1.0 PURPOSE

To define the requirements for preparing, checking, approving, and revising of calculations.

2.0 GENERAL

This procedure applies to design calculations prepared by the Facilities Maintenance and Engineering personnel.

2.1 Definitions

Calculation- A Calculation is a document, which form the basis of drawings, specifications, or other design documents, which are used to construct a facility. A calculation may be revised due to changes in design criteria, methods, or for other reasons.

3.0 PROCEDURE

3.1 Sequencing

Calculations shall be completed (checked and approved), in accordance with this procedure, prior to using calculation results for input to design output documents (drawings, specifications, etc.) for procurement, fabrication, or installation.

3.2 Preparation

3.2.1 Calculation Numbering

Calculations shall be numbered in accordance with the requirement of the Facilities Maintenance and Engineering procedure FMEP-P-0240, Document Numbering.

3.2.2 Calculation Sheets and Cover Sheets

The originator of the calculation shall use calculation sheets similar to that shown in Exhibit A.

3.2.3 Contents

Calculations shall be orderly and complete. Commensurate with its complexity, the body of the calculation should include the following sections:

I.   Purpose
II.   Inputs (including applicable criteria and clearly stated assumptions)

III. References (including drawings, codes, standards, and computer program used. Include revision/version identity).

IV. Calculation (including identification of units used. Also, source or derivation of equations not in common usage)

V. Results and Recommendations.

3.2.4 Computer Calculations

The calculation package shall include the following:

(a) Inputs and outputs.

(b) Detailed description of the program (by inclusion or by reference).

(c) Program name and number.

(d) Program version/release used.

(e) Program options used, if appropriate.

3.2.5 Preparation Completion

Upon completion of the calculation, the originator of the calculation shall initial in the "by" block of the calculation cover sheet.

3.4 Checking

Calculations shall receive an independent check by an individual(s) who has adequate qualifications to have originated the calculation.

The Manager of Engineering is responsible for the selection of the individual who will perform the checking function.

3.4.1 Checking Methods

The checker verifies the calculations by performing a mathematical check. Approximation methods are acceptable.

3.4.2 Checker Responsibilities

The checker is responsible for the following actions:

(a) Reviewing calculation input to verify conformance with specific applicable conditions.

(b) Reviewing for validity of assumptions, appropriateness of analytical methods and judgment, attainment of required mathematical accuracy, compliance with design criteria, completeness, and reasonableness of output data.

(c) For all computer program calculations, check for suitable application of the computer program.

(d) Initialing the "checked" block of the calculation cover sheet after all pages or revisions have been checked.

3.5   Revision

3.5.1   Revision Control

Revisions to completed calculations shall be checked, reviewed and approved in the same manner as the original calculations. Only those parts of the completed calculation which are affected by the revision need to be checked, although the entire original calculation shall be reviewed to determine which parts are affected. If any interfacing or reference documents are affected by the revision, the required interface action shall be taken.

3.5.2   Revision Identification

Revisions to calculations shall be identified as follows:

(a) Revisions to a manually prepared calculation sheet shall be identified by a vertical bar(s) in the right margin adjacent to the revised material; change bars from previous revisions shall be removed. The revision number of the sheet shall be updated.

(b) For computer calculations, a description of the change shall be placed on the cover sheet or in the calculation itself.

(c) Revisions may require the addition of new calculation sheets or the deletion of existing sheets.

(d) The addition of pages to a completed calculation shall be by revision. The added sheet(s) shall be identified with the new revision number.

(e) All calculation sheets affected by the revision shall be identified on the calculation cover sheet. For large calculations a revision status sheet may be employed.

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FMEP-P-0330 Exhibits

Exhibit A – Calculation Sheet (1 page)