures were included in the models.

All elevations are referenced from North American Vertical Datum of 1988 (NAVD88); elevation reference marks used in the study are shown on the maps.

3.3 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum in use for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the finalization of the North American Vertical Datum of 1988

(NAVD88), many FIS reports and FIRMs are being prepared using NAVD88 as the referenced vertical datum.

Effective information for this countywide FIS report was converted from NGVD29 to NAVD88 based on data presented in TABLE 15. The average conversion of NGVD29-0.496=NAVD88 was applied to convert all effective Base Flood Elevations (BFEs). Structure and ground elevations in the community must, therefore, be referenced to NAVD88. It is important to note that adjacent communities in other counties not presented in this countywide FIS may be referenced to NGVD29. This may result in differences in BFEs across the corporate limits between communities.

TABLE 15 – Datum Conversion Calculation

Quadrangle Name	Quadrangle Corner	Latitude	Longitude	Difference
Wyandotte OE E	SW	42.125	83.125	-0.568 ft
Northville	SW	42.375	83.500	-0.420 ft
Redford	SW	42.375	83.375	-0.453 ft
Royal Oak	SW	42.375	83.250	-0.479 ft
Highland Park	SW	42.375	83.125	-0.512 ft
Gross Pointe	SW	42.375	83.000	-0.518 ft
Gross Pointe OE E	SW	42.375	82.275	-0.531 ft
Wayne	SW	42.250	83.500	-0.433 ft
Inkster	SW	42.250	83.375	-0.453 ft
Dearborn	SW	42.250	83.250	-0.502 ft
Detroit	SW	42.250	83.125	-0.564 ft
Belleville	SW	42.125	83.500	-0.466 ft
Flat Rock NE	SW	42.125	83.375	-0.499 ft
Wyandotte	SW	42.125	83.250	-0.541 ft

Average Conversion	-0.496
Range	-0.568 to -0.420
Max Offset	0.076

Note that for the portion of the City of Northville within Oakland County, the average conversion of NGVD29-0.385=NAVD88 was applied to convert effective BFEs. This conversion was obtained from the 2006 Oakland County FIS (Reference 89).

For more information on NAVD88, see the FEMA publication entitled Converting the National Flood Insurance Program to the North American Vertical Datum of 1988 (Reference 81), or contact the Vertical Network Branch, National Geodetic Survey, Coast and Geodetic Survey, National Oceanic and Atmospheric Administration, Silver Spring, Maryland 20910 (http://www.ngs.noaa.gov).

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the TSDN associated with this countywide FIS report and FIRM for this community. Interested individuals may contact FEMA to access these data.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages state and local governments to adopt sound floodplain management programs. Therefore, each FIS provides l-percent-annual-chance (100-year) flood elevations and delineations of the 1- and 0.2-percent-annual-chance (500-year) floodplain boundaries and l-percent-annual-chance floodway to assist communities in developing floodplain management measures. This information is presented on the FIRM and in many components of this countywide FIS report, including Flood Profiles, Floodway Data tables, and the Summary of Stillwater Elevations table. Users should reference the data presented in this countywide FIS report as well as additional information that may be available at the local map repository before making flood elevation and/or floodplain boundary determinations.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using a Digital Terrain Model (DTM) with a contour interval of 2 feet (Reference 82).

Floodplain boundaries along the Detroit River are based upon the estimated flood elevations at the Gibraltar, Wyandotte, Fort Wayne, and Windmill Point water-level gage stations and the estimated flood elevations of Lake Erie and Lake St. Clair. Between each of these points, flood elevations were estimated by linearly interpolating.

The 1- and 0.2-percent-annual-chance floodplain boundaries are shown on the FIRM. On this map, the l-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE) and the 0.2-percent-annual-chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1- and 0.2-percent-annual-chance floodplain boundaries are close together, only the l-percent-annual-chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the l-percent-annual-chance floodplain boundary is shown on the FIRM. For lakes designated as Zone A, the floodplains were delineated using the 1-percent-annual-chance pool elevation, which was obtained from MDEQ, if available. Otherwise, they were digitized to the nearest contour and checks were made to see that the elevations fall between the normal pool and the top of dam elevations.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the l-percent-annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the l-percent-annual-chance flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodway presented in this countywide FIS report and on the FIRM was computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations have been tabulated for selected cross sections. In cases where the floodway and l-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and l-percent-annual-chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water surface elevation of the l-percent-annual-chance flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in FIGURE 1.

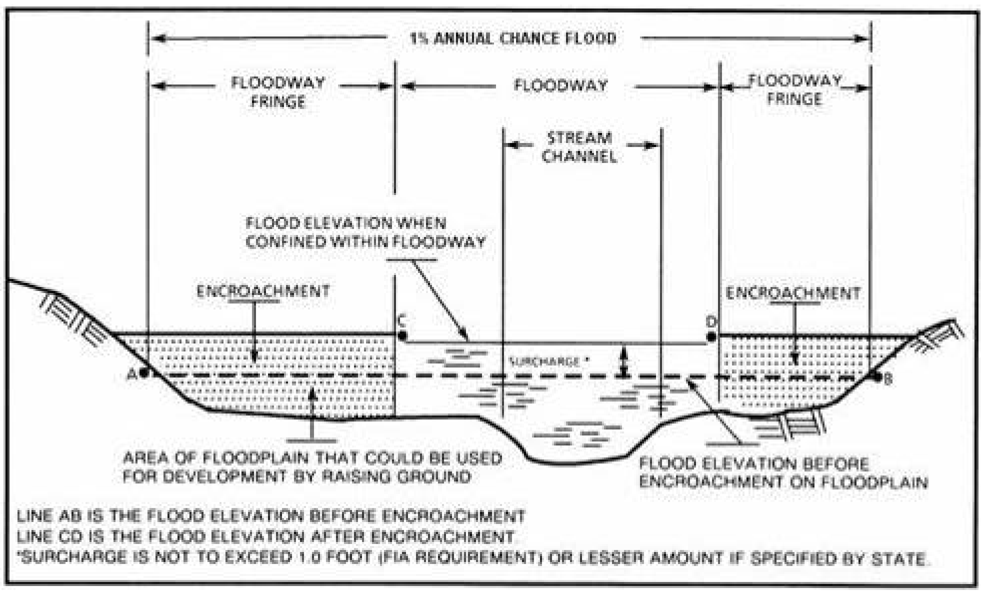

FIGURE 1 – Floodway Schematic

In Michigan, under the state's Floodplain Regulatory Authority, found in Part 31 of the Natural Resources and Environmental Protection Act, 1994 PA 451, (Reference 42), encroachment in the floodplain is limited to that which will cause only insignificant increases in flood heights. At the recommendation of MDEQ, Land and Water

Management Division, a floodway having no more than a 0.1-foot surcharge has been delineated for this countywide FIS.

The floodways presented in this study were initially computed on the basis of equal conveyance reduction from each side of the flood plain. In those areas where problems arose with the equal conveyance reduction encroachment option of the HEC-2 or HEC-RAS backwater programs, modifications were applied based on experience.

In the redelineation efforts, the floodways were not recalculated. As a result, there were areas where the previous floodway did not fit within the boundaries of the redelineated 1-percent-annual-chance floodplain. In these areas, the floodway was reduced. Water-surface elevations, both with and without a floodway, the mean velocity in the floodway, and the location and area at each surveyed cross section as determined by hydraulic methods can be seen in TABLE 16, Floodway Data. The width of the floodway depicted by the FIRM panels and the amount of reduction to fit the floodway inside the 1-percent-annual-chance floodplain, if necessary, is also listed. Note that floodways were not computed for Clee Drain West, Cook and Gladding Drain upstream of Arsenal Road, Middle River Rouge within the Township of Plymouth, Smith Creek upstream of West Road, Tonquish Creek in the City of Westland, or Willow Creek within the City of Westland.

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
ASHCROFT-SHERWOOD DRAIN									
A	266	44	348	5.2		607.6	607.6	607.7	0.1
B	736	70	475	3.8		609.8	609.8	609.9	0.1
C	1,020	95	581	3.1		610.3	610.3	610.4	0.1
D	1,440	85	441	4.1		610.8	610.8	610.9	0.1
E	2,211	65	508	1.3		615.8	615.8	615.9	0.1
F	2,750	46	349	2.0		616.0	616.0	616.1	0.1

[1] Feet above City of Detroit/Township of Redford corporate limits

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

ASHCROFT-SHERWOOD DRAIN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BAKEWLL TILE ENTENSION									
A	1,143	17	76	3.4		671.5	671.5	671.5	0.1

[1] Feet above confluence with Bell Branch

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

BAKEWELL TILE EXTENSION

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BEITZ DRAIN									
A	70	23	113	3.4		642.0	639.3[2]	639.4	0.1
B	2,115	83	105	3.6		646.2	646.2	646.2	0.0
C	2,409	13	48	8.0		647.5	647.5	647.5	0.0
D	2,526	13	70	5.5		648.7	648.7	648.7	0.0
E	4,065	46	90	4.2		655.1	655.1	655.2	0.1
F	4,565	8	32	11.8		655.8	655.8	655.8	0.0
G	5,640	8	38	9.9		660.8	660.8	660.8	0.0

[1] Feet above confluence with Bell Branch
[2] Elevation computed without consideration of backwater effects from Bell Branch

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

BEITZ DRAIN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BELL BRANCH									
A	1,220	322	1335	3.2		617.0	617.0	617.1	0.1
B	2,210	396	1235[2]	3.2[2]		617.0	617.0	617.1	0.1[3]
C	3,630	520	1235	3.2	50	617.1	617.1	617.2	0.1
D	4,620	605	1235	3.2		617.1	617.1	617.2	0.1
E	5,275	574	1235	3.2		617.2	617.2	617.3	0.1
F	5,405	577	3954	1.0		617.4	617.4	617.5	0.1
G	6,930	613	4642	0.9		617.5	617.5	617.6	0.1
H	8,680	260	1816[2]	2.2[2]		617.6	617.6	617.7	0.1[3]
I	9,135	280	2015[2]	1.8[2]		617.7	617.7	617.8	0.1[3]
J	10,180	309	2230	1.6	40	617.8	617.8	617.9	0.1
K	10,770	337	2979	1.2		618.0	618.0	618.1	0.1
L	10,900	349	3220	1.1	30	618.5	618.5	618.6	0.1
M	12,010	460	1238[2]	2.9[2]		618.6	618.6	618.7	0.1[3]
N	13,408	388	1239	2.9		618.7	618.7	618.8	0.1
O	14,735	250	1242[2]	2.9[2]		620.0	620.0	620.0	0.0
P	14,830	200	1,417	2.5		620.8	620.8	620.9	0.1
Q	15,350	258	1,607	2.2		621.0	621.0	621.1	0.1
R	16,660	367	2,801	1.3		621.8	621.8	621.9	0.1
S	17,460	348	1,959	1.8		622.0	622.0	622.1	0.1
T	18,660	568	2,659	1.4		622.8	622.8	622.9	0.1
U	19,230	197	901	2.4		623.1	623.1	623.2	0.1
V	19,760	230	1,371	1.5	48	623.8	623.8	623.9	0.1
W	20,230	183	1,006	2.1		624.1	624.1	624.2	0.1
X	20,810	180	950	2.2		624.5	624.5	624.6	0.1
Y	21,080	55	590	3.6		625.2	625.2	625.3	0.1

[1] Feet above confluence with Upper River Rouge
[2] This data is approximate
[3] The surcharge is less than or equal to value shown

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

BELL BRANCH

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BELL BRANCH (CONTINUED)									
Z	21,156	55	591	3.6		625.2	625.2	625.3	0.1
AA	22,506	274	1,874	1.1		625.8	625.8	625.9	0.1
AB	23,606	283	1,119	1.9		626.6	626.6	626.7	0.1
AC	26,786	383	1,686	1.3	39	629.1	629.1	629.2	0.1
AD	27,536	173	785	2.7		629.6	629.6	629.7	0.1
AE	28,731	53	435	4.9		632.1	632.1	632.2	0.1
AF	28,805	53	469	4.5		632.7	632.7	632.8	0.1
AG	29,370	568	2,950	0.7		633.4	633.4	633.5	0.1
AH	31,015	174	1,030	2.1	55	633.7	633.7	633.8	0.1
AI	32,490	66	562	3.8		635.6	635.6	635.7	0.1
AJ	32,536	53	563	3.8	30	635.6	635.6	635.7	0.1
AK	33,210	188	962	2.2		636.3	636.3	636.4	0.1
AL	34,890	249	1,063	2.0		638.1	638.1	638.2	0.1
AM	36,770	55	312	6.8		639.9	639.9	640.0	0.1
AN	36,856	55	316	6.7		640.0	640.0	640.1	0.1
AO	38,006	304	1,383	1.5		641.7	641.7	641.7	0.0
AP	38,806	229	764	2.8		642.0	642.0	642.0	0.0
AQ	40,378	183	847	2.1		643.9	643.9	644.0	0.1
AR	41,438	272	1,470	1.2		644.6	644.6	644.7	0.1
AS	43,338	290	850	2.0		645.9	645.9	646.0	0.1
AT	44,198	185	553	2.0		648.1	648.1	648.2	0.1
AU	45,396	59	212	3.3		650.1	650.1	650.2	0.1
AV	46,033	245	1,058	0.7		654.4	654.4	654.5	0.1
AW	47,219	139	730	1.0		654.5	654.5	654.6	0.1

[1] Feet above confluence with Upper River Rouge

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

BELL BRANCH

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BELL BRANCH (CONTINUED)									
AX	47,888	26	150	4.7		656.7	656.7	656.8	0.1
AY	48,609	34	164	4.3		658.4	658.4	658.4	0.0
AZ	49,382	44	165	4.3		660.1	660.1	660.1	0.0
BA	50,913	39	177	3.4		665.0	665.0	665.1	0.1
BB	51,502	41	183	3.3		667.3	667.3	667.3	0.0
BC	52,351	100	238	1.5		671.0	671.0	671.0	0.0

[1] Feet above confluence with Upper River Rouge

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

BELL BRANCH

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BINGELL DRAIN									
A	200	18	51	5.9		654.5	642.5[2]	642.6	0.1
B	500	18	49	6.1		654.5	644.9[2]	645.0	0.1
C	933	28	47	6.4		654.5	649.6[2]	649.7	0.1
D	1,143	72	572	0.5		657.8	657.8	657.9	0.1
E	1,660	53	297	1.0		657.8	657.8	657.9	0.1
F	1,910	29	113	1.0		657.8	657.8	657.9	0.1
G	2,260	27	90	3.3		658.0	658.0	658.1	0.1
H	2,660	23	78	3.8		659.8	659.8	659.9	0.1
I	2,860	24	90	3.3		661.1	661.1	661.2	0.1
J	3,090	90	429	0.7		661.6	661.6	661.7	0.1

[1] Feet above confluence with Lower River Rouge
[2] Elevation computed without consideration of backwater effects from Lower River Rouge

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

BINGELL DRAIN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BIRD MARSH DRAIN									
A	182	18	37	1.9		666.5	666.5	666.5	0.0
B	2,376	19	39	1.8		669.3	669.3	669.3	0.0
C	4,908	19	37	1.9		671.5	671.5	671.6	0.1
D	5,650	14	30	2.4		672.1	672.1	672.2	0.1
E	6,529	19	52	1.4		672.8	672.8	672.8	0.0
F	7,496	17	40	1.7		673.2	673.2	673.2	0.0
G	9,178	47	69	1.0		675.7	675.7	675.8	0.1

[1] Feet above confluence with Day and Cutter Drain

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

BIRD MARSH DRAIN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BRADSHAW DRAIN									
A	1,013	334	655	0.8		642.8	642.8	642.9	0.1
B	3,466	45	169	3.0		644.1	644.1	644.2	0.1
C	5,591	426	544	0.9		645.2	645.2	645.2	0.0
D	7,628	222	475	0.9		647.2	647.2	647.3	0.1
E	9,595	34	111	3.8		649.7	649.7	649.7	0.0
F	11,710	337	330	1.3		652.7	652.7	652.8	0.1
G	14,627	67	206	2.0		657.0	657.0	657.1	0.1
H	17,825	23	81	4.1		660.4	660.4	660.5	0.1
I	19,227	27	100	3.3		662.9	662.9	662.9	0.0
J	20,723	27	104	3.2		665.2	665.2	665.2	0.0
K	22,385	31	94	2.3		666.6	666.6	666.6	0.0

[1] Feet above Monroe/Wayne County boundary

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

BRADSHAW DRAIN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BRANCH NO. 1 MOSQUITO DRAIN									
A	3,368	14	616	1.8		624.0	624.0	624.0	0.0
B	4,705	459	1,201	0.1		626.9	626.9	626.9	0.0
C	5,687	171	1,902	0.3		626.9	626.9	626.9	0.0
D	7,362	399	575	0.7		627.2	627.2	627.2	0.0

[1] Feet above confluence with Mosquito Drain

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

BRANCH NO. 1 MOSQUITO DRAIN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BRIGHTON DRAIN									
A	280	123	178	2.0		605.4	602.6[2]	602.7	0.1
B	765	208	411	0.9		605.4	603.4[2]	603.5	0.1
C	2,603	200	275	1.3		605.4	605.2[2]	605.3	0.1

[1] Feet above confluence with Sexton-Kilfoil Drain
[2] Elevation computed without consideration of backwater effects from Sexton-Kilfoil Drain

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

BRIGHTON DRAIN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BROOKS DRAIN									
A	120	21	172	2.0		615.9	615.9	616.0	0.1
B	1,333	38	64	3.8		627.8	627.8	627.9	0.1
C	3,164	34	83	2.9		634.8	634.8	634.9	0.1
D	3,781	122	218	1.1		641.5	641.5	641.5	0.0
E	4,636	10	27	5.5		643.7	643.7	643.8	0.1
F	5,965	14	36	4.2		648.4	648.4	648.4	0.0
G	7,371	135	281	0.5		654.9	654.9	654.9	0.0
H	8,097	11	40	3.8		654.9	654.9	655.0	0.1

[1] Feet above confluence with Huron River

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

BROOKS DRAIN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BROWNSTOWN CREEK									
A	1,631	287	987	1.4		577.2	574.0[2]	574.0	0.0
B	2,131	251	765	1.8		577.2	575.2[2]	575.2	0.0
C	2,182	340	1,277	1.1		577.2	575.2[2]	575.2	0.0
D	2,632	210	638	2.1		577.2	575.2[2]	575.2	0.0
E	2,932	60	420	3.2		577.2	575.3[2]	575.3	0.0
F	3,049	31	227	5.9		577.2	575.7[2]	575.7	0.0
G	3,250	329	1,588	0.8		577.2	576.4[2]	576.4	0.0
H	7,298	52	313	5.7	32	577.2	576.9[2]	576.9	0.0
I	7,355	52	783	2.3	148	577.4	577.4	577.4	0.0
J	7,805	500	585	3.0		577.6	577.6	577.6	0.0
K	8,305	195	503	3.5		578.3	578.3	578.3	0.0
L	8,658	36	334	5.3		579.2	579.2	579.2	0.0
M	8,816	70	636	2.8		579.7	579.7	579.7	0.0
N	9,127	59	362	4.2		579.8	579.8	579.8	0.0
O	9,764	550	1,690	0.9		580.4	580.4	580.4	0.0
P	10,264	701	1,770	0.8		580.4	580.4	580.4	0.0
Q	10,764	565	1,361	1.1		580.5	580.5	580.5	0.0
R	11,134	493	834	0.9		580.5	579.5[3]	579.5	0.0
S	11,734	184	273	2.6		580.5	579.6[3]	579.6	0.0
T	12,164	59	540	1.3	213	580.5	580.1[3]	580.1	0.0
U	12,884	27	244	2.9	145	580.6	580.6	580.6	0.0
V	13,324	37	378	1.9	165	581.3	581.3	581.3	0.0
W	13,724	24	186	1.8	186	581.7	581.7	581.7	0.0
X	13,894	27	215	3.3	77	581.8	581.8	581.8	0.0

[1] Feet above confluence with Detroit River
[2] Elevation computed without consideration of backwater effects from Detroit River
[3] Elevation computed without consideration of backwater effects from Marsh Creek

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

BROWNSTOWN CREEK

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BROWNSTOWN CREEK (CONTINUED)									
Y	14,079	19	83	8.6		582.6	582.6	582.6	0.0
Z	14,420	197	808	0.9	98	584.1	584.1	584.1	0.0
AA	14,800	101	518	1.4	175	584.2	584.2	584.2	0.0
AB	15,021	85	354	2.0		584.3	584.3	584.3	0.0
AC	15,055	60	602	1.2	290	585.7	585.7	585.8	0.1
AD	15,270	296	446	1.6	33	585.7	585.7	585.8	0.1
AE	15,315	79	542	1.3	235	586.2	585.6	586.3	0.1
AF	15,613	625	1,638	0.4		586.4	586.4	586.4	0.0
AG	16,222	250	530	1.3		587.4	587.4	587.4	0.0
AH	16,564	267	863	0.8		587.6	587.6	587.6	0.0
AI	17,216	308	905	0.8		587.7	587.7	587.7	0.0
AJ	18,004	203	699	1.0		587.9	587.9	587.9	0.0
AK	18,969	190	421	1.7		588.3	588.3	588.3	0.0
AL	19,255	135	709	1.0		590.2	590.2	590.2	0.0
AM	21,555	390	1,816	0.4		590.4	590.4	590.4	0.1
AN	22,955	125	371	1.9		590.4	590.4	590.5	0.1
AO	24,305	217	334	1.2		591.2	591.2	591.3	0.1
AP	25,327	56	169	2.4		591.9	591.9	592.0	0.1
AQ	26,039	202	512	0.6		593.1	593.1	593.1	0.0
AR	27,516	150	393	0.8		594.5	594.5	594.6	0.1
AS	28,746	175	368	0.9		594.7	594.7	594.8	0.1
AT	29,816	330	816	0.4		595.6	595.6	595.7	0.1
AU	30,993	49	161	2.0		595.7	595.7	595.7	0.0

[1] Feet above confluence with Detroit River

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

BROWNSTOWN CREEK

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BROWNSTOWN CREEK (CONTINUED)									
AV	31,793	43	123	2.6		596.1	596.1	596.2	0.1
AW	32,955	151	277	1.1		598.2	598.2	598.2	0.0
AX	34,172	89	401	0.8	81	599.1	599.1	599.2	0.1
AY	34,858	31	147	2.2		599.2	599.2	599.3	0.1
AZ	34,955	28	253	1.8	126	599.1	599.1	599.1	0.0
BA	36,816	39	133	3.5		600.8	600.8	600.9	0.1
BB	37,815	61	155	3.1		602.0	602.0	602.1	0.1
BC	39,015	171	223	1.7		603.6	603.6	603.7	0.1
BD	40,095	65	144	2.8		604.4	604.4	604.4	0.0
BE	42,145	36	121	1.7		605.7	605.7	605.8	0.1
BF	48,839	22	73	2.8		614.5	614.5	614.5	0.0
BG	50,580	23	58	1.3		615.1	615.1	615.1	0.0

[1] Feet above confluence with Detroit River

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

BROWNSTOWN CREEK

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
CARROLL DRAN									
A	142	30	95	2.5		631.4	631.4	631.5	0.1
B	1,290	459	481	0.5		632.8	632.8	632.9	0.1
C	2,233	531	553	0.4		633.5	633.5	633.6	0.1
D	4,022	62	72	2.1		633.9	633.9	634.0	0.1
E	5,357	86	80	1.9		635.6	635.6	635.7	0.1
F	5,731	25	69	2.2		636.2	636.2	636.3	0.1
G	7,757	55	123	1.2		638.4	638.4	638.5	0.1

[1] Feet above confluence with Burnap Drain

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

CARROLL DRAIN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
CLARK-MOREY DRAIN									
A	78	120	239	0.9		631.1	631.1	631.2	0.1
B	1,157	26	90	2.5		631.6	631.6	631.7	0.1
C	2,688	158	153	1.4		632.7	632.7	632.8	0.1
D	4,577	721	1435	0.2		633.0	633.0	633.1	0.1
E	5,836	222	138	1.6		633.6	633.6	633.7	0.1
F	8,210	166	127	0.9		635.3	635.3	635.4	0.1
G	9,283	17	40	2.7		636.2	636.2	636.3	0.1
H	10,464	30	62	1.8		637.7	637.7	637.7	0.0
I	12,286	19	38	2.9		640.2	640.2	640.2	0.0
J	14,024	19	53	2.1		642.2	642.2	642.2	0.0
K	16,236	21	51	2.2		645.4	645.4	645.4	0.0

[1] Feet above confluence with Lords Drain

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

CLARK-MOREY DRAIN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
CLEE DRAIN EAST									
A	0	290	633	0.2		590.8	590.8	590.8	0.0
B	992	120	269	0.6		590.8	590.8	590.9	0.1
C	1,930	135	373	0.7		592.1	592.1	592.1	0.0
D	2,130	175	449	0.6		592.1	592.1	592.1	0.0

[1] Feet above confluence with Brownstown Creek

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

CLEE DRAIN EAST

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
CLEE DRAIN WEST									
A	1,000	*	*	*		592.9[2]	*	*	*
B	2,000	*	*	*		593.1	*	*	*
C	3,000	*	*	*		593.3	*	*	*
D	3,950	*	*	*		593.4	*	*	*
E	5,000	*	*	*		593.5	*	*	*

[1] Feet above confluence with Brownstown Creek
[2] Elevation controlled by backwater effects from Brownstown Creek
* Data not computed

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

CLEE DRAIN WEST

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
COOK AND GLADDING DRAIN									
A	300	12	37	0.7		590.4	585.0[2]	585.1	0.1
B	1,300	9	22	1.2		590.4	585.2[2]	585.3	0.1
C	1,700	5	6	4.4		590.4	586.0[2]	586.0	0.0
D	1,836	5	8	3.2		590.4	587.7[2]	587.7	0.0
E	2,284	67	131	0.2		590.4	588.0[2]	588.0	0.0
F	3,041	5	14	1.9		590.4	588.0[2]	588.0	0.0
G	3,210	5	9	3.0		590.4	588.5[2]	588.5	0.0
H	3,384	6	19	1.4		590.4	588.7[2]	588.7	0.0
I	3,548	6	20	1.3		590.4	588.8[2]	588.8	0.0
J	3,792	5	6	4.5		590.4	588.8[2]	588.8	0.0
K	3,833	5	9	2.9		590.4	589.6[2]	589.6	0.0
L	4,437	6	18	1.5		590.4	590.0[2]	590.1	0.1
M	4,479	6	23	1.2		590.9	590.9	591.0	0.1
N	4,853	103	219	0.1		590.9	590.9	591.0	0.1
O	5,253	4	20	1.3		591.0	591.0	591.1	0.1
P	5,299	4	19	1.4		591.5	591.5	591.6	0.1
Q	5,776	4	14	2.0		591.6	591.6	591.7	0.1
R	5,851	4	31	0.9		597.1	597.1	597.2	0.1
S	5,925	*	*	*		597.2	*	*	*
T	6,000	*	*	*		597.2	*	*	*
U	7,910	*	*	*		597.4	*	*	*
V	8,740	*	*	*		597.4	*	*	*
W	9,740	*	*	*		597.5	*	*	*
X	10,700	*	*	*		597.5	*	*	*

[1] Feet above confluence with Huron River
[2] Elevation computed without consideration of backwater effects from Huron River
* Data not computed

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

COOK AND GLADDING DRAIN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
DAY AND CUTTER DRAIN									
A	236	21	70	2.0		666.0	666.0	666.0	0.0
B	527	25	58	2.4		666.1	666.1	666.1	0.0
C	1,284	20	48	1.5		667.7	667.7	667.7	0.0
D	2,187	26	51	1.4		669.5	669.5	669.5	0.0
E	4,521	16	29	2.4		670.8	670.8	670.8	0.0
F	6,268	21	41	1.7		672.1	672.1	672.1	0.0
G	7,514	26	64	1.1		674.2	674.2	674.3	0.1

[1] Feet above confluence with Bradshaw Drain

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

DAY AND CUTTER DRAIN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
DESBROW DRAIN									
A	283	39	156	3.9		625.3	625.3	625.4	0.1
B	1,678	66	263	2.3		627.3	627.3	627.3	0.0
C	2,324	61	289	0.3		628.1	628.1	628.1	0.0
D	2,811	84	224	0.7		628.2	628.2	628.2	0.0
E	3,297	97	335	0.7		628.2	628.2	628.2	0.0
F	3,405	71	382	0.6		628.2	628.2	628.2	0.0
G	9,793	96	192	1.4		631.2	631.2	631.3	0.1
H	10,846	30	77	3.5		633.4	633.4	633.4	0.0
I	13,390	995	1291	0.2		635.3	635.3	635.4	0.1
J	16,490	370	299	0.9		638.2	638.2	638.3	0.1
K	18,662	34	91	3		643.2	643.2	643.2	0.0
L	20,912	410	346	0.8		646.9	646.9	647.0	0.1
M	22,266	31	89	3.0		650.6	650.6	650.6	0.0
N	23,483	180	379	0.7		654.5	654.5	654.5	0.0
O	24,782	20	66	4.1		655.8	655.8	655.8	0.0
P	27,427	18	46	3.4		659.9	659.9	660.0	0.1
Q	28,835	40	67	2.4		663.5	663.5	663.5	0.0
R	31,129	24	50	3.2		669.6	669.6	669.7	0.1
S	32,664	30	62	2.6		672.8	672.8	672.8	0.0
T	34,213	720	495	0.3		673.7	673.7	673.8	0.1

[1] Feet above Monroe/Wayne County boundary

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

DESBROW DRAIN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
DIVISION A									
A	730	73	52	4.9		580.2	580.2	580.2	0.0
B	1,430	95	370	0.7		580.8	580.8	580.8	0.0
C	2,030	96	408	0.6		580.8	580.8	580.8	0.0
D	3,030	85	497	0.5		580.8	580.8	580.8	0.0

[1] Feet above confluence with Brownstown Creek

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

DIVISION A

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
DIVISION B									
A	330	73	47	4.7		581.7	581.7	581.7	0.0
B	1,030	105	439	0.5	86	582.3	582.3	582.3	0.0
C	1,630	247	1,267	0.2		582.3	582.3	582.3	0.0
D	2,630	330	2,380	0.1		582.3	582.3	582.3	0.0

[1] Feet above confluence with Brownstown Creek

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

DIVISION B

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
ECORSE CREEK									
A	136	70	662	6.7		577.4	574.6[2]	574.6	0.0
B	187	91	692	6.4	57	577.4	574.8[2]	574.8	0.0
C	737	123	979	4.5		577.4	575.5[2]	575.5	0.0
D	797	107	747	5.9		577.4	575.5[2]	575.5	0.0
E	859	109	782	5.6	100	577.4	575.7[2]	575.7	0.0
F	921	107	806	5.5		577.4	575.9[2]	575.9	0.0
G	985	81	597	7.4		577.4	576.0[2]	576.0	0.0
H	1,036	118	845	5.2		577.4	576.6[2]	576.6	0.0
I	2,436	102	932	4.7		577.6	577.6	577.6	0.0

[1] Feet above confluence with Detroit River
[2] Elevation computed without consideration of backwater effects from Detroit River

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

ECORSE CREEK

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
FELLOWS CREEK									
A	5,519	258	1,116	1.1		659.7	659.7	659.8	0.1
B	6,252	293	650	1.9		660.0	660.0	660.1	0.1
C	8,537	94	354	3.4		663.1	663.1	663.1	0.0
D	9,407	44	306	3.9		663.9	663.9	664.0	0.1
E	10,288	100	379	3.2		664.7	664.7	664.8	0.1
F	11,214	39	255	4.7		665.6	665.6	665.7	0.1
G	11,713	55	349	2.4		666.7	666.7	666.8	0.1
H	12,380	27	173	4.9		667.0	667.0	667.1	0.1
I	14,152	63	330	2.6		668.9	668.9	669.0	0.1
J	16,208	95	423	2.0		670.7	670.7	670.8	0.1
K	18,973	82	360	2.4		673.6	673.6	673.7	0.1
L	20,697	37	171	4.1		675.9	675.9	676.0	0.1
M	22,547	49	227	3.1		678.5	678.5	678.6	0.1
N	25,670	102	385	1.8		684.3	684.3	684.3	0.0
O	27,803	26	121	4.0		687.6	687.6	687.7	0.1

[1] Feet above confluence with Lower River Rouge

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

FELLOWS CREEK

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
FRANK AND POET DRAIN									
A	600	96	384	2.7		577.2	574.0[2]	574.0	0.0
B	1,127	20	133	7.7		577.2	574.1[2]	574.1	0.0
C	1,178	120	609	1.7		577.2	575.2[2]	575.2	0.0
D	1,628	229	1,009	1.0		577.2	575.3[2]	575.3	0.0
E	2,428	277	986	1.0		577.2	575.4[2]	575.4	0.0
F	3,228	49	229	4.5		577.2	575.4[2]	575.4	0.0
G	3,884	202	650	0.9		577.2	576.4[2]	576.4	0.0
H	4,035	215	474	1.3		577.2	576.4[2]	576.4	0.0
I	4,266	386	671	0.9		577.2	576.6[2]	576.6	0.0
J	4,524	395	943	0.7		577.2	576.6[2]	576.6	0.0
K	5,024	234	437	1.4		577.2	576.7[2]	576.7	0.0
L	5,524	230	829	0.7		577.2	576.8[2]	576.8	0.0
M	5,924	192	636	1.0		577.2	576.8[2]	576.8	0.0
N	6,024	110	512	1.2		577.2	576.8[2]	576.8	0.0
O	6,290	24	204	3.1		579.5	579.5	579.5	0.0
P	6,313	68	512	1.2		579.6	579.6	579.6	0.0
Q	7,013	345	1,477	0.4		579.7	579.7	579.7	0.0
R	7,513	294	1,200	0.8		579.7	579.7	579.7	0.0
S	8,013	200	753	0.8		579.7	579.7	579.7	0.0
T	8,445	27	183	3.4		579.7	579.7	579.7	0.0
U	8,510	13	135	4.7		580.7	580.7	580.7	0.0
V	8,868	15	158	5.6		581.6	581.6	581.6	0.0
W	9,177	472	3,060	0.4		582.2	582.2	582.2	0.0
X	9,677	529	3,521	0.3		582.2	582.2	582.2	0.0

[1] Feet above confluence with Detroit River
[2] Elevation computed without consideration of backwater effects from Detroit River

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

FRANK AND POET DRAIN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
FRANK AND POET DRAIN (CONTINUED)									
Y	10,177	584	4,051	0.3		582.2	582.2	582.2	0.0
Z	10,622	614	4,341	0.3		582.2	582.2	582.2	0.0
AA	10,693	614	2,449	0.5		582.2	582.2	582.2	0.0
AB	10,735	680	2,605	0.4		581.6	581.6	581.7	0.1
AC	10,784	926	3,565	0.5		581.6	581.6	581.7	0.1
AD	12,432	598	3,670	0.5		581.7	581.7	581.8	0.1
AE	13,152	746	4,061	0.5		581.8	581.8	581.9	0.1
AF	13,882	1,299	5,054	0.4		581.9	581.9	582.0	0.1
AG	13,896	944	3,191	0.6		584.1	584.1	584.2	0.1
AH	14,759	497	3,320	0.5		584.1	584.1	584.2	0.1
AI	15,110	293	1,930	0.9		584.1	584.1	584.2	0.1
AJ	15,341	285	1,081	1.7		584.2	584.2	584.2	0.0
AK	15,534	360	1,418	1.3		584.3	584.3	584.3	0.0
AL	16,142	358	1,506	1.2		584.5	584.5	584.5	0.0
AM	16,293	325	2,102	0.9		584.6	584.6	584.6	0.0
AN	16,431	303	1,707	1.1		584.6	584.6	584.6	0.0
AO	16,515	303	1,692	1.1		584.6	584.6	584.6	0.0
AP	16,763	34	348	5.2		584.6	584.6	584.6	0.0
AQ	16,775	30	313	5.8		584.8	584.8	584.9	0.1
AR	16,825	90	843	2.2		585.4	585.4	585.5	0.1
AS	17,421	538	2,692	0.7		585.5	585.5	585.6	0.1
AT	18,485	390	2,659	0.7		585.6	585.6	585.7	0.1
AU	18,657	360	1,119	1.6		585.6	585.6	585.7	0.1

[1] Feet above confluence with Detroit River

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

FRANK AND POET DRAIN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
FRANK AND POET DRAIN (CONTINUED)									
AV	18,713	360	1,324	1.4		585.7	585.7	585.8	0.1
AW	18,763	410	1,536	1.2		585.7	585.7	585.8	0.1
AX	19,919	190	1,204	1.5		585.9	585.9	586.0	0.1
AY	21,337	200	1,117	1.6		586.1	586.1	586.2	0.1
AZ	21,487	200	1,120	1.6		586.1	586.1	586.2	0.1
BA	21,571	187	764	2.4		586.2	586.2	586.3	0.1
BB	21,641	187	776	2.3		586.2	586.2	586.3	0.1
BC	22,897	325	1,672	1.1		586.7	586.7	586.7	0.0
BD	23,890	521	2,808	0.6		586.9	586.9	586.9	0.0
BE	24,090	521	2,816	0.6		587.0	587.0	587.0	0.0
BF	24,146	560	904	2.0		587.0	587.0	587.0	0.0
BG	24,196	560	2,127	0.8		587.0	587.0	587.0	0.0
BH	25,858	780	3,106	0.6		587.2	587.2	587.2	0.0
BI	26,578	487	2,553	0.7		587.3	587.3	587.3	0.0
BJ	26,728	487	2,558	0.7		587.3	587.3	587.3	0.0
BK	38,280	183	1,013	1.6	103	593.5	593.5	593.5	0.0
BL	38,808	142	680	2.4		593.6	593.6	593.6	0.0
BM	39,283	95	523	3.1		593.8	594.8	593.8	0.0
BN	39,547	105	517	3.2		593.9	593.9	593.9	0.0
BO	40,075	400	1,329	0.8		594.2	591.2	594.2	0.0
BP	41,026	350	1,327	0.8		594.3	594.3	594.3	0.0
BQ	41,237	255	770	1.4		594.4	594.4	594.4	0.0
BR	41,342	210	548	2.0		594.4	594.4	594.4	0.0

[1] Feet above confluence with Detroit River

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

FRANK AND POET DRAIN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
FRANK AND POET DRAIN (CONTINUED)									
BS	41,448	210	373	2.9		594.5	594.5	594.5	0.0
BT	41,554	403	727	1.5		594.7	594.7	594.7	0.0
BU	41,659	405	398	2.7		596.1	596.1	596.1	0.0
BV	42,187	194	654	1.7		596.3	596.3	596.3	0.0
BW	42,662	346	1,399	0.8	130	596.4	596.4	596.4	0.0
BX	43,032	285	867	1.3		596.5	596.5	596.5	0.0
BY	43,454	193	517	2.0		596.7	596.7	596.7	0.0
BZ	43,824	106	277	3.9		597.1	597.1	597.1	0.0
CA	43,877	121	305	3.5		597.3	597.3	597.3	0.0
CB	44,051	200	1,003	1.1		600.6	600.6	600.7	0.1
CC	44,851	180	969	1.1		600.7	600.7	600.8	0.1
CD	44,968	180	979	1.1		600.8	600.8	600.9	0.1
CE	45,079	180	988	1.1		600.8	600.8	600.9	0.1
CF	45,139	180	939	1.2		600.8	600.8	600.9	0.1
CG	45,279	180	962	1.1		600.9	600.9	601.0	0.1
CH	45,879	60	300	3.7		600.9	600.9	601.0	0.1
CI	46,240	55	362	3.0		601.7	601.7	601.8	0.1
CJ	46,635	49	312	3.5		601.8	601.8	601.9	0.1
CK	46,773	70	369	3.0		602.6	602.6	602.7	0.1
CL	49,031	70	514	2.1		603.0	603.0	603.1	0.1
CM	49,160	47	404	2.7		603.3	603.3	603.4	0.1
CN	49,480	123	984	1.1		604.7	604.7	604.8	0.1
CO	49,930	54	427	2.6		604.7	604.7	604.8	0.1

[1] Feet above confluence with Detroit River

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

FRANK AND POET DRAIN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
FRANK AND POET DRAIN (CONTINUED)									
CP	50,085	140	805	1.4		604.8	604.8	604.9	0.1
CQ	50,385	265	1,278	0.9		604.8	604.8	604.9	0.1
CR	50,541	205	1,007	1.1		604.8	604.8	604.8	0.0
CS	51,181	85	514	2.1		604.9	604.9	604.9	0.0
CT	51,310	130	726	1.5		605.0	605.0	605.0	0.0
CU	51,421	200	737	0.9		605.1	605.1	605.1	0.0
CV	51,641	200	746	0.9		605.1	605.1	605.1	0.0
CW	52,082	300	1,389	0.5		605.1	605.1	605.2	0.0
CX	52,307	290	1,355	0.5		605.2	605.2	605.2	0.0
CY	52,547	190	1,446	0.5	229	605.2	605.2	605.2	0.0
CZ	52,638	240	832	0.8	56	605.2	605.2	605.2	0.0
DA	53,078	54	244	2.9		605.1	605.1	605.1	0.0
DB	53,283	40	325	2.2	27	606.3	606.3	606.3	0.0
DC	53,650	51	228	3.1		606.4	606.4	606.4	0.0
DD	53,861	47	285	2.5		607.7	607.7	607.7	0.0
DE	54,511	120	476	1.5	100	607.9	607.9	607.9	0.0
DF	54,704	227	490	1.4		607.9	607.9	607.9	0.0
DG	54,999	219	769	0.9		608.0	608.0	608.0	0.0
DH	55,215	261	845	0.8		608.0	608.0	608.1	0.1
DI	55,565	186	604	1.2		608.0	608.0	608.1	0.1
DJ	55,721	190	620	1.1		608.0	608.0	608.1	0.1
DK	55,946	167	573	1.2		608.0	608.0	608.1	0.1
DL	56,112	203	678	1.0		608.3	608.3	608.3	0.0

[1] Feet above confluence with Detroit River

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

FRANK AND POET DRAIN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
FRANK AND POET DRAIN (CONTINUED)									
DM	56,212	100	355	2.0		608.3	608.3	608.3	0.0
DN	56,368	105	390	1.8		608.5	608.5	608.5	0.0
DO	56,454	177	492	1.3		608.5	608.5	608.6	0.1
DP	56,843	100	420	1.5	83	608.5	608.5	608.6	0.1
DQ	57,113	153	393	1.7		608.6	608.6	608.7	0.1
DR	57,275	170	433	1.5		608.6	608.6	608.7	0.1
DS	57,985	171	168	3.9		608.8	608.8	608.9	0.1
DT	58,173	160	285	2.3		609.5	609.5	609.5	0.0
DU	58,222	33	201	3.2	42	609.5	609.5	609.5	0.0
DV	58,328	40	159	4.1		610.0	610.0	610.1	0.1
DW	58,628	72	248	2.6		610.6	610.6	610.7	0.1
DX	58,868	73	263	2.5		610.7	610.7	610.8	0.1
DY	59,968	30	136	4.8		611.1	611.1	611.2	0.1
DZ	60,194	104	301	2.2		612.0	612.0	612.0	0.0
EA	61,094	115	335	3.0		612.9	612.9	613.0	0.1
EB	61,342	70	391	2.6		615.1	615.2	615.1	0.0
EC	63,068	230	2,148	0.3	436	615.7	615.7	615.8	0.1
ED	64,376	57	194	3.9		616.9	616.9	617.0	0.1
EE	64,626	94	291	2.6		617.2	617.2	617.3	0.1
EF	64,907	100	325	2.3		617.5	617.5	617.6	0.1
EG	65,007	50	139	5.4		617.3	617.3	617.4	0.1
EH	65,349	150	356	2.1		618.5	618.5	618.6	0.1
EI	65,499	82	237	3.2		618.5	618.5	618.6	0.1

[1] Feet above confluence with Detroit River

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

FRANK AND POET DRAIN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
FRANK AND POET DRAIN (CONTINUED)									
EJ	65,705	76	276	2.7		619.5	619.5	619.6	0.1
EK	65,855	126	381	2.0		619.6	619.6	619.7	0.1
EL	66,057	157	484	1.6		620.1	620.1	620.2	0.1
EM	67,227	442	933	0.8		620.9	620.9	621.0	0.1
EN	67,342	260	1,010	0.7	230	621.0	621.0	621.1	0.1
EO	69,692	44	452	1.7	236	623.3	623.3	623.4	0.1

[1] Feet above confluence with Detroit River

TABLE 16

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAYNE COUNTY, MI
(ALL JURISDICTIONS)

FLOODWAY DATA

FRANK AND POET DRAIN