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I. WRIGHT STATE UNIVERSITY ENVIRONMENTAL HEALTH AND SAFETY CAMPUS DESIGN AND CONSTRUCTION SPECIFICATIONS/REQUIREMENTS – May 2013

A. Purpose

These specifications have been developed by Wright State University's Department of Environmental Health and Safety (EHS) to serve as specifications for all campus projects. Adherence to these specifications will result in projects designed to reduce the campus impact on the environment during demolition and construction, maintain the safety and health of project workers, and create a final product that takes into consideration the safety, health, and environmental impacts during future use and maintenance activities.

B. General Comments Relative to all Planning, Design, Demolition, and Construction Jobs:

The university shall use an overall risk management system approach to design for environmental, health and safety. By utilizing codes, regulations, guidelines, and best practices to identify and mitigate building-related health and safety risks early in the design phase of the project, occupants, including maintenance personnel, will be free from safety and health concerns. Environmental and occupational risks can include, but are not limited to, asbestos, lead based paint, confined spaces, fall protection, soil contamination, storm water, pre-treatment, and NPDES requirements.

The most recent version of ANSI/AIHA Z10 should be used to guide design efforts. Each building design phase shall identify and mitigate risks in accordance with the following order of precedence; 1) Eliminate or reduce the hazard; 2) Isolation of the hazard; 3) Provision of warning devices; and 4) Identification and development of procedures and training.

The Occupational Safety and Health Administration (OSHA) does not directly regulate facility design; however, the construction, operation, and occupation of facilities must comply with OSHA regulations. The university shall ensure all facilities, renovations, and related-construction activities maintain compliance with 29 CFR 1926. The design shall anticipate all facility operations and maintenance be performed in compliance with 29 CFR 1910; Ohio Administrative Code 4101; nor subject building occupants to conditions in violation of 29 CFR 1910.

C. Specific Design, and Construction Considerations

The following considerations are not intended to be all inclusive of the environmental health and safety issues related to every project, nor are every consideration applicable to every project. These considerations are based on observations made from past experiences and are listed to ensure similar matters are addressed at the design and construction phase of a project.

1. Environmental Impact Considerations

- a. In any area where physical demolition is to take place the project shall ensure a third party site assessment of the area be performed for the presence of asbestos containing material, lead paint and walls or shielding, PCB's (specifically in light ballasts but in other possible material), mercury containing fluorescent lighting, mercury containing devices (i.e. thermostats, etc...), mechanical system fluids in equipment requiring removal or demolition (i.e. oils, antifreeze, freon, etc...), tritium exit lights, miscellaneous left behind hazardous material, potential drain trap contamination, fume hood removal hazard safety, batteries, and any other potential hazardous material. Based on the assessment a plan for the safe and legal demolition as well as disposal of all identified material shall be developed, submitted and approved by the university prior to demolition or renovation.
- b. If the construction project results in the disturbance of greater than one acre of land the project will be subject to OEPA construction activity storm water discharge permitting. If greater than one acre is to be disturbed responsible parties must be determined and a permit procured prior to commencement of construction activities.
- c. Regardless of construction site size, post-construction storm water management strategies, or systems, should be designed as part of any project that will affect stormwater discharge. Maintenance procedures for all post construction storm water management systems must be included in the contractor's closeout documents.
- d. Any new storm water connections created during the project must be in compliance with WSU's storm water permit. A copy of the university's EPA NPDES storm water discharge permit which covers WSU's storm water discharge activities is available on Environmental Health and Safety's website (<http://www.wright.edu/admin/ehs/>) or can be accessed by contacting WSU Environmental Health and Safety. Any storm water connections that are not authorized discharge activities under the university's permit shall not be constructed.
- e. Any interior storm water drainage system (i.e. a system designed to collect wastewater or other discharge from an interior process) shall be removed or re-routed to prevent illicit storm water system discharges from the university in violation of the university's EPA NPDES storm water discharge permit.
- f. A list of any new equipment to be installed, or any existing equipment that is altered, that contains 55 gallons or more of oil must be forwarded to WSU Environmental Health and Safety. Examples of such equipment include, but are not limited to, elevators, electric switches, waste oil storage, generators and

transformers. This information is needed to remain compliant with EPA spill prevention rules.

- g. Any emergency generator and/or boiler system that does not meet the exemption for air permitting pursuant to OAC 3745-31-03 or the “de-minimus” air contaminant source exemption pursuant to OAC 3745-15-05 must be properly permitted prior to installation and all permits of such sources must be provided to WSU Environmental Health and Safety.
- h. Underground storage tanks are not to be designed into any projects without prior approval from WSU Environmental Health and Safety.

2. Laboratory Considerations

- a. The most recent published version of the *ASHRAE Laboratory Design Guide* shall be used as a reference for the planning, layout, and design of laboratories.
- b. Laboratory ventilation shall be designed consistent with the most recent published version of the *American National Standards Institute (ANSI) Z9.5 Laboratory Ventilation* standard.
- c. All laboratories designed for the use of biological materials should be designed and equipped to at least meet the recommendations for a biological safety level 2 (BSL2) lab as described in the most recent published version of the CDC/NIH publication *Biosafety in Microbiological and Biomedical Laboratories*. Where more hazardous biological work is to be performed additional facility design would be required.
- d. Tissue culture rooms, or other rooms designed to house biological safety cabinets, must be designed with laboratory air, or provisions for other means of lab air must be made, to allow for the required annual certification testing of the biological safety cabinets.
- e. No gas jets/valves shall be designed for installation into any biological safety cabinets.
- f. All newly installed, or renovated, fume hoods should be designed following ANSI Z9.2 *Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems* and shall be commissioned under a performance test following ASHRAE Standard 110 *Method of Testing Performance of Laboratory Fume Hoods*.
- g. Fume hood location shall be designed away from doorways, high traffic areas, windows and not below or adjacent to supply/exhaust vents so the effectiveness of the hoods are not compromised due to airflow created by traffic patterns or other air flows.
- h. All newly installed, or renovated, fume hood systems shall be equipped with an airflow monitor and an alarm system that will allow notification to the user that the hood is not operating as designed and the system shall be designed to report alarm conditions to Physical Plant’s building automation system.
- i. Fume hoods must be identified with appropriate fan information to allow for the coordination of safe shutdown procedures during future maintenance activities.
- j. Fume hoods requiring special equipment such as filters, washdown systems, etc... must receive approval from WSU Environmental Health and Safety prior to installation.
- k. No eating or drinking is permitted in any research or teaching lab space, as such adequate space should be designed on each floor for the allowance of faculty, staff, and students to eat and drink in an area outside of any new or renovated laboratory.

- l. Office space, and other rooms suitable for eating and drinking, in laboratory buildings must be designed outside of the lab space. When made part of a laboratory design all office areas must have an entrance from the outside corridor. The integrity of the laboratory's containment capability becomes compromised if entry into an office area requires a person to walk through a laboratory. This design is required to prevent occupants from bringing food and drink into or through the laboratory.
- m. OSHA and NIH regulations and guidelines call for labs to have sinks readily available for hand washing. At least one sink in each lab shall be designed with soap dispensing and hand drying capabilities. These sinks should be installed near the entrance/exit of each lab to allow for proper handwashing just prior to exiting, or upon immediate entrance, into labs.
- n. All furniture within the laboratory must be capable of undergoing decontamination in the event of a spill event (no cloth-coverings allowed).
- o. Laboratory doors shall be self-closing design for security reasons and to assist with keeping the lab air pressure negative to the hallways.
- p. Any project that will include the installation of chemical storage cabinets shall ensure the cabinets are adequately sized based on input from their end user. All flammable/combustible chemical storage cabinets must be designed per the specifications of NFPA 30 Chapter 4.3.3(a) and (b) and OSHA 29 CFR 1910.106(d)(3)(ii) through (d)(3)(ii)(a). Corrosive chemical cabinets must be designed as corrosion resistant cabinets, preferably the polypropylene or polyethylene type. Areas for the installation and use of chemical storage cabinets should be such that they are not near a lab egress so as to allow for emergency exiting in the case of a release of a chemical from the cabinet or a fire.
- q. Designated chemical storage areas, including cabinets, should be constructed with secondary containment capabilities.
- r. All compressed gas storage areas must be equipped with proper restraining systems with the capacity to restrain the number of cylinders designed to be stored within the area.
- s. The requirement to install, or keep, acid neutralization pits must be evaluated. Requirements to receive an exemption from the local plumbing authority should be verified and received if needed. Requirements that must be met in order to qualify for an exemption (i.e. lab sink labeling, acid use inventory, etc...) must be made part of the scope of work for any applicable project.
- t. All laboratory vacuum systems should be designed as local lab systems with filtering capability in the lab. No house vacuum systems shall be designed without filtering capabilities, preferably at each laboratory.
- u. Laboratory room signage shall be installed at the entrances of all laboratories consistent with lab signage used in other laboratory buildings on campus such that hazard communication information representative of the work being done in the lab can be posted.

3. Emergency Showers/Eyewash Stations

- a. Emergency showers and eyewashes must be provided for all locations where hazardous materials are used, including, but not limited to, laboratories and mechanical rooms. All emergency eyewash and shower stations must be designed, operated, and located compliant with the most recent published

version of ANSI Standard Z358.1 *American National Standard for Emergency Eyewash and Shower Equipment* which.

- b. Emergency showers and eyewashes should be accompanied with an appropriately designed drain to accept wastewater during testing and/or use. Consideration should be given to the fact a large volume of water will be discharged if the showers are designed to ANSI standards and they are operated for fifteen minutes as recommended after a chemical exposure. The drainage for the eyewash stations should be designed such that if direct flow to a floor drain does not exist a testing bucket can be easily positioned under the drain to collect water during testing.
- c. All emergency showers or eyewash stations that are moved, newly installed, or altered in any manner shall be tested by the contractor, prior to release to the university for use, per the requirements of the most recent published version of ANSI Standard Z358.

4. Fall Protection Considerations

- a. Fall protection solutions for maintenance activities must be designed into the installation of all new equipment and locations where fall hazards exist. This shall include, but not be limited to:
 - i. New light installations such that cleaning and maintenance can be performed in a manner that will not subject personnel to fall hazards. Design shall be such that maintenance and cleaning can be performed by personnel through the safe use of a ladder in compliance with 29 CFR 1910.26(c)(3) or engineering controls shall be designed that will allow the equipment to be lowered, otherwise adjusted, or fall protection systems installed for safe access for cleaning and maintenance.
 - ii. Any mechanical equipment (i.e., fans, cooling towers, etc...) such that cleaning and maintenance can be performed in a manner that will not subject personnel to fall hazards. Fall protection shall be provided in compliance with 29 CFR 1910.23.
 - iii. Fall protection for roofs must be addressed to include an engineered fall protection component for all new or renovation roof related design. A parapet (equal to or greater than 42 inches) along the perimeter of rooftops shall be of first consideration. In the absence of such a parapet the engineered fall protection component must provide protection for all accessible areas of the roof.
 - iv. Skylights shall be installed to prevent accidental breakage to workers on roof tops and occupants below. During construction and installation 29 CFR 1910.23(a)(4) shall be enforced. At a minimum, skylights shall have screens to protect workers from falls. Skylight screens shall be of such construction and mounting that they are capable of withstanding a load of at least 200 pounds applied perpendicularly at any one area on the screen. They shall also be of such construction and mounting that under ordinary loads or impacts, they will not deflect downward sufficiently to break the glass below them. The construction shall be of grillwork with openings not more than 4 inches long or of slatwork with openings not more than 2 inches wide with length unrestricted. Skylights shall be designed to protect occupants beneath a skylight. In the event of glass failure, the inboard glass shall contain screening **or equivalent** to contain and capture falling glass. Optimal design would utilize shatter proof glass

that prevent workers from falling through a skylight and skylight glass from falling to occupants below. Any new or renovated skylight that must be installed, or remain, shall be constructed, or retrofitted, so as to be compliant with 29 CFR 1910.23(e)(8).

- v. Floor loading protection shall be provided in compliance with 29 CFR 1910.22(d) such that the loads approved by the building official for every building or other structure, or part thereof, shall be marked on plates of approved design and securely affixed in a conspicuous place in each space to which they relate.

5. Lockout/Tagout Considerations

- a. Contractors installing new, or renovating any, equipment shall include a posted shut-down/lock out procedure designed to prevent accidental startup of the machine or equipment, and to prevent the release of stored energy during servicing or maintenance. All energy sources requiring lockout shall be labeled as such and the label shall correspond to the appropriate lock out method listed in the shut-down/lock out procedure for the piece of equipment it serves. All energy sources requiring lockout shall have a mechanism appropriate for lock out provided by the manufacturer or installer. These procedures shall be posted on the equipment or submitted in the contractor's closeout documents.

6. Drinking Water System Considerations

- a. For any project that will require shutdown of the campus drinking water system procedures must be developed for disinfecting and sampling of the system prior to startup. When applicable, the most recent published version of American Water Works Association Standard C651 or C652 shall be used to provide proper disinfection and sampling.
- b. A backflow prevention device must be designed and installed for any project that will create a new service connection to the campus water distribution system. The device shall be installed at the first possible location on the water distribution line after it enters a building.

7. Electrical Safety Labeling Considerations

- a. An arc fault analysis of the electrical system for any newly developed or renovated area shall be performed as part of any project and proper labeling of electrical equipment, panel boards, etc... for arc flash potential shall be provided in compliance with NFPA 70E.

8. Radiation Safety

- a. All building designs, renovations, and radiation generating equipment must conform to applicable Ohio Revised Codes, Ohio Administrative Codes, OSHA, EPA, local, and institutional codes, including the most current Wright State University radiation safety policies. All shielding designs must have the final approval of the Radiation Safety Officer and the Radiation Safety Committee.

9. Laser Safety

- a. All building designs and renovations must conform to applicable ANSI standard Z136, Ohio Revised Codes, Ohio Administrative Codes, OSHA, EPA, local, and institutional codes, including the most current Wright State University laser safety policies. All designs and renovations must have the final approval of the Laser Safety Officer.

10. Miscellaneous:

- a. Whenever new exit signage will be installed there must be assurance that they are not tritium exit signs.
- b. Any area designed as an x-ray producing equipment use area must have shielding calculations performed to determine shielding requirements. These calculations must be forwarded to the University Radiation Safety Officer in WSU Environmental Health and Safety for final approval.
- c. Any new or renovated equipment that will produce a sound level at or above 85 decibels (OSHA limit for the establishment of an employee hearing conservation program) shall be identified to WSU Environmental Health and Safety prior to installation. Sound reduction engineering controls shall be installed with this equipment where possible.
- d. Any project that will limit access to a previously designated storm/emergency shelter area must have a temporary area identified and the location communicated to building occupants prior to demolition/construction activities.
- e. Any project that will permanently affect the use of a previously identified storm/emergency shelter must have another area identified and communicated to building occupants upon completion of the project.
- f. Any project that will create a new, or alter an existing, confined space shall be identified to WSU Environmental Health and Safety prior to creation/alteration. A confined space is defined as any space that is large enough, and so configured, that any employee can bodily enter and perform assigned work, has limited or restricted means for entry or exit, and is not designed for continuous employee occupancy. Confined spaces include, but are not limited to: storage tanks, pits, vats, vessels, sewer manholes, electrical manholes, vaults, pump or lift stations, septic tanks, boilers, pipelines, ventilation and exhaust ducts, trenches, elevator shafts and excavations. A list of identified confined spaces on campus is available through WSU Environmental Health and Safety.
- g. Any new building shall be equipped with an operating Automated External Defibrillator (AED). AED installation shall also be part of a redesign of any existing building currently without an AED. The AED shall be of make and model consistent with AED's used throughout campus, installed at a location consistent with the location plan initiated by the university AED Committee, and connected to the university's police communication system.

11. Demolition/Construction Considerations

- a. Any project that is to include the removal and recycling of any fluorescent bulbs shall be performed in accordance with all applicable federal, state, and local rules

including, but not limited to, the OEPA Universal Waste rules of OAC 3745-273. The following must occur:

- i. Prior to commencement of work the proposed recycling facility for the recycling of fluorescent bulbs shall be submitted and approved by WSU Environmental Health and Safety.
 - ii. Fluorescent bulbs are to be removed intact and immediately placed in contractor supplied cardboard boxes designed for the storage of fluorescent bulbs. Each box must be marked as "Universal Waste Fluorescent Bulbs" and include the date and the count of bulbs contained in the box.
 - iii. Full and appropriately marked boxes shall be taped closed and stored in a centralized area and marked with barrier tape and signs denoting "Universal Waste Storage Area".
 - iv. Any bulbs broken during the removal and collection process must be immediately cleaned up and collected in appropriate containers acceptable for transportation and recycling by the recycling facility.
 - v. The contractor is responsible for the handling and transport of bulbs to the submitted Ohio EPA listed recycler. Transportation shall be in accordance with all applicable DOT and EPA regulations.
 - vi. Documents showing the proper handling, transport and receipt of materials to the recycling facility must be included in the contractor's closeout documents and shall include a copy of the recycling certificate noting the quantity of bulbs recycled. A copy of this documentation shall be forwarded to WSU Environmental Health and Safety.
 - vii. All costs associated with the management and recycling of fluorescent bulbs shall be the responsibility of the contractor.
- b. Any project that is to include the removal and disposal/recycling of any fluorescent lamp ballasts shall be performed in accordance with all applicable federal, state, and local rules.

The following must occur:

- i. Prior to commencement of work the proposed disposal or recycling facility for the disposal or recycling of fluorescent lamp ballasts shall be submitted and approved by WSU Environmental Health and Safety.
- ii. Fluorescent lamp ballasts are to be removed; wires clipped from the ends, and collected in appropriate DOT approved containers.
- iii. The contractor is responsible for the handling and transport of fluorescent lamp ballasts to the submitted approved disposal or recycling facility. Transportation shall be in accordance with all applicable DOT and EPA regulations.
- iv. Documents showing the proper handling, transport and receipt of fluorescent lamp ballasts to the disposal or recycling facility must be included in the contractor's closeout documents and shall include a copy of the disposal or recycling certificate noting the quantity of ballasts disposed or recycled. A copy of this documentation shall be forwarded to WSU Environmental Health and Safety.
- v. All costs associated with the management, disposal and/or recycling of fluorescent lamp ballasts shall be the responsibility of the contractor.

- c. Any hazardous material brought on-site during demolition or construction activities, including fuel in aboveground storage tanks, must be stored within secondary containment devices and a material safety data sheet must be submitted to WSU Environmental Health and Safety.
- d. Any discharges of wastewater or other waste liquids to the sanitary or storm sewer system during demolition or construction activities must receive approval from WSU Environmental Health and Safety prior to discharge.
- e. Any hazardous material brought on-site by the contractor must be removed from university property at the end of the project. The university reserves the right to dispose of any hazardous material left behind at the expense of the contractor.