H.1 General Health and Safety

H.1.1 Federal Regulations and Executive Orders

Occupational Health and Safety Administration (OSHA), Title 29 of the Code of Federal Regulations (29 CFR)

Part 1910 - General Industry Standards (July 1994 Edition):

- Subpart D, Walking - Working Surfaces (1910.21-.32): placement and structure of platforms, catwalks, etc.
- Subpart E, Means of Egress (1910.35-.40): employee's emergency escape requirements
- Subpart G, Occupational Health and Environmental Control (1910.94-.100): ventilation, noise control, ionizing/ nonionizing radiation
- Subpart H, Hazardous Materials (190.101-.120): storage, handling of hazardous materials
- Subpart J, General Environmental Controls (1910.141-.150) safety color coding and lock out/tag out systems
- Subpart L, Fire Protection (1910.155-.165): sprinkler, detection, and alarm systems
- Subpart N, Materials Handling and Storage (190.176-.190): cranes, conveyance systems
- Subpart O, Machinery and Machine Guarding (190.211-.222): mechanical equipment (hard wired and/or designed in) and power-transmission apparatus
- Subpart S, Electrical (1910.301-.399): design safety standards, hazardous locations, special- purpose systems, and safety-related maintenance requirements (design in)
- Subpart Z, Toxic and Hazardous Substances (1910.1000-

.1500): protection from airborne hazardous substances; provides specific guidance to toxic chemicals, e.g., ethylene oxide (see 1910.1047)

Part 1926 - Construction Industry Standards (July 1994 Edition):

- Subpart C, General Safety and Health Provisions (1926.20-.35): fire protection, illumination, sanitation during construction

- Subpart D, Occupational Health and Environmental Controls (1926.50-.66): protect workers, public from noise, radiation, gases/vapors, asbestos, lead, and emergency response

- Subpart E, Personal Protective and Life Saving Equipment (1926.95-.107): PPE, lifelines, and safety nets

- Subpart F, Fire Protection and Prevention (1926.150-.159): materials protection against ignition sources, extinguishers

- Subpart G, Signs, Signals and Barricades (1926.200-.203): warning signs, signals, and barriers around construction

- Subpart H, Materials Handling Storage, Use and Disposal (1926.250-307): movement of materials; disposal of construction debris

- Subpart J, Welding and Cutting (1926.350-.354): fire protection and exposure protection

- Subpart K, Electrical (1926.400-.449): electrical systems in construction related to worker/public protection

- Subpart L, Scaffolding (1926.451-.453): requirements of design and use

- Subpart M, Floor and Wall Openings (1926.500-.502): use of guardrails, handrails, etc.

- Subpart N, Cranes, Derricks, Hoists, Elevators and

Conveyors (1926.550-.556): materials movement systems use

- Subpart O, Motor Vehicles, Mechanized Equipment and Marine Operations (1926.600-606): construction vehicles and material-handling equipment

- Subpart P, Excavations (1926.650-.652): trenching and shoring requirements

- Subpart Q, Concrete and Masonry Construction (1926.700-.706): requirements related to construction with these building materials

- Subpart R, Steel Erection (1926.750-.752: assembly requirements

- Subpart T, Demolition (1926.850-.860): removal, storage, and disposal of building materials

- Subpart V, Power Transmission and Distribution (1926.950-.960): grounding, overhead/underground lines

- Subpart X, Stairways and Ladders (1926.1050-.1060): setup, construction, and use requirements for temporary activities

- Subpart Z, Toxic and Hazardous Substances (1926.1100-.1148): protection against exposures from use of chemicals

Part 1960 - Federal Employee Safety and Health Programs (1994 Edition): Subparts A-K, requirements to establish and maintain federal agency OSH programs

Executive Order: Executive Order 12196, Occupational Safety and Health Programs for Federal Employees, effective July 1980

H.1.2 State Regulations

Maryland Occupational Safety and Health Administration: Code of Maryland Regulations (COMAR), Title 9, Subtitle 12, Chapter 20, Occupational Safety and Health

H.1.3 Other Federal Agency Regulations/Policies

General Services Administration: 41 CFR, Management of Federal Facilities

Department of Transportation:49 CFR Parts 171 - 179: Hazardous Materials Handling and Transport Requirements

Department of Health and Human Services (DHHS):

- *Safety Management Manual*, 1990
- *Environmental Management Manual*, 9/94 (Draft)
- DHHS, Public Health Service, Centers for Disease Control (CDC), and the NIH, *Biosafety in Microbiological Laboratories*, May 1988
- DHHS, NIH, *Guidelines for Research Involving Recombinant DNA Molecules*, 51 FR 16958, May 1986
- DHHS, NIH, *Laboratory Use of Chemical Carcinogens*, 1989

National Institutes of Health:

- The NIH Manual Issuance 3032, *Solid Waste Management*
- The NIH Manual 1341, *Protective Clothing and Equipment*
- The NIH Manual 1342, *Occupant Evacuation Plan*
- The NIH Manual Transmittal 1361, *Corridor Utilization Policy*

- The NIH Manual Issuance 1340, *Occupational Safety and Health Management*, 1990
- NIH Division of Engineering Services (DES) *Instruction Manual*
- Code 1340-1, DES Safety Program
- Code 1340-2, Safety Precautions and Procedures Related to Low-Voltage Electrical Circuits
- Code 1340-3, Uniforms and Protective Clothing
- Code 1340-4, Safety Footwear Program
- Code 1340-5, Safety Precautions and Procedures Relating to Radiation Hazards
- Code 1340-6, Policy and Procedures for Working with Asbestos
- Code 1340-7, Procedures for Entering Manholes or Other Below Grade Confined Spaces
- Code 1340-11, DES Procedures for Handling PCBs
- Code 1340-12, Walking and Working Surfaces
- Select DES Engineering Specification Guidelines
- Section 01546, NIH Design and Construction Mandatory Specifications for Site Safety and Health
- Section 02085, NIH Asbestos Abatement Specifications
- Section 11810, NIH Fume Hood, Laboratory, Air By-Pass Type Specification

H.1.4 Industry Consensus Standards

National Institute of Occupational Safety and Health (NIOSH), Cincinnati, OH:

- *Guide to Chemical Hazards Handbook*, June 1994

American Conference of Governmental Industrial Hygienists (ACGIH):

- *Industrial Ventilation: A Manual of Recommended Practice* (current edition), Lansing, MI
- *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices* (current edition)

American National Standards Institute (ANSI), New York:

- *Fundamentals Governing the Design and Operation of Local Exhaust Systems* (current edition)
- Numerous committee papers on materials and systems certifications (see attached cross-reference listing in OSHA publication of OSHA regulatory criteria and their requisite ANSI standards)

American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAG), New York:

- No. 62-1989, *Ventilation for Acceptable Indoor Air Quality*
- No. 55-1981, *Thermal Environmental Conditions for Human Occupancy*
- 1991 *ASHRAE Handbook - HVAC Applications*

American Society of Testing Materials (ASTM), Philadelphia, PA:

- *Annual book of ASTM Standards* (current edition), verifying

minimum quality standards for various construction materials and products

Building Officials and Code Administrators International, Inc. (BOCA), Country Club Hills, IL:

- *BOCA National Mechanical Code* (1990 edition)

General Reference Publications:

- *Patty's Industrial Hygiene and Toxicology*, Vol. I (current edition), Wiley-Interscience, New York

- DHHS, NIOSH, *The Industrial Environment:Its Evaluation and Control,* (latest edition), GPO, Washington, DC

H.2 Biosafety

H.2.1 Federal Regulations

- U.S. Department of Labor, OSHA, Occupational Exposure to Bloodborne Pathogens, 29 CFR 1910.1030
- U.S. Department of Labor, OSHA, Enforcement Policy and Procedures for Occupational Exposure to Tuberculosis, 1993
- U.S. Department of Labor, OSHA, Specifications for Accident Prevention Signs and Tags, 29 CFR 1910.145

H.2.2 State Regulations

- State of Maryland, Department of Environment (MDE), Title 26, Subtitle 13: Disposal of Controlled Hazardous Substances, Chapter 11, Special Medical Wastes

H.2.3 Industry Standards

American Conference of Governmental Industrial Hygienists:

- *Industrial Ventilation: A Manual of Recommended Practices* (latest edition), Cincinnati, OH

American Society of Heating, Refrigerating and Air-Conditioning Engineers:

- Chapter 7, Health Facilities, in *1991 Application Handbook*, Atlanta, GA: ASHRAE, 1991
- Chapter 14, Air Flow Around Buildings: in *1989 Fundamentals Handbook*, Atlanta, GA: ASHRAE 1989

U.S. Department of Health and Human Services, Public Health Service, CDC/NIH:

- *Biosafety in Microbiological and Biomedical Laboratories* (3rd edition), DHHS Pub. No. (CC) 93-8395, 1993

- *Guide for the Care and Use of Laboratory Animals*, DHHS Publication No. (NIH) 85-23, 1985

- *Proceedings of the National Cancer Institute Symposium on Design of Biomedical Research Facilities*, Cancer Research Safety Monograph Series Vol. 5, NIH Pub. No. 81-2305, 1979

H.3 Radiation Safety

H.3.1 Regulatory Compliance Requirements

Federal Regulations:

- U.S. Nuclear Regulatory Commission (NRC) 10 CFR Part 20: Standards for Protection Against Radiation (current revision)
- NRC 10 CFR Part 30: Rules of General Applicability to Domestic Licensing of Byproduct Material (current revision)
- U.S. Environmental Protection Agency (EPA), National Emission Standards for Hazardous Air Pollutants (NESHAPS), 40 CFR, Part 61, Subpart I, (current revision).

H.3.2 NRC Guidance

- NRC Information Notice No. 90-09, *Extended Interim Storage of Low-Level Radioactive Waste by Fuel Cycle and Materials Licensees,* February 5, 1990
- NRC Information Notice in an Amendment, *Request Decay-in-Storage of Radioactive Materials with Half-Lives Greater Than 65 Days*
- NRC Regulatory Guide *8.37ALARA Effluents from Materials Licenses* July, 1993
- NRC Regulatory Guide 8.25, *Air Sampling in the Workplace*, June 1992, Revision 1
- NRC Information Notice 94-07;*Solubility Criteria for Liquid Effluent Releases to Sanitary Sewerage Under Revised 10 CFR Part 20*, January 28, 1994
- NRC Regulatory Guide 8.23, *Radiation Safety Surveys at Medical Institutions,* January 1981

- NRC NUREG 1400 *Air Sampling in the Workplace,* September 1993

- NRC Draft Report, NUREG 1516 *Management of Radioactive Material Safety Program at Medical Facilities,* January 1995

H.3.3 State of Maryland Requirements

- MDE Subtitle 15 Disposal of Controlled Hazardous Substances, Radioactive Hazardous Substances (RHS) (latest revision)

H.3.4 ANSI Standards

- ANSI/American Nuclear Society (ANS), Volume Reduction of Low-Level Radioactive Waste, ANSI/ANS 40.35-1991, current revision.

- (For radioactive airborne effluent monitoring systems) ANSI Standard N13.1, Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities, 1969

- ANSI Standard N42.18, Specification and Performance of On-Site Instrumentation for Continuous Monitoring Radioactive Effluents, current revision.

H.3.5 National Council on Radiation Protection and Measurements (NCRP) Guidance

- NCRP Commentary No. 3, *Screening Techniques for Determining Compliance with Environmental Standards,* January 1989, addendum October 1989

H.3.6 Radiation Safety Regulatory Compliance Documentation

The NIH Design Policy and Guidelines Project shall be in total compliance with the following Federal, State, and local regulations.

- The materials license is issued by the NRC, and compliance with and conditions of the license are regulated by the NRC, consistent with latest revisions of 10 CFR Part 20, 10 CFR Part 30, and all appropriate Regulatory Guides (latest revisions).

- EPA regulations on NESHAPS, 40 CFR 61 Subpart I (latest revision)

- OSHA Ionizing Radiation Regulations 1910.96 (current revision) and current Memorandum of Understanding Between the OSHA and the NRC, December 23, 1989 (Enclosures B and C)

- U.S. Food and Drug Administration, 21 CFR 1000, Subchapter J, Radiological Health, through 1040.11 (current revision)

- MDE Subtitle 15, Disposal of Controlled Hazardous Substances; Radioactive Hazardous Substances (RHS). Implementation of these regulations addresses certain requirements of Environment Articles, Title 7, Annotated Code of Maryland, concerning the management of low-level nuclear waste in Maryland. Regulation 03, Maryland identification number under COMAR 26.15.03, Standards Applicable to a Generator of RHS, specifies that "a person may not manage RHS without first having obtained a Maryland identification number from the Secretary"

- Any appropriate regulatory compliance requirements identified by the Washington Suburban Sanitary Commission

- The appropriate and current NIH policy and procedures manual

<u>Voluntary Guidelines, Recommendations, and/or Standards</u>:

- American National Standards Institute

- American Association of Physicists in Medicine

- Conference of Radiation Central Program Directors, Inc.
- Health Physics Society
- Society of Nuclear Medicine
- International Commission on Radiological Protection
- National Council on Radiation Protection and Measurements
- United Kingdom National Radiological Protection Board
- COMAR 26.12.01.01, Regulations for the Control of Ionizing Radiation 1994 (latest revision)
- *Suggested State Regulations for the Control of Radiation. Volume I; Ionizing Radiation* (8th edition), June 1990 (latest revision)

H.3.7 Regulatory Compliance Issues

- EPA regulations on NESHAPS will provide compliance with NRC regulations and license conditions for air emissions. However, the materials license is issued by the NRC, and compliance with and the conditions of the license are regulated by the NRC
- Design requirements shall reflect the current Federal, State, and local regulatory compliance standards
- The latest guidance may be followed if it does not conflict with current Federal, State, and local regulatory requirements.

  Sections H.4, H.5, and H.6 contain lists of selected publications, regulations, and regulatory guides which are applicable.

H.4 Environmental Management References

H.4.1 Federal Regulations

- Resource Conservation and Recovery Act
- 40 CFR 260 to 268, definition, transportation, treatment, storage, and disposal of solid and hazardous wastes
- 40 CFR 280, underground storage tanks
- Clean Water Act
- 40 CFR 112, spill prevention control and counter-measure
- 40 CFR 122, permit requirements
- 40 CFR 125, NPDES Requirements
- 40 CFR 131, water quality criteria
- Toxic Substances Control Act
- 40 CFR 761, PCB Requirements
- Clean Air Act
- National Emergency Standards for Hazardous Air Pollutants
- 40 CFR 61
- Hazardous Materials Transportation Act
- 49 CFR 171 to 179, transportation of hazardous materials
- Worker Safety Requirements
- 29 CFR 1910.120, hazardous waste operations and emergency response

H.4.2. State of Maryland Regulations

- Maryland Solid Waste Regulations
  COMAR 26.04.07

- Maryland Hazardous Waste Regulations
  COMAR 26.13

- Maryland Hazardous Waste Facilities Siting Regulations
  COMAR 14.14

- Maryland Underground Storage Tank Regulations
  COMAR 26.10.02

- Maryland Water Pollution Control Regulations
  COMAR 26.08

- Maryland Stormwater Management Regulations
  COMAR 26.09.02

- Maryland Drinking Water Regulations
  COMAR 26.04.01

- Maryland Oil Pollution Control Regulations
  COMAR 26.10.01

- Maryland Pretreatment Regulations
  COMAR 26.08.08

- Maryland Air Pollution Control Regulations
  COMAR 26.11

H.4.3. Industry Standards

- American Petroleum Institute, various standards regarding design, installation, and maintenance of above-ground storage tanks

- Washington Suburban Sanitary Commission, Industrial Users Compliance Requirements

H.5 Federal Regulations and Executive Orders

H.5.1 Environmental Protection Agency

- Presidential Documents, *Federal Register*, Volume 52, No. 15, Tuesday, January 27, 1987, "Radiation Protection Guidance to Federal Agencies for Occupational Exposure; Approval of Environmental Protection Agency Recommendations"

- EPA Standards for Radioactivity in Community Drinking Water Systems, 40 CFR Part141 (1976)

- EPA Standards for Airborne Emission of Radionuclides, 40 CFR Part 61 (1989) (National Emission Standards for Hazardous Air Pollutants, 40 CFR Part 61 (1994))

H.5.2 Occupational Safety and Health Administration (OSHA)

- Ionizing Radiation, Section 1910.96 (current revision)

- Memorandum of Understanding Between OSHA and the NRC, December 23, 1989

H.5.3 Department of Transportation (DOT)

H.5.4 U.S. Nuclear Regulatory Commission (NRC)

- NRC, 10 CFR Part 19, Notices, Instructions, and Reports to Workers, Inspections (current revision)

- NRC, 10 CFR Part 20 et al., Standards for Protection Against Radiation, Final Rule May 21, 1991

- NRC, 10 CFR Part 30, Rules of General Applicability to Domestic Licensing of By Product Material (current revision).

- NRC, 10 CFR Part 3, Specific Domestic Licenses of B Road Scope for By Product Material (current revision)

- NRC, 10 CFR Part 35, Medical Use of By Product Material (current revision)

- NRC, 10 CFR Part 71, Packaging and Transportation of Radioactive Material (current revision)

- NRC, Nuclear Regulatory Guide List, November 1, 1994 (Enclosure A)

H.5.5 U.S. Food and Drug Administration (FDA)

- FDA, 21 CFR 1000, Subchapter J, Radiological Health, through 1040.11 (current revision)

- FDA, Title 21, Part 892, Radiology Devices, Subpart B, Diagnostic Devices, 892.1000, Magnetic Resonance Imaging (current revision)

- FDA Title 21, Part 1040, Performance Standard for Light-Emitting Products (current revision)

H.6 State and Local Requirements

H.6.1 Industry Consensus Standards

- National Council on Radiation Protection and Measurements (NCRP), NCRP Recommendations on Exemption Principles

  NCRP Report No. 91 (1987): Average annual effective dose equivalent of 1 mrem (0.01 mSv) corresponds to a negligible risk level for individuals. Collective dose assessments for particular practices or sources should exclude annual effective dose equivalents to individuals of 1 mrem (0.01 mSv) or less.

- International Commission on Radiological Protection (ICRP), ICRP Pub. No. 26, *Recommendations of the ICRP, Radiation Protection*, January 17, 1977

- International Atomic Energy Agency (IAEA). IAEA Recommendations on Exemption Principles IAEA Safety Series No. 89 (1988)

Recommendation for exemption of single practice or source of radiation exposure:

- Annual effective dose equivalent to maximally exposed individuals would be less than 1 mrem (0.01 mSv)

- Collective effective dose equivalent form 1 year of unregulated practice would be less than 100 person-rem (1 person-Sv)

H.7 American National Standards Institute (ANSI)

- Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities, ANSI Standard N13.1-1969

- Specification and Performance of On-Site Instrumentation for Continuous Monitoring of Radioactive Effluents, ANSI Standard N 42.18 (current revision)

- Testing of Nuclear Air-Cleaning Systems, ANSI/ASME Standard N510-1980, 1975

- American National Standard for the Use of Lasers, ANSI Standard 2136.1, 1986

H.8 FIRE PROTECTION

This reference Guideline section contains general fire protection requirements for new construction at NIH facilities. Modifications, renovations and alterations of existing NIH facilities shall be accomplished as nearly as practicable with the requirements for new construction except as provided in this section. Only the altered, renovated, or modernized portion of an existing building, system, or individual componet shall be required to meet provisions applicable to new construction, unless otherwise required in this document.

Modifications, renovations and alterations over 25 percent

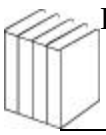
If the cost of modifications, renovations and alterations, as descibed in BOCA International Building Code (Existing Structures chapter), is over twenty-five (25) percent of the physical value of the building, by concenus of the NIH Policy and Guidelines Committeee, it shall be determine to what degree the portions so altered or repaired shall be made to conform to the requirements for new buildings.

Modifications, renovations and alterations under 25 percent.

If the cost of modifications, renovations and alterations, as descibed in BOCA International Building Code (Existing Structures chapter), is under twenty-five (25) percent of the physical value of the building, by concenus of the NIH Policy and Guidelines Committeee, restoration of the building to its condition previous to damage or deterioration shall be permitted with the same kind of materials as those of which the building was constructed; provided, that such construction does not endanger the general safety and public welfare and complies with other provisions of BOCA International Building Code in respect to existing roofs.

Modifications, renovations and alterations general:

If the alteration, renovation, or modernization adversely impacts required life safety features, additional upgrading shall be required. Existing life safety features that do not meet the requirements for new buildings, but exceed the requirements for existing buildings, shall not be diminished further. Any changes in use group or the increase of building volume, shall be considered new construction and requirements of current codes shall be applied to the extent practical. Additional requirements for individual occupancies can be obtained in the individual Guideline sections: Hospital, Laboratory, and Vivarium.



H.8.1 General Policy

Fire protection design shall follow the NFPA National Fire Codes, BOCA National Building Code, and NIH standards, unless specifically altered or amended in this document. When a conflict between the various code requirements exists, the most stringent/ conservative standard shall apply. All portions of the NFPA National Fire Codes shall be followed including appendices, recommended practices, interim amendments, and formal interpretations. All NFPA code wording using the word "should" shall be interpreted as "shall" (i.e. must be followed). Any departure from NFPA or BOCA requirements must be clearly delineated in the A/E's "Fire Protection Engineering Analysis", if required (see requirement below for this document), or other project correspondence, along with justification of the departure. The most recent published code or standard, in place at the date of the design "notice to proceed" (NTP), shall be used by the design team. The NIH re-design policy is based on a project having only a one year shelf life. Any project which has been shelved or inactive for one year or more must go through a review process to ensure compliance with the latest published codes and standards.

The NIH Fire Prevention Section (FPS) is the Authority Having Jurisdiction, as defined in the NFPA and BOCA requirements. All fire protection devices/ equipment shall be listed/ approved for the intended use. Listed/ approved shall mean equipment/ materials that are identified in the Factory Mutual (FM) Approval Guide and/ or the various directories of Underwriters Laboratories (UL). Testing by another nationally recognized laboratories may be approved by the FPS on a case-by-case basis.

H.8.2 Fire Protection Submission Guidelines

A/E's shall provide lanuage in the contract documents to reference the use of the **Fire Protection Submission Guidelines** for all fire protection system(s). These Guidelines contain the submission requirements for design and construction submissions, as well as, required construction inspections and are available with the Project Officer(NIH)

H.8.3 Fire Protection Engineering Analysis

All designs for new structures (including new wings or other add-ons), and those which include the addition or modification of fire protection systems or egress components, shall have a "Fire Protection Engineering Analysis" performed by a registered fire protection engineer, at the concept and final design phase. A registered fire protection engineer shall be defined as a Professional Engineer with expertise in the field of Fire Protection Engineering as demonstrated by the passing of the National Council of Examiners for Engineers and Surveyours - "Principals and Practice Examination" in the discipline of Fire Protection Engineering. A Fire Protection Engineering Analysis shall contain the following key features:

- An overview of the total fire protection system for the proposed facility
- A list of all fire protection features required by the codes or standards referenced above. All fire protection and life safety features shall be suitably integrated
- Type of construction
- Classification of occupancy
- Analysis of fire resistance ratings required by hazardous Materials in excess of the exempt amounts identified in the BOCA *Interational Building Code*
- Fire resistance rating of all structural components (floors, columns, and bearing walls, exterior walls, and roof), clearly specifying the applicable industry design guide and/ or Underwriters Laboratories designation (alpha numeric or otherwise) for the protection scheme for each component
- Location of all fire rated assemblies used for the enclosure of all stairs/ shafts/ openings and/ or the separation of fire areas and the fire rated components (doors, dampers) necessary to

protect openings in these barriers. Indicate the hourly rating of these barriers and the components protecting openings, clearly specifying the applicable industry design guide and/ or Underwriters Laboratories designation (alpha numeric or otherwise) for each barrier

- Location of all smoke barriers and the smoke/ fire rated components (doors, dampers) necessary to protect openings in these barriers, clearly specifying the applicable industry design guide and/ or Underwriters Laboratories designation (alpha numeric or otherwise) for each smoke barrier design

- Building separation or exposure protection

- Fire protection criteria references

- Occupant load and exit calculations based on NFPA 101 Life Safety Code requirements

- Automatic extinguishing systems, including the identification of sprinkler protected areas and areas protected by other automatic suppression means

- Water supply analysis to determine system requirements and adequacy of the present water supply; this analysis shall determine the need for a fire pump assembly; the water supply data shall be obtained by the A/E design team via fire hydrant flow tests. (Flow test results should be transmitted to the Fire Prevention Section for concurrence before use in the design process)

- Describe Fire Department access including: distance of hydrants from the structure; distance of each side of the structure from the street, distance of standpipe connections from the road; and distance of standpipe connections from the closest hydrant

- Automatic detection/ fire alarm system, including the identification of detection requirements, zoning arrangements, elevator control system interconnection and

evacuation alarm description;

H.8.4 Types of Construction *(BOCA International Building Code)*

The construction classifications described in the BOCA International Building Code shall be followed.

H.8.5 Fire Resistant Materials and Construction *(BOCA International Building Code)*

The BOCA International Building Code "Through - Penetration System" details in section 713.4.1, are amended by the following additions: All new and existing fire barriers exposed or penetrated during construction (includes fire rated walls, and floor slabs) shall be firestopped with an approved and listed material. All existing penetrations shall be shown on the contract drawings, and the quantity and sizes shall be noted. Firestopping material product data and installation details shall be a required submittal. The firestopping system shall maintain the required fire rating (designed or original) of the fire resistive barrier.

All boiler rooms and furnace rooms shall be separated from adjacent construction by minimum one hour fire rated construction.

Off-campus facilities with quantities of hazardous materials in excess of the exempt amounts identified in the BOCA *International Building Code* Section 307.8 shall be provided with fire rated separations as required by that Section.

Main campus facilities with quantities of hazardous materials in excess of the exempt amounts identified in the BOCA *International Building Code* Section 307.8 shall require coordination with the NIH Fire Prevention Section so a facility specific hazardous material plan can be developed in conjuntion with DES and the users.

Spray-applied fireproofing shall be cementitious type only, mineral fiber type fireproofing is not permitted.

Sound attenuation materials within wall cavities shall have a flame spread rating of 0 - 75, and a smoke developed rating of 0 - 150.

H.8.6 Fire and Smoke Dampers *(NFPA 90A)*

Fire Dampers shall be installed in locations where required by BOCA *International Building Code.* The exception shall be modified allowing the omission of fire dampers in one hour or less fire rated walls and shall be extended to all buildings which are not classified as Use Group H regardless of sprinkler protection.

Fire dampers shall not be provided in any grease removal exhaust system per NFPA 96. Provide alternative protection consisting of independent risers in a fire rated shaft (vertically & horizontally). Provide cleanouts per NFPA 96.

Fire dampers shall not be provided in any laboratory fume removal exhaust system or in laboratory hoods per NFPA 45. Alternative protection of the fire rated assembly shall be provided by means of one of the following:

- Independent risers from each floor in a fire rated shaft.
  or
- Steel sub-ducts at least 56 cm (22 inches) in length shall be used at each branch duct connections of exhaust risers in which the airflow moves upward and the riser is appropriately sized to accommodate the flow resistion created by the sub-duct.

Fire dampers shall be provided in all other duct openings of all rated vertical shafts.

Transfer grills in fire resistive partitions of one hour or greater, shall be protected by fire dampers.

Fire dampers shall be installed in accordance with the requirements of the Sheet Metal and Air-conditioning Contractors National Association (SMACNA). Furthermore, fire dampers shall be

installed in accordance with the requirements of its listing.

Duct penetrations in required smoke resistive barriers shall be protected by smoke dampers, unless other codes premitted exceptions exist. Smoke dampers shall be controlled as required by NFPA 90A.

Access shall be provided to each fire and smoke damper for maintenance purposes.

All fire and smoke damper installations shall be in strict accordance with the U.L. listing.

H.8.7 Interior Finishes *(NFPA 101)*

All temporary interior construction barriers shall be constructed of noncombustible or fire retardant treated materials. All plastic sheeting shall be fire retardant type as tested by NFPA 701.

All interior wall and ceiling finishes shall be Class A, with a flame spread rating of 0 - 25. The smoke developed rating shall be 0 - 450 for walls, and 0 - 50 for ceilings.

All interior floor finishes in the exit access corridors and in the stairwells shall be Class I (minimum critical radiant flux of 0.45 watts/cm^2).

H.8.8 Fire *Protection* Systems *(NFPA 13)*

Automatic Sprinkler Systems: All new structures and/or building additions over 185 square meter shall be sprinklered. Smaller facilities shall also be sprinklered, unless this requirement is waived in writing by the Chief, FPS. This requirement is based on compliance with the Federal Firesafety Act of 1992. Major renovations (see **H.8 Fire Protection** provisions) of an unsprinklered building shall include the provision of sprinklers in the renovated areas with provision of blanked off connections of suitable size to provide later sprinkler protection in other areas of the facility. Smaller renovations shall, whenever feasible, include the provision of capped off sprinkler piping in the renovated areas

to facilitate the later provision of sprinklers throughout the facility in order to implement NIH policy to provide sprinkler protection in all occupied facilities. The capped off sprinkler piping shall be sized in accordance with the ordinary hazard pipe schedule method described in NFPA 13. All sprinkler system designs shall meet, at a minimum, NFPA 13 Ordinary Group I spacing and hydraulic requirements.

Wet pipe sprinklers shall be used, except in areas subject to temperatures below 4°C. The minimum slope towards the main drain of the system branchlines shall be 4mm/m. The minimum slope towards the main drain of the system mains shall be 2mm/m. The maximum number of dry pendant or dry sidewall sprinklers shall be limited to 25 sprinklers per system.

All exterior sprinkler supply mains shall be adequately protected from freezing by proper burial depths in accordance with NFPA 24. Sprinkler piping exposed to freezing temperatures shall be part of a dry pipe system or, in instances such as sprinkler in a building canopy, dry pendent heads may be used on a wet system.

Sprinkler head locations shall NOT be shown on the contract drawings, with exception of special design areas (i.e. water curtains, aesthically sesitive areas) Sprinkler locations if shown, shall be designed by a registered fire protection engineer, or a NICET Level III or IV sprinkler designer. A registered fire protection engineer shall be defined as a Professional Engineer with expertise in the field of Fire Protection Engineering as demonstrated by the passing of the National Council of Examiners for Engineers and Surveyours - "Principals and Practice Examination" in the discipline of Fire Protection Engineering. Where sprinklers are shown, provide the following statement noted on each drawing: "Sprinkler head locations have been shown for suggested and illustrative purposes only. Sprinkler head locations shall be coordinated in the field based on NFPA 13 spacing requirements . Sprinkler system shop drawings shall be prepared and submitted in accordance with NFPA 13 spacing requirements."

Sprinklers shall not be provided in elevator hoistways.

The sprinkler pipe shall be Schedule 40 black steel or galvanized, except for installations where non-ferrous materials are required. No plastic pipe shall be provided. No lightwall sprinkler pipe shall be provided.

Sprinkler system fittings shall meet the following requirements: Fittings into which sprinkler heads and sprinkler head riser nipples are threaded shall be welded, threaded, or grooved-end type. Plain-end fittings with mechanical couplings and fittings which use steel gripping devices to bite into the pipe when pressure is applied are not permitted. Rubber gasketed grooved-end pipe and fittings with mechanical couplings shall be permitted in pipe sizes 40 mm and larger. Fittings, mechanical couplings, and rubber gaskets shall be supplied by the same manufacturer in accordance with manufacturer's written instructions. Fittings shall be malleable iron, banded type or cast ferritic ductile iron with threaded ends, OR cut or rolled grooved with malleable iron or ductile iron fittings OR standard seamless steel with butt-welded ends, OR forged steel with flanged ends. Copper tube shall be joined with brazed wrought copper fittings. Dielectric transitions, shall be used as necessary in areas where ferrous piping cannot be used. Where chrome pendent sprinklers are installed on exposed piping (in areas with concrete ceilings), tee and elbows to which sprinklers are connected shall have one-inch outlets and shall be provided with 1" x 1/2" hexagon reducing bushings to permit connection of 1" drop nipples in the future.

All concealed sprinkler piping and sprinkler piping in the stairwells, storage rooms, mechanical rooms, and utility rooms, shall be painted red enamel. All other exposed sprinkler piping (outside of the stairwells) shall be painted to match the existing ceiling, and 0.1 meter wide red enamel bands shall be painted at 3 meter intervals.

All new sprinkler systems shall have a central drain riser adjacent to the system riser which shall be accessible to maintenance and safety personnel without "restrictions".

With the exception of low point and auxiliary drains, all new system drains shall be hard-piped to an approved exterior location,

or to a safe location inside the building which shall accept full flow without causing property damage or a safety hazard.

Inspector's test locations shall be provided at the hydraulically most remote point in each system. These drains shall also be piped as described above.

NOTE: Due to performance issues, flow control (on/off) sprinklers shall NOT be used at this time.

Quick response sprinklers are to be used throughout all NIH facilities, except that quick response sprinklers are not permitted in autoclave areas, electrical switchgear rooms, transformer rooms, electrical closets, freezers and cold rooms, and mechanical rooms.

Sprinkler head temperature rating shall be between 71°C and 74°C for all NIH facilities/ occupancies except: (1) sprinklers designed for 93°C shall be used in electric closets, and (2) high temperature sprinklers rated at 141°C with sprinkler head guards shall be used in autoclave areas, mechanical room, electrical room, electrical switchgear and transformer rooms, and any other areas in which high temperatures will routinely be experienced.

All sprinklers shall be installed at least 0.46 meters from any air devices. Sprinkler location at Wall-Mounted & Peninsular Shelving Heights shall be as follows:

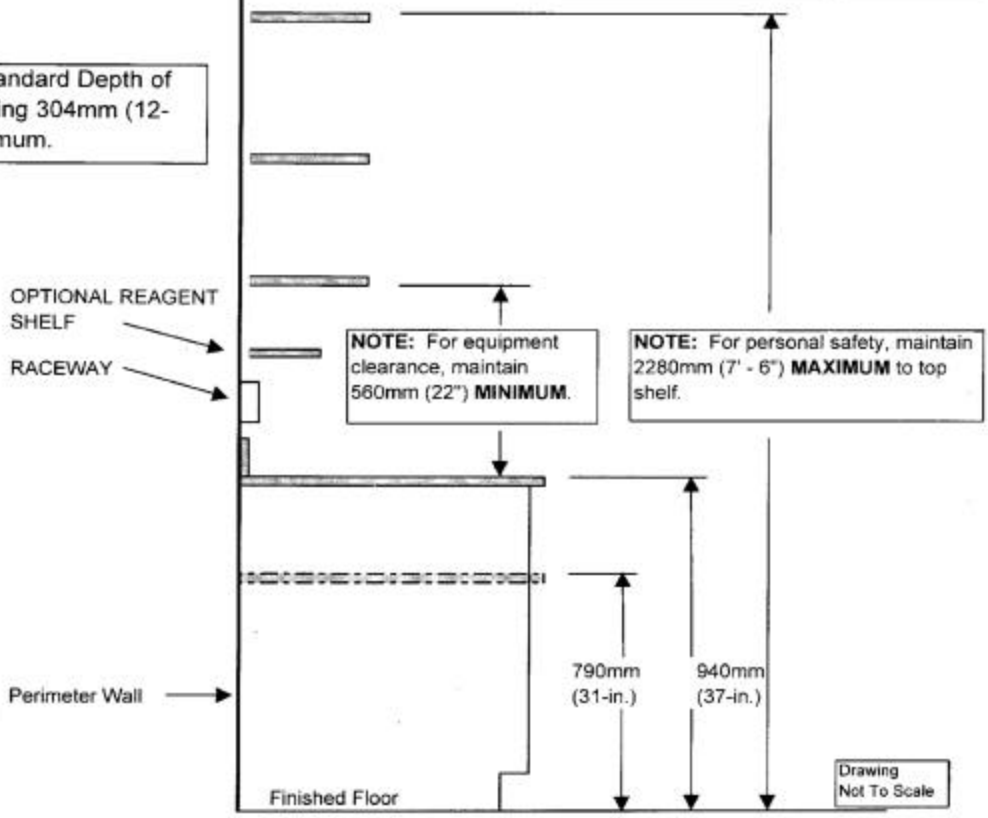
PENINSULA & ISLAND SHELVING:
Provide 760mm (30") clearance from top shelf to sprinkler head deflector and 460mm (18") clearance from top of storage to sprinkler head deflector. Note: Options are not available for pennsula & island shelving.

PERIMETER WALL SHELVING OPTIONS:

OPTION #1 - With shelf board tight to wall surface, provide 460mm (18") clearance from top of shelf to sprinkler head deflector. Tight to wall surface is defined as gap < or = 6mm (1/4"). Storage is permitted tight to ceiling*. Sprinkler head shall not be located above the top shelf.

OPTION #2 - With wall to shelf gap > 6mm (1/4") between shelf board and wall surface, provide 760mm (30") clearance from top shelf to sprinkler head deflector and 460mm (18") clearance from top of storage to sprinkler head deflector.

NOTE: Standard Depth of **ALL** Shelving 304mm (12-inch) Maximum.



WALL- MOUNTED & PENINSULAR SHELVING HEIGHTS POLICY

SPRINKLER HEAD CLEARANCE TO SHELVING

*NOTE: Per NFPA 13, the 460mm (18-in.) dimension is not intended to limit the height of shelving on a wall or shelving against a wall. Where shelving is installed on a wall and not directly below sprinklers, the shelves, including storage thereon, may extend above the plane located 460mm (18-in.) below ceiling sprinkler deflectors. Shelving, including storage thereon, directly below sprinklers may not extend above a plane located 460mm (18-in.) below the ceiling sprinkler deflectors.

All sprinklers shall have a 12.7 mm nominal orifice.unless required per NFPA13.

Installation of a backflow preventer on the sprinkler supply main, below the system isolation valve(s), is required for all new sprinkler installations. The backflow preventer shall be selected to minimize friction loss through the device.

Water Supply shut-offs: ***(NFPA 24)*** When a dedicated fire protection service is provided, the exterior isolation valves shall be equipped with a lockable post indicator valve (PIV).

Standpipes: ***(NFPA 14 & 241)*** An interior standpipe system is required if the facility has three or more stories above grade, or more than one story below grade. An interior standpipe system is required if the travel distance from the primary fire department vehicle access point to any point in the building is 61 meters or greater. Standpipes shall be maintained in accordance with NFPA 241 during new construction, demolition, modifications, renovations and alterations of existing NIH facilities.

No pressure reducing valves shall be permitted on the standpipe riser or sprinkler system take-offs.

H.8.9 Other Suppression Systems

- Anti-freeze systems are not permitted.
- Preaction systems are not permitted.
- Heat trace tape is not permitted.
- Alternative agent suppression systems (water mist, halon replacements) are only permitted on a case-by-case bases. Coordinate with NIH for selection and use.

Commercial Cooking Fire Suppression Systems: Approved fire suppression systems shall be provided below and within all

commercial cooking hood systems and grease removal systems. The fuel/power controls, the exhaust fan controls, and any washdown equipment must be properly interfaced with the fire suppression system. U.L. Listed cooking area hood assemblies must be provided.

No dry chemical fire extinguishing systems shall be provided.

H.8.10 Fire Pumps *(NFPA 20)*

Only electric driven fire pumps shall be installed.

H.8.11 Fire Department Key Box

Provide a fire department secured key-box, located at the main entrance door of the facility. This key-box shall be provided in all new construction for fire department entry. The key shall match other existing secured key boxs.

H.8.12 *Fire Department Connections (NFPA 13/ 14) and Fire Hydrants (NFPA 24)*

Fire Department Connections: All fire department connections (new building construction) shall be within 30 meters of a fire hydrant.

The fire department connections shall be equipped with 2-1/2 inch National Standard Fire Hose Thread.

If any dimension of the building is over 47 meters, then two remote fire department connections shall be provided.

Each fire department connection shall be equipped with a fixed weather resistant information placard which contains the following information: the type of system served, and a physical description of the area of coverage.

Fire Hydrants: All fire hydrants shall be Underwriters Laboratories listed or Factory Mutual approved and be of the dry barrel type. The hydrants shall have two 2-1/2 inch hose outlets

and one 4-1/2 inch pumper connection with National Standard Fire Hose Threads in accordance with NFPA 24, *Private Fire Service Mains and Their Appurtances, and NFPA 1963, Screw Threads and Gaskets for Fire Hose Connections.*

All hydrants shall be installed adjacent to paved areas between 0.9 and 2.1 meters from the roadway shoulder or curb line where they will be readily accessible to fire department apparatus. All hydrants shall be located at least 12 meters away from the building they are intended to protect. They should also be convenient to the sprinkler/standpipe fire department connections for the building. Hydrants shall be installed with not less than a 6 inch connection to the supply main and shall be valved at the connection. Roadway valves shall be located between 0.9 and 1.5 meters from the hydrant. The installation of all new hydrants shall conform to NFPA 24 except as modified above.

A minimum of two hydrants shall be provided within 150 meters of each building. All parts of buildings shall be reached by hose lays of not over 107 meters with consideration given to accessibility and obstructions.

All construction contract drawings shall show the locations of all existing and new hydrants that are intended to protect a new or renovated facility, and hydrant and standard thrust block details shall be provided.

H.8.13 Fire Department Access *(BOCA International Building Code)*

All new buildings, shall have at least two sides readily accessible to fire department apparatus at all times. Access to all fire department connections must be provided.

Fire lanes shall be provided for buildings which will be set back more than 45 meters from a public road or exceed 9.2 meters in height and are set back more than 15 meters from a public road.

Fire lanes shall be at least 6.1 meters in width with the road edge closest to the building at least 3.1 meters from the building.

The minimum roadway turning radius shall conform to the standard 14.6 meter semi-trailer template.

Fire lanes shall be constructed of an all weather driving surface capable of supporting imposed loads of 27,216 kilograms.

Any dead end road more than 90 meters long shall be provided with a turn-around at the closed end at least 27 meters in diameter.

Fire lanes and access areas for fire hydrants and automatic sprinkler/standpipe fire department connections shall be clearly identified by painting adjacent curbing yellow. In addition, signage shall be posted and spaced at 30 meter intervals and/or at the beginning and end of the no parking zones.

H.8.14 Fire Protective Signaling Systems *(NFPA 72)*

All new structures and/or building additions over two stories and/ or 1,858 square meter shall be provided with a fire alarm and evacuation system. Smaller facilities shall also be equipped with such a system if required by BOCA or NFPA 101. Major renovations (ie. of a wing or a floor) of a building with no fire alarm system shall include the provision of a fire alarm system in the renovated areas with provision of a control panel of suitable size to permit later expansion to other areas of the facility. All installations shall comply with the requirements of BOCA National Building Code, NFPA 101, NFPA 70 and NFPA 72. requirements.

If the fire protective signaling system includes an automatic smoke detection system, other than smoke detection required for elevator fire protection, then an addressable multiplex fire alarm system shall be provided.

If the facility is considered a high-rise building in accordance with BOCA National Building Code section 403.1, then an addressable multiplex fire alarm system shall be provided.

All special purpose facilities shall be equipped with an addressable multiple fire alarm system, of fire department communication

stations and two-way occupant emergency communication. Upon an alarm, the fire alarm speakers are to sound a "slow-whoop" signal, at 90 - 110 dB, for four (4) cycles, followed by a voice evacuation message. Upon completion of the voice message the slow-whoop shall resound and continue until the fire alarm control panel is reset or the "alarm silence" switch is activated.
Special purpose facilities include: high-rise building, windowless structures, tunnels, and vaults.

When voice communication systems are provided, at least two audio channels shall be provided. The audio channels shall be suitably supervised. Voice paging shall take priority over all automatic messages. The voice communication system shall be equipped with back-up amplifier(s) such that the loss of any amplifier shall result in automatic switching to the back-up amplifier(s).

Fire protective signaling systems shall have the following circuit supervision styles (NFPA 72):

- All signaling line circuits (SLC) shall meet *S*tyle 6 requirements

- All indicating device circuits (IDC) shall meet *S*tyle D requirements

- All notification appliance circuits (NAC) shall meet *S*tyle Z requirements

- All panel to panel communication SLCs shall meet *S*tyle 7 requirements

If the main fire alarm control panel is required to have a back-up control unit; the back-up control unit must be separated from the primary control unit by two hour fire rated construction.

All fire alarm wiring shall be installed in 19.05 mm (3/4-inch) minimum conduit or electrical metallic tubing (EMT). All fire alarm wiring in damp locations (I.E. fire pump & valve rooms, at flow and tamper switches) shall be installed in liquid-tight flexible

metal conduit. Flexible metal (green field type) concuit is limited to 1.83 meters and shall be secured per NEC.

All concealed fire alarm conduit, and conduit located in the stairwells, storage rooms, mechanical rooms, and utility rooms shall be painted red enamel. All other exposed fire alarm conduit (outside of the stairwells) shall be painted to match the existing adjacent wall surface, and 0.10 meter wide red enamel bands shall be painted at 3.0 meter intervals. This painting requirement also applies to the pull boxes, junction boxes, mounting boxes and extensions. Red enamel bands shall not be painted on the pull boxes, junction boxes, mounting boxes and extensions.

All fire alarm system notification appliances shall be combination audio-visual units. In renovation projects, fire alarm notification appliances shall match existing equipment,

Special hazard areas such as: industrial shops, mechanical rooms, computer rooms, LAN rooms, power plants, and cage wash areas, shall be equipped with additional audio-visual units.

General office areas are not to be equipped with smoke detection.

Heat detectors shall be combination fixed temperature (57.2°C) and rate of rise units. High temperature areas shall be equipped with appropriate high fixed temperature heat detectors. Fixed temperature (57.2°C) shall be provided in areas subject to rapid temperature increases.

The fire alarm wire for 120 volt circuits shall be #12 AWG, solid copper, TFN insulation.

The fire alarm wire for 24 volt D.C. (or less) circuits shall be #16 AWG, solid copper, TFN insulation or solid copper cable in strict accordance with written *equiptment manufacturer's* requirements.

The fire alarm field devices (initiating, notification appliance, and interface equipment) shall be shown on the electrical (power or dedicated electrical fire protection) floor plans.

All fire alarm control panels, remote data gathering panels, power supply panels, and terminal cabinets shall be equipped with CAT 45 key & lock set.

Standby battery requirements shall include 48 hours of standby system supervision, and an additional 30 minutes with all notification appliances activated. Battery back-up is required on all systems. In facilities servered with a approved secondary power source or emergency generator powered circuits, provide battery system for 24 hours of standby system supervision, and an additional 30 minutes with all notification appliances activated.

Alarm initiation modules for hard-wired (ie. not multiplex) fire alarm systems shall have an approved zone disconnect switch which permits the entire zone to be disconnected at the control panel without the need to remove wires or install jumpers. Operation of the zone disconnect switch shall cause operation of the system trouble signal on the fire alarm control panel. Smoke detection zones for buildings with hard-wired (ie. not multiplex) fire alarm systems shall match boundaries of the sprinkler zones on each floor, unless an exception is authorized in writing by the Fire Prevention Section. Zoned multiplex (ie. not addressable) fire alarm systems shall be programmable to take any zone out of service, but activation of this feature shall cause a system trouble signal. Addressable multiplex fire alarm systems shall be programmable to take any device, zone, or circuit(s) out of service, but activation of this feature shall cause a system trouble signal.

All testing of the system shall be performed in accordance with NFPA 72 requirements.

The design and space layout of the fire command/control room shall be as a minimum:

- Two (2) hour rated enclosure.
- Located at or near the main lobby entrance aprroved by FPS preferable located on an outside wall, not located next to or adjacent to boiler, transfomer or hazardous locations.
- Provided with adequate ventilation necessary for removal of heat generated by equiptment.
- Electrical, mechanical or plumbing equiptment, other than directly related to the system, shall not be located in or routed

through the fire command/control room including ceiling plenum.
• Provide 1525 mm (5 feet) of clearance in front of all panels and clearance at the top, sides and back of panels per written equiptment manufacturer's requirements.

All 120 volt A.C. primary operating power for the fire alarm system shall be obtained from the line side of the building incoming power source ahead of all building services and disconnect switches. Provide an independently fused safety switch which has provisions for the cover and operating handle to be locked in the "power on" position. Locate this fused safety switch adjacent to the main electrical distribution panel. This enclosure shall be painted red, and shall be labelled by a letter designation.

All fire alarm systems shall be equipped with a two minute time delay, such that all "trouble" alarms are transmitted to the NIH Fire Department between 120 and 200 seconds after the trouble condition occurs.

The A/E shall provide a fire alarm riser diagram on the electrical power (contract) drawings with the following information shown:

- All fire alarm initiating devices (smoke detectors, heat detectors, manual pull stations, sprinkler waterflow switches, control valve tamper switches, and any other supervisory devices)

- All fire alarm notification appliances (white strobes, red strobes, horns, speakers, chimes)

- Existing fire alarm control panel; new fire alarm control panel and any remote panels; all conduit and wire (sizes and quantity)

- All interfacing devices (electric door strikes, door hold open devices, auxiliary relays, terminal cabinets)

H.8.15 Duct Smoke Detection *(NFPA 90A)*

Duct Smoke Detectors are NOT required except in air handling units which serve health care occupancies per NFPA 101

requirements. Where duct smoke detectors are installed, they shall be installed in accordance with NFPA 90A. Where duct smoke detectors are installed, they shall be of the photoelectric type, connected to the building fire alarm system, cause a supervisory (not evacuation) alarm condition and shall cause shutdown of the associated air handler upon alarm.

H.8.16 Fire Extinguishers *(NFPA 10)*

Fire extinguishers shall have fully recessed cabinets, with the upper edge at 1.37 meters above the finished floor. All fire extinguisher cabinets shall be sized to contain a 9.6 liter pressurized water extinguisher (Type 2).

Fire extinguisher cabinets shall not have locks.

Fire extinguishers shall not be provided in open parking garages.

All fire extinguishers shall be located in the corridors. The maximum travel to an extinguisher shall be 23 meters.

If the construction project requires more than 10 fire extinguisher cabinets, then the construction project budget shall include the purchase of the portable fire extinguishers. The type and size of the fire extinguishers shall be specified by the NIH fire department.

H.8.17 Means of Egress *(NFPA 101)*

The design shall comply with NFPA 101, The *Life Safety Code*, requirements.

No loading dock exit door shall be utilized as required egress path as the are subject to looking for security and any such doors shall be adequately posted "Not An Exit."

H.8.18 Roof Coverings *(BOCA International Building Code)*

All roof coverings shall be Class A listed by U.L. in the U.L. *Building Materials Directory* based upon U.L. 790, *Test Methods*

for Fire Resistance of Roof Covering Materials.

H.8.19 Roof Deck Assemblies *(BOCA International Building Code)*

Roof deck assemblies shall be listed as Class I in the FM Approval Guide and/or as Fire Classified in the U.L. *Building Materials Directory*.

H.8.20 Fire Protection Emergency Power Requirements *(BOCA International Building Code, NFPA's 20, 72, 101)*

The following systems shall be provided with an approved secondary power source:

- Exit signage
- Exit lighting (exit access and exit)
- Fire protective signaling system (fire alarm system)

The following systems shall be connected to the emergency generator powered circuits, if such equipment is provided or exists:

- Exit signage
- Exit lighting (exit access and exit)
- Fire protective signaling system (fire alarm system)
- Elevator(s)
- Smoke control system (including controls and fans)
- Electric fire pump
- Electric fire pump controller
- Dry pipe sprinkler system air compressor/ air maintenance device

- Fire control room environment (power, lighting, HVAC)

- Elevator shunt trip power feeds

  Electrical Receptacles for Fire Department Use: Provide single receptacle NEMA L5-20R, twist-lock, 125 V receptacles at each standpipe system connection within stairwells and at 30 meter intervals in the exit access corridors at each level for the operation of fire department electrical equipment in the event of an emergency. The receptacles shall be provided with a red cover plate and be suitably identified by the following lettered designation "For Fire Department Use Only."

H.8.21 Elevator Fire Protection *(ANSI A17.1, NFPA's 13 & 72)*

Elevator fire safety arrangements shall meet the latest version of the ASME/ANSI A17.1 Elevator Code and NFPA 13 & 72. The requirements of these documents shall be supplemented by the latest General Services Administration (GSA) requirements for elevators and by the additional NIH requirements listed below.

Phase 1 Emergency Recall Operation (ANSI A17.1 - 211.3a)

- A three position (OFF, ON, and BYPASS) key-operated switch for Phase I Emergency Recall Operation shall be provided only at the primary designated level and alternate level for each single elevator or group of elevators. The key shall be removable in the OFF and ON positions only. The switch shall normally be in the OFF position. Operation of the three positions shall be as follows:

- OFF Position - Restoration of normal elevator service to the elevator or group of elevators served by the switch.

- ON Position - Recall of the elevator or group of elevators served by the switch to the designated or alternate level.

- BYPASS Position - Allows the restoration of normal elevator service to all elevators served by the switch, regardless of elevator smoke detector(s) status.

- The contractor shall provide Phase I Emergency Recall Operation and Phase II Emergency In-Car Operation key switches (which come with the installation of the elevators) for use during construction. After complete installation and before final acceptance by the Government, the contractor shall replace the aforementioned switches by installing Government furnished Phase I Emergency Recall Operation and Phase II Emergency In-Car Operation key switches. These Government furnished switches shall be tested by the Government during the final inspection and acceptance testing of the elevators.

Smoke Detectors (ANSI A17.1 - 211.3b)

- Smoke detectors (multiple detectors where lobby areas are large enough to acquire them) shall be provided in each elevator lobby/landing and in all elevator machine rooms. smoke detectors shall NOT be installed at the top of the elevator shaft/hoistway.

- The activation of a smoke detector in any elevator lobby/ landing, other than the designated level, or in any associated elevator machine room shall cause all cars in the group (common to the machine room or hoistway) to return nonstop to the designated level in conformance with the requirements of ANSI A17.1.

- If the smoke detector at the designated level is activated, the operation shall conform to ANSI A17.1 except that the cars shall return nonstop to an alternate level approved by the NIH Fire Prevention Section.

Phase II Emergency In-Car Operation (ANSI A17.1 - 211.3c)

- A three position (OFF, ON, and HOLD) key-operated switch for Phase II Emergency Recall Operation shall be provided

in all elevator cabs. The key shall be removable in the OFF - ON and HOLD positions. The switch shall normally be in the OFF position. Operation of the three positions shall be as follows:

- OFF Position - Automatically cause the elevator to return to the "designted level" for use by later arriving firefighters.

- ON Position - Permits the firefighter to take control of the elevator overriding automatic operations.

- HOLD Position - Allows the firefighters to remove the key and leave the car without danger of the car being taken to another floor.

- The contractor shall provide Phase I Emergency Recall Operation and Phase II Emergency In-Car Operation key switches (which come with the installation of the elevators) for use during construction. After complete installation and before final acceptance by the Government, the contractor shall replace the aforementioned switches by installing Government furnished Phase I Emergency Recall Operation and Phase II Emergency In-Car Operation key switches. These Government furnished switches shall be tested by the Government during the final inspection and acceptance testing of the elevators.

Sprinklers in Machine Rooms (ANSI A17.1 - 102.2)

- Sprinklers shall be provided in all elevator machine rooms in accordance with NFPA 13. Sprinkler heads shall be rated at 141°C and be equiped with sprinkler head guards. The temperature rating of the sprinklers in the machine room must be higher than the heat detectors (57.2°C). Sprinklers shall not be provided in elevator hoistways. Means shall be provided to interript power to the elevator driving machine upon activation of sprinklers in the elevator machine rooms.

- Fixed-temperature (57.2°C) heat detectors shall be provided

in each elevator machine room. Activation of a heat detector shall cause shunt-trip breaker(s) to disconnect the main line power to the affected elevator. The actuation of heat detector(s) shall cause a "supervisory alarm" on the building's fire protective signaling system, if provided. No heat detectors are required in the elevator hoistway. Heat detectors shall be placed within 0.61 meters laterally of each sprinkler.

- A sprinkler system waterflow switch shall be provided for the elevator machine room sprinklers, it shall not be equipped with a time delay mechanism, and the waterflow switch shall not cause elevator power to shunt trip. Each sprinkler supply line serving elevator machine room (EMR) sprinklers shall be equipped with a supervised (tamper switch) O.S.&Y. control valve located immediately outside the EMR.

- For buildings with a multiplex/ addressable fire alarm system, the interuption of power to the elevator driving machine upon activation of sprinklers in the elevator machine rooms shall be accomplished through the fire alarm system software. The elevator shall perform Phase I recall prior to the interuption of power.

H.8.22 Smoke Control Systems: (*BOCA International Building Code)*

Smoke control systems, if provided or being renovated, shall have their method of operation and control mechanisms clearly defined in the "Fire Protection Analysis".