

MILWAUKEE COUNTY

UPDATE TO LAND RECORDS MODERNIZATION PLAN: 2010

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Milwaukee County Land Information Officer
And Register of Deeds

**Adopted by the Milwaukee County Automated Mapping and
Land Information System (MCAMLIS) Steering Committee
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I. EXECUTIVE SUMMARY

A. Identification and Contact Information

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B. Participants in the Planning Process

On February 15, 1990, the Milwaukee County Board of Supervisors adopted SEWRPC Community Assistance Planning Report No. 177, Feasibility Study for a Milwaukee County Automated Mapping and Land Information System, October 1989 (hereinafter referred to as the “plan”). The 2010 plan update, is intended to expand and extend the original 1990 plan.

The Milwaukee County plan, as originally adopted by the County Board, is believed to be unique within Wisconsin in that it created a public-private partnership that would jointly fund and develop the automated mapping system. Accordingly, a cooperative agreement was executed in November 1990, establishing the Milwaukee County Automated Mapping and Land Information System, known by the acronym MCAMLIS. Milwaukee County, the Milwaukee Metropolitan Sewerage District, Wisconsin Bell Telephone Company, the Wisconsin Electric Power Company, and the Wisconsin Gas Company all executed the agreement. The agreement provided for the creation of a Steering Committee with representatives from the County and City of Milwaukee, the suburban cities and villages within Milwaukee County, the Milwaukee Metropolitan Sewerage District, and the private utilities operating within the County.

The 2010 update of the Milwaukee County Land Records Modernization Plan was prepared under the direction of the MCAMLIS Steering Committee, whose membership includes the following:

Donald R. Nehmer, Jr., Chairman.....Capital Program Business Manager,
 Milwaukee Metropolitan Sewerage District

Kurt W. Bauer.....Milwaukee County Surveyor
 John L. La Fave.....Register of Deeds and Land Information Officer
 John M. BennettEngineer, City of Franklin representing the 18 suburban communities
 Kevin S. Anderson.....Design Area Manager, AT&T
 Cynthia Archer.....Director, Department Administration Services
 Jack Takerian.....Director, Department of Transportation and Public Works
 Nancy A. Olson, Vice Chair.....Chief Information Officer, City of Milwaukee
 John C. Place.....Manager, Maps & Records, We Energies

C. Summary of Plan and Status of Implementation

This update to the plan is intended to provide County and local officials, State agencies, private entities, and other interested parties with basic knowledge of Milwaukee County's continued efforts to modernize its land records system. Since adoption of the original plan in 1990, Milwaukee County has diligently pursued the creation of a parcel-based, multi-purpose, multi-user automated mapping base as the foundation for land information systems. The initial focus was on the establishment of a geodetic framework, the preparation of large-scale planimetric and topographic base maps, and the preparation of companion large-scale maps. This mapping effort was completed in or converted to digital form and has been integrated into a computerized database now serving Milwaukee County. This update document summarily describes how Milwaukee County intends to continue to build on that database over the next five years and to expand our cooperation with local units of government in the County and with participating utility organizations operating in Milwaukee County in pursuing important land records modernization initiatives.

D. Milwaukee County Land Information Office Website

[Milwaukee County Land Information Office Interactive Mapping Service](#)

The MCLIO website is used to support the display and distribution of over 150 layers of published data along with document links to PLSS, Plat of Survey, CSM's, Subdivision Plats and Condominium Plats throughout Milwaukee County.

[Milwaukee County Register of Deeds](#)

The Register of Deeds office provides for fee based Internet access to recorded documents.

E. Websites Serving Land Information for Municipalities within Milwaukee County

[Cudahy Land Records Search](#)

[Franklin Land Records Search](#)

[Franklin Interactive Mapping](#)

[Glendale Land Records Search](#)

[Greenfield Land Records Search](#)

[Greenfield Interactive Mapping](#)

[Milwaukee Land Records Search](#)

[Milwaukee Interactive Mapping](#)

[Oak Creek Land Records Search](#)
[South Milwaukee Land Records Search](#)
[South Milwaukee Interactive Mapping](#)
[St. Francis Land Records Search](#)
[Wauwatosa Land Records Search](#)
[West Allis Land Records Search](#)
[West Allis Interactive Mapping](#)
[Brown Deer Land Records Search](#)
[Brown Deer Interactive Mapping](#)
[Fox Point Land Records Search](#)
[Fox Point Interactive Mapping](#)
[Greendale Land Records Search](#)
[Hales Corners Land Records Search](#)
[Shorewood Land Records Search](#)
[Shorewood Interactive Mapping](#)
[Whitefish Bay Official Website](#)
[Whitefish Bay Land Records Search](#)
[SEWRPC Map Server](#)

II. LAND INFORMATION PLAN

This document is intended to update and extend the original plan as adopted in 1990 for the creation and use of an automated mapping and land information system for Milwaukee County. This document is also intended to provide county and local officials, state agencies, private entities, and other interested parties with information about the objectives, status, and proposed continuing development of that system within Milwaukee County. Methods and procedures that were detailed in earlier Milwaukee County plans have been incorporated into standard practice and are no longer fully articulated as part of the current plan. These earlier plans, dating back to 1990, provide a complete documenting of the foundational elements addressed by the MCAMLIS project and may be obtained from the MCAMLIS Project Manager.

A. Goals and Objectives

The automated mapping and land information system for Milwaukee County has resulted in substantial improvements in both efficiency and effectiveness in the acquisition, conversion, storage, retrieval, and use of information about the land area which comprises Milwaukee County. Given the current status of the system, the goals and objectives for the continued development, enhancement, and use of the system are as follows:

GOAL 1: Maintain Core Foundational Elements

Objectives -

- a. Ongoing maintenance of the location and re-monumentation of all U. S. Public Land Survey corners in the County, including the centers of the sections.
- b. Maintenance of high-order horizontal and vertical control surveys to establish the State Plane Coordinates and elevations of the U. S. Public Land Survey corners.
- c. Maintenance of large-scale topographic base maps in digital form at a scale of one-inch equals 100 feet with two-foot contour intervals.
- d. Maintenance of companion cadastral maps to the topographic maps in digital form at a scale of one inch equals 100 feet providing detailed information on the location and configuration of all real property boundaries, including the boundaries of all streets and public ways and other public land holdings; and assigning a parcel identification number (tax key number) to each ownership parcel to enable the linking of geographic with non-geographic data files.

GOAL 2: Promote the Integration of Parcel Based Land Information

Objectives -

- a. Develop and integrate carefully selected attribute data having broad utility, including current land use, zoning, flood hazard, wetland, and assessment data, among others
- b. Provide technology and services used to foster the integration of parcel based land information within Public Works management systems throughout Milwaukee County
- c. Provide that the information assembled under the program is readily translatable and available for use by state, county, and municipal units and agencies of government and public utilities and by private entities, including, importantly, interested citizens. This requires making the information available via the Internet for viewing and retrieval of base map and land-related information;
- d. Provide enabling technologies and platforms including; general purpose interactive internet based land information mapping, standardized client selectable on-line map services, and Representational State Transfer templates for implementing a wide variety of web based applications including public works asset inventory and management systems.

GOAL 3: Educational Outreach

Objectives -

- a. Conduct educational outreach programs through the use of technical and non-technical forums e.g., annual MCLIO open-house, custom training, documentation and best practice presentations;

- b. Solicit input from local governmental units with regard to supporting their mapping requirements;
- c. Introduce local governmental units to organizations and speakers that exhibit best practice solutions that meet countywide land information requirements.

GOAL 4: Countywide Initiatives

Where appropriate, identify, initiate, and complete projects proposed by Milwaukee County or its constituent municipalities, agencies of the federal, state or regional government, public utilities and by private entities, including, importantly, interested citizens which would, by understanding of the MCAMLIS Steering Committee, prepare information and maps useful for meeting the needs of the County and *its local* units of government and contributing toward the implementation of the Wisconsin Land Information Program.

Objectives:

- a. Develop a methodology for prioritizing project requests to ensure projects are aligned with MCAMLIS strategic objectives and ensure the efficient use of scarce resources;
- b. Continue to develop and maintain an Enterprise Address System (EAS) capable of integrating process, data, technology and organizational components across Milwaukee County municipalities, law enforcement, emergency management and land development interests. This objective strives to remedy current operational constraints while enhancing access to and usability of street name and address data countywide;
- c. Complete the mapping of the 100-year recurrence interval flood hazard areas within Milwaukee County, integrating the mapping into the automated land information system;
- d. Automate the access to and maintenance of address information providing location-based, current, complete and standardized address information across the county via web-based technologies;
- e. Consideration of projects initiated include, but would not be restricted to, diverse technologies and collaborative efforts such as those that may be required to collect and interpret broad categories of image augmenting technologies (infrared, near infrared, thermal imaging, ground penetrating radar, or as may be required to perform diverse data collection) leading to improvements in the compilation and assessment of countywide land information based asset inventories and;
- f. Consider opportunities to assist Milwaukee County municipalities via providing services to host GIS applications and/or data.

B. Progress Report on Ongoing Activities

GOAL 1: Maintain Core Foundational Elements

a. Remonumentation

Products that have been developed to date include U.S. Public Land Survey corner dossier sheets for each re-monumented U. S. Public Land Survey corner within the County facilitating its use as a control survey station; the program provides for the annual funding of the County Surveyor

b. Control Surveys

Control survey summary diagrams providing data on the State Plane Coordinates and elevations of all of the re-monumented U. S. Public Land Survey corners, and on the grid and ground lengths and bearings of the one-quarter section lines, the interior angles of the quarter sections, and the area of the quarter sections, together with such important information as the combination, scale, sea level reduction factors, and the mapping angle

c. Topographic / Planimetric Mapping

Digital topographic map files are completed for all of Milwaukee County. Most recently Township 8 North, Range 21 & 22 East were completed based on spring 2004 aerial photography; the remainder of the county was completed based on spring 2005 aerial photography; the area including the Marquette Interchange was completed using spring 2009 aerial photography

d. Cadastral Mapping

MCAMLIS standard cadastral data for all of Milwaukee County is compiled quarterly. Cadastral data covering the 18 suburban municipalities outside the City of Milwaukee are mapped to MCAMLIS standards through agreement between MCAMLIS and the Milwaukee County Register of Deeds; The MCAMLIS Steering Committee has contracted with the City of Milwaukee to oversee the completion by the City of large-scale cadastral mapping covering the City of Milwaukee to MCAMLIS standard for such mapping at a scale of one inch equals 100 feet.

GOAL 2: Promote the Integration of Parcel Based Land Information

a. Data Integration

The integration of over 140 layers of data are registered to MCAMLIS parcel information and maps used in operations across the county.

Local Government Public Works and Utilities alone constitute major contributors and users of MCAMLIS data. Utility these include We Energies, MMSD and ATC. Over 56% of all data requests are principally aligned with Public Works activity. Parcel mapping is a key component as projects are now related to on-line web and desktop systems utilizing MCAMLIS base maps and parcel data compiled across Milwaukee County with highly accurate quarterly updates.

b. Data Portability

The MCAMLIS Program currently collects and manages just under 2 terabytes of active data, with an additional off-line storage of another terabyte.

Of the over 140 categories of feature data e.g., parcels, floodplain, topographic contours and elevations, 99% are available via the internet for public access with the remainder available for secure internet access. Secure access is required for purposes of protecting proprietary data (see E.5 'Data Requisition and Distribution Guidelines'. There are 200 individually executed data license agreements between MCAMLIS and various organizations included within the following categories: Commercial Development (32%), Educational (10%), Local Government (14%), Non-Profits (8%), Private Citizen (9%), Real Estate (5%), Resource Planning (14%), State & Federal Government (5%), Utility (3%). Since the introduction of the Interactive Mapping Service located at the maps.milwaukeecounty.org website launched in March 2009, web access for both public and secure use averages 250,000 per month. Individual data requests average 200 a year

c. Internet Services

The Milwaukee County Land Information Office (MCLIO) launched an Interactive Mapping Services site <http://maps.milwaukeecounty.org> in March 2009. Usage has continued to grow for both PUBLIC and SECURE access. Users of the site have access to a wide range of data and GIS functionality such that they can retrieve parcel ownership and related documents e.g., Plat of Survey, PLSS Dossier and Control Survey Summaries and oblique imagery (Pictometry). As technologies have evolved the MCLIOs existing Internet platforms have been expanded to embrace the newest forms of REST services whereby application practitioners can choose to integrate the MCLIO services within any similarly compatible framework

GOAL 3: Educational Outreach

a. Facilitate

In April 2009 the MCLIO conducted its first ever Open House. There were nearly 70 attendees representing a range of data and technology interests across the county. A future Open house is planned for winter of 2010/11. Beyond this numerous campaigns have been initiated to promote best practice e.g., Enterprise Addressing concepts, Diggers Hotline and the integration of Pictometry imaging into everyday operations.

b. Solicit

Notable accomplishments in this area include North Shore Fire department street atlas, Cudahy health, water and police crime maps, and dispatch data assistance provided to multiple communities.

c. Expand

Staff is made available to update and support materials for presentations and public meetings. Examples of this include Intergovernmental Coordination Committee of Milwaukee County. MAPWA, Diggers Hotline. Product training is available upon request. Much of this is provided hands-on and is typically customized to meet a specific need or interest. Examples include Pictometry and MCLIO website training.

GOAL 4: Countywide Initiatives

b. Address System

This effort includes address maintenance linking Street, Parcel and Buildings for efforts serving countywide addressing.

c. Floodplain Mapping

Flood Hazard Mapping is a project that began in 2002 and will be completed by 2011. Documents and maps are made available on the MCLIO website as Draft Floodplain materials becomes available.

d. Address access

Upon completion of 4.a: On-line data access through an Application Program Interface capable of validating and locating address information across the county.

e. Countywide Projects

- The mapping of obstructions to air navigation within the safety approach zones attendant to the existing and proposed runways at Milwaukee County General Mitchell International Airport were developed in cooperation with the Airport Manager and Airport Engineer;
- Document index on-line retrieval via the MCLIO website:
Plats of Survey;
Recorded CSM, Condominium Plats and Subdivision Plats;
PLSS corner dossier and Control Survey Summaries;
- Housing Foreclosure;
- Flood event tracking;
- Historic Aerial photos (1936, 1937, 1956, 1963);
- Orthophotography (1995, 2000, 2005, 2007, 2010);
- Oblique imagery (2006, 2008, 2010), and;
- 2010 LiDAR acquisition.

C. New Initiatives

The following proposed work tasks are listed here and related to the above Goal(s). These represent tasks that, at this time, have either been discussed by the Steering Committee or that are currently under active investigation by project staff, but have yet to be presented to the Steering Committee for consideration and approval. All expenditure amounts set forth in the narrative are approximate amounts for the purposes of planning future annual work program element. At the time that contracts would be negotiated for the pursuit of any of these projects, final project budgets would be developed by project staff and presented to the Steering Committee for review and approval. The order in which these potential tasks are presented is not intended to imply any order of priority. Note that each task may serve to meet multiple goals as well as meeting multiple objectives within a specific goal.

1. Projects Developed for the use of the \$2 Locally Retained Document Filing Fee

Related to Goal and Objective: 2.b-d, 3.a and 4.b, d, e

A strategy for expending these receipts needs to be further developed to directly fund the use of the Internet for access to land information. In this regard there are a number of opportunities for MCAMLIS to assist in coordination and funding of web enabled countywide efforts e.g., continued basemap and infrastructure support, election ward and polling place location, voter registration assistance, disaster and risk management, location-based business intelligence, land use, zoning, housing occupancy, school districts, transportation routes and asset management e.g., water/sewer utility, pavement & sign inventories among others.

2. Replacement Topographic Mapping

Related to Goal and Objective: 1.c and, 4.e

On occasion the Steering Committee has discussed the desirability of undertaking additional projects to acquire replacement topographic mapping. Since the acquisition of countywide digital topographic mapping in 2005 and the completion in 2009 of topographic mapping including the Marquette Interchange there has been no ongoing program or work task authorized by the MCAMLIS Committee to undertake a topographic replacement program.

The analysis that led to approval by the Steering Committee of the \$3.2 million project in 2005 considered the useful life of the prior topographic mapping to be roughly 10 years. The average cost per square mile was over \$13,000 in 2005. With the completion of the 2005-2009 topographic mapping project it is clear that continued maintenance should be considered to preserve its value into the future. Notwithstanding the prior method of wholesale replacement mapping should be examined through a more objective lens given its initial cost, the mitigating factors that can influence future costs, and how the topographic mapping program maintenance can be sustained within an economic framework that is suitable to the needs of Milwaukee County.

Prior to the 2004/2005 Topographic mapping project, compilation of data for purposes of topographic mapping was not well organized. Earlier topographic mapping project selection was neither comprehensive nor systematic. Each project area was compiled separately for purposes of updating the mapping within the limits of a given project. Subsequently, patchworks of areas having notable inconsistencies across many different project boundary edges were evident. In addition, each project required the construction of a suitable terrain model that serves to control the generation of elevation contours and ensure proper alignment of photo observable “planimetric” features within a project area. This practice caused a similar situation whereby discontinuous contour information was evident when newer mapping was viewed next to earlier mapping.

Consequently, the design elements of the 2004/2005 mapping project not only delivered a set of seamless topographic and planimetric feature maps but also created a seamless terrain model covering the entire county. To maximize the utility of the 2004/2005 terrain model and preserve its seamless qualities, methods

need to be devised to analyze changes that have occurred during the interim between data collection periods and to guide the on-going maintenance of a revised seamless topographic basemap and terrain model. The automation of the collection of terrain information and the prospect of the resulting analysis is fast becoming a possible solution in consideration of a method to guide where topographic and planimetric map maintenance needs to be performed.

In 2009 the MCAMLIS Steering Committee authorized staff to enter into a program to acquire LiDAR data and to produce 1-foot contour elevations covering Milwaukee County. Subsequently, the derivation of new contours using the 2010 LiDAR data will make use of the 2004/2005 terrain model as a means to establish the accuracy of the updated topographic mapping to be delivered as part of this project. A project would need to be authorized by the Steering Committee, directing staff to further develop the necessary software and methods capable of wholesale change detection between the 2005 topographic base map products and recently acquired data e.g., utilizing the 2010 LiDAR and Orthophotography data to produce an acceptable seamless basemap update. Given the experience of two earlier pilot projects, staff is confident that a maintenance program can be developed around multiple technologies that, in effect, become tools to manage, incrementally maintain and ultimately set in motion the means to sustain the countywide topographic and planimetric base map at a fraction of the cost of more traditional methods alone.

Although photo observable planimetric features are changing on a daily basis and some of these are more easily detected via remote measures e.g., a complete building demolition or new construction versus a small building addition, it is clear that a large percentage can be identified though a combination of automation and more traditional measures. Improved accuracy in this regard is attained by knowing the locations of recorded developments (estimated at an approximate rate of 5% by area from 2005 through today, or 12 square miles) and major transportation realignments that have been or will be completed within the years 2010 thru 2013 e.g., I-94 north/south corridor from the southern county line to the Mitchell Interchange through 2011 (approximate area to be mapped is 5 square miles).

Notwithstanding, the result of the aforementioned methods of identifying features to be mapped, it is important that any strategy that the Committee employs must consider that the proper maintenance of mapped features, once identified, requires that updates be performed to the exacting topographic mapping standards currently in use by the mapping industry. Otherwise, it is possible that the introduction of unverified or inaccurately placed elements within the original topographic base map would in effect decertify our current map series.

Further scoping of this effort would be required to establish the overall cost of countywide topographic map production. However, at this time it is believed that critical updates could be completed through a combination of MCAMLIS staff and the services of a certified mapping contractor capable of producing the required base map products along with opportunities to augment this effort with temporary staff utilizing MCLIO operating resources. Project cost is estimated to

include costs for 2012 Orthophotography (\$134,490), 2012 LiDAR (\$79,860) and services of a certified mapping contractor (\$100,000) totaling \$314,350.

3. MCAMLIS Address Database Maintenance Enhancement*

Related to specific Goal and Objective: 1.d, 2.c and 4.b, d

At its meeting held August 22nd, 2006, the MCAMLIS Steering Committee authorized staff to proceed to further develop the MCAMLIS Address Database. The resulting program work effort has continued to the present and is now maintained as the MCAMLIS Enterprise Address System whereby street, parcel, building and unit addresses are fully integrated across the entire county. The bulk of this work has been completed and the remaining effort is scheduled to be completed through 2010. Once the work is fully in production, maintenance automation tools will be required to manage the database as address component updates are required and maintenance is performed. The cost estimate for this software is \$20,000.

4. Milwaukee County Plat-of-Survey Records*

Related to Goal and Objectives 2.c and 4.d

At its meeting held March 24th, 2009, the MCAMLIS Steering Committee approved the consolidation of plat-of-survey records held by the Milwaukee County Surveyor and the Milwaukee County Register of Deeds Office to be digitally scanned and a system be devised to allow these to be presented to the public in a map parcel indexed format. In total, there were approximately 90,000 documents with the bulk of this work being completed through May of 2010. There remain approximately 500 plat of survey documents to be indexed and an additional 1300 new 2010 documents to be scanned and indexed. Annual maintenance is anticipated to include approximately 2,000 new surveys. The cost estimate for performing the annual indexing and web posting is estimated to be \$5,500.

5. Pictometry Oblique, Orthophotography with LiDAR

Related to Goal and Objective: 1.c, d, and 4.e

At its meeting held September 22nd, 2009, the MCAMLIS Steering Committee approved the acquisition of Pictometry International Inc. AccuPlus certified orthophotography. This project was presented and approved along with a project to acquire digital orthophotography included with the SEWRPC 2010 Regional Orthophotography Program. The nature of this dual acquisition allows that a comparison can be made to determine if each of the separate orthophotography acquisition techniques are certifiably equivalent through the execution of a rigorous comparative study. The comparative study was commissioned as part of an agreement between Milwaukee County, Pictometry International, Inc., Aerometric Engineering and SEWRPC and included in the 2010 Regional Orthophotography Program. A favorable outcome of the comparative study

* Note: Project is eligible for \$2 fee expenditures

would declare that the Pictometry AccuPlus product can be certified by the Planning Commission and therefore eligible for counties in the region to elect to use Pictometry among other vendor choices in future regional acquisition programs. The next acquisition period for orthophotography in Milwaukee County is anticipated for the spring/summer of 2012. The total cost of the Pictometry AccuPlus flight in 2012 is expected to be \$214,350.

6. Ash Tree Inventory utilizing Hyper-Spectral Imagery

Related to Goal and Objective: 3.b and 4.e

On occasion the Steering Committee has discussed the possibility of utilizing MCAMLIS funding to provide mapping assistance to suburban communities outside the City of Milwaukee for purposes of an ash tree inventory. The need for an inventory is especially acute in locations where the emerald ash borer has been identified. As more public and private resources are focused on ash borer infestation there appears to be a space for MCAMLIS to assist in the coordination of the mapping effort as well as provide technical support and data deployment services. The cost estimate of \$190,000 is provided.

7. Thermal Map of Milwaukee County

Related to Goal and Objective: 3.b and 4.e

This particular image technology has not been formally discussed among members of the Steering Committee, nonetheless staff has included it here as a possible strategy for a future undertaking by the MCAMLIS Program. With the current emphasis placed on green technology the measurement of thermal heat loss is critical to the establishment of remedial programs investing in this technology. The MCAMLIS Program could undertake an initiative to build capacity for mapping thermal loss and radiation that would be used by other programs and projects related to this subject. A scope of work would be required to fully develop this effort and therefore no estimate is provided at this time

8. Historical Aerial Photo Geo-rectification^{*}

Related to Goal and Objective: 2.c, 3.b and 4.e

Various land information programs in adjacent counties have successfully pursued recovery and geo-rectification of historical aerial black and white photography dating back to the mid 1930s. MCAMLIS staff has obtained variously dated un-rectified or poorly rectified digital datasets from UW Milwaukee AGS Library and UW Madison, Arthur Robinson Library. These data have not been fully geo-rectified and in some cases original prints would need to be re-scanned to obtain improved resolution. This effort could be undertaken at minimal cost through use of student and intern labor along with the use of precision scanning equipment located at the Register of Deeds Office. There are 3 flights being considered: 1936-37, 1956, and 1963. Each flight series labor is estimated to cost approximately \$4,000 for a total estimate of \$12,000.

^{*} Note: Project is eligible for \$2 fee expenditures

D. Custodial Responsibilities

As already noted, the Southeastern Wisconsin Regional Planning Commission was originally given the custodial responsibilities for the Milwaukee County automated mapping and land information system. Although this assignment of custodial responsibility was envisioned in the original plan to be temporary, the Commission has, until January 2005, fulfilled the responsibility at the specific request of the Milwaukee County Board of Supervisors and the County Executive since adoption of the initial plan in 1990.

As of January 2005 Milwaukee County Government has assumed the MCAMLIS custodial responsibilities on a permanent basis and now provides for MCAMLIS data distribution and MCAMLIS Project Management.

In considering a reassignment of custodial responsibilities, the Milwaukee County surveyor responsibilities remains with the Regional Planning Commission. These responsibilities include the perpetuation of the U. S. Public Land Survey system within the County; the maintenance of the related horizontal and vertical control survey networks; and the recording and indexing of land surveys conducted within the County. In addition, responsibilities for periodically obtaining orthophotography remain with the Regional Planning Commission as an integral part of its overall comprehensive regional planning program.

All other custodial functions, however, including maintenance of the cadastral maps; the street address coding; the development and integration of additional attribute data; and efforts to ensure that information assembled under the program is readily translatable and available for use now rest with Milwaukee County Government.

E. Foundational Elements and Statewide Standards

1. Communication, Educational Training, and Technical Assistance

Using Internet system technology, the Milwaukee County Land Information Officer will subscribe to, and participate in the Wisconsin clearinghouse and technical assistance list service maintained by the Wisconsin Land Information Program.

As access to the MCAMLIS data is provided through web-based services, provisions will be made with an educational agency, such as Milwaukee Area Technical College for training of potential users. Alternatively, MCAMLIS may develop Internet access to educational materials in order to further facilitate the public's knowledge about and use of the MCAMLIS data.

2. Geographic Reference Frameworks

a. Integration of U. S. Public Land Survey and State Plane Coordinate Systems

As already noted, the densification of the National Geodetic Survey control network within the County was completed by MCAMLIS early in its history. Indeed, much of this work was completed before the formation of the creation of the Wisconsin Land Information Program.

The horizontal control survey network within Milwaukee County consists of 1,065 U. S. Public Land Survey corners, including the centers of the sections, thus placing a monumented control survey section of known position on both the U. S. Public Land Survey system and State Plane Coordinate system, and of known elevation, at approximately one-half mile intervals throughout the County. Substantial concrete monuments with brass caps mark the corner locations. The brass caps are inscribed with the corner notation--U. S. Public Land Survey system quarter-section, township and range. The monuments placed are referenced by ties to at least four witness marks and a control survey station recovery form or dossier sheet--is provided for each corner. The dossier sheet provided for each corner includes a sketch showing the monument erected in relation to the salient features of the immediate vicinity, all witness monuments set together with ties, the State Plane Coordinates of the corner, its U. S. Public Land Survey system identification, the elevation of the monument, the location and elevation of one or more reference benchmarks, and a certificate prepared and executed by the County Surveyor setting forth the history of the location and monumentation of the corner.

The U. S. Public Land Survey corners have been placed on the State Plane Coordinate system by high-order traverse and global position system surveys. The coordinates are expressed in terms of the Wisconsin Plane Coordinate System, South Zone, North American Datum of 1927. The densified survey control network was connected to and integrated with all of the monumented stations of the national control survey network, as established by the U. S. Coast and Geodetic Survey--the predecessor agency to the National Geodetic Survey and by the U. S. Lake Survey of the U. S. Army Corps of Engineers. The horizontal control surveys meet or exceed the specifications for Third-Order, Class I, accuracy standards as established by the National Geodetic Survey.

Elevations were established for all of the monumented U. S. Public Land Survey system corners and for ancillary reference benchmarks. The vertical control survey network so created was based upon the National Geodetic Vertical Datum, 1929 adjustment. All level surveys conducted met or exceeded the specifications for Second-Order, Class II, accuracy standards as established by the National Geodetic Survey.

As part of the precise leveling operations, equations were established which permit the elevations referenced to the National Geodetic Vertical Datum to be converted to City of Milwaukee Datum and to the International Great Lakes Datum.

The specifications governing the creation of geodetic reference framework within the County required the preparation of control survey summary diagrams showing the exact grid and ground lengths and grid bearings of the exterior boundaries of each U. S. Public Land Survey quarter-section; the area of each quarter section; all monuments erected; the number of degrees, minutes and seconds on the interior angles of each quarter-section; the State Plane Coordinates of all quarter-section corners, together with their Public

Land Survey system identification; the benchmark elevations of all monuments set; and the basic National Geodetic Survey control stations utilized to integrate the Public Land Survey system corners into the horizontal geodetic control system, together with the coordinates of the national stations. The angle between geodetic and grid bearing is noted on each diagram as is the applicable combination sea level and scale reduction factor.

The Regional Planning Commission has developed algorithms* which can be used to convert the control station coordinates from the North American Datum of 1927 to the North American Datum of 1983, 1991 adjustment; and the benchmark elevations from the National Geodetic Vertical Datum of 1929 to the National Geodetic Vertical Datum of 1988. The conversion algorithms maintain the underlying accuracies and precisions of the horizontal and vertical control networks.

b. Topographic Base Mapping

Also as already noted, the MCAMLIS program has completed the preparation of one inch equals 100 feet scale, 2 foot contour interval topographic maps for all of the 242 square miles of land area within Milwaukee County. These maps were prepared to National Map accuracy standards and are available in digital format. The topographic maps accurately record the basic geography of the area mapped.

c. Quadrangle Boundaries

Since the topographic maps prepared under the MCAMLIS program are superior to the U. S. Geological Survey quadrangle maps for county, municipal and utility planning, engineering, and land information system applications, the MCAMLIS program does not intend to prepare digital map representations of the quadrangle map boundaries.

d. Image Bases

The MCAMLIS program does not intend to acquire digital raster graphics files prepared from U. S. Geological Survey. Larger scale and higher resolution digital raster images are available under the MCAMLIS program.

The MCAMLIS program has available to it in digital format the aerial orthophotography completed by the Southeastern Wisconsin Regional Planning Commission initially in the spring of 1995 and has been obtained every five years thereafter. The most recent orthophotography, obtained in 2010 is available in color and compiled for use at a scale of one inch equals 100 feet with a 6" pixel resolution. and meets National Mapping Accuracy Standards at that scale.

The MCAMLIS program does not intend to acquire digital orthoquad image data available from the Federal government. These images are available at map scales to small to be useful within urban and urbanizing areas such as

* Technical Report 49, titled Bidirectional Transformation of Legacy and Current Survey Control Data Within Southeastern Wisconsin

Milwaukee County. The digital aerial orthophotography available to the MCAMLIS program is in every way superior and more suitable to the needs of the greater Milwaukee area.

The MCAMLIS program does not intend to acquire digital line graph files prepared from U. S. Geologic Survey quadrangle maps. The MCAMLIS topographic maps provide the larger map scales and higher resolutions needed within urban and urbanizing areas such as Milwaukee County.

The MCAMLIS program does not intend to acquire satellite imaging available either from the Federal government or from other sources. The large-scale hard copy and digital aerial orthophotography available to the MCAMLIS program is superior to satellite imagery for all purposes within Milwaukee County.

The MCAMLIS program has acquired and intends to continue acquiring high resolution oblique and LIDAR imagery. High resolution oblique imagery was acquired in 2006, 2008 and 2010. LiDAR was first acquired in 2010. Additional acquisition of both oblique and LiDAR imagery are planned in 2013. Applications and use of this type of imagery are considered useful for purposes of planning, in-office field inspection, terrain modeling and change detection.

e. Digital Terrain Models

The MCAMLIS program has acquired and distributed a digital terrain model (DTM) that can be used to assist in the development of triangulated irregular networks used in contour mapping. The 2005 through 2009 topographic mapping update program provided this data to the MCAMLIS Steering Committee. An update of this data is expected in late 2010 and is to be derived using LiDAR imagery acquired in the spring of 2010 and will be updated again in 2013.

f. Adherence to Standards

The Wisconsin Land Information Program has prepared specifications and guidelines for the densification of the Wisconsin High Accuracy Reference Network (HARN) using global position system technology. This standard is not relevant to the MCAMLIS program, which has completed densification of the survey control network within the County. The MCAMLIS program, as already noted, utilizes, and intends to continue to utilize, the North American Datum of 1927 as the basis for horizontal survey control*.

g. Custodial Responsibilities and System Requirements

As already noted, Milwaukee County Government as of 2005 is responsible for the custody of the MCAMLIS system data and for the distribution of these data to users.

* Southeastern Wisconsin Regional Planning Commission, Technical Report 49, titled Bidirectional Transformation of Legacy and Current Survey Control Data Within Southeastern Wisconsin

MCAMLIS will continue to work with the Commission and the County Surveyor, to perpetuate the U. S. Public Land Survey system within the County and maintain the attendant control survey network. The designation of areas to be remapped will be determined by the MCAMLIS Steering Committee.

3. Parcel Mapping

Also as already noted, digital cadastral real property boundary line mapping has been completed under the MCAMLIS program for all of Milwaukee County. The completed mapping covers 100 percent of the total area of the County. The cadastral mapping has been prepared as a companion overlay to the topographic base data, is at a scale of one inch equals 100 feet, is referenced to both the U. S. Public Land Survey and State Plane Coordinate systems, and is based on a common geodetic control survey network, all as heretofore described. The cadastral map data meets accuracy standards long promulgated by the Regional Planning Commission for use within the Southeastern Wisconsin planning region. Those standards predate the creation of the Wisconsin Land Information Program and have proven by use over a period of almost four decades to be sound.

The cadastral data are topologically structured and all ownership parcels are recognizable as closed polygons through the appropriate use of computer software programs. The cadastral data identify in their proper location, orientation, and extent, all public street and alley rights-of-way, railway rights-of-way, major cross country utility easements, and major sanitary sewer and storm water drainage easements. The cadastral data contain parcel identification numbers that provide the linkage to associated non-graphic attribute data. The parcel identification scheme is compliant with Wisconsin Land Information Program standards.

Also as already noted, the maintenance of the cadastral maps current is a major initiative included under this updated land records modernization plan.

Also as already noted, street addresses are being assigned to major buildings located on individual parcels and the completion and maintenance of these among other major address coding initiatives being included under this updated Land Records Modernization Plan.

4. Parcel Administration

Milwaukee County has integrated and will continue to integrate its land ownership and tax assessment data into the MCAMLIS land information system. The Milwaukee County Register of Deed's office has installed optical imaging equipment for the storage, retrieval, and indexing of real estate documents. The Milwaukee County Register of Deeds acts as the County Land Information Officer.

5. Public Access

As noted above, Milwaukee County, the local units of government in Milwaukee County, and the private utilities created the Milwaukee County

Automated Mapping and Land Information System (MCAMLIS) program in response to the need for the development of an automated mapping base. At the outset, it was recognized that an infusion of monetary resources from the private sector was necessary to create an automated mapping base for the County in a timely fashion. In response to this need, We Energies (formerly Wisconsin Gas Company and Wisconsin Electric Power Company), AT&T (formerly SBC AMERITECH, Wisconsin Bell) and The Milwaukee Metropolitan Sewerage District invested significant private capital in the MCAMLIS program.

In order to protect their investments, the private utility members of MCAMLIS were granted the MCAMLIS copyright to the mapping base in its digital form. The utility member copyright interest was dissolved in 2009 and the MCAMLIS Steering Committee now holds copyright to all MCAMLIS digital and hardcopy materials. Nevertheless, the overall goal of the MCAMLIS program has been, and continues to be, the construction of the automated mapping system that is consistent with the standards specified in the County plan, and to make the end products created as a result of the MCAMLIS program available to the widest possible range of users in a fair and efficient manner. Monies generated as a result of the sale of MCAMLIS derived data to commercial entities--other than those commercial entities requesting data for non-commercial, internal use--are to be returned to the MCAMLIS budget, and used in the continued development of the MCAMLIS automated mapping base. The MCAMLIS program is not, and was not intended to be, a 'for profit' venture. Accordingly, the [Data Requisition and Distribution Guidelines](#) presented therein are intended to embody a spirit of fair and reasonable access to the MCAMLIS digital materials

All of the data assembled to date under the MCAMLIS program is available for use under policies established by the MCAMLIS Steering Committee. As already noted, expansion of opportunities for public access is an initiative include under the updated Land Records Modernization Plan.

6. Additional Attribute Data: Zoning, Soils, Wetlands, Administrative Boundaries, Address by Block Face

It is the intent of the MCAMLIS program, as heretofore indicated in this plan, to compile additional attribute data and link such data to the geographic locations identified by the parcel identifiers. Such data will include existing land use, and zoning. Soils will not be included for the reasons heretofore given.

The MCAMLIS cadastral data captures county and minor civil division boundaries and are amenable to the ready addition of special purpose boundaries, such as utility districts, legislative districts, zoning districts, tax increment financing districts, school districts, watersheds and sub-watersheds, and similar geographic units. The cadastral maps permit the establishment of a complete system of public street and highway centerlines within the County and the identification of street addresses by block faces.

F. Integration and Cooperation

The MCAMLIS program seeks to achieve cooperation between the various levels, units and agencies of government and private utilities operating within Milwaukee County. Indeed, the MCAMLIS program is founded in a formal cooperative arrangement between the County, the Milwaukee Metropolitan Sewerage District, and two private utilities operating within the County. That arrangement is expanded through membership of the MCAMLIS Steering Committee to include the City of Milwaukee and the 18 suburban units of government within Milwaukee County. Milwaukee County staffs the MCAMLIS Steering Committee. This arrangement ensures the use of sound and mutually acceptable technical standards and procedures in the MCAMLIS program, the dissemination of MCAMLIS data to municipal and utility users, and the scheduling of work elements in accordance with the perceived needs of the County agencies, Milwaukee Metropolitan Sewerage District, City of Milwaukee, and the suburban cities and villages within the County.

The past and present institutional structure has worked well in the creation of the foundational elements for the Milwaukee County automated mapping and land information system, and in the initial use of MCAMLIS data over a period of more than two decades.

G. Technical Standards Not Directly Associated with Foundational Elements

The MCAMLIS Steering Committee has been responsible for the review of all technical standards, including those associated with the foundational elements.

Technical standards not directly associated with such elements have included data distribution and interchange, metadata standards, control procedures and optical imaging of public records, among other standards.

Administrative Standards not Associated with Foundational Elements

This plan is intended to represent an agreement between the MCAMLIS program and the Wisconsin Land Information Program administered by Wisconsin State Department of Administration (DOA). The agreement is intended, to the extent practicable to further the objectives of the Wisconsin Land Information Program as embodied in the enabling State legislation. In order for the plan to be accepted by DOA, the DOA and the MCAMLIS Steering Committee hereby agree and consent as follows:

1. Milwaukee County and the MCAMLIS Steering Committee agree to observe and follow the Wisconsin Statutes relating to the Wisconsin Land Information Program and other relevant programs;
2. Milwaukee County and the MCAMLIS Steering Committee agree to permit the Wisconsin Department of Administration access to the books, records, and products for inspection and audit, including unannounced inspections and audits by DOA;
3. Milwaukee County and the MCAMLIS Steering Committee agree to complete a WLIP Survey as may be conducted from time to time;

4. Milwaukee County and the MCAMLIS Steering Committee agree to update this plan every 5 years and in the interim if the plan should change;
5. Milwaukee County and the MCAMLIS Steering Committee understand that the Wisconsin Department of Administration agrees to provide assistance to the county including an on-line Technical Assistance Service;
6. Milwaukee County and the MCAMLIS Steering Committee understand that the Wisconsin Department of Administration intends to distribute an inventory of land information and land information systems throughout the State;
7. Milwaukee County and the MCAMLIS Steering Committee understand that the development of this plan and its implementation will convey certain benefits on the County and on local governments within the County, including continued eligibility for program funding through grants administration by the Wisconsin Department of Administration. Milwaukee County, and the MCAMLIS Steering Committee further understand that a peer review process will be used to assess plan acceptability;
8. Milwaukee County and the MCAMLIS Steering Committee understand that the Wisconsin Department of Administration hereby agrees to review funding requests and to provide guidance to the County and local governments within the County with respect to the development of such requests;
9. Milwaukee County and the MCAMLIS Steering Committee understand that the Wisconsin Department of Administration hereby agrees to make available an annual report regarding the status of the Wisconsin land information program and related activities.

JLL/wcs
3/31/2011
2010 Update - LRMP