U.S. Department of Homeland Security

United States Coast Guard

NAVAL ENGINEERING COMPUTER
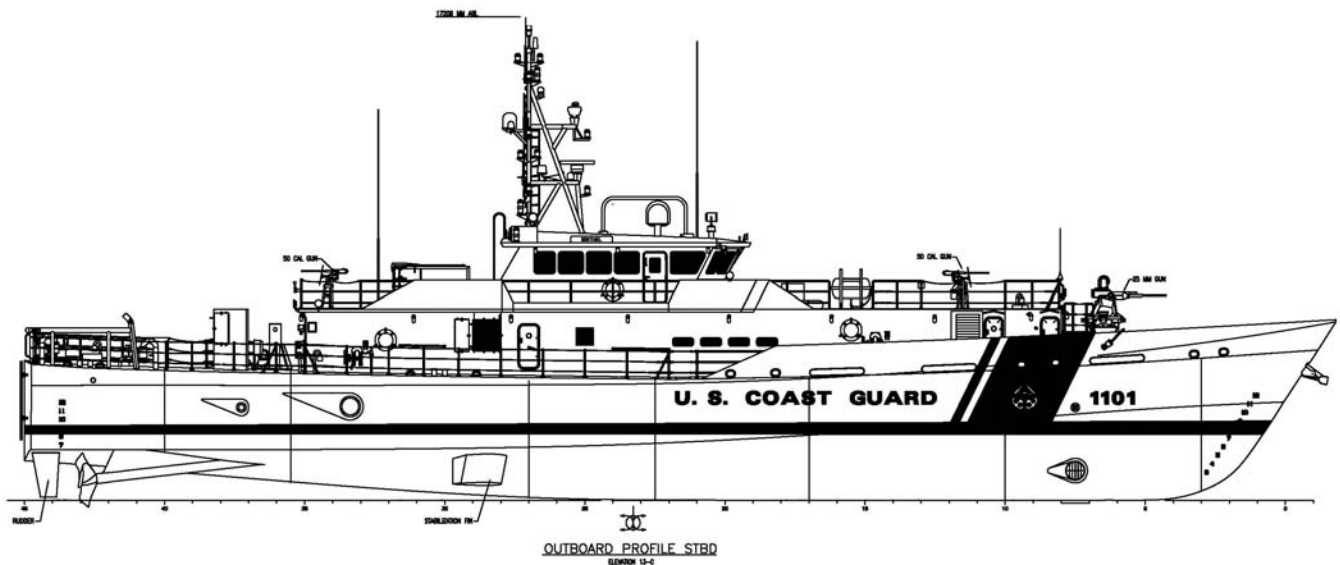
AIDED DESIGN STANDARDS

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COMDTINST 9085.1C

12 NOV 2011

COMMANDANT INSTRUCTION M9085.1C

Subj: NAVAL ENGINEERING COMPUTER AIDED DESIGN STANDARDS

1. <u>PURPOSE</u>. This Manual provides direction for Coast Guard activities and commercial contractors to develop Coast Guard drawings for Hull, Mechanical, Electrical (HM & E), Ordnance and Electronic systems and equipment for Coast Guard vessels.

2. <u>ACTION</u>. All Coast Guard unit commanders, commanding officers, officers-in-charge, deputy/assistant commandants, and chiefs of headquarters staff elements shall comply with the provisions of this Manual. Internet release is authorized.

3. <u>DIRECTIVES AFFECTED</u>. COMDTINST 9085.1B is canceled.

4. <u>BACKGROUND</u>.

   a. Commandant (CG-4) has adopted AutoCAD™ 2009 as the standardized computer aided design system for Coast Guard vessels.

   b. AutoCAD™ systems have been installed at all major Coast Guard maintenance and logistics support activities.

5. <u>SUMMARY OF CHANGES</u>. Changes made within this revision are primarily to be utilizing current technology more efficiently.

   a. Whole document: Modified all references to AutoCAD 2002 to AutoCAD 2009.

   b. Chapter 2: Revised Signature Authority criteria to conform to the CG's modernization.

   c. Chapter 4: Revised Storage and Transmission Media for Electronic Files to remove "Floppy Disk."

DISTRIBUTION – SDL No. 154

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
A																										
B	x			x	x				x			x		x											x	
C				x							x							x						x	x	
D	x			x			x													x		x				
E						x	x																			
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G																										
H							x																			

NON-STANDARD DISTRIBUTION:

d. Chapter 5: Modified Dimensioning criteria to require them to be in Paper Space. Added section "Computer Oriented Wiring Diagrams (COED)." Added section "Proofing and Performing Drawing Check-Off."

e. Chapter 6: Revised Drawing Sheet and Border Template requirements to match current standards and AutoCAD 2009 capabilities. Added requirement of multi-sheet drawings to be in one electronic file utilizing the 'Layout Tabs' feature in AutoCAD 2009.

6. POLICY.

a. All drawings shall be delivered to the Coast Guard in AutoCAD™ 2009 compatible (.dwg) file format and in accordance with Naval Engineering Manual M9000.6 (series) to allow for the life-cycle drawing maintenance.

b. Chief of Surface Forces Logistics Center (SFLC), Engineering Service Division (ESD), Technical Information Management Branch, (TIMB), is designated as the systems manager for all AutoCAD™ drawing issues relating to Coast Guard vessel drawings.

c. The CAD standard requirements identified in this instruction apply to all new drawings and for all revisions to existing drawings.

d. For Coast Guard units and commands, this Manual does not constitute authority to purchase the hardware or software required to comply with this Manual. Such procurements must be conducted in accordance with current Coast Guard directives for the purchase of computer hardware and software.

7. CONTENTS. This Manual consists of written standards for use in the development of CAD drawings.

8. CHANGES. Recommendations for future changes to this Manual shall be submitted to:

> Commanding Officer
> ATTN: ESD-TECH INFO MGMT Branch
> Surface Forces Logistics Center
> 2401 Hawkins Point Rd. Stop 25
> Baltimore, MD 21226-1797

9. RECORDS. Records created by compliance with the requirements of this Manual, including those promulgated in Naval Engineering Manual, COMDTINST M9000.6 (series), will be maintained in accordance with Information and Life Cycle Management Manual , COMDTINST M5212.12 (series).

10. ENVIRONMENTAL ASPECT AND IMPACT CONSIDERATIONS. This action is not

expected to result in any significant adverse environmental impacts as described in the National Environmental Policy Act of 1969 (NEPA). The proposed action has been reviewed by the USCG and has determined this action to be categorically excluded from further environmental documentation under current USCG Categorical Exclusion # 33, in accordance with National Environmental Policy Act Implementing Procedures and Policy for Considering Environmental Impacts, COMDTINST M16475.1 (series), Figure 2-1.

11. <u>FORMS AND REPORTS</u>. None.

                                    R. J. RÁBAGO /s/
                                    Rear Admiral, U. S. Coast Guard
                                    Assistant Commandant for Engineering and Logistics

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LIST OF FIGURES

CHAPTER - 1   INTRODUCTION

A.   Standards and Requirements

1. This Manual sets forth the minimum standards that shall be followed in the development of all CAD drawings created for Coast Guard (CG) vessels.

2. These standards are subject to change and will require periodic updates to take advantage of technological advancements. Recommended changes shall be forwarded in writing to Commanding Officer (SFLC, ESD, Technical Information Management Branch, 2401 Hawkins Point Road, Baltimore, MD 21226-1797).

B.   Additional Standards and Requirements

1. These standards are not stand-alone requirements; they are intended to augment existing commercial and military standards that are commonly used in drawing development within Naval Engineering programs. Except as noted in this Manual, the following standards shall be considered an integral part of this Manual.

2. In the event of a conflict between the text of this document and the references cited herein, the text of this document shall take precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

C.   List of Specifications and Standards

1. COMDTINST M9000.6	USCG Naval Engineering Manual, Chapter 085	
2. COMDTINST M5260.6	Management of Scientific and Technical Information	
3. ANSI/ASME Y14.l-2005	Decimal Inch Drawing Sheet Size and Format	
4. ANSI/ASME Y14.2-2005	Line Conventions and Lettering	
5. ANSI/ASME Y14.3-2003	Multiview and Sectional View Drawings	
6. ANSI/ASME Y14.5-2009	Dimensions and Tolerancing	
7. ANSI/ASME Y14.3-2008	Associated Lists	
8. ANSI/ASME Y14.35M	Revision of Engineering Drawings and Associated Documents	
9. ANSI/ASME Y14.38	Abbreviations & Acronyms for Use on Drawings and related Documents	

10. ANSI/ASME Y14.100	Engineering Drawing Practices
11. ANSI/ASME Y32.2.4	Graphic Symbols for Heating, Ventilating and Air Conditioning
12. ASTM F856	Standard Practice for Mechanical Symbols Shipboard-Heating, Ventilation And Air Conditioning (HVAC)
13. AWS A2.4	Standard Symbols for Welding, Brazing and Nondestructive Examination
14. AWS A3.0	Standard Welding Terms and Definitions: Including Terms for Adhesive Bonding, Brazing, Soldering, Thermal Cutting, and Thermal Spraying
15. ISO 1219-1	Graphic Symbols for Fluid Power
16. ISO/IEC 10149:1995	Information Technology – Data Interchange on read – only 120 mm optical data disks (CD-ROM)
17. IEEE-315	Graphic Symbols for Electrical and Electronics Diagrams
18. IEEE-91-1984	Graphic Symbols for Logic Functions
19. ANSI-Y32.9-1972	Graphic Symbols for Electrical Wiring and Layout Diagrams Used in Architecture and Building Construction
20. MIL-D-23140D	Drawings, Installation Control, for Electronic Equipment
21. MIL-STD-31000	Technical Data Packages
22. MIL-STD-25	Ship Structural Symbols for Use on Ship Drawings (See Note)
23. MIL-HDBK-290(1)	Standard Electrical Symbol List
24. ISO 14617-1:2005	Graphical symbols for diagrams Part 1: General information and indexes
25. ISO 14617-2:2002	Graphical symbols for diagrams - Part 2: Symbols having general application

26. ISO 14617-3:2002   Graphical Symbols for Diagrams - Part 3: Connections and related devices

27. ISO 14617-4:2002   Graphical Symbols for Diagrams - Part 4: Actuators and related devices

28. ISO 14617-5:2002   Graphical Symbols for Diagrams - Part 5: Measurement and control devices

29. ISO 14617-6:2002   Graphical Symbols for Diagrams - Part 6: Measurement and control functions

30. ISO 14617-7:2002   Graphical Symbols for Diagrams - Part 7: Basic mechanical components

31. ISO 14617-8:2002   Graphical Symbols for Diagrams - Part 8: Valves and dampers

32. ISO 14617-9:2002   Graphical Symbols for Diagrams - Part 9: Pumps, compressors and fans

33. ISO 14617-10:2002   Graphical Symbols for Diagrams - Part 10: Fluid power converters

34. ISO 14617-11:2002   Graphical Symbols for Diagrams - Part 11: Devices for heat transfer and heat engines

35. ISO 14617-12:2002   Graphical Symbols for Diagrams - Part 12: Devices for separating, purification and mixing

36. ISO 14617-15:2002   Graphical Symbols for Diagrams - Part 15: Installation diagrams and network maps

Note: Ship drawings shall comply with MIL-STD-25 except that steel symbol designations may conform to the current American Institute of Steel Construction (AISC) "Manual of Steel Construction."

CHAPTER - 2   DRAWING SIGNATURE AUTHORITY

A. <u>Drawing Signature Authority</u>

1. Newly created drawings and revisions to existing drawings require the signature of a designated Coast Guard authority to become part of the official Coast Guard drawing planset. Authorized signature authorities for new and revised drawings are:

    a. SFLC-ESD-Naval Architecture & Marine Engineering Branch

        (1)   Naval Architecture Section Chief

        (2)   Main Propulsion Machinery Section Chief

        (3)   Auxiliary Machinery Section Chief

        (4)   Electrical Systems Section Chief

    b. SFLC-ESD-Technical Information Management Branch and CG Yard

        (1)   Branch Chief (Non-engineering changes)

        (2)   Hull Section Chief

        (3)   Electrical/Electronics Section Chief

        (4)   Mechanical Section Chief

    c. C4ITSC and Project Resident Office (PRO)

        (1)   Command Appointed Engineering Authority

        (2)   Command Appointed Engineering Authority

    d. Product Line and Contract & Contract Guidance Drawings

        (1)   Engineering Section Chief

        (2)   Chief, Office Of Naval Engineering (CG-45)

2. For new drawings, signature approval in the Title Block on sheet one of a multi-sheet drawing constitutes approval of all sheets of that drawing. Approval signatures are not required on subsequent sheets of the same drawing.

3. For drawing revisions, signature approval is only required in the Revision Block with the latest revision write up. Both the draftsman completing the revision and the approval

authority shall date, add his/her first initial, full last name and organization of the approving official in the revision history block. The approval signatures in the revision history block constitute approval of all portions of that revision.

4. For AutoCAD™ drawings, both new and revised, printed names (i.e. text) with the suffix designator "/s/" shall represent drawing approval signatures.

CHAPTER - 3   TITLE BLOCK NUMBERING CONVENTION

A. Drawing Numbers and Title Block Numbering Convention

   1. All drawings relating to cutters, boats, and installations thereon shall be assigned a Coast Guard drawing number issued by Surface Forces Logistics Center, Engineering Services Division, Technical Information Management Branch (SFLC-ESD-TIMB) in accordance with the Naval Engineering Manual, COMDTINST M9000.6 (series).

   2. The Coast Guard drawing number is the key component for drawing identification and management. Drawing numbers shall be shown in all title blocks and will be structured as follows:

PLATFORM CLASS NUMBER CONSISTING OF:				
Platform Length	Platform Sub-Class	Platform Class	Ship Work Breakdown Structure (SWBS)	Serial Number
110	B	WPB	521	001
DRAWING NUMBER: 110B-WPB-521-001				

   Note 1: Older Platform Classes may use a different numbering system than that described above (e.g. 9000 series number versus SWBS number). In those instances where a different numbering system is used, new and revised drawings shall follow the existing Platform Class numbering system.

  3. When creating multiple drawings with the same title, applicable to a specific hull within a class, the vessel name shall be included in the title in parenthesis.

   Example:
   ENGINE ROOM WATER FOG SYSTEM (KICKAPOO ONLY)
   ENGINE ROOM WATER FOG SYSTEM (KANAWHA ONLY)

**CHAPTER - 4   ELECTRONIC FILE LABELING CONVENTIONS AND
                   STORAGE/TRANSMISSION MEDIA**

A. Electronic File Naming Convention For Drawing Files

   1. There are six fields needed to define an electronic drawing file to allow easy recognition of
      file content. The notes below provide examples:

       Note 4   *Note 5*   *Note 6*   *Note 7*   *Note 8*

<platform class>_<SWBS>_<serial>_<sheet>_<addendum sheet> _<revision> .dwg

Examples

DRAWING SHEET	ELECTRONIC FILE NAME
378-FRAM-E-085-002, Sheet 5A, Rev. D	378-FRAM-E_85_2_5_A_D.dwg
160-WLIC-1205-003, Sheet 1, Rev. -A (Old 4-digit SWBS Numbering System)	160-WLIC-1205-3-1-A.dwg

     Note 1: All fields are mandatory.
     Note 2: Do not use leading zeros in any field (i.e. SWBS 0243 = 243).
     Note 3: All fields will be separated by an underscore.
     Note 4: *<platform class>* consists of Platform Length, Platform Sub-Class and Platform
                Class as identified in Chapter 3.
     Note 5: Multiple sheet drawings in a single data file shall have "1" assignment for sheet
                number.
     Note 6: If the sheet is not an addendum sheet (e.g. sheet 5A), use a dash in the
                addendum sheet field.
     Note 7: Use dashes in the revision field to indicate an original, non-revised sheet.
     Note 8: .dwg indicates file extension for an AutoCAD™ drawing.

B. Storage and Transmission Media for Electronic Files

   1. The Naval Engineering Technical Information Management System (NE-TIMS) will be
      used for the management of all Naval Engineering drawings. Check-In and Check-Out of
      drawings shall continue to follow established internal procedures set by ESD-TIMB.

   2. For commands and commercial entities not authorized direct access to the drawing
      management features of NE-TIMS, a CD-ROM or DVD is the preferred medium of
      temporary storage and transmission of electronic files in accordance with ISO/IEC 10149.

   3. File encryption shall not be used. If encryption is required for security reasons, an
      approved method of encryption will be designated by SFLC-ESD-TIMB.

CHAPTER - 5   GENERAL REQUIREMENTS

A. Authorized Software

1. All new drawings and revisions to existing drawings shall be delivered to SFLC-ESD-TIMB in AutoCAD™ 2009 compatible (.dwg) file format and in accordance with Naval Engineering Manual M9000.6 (Series).

B. Drawings Prepared In Data Processing Systems (Text and Graphics Processing).

1. If data processing systems other than AutoCAD™ are used to prepare drawings, text and graphics must be imported and embedded into the AutoCAD™ file and must follow the standards of this Manual. Text and graphic files must be readable and allow for modification and editing within AutoCAD™ or the Microsoft ™ Office Suite without the use of additional software.

2. Drawings may be prepared in discipline specific software or other applications that are in an AutoCAD™ 2009 compatible (.dwg) file format and shall be capable of being viewed, printed and modified without the use of the original generating program or Object Enabler plug-in.

C. Sheet Sub-Titles

1. If it is desirable to use sub-titles on subsequent sheets, the sub-title shall be displayed below the primary drawing title using smaller fonts.

D. Paper Space

1. The border templates containing the standard attributable blocks required by this Manual shall be utilized and are created in paper space at 1:1 scale. The actual physical components depicted shall be at full scale (1:1) in model space and scaled viewports utilized. Viewports shall be on layer "0-viewports."

2. For Metric drawings, border templates shall be scaled up by a factor of 25.4. Plot Scale shall be set to "Custom" with 1" = 25.4 units for plotting the drawing to actual paper size.

3. Existing model space drawings undergoing revision need not be converted to paper space unless specifically stated in the contract or statement of work.

E. Drawing Layering Convention

1. Layer naming systems shall be used and based on the specific usage of the drawing information. Layer naming systems shall be used to distinguish system types, component sizes and/or materials, manufacturing data, geometric location or orientation, type of drawing entity, or other uses specific to the needs of the user. The following general guidance shall be applied to all drawings:

a. No entities may be drawn on layer "0" (zero) except elements of blocks. Blocks with internal layering may be inserted on layer "0" (zero).

b. At a minimum, layering systems shall provide at least one separate layer name for each of the following elements and contain at least one alpha character:

(1)　　Notes and other text not part of dimensions

(2)　　Dimensions

(3)　　Reference or construction lines that do not represent actual material or structure, such as baselines, centerlines, lines of frames, perpendiculars, etc.

(4)　　Systems, structure or components used as background, not ordered or modified by the drawing.

(5)　　Specialized information such as weight data.

(6)　　Drawing features such as section or detail cut lines, break lines, and similar non-physical entities.

c. Revision entities outside of the revision history block such as revision triangles, hashing and revision clouds shall be on a separate layer for each revision. Note that this does not require that the drawing elements inserted at a revision be on a separate layer, (though this is not prohibited either), only that the revision cloud and symbol be on a separate layer for each revision. Layer names shall not be used solely to distinguish between line types or colors. Layer names used to distinguish line types or colors shall include elements that also identify the entities as to drawing function.

2. Layer "No Plot" and "0-viewports" may be used for any information that should be visible on the drawing but not be plotted. Layer "0-viewports" will be turned off, not frozen, during viewing or plotting. Layer Manager will be set for no plot for layer named "no-plot." Layers used within a standard Coast Guard drawing template may be copied, modified, renamed, or deleted as required.

F. Blocks and Shapes

1. No blocks subject to copyright or other licensing restrictions may be used in any drawing.

2. All block and shape files used, including those automatically produced by proprietary software, shall be provided to the Coast Guard with no license restrictions controlling use, modification of, or distribution of the drawings containing these blocks or shapes. Proprietary software, which does not comply with this requirement, shall not be used for developing Coast Guard drawings.

G. Drawing Zone Requirements

1. All drawing sheets, except A and B size drawings, shall include vertical (alphabetical) and horizontal (numerical) zones for reference purposes (Figure 1).

   a. The alphabetical (vertical) lettering shall start at "A" with exception that addendum sheet(s) shall have alphabetic (vertical) zone designators continuing the lettering scheme of the sheet it is inserted after (e.g. if sheet 2 of a D-size border is zoned 9-A through 16-D, sheet 2A shall be zoned 9-E through 16-H).

   b. The numerical (horizontal) entries shall start with "1" on the first sheet lower right corner and continue with consecutive numbering throughout the drawing (e.g. on an H size 8 panel drawing, sheet one will start with 1 and go to 8, sheet two 9 to 16, sheet three 17 to 24, etc.).
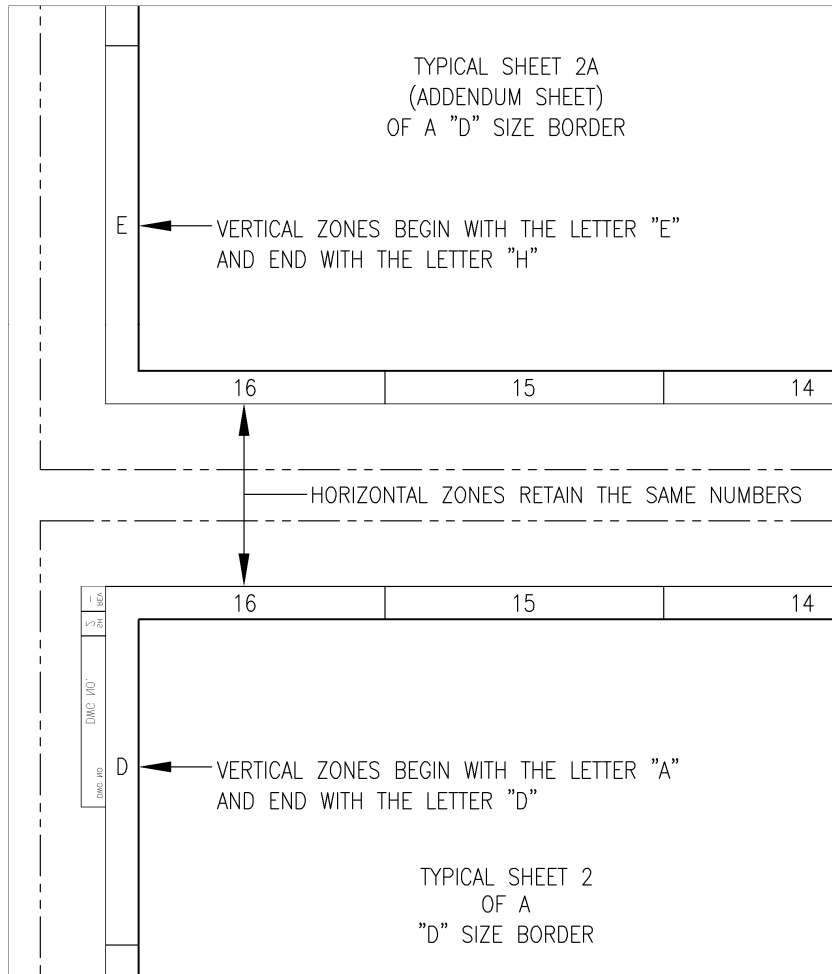

FIGURE 1: DRAWING ZONES FOR ADDENDUM SHEETS

NOT TO SCALE – FOR ILLUSTRATION PURPOSES ONLY

H. <u>External References.</u> The current Coast Guard drawing management system does not allow for the tracking and control of external reference files (XREFs). Therefore, all XREFs shall be bound or inserted into the drawing file before delivery to SFLC-ESD.

I. <u>Solid Models, 3D Models and Renderings/Shading</u>

1. Tessellation lines may appear on drawings if desired. Hidden line removal, if required, shall be set. Proper drawing plotting shall not require the user to set hide options prior to plotting.

2. Three dimensional models, either solids, wire frames or surfaces are acceptable. If 3D models are used, creators of drawings should ensure that the drawings they create are clear and understandable.

3. Shading or rendering shall not be required to view or plot a drawing, and drawings shall be clear and understandable without the use of shading or rendering.

J. <u>Dimensions</u>. All dimensions shall be in paper space layout with a DIMASSOC value of 2 when possible. Dimensions shall be associative and not be exploded. Dimension styles preloaded within the border template (CG-ARCH-PS, CG-ARCH-SF1, CG-FRAC-PS, etc.) shall be used and modified for scale purposes only when necessary. Dimension style STANDARD shall not be used.

K. <u>Text Styles</u>. Text height shall not be set any smaller than 0.1-inches, as well as be in accordance with ANSI Y 14.2. Text not used for special purposes such as illustration of actual labels shall be "Romans.shx" font. Width may be set as required for the text style.

L. <u>Line Types</u>. Only the line types supplied with AutoCAD™ 2009 shall be used.

M. <u>Color Usage</u>. All drawings shall be done on a black background. All drawings shall be created using colors visible both in the electronic .dwg file as well as on plotted drawings.

N. <u>Revision Symbol Block</u>. A triangle style revision symbol attributable block shall be used and inserted on a layer name based on the revision letter (Figure 7). The block is visibly attributed with the revision letter and the item number and is invisibly attributed with the item description, zone, revision creator, date revised and applicability. It may be replaced with another block as long as it complies with this Manual except it may contain additional attributes, or differently named attributes if required by a specific design development process.

O. <u>Computer Oriented Wiring Diagram (COED's)</u>

1. All COED's shall adhere to the following two part formatting constraints:

a. Part 1 - Cover Sheets: The cover sheet(s) shall consist of one, multi-sheet file on standard horizontal A sized borders. At a minimum these sheets should include:

(1)   Sheet one shall have: Coast Guard Title, Drawing Number Block, USCG Approval Block, Command or Contractor Block, Revision History Table, Applicability Table, Sheet Revision Status Table, Special Notations Table and Reference Plans Table.

(2)   The COED DATABASE LINK section (refer to the template listed in Section O.2.) is reserved for SFLC, ESD, Technical Information Management Branch use and should not moved or altered.

(3)   Sheet 2 is meant as a continuation of sheet one for information and or data that does not fit on in the blocks on sheet 1. If needed, the Materials List Table should go on sheet 2.

b. Part 2 - Cable Database: The Cable Database shall be in Access format, utilizing the standard Coast Guard COED Template. The database report will consist of two or three separate reports generated from the Access Database COED Template. These reports are located in the reports section of the database and are as follows:

(1)   Cable Run Report (Mandatory) – Contains origin and destination information for cables, also includes length and cable type

(2)   Final Report (Mandatory) – Contains origin and destination information for cables as well as special instructions, point-to-point information for all conductors of the cables, connectors and revision notation

(3)   Sleeving Report (Optional) – Generates a report for the label designations for all individual conductors

(4)   COED cover sheets and database templates can be found on the SFLC website: http://www.uscg.mil/sflc/drawings.asp

P. <u>Proofing and Performing Preliminary Drawing Check-Off</u>

Internal Errors: Audit the drawings to ensure that there are no internal errors.

1. Purge the drawings of unused block definitions, layers, line types, etc. (except for special layers which may be required for assignment drawings in supplemental CAD policies) to keep file size to a minimum.

2. Remove any extraneous data outside the drawing borders to keep file size to a minimum.

3. If the drawings were associated with a sheet set, the association to the sheet set must be purged from each drawing prior to submission, to avoid the lost set association error. To remove the association, open the drawing in the absence of the sheet set file, and select remove on the Lost Set Association dialog, and save.

4. Fields are permitted. Fields may also be embedded inside the attribute values of the title block. If fields are used, all drawings must be saved prior to submission, so that all current field values are cached inside the drawing files, to ensure that earlier versions of AutoCAD™ viewers can read the current field values and to ensure that the current field values can be read in the absence of the sheet set file. The Resave All Sheets command in the sheet set manager provides a convenient method for doing this.

5. Multiple sheet files: Multiple sheet drawings should have all sheets contained within one file. Each sheet shall be on a different layout. The title blocks shall reside in paper space. Use of script files to turn on and off layers is prohibited. All sheets in a multiple sheet drawing shall be the same size.

6. Suggested Layout Naming Convention: Layouts of sheet files shall be named with the drawing sheet number (e.g. 1, 2, 3, etc.).

7. Ensure provided title blocks / information blocks are in all sheet and model files.

8. Ensure layer "0" is not used with exception of block insertion.

9. Delete any unused layout tabs.

10. Delete any unattached XREF paths & bind XREF.

11. Turn off layers "0-Viewports" and ensure layer "No-Plots" is set not to plot.

12. QTEXTMODE shall be set to 0

13. ATTMODE shall be set to 1

14. PSTYLEMODE shall be set to 0

15. For metric drawings, set LUNITS to 2. For imperial drawings, set LUNITS to 4.

16. ZOOM to EXTENTS and save drawing

17. Save in accordance with AutoCAD 2009 drawing format.

CHAPTER - 6   DRAWING SHEET & BORDER TEMPLATE

A. Drawing Format and Sizes

    1. The format of all drawings shall be in accordance with instructions as specified herein and in accordance with ASME Y14.1.

    2. Drawings shall be produced from AutoCAD™ 2009 templates provided by the Technical Information Management Branch (TIMB).

    3. All drawing sheets within the same drawing shall be the same size.

B. Standardized Border Templates

    1. Single and multiple sheet drawing border template files, with all mandatory and conditional blocks, have been developed in AutoCAD™ Release 2009, (1:1). These templates shall be used on all drawings and are available from SFLC-ESD-TIMB. The template file is intended to provide a consistent drawing format for technical information management. Unnecessary drawing layouts shall be deleted as required per chapter 5, Section (P).

    2. Templates can be downloaded from the Surface Forces Logistics Center, Engineering Services Division Internet site at: http://www.uscg.mil/SFLC/drawings.asp

    3. All new multi-sheet drawings will utilize layout tabs and be contained in a single drawing file. Existing drawings in a one sheet per file format are not required to be converted to a multi-sheet single file format.

C. Mandatory and Conditional Blocks or Tables.

    1. Mandatory Blocks or Tables can be found with in the standard drawing border templates at http://www.uscg.mil/SFLC/drawings.asp.

        a. Sheet one shall have:

            (1)   Coast Guard Title Block

            (2)   Drawing Number Block

            (3)   USCG Approval Block

            (4)   Command or Contractor Block

            (5)   Scientific Technical Information (STINFO) Block

            (6)   Revision History Table

(7)   Applicability Table

(8)   Sheet Revision Status Table

(9)   Special Notations Table

(10)   Weight Control Table

(11)   Reference Plans Table

b. Linear Reduction Scale Block is mandatory for each viewport with scalable geometry. Only one scale is needed for a sheet containing multiple viewports with the same scale. The block is not required for geometry drawn at a scale of 1:1.

c. Revision History Table, Weight Control Table & Reference Plans Table may be placed on or carried over to sheet 1A and/or subsequent sheets.

d. Mandatory attributable blocks shall not be modified with the exception of Command or Contractor Approval Signature Block (CCBLK).

e. Figure 2 through 16 depict the mandatory and conditional blocks or tables.

2. Conditional Blocks or Tables like Revision Triangle Block, Weight Control Table and Material List Table may be modified to suit.

UNITED STATES COAST GUARD   WASHINGTON, D.C. 20593

OFFICE OF NAVAL ENGINEERING

LENGTH   CLASS

TOP DWG TITLE
CENTER DWG TITLE
SUB–TITLE_LINE–3
SUB–TITLE_LINE–4

COMMAND OR CONTRACTOR BLOCK (SEE FIGURE 4)

SIZE	FSCM CAGE NO	U.S.C.G. DRAWING NO.	REV
D	81340	DRAWING NO.	REV

U.S.C.G. APPROVAL APPVL DATE
APPVL SIG /s/
APPVL AUTH

SCALE: DWG SCALE 6.00 SQ FT SHEET 1 OF TSH#

FIGURE 2: COAST GUARD TITLE WITH USCG APPROVAL BLOCK (SHEET 1)

UNITED STATES COAST GUARD   WASHINGTON, D.C. 20593

OFFICE OF NAVAL ENGINEERING

LENGTH   CLASS

TOP DWG TITLE
CENTER DWG TITLE
SUB–TITLE_LINE–3
SUB–TITLE_LINE–4

SIZE	FSCM CAGE NO	U.S.C.G. DRAWING NO.	REV
D	81340	DRAWING NO.	REV

SCALE: DWG SCALE 6.00 SQ FT SHEET 2 OF

**FIGURE 3: COAST GUARD TITLE BLOCK FOR CONTINUATION SHEET
(SHEET 2 AND SUBSEQUENT)**

BLOCKS AND TABLES NOT TO SCALE – FOR ILLUSTRATION PURPOSES ONLY

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┌─────────────────────────────┐
│       XYZ SHIPYARD INC.      │
│                             │
│        3425 BALLARD RD.      │
│   ENG. DEPT., MAIL STOP 25   │
│     GRAND FORK, MD 23333     │
│                             │
│    PHONE: (555)555−5555      │
│                             │
│      CONTRACT/PO NO.         │
│      DTCG−23−222−2222        │
├─────────────────────────────┤
│ DESIGNED: DSGN SIG /s/  MM/DD/YY │
├─────────────────────────────┤
│ DRAWN: DRWN SIG /s/     MM/DD/YY │
├─────────────────────────────┤
│ CHECKED: CHKD SIG /s/   MM/DD/YY │
├─────────────────────────────┤
│ APPROVED: APVD SIG /s/  MM/DD/YY │
└─────────────────────────────┘
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FIGURE 4: COMMAND OR CONTRACTOR APPROVAL SIGNATURE BLOCK (CCBLK)

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┌──────────────────────────────┬──────┬──────┐
│ DWG NO                       │  SH  │ REV  │
│           DWG NO.            │   1  │  −   │
└──────────────────────────────┴──────┴──────┘
```

FIGURE 5: SUPPLEMENTAL DRAWING NUMBER BLOCK (SUPDWGBLK)

4		
3		
2		
1	TITLE OF DRAWING	DRAWING NUMBER
NO.	TITLE	DRAWING NO.
	REFERENCE PLANS	

FIGURE 6: REFERENCE PLANS TABLE (REFPLBLK)

BLOCKS AND TABLES NOT TO SCALE – FOR ILLUSTRATION PURPOSES ONLY

FIGURE 7: REVISION TRIANGLE BLOCK (REVTRIBLK)
NOTE: Revision triangle used to show where change was required.

MATERIALS LIST						
REV	PC#	QTY	UNIT	MFR PART NO / NSN	DESCRIPTION	MATERIAL
–	–	–	–	ALL OTHER TEXT IS	DESCRIPTION TEXT IS TOP LEFT JUSTIFIED	–
				TOP CENTER JUSTD	SEE INSTRUCTIONS TO ADD & DELETE ROWS & COLUMNS	

FIGURE 8: MATERIALS LIST TABLE (MATBLK)
NOTE: Expand as necessary with additional columns
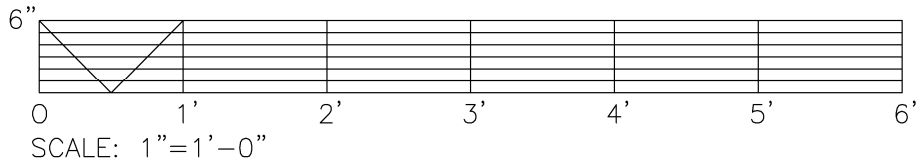

FIGURE 9: LINEAR REDUCTION SCALE BLOCK
1" = 1'-0"

NOTE: Additional scales for Imperial and Metric measurement are available for use in each template.

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WEIGHT CONTROL								
WEIGHT GROUP	DESCRIPTION	WT (LBS)	VCG REF BL	LCG (SEE NOTE)	F/A	TCG REF CL	P/S
SWBS	DESCRIPTION TEXT IN CELL IS MIDDLE LEFT JUSTIFIED	0.0	0.0	0.0	F/A	0.0	P/S

FIGURE 10: WEIGHT CONTROL TABLE (WGTBLK)

NOTE: Longitudinal Center of Gravity (LCG) - The reference point is the forward perpendicular for vessels 120'and greater in length. For vessels and standard boats less than 120', identify the reference point used. Indicate the reference point (i.e. FP or frame number) in the (SEE NOTE) space below the LCG column heading.

FIGURE 11: REVISION HISTORY TABLE (REVHISBLK)

FIGURE 12: SHEET REVISION STATUS AND TITLE TABLE (SREVBLK)

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PLAN SET OF CUTTER OR BOAT	APPLICABLE HULL NUMBERS
PLAN SET	HULLS
APPLICABILITY	

FIGURE 13: APPLICABILITY TABLE (APPBLK)

SPECIAL NOTATIONS
SAMPLE TEXT FOR SPECIAL NOTATIONS IS MIDDLE LEFT JUSTIFIED.

FIGURE 14: SPECIAL NOTATIONS TABLE (SNOTEBLK)

SPECIAL PLOTTING INSTRUCTIONS
RECOMMENDED CG LINE WEIGHT COLOR TABLE FOR PLOTTING BLACK LINE DRAWINGS: THE INFORMATION IN THIS TABLE MAY BE MODIFIED TO ACCOMMODATE COMMAND/CONTRACTOR PREFERENCES FOR PLOTS. EXCEPT FOR COLOR 8 AND GRAY SHADES (251–254), ALL OBJECT COLORS SHALL BE ASSIGNED TO PLOT IN BLACK. THE FILE "CG_LINEWEIGHT.CTB" MAY BE DOWNLOADED FROM THE SFLC WEBSITE AT: \<http://www.uscg.mil/hq/elcbalt/drawings.asp\> COLOR 1 (RED), 0.0039", VERY FINE COLOR 2 (YELLOW), 0.0051", FINE COLOR 3 (GREEN), 0.0098", MEDIUM COLOR 4 (CYAN), 0.0157", MEDIUM HEAVY COLOR 5 (BLUE), 0.0209", HEAVY COLOR 6 (MAGENTA), 0.0059", MEDIUM FINE COLOR 7 (WHT/BLK), 0.0079", NOMINAL COLOR 8 (GRAY), 0.0138", MEDIUM HEAVY COLOR 9–250 (OTHERS), 0.0098", MEDIUM COLOR 251–254 (GRAY SHADES), 0.0138", MEDIUM HEAVY NOTE: THIS INFORMATION WILL NOT SHOW ON PLOTS.

FIGURE 15: SPECIAL PLOTTING INSTRUCTIONS BLOCK (PLTBLK)

BLOCKS AND TABLES NOT TO SCALE – FOR ILLUSTRATION PURPOSES ONLY

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┌─────────────────────────────────────────────────────────────────────────┐
│                        STINFO  DESIGNATION                                │
├─────────────────────────────────────────────────────────────────────────┤
│ DISTRIBUTION STATEMENT D- DISTRIBUTION AUTHORIZED TO DHS/CG/DOD AND THEIR  │
│ CONTRACTORS; ADMINISTRATIVE AND OPERATIONAL PURPOSE; 01/01/2009. OTHER     │
│ REQUESTS SHALL BE REFERRED TO: COMMANDING OFFICER, USCG SFLC ESD TIMB,     │
│ 2401 HAWKINS POINT ROAD, MAIL STOP 25/STINFO PROJECT MANAGER, BALTIMORE,   │
│ MD 21226-5000.                                                            │
│ WARNING-THIS DOCUMENT CONTAINS TECHNICAL DATA WHOSE EXPORT IS RESTRICTED BY│
│ THE ARMS EXPORT-CONTROL ACT (TITLE 22, U.S.C. SEC 2751, ET. SEQ.) OR THE   │
│ EXPORT ADMINISTRATION ACT OF 1979, AS AMENDED, TITLE 50, U.S.C. APP 2401   │
│ ET. SEQ. VIOLATIONS OF THESE EXPORT LAWS ARE SUBJECT TO SEVERE CRIMINAL    │
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│ DOCUMENT.                                                                 │
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FIGURE 16: SCIENTIFIC TECHNICAL INFORMATION (STINFO) BLOCK

BLOCKS AND TABLES NOT TO SCALE – FOR ILLUSTRATION PURPOSES ONLY

CHAPTER - 7   PLOTTING INSTRUCTIONS

A. <u>Normal Layer Line Width and Visibility</u>

   1. All colors except cyan and blue will normally be printed in a nominal line width of 0.010 inches. Cyan will normally be printed with a line width of 0.015 inches and blue will normally be printed with a line width of 0.021 inches.

   2. All layers will normally be on. Layer "0-viewports" shall be off, not frozen, and layer "no-plot" shall have plotting turned off. Drawings requiring other plotting instructions must have the special plotting instructions prominently visible on layer "defpoints" or "No Plot".

B. <u>Special Plotting Instructions</u>. All special plotting preferences will be included in the Special Plotting Instructions block in the upper right-hand corner of the drawing template. (Figure 15)

CHAPTER - 8   GENERAL DRAWING PRACTICES

A. <u>Drawing Creation</u>

1. New drawings should be created (with a new drawing number) when the data to be presented involves an entirely new system, equipment or cannot otherwise be appropriately integrated (by revision) into an existing drawing.

2. All Technical Data Packages (TDP) should be delivered in accordance with MIL-STD-31000.

B. <u>Drawing Revisions</u>

1. Standard Revision Practices - The following standard drawing revision practices shall be observed. These practices are generally in accordance with MIL-STD-31000 Technical Data Packages and ANSIY 14.100. Additional information may be found in those documents or commercially prepared compilations of those documents for industry use. For specific questions and assistance, contact SFLC-ESD-TIMB.

   a. Drawings should be revised when the extent of drawing changes are minor and old data can be easily retained. Additional sheets can be provided as needed when large portions of a drawing must be re-drawn. The old portions shall be hashed out, and the new sheet(s) can then be drawn in AutoCAD™. Revision Symbol blocks (see Figure 7) shall be applied within each sheet's boundary as required indicating change. In order to revise a drawing, the Master drawing must be acquired from SFLC-ESD-TIMB.

   b. Retaining Historical Data - Revisions shall be prepared retaining as much of the previously shown data as possible. Ideally, it should be possible to reconstruct the previous version of the drawing simply by undoing the changes described in the revision column. Thus the revision column itself should detail every change made, using wording that describes the change as accurately as possible, such as "ADDED DETAIL 9-F", "DELETED REF 16", or "RV-7 SET PRESS WAS 60 PSI." It would be redundant to say "CHANGED RV-7 SET PRESS FROM 60 TO 75 PSI," because the body of the drawing already shows the set pressure as 75 PSI. Erasure for revision is allowable on all digital AutoCAD files; however, all changes must be fully documented in the Revision History Block. On hard copy original drawings, data should be hashed-out and redrawn in another place. It should never be erased.

   c. If a revision needs to be made to an original hard-copy drawing, and the new revision will be created using AutoCAD ^{TM}, all sheets of that drawing shall be converted to AutoCAD ^{TM} for uniformity when possible.

   d. Give Reason for Revision. The revision column should begin by documenting the reason for the revision, such as "TO SUIT TIME COMPLIANCE TECHNICAL ORDER (number) TO REPLACE BEARING MATERIAL".

e. Show Revision Status.

   (1)   Sheet one of all drawings shall always contain the highest revision designator of the drawing, while each remaining sheet shall carry the revision designator associated with the latest revision affecting that individual sheet. On multi sheet drawings, each sheet shall carry its own revision designator. Accordingly, the first sheet of a multi-sheet drawing shall have a Revision History Table, which shall indicate the revision designator of each sheet of the drawing. Each time a drawing is revised a revision symbol is added to each sheet where changes are made. The Revision History Table on sheet one shall be updated to the next sequential letter. Likewise, the revision designator of each affected sheet shall be updated to the current revision. The revision designator of unaffected sheets shall not be changed.

   (2)   The revision designator for a drawing shall be identified by an upper case letter or letters. Each new drawing created shall begin with the "tack" symbol (-) in the revision designator. The first revision shall then be identified by "A". Successive changes shall use the next sequential letter, except that the letters "I", "O", "Q", "S", "X", and "Z" shall not be used. Upon exhaustion of the alphabet, sequential revisions shall be "AA", "AB", etc., and then "BA", "BB", etc.

   (3)   Submittals of draft Coast Guard drawings shall have a revision designator and be identifiable as a first submittal. If the drawing is required to be resubmitted after corrections/changes are made, it shall have the next sequential revision designator shown in all appropriate title and border blocks.

   (4)   On legacy drawings where numbers have been used instead of letters for revision designators, the use of numbers shall be continued.

   (5)   If a sheet is deleted, the title block of the deleted sheet shall be hashed out. A revision triangle block shall be placed next to the hashed out title block indicating the revision that deleted the sheet. The words "THIS SHEET DELETED BY REVISION _" should also appear next to the title block utilizing the largest practical font size.

f. Platform Applicability. Drawings applicable to more than a single platform may be revised only if changes made do not result in the loss of information describing other platforms.

g. Revision History Block

   (1)   All revision notes shall be placed in a revision history block beginning on sheet one and continued on addendum sheets to sheet one as needed. In addition to revision description, the revision note shall identify the sheet number and applicable panel.

(2) A triangular revision identifier shall be placed adjacent to all revised areas, except where the entire sheet has been added by revision. The triangular symbol shall contain the appropriate revision character. Where multiple items are being revised under the same revision, each item or group of items shall be identified with a superscript number outside the revision symbol that relates to the revision notes in the revision history block.

C. Revision Procedure for Special Situation

1. Master Drawing Not Yet Available - This situation arises when master engineering drawings have not yet been received from the shipbuilder, and changes need to be made to certain systems. In this instance, a new engineering drawing shall be created for the purpose of documenting needed changes. The new drawing will be created in the appropriate SWBS and assigned a number that does not duplicate numbers issued to the contractor (s). The new master engineering drawing will be retained by SFLC-ESD and will be available for depicting changes until the complete master engineering drawings are received from the shipyard.

2. The title of the new master engineering drawing shall reflect the appropriate title to incorporate the changes, (e.g. Revisions to drawing 87-WPB-XXX-XXX).

D. Superseding a Drawing. Drawings should be superseded if extensive revisions are required or if the quality of the existing master engineering drawing is poor (e.g. torn, faded, smeared, etc.). If a drawing is superseded, the following steps shall be followed:

1. The new (superseding) master engineering drawing shall carry a new USCG drawing number assigned by SFLC-ESD-TIMB. The superseded drawing title, approval names (text format) and approval dates shall be carried over to the new drawing. The new drawing shall be a "clean" drawing; revision symbols, cross-outs, and the revision block from the old superseded drawing shall not be reconstructed on the new drawing. The following statement entered in bold characters shall be placed immediately adjacent to the title block "**THIS DRAWING SUPERSEDES USCG DWG XXX**." The original issue of the superseding drawing shall be REV "-", and the revision column shall be annotated as follows "THIS DRAWING WAS CREATED BECAUSE (give reason)." If redrawn with substantive change from what was shown on the superseded drawing, describe the changes and the reason for the changes in the revision column as per normal revision practices.

2. The superseded drawing, with the title block hashed out and superseded statement entered next to the title block will increase in a revision letter as a result of being superseded. The superseded drawing shall be returned to SFLC-ESD TIMB and retained in the active file and drawing index for the affected platform(s) for historical information purposes.

E. Canceling a Drawing

1. If a drawing no longer contains useful or applicable information, such as an entire system being removed from a platform, the drawing shall be canceled. Hash mark out the title block and place the following bold face note immediately adjacent to the title block "**THIS DRAWING HAS BEEN CANCELED.**" Give the reason for the drawing cancellation in the revision block. The canceled drawing, with the title block hashed out and cancellation statement entered shall be returned to SFLC-ESD for historical information purposes and the drawing index shall add notation "canceled" for the affected platform(s).

2. All canceled drawings will increase in a revision letter as a result of being canceled.

APPENDIX - A INSTRUCTIONS FOR COMPLETING ATTRIBUTE BLOCKS

A. Coast Guard Title with USCG Approval Block

1. LENGTH: Enter the length of the vessel or standard boat in feet.

2. CLASS: Enter the class designator of the vessel or standard boat such as WMEC or BUSL.

3. TOP DRAWING TITLE: Enter line one of the drawing title. See Chapter 6

4. CENTER DRAWING TITLE: Enter line two of the drawing title. See Chapter 6.

5. SUB-TITLE_LINE-3 and 4: If sub-titles are used, enter one or two lines of the drawing sub-title. See Chapter 6.

6. DRAWING NO: Enter the Coast Guard assigned drawing number. See Chapter 3 & 6.

7. REVISION: Enter the drawing revision character. Note that the first sheet of a drawing must contain the highest revision character of the drawing. See Chapter 6 & 8.

8. DRAWING SCALE: Enter the drawing scale, AS NOTED or NONE.

9. SHEET NO: Enter the sheet number of the drawing.

10. TOTAL NO. OF SHEETS: Enter the total number of sheets in the drawing set. If the drawing includes addendum sheets (i.e. sheet 5A), include this in the total number of sheets (i.e. if a drawing consists of sheets 1, 2, 2A & 3, the total number of sheets would be 4). NOTE: The total number of sheets is only required to be filled in on the Title sheet of the drawing. On subsequent sheets it may remain blank.

11. APPROVAL SIGNATURE: Enter "/s/" to indicate electronic signature. See Chapter 2.

12. APPROVAL AUTHORITY: Enter the name of the USCG approving official. See Chapter 2.

13. APPROVAL DATE: Enter the date the drawing was approved by the Coast Guard.

B. Supplemental Drawing Number Block.

1. DRAWING NO: Enter the Coast Guard assigned drawing number. See Chapter 3.

2. SHEET NO: Enter the sheet number of the drawing.

3. REVISION LETTER: Enter the sheet revision character. Note that the first sheet of a drawing must contain the highest revision character of the drawing. See Chapter 8.

C. Coast Guard Title Block, Continuation Sheet

1. LENGTH: Enter the length of the vessel or standard boat in feet.

2. CLASS: Enter the class designator of the vessel or standard boat such as WMEC or BUSL.

3. TOP DRAWING TITLE: Enter line one of the drawing title. See Chapter 6.

4. CENTER DRAWING TITLE: Enter line two of the drawing title. See Chapter 6.

5. SUB-TITLE_LINE-3 and 4: If sub-titles are used, enter one or two lines of the drawing sub-title. See Chapter 6.

6. DRAWING NO: Enter the Coast Guard assigned drawing number. See Chapter 3 & 6.

7. REVISION: Enter the drawing revision character. Note that the first sheet of a drawing must contain the highest revision character of the drawing. See Chapter 6 & 8.

8. DRAWING SCALE: Enter the drawing scale, AS NOTED or NONE.

9. SHEET NO: Enter the sheet number of the drawing.

10. TOTAL NO. OF SHEETS: Enter the total number of sheets in the drawing set. If the drawing includes addendum sheets (e.g. sheet 5A), include this in the total number of sheets (e.g. if a drawing consists of sheets 1, 2, 2A & 3, the total number of sheets would be 4).

  NOTE: The total number of sheets is only required to be filled in on the Title sheet of the drawing. On subsequent sheets it may remain blank.

D. Command or Contractor Approval Signature Block.

1. CONTRACTOR/COMMAND NAME: Enter contractor or command name.

2. ADDRESS LINE-1: Enter line one of the contractor or command address.

3. ADDRESS LINE-2: Enter line two of the contractor or command address.

4. ADDRESS LINE-3: Enter line three of the contractor or command address.

5. ADDRESS LINE-4: Enter line four of the contractor or command address.

6. PHONE NO: Enter the contractor or command phone number. Include the area code in parentheses.

7. CONTRACT/PO NO: Enter the contract, purchase, project, or job order number.

8. SIGNATURE: Enter the name of the preparer. Include "/s/" to indicate electronic signature.

9. DATE: Enter the design date.

10. SIGNATURE: Enter the name of the individual who checked the drawing. Include "/s/" to indicate electronic signature.

11. DATE: Enter the date the drawing was checked.

12. SIGNATURE: Enter the name of the lead engineer with contractor or command approval authority. Include "/s/" to indicate electronic signature.

13. DATE: Enter the date of approval.

E. Revision Triangle Block

 1. REVISION LETTER: Enter the appropriate revision character.

 2. REVISION ITEM #: Enter the item number from the revision history block.

 3. ZONE: Enter the zone designator the item is located in.

 4. ITEM DESCRIPTION: Enter a brief description of the item.

 5. DATE OF REVISION: Enter the date of the appropriate revision from the revision history block.

 6. REVISED BY: Enter the initials of the person making the revision.

 7. APPLICABILITY: Enter the hull number(s) of the platform revision application. Use "ALL" if the revision applies to the entire platform class.