

COUNTY PLAN

Monumentation and Remonumentation Plan

for _____ County, Michigan

Prepared for the implementation of 1990 PA 345, MCL 54.261-279

Original Approved by
Board of County Commissioners:

(Date)

Original Approved by
State Survey and Remonumentation Commission:

(Date)

Revised and Approved by
Board of County Commissioners:

, Chairperson

(Date)

Revised and Approved by
Department of Licensing and Regulatory Affairs:

, Director

(Date)

TABLE OF CONTENTS

<u>Section</u>	<u>Topic</u>	<u>Page Number</u>
	Title Page	i
	Table of Contents	ii
I.	Introduction - The Reason for this Plan	1
II.	Definitions.....	2
III.	Plan Objectives	4
IV.	Grant Administration	5
V.	Plan Execution	6
VI.	Work Program.....	8
VII.	Perpetual Monument Maintenance Plan	9
VIII.	Geodetic Densification and Maintenance Program.....	10
IX.	Rapid Geodetic Positioning of PLS Corners.....	11
X.	Amending the Plan.....	14
XI.	Severability	15
XII.	Annual Funding Availability	16
 <u>Appendices</u>		
A.	Items Eligible for Grant Funds.....	17
B.	Procedure for Ratification of a Corner Position.....	18
C.	Minimum Standards for Monumentation.....	19
D.	Minimum Standards for Corner Witnessing	20
E.	Research	21
	I. Reconnaissance	24
	II. Corner Monumentation	25
	A. Horizontal Control	26
	B. Addresses for Research Sources	27
F.	*Survey History of the County.....	31

*This topic is highly recommended, but is not required for approval by the Department of Licensing and Regulatory Affairs.

I INTRODUCTION THE REASON FOR THIS PLAN

The adoption by the Board of County Commissioners of a “County Monumentation and Remonumentation Plan” is a requirement of 1990 PA 345, MCL 54.261-279. When the State Legislature was considering the adoption of Senate Bill 380 (which became 1990 PA 345, MCL 54.261-279), the following “Supporting Argument” was presented by nonpartisan Senate staff for use by the Senate in its deliberations:

Implementing the county monumentation program would mark the first time in 175 years that a concerted effort was made to do this critically needed job. Since the 1850s, there has been no statewide effort to validate corners, even though surveyors’ tools have advanced from a 33-foot chain and a compass to a technological arsenal that includes a device that gives automatic measurements of angles between corners, and instruments that bounce a signal off a satellite to determine the exact longitude and latitude of a given point. Orderly, consistent remonumentation with standardized markers would assist in the documentation and planning of roads and utilities, the (location) of public and private property, the settlement of ownership claims and disputes, and the provision of a central data base containing information on counties and townships throughout the State. Completion of the remonumentation system in a county would enable the county to implement a computerized mapping system that would include the precise location of roads, utilities, and property lines; the corners would serve as the foundation for such a map. Further, the remonumenting on a county-wide basis would be more economical than contracting out a few corners at a time, and individual surveys would be less expensive if surveyors could rely on monumented corners.

The County must adopt county plan which must be approved by the Department of Licensing and Regulatory Affairs in order to be eligible for state grants for monumentation and remonumentation. The Model County Plan with prepared and adopted by the Department of Licensing and Regulatory Affairs pursuant to Section 8(1) of 1990 PA 345, MCL 54.261-279, may be adopted as is by a county or, if necessary, with changes appropriate for that county. The grants are made available from funds that the County must send to the state regularly, as has been done since January of 1991. 1990 PA 346, MCL 600.2567 (Senate Bill 381) provides for the collection of funds by each county’s Register of Deeds.

II DEFINITIONS

The following words or phrases as used in this plan are either contained in 1990 PA 345, MCL 54.261-279 or are necessary for its administration:

- A) **Act** – means 1990 PA 345, MCL 54.261-279 the State Survey and Remonumentation Act.
- B) **Commission** – means the Director of the Department of Licensing and Regulatory Affairs.
- C) **Corner** – means a public land survey corner or a property controlling corner.
- D) **County Grant Administrator** – means a person appointed by the County Board of Commissioners as the individual responsible for completing and submitting the annual application for a Survey and Monumentation grant to the State of Michigan, and the administering of the approved annual grant. The County Grant Administrator’s duties are those set forth herein.
- E) **County Representative** – means (1) the County Surveyor, whether elected or appointed, pursuant to Section 95 of Chapter 14 of the Revised Statutes of 1846, being Section 54.95 of the Michigan Compiled Laws; or, (2) the Professional Surveyor appointed by the County Board of Commissioners if the county does not have a County Surveyor. The County Representative shall perform any duties assigned by law and other duties described herein.
- F) **Department** – means the State Department of Licensing and Regulatory Affairs.
- G) **Locate** – means to recover an existing corner which conforms to the minimum standards specified herein.
- H) **Lost Corner** – means a previously established corner whose position cannot be recovered beyond reasonable doubt, either from traces of the original General Land Office (GLO) marker or its accessories or from acceptable evidence or testimony that bears upon the original position, and, whose location can be restored only by reference to one or more interdependent corners.
- I) **Marker** – means the physical object which occupies the location of a public land survey corner, a property-controlling corner, or a horizontal or vertical control station.
- J) **Monument** – means to install a marker which meets or exceeds minimum standards as specified herein.

DEFINITIONS (continued)

- K) **Monumentation** – means all field activities which pertain to a corner including, but not limited to, field reconnaissance for evidence revealed in research data, searching, excavating, traversing, computing, monumenting, witnessing, etc. and Peer Group ratification of a corner
- L) **Monumentation Surveyor** – means the surveyor who is awarded a contract to (1) perform research for and monument or remonument markers; or, (2) establish horizontal and/or vertical control markers.
- M) **Obliterated Corner** – means a previously established corner which has no remaining traces of the marker or its accessories, but its position has been perpetuated or its position may be recovered beyond reasonable doubt by the acts and testimony of the interested landowners, competent surveyors, or other qualified local authorities or witnesses, or by some acceptable record evidence.
- N) **Open Meetings Act** – means 1976 PA 267, MCL 15.261-275.
- O) **Peer Group** – means a minimum of three non-associated surveyors appointed by the County Representative. Non-associated means members are not from the same company or firm. One member of the Peer Group shall be the County Representative, who shall act as Chair of the Peer Group.
- P) **Property-Controlling Corner** – means a Public Land Survey (PLS) corner or any property corner which does not lie on a property line of the property in question, but which controls the location of one or more of the property corners of the property in question.
- Q) **Public Land Survey Corner** – means any corner actually established and monumented in an original survey or resurvey used as a basis of legal description for issuing a patent for the land to a private person from the United States government.
- R) **Research** – means the compilation of all historical records which pertain to a corner.
- S) **Remonument** – means to install a marker where (1) the existing marker does not meet minimum standards as specified; or (2) the existing marker is in danger of becoming lost or obliterated; or, (3) the corner has been lost or obliterated.
- T) **Surveyor** – means a Professional Surveyor licensed under Article 20 of the Occupational Code, 1980 PA 299, MCL 339.2001-2014.

III PLAN OBJECTIVES

- A) Provide for the location, monumentation and/or remonumentation of corners on a maximum of 20-year planned timetable.
- B) Create a system for the research of the history of all corners and horizontal and vertical control markers.
- C) Create and maintain a repository for all records pertaining to Public Land Surveys.
- D) Provide for a perpetual maintenance program for all corners and horizontal and vertical control markers.
- E) Provide for the location of and a data base for horizontal and vertical control markers.
- F) Coordinate with adjoining counties for the monumentation of all county line corners.
- G) Annually determine monumentation requirements for which a grant application will be submitted for approval by the Department of Licensing and Regulatory Affairs.

IV GRANT ADMINISTRATION

For the purpose of implementation of this Act, the County Board of Commissioners must appoint a County Grant Administrator. The county shall also appoint a County Representative if the county has abolished the position of County Surveyor in accordance with law.*

The County Grant Administrator's duties include:

- A) Submitting annually a grant application and supporting documents to the Department of Licensing and Regulatory Affairs by December 31st of the year preceding the grant year.
- B) Selecting monumentation surveyors in compliance with Qualification-Based Selection (QBS) as set forth in House Concurrent Resolution 206 (June, 1987).
- C) Submitting proposed county/monumentation surveyor contracts to the Board of County Commissioners for its approval and its authorization for execution.
- D) Recommending payment to the monumentation surveyor as provided by the contract.
- E) Submitting other documents as may be required by the Department of Licensing and Regulatory Affairs.

*** NOTE: IF THE SURVEYOR ACTING AS THE COUNTY REPRESENTATIVE IS NOT A MONUMENTATION SURVEYOR, THAT PERSON MAY ALSO BE THE COUNTY GRANT ADMINISTRATOR.**

V PLAN EXECUTION

In addition to any duties assigned by law, the County Representative shall establish requirements and procedures to implement the following:

- A) Research the history of corners and horizontal and vertical control stations.
- B) Field verify whether corners are existent, lost, or obliterated.
- C) Set a marker at all corners, following the Peer Group's ratification. The location of said corners shall be established in accordance with the procedures set forth in the Manual of Instructions for the Survey of Public Lands of the United States (1973) prepared by the Bureau of Land Management of the United States Department of Interior (Technical Bulletin 6, or subsequent editions).
- D) Recover all existing horizontal and vertical control stations.
- E) Perpetual monument maintenance of all corners.

THE COUNTY REPRESENTATIVE SHALL ALSO BE RESPONSIBLE FOR:

- A) Establishing, scheduling meetings of, and chairing a Peer Group which will meet and act as advisors for ratification of corner locations. These meetings shall be in compliance with the Open Meetings Act.
- B) Creating and maintaining a filing system for each corner, which contains all survey information compiled.
- C) Submitting documentation to the County Grant Administrator as required for the annual Application for Monumentation Grant which includes, but is not limited to, the following:
 - 1) For the current year projects, a description of the work area completed, the work area projected to be completed by December 31st and the work area remaining to be completed.
 - 2) A general work progress report for all previously awarded contracts.
 - 3) The proposed work program for the following year. The work program will indicate (a) the area where the Public Land Survey (PLS) corners and property-controlling corners are proposed to be monumented and/or remonumented within the next contract year; (b) the area where the PLS corners and property controlling corners are to be researched in the next contract year; (c) the area where corners will be checked and, if necessary, remonumented according to the perpetual monument maintenance plan; (d) the area where horizontal and vertical control stations are to be researched and located; and (e) the area where horizontal and vertical coordinates are to be established.

PLAN EXECUTION (continued)

- D) Creating and maintaining a filing system for horizontal and vertical geodetic monumentation information obtained from the National Geodetic Survey (NGS), United States Geological Survey (USGS) and other sources.
- E) Coordinating the densification of horizontal and vertical geodetic monumentation with the State's Geodetic Advisor.

VI WORK PROGRAM

The meet the objectives of the Act, all work shall be performed in the following manner:

- A) Research: All corner locations shall be researched prior to monumentation. Copies of all research information shall be available to the public. The county may charge a reasonable fee for such copies.

No marker shall be considered a part of the plan until the research for its location has been performed and the location has been ratified by the Peer Group.

Research on corners means only those activities for the compilation of the historical records which pertain to a particular corner. All work performed beyond the compilation of a historical record is included in the work category monumentation of corners.

- B) Monumentation: Annually locate and monument or remonument a specific number of corners so as to complete the program within the 20-year time frame.

The corners proposed to be monumented shall be specified as part of the annual grant application. An annual grant may include some unspecified corners in danger of becoming lost or obliterated.

Monumentation of corners means all field and related activities which pertain to a corner including, but not limited to, field reconnaissance for evidence revealed in research data, searching, excavating, traversing, computing, monumenting, witnessing, etc. and peer group ratification of a corner.

For corners monumented under the Act, the monumentation surveyor shall furnish the County Representative two copies of a completed and recorded Land Corner Recordation Certificate (LCRC) as required by 1970 PA 74, MCL 54.201-210d. The County Representative shall forward one copy to the County Grant Administrator to be forwarded to the Department of Licensing and Regulatory Affairs with the work progress reports, as required by the Department.

Any surveyor may submit a corner location to the County Representative for Peer Group review. When filed with the County Representative, all information is considered filed with and available to the Commission. The county agrees to maintain these records and to provide copies of any records requested by the State at no charge.

VII PERPETUAL MONUMENT MAINTENANCE PLAN

When all corners have been monumented as specified under this Act, a “Perpetual Monument Maintenance Program” shall begin the year following the year of completion of monumentation or remonumentation. Each year thereafter, a minimum of 1/20th of the corners shall be checked and, if necessary, remonumented. The specific corners or specific region to be checked shall be a part of the annual grant application.

VIII GEODETIC DENSIFICATION AND MAINTENANCE PROGRAM

The County Representative shall research an entire county for existence of NGS/CGS (National Geodetic Survey/Coast and Geodetic Survey) and other important horizontal and vertical control stations. Thereafter, a thorough field search shall be made for each control station identified by the research. A report of the status of each station shall be prepared using the NOAA/NGS DDPROC (National Oceanic and Atmospheric Administration/National Geodetic Survey Descriptive Data Processing System) method. The report shall be filed with the County Representative, the Department of Licensing and Regulatory Affairs, and the NGS Geodetic Advisor for submission to NGS (National Geodetic Survey). The County Representative shall provide for the preservation and maintenance of all geodetic markers in the county.

When deemed timely by the County Representative, a monumentation surveyor shall be engaged to determine NAD 83 (North American Datum of 1983), three-dimensional coordinates in accordance with 1964 PA 9, MCL 54.231-239, on corners or other monumented points approved by the Department. All work for NGS control densification and inclusion into the National Geodetic Reference System (NGRS) shall meet or exceed the positional accuracy and marker requirements of Group C; Order 2; 20 PPM according to the FGCS standards entitled Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques for GPS (Global Positioning Systems) or Second-Order Class I-1:50,000 minimum distance accuracy for all other measurement systems according to the FGCS manual entitled Standards and Specifications for Geodetic Control Networks. The NGVD 1929 (National Geodetic Vertical Datum of 1929) datum will be used until such time as the new NAVD 1988 (North American Vertical Datum of 1988) vertical adjustment is completed.

Essentially, only the base network markers meeting the necessary requirements may become part of the NGRS and the corner markers will be positioned to a minimum of Third-Order Class I horizontal control network standards or Group C, Order 3-100 PPM for GPS according to the new FGCS standards and specifications.

The specific stations or specific region to be included in the annual work program shall be a part of the annual grant application.

IX RAPID GEODETIC POSITIONING OF PLS CORNERS

When deemed timely by the County Representative, a monumentation surveyor shall be engaged to determine NAD 83 (North American Datum of 1983), three-dimensional coordinates in accordance with 1964 PA 9, MCL 54.231-239, on corners or other monumented points approved by the Department.

The specific stations or specific region to be included in the annual work program shall be a part of the annual grant application.

In addition to the conventional surveying methods and static GPS methods specified in Section VIII, Rapid GPS surveying methods may be utilized that meet the following minimum specifications:

- A) Control stations of at least one level higher than the desired final product shall be utilized.
- B) “Rapid” GPS (Global Positioning System) data collection:
 - a. At least 2 independent sets of data shall be observed.
 - b. An independent set shall consist of 3 observations followed by a break in lock and re-initialization followed by 3 more observations to each control station. All observations from the same control station must agree within 0.04 feet.
 - c. Each point shall be observed from 2 different control stations and be re-observed a minimum of 30 minutes after the initial observation to utilize a significant geometry change in the satellite constellation.
 - d. Observation time in each session shall be adequate to ensure that all ambiguities are resolved and all integers are fixed and the desired positional tolerance is achieved.
 - e. Observations on different days are recommended to collect field data under different atmospheric conditions.
- C) Eight-five (85) percent of all points observed must lie within the perimeter of the control network being utilized. Use of the High Accuracy Reference Network (HARN), the Continuously Operating Reference Station (CORS) of the Michigan Spatial Reference Network (MSRN), or an approved future control system is recommended.
- D) The final coordinates shall be a result of a rigidly adjusted network using least squares adjustments software. The result of the adjustment shall be a mathematically proven positional tolerance at a 1.96 sigma, 95% confidence level, not to exceed 0.25 feet horizontally where non-trivial connections or a direct physical horizontal measurement are made to adjacent corners or 0.125 feet for all other coordinates where corners are one-half mile or more apart.

- a. Direct, physical horizontal measurement by independent means between a randomly selected 10 percent of the adjacent points shall be made, the result of such measurements indicating compliance with the required positional tolerance.
 - b. A direct measurement shall be made using conventional methods between adjacent corners that are 100 feet or less apart.

- E) Instruments of geodetic grade, including antenna equipped with a multi-path mitigating device and fixed rod height with bipod at the rover, shall be utilized.
 - a. Observations taken must meet or exceed the manufacturer's specifications for the type of work being performed.
 - b. Field observations should generally not be taken under canopy; however, some canopy is acceptable if there are adequate satellites available at the proper angles to achieve the desired accuracy.

- F) All field observations shall follow the current generally accepted principles of surveying, taking into account the following:
 - a. Currently, the acceptable Positional Dilution of Precision (PDOP) is under 5. PDOP is the overall measure of the precision obtainable with a given satellite geometry and refers to Horizontal (HDOP) and Vertical (VDOP) measurements (northing, easting and elevation /latitude, longitude and altitude). PDOP is also an indicator expressing the relationship between the error in user position, and the error in satellite position.
 - b. An elevation mask of no less than 15 degrees from the horizon
 - c. Minimum number of satellites observed simultaneously between the base and the rover shall not be less than 5
 - d. Observations should begin and end with check shots to known control

- G) A written report shall be compiled under the supervision of the professional surveyor in responsible charge of the effort. The report shall include:
 - a. Equipment manufacturer, model & serial number of the receiver(s) and antenna(s) used
 - b. Names of equipment operators
 - c. Names or I. D. numbers of control stations utilized
 - d. Certification that equipment calibration was performed (bubble checks on rods)
 - e. Dates of observations
 - f. A written narrative of the mission planning, field and office procedures followed
 - g. A compilation of the points observed, resulting coordinate values, and their standard deviation at 1 sigma and at 1.96 sigma.

- h. Results of the physical horizontal check measurements
- i. Description of intervening, conventional traverse activity for inaccessible points
- j. Professional Surveyor certification, signature, seal and date
- k. Map of control network
- l. MCS83 adjustment year
- m. Vertical Datum
- n. Combined factor
- o. All residuals

X AMENDING THE PLAN

This plan may be amended subject to:

- A) Approval by the Board of County Commissioners; and
- B) Approval by the State Department of Licensing and Regulatory Affairs.

XI SEVERABILITY

If any section or provision of this plan for any reason conflicts with present or future Legislative Acts or Administrative Rules, that section shall be invalid, but such invalidation shall not affect the remaining provisions of this plan.

XII ANNUAL FUNDING AVAILABILITY

Work programs specified in Sections VI, VII and VIII shall be adjusted depending upon the actual annual grant and other funds available.

The State shall be liable to the county for none of the costs expended and/or borrowed and subject to reimbursement under this agreement, except to the extent to which monies are appropriated by the Legislature and made available to the State of Michigan, Department of Licensing and Regulatory Affairs. The monies for survey and remonumentation are allocated annually under the provisions of the Act to the county consistent with the Act, rules, and annual grant formula.

APPENDIX A – ITEMS ELIGIBLE FOR GRANT FUNDS

Items eligible for grant funds include, but are not limited to, the following:

1. Corner research expenses. Expenditures incurred for research on corners means only those expenditures incurred for the compilation of the historical records which pertain to a particular corner. Any work performed beyond the compilation of a historical record is considered monumentation of corners.
2. Corner monumentation expenses. Expenditures incurred for monumentation of corners means all field activities which pertain to a corner including, but not limited to, field reconnaissance for evidence revealed in research data, searching, excavating, traversing, computing, monumenting, witnessing, etc. and peer group ratification of a corner.
3. Time spent in developing corner location documentation, including time spent to research existing records, summarize the evidence found, prepare drawings when necessary, and prepare a final report. Information to be shown on the above-noted drawing may include traverse information and useful physical features (e.g., lines of occupation, roadways, fences, etc.).
4. Time spent in presenting corner locations to the Peer Group for ratification.
5. Grant monies used to pay for installation of a marker for survey work which is a part of another public or private contract or work assignment. A contract must be executed prior to the services being performed. The county may furnish the marker to be used or include the cost for it in the contract for monumentation. There are no other eligible costs for this type of corner monumentation.
6. Such other items as may be specified in the annual grant application and approved by the Department of Licensing and Regulatory Affairs.

APPENDIX B – PROCEDURE FOR RATIFICATION OF A CORNER POSITION

When a monumentation surveyor desires the ratification of a corner position, he/she shall make a written request for same to the County Representative, accompanied by the corner position documentation. Not later than 28 calendar days after said request, the County Representative shall call and chair a meeting, noticed in compliance with the Open Meetings Act, of a Peer Group to review the corner position documentation furnished.

At least ten days prior to the meeting, the County Representative shall give notice of the meeting to the Peer Group, each monumentation surveyor whose corner position documentation will be reviewed, and any surveyor who has set a corner different from the position being considered. All corner position documentation will be reviewed by the Peer Group. Minutes shall be taken which shall become the official record when approved by the Peer Group.

A monumentation surveyor may not consider or vote on his/her own corner(s) for ratification as a member of a Peer Group.

When a surveyor brings a corner to the Peer Group for ratification as a result of work performed to fulfill a public or private contract or work assignment for other than a remonumentation contract, that corner may be considered for ratification by the Peer Group. Upon approval by the Peer Group of such a corner for monumentation, the corner is considered a part of the program. The county Grant Administrator may provide the marker and use grant monies to pay the cost of installation of a marker if a county requires a special marker other than what is necessary to meet the minimum requirements of 1970 PA 74, MCL 54.201-210d.

After the Peer Group's ratification, the monumentation surveyor shall install the appropriate corner marker and cap and shall file a Land Corner Recordation Certificate as required by 1970 PA 74, MCL 54.201-210d. Two copies of said certificate shall be furnished to the County Representative.

APPENDIX C – MINIMUM STANDARDS FOR MONUMENTATION

The permanent marker set at the location of the corner shall be set in conformance with 1970 PA 74, MCL 54.201-210d.

The county shall adopt standardized markers and/or caps to be utilized when remonumentation is necessary.

APPENDIX D – MINIMUM STANDARDS FOR CORNER WITNESSING

All corners shall be witnessed in accordance with 1970 PA 74, MCL 54.201-210d, and the published rules promulgated by the State Board of Land Surveyors under 1980 PA 299, MCL 339.2001-2014.

APPENDIX E – RESEARCH

I RESEARCH SOURCES AND ANALYSIS

By thoroughly examining and using the following list of sources for survey information, the prudent surveyor can be confident that the corner has been properly located:

- A. General Land Office (GLO) Survey: including original, dependent, independent, or omitted lands (notes, plats, and special instructions).

If these records are not available in the county offices, they may be obtained from the Michigan Department of Natural Resources, the National or State Archives, or the Eastern Regional Office of the Bureau of Land Management.

<u>Sources</u>	<u>Type of Information Usually Available</u>
B. COUNTY RECORDS:	
County Surveyor	Land Corner Recordation Certificates, public and private land surveys and notes
County Register of Deeds	Land Corner Recordation Certificates, land surveys, subdivision plats, condominium subdivisions and other records
County Road Commission or Department of Public Works	Highway location surveys, GLO corner ties, highway easements, township road orders and other records
County Drain Commissioner or Department of Public Works	County and township drain records, unrecorded maps, and other records
Clerk of Court	Court records
Abstract Office/Title Company	Abstract records, survey maps, tract maps
Local Assessor	Conveyances, survey maps, tax maps and descriptions
Adjoining County Offices or Departments of Public Works	County line records, county line roads

<u>Sources</u>	<u>Type of Information Usually Available</u>
C. MUNICIPAL RECORDS:	Board meeting minutes, cemetery records, township road and drain descriptions and maps, engineer, clerk, zoning administrator, utility and public works departments
D. OTHER AGENCIES:	
State	Department of Management and Budget (Bureau of Facilities), Department of Transportation, Department of Natural Resources, universities and historical collections, State Archives, State Library
Federal	Bureau of Land Management, Fish and Wildlife Service, Soil Conservation Service, U.S. Corps of Engineers, Civilian Conservation Corps, Coast Guard, National Parks Service, U.S. Forest Service, Federal Aviation Administration, Federal Communications Commission, National Geodetic Survey, U.S. Geological Survey, Bureau of Indian Affairs, International Great Lakes Survey, National Geospatial-Intelligence Agency
Adjoining States	Bordering state survey records (Indiana, Ohio, Wisconsin)
E. OTHER SOURCES:	Private surveyors' and engineers' records, utility companies, forest product companies, mining companies, land agencies, railroad companies, abstractors, lending institutions, historical societies, oil and gas companies, American Land Title Association surveys
F. OTHER MAPS AND PLATS:	Plat books of ownership (Index to County Atlases and Plats)
G. AERIAL PHOTOS:	U.S. Soil Conservation Service, U.S. Agriculture Stabilization and Conservation Service, Department of Natural Resources, Department of Transportation, aerial mapping companies,

and/or other agencies previously listed

H. For Property Owner and Resident Interviews:

1. Develop an interview form. The form should include space for the date, interviewer's name, and the name, statement, and signature of the person interviewed.
2. The interviewer should determine the credibility of the person interviewed and make a statement on the interview form.
3. The interviewer should attempt to obtain an affidavit when important parole evidence is used to determine the position of a corner.

ANALYSIS:

- A. Develop a checklist to ensure that all possible sources of information have been investigated.
- B. Review, when necessary, all maps, plats, and aerial photos with the Public Land Survey (PLS) notes to correlate physical calls such as streams, lakes, swamps, etc., with distances on the maps, plats and photos.
- C. Review, when necessary, subsequent surveys to correlate with the PLS and other later surveys.

II RECONNAISSANCE (FIELD)

- A. All record data related to established monuments, accessories, and calls to natural features should be reviewed to locate and define the area of search. Thereafter, a reconnaissance of the area, using the record-research data or PLS methods, is necessary to narrow the area of search and explore the area for evidence. Then, make a survey to locate existing monuments, occupation lines, possible corner locations, and natural feature calls from PLS field notes.
- B. A licensed professional surveyor experienced in land corner search, should make the field search or valuable evidence may be overlooked or destroyed.
- C. The field search should be made at a time of year when conditions are most suitable for uncovering evidence. This may depend on the terrain, vegetation, or seasonal ground cover.
- D. The record evidence of the monument to be located will suggest the type of search equipment to be used during the field search. The following list should be considered when preparing for the search:
 - 1. Metal locator – for recovery of metallic monuments.
 - 2. Hand tools (picks, shovel, etc.) – where monumentation is expected within a small area or near the surface.
 - 3. Mechanical equipment (backhoe or jackhammer) – for excavation in large, deep, or difficult search areas.

The surveyor's judgment will control the depth and extent of the excavation. For reference purposes (for future surveys), provide an excavation report describing the extent and the location of the excavation. This may eliminate duplicate excavation efforts.

- E. In areas where the only information available is the original General Land Office (GLO) survey data or where it is difficult to narrow down a corner search area, it may be advantageous to perform a corner search after a random traverse line has been surveyed along the section lines between known corners. The original line calls and corner locations can be calculated and field located from the random traverse, thus narrowing down the search area and maximizing the effort spent on the actual field search for original survey evidence and/or subsequent survey corner evidence.

CORNER MONUMENTATION

FIELD MONUMENTATION

A. Type of Marker

A durable and easily identifiable marker locatable with a magnetic locator should be placed at the position of each remonumented corner, if possible. Each county will standardize the markers placed within its boundaries. Each marker will be stamped or engraved to identify it, have a centering mark to define the exact location of the corner, and be stamped with the license number of the surveyor responsible for its placement.

B. In-place Markers

An existing in-place, non-ferrous marker shall be replaced with a standard county marker.

SETTING OF MARKER

The marker should be placed carefully to minimize any future movement of the marker. Reference markers should be placed where corner positions are in unstable or inaccessible locations. It is always necessary to consider what future uses may be made of the marker location.

NUMBER OF WITNESSES

Each marker should have a minimum of four (4) witnesses to substantial objects.

LAND CORNER RECORDATION CERTIFICATE

A Land Corner Recordation Certificate shall be prepared and filed for each corner monumented or remonumented. This certificate shall be a complete document relating to the location, monumentation, perpetuation and history of a corner in accordance with 1970 PA 74, MCL 54.201-210d.

HORIZONTAL CONTROL

The ultimate goal of the remonumentation program is the remonumentation of every corner in the State of Michigan, which may include the determination of NAD 83 (North American Datum of 1983) three-dimensional coordinates on these remonumented corners. The task of remonumentation will frequently involve horizontal traverse work between existing corners to enable the restoration of lost and/or obliterated corners. In order to maximize the remonumentation efforts, this traverse should be performed to the minimum accuracy standard allowable to meet the requirements of 1964 PA 9, MCL 54.231-239, i.e., FGCS, Third-order Class I for Horizontal Control.

It should be stressed that the recommended survey control system does not propose to promote the State Plane Coordinate system at the expense of adequate monumentation perpetuation and recordation of corners. Instead, the system seeks to remonument the corners and to erect new accessories to these corners in accordance with sound land surveying procedures while at the same time applying all of the advantages of the State Plane Coordinate system. In counties where extensive traverse work will be required, it will be advantageous to be on the State Plane Coordinate System right from the beginning of the remonumentation project.

There are several publications that can be obtained from the National Geodetic Survey that can assist in understanding State Plane Coordinates and implementing these types of survey traverses:

1. **Understanding State Plane Coordinate Systems** by Joseph F. Dracup
2. **Fundamentals of the State Plane Coordinate Systems** by Joseph F. Dracup
3. **FGCS, Standards and Specifications for Geodetic Control Networks**
4. **FGCS, Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques**

These publications, along with the horizontal and vertical geodetic control data for the county, can be obtained from:

NGS Information Services, NOAA, N/NGS12
National Geodetic Survey SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282
<http://www.ngs.noaa.gov/>

ADDRESSES FOR RESEARCH SOURCES

<p>ACSM 6 Montgomery Village Avenue, Suite #403 Gaithersburg, MD 20879 http://www.acsm.net/</p>	<p>FEDERAL COMMUNICATIONS COMMISSION (FCC) 445 12th Street SW Washington, DC 20554 http://www.fcc.gov/</p>
<p>BUREAU OF LAND MANAGEMENT BLM Washington Office 1849 C St NW Washington, DC 20240-0001 http://www.blm.gov/</p>	<p>INTERNATIONAL GREAT LAKES SURVEY [This organization no longer exists. Its work was split in half between NOAA and the Corps of Engineers. The data on buoys and level gauges went to NOS, the benchmarks for vertical control on the Great Lakes went to the Geodetic Survey; the analytical work went to the Corps.]</p>
<p>BUREAU OF LAND MANAGEMENT Cadastral Survey Eastern States Offices 7450 Boston Boulevard Springfield, VA 22153 www.blm.gov/cadastral/</p>	<p>INTERSTATE COMMERCE COMMISSION [This agency was charged with regulating the economics and services of specified carriers engaged in transportation between states. Surface transportation under the ICC's jurisdiction included railroads, trucking companies, bus lines, freight forwarders, water carriers, oil pipelines, transportation brokers, and express agencies. The ICC's safety functions were transferred to the Dept. of Transportation in 1966; the ICC retained its rate-making and regulatory functions. The agency was eventually terminated in 1995 with its remaining functions transferred to the Surface Transportation Board.]</p>
<p>BUREAU OF LAND MANAGEMENT GLO Records Access Staff Eastern States Offices 7450 Boston Boulevard Springfield, VA 22153-3121 http://www.glorerecords.blm.gov/</p>	
<p>CIVILIAN CONSERVATION CORPS [This agency became the Works Progress Administration in 1935, then the Works Projects Administration in 1939, then Consolidated Federal Works Administration in 1942. It was abolished in 1949 and its services were transferred to the General Services Administration.]</p> <p>U.S. General Services Administration Great Lakes Region (5) Room 3700 230 South Dearborn Street Chicago , IL 60604 http://www.gsa.gov/</p>	<p>U.S. Department of Transportation 1200 New Jersey Ave, SE Washington, DC 20590 http://www.dot.gov/</p> <p>Surface Transportation Board 395 E Street, SW Washington DC 20423 http://www.stb.dot.gov/</p>

<p>MICHIGAN DEPARTMENT OF EDUCATION Michigan State Library 702 West Kalamazoo Street P.O. Box 30738 Lansing, MI 48909-8238 http://www.michigan.gov/hal/</p>	<p>NATIONAL ARCHIVES AND RECORDS ADMINISTRATION 8601 Adelphi Road College Park, MD 20740-6001 http://www.archives.gov/</p>
<p>MICHIGAN DEPARTMENT OF MANAGEMENT & BUDGET Lewis Cass Building 320 South Walnut Street P.O. Box 30026 Lansing, MI 48909 http://www.michigan.gov/dmb/</p>	<p>NATIONAL GEOSPATIAL-INTELLIGENCE AGENCY (NGA) Office of Corporate Relations Public Affairs Division, MS D-54 4600 Sangamore Road Bethesda, MD 20816-5003 https://www1.nga.mil/Pages/Default.aspx</p>
<p>MICHIGAN DEPARTMENT OF NATURAL RESOURCES 530 W Allegan St Lansing, MI 48933-1521 http://www.michigan.gov/dnr/</p>	<p>NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) National Geodetic Survey NGS Information Services, NOAA, N/NGS12 National Geodetic Survey SSMC-3, #9202 1315 East-West Highway Silver Spring, MD 20910-3282 http://www.ngs.noaa.gov/</p>
<p>MICHIGAN DEPARTMENT OF NATURAL RESOURCES Michigan Historical Center State Archives 702 W Kalamazoo St Lansing, MI 48915-1609 http://www.michigan.gov/dnr/</p>	<p>NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) National Ocean Service SSMC4, Room 13632 1305 East-West Hwy Silver Spring, Maryland 20910 http://oceanservice.noaa.gov/</p>
<p>MICHIGAN DEPARTMENT OF TRANSPORTATION State Transportation Building 425 W. Ottawa St. P.O. Box 30050 Lansing, MI 48909 http://www.michigan.gov/mdot/</p>	<p>NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA) National Ocean Service - Office of Coast Survey 1315 East-West Hwy Room 6127 Silver Spring, MD 20910 http://oceanservice.noaa.gov/programs/cs/</p>

<p>NATIONAL PARK SERVICE 1849 C St NW Washington, DC 20240-0001 http://www.nps.gov/index.htm</p>	<p>U.S. DEPARTMENT OF AGRICULTURE Natural Resources Conservation Service (NRCS) 3001 Coolidge Road, Suite 250 East Lansing, Michigan 48823 http://www.nrcs.usda.gov/</p>
<p>NATIONAL PARK SERVICE Midwest Region 601 Riverfront Drive Omaha, NE 68102-4226 http://www.nps.gov/index.htm</p>	<p>U.S. DEPARTMENT OF TRANSPORTATION 1200 New Jersey Avenue, SE Washington, DC 20590 http://www.fhwa.dot.gov/</p>
<p>U.S. ARMY CORPS OF ENGINEERS Headquarters, US Army Corps of Engineers 441 G. Street, NW Washington, DC 20314-1000 http://www.usace.army.mil/</p>	<p>U.S. DEPARTMENT OF TRANSPORTATION Federal Highway Administration 315 W Allegan St Lansing, MI 48933-1500 http://www.fhwa.dot.gov/</p>
<p>U.S. ARMY CORPS OF ENGINEERS North Central Division Detroit District (CELRE-PA) P. O. Box 1027 Detroit, MI 48231-1027 http://www.lre.usace.army.mil/</p>	<p>U.S. FISH AND WILDLIFE SERVICE 1849 C St NW Washington, DC 20240-0001 http://www.fws.gov/</p>
<p>U.S. DEPARTMENT OF AGRICULTURE 1400 Independence Ave., S.W. Washington, DC 20250 http://www.usda.gov/</p>	<p>U.S. FISH AND WILDLIFE SERVICE Great Lakes – Big Rivers (Midwest Region – Region 3) One Federal Drive Fort Snelling, MN 55111-4056 http://www.fws.gov/midwest/</p>
<p>U.S. DEPARTMENT OF AGRICULTURE Natural Resources Conservation Service (NRCS) P.O. Box 2890 Washington, DC 20013 http://www.nrcs.usda.gov/</p>	<p>U.S. FISH AND WILDLIFE SERVICE Great Lakes – Big Rivers (Midwest Region – Region 3) East Lansing Ecological Services Office 2651 Coolidge Road East Lansing, MI 48823 http://www.fws.gov/midwest/</p>

<p>U.S. FOREST SERVICE 1400 Independence Ave., SW Washington, D.C. http://www.fs.fed.us/</p>	<p>U.S. GEOLOGICAL SURVEY 6520 Mercantile Way, Suite 5 Lansing, MI 48911 http://www.usgs.gov/</p>
<p>U.S. FOREST SERVICE Eastern Region - R9 626 East Wisconsin Ave. Milwaukee, WI 53202 http://www.fs.fed.us/</p>	<p>U.S. GOVERNMENT PRINTING OFFICE 732 North Capitol Street, NW Washington, DC 20401-0001 http://www.gpo.gov/</p>
<p>U.S. GEOLOGICAL SURVEY Headquarters and Eastern Region 12201 Sunrise Valley Drive Reston, VA 20192, USA http://www.usgs.gov/</p>	

APPENDIX F - SURVEY HISTORY

This page is optional