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FMOC

Design Standards Manual: Chapter 1 – Introduction

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Change Log

Rev.	By	Date	Type	Change Description	ID
0	DH/JCG	02/14/12	Subst	Updated chapter to reflect the adoption of 2009 I-codes. Applied standard FMOC template to document and edited it for grammar and style. Checked all references for correct titles and other information.	

1.0 Introduction

At Sandia National Laboratories in New Mexico (SNL/NM), the design, construction, operation, and maintenance of facilities is guided by industry standards, a graded approach, and the systematic analysis of life cycle benefits received for costs incurred. The design of the physical plant must ensure that the facilities are "fit for use," and provide conditions that effectively, efficiently, and safely support current and future mission needs. In addition, SNL/NM applies sustainable design principles, using an integrated whole-building design approach, from site planning to facility design, construction, and operation to ensure building resource efficiency and the health and productivity of occupants. The safety and health of the workforce and the public, any possible effects on the environment, and compliance with building codes take precedence over project issues, such as performance, cost, and schedule.

These design standards generally apply to all disciplines on all SNL/NM projects. Architectural and engineering design must be both functional and cost-effective. Facility design must be tailored to fit its intended function, while emphasizing low-maintenance, energy-efficient, and energy-conscious design. Design facilities that can be maintained easily, with readily accessible equipment areas, low maintenance, and quality systems. To promote an orderly and efficient appearance, architectural features of new facilities must complement and enhance the existing architecture at the site. As an Architectural and Engineering (A/E) professional, you must advise the Project Manager when this approach is prohibitively expensive.

You are encouraged to use professional judgment and ingenuity to produce a coordinated interdisciplinary design that is cost-effective, easily contractible or buildable, high-performing, aesthetically pleasing, and compliant with applicable building codes. Close coordination and development of civil, landscape, structural, architectural, fire protection, mechanical, electrical, telecommunications, and security features is expected to ensure compatibility with planned functional equipment and to facilitate constructability. If portions of the design are subcontracted to specialists, delivery of the finished design documents must not be considered complete until the subcontracted portions are also submitted for review.

You must, along with support consultants, perform functional analyses and programming in developing design solutions. These solutions must reflect coordination of the competing functional, budgetary, and physical requirements for the project. During design phases, meetings between you and the SNL/NM Project Team to discuss and resolve design issues are required. These meetings are a normal part of the design process. For specific design-review requirements, see the project-specific Design Criteria.

In addition to the design requirements described in this manual, instructive information is provided to explain the sustainable building practice goals for design, construction, operation, and maintenance of SNL/NM facilities. Please notify SNL/NM personnel of design best practices not included in this manual, so they can be incorporated in future updates.

You must convey all documents describing work to the SNL/NM Project Manager in both hard copy and in an electronic format compatible with the SNL/NM-prescribed CADD and other software packages, and in accordance with a SNL/NM approved standard format. Print all hard copy versions of submitted documents (excluding drawings and renderings) double-sided when practical.

1.1 Audience

The Facilities Management and Operations Center (FMOC) has written this *Design Standards Manual* for design professionals who perform work for SNL/NM. The contents of this manual represent institutional knowledge derived from FMOC design, construction management, operations, and maintenance. To be more efficient and effective in managing SNL/NM's extensive construction and drawing files, refer to this manual first for design work. The manual is directed to you as a competent design professional and is not intended to be a detailed design handbook.

The manual contains general requirements that apply to nonnuclear and nonexplosive facilities. For design and construction requirements for modifications to nuclear or explosive facilities, see the project-specific design requirements noted in the Design Criteria.

The criteria and standards presented in the manual are those determined to be the minimum acceptable values necessary to result in system designs having satisfactory functional characteristics, durability, and operational suitability. You must strive for the best design to suit the circumstances involved, and the designs must reflect sound professional judgment at all times. In addition, you must coordinate design efforts with other project discipline design team members for an integrated site design approach.

1.2 References

Unless otherwise noted, comply with the latest editions of the following references:

1.2.1 Department of Energy Directives

Follow these Department of Energy (DOE) guides, manuals, orders, and standards:

- DOE Guide 430.1-1, *Cost Estimating Guide*
- DOE Manual 473.1-1, *Physical Protection Program Manual*
- DOE Order 413.3, *Program and Project Management for the Acquisition of Capital Assets*
- DOE Order 414.1A, *Quality Assurance*
- DOE Order 420.1B, *Facility Safety and the Contractor Requirements Document*
- DOE Order 430.2B, *Departmental Energy Renewable Energy, and Transportation Management*
- DOE Standard 1020-2002, *Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities*
- DOE Standard 1021-93, Chg 1, *Natural Phenomena Hazards Performance Categorization Guidelines for Structures, Systems, and Components*
- DOE Standard 1090-2004, *Hoisting and Rigging*

1.2.2 Code of Federal Regulations

Follow these titles, chapters, and lower-level designations in the Code of Federal Regulations (CFRs):

- 10 CFR 436, Subpart A, *Methodology and Procedures for Life Cycle Cost Analysis*
- 10 CFR 830, *Nuclear Safety Management*
- 10 CFR 835 Subpart K, *Occupational Radiation Protection Design and Control*
- 10 CFR 851, *Worker Safety and Health Program*
- 29 CFR 1910, *Occupational Safety and Health Standards*
- 29 CFR 1926, *Safety and Health Regulations for Construction*

1.2.3 Commercial Codes and Standards

Sandia National Laboratories has adopted international and national commercial codes and standards from the following organizations and others:

- American National Standards Institute (ANSI)
- American Society of Heating, Refrigeration, and Air Conditioning (ASHRAE)
- Crane Manufacturers Association of America (CMAA®), Inc.
- National Fire Protection Association (NFPA®)
- National Roofing Contractors Association (NRCA)
- Illuminating Engineering Society of North America (IESNA)
- Institute of Electrical and Electronics Engineers (IEEE)
- Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

Please follow these codes, guidelines, manuals, and standards:

Codes

- *2008 National Electric Code®*
- *2009 International Building Code®*
- *2009 International Plumbing Code®*
- *2009 International Mechanical Code®*
- *2009 International Fire Code®*
- *2009 International Energy Conservation Code®*
- *2009 International Existing Building Code®*
- NFPA 70, *National Electric Code®* (2008)
- NFPA 72, *National Fire Alarm and Signaling Code*
- NFPA 101, *Life Safety Code®*
- IEEE C2-2007, *National Electrical Safety Code*

Guidelines

- General Services Administration (GSA) Architectural Barriers Act Accessibility (ABA) Standard for Federal Facilities. http://www.access-board.gov/ada-aba/aba-standards-gsa.cfm#a402. Handbooks, Manuals, and Other Documents
- Federal Highway Administration, *Manual on Uniform Traffic Control Devices*
- IESNA *Lighting Handbook*, 9th edition or later
- *NRCA Handbook of Accepted Roofing Knowledge*
- *NRCA Roofing Manual*

Databases and Research Projects

- ASHRAE Research Project 308-1985, *Investigation of Duct Leakage*
- *ASHRAE Duct Fitting Database CD,* Version 5.00.00 (2008)

Standards

- ANSI/ASHRAE Standard 90.1-2004, *Energy Standard for Buildings Except Low-Rise Residential Buildings*
- ANSI/ASHRAE Standard 100-2006, *Energy Conservation in Existing Buildings*
- ASHRAE Standard 62.1-2007, *Ventilation for Acceptable Indoor Air Quality*
- CMAA Specification No. 70, *Multiple Girder Cranes* (2010), "Specification for Top Running Bridge and Gantry Type Multiple Girder Electric Overhead Traveling Cranes"
- NFPA 13, *Standard for the Installation of Sprinkler Systems*
- NFPA 70E, *Standard for Electrical Safety in the Workplace*® (600V and below)
- NFPA 75, *Standard for the Protection of Information Technology Equipment*
- NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*
- NFPA 90B, *Standard for the Installation of Warm Air Heating and Air-Conditioning Systems*
- NFPA 318, *Standard for the Protection of Semiconductor Fabrication Facilities*
- NFPA 780, *Standard for the Installation of Lightning Protection Systems*
- NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*
- IEEE 315-1975, *Graphic Symbols for Electrical and Electronics Diagrams*
- IEEE 315A-1986, *Supplement to Graphic Symbols for Electrical and Electronics Diagrams*
- IEEE-519-1992, *IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems*
- *IEEE Color Books – Complete Standards Series*: *VuSpec*
- SMACNA, *HVAC Duct Construction Standards – Metal and Flexible* (1995)

1.2.4 Specifications, Drawings, and Standards

Follow these construction specifications, drawings, guidelines, manuals, and procedures, which the FMOC maintains:

- FMOC Procedure, *Site Modifications Review on SNL/NM-Controlled Properties within KAFB (*PCD-077)
- SNL Standard Construction Specifications
- SNL Standard Drawings
- *Sandia National Laboratories CADD Standards Manual*
- *Campus Design Guidelines (CDG)*
- *SNL Sign Standard for Interior and Exterior Signs*
- *Sandia National Laboratories Telecommunications Systems Design Manual*

1.3 Updates to This Manual

As the industry standards and practices cited in this manual change, the FMOC will issue updates. The FMOC intends to revise the manual when changes are warranted. Consult the external SNL web site for the current version.

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