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DESIGN MANUAL
GENERAL INSTRUCTIONS

**Baltimore County
Department of Public Works Design Manual**

General Instructions

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GENERAL INSTRUCTIONS

References to this *Manual*, *sections* of this *Manual* or to other publications are highlighted and italicized.

I. GENERAL INFORMATION

These Design Standards are written in accordance with the requirements of Section 32-4-404 of the Baltimore County Code. They are intended to be compatible with all applicable regulations of the Federal Government, COMAR, and the regulations and guidelines of the Natural Resources Conservation Service, the Maryland Departments of Environment and Transportation, The Maryland State Highway Administration, the Baltimore County Department of Permits and Development Management and the Baltimore County Department of Environmental Protection and Resource Management.

This *Baltimore County Design Manual* ("*Manual*") is intended to guide the design of public works projects within the County. Its suitability for other purposes is unintentional and the County assumes no liability for use of the enclosed material for purposes other than its intended purpose. The objective of this **Design Manual** is to provide a sound, workable guide for the standardization of all designs prepared for public (and private, as applicable) construction projects in Baltimore County. In using this document, the Design Professional shall not be relieved of the responsibility of applying his own knowledge and professional judgement toward the designs.

Waivers or Variances: Waivers or variances of these design guidelines may be approved, by the Director of Public Works or his designee, on the basis of a justification / analysis which will include but not be limited to life-cycle costs, maintenance requirements, context sensitive considerations or other local considerations.

The Director of Public Works shall resolve any questions regarding the contents of this *Manual* upon written request to the following address:

Director of Public Works
Baltimore County Department of Public Works
111 West Chesapeake Avenue, Room 307
Towson, Md 21204

The Design Professional should also contact the Bureau of Engineering and Construction before proceeding with design when problems are encountered that are not addressed by this *Manual* or by the **Standard Specifications and Details for Construction**. When this situation exists, the Design Professional will be expected to provide supporting specifications and computations for non-standard designs using established methods as presented within standard reference books listed in the References portion of the applicable section of this *Manual*.

Conflicts in engineering judgement between a reviewer and a Design Professional will be resolved by the respective Section Chief, Bureau Chief, or, if necessary, by the Director of Public Works. The Bureau of Engineering and Construction will provide technical assistance toward resolution of issues wherever possible.

Where judgement will allow the application of various techniques, and no clear advantage is given by a particular technique, the Design Professional shall apply his best judgement.

A. Sustainable Design

Sustainable Design, or Environmentally Sustainable Design (ESS) is intended to eliminate negative environmental impact through design, by designing physical objects, the built environment and services to minimize or eliminate use of non-renewable resources, minimize environmental impact and “relate people to the natural environment”. This concept is applicable to entire projects and to the individual pieces and components that make up the project.

Principles of sustainable design include:

- Use of low-impact, non-toxic or recycled materials that are locally produced,
- Use processes and materials that require less energy to produce and maintain,
- Use of materials and systems that will need to be replaced less frequently,
- Use of materials that can be recycled/composted at the end of their useful life,
- Mimicry of natural or biological processes where applicable,
- Healthy buildings that do no harm to occupants or surrounding environment. LEED Silver or comparable standards shall be considered for new County buildings. The County reserves the right to deviate from this standard of construction based upon project-specific considerations.
- Recognition of the diminishing returns that occur when assigning increased resources and investment to failing systems.

Designers of Public Works projects shall consider these factors and their impacts on costs of publicly funded projects during the initial study phase and shall issue a report summarizing their recommendations prior to beginning design.

B. Context-Sensitive Solutions

Context-sensitive solutions are an approach that considers how transportation facilities should fit into the physical setting, so that the social, economic, aesthetic, historic and natural community environment can be preserved or enhanced to the greatest degree possible while maintaining safety and mobility. It considers, and incorporates as appropriate, all modes of transportation, including walking, cycling and transit. It includes public involvement and input, and encourages creative thinking to achieve a design that meets all of the community’s transportation needs in a manner that adds multi-faceted value.

The successful context-sensitive solution will integrate community concerns taken from their input with the needs of the County's overall transportation and utilities systems. The context-sensitive solution concept is developed more fully in the ITE publication "Context-Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities", 2006, Institute of Transportation Engineers, ISBN 1-933452-11-0.

II. PROJECT TYPES

Capital projects are those projects listed in the Capital Improvement Program (CIP) that are expected to last at least 20 years. Capital projects may include projects that meet this definition that are initiated within any County Department or agency.

The Developers Design Section may initiate and complete Capital Projects as part of work performed by a Developer. Capital projects that are initiated by Developers design are completed under the supervision of that agency, with assistance by divisions within the Bureau of Engineering and Construction, as required.

The Department of Public Works will initiate and construct Capital Projects as part of infrastructure maintenance or improvements. Those Capital Projects that fall within the purview of the Department of Public Works are initiated and processed to completion through the various Bureaus within that Department.

This **Manual** is intended to serve as the basis for design of publicly funded Capital Projects that will be designed and/or reviewed by the Bureau of Engineering and Construction within the Department of Public Works. It should also be considered as a guide to design when the Bureau of Engineering and Construction will review portions of Capital Projects designed under other County Agencies. When this document (and also the **Standard Specifications for Construction and Materials** and the **Standard Details for Construction** prepared by DPW) is to be used as the basis for design of another agency's Capital Project, that agency should specify that fact in all contractual documents with consultants and contractors, including Special Provisions and General Notes on plans.

III. CAPITAL PROJECT DESIGN PROCEDURE

In the earliest part of any project, a Design Professional will be asked to submit a proposal outlining his design effort, a schedule for completion of design and a summary of his costs to complete the design of a particular project. Upon acceptance of this proposal by the County, and issuance of a purchase order, the Design Professional will be authorized to begin the initial design phase of the project.

Details regarding specific project phases required for the various types of Public Works projects may be found within the **individual design sections (Highways, Public Buildings, Sanitary Sewer, etc.)** of this **Manual**.

During the initial phase of a project, the Design Professional may be directed to prepare a study and a report for the project (if applicable) that will include the following information:

- A general description history of the project and of the problem under study;
- Existing conditions that justify or mitigate the need for the project;
- An examination of alternate solutions to the problem under study;
- Discussion of pros and cons of each alternate, including a cost analysis;
- Recommendations, with a complete cost estimate for the recommended improvements.

The submitted study report will be in a standard bound 8 ½" x 11" format. It will provide all necessary drawings, sketches, maps, tables, graphs, computations, etc. necessary to support the conclusions and recommendations in the report. Each report shall be signed and sealed by a Design Professional registered in Maryland, under whose direction the reports were prepared. The Design Professional shall be registered (in Maryland) within a specialty (Engineer, Architect, Surveyor, Landscape Architect, etc.) that is authorized by Maryland law to perform the required work.

Following County approval and acceptance of the submitted study report, the Design Professional will be authorized to proceed with final design as the project budget allows. The Design Professional will be asked to submit the required number of copies of plans at agreed-upon intervals of completion for review during this phase, with the Special Provisions and a cost estimate accompanying 90% and 100% plan submittals. Drawing numbers should be issued to the drawings at the earliest possible review. The Design Professional should prepare and submit all necessary plats for land acquisition for the project as soon as those requirements can be established, in order to allow the Bureau of Land Acquisition sufficient time to complete the acquisitions in time for scheduled construction. The 90% or 100% plans submittal also will be reviewed by the Division of Construction Contracts Administration, which will provide comments regarding construction issues on the plans. Following acceptance of the 90% and/or 100% submittal, the Design Professional will address any final comments, prepare final Special Provisions and a final Estimate. Signed and sealed original drawings and Special Provisions are then submitted to the County.

IV. RIGHT-OF-WAY PLATS

Right-of-Way plats required for Capital projects shall be prepared as discussed in the ***Land Acquisition section*** of this ***Manual***.

V. CONTRACT DRAWINGS

A. GENERAL PRACTICES:

1. A standard drawing sheet with title block and border suitable for the type and size of drawing shall be obtained from the County in either electronic DWG format or as a sheet. Mylar used for CADD drafting shall also be suitable for hand drafting using readily available pencil leads, erasers and inks as required for any necessary corrections or as-built notes. Suitability in this context implies ability to accept and retain ink lines without flaking, ability to accept and retain a dark pencil line without gouging film coating and the ability to erase without damaging the film coating or leaving visible residue.

2. CADD drafting practices shall be as outlined within the **CADD Drafting section** in this **Manual**. Readability and clarity of purpose of final drawings is a key to drafting acceptability. Hand drafting of small drawings is also acceptable, if approved by the involved Design Section. In general, existing features on hand-drafted drawings shall be shown in ink, with proposed work shown in pencil. Shading shall not be used.
3. Professional seal, with handwritten signature across the seal and registration number of the (Maryland) registered Design Professional responsible for the design shall be shown on the title block of each sheet. The name in the Engineer's block shall be printed rather than signed. This block shall be dated by the Design Professional.

When a Professional Engineer's Seal is used, the following additional certification will be added in an area close to the seal:

"Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed Professional Engineer under the laws of the State of Maryland, License No. _____, Expiration Date: _____."

This certification is included as part of the CAD drawing borders currently in use by DPW.

On architectural drawings, the title block shall include the statement of professional certification required under Maryland law. Other certifications required shall be as addressed within the individual sections of this **Manual**.

4. Drawings for each proposed utility shall be presented on sheets separate from other utilities.
5. The following shall be provided on the first sheet of each set of design drawings:
 - A Location / Vicinity Map with the location of the benchmark used for design shown (A complete description of each bench mark, stating designation, location, elevation and datum reference, shall be shown near the Location Plan.);
 - An index of drawings, including final drawing numbers;
 - General Notes for the set of drawings, labeled as GENERAL NOTES;
 - File number for all types of drawings in the complete set shown in the file block;
 - Local Survey Control points for project
 - Complete revision notes for the set of drawings.
6. Scales:
 - Scale to be used on all drawings for each utility is indicated in the appropriate section of this **Manual**. Preferred scales are 1" = 20', 1" = 30' or 1" = 50' for plan views. For profile views, use a vertical scale of 1" = 5'

with a horizontal scale the same as the scale of the corresponding plan view.

- The scale to be used for structural and/or architectural details on any one set of plans shall be either:

Multiples of $1/8" = 1' - 0"$ (i.e., $1/4"$, $1/2"$, $1"$),

OR

Multiples of $3/16" = 1' - 0"$ (i.e., $3/8"$, $3/4"$, $1\ 1/2"$).

7. Revision dates, together with nature of revision, shall be noted clearly in the manner indicated on included "Sample Drawings". Complete revision notes shall be shown on the Title Sheet of the drawing set. Individual revisions shall also be noted upon the applicable sheet(s).

- a. Plan Revisions as Part of an Addendum to a Project

- All revisions shall be made using good drafting practices, showing the intent of both plan and revision clearly. Erasures and/or deletions will be allowed to make revisions to the advertised Plans.
- Revision(s) to the Plans shall be accompanied by the Addendum number in a triangle immediately adjacent to the revision(s). If the revision involves more than one location on a sheet then each location shall be noted with the Addendum number in the triangle.
- The Addendum number in a triangle must also appear in the revision block with a brief description of the revision, the initials of the person making the revision and the date of the addendum.
- When the magnitude of the revision results in the introduction of a new sheet, it shall be placed in its proper sequence in the Plans and given a new drawing number. The Contract Number will be added in its appropriate place. In the revision block the description should read, "New Sheet Added." This sheet shall be stamped and sealed by the Engineer, initialed by appropriate group chiefs and signed by the Bureau Chief and Director.
- When the magnitude of the revision results in the deletion of all the details on a sheet, it shall be replaced with a new sheet containing only a note stating, "This Sheet Not Used." This sheet shall be stamped and sealed by the Engineer, initialed by appropriate group chiefs and signed by the Bureau Chief and Director.
- All revisions to the Plans will be indicated on the title sheet. The Addendum number in a triangle, the sheets affected and the date of the addendum shall be shown. When an addendum is issued with changes to the Plans after one or more addenda have been previously issued with no changes to the Plans, then the previous addenda should be noted on the title sheet, with an indication that they contained no changes to the Plans.

b. Plan Revisions After the Award of a Project

- All revisions shall be made clearly in red using good drafting practices. Use CADD or red pencil (i.e. Colorbrite Medium Red 2126) that does not smear and reproduces clearly. No erasures will be allowed to make revisions to as-bid Plans. If it is impossible to correct an existing detail, then a new detail should be drawn as close to the original as possible and the old detail crossed out.
 - Revision(s) to the Plans shall be accompanied by a number in a square immediately adjacent to the revision(s). The revision number will be the number of the revision to the project as a whole and not to the individual sheet being revised. If there have been revisions to the Plans under an Addendum, then revisions after the award of the contract will start with the number one in a square. If the revision involves more than one location on a sheet, then each location shall be noted with the revision number in a square.
 - The revision number in a square must also appear in the revision block along with a brief description of the revision, the initials of the person making the revision and the date the revision is made.
 - When the magnitude of the revision results in the introduction of a new sheet, it shall be placed in its proper sequence in the Plans and given a new drawing number. The Contract Number will be added in its appropriate place. This sheet does not need to be drawn in red. In the revision block the description should read "New Sheet Added." This sheet shall be stamped and sealed by the Engineer, initialed by appropriate group chiefs and signed by the Bureau Chief and Director.
 - When the magnitude of the revision results in the deletion of all the details on a sheet, the entire sheet shall be crossed out with an X. In the revision block the description should read "This Sheet Deleted."
 - All revisions to the project will be indicated on the title sheet. The revision number in a square, the sheets affected and the date of the revision shall be shown.
8. A note specifying horizontal coordinate system (BCMD or NAD83/[current]) and vertical datum (BCD or NAVD88/[current]) shall be placed on each sheet near the lower right corner. Bearings shall be related to grid North. North arrows shall be labeled as either Maryland Coordinate System (NAD83/[current]) or Baltimore County Metropolitan District Grid Meridian along the stem of the arrow.
9. Limits of contract shall be clearly shown on all drawings.
10. Each site plan shall be so oriented on the plan sheet so that the North arrow points towards the top or left side of the sheet and shall be of size and shape as indicated on "Sample Drawings".

11. Symbols shall be as indicated in the **CADD drafting section** of this **Manual**. Duplicative dimensions shall be avoided. Leaders shall be used to clarify the object referred to.
12. All drawings in the same contract shall be cross-referenced by assigned drawing numbers. Match lines with a minimum length of 4" shall be identified by the drawing number of the matching sheet and shall be used wherever the plan is to be continued on the same or another sheet. Sheet numbers in lieu of drawing numbers may be used only if drawing numbers are indicated for each sheet in the drawing index on the Title Sheet, and if the Title Sheet carries the file numbers of each type of drawing in the drawing set.
13. Floor elevations, invert elevations and finish grade elevations shall be shown to hundredths. General earthwork grades shall be shown to tenths. Abbreviations, ditto marks or ditto abbreviations shall not be used other than those designating standard engineering units.
14. Utility structures shall be numbered as specified within the **sections for specific utilities** in this **Manual**.
15. Show the applicable drawing number parallel and next to existing utilities shown in the plan view.
16. Plans shall include geometric layout information (baselines and offsets, coordinates, etc.) sufficient to lay out the construction work in the field. The information provided shall be based upon accepted practices and the requirements of this **Manual**.
17. Paving thickness and material shall be determined and indicated on the plans for underground utility projects that are located in roads. Location of utilities and their depths as determined by test pits shall be shown on plan and profiles respectively.

B. STANDARD DRAWING SIZES

All new design drawing originals covered in this **Manual** shall be submitted in accordance with the sheet sizes as specified below.

1. Plats (Bureau of Land Acquisition, PDM) --- 8 1/2 in. x 11 in. (Standard format)
2. Construction Drawings:

Public Buildings	(File 8)	22" x 34"	Border on 24" x 36" Sheet
Roads and Streets	(File 5)	"	"
Storm Drains	(File 4)	"	"
Water Supply	(File 3)	"	"
Sanitary Sewer & Pumping	(File 1)	"	"
Bridges and Structural	(File 7)	"	"

VI. SPECIAL PROVISIONS

Complete project specifications shall include the Baltimore County Department of Public Works **Standard Specifications** and the Special Provisions for the Contract. The Special Provisions shall be prepared by the Design Professional and submitted with 90% plans. The Special Provisions shall:

- Include all items affecting cost of the work that are not part of the **Standard Specifications**;
- Agree in name with the bid item;
- Use standard materials and procedures familiar to County contractors wherever possible;
- Be prepared in a format compatible with the format of the **Standard Specifications**, including a (1) description, (2) materials, (3) construction and (4) measurement and payment section for each item;
- Be clear in terminology used, avoiding terms that are not clearly defined either in the Special Provision itself or in the **Standard Specifications** (examples to avoid: “reasonable”, “workmanlike”, “etc.”);
- Be arranged logically, and in sequence with the applicable **Standard Specifications** and **Commodity Catalog** items;
- State limits of measurement and methods used to measure in addition to the units of measurement themselves;
- Use short, simple sentences that make a simple statement;
- Avoid repetition of material shown on drawings or in the **Standard Specifications**;
- Minimize use of cross-references, including titles when this must be done.

Public Building projects are bid based upon both the Department of Public Works **Standard Specifications** and applicable architectural specifications. For more detail, refer to the **Public Buildings Design section** within this **Manual**.

VII. DESIGN DATA AND COMPUTATIONS

The Design Professional shall furnish design data and computations as specified in subsequent sections of this **Manual** unless written consent for omission is obtained from the Department of Public Works. The design data and computations shall be on 8 ½” x 11” reproducible sheets, using standard formats when provided, bound in a folder satisfactory for filing and labeled for identification by title, location and job order number. This data shall be submitted to the Department of Public Works together with the final Contract Drawings and Special Provisions.

VIII. QUANTITIES AND ESTIMATES

The Design Professional shall furnish a tabulated estimate of quantities and costs, including contingent items, which shall be submitted to the Department of Public Works as part of the Contract Specifications at the time of the 90% submittal. A copy of all support computations used to develop the estimate shall also be submitted at this time.

Lump sum items that are not from the Commodity Catalog may be used only under the following conditions:

- The item is fully described in the Special Provisions, and
- Use of the lump sum item has the prior approval of the reviewing agency.

Unit prices used for the estimate shall be taken from recent, local (Baltimore County, MdSHA, adjacent County or Baltimore City) bids given by Contractors for Capital Projects. Where prices for a particular item or size are not available, the Design Professional may contact suppliers or use currently dated estimating aids to obtain a price based upon labor and materials. These steps should be carefully documented when used and document copies submitted as part of the estimate.

Care shall be used with those items that may be volatile in price because of factors beyond the control of contractors and suppliers.

The Design Professional will be required to justify the source of his unit prices in writing when the estimate prepared by that Design Professional for a project is more than 20 percent below the low bid received on a project.

Estimates for Public Building projects shall be in accordance with information provided in the **Public Buildings Design section** of this **Manual**.

IX. VALUE ENGINEERING CHANGE PROPOSALS (VECP) / LIFE CYCLE ANALYSIS

Value engineering is a systematic process to seek out the best functional balance between the cost, reliability and performance of a product, process or project with the objective of removing unnecessary costs from a particular project. A value engineering analysis will be done in response to a request or requests to make changes to either design elements of a project or to change major commodities used on the project. Two examples of situations where value engineering analysis might apply would be (1) the substitution of a closed section design for an open section design on a section of highway and (2) substitution of HDPE pipe for RCC pipe on a particular storm drain project.

Value engineering Change Proposals (VECP) shall be processed and operate as outlined in the **Standard Specifications**, Terms and Conditions Section TC-2.03.

In reviewing each project for value received versus cost, the following criteria shall be considered when changes to prepared plans are considered:

- Compatibility of changes with these **Design Standards**, the **Standard Specifications** and **Standard Details for Construction** (current editions);
- State of the Art industry practices;
- Life-cycle costs of any recommended substitute materials compared to materials used in the design;
- Any additional costs of Design;
- And finally, the short-term savings available to the Contractor and to the County.

X. ADDITIONAL INSTRUCTIONS

A. LOCATION OF OTHER UTILITIES

Unless otherwise directed by the County, the Design Professional shall be responsible for the identification of existing surface and subsurface utilities and utility conflicts for the design work in question. The level of effort of this activity shall be discussed with the County and shall most often include:

- A utility record search for gas, telephone, electric, etc.;
- Horizontal and vertical location of the existing utilities, shown on the project plans, to an agreed-upon level of accuracy. Means of location shall be by actual utility exposure (test pitting) or by other non-destructive methods.

All excavation, including test pit excavation, shall be done only after notifying Miss Utility and having utility locations marked in the field by the appropriate utilities.

B. CHECKLISTS

The design of each project shall be verified by use of checklists contained in this section and in subsequent sections. The Design Professional shall see that all information contained on all applicable check lists are shown on the drawings and shall submit one copy of the applicable checklists along with the Final Drawings, with appropriate information filled in. The completed checklist shall be initialed by the Design Professional; thereby signifying that the items on the checklist have been addressed and satisfied.

C. TOPOGRAPHY & LAND USE / ZONING

Topographic and land use maps for the County are available from Geographic Information Systems in the Office of Information Technology (410-887-2233) for a nominal charge. Maps are also available in electronic format to qualified buyers, subject to a usage agreement. Zoning maps are available for reference

or copies from the Zoning counter (410-887-3391) within the Department of Permits and Development Management.

D. AS-BUILT DRAWINGS

Construction drawings for County roads, streets and utilities are normally modified as record drawings within the Department of Public Works following construction based upon field notes and dimensions taken by the County Inspector during construction. The purpose of these As-Built record drawings is to maintain a permanent record of constructed facilities for purposes of both infrastructure maintenance and for public service and utilities connections.

As-Built record drawings for bridges or for public buildings are prepared by the Engineer/Architect (as applicable) under their contract with the County. For additional information, refer to the **Public Buildings Design section** or to the **Structural Design section**, as applicable, of this **Manual**.

A second kind of As-Built Drawing is that required by outside regulatory agencies. Certain applications, such as wetland construction or the construction of earth dam embankments for storm water management, require that specialized inspections of materials and their installation be done during construction. As proof of these inspections, and in order to guarantee that construction be in material accordance with the plans, red-lined prints (As-Built drawings) of the construction plans with measured construction elevations and dimensions taken during the inspections must be submitted to reviewing agencies. These plans must be signed and sealed by a Professional Engineer registered in Maryland that has specialization and experience in the types of inspection required by the plans.

In the case of the regulatory agency As-Built drawings, Baltimore County requires that the Engineer/Architect (as applicable) signing the plan originals also perform the inspections and sign and seal the As-Built drawings, thereby certifying that the project is built in accordance with the plans.

E. TIDAL AND RIVERINE FLOODING AREAS

Design of utilities and roads in areas subject to tidal flooding shall consider the impacts of both normal and extreme high tides upon the project. Construction within riverine flood areas and their buffers shall be in accordance with limits upon construction and grading imposed by the County Code.

F. USE OF COMPUTER PROGRAMS

Baltimore County DPW uses certain computer programs within its design sections for purposes of analysis and design. In the interest of compatibility within this agency and with other reviewing agencies, consultants engaged in design of projects for this Department or otherwise submitting work for review shall also use these programs in order that review of the Design Professional's work shall not be impeded by unfamiliarity with the program used for analysis. The Design Professional is encouraged to discuss this matter with representatives of the involved design sections prior to beginning any work. In

general, our policy is to accept no work that requires use or installation of a non-approved computer program to read, print, verify input or methodology, or otherwise review results.

G. ELECTRONIC DRAWINGS AND DATA

Upon completion of a project funded by Baltimore County for which drawings are produced, the consultant will supply electronic copies of all drawings produced for County archiving, without exception. These drawings shall be provided to the County in AutoCAD™ .DWG format, compatible with the current version of AutoCAD in use at the County.

The consultant is also expected to provide electronic copies of the following, in addition to the requisite number of paper copies:

- Survey data (ASCII data dump or AutoCAD Civil Package format)
- Hydrologic (TR-20) and Hydraulic (HEC-2, HEC-RAS) data
- Special Provisions (MS Word*)
- Estimates (MS Excel*)
- Other design calculations required by County scanned in PDF format*.

**** Compatible with release in use by review agency.***

Use of GIS data obtained through Baltimore County's Office of Information and Technology shall be subject to the agreement executed with that Office at the time that the data was obtained.

H. Ownership of Design

Data created for a capital project funded by Baltimore County, including but not limited to survey data, drawings, specifications and special details, shall not be copyrighted and shall become the property of Baltimore County. Future use of this material shall be in accordance with the Contract between the design professional and the County.

When details or descriptions of a proprietary device are to be included as part of County drawings or specifications, the Design Professional shall determine any restrictions upon use or distribution of the details or descriptions and so advise the County at the time finished drawings are presented to the County.

I. Testing – Soils, Materials and Environmental

The County does not perform soils, materials or environmental testing. Any such testing required for design or for construction shall be performed by private testing firms subcontracted for this purpose.

XI. DESIGN FIGURES

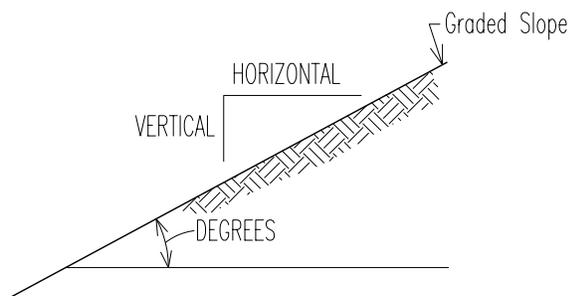
See the following Design Figures and Checklists on the next pages:

CONSTRUCTION GRADING-EQUIVALENT SLOPES	General Design G-A
SOIL & SOIL AGGREGATE MIXTURES	General Design G-B
GENERAL INSTRUCTIONS CHECKLIST	General Design G-C
EVENT STATUS SHEET – IN-HOUSE PROJECTS	-

TABLE OF EQUIVALENT SLOPES – CONSTRUCTION GRADING

PERCENT	DEGREES	Ft./Ft. (V/H)	In./Ft. (V/H)	HORIZONTAL : VERTICAL	CONSTRUCTION GRADING NOTES
1.04%	0.60°	0.0104	1/8	96 : 1	<div style="display: flex; align-items: center; justify-content: center;"> <div style="border-left: 1px solid black; border-right: 1px solid black; height: 100%; width: 20px; margin-right: 5px;"></div> <div style="text-align: left; padding-left: 10px;"> <p>Unacceptable – Poor Drainage</p> <p style="font-size: 2em; margin: 0;">}</p> <p>Range of Acceptable Construction Grading</p> <p style="font-size: 2em; margin: 0;">}</p> <p>Unacceptable – Risk of Erosion, Slope Failures. Special Design Use Only.</p> </div> </div>
1.56%	0.90°	0.0156	3/16	64 : 1	
2.08%	1.19°	0.0208	1/4	48 : 1	
4.17%	2.39°	0.0417	1/2	24 : 1	
6.25%	3.58°	0.0625	3/4	16 : 1	
8.32%	4.76°	0.0832	1	12 : 1	
16.67%	9.46°	0.1667	2	6 : 1	
20%	11.31°	0.20	2.4	5 : 1	
25%	14.04°	0.25	3	4 : 1	
33%	18.43°	0.33	4	3 : 1	
50%	26.57°	0.50	6	2 : 1 *	
66.67%	33.69°	0.667	8	1.5 : 1	
100%	45.0°	1.00	12	1 : 1	

* Undesirable for Development lot grading.



Ft./Ft. = Vertical / Horizontal

Ft./Ft. = In./Ft. / 12

Percent = Ft./Ft. x 100

Degrees = arctan (Ft./Ft.)

Grading shall meet all applicable requirements of reviewing agencies.



DEPARTMENT OF PUBLIC WORKS
GENERAL DESIGN

CONSTRUCTION GRADING EQUIVALENT SLOPES

ISSUED: MARCH, 2005
REVISED: _____
REVISED: _____

PLATE
G-A

	SYMBOLS	TYPICAL GRADING	TYPICAL PHYSICALS	REMARKS
A - 3 SAND		C.S. = 22% F.S. = 48% SILT = 20% CLAY = 8% COLL. = 2%	L.L. = N.P. P.I. = N.P.	SAND - 53% MIN. % - #200 - 20% MAX. P.I. - N.P. L.L. - MUST BE N.P.
A - 2 SAND & FINES		C.S. = 20% F.S. = 43% SILT = 19% CLAY = 10% COLL. = 8%	L.L. = 22 P.I. = 2 S.L. = 18	SAND - 53% MIN. 5 - #200 - 20% MAX. P.I. - 7 MAX. L.L. - 34 MAX. (MUST HAVE L.L.)
A - 2 - 4 SILTY SAND		C.S. = 25% F.S. = 30% SILT = 32% CLAY = 7% COLL. = 6%	L.L. = 24 P.I. = 2 S.L. = 21	SAND - 53% MIN. % - #200 - 21% MIN. - 30% MAX. P.I. - 7 MAX. L.L. - 34 MAX. (MAY BE N.P.)
A - 4 - 2 SANDY SILT		C.S. = 23% F.S. = 28% SILT = 33% CLAY = 10% COLL. = 6%	L.L. = 25 P.I. = 3 S.L. = 21	SAND - 48% MIN. % - #200 - 31% MIN. P.I. - 7 MAX. L.L. - 40 MAX. (MAY BE N.P.)
A - 2 - 7 CLAYEY SAND		C.S. = 38% F.S. = 31% SILT = 15% CLAY = 8% COLL. = 8%	L.L. = 31 P.I. = 10 S.L. = 18	SAND - 48% MIN. CLAY - 29% MAX. P.I. - 8 - 14 L.L. - 40 MAX.
A - 7 - 2 SANDY CLAY		C.S. = 20% F.S. = 29% SILT = 17% CLAY = 21% COLL. = 13%	L.L. = 39 P.I. = 17 S.L. = 16	SAND - 48% MIN. CLAY - 17% - 35% P.I. - 15 MIN. L.L. - 30 MIN.
A - 4 SILT		C.S. = 20% F.S. = 22% SILT = 40% CLAY = 10% COLL. = 8%	L.L. = 30 P.I. = 6 S.L. = 19	SAND - 47% MAX. CLAY - 29% MAX. P.I. - 9 MAX. L.L. - 40 MAX.
A - 4 - 7 CLAYEY SILT		C.S. = 8% F.S. = 17% SILT = 40% CLAY = 23% COLL. = 12%	L.L. = 33 P.I. = 11 S.L. = 18	SAND - 47% MAX. CLAY - 25% MIN. P.I. - 14 MAX. L.L. - 40 MAX.
A - 7 - 4 SILTY CLAY		C.S. = 18% F.S. = 20% SILT = 35% CLAY = 12% COLL. = 15%	L.L. = 39 P.I. = 15 S.L. = 16	SAND - 47% MAX. CLAY - 29% MAX. P.I. - 15 MIN. L.L. - 30 MIN.
A - 7 CLAY		C.S. = 18% F.S. = 22% SILT = 23% CLAY = 22% COLL. = 15%	L.L. = 40 P.I. = 17 S.L. = 15	SAND - 47% MAX. CLAY - 30% - 59% P.I. - 15 MIN. L.L. - 35 MIN.
A - 6 COLLOIDAL CLAY		C.S. = 6% F.S. = 7% SILT = 18% CLAY = 33% COLL. = 36%	L.L. = 50 P.I. = 33 S.L. = 14	CLAY - 60% MIN. P.I. - 25 MIN. L.L. - 45 MIN.
A - 5 MICA, DIATOMS, DECOMPOSED ROCK		C.S. = 15% F.S. = 35% SILT = 30% CLAY = 15% COLL. = 5%	L.L. = 35 P.I. = 4 S.L. = 26	GRAD. NOT SIGNIFICANT P.I. - LOW, L.L. - HIGH S.L. - 26 MIN. VISUAL INSPECTION NECESSARY TO DETERMINE TYPE.
A - 8 SWAMP MUCK		C.S. = 18% F.S. = 26% SILT = 45% CLAY = 7% COLL. = 4%	L.L. = 52 P.I. = 7 S.L. = 38	ORGANIC CONTENT - 4% MIN. P.I. - LOW L.L. - HIGH, WHEN OBTAINABLE S.L. - 26 MIN.
ROCK REFUSAL				



DEPARTMENT OF PUBLIC WORKS
GENERAL DESIGN

SOIL & SOIL-AGGREGATE MIXTURES DESIGNATIONS

ISSUED: AUGUST, 1997
REVISED: _____
REVISED: _____

PLATE
G-B

Signed: _____

Date: _____

GENERAL INSTRUCTIONS

A BALTIMORE COUNTY CHECKLIST FOR PREPARATION OF PLANS, SPECIFICATIONS AND ESTIMATES

I. CONTRACT DRAWINGS

A. GENERAL PRACTICES:

- ___ 1. Standard drawing sheet used, with a suitable title block and border obtained from the County in either electronic DWG format or as a sheet.
- ___ 2. Mylar used for CADD drafting will readily accept hand-drafted corrections in ink & pencil.
- ___ 3. Each proposed utility is shown on a separate sheet, unless otherwise directed by BCBECE.
- ___ 4. Each sheet is signed, sealed and dated by a Design Professional who is registered in Maryland in a specialty appropriate for the work shown on the plan.
- ___ 5. Plans are compatible with requirements of all agencies that will review plans.
- ___ 6. Line weights, line types, scales, layers, lettering in compliance with General Instructions and with CADD standards. RomanS font used (except title on title sheet). Special fonts not used.

B. DRAWING TITLE BLOCKS:

- ___ 1. Title, Project Location, Subdivision, Election District, Job Order Number, Key Sheet, Position Sheet, P.W.A. No., Right of Way, Designer/Drawn/Check and Design Professionals Information Block all completely filled out. Drawing Number & Contract Number added when County provides this information.
- ___ 2. Company name shown above Design Professional's Name & License block (both printed).
- ___ 3. Scales are shown in title block and with each special detail.
- ___ 4. File number for particular drawing type shown in the file block
- ___ 5. Complete revision notes for the set of drawings.
- ___ 6. Revision dates & nature of revision noted clearly on sheets revised.
- ___ 7. Note specifying horizontal coordinate system (BCMD or NAD83/[current]) and vertical datum (BCD or NAVD88[current]) placed on each sheet near the lower right corner.

C. BODY OF DRAWING:

- ___ 1. Lettering is 0.08" minimum height; is legible; doesn't overwrite other text or objects.
- ___ 2. Symbols in accordance with General Design Plates and County CADD standards.
- ___ 3. Existing features are graphically differentiated from proposed features.
- ___ 4. Shading shall not be used where it may obscure existing or proposed features in a second or third generation print (As-Built).
- ___ 5. Scales used are appropriate and as specified for plan views, profiles and structural/architectural details.
- ___ 6. North arrows labeled as either MCS (Maryland Coordinate System) or BCMD (Baltimore County Metropolitan District Grid Meridian) along the stem of the arrow. Each plan view is oriented on the plan sheet so that the North arrow points towards the top or left side of the sheet. Minimum of three (3) coordinate ticks shown.
- ___ 7. Limits of contract shall be clearly shown on all drawings.
- ___ 8. Drawings cross-referenced at Match Lines by assigned Drawing Number. Sheet numbers allowed if (1) Title Sheet shows complete index of plan numbers, (2) plan number for title sheet is referenced on individual sheets and (3) file numbers for all drawings in set are shown on Title Sheet.
- ___ 9. Floor elevations, invert elevations and finish grade elevations shown to the hundredth of a foot. General earthwork grades are shown to the tenth of a foot.

- ___ 10. Abbreviations, ditto marks or ditto abbreviations shall not be used other than those designating standard engineering units.
- ___ 11. Areas of 100 year tidal or riverine flooding shown based upon approved (BCBEC) floodplain study. Buffers for flood plains and wetlands shown and labeled. Mitigation plans if required included as part of construction drawings.
- ___ 12. Geometric layout information (baselines and offsets, coordinates, etc.) sufficient to lay out the construction work in the field is shown.
- ___ 13. Existing road and street grades are shown and checked against established road profile. Existing paving thickness and material indicated on the profile where road excavation required for underground utility projects. Names of roads indicated clearly on plan view; State-maintained and privately maintained roads are labeled clearly.
- ___ 14. Location of utilities and their depths as determined by test pits (or other field investigation techniques) shown on plan and profiles respectively.
- ___ 15. Proprietary or copyrighted details or specifications labeled clearly as such on plans.
- ___ 16. Property Information - existing & proposed right-of-way shown & labeled; lot numbers and front dimensions shown; liber/folio information listed.
- ___ 17. Existing utilities – shown & labeled with size, type & reference drawing number; location checked against both reference drawing and survey information.
- ___ 18. Utility relocations coordinated with involved County design section or outside utility company.

D. TITLE SHEET:

- ___ 1. A Location / Vicinity Map with the location of the benchmark used for design shown. Limits of contract shall be clearly shown.
- ___ 2. A complete description of each bench mark, stating designation, location, elevation and datum reference, is shown near the Location Plan.
- ___ 3. An index of drawings, including final drawing numbers is shown.
- ___ 4. General Notes for the set of drawings shown; labeled as GENERAL NOTES.
- ___ 5. Local Survey Control points for project shown.
- ___ 6. File number for all types of drawings in the complete set shown in the file block.
- ___ 7. All contract revisions noted and described.

II. DESIGN DATA, QUANTITIES AND ESTIMATES

- ___ 1. Design Data and Computations submitted on 8 1/2" x 11" reproducible sheets, bound in folder suitable for filing; labeled by Title, Location & Job Order No. in accordance with requirements of specific sections of Design Manual.
- ___ 2. Standard formats are used for computations when provided either as part of this Manual or by the County.
- ___ 3. Submittal of a tabulated estimate of quantities and costs, including contingent and fixed price items, received at time of submittal of 90% Contract Drawings & Specifications.
- ___ 4. A copy of all supporting computations used to develop the estimate shall also be submitted at this time.
- ___ 5. Lump sum items and other items either not in Commodity Catalog or therein described as "S.P." are fully described in the Special Provisions. Lump sum items and other items not in Commodity Catalog have prior approval of reviewing agency.
- ___ 6. Source of Unit Prices (MdSHA, County, Supplier, etc.): _____

III. CHECK LIST & MISCELLANEOUS

- ___ 1. Completed and signed by responsible Design Professional.
- ___ 2. Design Section-specific check lists, applicable to project plans, attached: _____
- ___ 3. Electronic drawings submitted in DWG format.
- ___ 4. Special Provisions, Estimates, etc. submitted as MSOffice files.

**Bureau of Engineering & Construction
Event Status Sheet
In-House Project**

Project: _____

Job Order: _____

Date	Event	Remarks
_____	1. Study & Preliminary Estimate Complete	_____
_____	2. Job Order Number Obtained	_____
_____	2A. List project in Capital Tracking Program	_____
_____	3. Initial Allotment for Surveys, Test Pits	_____
_____	4. Initial Allotment Signed	_____
_____	5. Surveys Requested	_____
_____	5A. Request Wetlands Assessment & Delineation (if required).	_____
_____	6. Utilities Information Requested	_____
_____	7. County Record Drawings Researched	_____
_____	8. Surveys Complete	_____
_____	9. Construct Base Drawing from Survey Data	_____
_____	10. County and Utilities Information On Drawing	_____
_____	11. Lay Out Plan View for Proposed Utility	_____
_____	12. Community Meeting (If requested)	_____
_____	13. Utility Information Received	_____
_____	14. Request Test Pits	_____
_____	15. Test Pits Complete	_____
_____	16. Wetlands Delineation Completed	_____
_____	17. Establish Utility Profiles W/Test Pit Data	_____
_____	18. Request Right-of-Way, Easements, Work Areas	_____
_____	19. Submit Design to Utility Companies for Review	_____
_____	19A. BGE Gas Approval Received	_____
_____	19B. BGE Electric Approval Received	_____
_____	19C. Verizon Approval Received	_____
_____	19D. ComCast Approval Received	_____
_____	20. JARG Meeting (If req'd)	_____
_____	21. Approve Plats-Begin Title Work, Appraisals &	_____

Date	Event	Remarks
	Contacts Within Land Acquisition	
_____	22. Begin Joint Application Process	_____
_____	23. Complete Plan, Profiles and Details	_____
_____	24. Request Grading & Stormwater Mgt Approval	_____
_____	25. Complete Sediment Control Plans	_____
_____	26. Request Sediment Control Approval	_____
_____	27. Plans to Traffic Engineering/Traffic Control Plan	_____
_____	28. Prepare Special Provisions and Estimate	_____
	28A. Submit 1 set of plans, estimate to Construction Inspection for comments.	_____
_____	29. Plans Routed Through DPW for Signature	_____
_____	30. Receive Plats	_____
_____	31. Plan & Permit Approvals Received	_____
_____	31A. Grading Approval (DEPRM)	_____
_____	31B. Stormwater Management Approval (DEPRM)	_____
_____	31C. Sediment Control Approval Received (SCD)	_____
_____	31D. Joint Permit Approval Received (MDE)	_____
_____	31E. Roadside Tree Permit	_____
_____	31F. State Highway Administration	_____
_____	31G. Railroad (if Track Crossing Involved)	_____
_____	31H. NPDES Permit	_____
_____	31I. Critical Areas Permit	_____
_____	31J. Forest Conservation Plan	_____
_____	32. Plans Package W/Checklist To Contracts*	_____
_____	33. Advertise for Bids	_____
_____	34. Right-of-Way Clearance Received	_____
_____	35. Pre-Bid Meeting	_____
_____	36. Bids Received	_____
_____	37. Contract Awarded	_____
_____	38. Pre-Construction Meeting	_____
_____	39. Notice to Proceed	_____