The Michigan Geographic Framework
Program and Product Prospectus
Updated April 2, 2010
(MGF Version 10)

Please Note: If you have any questions about the framework data you have received, please contact Laura Blastic at the Department of Technology, Management and Budget, Center for Shared Solutions and Technology Partnerships (CSSTP). Phone: 517-373-7910, email: *blasticl@michigan.gov*

Background

For several years, GIS users from several Michigan state departments had been meeting monthly to share information. It became obvious to those users that the best way to obtain an up-to-date, accurate GIS statewide product would be to find ways to pool the state's resources to accomplish the job once for all departments. Such a product, with combined funding and support, would be much bigger and better than any one department could accomplish, and all could benefit from future joint maintenance of and enhancements to a common "Framework".

The Department of State made the first commitment, contracting with DMB to use an edited, enhanced TIGER file upon which to build their statewide voter registration system. This required the coding of every street and its postal address ranges, together with all jurisdictional and voting district boundaries. All of these same streets and street names and many of the boundaries are critical to the MALI system of locating crashes for the State Police and Traffic and Safety at MDOT. When it became obvious at the May 1996 GIS user's meeting that DMB, DOS, and MDOT were intent upon developing very similar products, the Framework multi-departmental, multi-jurisdictional effort was begun.

Meaningful comprehension of the Michigan Geographic Framework (MGF) requires a basic understanding of the following terms and descriptions:

Conflation
Geographic Information System (GIS)
Linear Referencing System (LRS)
TIGER
Michigan Resource Information System (MIRIS)
Michigan Accident Location Index (MALI).

These terms are defined briefly in the attached Glossary of Terms.

What is the Michigan Geographic Framework?

The Michigan Geographic Framework (MGF) is both a product and a program. As a product, the framework serves as the digital base map for state government. The goal of any base map is to be able to provide enough basic reference information that users can associate and locate attribute data for purposes of comparison or geographical correlation. While a base map can theoretically contain an infinite number of features, the framework is designed to contain those features most agencies need to do their business. Currently the geographic framework contains features such as roads, rivers, lakes, streams, railroads, political jurisdiction boundaries, and other miscellaneous features. Other map features are included in the base map that may have other functional applications. These features include school district boundaries, census area tabulation boundaries, legislative district boundaries, precinct boundaries, and ZIPCode boundaries.

As a program, the framework serves as the mechanism for maintaining a statewide base map that is both current and relevant for supporting Michigan's business applications. The program is designed to keep the map current both directly and indirectly. Directly, partners will provide map and attribute information periodically via their business applications by signaling changes that need to be made to the map. Indirectly, the Department of Technology, Management and Budget, Center for Shared Solutions and Partnerships Technology (CSSTP) will continue to integrate other more current and accurate GIS work from local agencies. The program also is designed to keep the user community always in sync with the current version of the products through the dissemination of change files, metadata, documentation, training, and support.

Specifically, this base map will consist of features and attributes from the 1994 TIGER/Line Files, base map features from the MDNR MIRIS Files and an enhanced linear referencing system built from the Michigan Accident Location Index (MALI). The Geographic Framework will serve as a common and standardized infrastructure on which all GIS users of 1:24,000 scale map data can build their applications. At the heart of the Geographic Framework will be the ability to administer programs that use location-based information and need to relate one database to another geographically. Selected benefits of this effort include:

- significant cost-savings due to less duplication of effort across agency lines
- low-cost geographic database for users of GIS
- a common-standardized product for any area in Michigan
- a focal-point for establishing partnerships between federal, state, regional, county and local agencies
- a product that will be a rallying point for creating an ongoing update and maintenance program for transportation and other features like hydrography and municipal boundaries
- improved communication between agencies involved in geographic information management
- the cross integration of demographic and natural resource information, and others
- the ability to look at "what-if" scenarios that were not possible before

Who is involved?

A. Primary (Contributors to the Framework Project):

- *Department of Technology, Management and Budget, Center for Shared Solutions and Technology Partnerships (CSSTP)*:
  CSSTP is responsible for managing the project. The CSSTP has contributed staff, equipment, software and technical expertise.
- *Department of State (DOS-QVF)*:
  The Qualified Voter File Project of the Michigan Department of State is a major contributor of monetary resources and recent contribution of additional staff and computers. The QVF is also responsible for the willingness of local clerks to review and verify map data accuracy.
- *Department of Transportation (MDOT)*
  The Michigan DOT contributed money, computers, and staff.
- *Department of Natural Resources (DNR- MIRIS)*

The Michigan Resource Information System of the Michigan DNR contributed the MIRIS base map and MIRIS staff expertise.

B. Secondary (using and building upon the Framework):

- *Michigan State Police*
  The Michigan State Police is using Framework generated MALI for crash location, crime analysis and emergency management. Also used in Negaunee 911 Dispatch Center for emergency dispatch are several Upper Peninsula counties.
- *Road soft/Michigan Tech*
  The Local Technical Assistance Program at the Michigan Technological University is writing crash location software for the Michigan State Police and the Traffic and Safety Division of MDOT. They also have incorporated GIS capabilities from Framework into Roadsoft, a software package developed for MDOT and the County Road Association to assist counties in collecting and using roadway and crash data. Originally based upon the MALI system, Roadsoft will incorporate the updated MALI from the Framework.
- *United States Census Bureau*
  Received maps updated by the clerks as a part of the QVF and Framework projects to be used in updating addresses in TIGER in preparation for Census 2000. Also received a digital copy of Framework for evaluation as a positional source for TIGER conflation.
- *Department of Environmental Quality*
  Have expressed their intent to add more environmental data layers to the framework.

Editing / Release Schedule

The Department of Technology, Management and Budget, Center for Shared Solutions and Technology Partnerships (CSSTP) receives information throughout the year and continuously updates the Michigan Geographic Framework (MGF). An annual version of MGF is released to the public after the approved updates from the working year have been incorporated. These edits can occur until March 1st. Feature lock down and delivery preparation take place from March 2nd through the June delivery. An initial release to MGF partners occurs in early April and the subsequent posting of shapefiles to the CSSTP website takes place later in the summer. These files are available for download from the MI Geographic Data Library (http://www.michigan.gov/cgi/0,1607,7-158-12693---,00.html).

Michigan Geographic Framework Versions

Version 1a

Version 1a of the Michigan Geographic Framework (MGF) created by the Department of Technology, Management and Budget, Center for Shared Solutions and Technology Partnerships (CSSTP) is a significant step in the creation of a consistent, statewide, seamless basemap for the

State of Michigan. Version 1a contains features including roads, rivers, lakes, streams, railroads, political jurisdiction boundaries, power lines, pipelines, school district boundaries, census area tabulation boundaries, and legislative district boundaries. Specifically, this Michigan base map consists of an Arc Info coverage which includes features and attributes based on TIGER/Line Files, base map features based on both the MDNR MIRIS Files and an enhanced linear referencing system built from the Michigan Accident Location Index (MALI). The MGF will serve as a common and standardized infrastructure on which all GIS users of 1:24,000 scale map data can build their applications. At the heart of the Geographic Framework will be the ability to administer programs that use location-based information and need to relate one database to another geographically.

Version 1b

Version 1b is the same as Version 1a described above except for the following enhancements:

Road topology changes occurred in Oakland and Wayne counties. The fields, Functional Class (FUNCLASS), Legal System (LEGALSYS), National Highway System (NHS), County ownership (PC_COL, PC_COR), and City ownership (PC_CITY_L, PC_CITY_R) had only been attributed along the Oakland and Wayne county boundaries in Version 1a. All Oakland and Wayne roads that require these attributes were appropriately updated and quality controlled in Version 1b. A few roads in Oakland and Wayne County also had to be split to reflect changes in attribution along the road. This has resulted in new nodes being added to the Oakland and Wayne coverages in Version 1b.

The following polygon boundary fields were also updated as needed throughout the State so boundaries are more complete and accurate:
FMCDL & FMCDR (city and township)
FPLL & FPLR (cities, villages and census designated places (CDPs))
SDL & SDR (schools)
USCL & USCR (1990 United State Congressional district)
STSL & STSR (1990 Michigan State Senate district)
STHL & STHR (1990 Michigan State House district)
CCDL & CCDR (1990 County Commissioner district)

Version 2a

Version 2a contains all the information available in Versions 1a and 1b. For Version 2a, CSSTP has realigned the position of all roads in the MGF that have names and Physical Road(PR) numbers (PRs are an identification system that allows linear referenced data to be mapped using Framework). The positional source for the realignment was 1:12,000 scale United States Geological Survey (USGS) Digital Ortho Quarter Quadrangle (DOQQ) aerial photographs. Framework partnerships were established between CSSTP and both Ottawa and Wayne counties. Both of these counties repositioned the Framework roads using there own high resolution ortho photography and then shared that geography with CSSTP so that both entities are now working with the same data thus improving the efficiency of digital data transfer.
A few Michigan counties made their higher resolution local orthophoto products available to CSSTP and these were used during the repositioning process resulting in an even more accurate road network. Allegan, Kent, Saginaw, and Washtenaw counties were repositioned using this higher resolution photography resulting in improved accuracy.

Topological updates were only made to State and US highway line features during this process. All other road centerlines were repositioned as accurately as possible without any topological updates. However, the areas where Framework topology disagrees with the topology displayed on the photo were noted and will be updated during Framework maintenance and included with the release of Version 3.

Version 2a address ranges have been enhanced using address data in the 2000 TIGER (Topologically Integrated Geographic Encoding and Referencing system) line files from the US Census Bureau. The data fields updated were FRADDL (from address left), TOADDL (to address left), FRADDR (from address right), and TOADDR (to address right). The address ranges in Framework Version 1a and Version 1b originally came from TIGER. The TIGER Line Identification (TLID) number is still a data item in the Framework. Using the TLID numbers, road features in Framework were linked to the TIGER data. Many of the features in Framework that had missing or incomplete address data were then updated.

The complete Framework file is maintained and primarily distributed as a "master arc" ArcInfo coverage. Hence, no polygons are distributed with the coverage. Version 2a contains attribution on the lines that will allow the following polygon coverages to be created; State, County, Minor Civil Divisions (Cities & Townships), Census Places (Cities, Villages, Census Designated Places (CDPs)), 1990 Congressional Districts, 1990 State Senate Districts, 1990 State House Districts, 1990 County Commissioner Districts, School Districts, 1990 Census Tracts, 1990 Census Block Groups, 2000 Census Tracts, and 2000 Census Block Groups. These polygon themes will also be available as separate "shape files" with the Version 2a release.

The 2000 US Congressional, State Senate and State House Legislative District boundaries were not available at the time Version 2a was created. They are not incorporated into this version of the Framework files. They will be incorporated into Version 3. The Districts have been mapped using Framework Version 2a. Statewide shapefiles are available on the Michigan Geographic Data Library.

For more information on the USGS DOQQ product, please go to:

http://www.usgs.gov/pubprod/aerial.html

For additional information about the realigning of Framework roads, see Repositioning Issues – "Road Features Issues" .PDF document located at:

http://www.michigan.gov/documents/rds_20811_7.pdf

Version 3a

Version 3a was created in June 2003 and differs from Version 2a as follow:

1. Act51 Certification used as a resource in updating the road network and the associated attribution.
    a. This process facilitated updates to the Legalsystem and road ownership fields
    b. The repositioning of the MGF dead-end roads was reviewed and edited as necessary. Dead-end roads in the MGF then were edited using 2 criteria. Roads where an endpoint could easily be identified on an aerial photo were considered 'Defined Endpoint' (DE) roads. Roads where an endpoint was not easily identified on an aerial photo were considered 'Undefined Endpoint' (UE) roads. DE roads were usually in residential areas,

UE roads were usually in rural areas. Please refer to aerial photo examples in the Appendix. DE roads in the MGF had their length changed to match the ACT51 length if the ACT51 length and the MGF length difference was less than 30 feet. UE roads in the MGF had their length changed to match the ACT51 length if the ACT51 length and the MGF length difference was less than 100 feet. If the differences were greater than 30 or 100 respectively, the MGF length remained unchanged.

c. MGF city and village boundaries were edited to match the ACT51 boundaries. The boundaries on the ACT51 maps are considered to be the official boundaries by the Michigan Department of State, Office of the Great Seal.
d. Roads not formerly in the MGF may have been added based on the ACT51 maps. The road name on the ACT51 map was assigned to the fename field for these added roads.

2. National Functional Class (NFC) and National Highway System (NHS) reviewed and updated by MDOT staff.
3. The following fields have been removed: LEVEL, CFCC, EX_RNGL, EX_RNGR, ANNEXL, ANNEXR, CTBNAL, BGL, CTBNAR, BGR, REF_FLG
4. The following fields have been added: FAUBL, FAUBR, OWP, ICN, MDOTEXP, VER
5. The following fields have been renamed: BLKL to BLK90L, BLKR to BLK90R
6. The following fields have been blanked out and will be updated in the future: CCDL, CCDR, PCTL, PCTR
7. Framework Classification Codes (FCC) enhanced and reviewed in many areas.
8. Street names enhanced and reviewed in many areas.
9. Some hydrology has been repositioned.
10. State trunkline updated as necessary.
11. Milepoints recalculated (BMP, EMP).

Version 3b

A Version 3a was created and is available in coverage format only. Version 3a contains all of the linear referencing information and was created to meet several early summer 2003 program deadlines. To get Version 3a delivered on time, CGI was unable to update several important attributes. Those attributes have now been updated resulting in Version 3b.

To attain the Version 3b shape files, contact Laura Blastic. Phone 517-373-7910, email: blasticl@michigan.gov

Version 3b contains all the information available in Versions 1a, 1b, 2a, and 3a. It has significant improvements over Version 2. These include:

1. Act51 2001 Certification used as a resource in updating the road network and the associated attribution. This resulted in the addition of hundreds of new roads not present in Version 2.
2. Some road names have been updated using the Act51 2001 resource.
3. All new State trunklines added and attributed accordingly.
4. All city, village, and township boundaries updated as of December 31, 2002.
5. Updates to GIS polygons; 2000 US Congressional, State Senate, State House, 2000 Census Tracts, 2000 Census Block Groups, and school districts.
6. Some areas of the State have had hydrography updates. This includes some repositioning of lakes, rivers, streams, and shorelines (see description of Version 2 for more information on repositioning). Framework Classification Codes (FCC) for hydro have also been refined to better differentiate features.

7. Enhancement and refinement to the FCC attribute for transportation features.
8. Updates to ZIPL (Zip left) and ZIPR (Zip right) fields on road features reflecting new Zipcodes added in Michigan.
9. All road topology changes not made before the release of Version 2 have been reviewed and updated as necessary.

Version 4b

Improvements since Version 3:

1. Act51 2002 Certification used as a resource in updating the road network and the associated attribution.
    a. This process facilitated updates to the Legalsystem and road ownership fields
    b. MGF city and village boundaries were edited to match the ACT51 boundaries. The boundaries on the ACT51 maps are considered to be the official boundaries by the Michigan Department of State, Office of the Great Seal as of 12/31/03. Additional official annexations received between 1/1/04 and 5/1/04 have also been incorporated.
    c. Roads not formerly in the MGF may have been added based on the ACT51 maps. Some road names have been updated using the Act51 2001 resource.
2. National Functional Class (NFC) and National Highway System (NHS) reviewed and updated by MDOT staff.
3. Additional roads were added to the MGF using information submitted by local authorities for the Qualified Voter File (QVF) street index.
4. Locally generated road centerlines have been provided to CGI for some areas of Michigan. The MGF for Keweenaw County was reconciled to a road centerline file that was created for Keweenaw County emergency dispatch. This centerline provided accurate geographic positioning, road names and address information.
5. The following fields have been added: FAUBL, FAUBR, QVF_IDL, QVF_IDR, CSPATH, SYNCBMP, and SYNCEMP
6. Framework Classification Codes (FCC) enhanced and reviewed in many areas.
7. Milepoints recalculated (BMP, EMP).
8. Hydrology repositioned and updated.
9. State Trunkline updated.
10. Verification of the attribute values for the following GIS polygons; 2000 US Congressional, State Senate, State House, 2000 Census Tracts, and 2000 Census Block Groups. In addition, the internal features of each polygon were assigned with the corresponding value of the bounding polygon feature.
11. Updates to ZIPL (Zip left) and ZIPR (Zip right) fields on road features reflecting new Zipcodes added in Michigan.
12. Federal Aid Urban Boundary (FAUB) codes were added to all features that are located within Federal Aid Urban boundaries.
13. MGF rail features have been repositioned using digital ortho photography. FCC codes have been added to identify active, inactive, and unknown status.
14. Rail features in the MGF that are now Rails-to-trails have been identified and coded in the FCC.

Version 5

Version 5 will soon be available on the MGDL (Mid September 2005). A Version 5 was created and is available in coverage format only. Version 5 contains all of the linear referencing information and was created to meet several early summer 2005 program deadlines.

To attain the Version 5 shape files, contact Laura Blastic. Phone 517-373-7910, email: blasticl@michigan.gov

Version 5 contains all the information available in Versions 1a, 1b, 2a, 3a, 3b, 4a and 4b.

Improvements since Version 4:

1. Act51 2003 Certification used as a resource in updating the road network and the associated attribution.
2. This process facilitated updates to the Legalsystem and road ownership fields
3. MGF city and village boundaries were edited to match the ACT51 boundaries. The boundaries on the ACT51 maps are considered to be the official boundaries by the Michigan Department of State, Office of the Great Seal as of 12/31/04.
4. Roads not formerly in the MGF were added based on the ACT51 maps. The road name on the ACT51 map was assigned to the fename field for these added roads.

5. The National Functional Class (NFC) has been changed to match the results of the 10-year review cycle. The Federal Highway Administration has approved all NFC changes, with the exception of Lodi, Webster, and York Townships in Washtenaw County. The National Functional Class (NFC) and National Highway System (NHS) were reviewed and updated by MDOT staff.

6. Additional roads were added to the MGF using information submitted by local authorities for the Qualified Voter File (QVF) street index.

7. Additional roads were added and name changes were done to the MGF using crash information received from MDOT and State Police.

8. Locally generated road centerlines have been provided to CSSTP for some areas of Michigan. The MGF for Luce, Mecosta, Menominee, Ontonagon, Osceola, and Schoolcraft Counties were reconciled to a road centerline file that was created for emergency dispatch. This centerline provided accurate geographic positioning, road names, and address information.

9. Framework Classification Codes (FCC) enhanced and reviewed in many areas.

10. Milepoints recalculated (BMP, EMP).

11. State Trunkline updated.

12. Verification of the attribute values for the following GIS polygons; 2000 US Congressional, State Senate, State House, 2000 Census Tracts, 2000 Census Block Groups, and FAUB. In addition, the internal features of each polygon were assigned with the corresponding value of the bounding polygon feature.

13. Centerline files for the four federal forests in the state were provided to CSSTP from the Federal Forest Agency. The MGF was reconciled to a road centerline files to create accurate geographic positioning, road names, and feature classification for the roads within the Federal Forest jurisdiction.

14. School district (SD) boundaries were updated in many areas based on local information received from Intermediate School Districts (ISD), School Districts, or county GIS offices. In addition, the internal features of each polygon were assigned with the corresponding value of the bounding polygon feature.

15. The majority of the unnamed road features were deleted. These features were without referencing information. Where data difference allowed, the intersection nodes were un-split.

16. National Inventory (NI) numbers were added to the at grade rail crossings.

Version 6

Improvements since Version 5:

1. ACT51 2005 Certification used as a resource in updating the road network and the associated attribution.
   a. Incorporated roads certified, decertified, or reclassified by cities, villages and counties occurring in 2004.
   b. This process facilitated updates to the Legalsystem and road ownership fields
   c. Incorporated city and village boundaries annexations.
   d. If a current imagery source was unavailable, roads not formerly in the MGF may have been added based on the ACT51 maps. The road name on the ACT51 map may have been assigned to the fename field for these added roads.

2. The National Functional Class (NFC) has been changed to match the results of the 10-year review cycle, which occurred during 2004. Additional counties were updated to match the changes resulting for the 10-year NFC review cycle. The National Functional Class (NFC) and National Highway System (NHS) were reviewed and updated by MDOT staff.

3. Active rail features were reviewed and posted with PR referencing.

4. Additional roads were added to the MGF using information submitted by local authorities for the Qualified Voter File (QVF) street index.

5. Additional roads were added and name changes were done to the MGF using crash information received from MDOT and State Police.

6. Locally generated road centerlines have been provided to CSSTP for some areas of Michigan. The MGF for Allegan and Genesee counties were updated with information acquired through local data sharing partnerships. This centerline provided accurate geographic positioning, road names, and address information.

7. Approved changes requested through the Asset Management Project were incorporated into the transportation network.

8. Framework Classification Codes (FCC) enhanced and reviewed in many areas.

9. Milepoints recalculated (BMP, EMP).

10. State Trunkline updated.

11. Verification of the attribute values for the following GIS polygons; 2000 US Congressional, State Senate, State House, 2000 Census Tracts, 2000 Census Block Groups, and FAUB. In addition, the internal features of each polygon were assigned with the corresponding value of the bounding polygon feature.

Version 7

Improvements since Version 6:

1. ACT51 2006 Certification used as a resource in updating the road network and the associated attribution.
    a. Incorporated roads certified, decertified, or reclassified by cities, villages and counties occurring in 2005.
    b. This process facilitated updates to the Legalsystem and road ownership fields
    c. Incorporated city and village boundaries annexations.
    d. If a current imagery source was unavailable, roads not formerly in the MGF may have been added based on the ACT51 maps. The road name on the ACT51 map may have been assigned to the fename field for these added roads.
2. The National Functional Class (NFC) has been changed to match the results of the 10-year review cycle, which occurred during 2005. Additional counties were updated to match the changes resulting for the 10-year NFC review cycle. The National Functional Class (NFC) and National Highway System (NHS) were reviewed and updated by MDOT staff.

3. Added and referenced State Park road features. Used GSP drivelines collected by MDOT in partnership with MDNR.

4. Added new and review current roundabouts features to follow referencing standards created by MDOT Referencing Specialist.

5. Additional roads were added to the MGF using information submitted by local authorities for the Qualified Voter File (QVF) street index.

6. Additional roads were added and name changes were done to the MGF using crash information received from MDOT and State Police.

7. Locally generated road centerlines have been provided to CSSTP for some areas of Michigan. The MGF for Allegan, Genesee, Ionia, and Jackson counties were updated with information acquired through local data sharing partnerships. This centerline provided accurate geographic positioning, road names, and address information.

8. Approved changes requested through the Asset Management Project were incorporated into the transportation network.

9. Framework Classification Codes (FCC) enhanced and reviewed in many areas.

10. Milepoints recalculated (BMP, EMP).

11. State Trunkline updated.

12. Verification of the attribute values for the following GIS polygons; 2000 US Congressional, State Senate, State House, 2000 Census Tracts, 2000 Census Block Groups, and FAUB. In addition, the internal features of each polygon were assigned with the corresponding value of the bounding polygon feature.

Version 8

Improvements since Version 7:

1. ACT51 2006 Certification used as a resource in updating the road network and the associated attribution.
    a. Incorporated roads certified, decertified, or reclassified by cities, villages and counties occurring in 2006.
    b. This process facilitated updates to the Legalsystem and road ownership fields
    c. Incorporated city and village boundaries annexations.
    d. If a current imagery source was unavailable, roads not formerly in the MGF may have been added based on the ACT51 maps. The road name on the ACT51 map may have been assigned to the fename field for these added roads.

2. The National Functional Class (NFC) and National Highway System (NHS) were reviewed and updated by MDOT staff.

3. Added and referenced many Michigan Department of Natural Resource Boating Access Sites (BAS) road features. Used GSP drivelines collected by MDOT in partnership with MDNR.

4. Inactive railroad features to active National Inventory (NI) intersections were reviewed, named, and added into the Linear Referencing System.

5. Michigan tribal roads have been identified with two new fields: irrcode and irrclass. Irrcode is a unique identifier for each of the Michigan tribes and the Irrclass is the Bureau of Indian Affairs functional classification of the road. In addition to adding many new tribal roads, several existing road features have been marked as being part of a tribal road network. This project is a multi-year project therefore not all tribal networks have been completed.

6. Added new and reviewed current roundabouts features to follow referencing standards created by MDOT Referencing Specialist.

7. Additional roads were added to the MGF using information submitted by local authorities for the Qualified Voter File (QVF) street index.

8. Additional roads were added and name changes were done to the MGF using crash information received from MDOT and State Police.

9. Locally generated road centerlines have been provided to CSSTP for some areas of Michigan. The MGF for Allegan, Ionia, Jackson, Kalamazoo, Macomb, Marquette, Monroe, Montmorency, Oakland, and Washtenaw counties were updated with information acquired through local data sharing partnerships and data sharing efforts

between CSSTP and many County and Regional GIS departments. The centerlines provided accurate geographic positioning, road names, and address information.

10. Approved changes requested through the Asset Management Project were incorporated into the transportation network.

11. Framework Classification Codes (FCC) enhanced and reviewed in many areas.

12. Linear referencing system mile points recalculated (BMP, EMP).

13. State Trunkline updated.

14. Verification of the attribute values for the following GIS polygons; 2000 US Congressional, State Senate, State House, 2000 Census Tracts, 2000 Census Block Groups, and FAUB. In addition, the internal features of each polygon were assigned with the corresponding value of the bounding polygon feature.

Version 9

Improvements since Version 8:

1. ACT51 2007 Certification used as a resource in updating the road network and the associated attribution.
    a. Incorporated roads certified, decertified, or reclassified by cities, villages and counties occurring in 2007.
    b. This process facilitated updates to the Legalsystem and road ownership fields
    c. Incorporated city and village boundaries annexations.
    d. If a current imagery source was unavailable, roads not formerly in the MGF may have been added based on the ACT51 maps. The road name on the ACT51 map may have been assigned to the fename field for these added roads.

2. The National Functional Class (NFC) and National Highway System (NHS) were reviewed and updated by MDOT staff.
    a. Worked toward standardization of the NFC (and legalsystem and other) values of roadways associated with boulevards, such as directional turnarounds.
    b. Changed the values of selected NHS routes to distinguish the different types of intermodal connectors from the “regular” NHS.

3. Added Authorized Vehicle Only crossovers on the limited access freeway based on GPS points collected by the Michigan Department of Transportation. These features were added into the Linear Referencing System.

4. Added and referenced many Michigan Department of Natural Resource Boating Access Sites (BAS) road features. Used GSP drivelines collected by MDOT in partnership with MDNR.

5. Michigan tribal roads have been identified with two new fields: irrcode and irrclass. Irrcode is a unique identifier for each of the Michigan tribes and the Irrclass is the Bureau of Indian Affairs functional classification of the road. In addition to adding many new tribal roads, several existing road features have been marked as being part of a tribal road network. This project is a multi-year project therefore not all tribal networks have been completed.

6. Added new and reviewed current roundabouts features to follow referencing standards created by MDOT Referencing Specialist.

7. Additional roads were added to the MGF using information submitted by local authorities for the Qualified Voter File (QVF) street index.

8. Additional roads were added and name changes were done to the MGF using crash information received from MDOT and State Police.

9. Locally generated road centerlines have been provided to CSSTP for some areas of Michigan. The MGF for Allegan, Ionia, Jackson, Kalamazoo, Kent, Macomb, Marquette, Monroe, Montmorency, Oakland, and Washtenaw counties were updated with information acquired through local data sharing partnerships and data sharing efforts between CSSTP and many County and Regional GIS departments. The centerlines provided accurate geographic positioning, road names, and address information.

10. Approved changes requested through the Asset Management Project were incorporated into the transportation network.

11. Framework Classification Codes (FCC) enhanced and reviewed in many areas.

12. Linear referencing system mile points recalculated (BMP, EMP).

13. State Trunkline updated.

14. Verification of the attribute values for the following GIS polygons; 2000 US Congressional, State Senate, State House, 2000 Census Tracts, 2000 Census Block Groups, and FAUB. In addition, the internal features of each polygon were assigned with the corresponding value of the bounding polygon feature.

Version 10

Improvements since Version 9:

1. ACT51 2008 Certification used as a resource in updating the road network and the associated attribution.
    a. Incorporated roads certified, decertified, or reclassified by cities, villages and counties occurring in 2009.
    b. This process facilitated updates to the Legalsystem and road ownership fields
    c. Incorporated city and village boundaries annexations.
    d. If a current imagery source was unavailable, roads not formerly in the MGF may have been added based on the ACT51 maps. The road name on the ACT51 map may have been assigned to the fename field for these added roads.

2. The National Functional Class (NFC) and National Highway System (NHS) were reviewed and updated by MDOT staff.
    e. Worked toward standardization of the NFC (and legalsystem and other) values of roadways associated with boulevards, such as directional turnarounds.
    f. Changed the values of selected NHS routes to distinguish the different types of intermodal connectors from the “regular” NHS.

3. The field name representing National Functional Class (NFC) previously known as "FUNCLASS" is now named "NFC". The data type and width will remain as identical to "FUNCLASS".

4. The field names previously known as "FAUBL" and "FAUBR" have been renamed in version 10 to "ACUBL" and "ACUBR" respectively. ACUB stands for Adjusted Census Urban Boundary, where FAUB stood for Federal-aid Urban Boundary. The new name/acronym better reflects what this urban boundary is and where it comes from. The valid values themselves have not changed, only the field name.

5. In addition to the field name change for NFC, the values themselves have also changed. The old values were 1-19, where values greater than 9 are in an adjusted census urban area, and values less than 10 were the equivalent values but are not in an urban area. Because the rural/urban distinction is defined by the ACUBL and ACUBR fields, this urban/rural distinction is no longer necessary. The equivalent of the old values will be stored in a field called "OLD_NFC" for version 10 only. New NFC value definitions, without the rural/urban distinction are:
   - 1 – Interstate
   - 2 – Other Freeway **
   - 3 – Other Principal Arterials
   - 4 – Minor Arterials
   - 5 – Major Collectors
   - 6 – Minor Collectors
   - 7 – Local

   * Roads with any NFC can be rural or urban (see RU_L and RU_R, below). As of MGF, version 10, there are no Minor Collectors that are urban in Michigan, but that is subject to change. All urban collectors, in the old nomenclature, are now major collectors (in urban areas).

   **Per HPMS, this is defined as Other Freeway and Expressway. MDOT chooses not to code Expressways along with Other Freeway but with Other Principal Arterials instead. The operational characteristics of Expressways have more in common with Other Principal Arterials (surface streets) than with Other Freeway.

6. Addition of Rural Urban Designation left (RU_L) and Rural Urban Designation left (RU_L) fields. RU_L and RU_R can be used in combination with NFC to give rural and urban functional classifications. RU values and definitions:
   g. 1 – Rural (population is less than 5,000 AND located outside any urban boundaries)
   h. 2 – Small Urban (urban cluster population is 5,000 – 49,999)
   i. 3 – Small Urbanized (population is 50,000 – 199,999)
   j. 4 – Large Urbanized (aka, TMA [Transportation Management Area] population is 200,000 or more)

   RU_L and RU_R are attributed differently on road segments on an urban boundary (that is, the Adjusted Census Urban Boundary), as compared with ACUBL and ACUBR. A road on an urban boundary is considered urban. For most boundary roads, RU_L = RU_R = 2, 3, or 4 depending on the population range of the area. In the case of a small number of boundary roads, the boundary divides contiguous urban areas of different population ranges. The RU_L and RU_R values will differ for such segments, but will not be 1. As to ACUBL and ACUBR, rural roads have the value of 0 for both fields, and

urban boundary roads have a positive number (unique to each urban area) on “one side” and zero in the other. A road segment with positive numbers in either or both ACUBL and ACUBR fields is urban.

7. Added new and reviewed current roundabouts features to follow referencing standards created by MDOT Referencing Specialist.

8. Additional roads were added and name changes were done to the MGF using crash information received from MDOT and State Police.

9. Locally generated road centerlines have been provided to CSSTP for some areas of Michigan. The MGF for Allegan, Ionia, Jackson, Kalamazoo, Kent, Macomb, Marquette, Monroe, Montmorency, Oakland, and Washtenaw counties were updated with information acquired through local data sharing partnerships and data sharing efforts between CSSTP and many County and Regional GIS departments. The centerlines provided accurate geographic positioning, road names, and address information.

10. Approved changes requested through the Asset Management Project were incorporated into the transportation network.

11. Framework Classification Codes (FCC) enhanced and reviewed in many areas.

12. Linear referencing system mile points recalculated (BMP, EMP).

13. State Trunkline updated.

14. Verification of the attribute values for the following GIS polygons; 2000 US Congressional, State Senate, State House, 2000 Census Tracts, 2000 Census Block Groups, and ACUB. In addition, the internal features of each polygon were assigned with the corresponding value of the bounding polygon feature.

Future products/services

The Michigan Geographic Framework (MGF) will continue to be updated and maintained. The positional accuracy will be updated, as better source information becomes available. Potential sources will involve digital orthophotography and local GIS base maps. Discussions have begun to include the following themes and attributes in the future:

FUTURE THEMES:	Hydrographic Centerlines Elevation and Bathymetry Public Parcels (point and polygon) State Owned/Leased Facilities Digital Orthoimagery Remonumentation points Election Geography Street Address Updating
FUTURE ATTRIBUTES:	Hydrographic Type

How can I get a product?

Products are being made available at no cost. Call the Department of Technology, Management and Budget, Center for Shared Solutions and Technology Partnerships (CSSTP) at 517-373-7910 for more information.

Appendix A – MDOT's Business Case for Participating in the Michigan Geographic Framework

How did it all begin?

MDOT

For several years, MDOT has been developing a linear reference system for use in collecting and referencing roadway data. Early efforts resulted in a trunkline only product based upon Control Section and milepoints. This effort, while very useful for displaying and analyzing mainline, trunkline data, also raised several issues. There was no one consistent standard for control section referencing; each "master" file used a slightly different version of control sections. There was no way to reference "auxiliary" roads such as service roads, ramps, etc. Divided roads and one-way street pairs where distances differed on opposite directions could not be handled easily in a GIS. Control sections were not always one continuous roadway "chunk" with only one begin and one end point such as is necessary within a LRS. And, most importantly, non-trunkline roads had no control section and thus could not be referenced.

With the passage of ISTEA, it became clear that it would be necessary to include non-trunkline roads within MDOT's LRS. FHWA's Highway Performance Monitoring System, which requests roadway data from each state once each year, added the requirement of a LRS which would include all roads functionally classified as principal arterials or rural minor arterials. At that time, these roads included approximately 1300 miles of non-trunkline roads. The NHS includes nearly 300 miles of non-trunkline roads. As the Transportation Management System (TMS) was developed, the goal was to include at least all federal aid roads in files that could be graphically displayed.

Using student assistants and contract employees, MDOT began the task of adding LRS data to a map base. The MIRIS base was selected as the most positionally accurate. The MALI PR reference system was selected as the most complete MDOT identification system tied to existing, current data (crash data) and which came closest to simulating LRS referencing principles. Since MALI at that time was being poorly maintained by the State Police due to staffing losses, MDOT agreed to accept maintenance of the MALI. It quickly became clear that both MIRIS and MALI were in need of updating. It also became critical to have a completed LRS soon for use in TMS. In April 1996, the MDOT staff was instructed to develop a way to complete the project within the Fiscal 1996-97 budget.

What are "The Framework" and "The Framework Project"?

The Framework is a very large computer file being created using GIS software. This file is being developed by merging TIGER, MIRIS, and MALI data into one totally synchronized GIS file. The roads in the Framework file will have a dual LRS; both postal

addresses and unique "Physical Road" (PR) numbers with milepoints will be recorded for each road. The Framework Project includes developing and using the procedures necessary to accomplish the merger. The merged file will have TIGER and MALI attributes on the more positionally accurate MIRIS base.

The project also includes all activities that may be required to correct addresses, PRs, intersection topology, etc., and to add missing roads. Other features that will be edited include street names, zip codes, and boundaries for county, city, village, township, as well as all boundaries required to determine voting districts and precincts. Finally, the project includes the creation of a new, updated MALI file for use by the Office of Highway Safety, State Police, and MDOT's Traffic and Safety and procedures for "moving" previous year crash information (located in reference to the "old" MALI), to the correct locations in the new MALI.

What can it be used for at MDOT; i.e., why is MDOT involved?

MALI file maintenance and Crash Location
Transportation Management System (TMS)
- Referencing System for roadway data
- Mapping, display of roadway data
- Geographic queries and analysis

Geo-referencing of "addressed" data
Base for Demand Modeling Networks
Roadway Data Collection, Storage, Display and Analysis using a GIS

What more must MDOT do to make the fullest practical use of the Framework?

Only data that is collected or stored using the Physical Road(PR) number and milepoints, or using postal addresses can readily be displayed or analyzed geographically. Much of MDOT's data for the state trunklines now exists in TMS, stored by PR and milepoint, but using the 1994 MALI version. That data needs to be "converted" to the 1995 MALI version that was the base from which the Framework began its MALI update. Non-trunkline data at MDOT is not currently stored using either addresses or MALI PR numbers. Non-trunkline tables must be generated for critical data. Initial efforts will concentrate upon creating tables for NHS, legal system, jurisdiction, and functional class.

Appendix B - Glossary of Terms

Conflation – A term used to describe the process of linking two databases and transferring the data from one to the other. In GIS terms, it is the transferring of attributes of one digital map base to another that represents the same features in the same geographic area.

GIS - A Geographic Information System is usually software which deals with data pertaining to known locations - such as the surface condition of segments of highway, the population densities of city blocks, the recorded information about motor vehicle crashes, or regional pavement preservation strategies. GIS can be used to organize, store, retrieve, analyze and display the location data. Computer generated maps are used to convey the information to the GIS user and to convey the questions the user is asking. (Questions about a location are asked by pointing to the location on the map.)

LRS - A GIS specially designed for referencing linear elements (such as roads).

The most common Linear Referencing Systems use street names and numbered addresses. Each street (Line) must have a unique name, and the addresses must increase in one direction along the Line. Another type of LRS uses unique names (or numbers) for all the different lines, and distance or length measurements instead of addresses. The locations of observations or events along linear features (such as highways, rivers, railroads or pipelines) can be recorded using a standard LRS, and thus enable the display of data on maps and analysis by Geographic Information Systems.

TIGER - A comprehensive GIS created for use by the Census Bureau for the 1990 census. The 1990 TIGER file was not terribly accurate; later versions are becoming more accurate. Positional accuracy is less than desirable. The TIGER file includes roads and corresponding road names and postal addresses, railroads, hydrography, and boundaries (census blocks and tracts, counties, cities, townships, villages, etc.)

MIRIS - (Michigan Resource Information System) A computerized map digitized by DNR in the 1970's positionally accurate to plus or minus fifty feet. Data cannot be referenced to linear road elements since they are merely lines with no “ID” to which data can be referenced. DNR has never made a consistent, statewide effort to keep the road layers current. Other major layers, many of which have been kept more current, include land use, hydrography, soils, and drainage basins.

MALI - (Michigan Accident Location Index) A total road, non-geographic file created in the 1970's for use in locating crashes. The file assigned a Physical Road (PR) number to each public road, and milepoints along each PR number for each intersection with another road. Maintained originally by State Police; level of maintenance declined as staff reductions occurred. Maintenance responsibility was transferred to MDOT’s Planning Bureau in 1994.