

FACILITIES MAINTENANCE AND ENGINEERING PROCEDURE			
Subject: ENGINEERING DRAWINGS	FMEP-P-0300		Rev. No. 3
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1.0 PURPOSE

- (a) To define the requirements for the preparation, review, approval and control of design drawings prepared by Facilities Maintenance and Engineering (FME) or an Architect and Engineering (A&E).
- (b) To define the requirements for the review of drawings prepared by a contracted A&E.

2.0 GENERAL

2.1 Control of Drawings Using Document Logs

Drawings received by FME for review and drawings issued by FME for use are to be controlled in accordance with Section 3.4 of the FME procedure, FMEP-A-0010, Processing of Design and Miscellaneous Documents.

2.2 Definition

Drawing a document that defines the description, scope, location, arrangement, and details of material, equipment, parts, processes, components, systems, and structures.

2.3 Types of Drawings

Drawing categories are described below:

2.3.1 Sketches

- (a) Sketches may be used to capture design concepts and details of a preliminary nature.
- (b) Sketches are not to be used for purchase or construction.
- (c) Sketches which exit FME shall be checked and approved by the Manager of Engineering. Sketches used internally shall only require checking.
- (d) Sketches shall be numbered and retained by the Design & Drafting Department.

2.3.2 Preliminary Design Drawings

- (a) Design drawings not ready to be issued for construction or procurement may be issued as preliminary design drawings for purposes such as:

- Internal coordination
- Client Review
- Supplier or Subcontractor bid

- (b) Preliminary design drawings shall be identified with alpha revision designators (i.e., A, B, C, etc.)

2.3.3 Design Drawings

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(a) Design drawings are drawings that are issued for purposes such as:

Procurement
Construction
Fabrication

(b) Design drawings shall be identified with numeric revision designators (i.e., 0, 1, 2, etc.).

2.3.4 Modification Drawings:

(a) A drawing that is based on or starts from an existing drawing.

(b) Identifies the changes to the existing drawing by the use of a suitable method.

(c) Is identified in the title block of the drawing by the Work Order (WO) Number in parenthesis followed by the number on the existing drawing.

Example: Existing drawing is identified as ABCD. The modification drawing is identified as (WO Number) ABCD.

(d) Defines the proposed description, scope, location, arrangement, and details of material, equipment, parts, processes, components, systems, and structures. After completion/construction of the proposed information depicted on the modification drawing, the information is transferred to an as built drawing. The purpose of using a modification drawing is to be able to depict design information for a project, with the intent of revising existing drawings rather than continually creating new drawings that have to be worked with existing drawings, to fully depict the configuration of a facility. The modification drawing will be used and controlled during project design and execution and retained in the files. Upon completion, the change depicted on the modification drawing will be incorporated into the appropriate existing (parent) drawing. Over time, the existing drawings will more accurately depict the facility as-built condition.

(e) Modification drawings may be either preliminary design drawings or design drawings.

2.3.5 As-Built Drawings

(a) Depict the final installed configuration, physical or functional.

(b) Incorporate:

- All field markups and redlines.
- All design change notices (DCN) (FMEP-P-0320).
- All approved design change requests (DCR) (FMEP-P-0320) requiring a design document revision.
- All approved Requests for Information (RFI) requiring a design document revision.
- Information on an as-built modification drawing (Section 2.3.4).

(c) Drawing Review of A&E as-built drawings shall be performed by the applicable engineering discipline. Coordination of such reviews will be by the COTR. Sign off shall be per Section 3.7(b).

(d) All revision “clouds,” circles and triangles shall be removed for this final issue.

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2.3.6 Record Drawings

- (a) Drawings of record are a set of drawings, for a specific building, that depicts the configuration (physical or functional) for that building. The set consist of an index sheet, which identifies all of the associated building drawings created with a pre-determined logic, and contains all of the drawings identified on the index sheet.
- (b) The original drawings for some of the facilities at Fort Detrick were created as long as 40 years ago.
- (c) The process of issuing drawings, which provided the renovation configuration, was to create a drawing showing the renovation configuration and using the drawing identification system shown in Procedure FMEP-P-0240, Document Numbering. Obviously, additional drawings were being added to the pile of drawings for a specific building, which made the research for creation of additional renovation drawings more cumbersome as time progressed.
- (d) A recent attempt was made to stop the addition of new drawings into the system, by the creation of a modification drawing, which is based on an existing drawing, and which shows the renovation configuration. Upon renovation completion, the information contained in the modification drawing would be placed back into the existing drawing. This attempt would halt the creation of new drawings. However, there would still be the pile of drawings to review for research on the next upcoming renovation.
- (e) Drawings of record are to be created on a building basis, and contain an index sheet which identifies all of the drawings for that specific building. The individual drawings, for a specific building, would have a pre-determined logic, for retrievability.
- (f) Record drawings will be maintained, controlled, revised, and filed by the Design & Drafting Department in the central flat files and/or on the computer.
- (g) Designs using the Record drawings are to be made using the Modification drawing process.

2.4 Signature and Date Requirements

- (a) All signature and dates are to be made using black ink or marker of a type appropriate for the document material.
- (b) Cursive "initials" may be used in lieu of cursive "signature" requirements in this procedure.

2.5 SAIC Review Signatures

The SAIC review signature on drawings created by a contracted Architect Engineer DOES NOT CONSTITUTE ACCEPTANCE OR APPROVAL OF DESIGN DETAILS OR MATERIAL SELECTION IDENTIFIED ON THE DOCUMENT AND DOES NOT RELIEVE THE CREATOR OF THE DOCUMENT FROM FULL COMPLIANCE WITH CONTRACTUAL OBLIGATIONS.

2.6 The A&E Drawing Review

Refer to the FME procedure FMEP-P-0340, Review of Architect Engineering Documents, for drawing review considerations.

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2.7 Units of Measure

The units of measure shall be the English system. When designs, equipment or material are produced in MKS metric units the English equivalent shall be show in parenthesis ().

3.0 PROCEDURE

3.1 Drawing Numbering

Both FME and an A&E design drawings shall be numbered in accordance with the FME procedure FMEP-P-0240, "Document Numbering."

3.2 Multisheet Drawings

Each sheet of a multi-sheet design drawing shall meet the signature requirements of this procedure. However, if the drawing has a cover page that identifies all the attached sheets and the revision level of each sheet, only the cover page needs to meet the signature requirement of this procedure.

Note: All sheets of a multi-sheet design drawing shall have the same drawing number.

3.3 Drawing Holds

When details of a pending drawing change have not been finalized, but issue of the drawing is required for other purposes, the area of the drawing not finalized shall be clearly "clouded" and identified as "HOLD."

3.4 Checking

- (a) All FME created drawings shall receive an independent check by an individual who has adequate qualifications to have originated the drawing. Preliminary design drawings, which are to be used internally by FME (not issued external by FME), may be excluded from the checking process. The Manager of Engineering is responsible for the assignment of checkers.
- (b) A complete set of drawings with the supporting data necessary to check the drawings shall be provided to the checker. While in the process of being checked, no changes shall be made on the drawing without coordination with the checker. The checker shall follow the checking practices described in Exhibit A.
- (c) The checker, when satisfied that the drawings are correct, shall sign in the appropriate title block location. After drawing review and signoff by the Project Manager (PM), the check prints may be discarded.

3.5 Reviews

- (a) The Lead Engineer (LE) shall determine the necessity for the review of the design drawings. Individuals reviewing the design drawings are responsible for evaluating and reviewing the items pertinent to his/her area of technical responsibility, initialing, and returning the comments to the originating engineer. The reviewer shall follow the review process described in Exhibit A.
- (b) Exhibit D is to be used to implement and track the completion of this process.

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3.6 Signature Requirements

- (a) The signature requirements for FME and A&E produced design drawing and design drawings are identified in Exhibits B and C.
- (b) Design drawings produced for interim reviews at 15%, 35%, 50%, 65%, and 95% shall as a minimum be signed by the Design Originator and Design Checker.

3.7 Signature Responsibilities

- (a) The responsibilities of those signing for the origination of design drawings are identified below. Signatures are applied to the horizontal sign-off blocks in the title block of the drawing.

<u>TITLE</u>	<u>RESPONSIBILITY</u>
Drafter	Signoff indicates drawing is complete, satisfying drafting requirements, and complies with requirements provided by the responsible engineer.
Design Originator	Signoff indicates the drawing reflects the intended design and the applicable design criteria.
Design Checker	Signoff indicates the drawing is complete, meets the applicable design criteria, and is in compliance with this procedure.
Approver	Manager of Engineering or A&E Principal, see below:

- (b) For drawings produced by an A&E, FME Engineering signoff of the design review will be in the vertical section of the drawing title block.

- (c) For FME created design drawings where the drawing requires the signoff by multiple engineering disciplines the additional signoffs will be in the vertical section of the title block as follows:

<u>TITLE</u>	<u>RESPONSIBILITY</u>
Verification Quality Assurance	Signoff indicates that the drawing reflects the intended scope of work.
Architectural Engineer Civil Engineer Mechanical Engineer Electrical Engineer Instrumentation Engineer	Signature indicates the drawing reflects the intended design and the applicable design criteria for their area of responsibility, or for A&E designs that the drawing has been reviewed in accordance with procedure FMEP-P-0340.
Drafting	Signoff indicates the drawing satisfies the drafting requirements.

- (d) For all drawings the following blocks of the vertical section of the title block shall be completed by FME at the 100% issue, Bid Set, and Issue for Construction/Construction Set.

<u>TITLE</u>	<u>RESPONSIBILITY</u>
Project Manager	Signoff indicates: (1) Drawing coordination has taken place and comments have been resolved. SAIC-Frederick, Inc. A Division of Science Applications International Corporation

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(2) Compliance with contract requirements

Contracting Officers
Technical Representative
Safety

Signoff indicates constructiveness review of the drawing.

Signoff indicates the drawing has considered all safety requirements.

Requestor

Signoff indicates the drawing reflects the intended scope of work.

Manager of Engineering

Signoff indicates:
(1) All signoffs have been completed
(2) Conformance to procedural requirements
(3) Release of drawing
(4) Signs here and in the Approver block

(e) Where the FME Shops have provided review and comment, as determined by the LE and/or PM, the Design Originator shall indicate coordination by placing a “√” check mark in the appropriate Shop block. Where coordination was not required, no mark is required in the block. The Design Originator signature attests that proper coordination was completed. No Shop signature or initials are required.

TITLE

RESPONSIBILITY

Carpenter
Pipe
Refrigeration
Electric
Sheet Metal
Instrument
Sheet Metal
Millwright
Telephone

Review indicates that the drawing reflects the required design.

3.8 Sealing

All Issued for Bid, Construction, Fabrication or Procurement design drawings, modification drawings, and as-built drawings produced by a contracted Architect or Engineer shall be sealed by a Registered Professional Engineer licensed in the State of Maryland, U.S.A.

4.0 CONTROL

4.1 Revision Identification

Every issue of the drawing is to have a revision identification placed in the “*REVISION*” block on the drawing and in the “Rev” block on the lower right hand corner of the title Block. The revision identification can be either an alphabetic or a numeric designator. See Exhibits B and C.

4.2 Date

Every issue of the drawing is to have the issue date placed in the “*DATE*” block on the drawing. See Exhibits B and C.

4.3 Revision Description

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Every issue of the drawing is to have a reason for issuance placed in the “*REVISION DESCRIPTION*” block on the drawing. Some typical reasons for drawing issuance are identified below.

- Issued for review at 15% (letter revision - usually ‘A’).
- Revised to Incorporate Review Comments, reissued for 35% review (letter revision - usually ‘B’).
- Revised to Incorporate Client Comments and Issued for 65% review (letter revision - usually ‘C’).
- Revised to Incorporate Client Comments and Issued for 95% review (letter revision - usually ‘D’).
- Issued for Bid (letter revision - usually ‘E’).
- Issued for Construction (number revision - usually 0).
- Issued As Built for WO XXXX-Incorporates _____ (Number revision - usually 1).

4.4 Drawing Revisions

(a) Revisions to drawings shall be checked, reviewed, and approved in the same manner as a new drawing. For the issuance of revision 0 drawings, reference to prior alphabetic revisions shall be removed from the drawing and from the “*REVISION DESCRIPTION*” block.

(b) Revised areas on drawings shall be clearly identified. Circle the changes made to the drawing in the revision being issued.

(c) Revision triangles, if used, shall be placed touching or within the revision “clouds” or circles. On subsequent revisions the previous “clouds” and revision triangles will be removed, unless it is necessary for clarity, in which case the “clouds” and associated revision triangles will be retained. All new changes will be “clouded” and the next revision level triangle will be applied to those changes. At no time shall “clouds” be removed without removal of the associated triangles.

4.5 Voided/Superseded Drawings

Voided or superseded drawings shall be “Issued to Void or Supersede”, as applicable, with the next revision designator and shall be clearly marked VOIDED or SUPERSEDED BY DWG. _____ on the face of the drawing. Voided or superseded drawing numbers shall not be re-used.

5.0 DESIGN CHANGE NOTICE

A design change notice can be issued against a drawing in lieu of revising and reissuing the drawing. Refer to FME procedure number FMEP-P-0320.

FMEP-P-0300 Exhibits

- Exhibit A-Drawing Checking and Review Practice (1page)
- Exhibit B-Requirements for Drawings Submitted by an A&E (1 page)
- Exhibit C-Requirements for Drawings Created by FME (1page)
- Exhibit D-Comment Memo and Comment Form (2 pages)
- Exhibit E-Deleted
- Exhibit F-Deleted