

RECOMMENDATION OF THE CECIL COUNTY
GIS WORK GROUP
GEODETIC CONTROL POINT SUBCOMMITTEE

for the

**ADOPTION OF GEODETIC CONTROL
REQUIREMENTS AS PART OF THE PLAN
REVIEW PROCESS**



Submitted For Consideration To The
Board Of County Commissioners For Cecil County

February 15, 2007 (*fourth draft*)

GIS Work Group Subcommittee Members

Mr. David R. Black, AICP, Office of Planning & Zoning, Chairman
Mr. Matheu J. Carter, P.E., Capital Facilities Administration
Mr. Jeff Coale, Water & Wastewater
Mr. Van Funk, Department of Public Works
Mr. Bill Henning, PLS, National Geodetic Survey
Mr. Edward Kelly, PLS, Morris & Ritchie Associates
Mr. Eric S. Sennstrom, AICP, Office of Planning & Zoning
Mr. James M. Shaw, Jr., PLS, G.W. Stephens & Associates
Ms. Lisa Thomas, Department of Public Works
Mr. Vernon D. Tome, Department of Public Works
Mr. Fred C. Von Staden, Environmental Health Department
Mr. Will Whiteman, PLS, WWLS, Inc.
Mr. Tim Whittie, P.E., Department of Public Works

INTRODUCTION

This proposal outlines the recommendations of the GIS Work Group's Geodetic Control Point Subcommittee in regards to the regulated community providing coordinate points as part of the plan review process. Recent suggestions from the Environmental Health Department and Department of Public Works have indicated a desire for the regulated community to provide NAD 83 x and y coordinates as part of final lot grading, stormwater management, roads and stormdrain, and water and sewer plans. Said coordinates would then be incorporated into the County's nascent geographic information systems (GIS) database for use in a variety of data analysis and data retrieval applications.

Adoption of these recommendations shall create a valuable data source that can be used in a variety of ways in the County's geographic information systems (GIS) database. Requiring coordinate points as part of the plan review process will also improve the quality of development within the County (i.e. by providing tighter controls on development and infrastructure standards) and reduce the County's need to conduct expensive infrastructure inventories in the future. By knowing where all stormwater management ponds are located when they are installed, for example, the County can avoid the future expense of having to inventory a large number of ponds. The inventory can also be utilized to assist the County inspectors in scheduling maintenance inspections required for certain infrastructure (stormwater management ponds, for example, are required by law to be inspected once every three years).

The subcommittee consists of thirteen individuals, with representatives from private engineering/surveying firms and County, State, and Federal government agencies. The subcommittee's findings have also been presented to the Susquehanna Chapter of the Maryland Society of Surveyors for their review and input. Only by working together with the regulated community can the subcommittee achieve its goals for the mutual benefit of all involved.

PROPOSAL

The subcommittee recommends that the Board of County Commissioners of Cecil County adopt the following requirements as part of the plan review process:

- 1) The NAD 83 x and y coordinates of the **well** installed to service any new construction be provided as part of the final lot grading as-built plan submitted to the Department of Public Works;
- 2) The NAD 83 x and y coordinates of **one corner of the proposed structure** (i.e. a new dwelling, new commercial building, etc) be provided as part of the final lot grading as-built plan submitted to the Department of Public Works;
- 3) The NAD 83 x and y coordinates of **one property corner** be provided as part of the final lot grading as-built plan submitted to the Department of Public Works;
- 4) The NAD 83 x and y coordinates of any **manholes, pumping stations, and/or stormdrain inlets** be provided as part of the roads and storm drains as-built plans and/or water and sewer as-built plans submitted to the Department of Public Works; and

- 5) The NAD 83 x and y coordinates for ***the riser structure of all stormwater management ponds*** be provided as part of the stormwater management as-built plans submitted to the Department of Public Works;

The subcommittee recognizes that the regulated community is held to different liability standards for coordinates included on recorded plats than for coordinates shown on plans that are not recorded. For this reason, all of the required coordinates would be provided on plans that are not recorded. This decision was deliberately made by the subcommittee in order to reduce the regulated community's liability in providing the coordinates.

Format Standards

In an organization as large as Cecil County Government, the quality, compatibility, and uniformity of GIS data is of utmost importance. As such, the coordinates required as part of the proposed revisions to the plan review process must be provided according to set standards.

The subcommittee hereby adopts the following format standards, and all coordinates will be provided based upon the following:

- Projection = Maryland State Plane
- Horizontal datum = North American Datum 1983 (NAD 83)
- Vertical datum = North American Vertical Datum 1988 (NAVD 88)
- Units of measurement = meters
- Accuracy = See the section below for details

The subcommittee has discussed the merits of distinguishing between the use of grid vs. ground coordinates when the required coordinates are provided. Much debate has occurred within the surveying community over the past few years regarding this issue. At the present time, the County desires GIS mapping level accuracy for the coordinates, not necessarily surveying level accuracy (as discussed below), and as such, the subcommittee does not feel the need to distinguish between the two coordinate types. This may change in the future, however, as the County's GIS system matures and evolves.

Additionally, the subcommittee recognizes that datums evolve and new, more accurate datums develop over time. This document uses the term "North American Datum 1983 (NAD 83)" in a general sense, and the subcommittee recognizes that more specific naming devices exist (i.e. NAD83(1986), NAD83(HARN), NAD83(1991), etc). Therefore, the proposed revisions to the various portions of Cecil County Code outlined in the appendices of this document include a clause stating that "Coordinate points submitted to the County must be provided in the datum, and to the levels of accuracy, approved by the Department of Public Works and/or the GIS Work Group."

Accuracy

Words are very important to the regulated community. When the word "accuracy" is used, everyone needs to know and understand what that means, and thus for all items proposed to have a coordinate associated with it, the regulated community needs to know how accurate that coordinate must be.

As mentioned in the previous section, the County desires GIS mapping level accuracy for the coordinates, not necessarily survey level accuracy. The subcommittee has further concluded

that requiring survey level accuracy would not be possible until a densification of monumentation is completed within the County.

Once a densification of monumentation is complete and accuracy standards can improve, then additional amendments to Sections 4.1.22(L), 4.1.13(D), and 5.4 of the Subdivision Regulations shall be proposed by the GIS Work Group. A separate proposal regarding a cooperative densification effort between Cecil County Government, the National Geodetic Survey, and the Susquehanna Chapter of the Maryland Society of Surveyors has been prepared for review by the Board of County Commissioners.

Given that a GIS system needs to be constructed and designed for the highest future use, the subcommittee has decided to utilize a transitional approach in terms of accuracy. This approach, as outlined in Table 1 below, would enable the regulated community to transition (i.e. in terms of equipment needs, cost proposals, etc.) with the County's proposed upgrades to the monumentation network, and thereby move from mapping level accuracy (today) to survey level accuracy in the future. The subcommittee's transitional approach to accuracy will also provide smaller firms in the regulated community the time and opportunity needed to make the adjustments needed to continue serving their Cecil County clientele.

Table 1 – Accuracy Standards Transition Plan

Group	Type	Accuracy Classification	95% Confidence	Examples	Timeline for implementation
Level 8	General GIS Mapping	Greater than 10 meters	Greater than 10 meters		Once amendments are adopted by BOCC
Level 7	General GIS Mapping	10 meter 5 meter	10.000 meters 5.000 meters	Location & inventory data gathering for GIS	6 months to a year after adoption
Level 6	General GIS Mapping	2 meter 1 meter	2.000 meters 1.000 meters	Location & inventory data gathering for GIS	One to two years after adoption
Level 5	Survey level quality	5 decimeter 2 decimeter 1 decimeter	0.500 meters 0.200 meters 0.100 meters		Once densification of monumentation is complete
Level 4	Survey level quality	5 centimeter	0.050 meters	3rd Order Control Points	To be determined in the future
Level 3	Survey level quality	2 centimeter	0.020 meters	2nd Order Control Points	
Level 2	Survey level quality	1 centimeter	0.010 meters	1st Order Control Points (*)	
Level 1	Survey level quality	5 millimeter	0.005 meters	"A" Order Control Points	
Level 0	Survey level quality	2 millimeter 1 millimeter	0.002 meters 0.001 meters		

Notes: * = The sanitary sewer mapping project done for DPW (in the North East and Meadowview sanitary subdistricts) was done at 1 cm horizontal accuracy

** BOCC = Board of County Commissioners for Cecil County

*** Accuracy classifications taken from Federal Geodetic Data Committee standards

As seen in Table 1, the accuracy level for providing the required coordinate points would move from an accuracy of greater than ten meters (upon adoption of this proposal by the Board of County Commissioners) to progressively more accurate levels as certain milestones are accomplished. The GIS Coordinator would work cooperatively with the regulated community and apprise them of changes to the level of required accuracy as the milestones are met.

The subcommittee wants to emphasize that if a certain firm or member of the regulated community can provide accuracy at a level greater than the minimum required, then that increased accuracy would be welcomed. This proposal is not intended to “dumb down” the submissions of any firms able to work at the higher accuracies.

Further, the subcommittee notes that this proposal will in no way impact the accuracy requirements in any work contracted by Cecil County Government. The Department of Public Works, for example, is currently contracting with URS Corporation to provide survey level mapping of the sewer infrastructure in the North East and Meadowview sanitary subdistricts. Due to the nature of buried utilities, coordinates for such infrastructure need to be more accurate than coordinates for above-ground features such as those discussed in this proposal.

Codified Changes

The changes proposed as part of this document will need to be codified via amendments to various sections of the Cecil County Code. Codifying new requirements enables members of the regulated community to know the County’s requirements up front and prepare for those changes accordingly. As part of the subcommittee’s work, the following sections of the County Code will need to be amended:

- Section 242 of the Cecil County Code (Cecil County Road Code and Standard Specifications) – Sections 1.01 and 10.1;
- Section 251 of the Cecil County Code (Stormwater Management Ordinance) – Sections 251-3(A) and 251-21;
- Sections 3.15 and 3.16 of the Stormwater Management Ordinance Guidance Manual; and
- Section 265 of the Cecil County Code (Standard Specifications and Details for Water Mains and Sewer Mains) – Sections 1.0 and 10(C).

The proposed amendments to the various sections listed above are contained in the appendices immediately following this page.

In conclusion, the subcommittee humbly requests that the recommendations presented herein be adopted by the Board of County Commissioners of Cecil County. Adoption of these recommendations shall create a valuable data source that can be used in a variety of ways in the County’s geographic information systems (GIS) database. The subcommittee and GIS Coordinator look forward to beginning the first phases of implementation.

APPENDICES

Proposed revisions to various sections of Cecil County Code

**AMENDMENT TO THE CECIL COUNTY
ROAD CODE and STANDARD SPECIFICATIONS**

WHEREAS, by virtue of Section 242-1.12 of the Cecil County Code of Public Laws, the Board of County Commissioners of Cecil County may establish standards for the construction of private and public road and drainage systems, and;

WHEREAS, the existing Road Code and Standard Specifications was adopted on April 25, 2002, and;

WHEREAS, the Director of the Cecil County Department of Public Works is charged with administering and enforcing said standards, and;

WHEREAS, the Department of Public Works and the GIS Work Group have recommended adoption of amendments to said standards, and;

WHEREAS, the Board of County Commissioners of Cecil County and the Department of Public Works conducted a public hearing regarding said amendments on _____ 2006 (said hearing having been duly advertised).

NOW, THEREFORE, BE IT RESOLVED, by the Board of County Commissioners of Cecil County, State of Maryland, that the following amendments are hereby enacted:

[Addition]
{Deletion}

Part 1 GENERAL PROVISIONS

1.01 DEFINITIONS AND TERMS

[Coordinate point – An x and y pair of locational points obtained through the use of global positioning systems (GPS) or traditional surveying techniques. A coordinate point represents the spatial location of a feature on the earth's surface relative to the locations of other features. Coordinate points submitted to the County must be provided in the datum, and to the levels of accuracy, approved by the Department of Public Works and/or the GIS Work Group.]

Part 10 CONSTRUCTION PLANS

10.01 PLAN APPROVAL PROCESS

E. As-built plans shall indicate red line confirmation of the horizontal and vertical alignment of all roads, the location and rim/invert elevations of all

utility structures (inlets, manholes, storm drain pipes and vaults), sidewalks, and other pertinent features. Confirmation of width for all roads shall be noted every 100 linear feet, at the centers of all intersections, and all Points of Curvature. **[As-built plans shall also contain a minimum of three coordinate points. Coordinate points shall be provided for each stormdrain inlet, manhole, and stormdrain outfall shown on the as-built plans. The Department reserves the right to require additional coordinate points in extraordinary circumstances, as determined by the Department.]**

Date Adopted

William C. Manlove, President

Attest:

Alfred C. Wein, Jr., County Administrator

Mark H. Guns, Vice President

Rebecca J. Demmler, Commissioner

Brian Lockhart, Commissioner

Wayne L. Tome, Sr., Commissioner

**AMENDMENT TO THE CECIL COUNTY
STORMWATER MANAGEMENT ORDINANCE and
STORMWATER MANAGEMENT ORDINANCE GUIDANCE MANUAL**

WHEREAS, by virtue of Section 251 of the Cecil County Code of Public Laws, the Board of County Commissioners of Cecil County may establish standards for purpose of managing stormwater, and;

WHEREAS, the existing Stormwater Management Ordinance was adopted on February 19, 2002, and the Stormwater Management Ordinance Guidance Manual was adopted on April 16, 2002, and;

WHEREAS, the Department of Public Works is charged with administering and enforcing said ordinance, and;

WHEREAS, the Department of Public Works and the GIS Work Group have recommended adoption of amendments to said ordinance, and;

WHEREAS, the Board of County Commissioners of Cecil County and the Department of Public Works conducted a public hearing regarding said amendments on _____ 2006 (said hearing having been duly advertised).

NOW, THEREFORE, BE IT RESOLVED, by the Board of County Commissioners of Cecil County, State of Maryland, that the following amendments are hereby enacted:

[Addition]
{Deletion}

Stormwater Management Ordinance

Article II

251-3 DEFINITIONS

- A. For purpose of this Ordinance, the following definitions describe the meaning of the terms used in this Ordinance;

[(9b) Coordinate point – An x and y pair of locational points obtained through the use of global positioning systems (GPS) or traditional surveying techniques. A coordinate point represents the spatial location of a feature on the earth's surface relative to the locations of other features. Coordinate points submitted to the County must be provided in the datum,

and to the levels of accuracy, approved by the Department of Public Works and/or the GIS Work Group.]

Article VIII

251-21 Inspection Requirements During Construction

D. Once construction is complete, as-built certification shall be submitted by either a professional engineer or professional land surveyor licensed in the State of Maryland, except as limited by Section 251-14 of this Chapter, to ensure that constructed stormwater management practices, conveyance systems, and site grading comply with the specifications contained in the approved plans. At a minimum, as-built certification shall include a set of drawings comparing the approved stormwater management plan and/or approved final grading plan with what was constructed. **[The as-built plans shall contain a minimum of three coordinate points. Coordinate points shall be provided for each stormdrain outlet, manhole, and stormwater management pond riser structure shown on the as-built plans. The Department reserves the right to require additional coordinate points in extraordinary circumstances, as determined by the Department.]** The as-built plan certification shall be accompanied by the geotechnical certification required in Section 251-13B(16). The Department of Public Works may require additional information to assure compliance with the approved plans. For individual residential lot construction, the as-built certification shall also be submitted by either a professional engineer or professional land surveyor licensed in the State of Maryland, and shall be the responsibility of the building permit applicant.

Stormwater Management Ordinance Guidance Manual

3.15 Section 251-21 D. (As built certifications, SWM facilities).

As built certifications must verify all elements of the facilities necessary to show compliance with the design, including structure types, sizes, locations, and elevations, pipe types, sizes, inverts, slopes and lengths, riprap lengths, widths, and depths, riprap rock size, grading contours, and site grading to establish drainage subareas. **[The as-built plans shall also contain a minimum of three coordinate points. Coordinate points shall be provided for each stormdrain outlet, manhole, and stormwater management pond riser structure shown on the as-built plans. The Department reserves the right to require additional coordinate points in extraordinary circumstances, as determined by the Department.]** If the as-built survey shows significant deviations from the proposed size, extent, elevations, etc. of various features, the applicant must provide revised calculations to demonstrate that the required management has been provided.

3.16 Section 251-21 D. (As built certifications, individual residential lots).

Lot grading plans must be submitted prior to request for a Certificate of Occupancy. **[In addition to meeting all other requirements, lot grading plans shall also contain a minimum of three coordinate points. Coordinate points shall be provided for any well installed to service the new construction, one corner of the constructed structure, and one property corner. The Department reserves the right to require additional coordinate points in extraordinary circumstances, as determined by the Department.]** Generally, the Department will require certification that the grades are within 6" +/- . However, if the grading is substantially in disagreement with the approved lot grading plan, the applicant's surveyor may argue that the actual grading, as surveyed, is consistent with the intent of the approved grading plan, particularly with regard to site elevations, slope, direction of runoff, and potential impacts to neighboring properties. The Department will review such arguments on a case-by-case basis. The Department does not intend a slavish adherence to the approved grading plan; rather, consistency with the intent of the project's stormwater submittal is essential.

Date Adopted

William C. Manlove, President

Attest:

Alfred C. Wein, Jr., County Administrator

Mark H. Guns, Vice President

Rebecca J. Demmler, Commissioner

Brian Lockhart, Commissioner

Wayne L. Tome, Sr., Commissioner

**AMENDMENT TO THE CECIL COUNTY
STANDARD SPECIFICATIONS AND DETAILS FOR WATER MAINS AND SEWER
MAINS**

WHEREAS, by virtue of Section 265-5.0 of the Cecil County Code of Public Laws, the Board of County Commissioners of Cecil County may establish standard specifications and details for water mains and sewer mains, and;

WHEREAS, the existing Standard Specifications And Details For Water Mains And Sewer Mains was adopted on April 25, 2002, and;

WHEREAS, the Director of the Cecil County Department of Public Works is charged with administering and enforcing said standards, and;

WHEREAS, the Department of Public Works and the GIS Work Group have recommended adoption of amendments to said standards, and;

WHEREAS, the Board of County Commissioners of Cecil County and the Department of Public Works conducted a public hearing regarding said amendments on _____ 2006 (said hearing having been duly advertised).

NOW, THEREFORE, BE IT RESOLVED, by the Board of County Commissioners of Cecil County, State of Maryland, that the following amendments are hereby enacted:

[Addition]
{Deletion}

General Provisions

1.0 DEFINITIONS

[H2. Coordinate point – An x and y pair of locational points obtained through the use of global positioning systems (GPS) or traditional surveying techniques. A coordinate point represents the spatial location of a feature on the earth's surface relative to the locations of other features. Coordinate points submitted to the County must be provided in the datum, and to the levels of accuracy, approved by the Department of Public Works and/or the GIS Work Group.]

10 APPROVED PLANS AND PROCEDURES

C. AS-BUILT PLANS

As-built plans shall indicate red line confirmation of the horizontal and vertical alignment of all utility structures (manholes, pipes, and vaults), and other

pertinent features as may be required by the Department. The Department may prepare a checklist that lists the applicable items required. **[In addition to meeting all other requirements, as-built plans shall also contain a minimum of three coordinate points. Coordinate points shall be provided for each manhole and pump station shown on the as-built plans. The Department reserves the right to require additional coordinate points in extraordinary circumstances, as determined by the Department.]**

Date Adopted

William C. Manlove, President

Attest:

Alfred C. Wein, Jr., County Administrator

Mark H. Guns, Vice President

Rebecca J. Demmler, Commissioner

Brian Lockhart, Commissioner

Wayne L. Tome, Sr., Commissioner