S-245, Patrol Training Academy Live Fire Shoot House Facility

Functional Requirements and Design Criteria

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-09RL14728

P.O. Box 650
Richland, Washington 99352

Approved for Public Release;
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J. C. Henderson
Mission Support Alliance

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<tr>
<td>ACI</td>
<td>American Concrete Institute</td>
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<tr>
<td>AISC</td>
<td>American Institute of Steel Construction</td>
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<td>ANSI</td>
<td>American National Standards Institute</td>
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<td>ASCE</td>
<td>American Society of Civil Engineers</td>
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<td>AWS</td>
<td>American Welding Society</td>
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<td>CFR</td>
<td>Code of Federal Regulations</td>
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<td>CRD</td>
<td>Contractor Requirements Document</td>
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<td>CSA</td>
<td>Canadian Standard Association</td>
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<td>DOE</td>
<td>U.S. Department of Energy</td>
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<td>DOE O</td>
<td>U.S. Department of Energy Order</td>
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<tr>
<td>EOCP</td>
<td>Elevated Observation and Control Platform</td>
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<td>FEMA</td>
<td>Federal Emergency Management Agency</td>
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<td>FM</td>
<td>Factory Mutual</td>
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<td>FRDC</td>
<td>Functional Requirements and Design Criteria</td>
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<td>FRP</td>
<td>Fiber Reinforced Plastic</td>
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<td>GS</td>
<td>General Service</td>
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<td>HSESP</td>
<td>Hanford Site Electrical Safety Program</td>
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<td>IBC</td>
<td>International Building Code</td>
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<td>ICC</td>
<td>International Code Council</td>
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<td>IEC</td>
<td>International Electrotechnical Commission</td>
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<td>IEEE</td>
<td>Institute of Electrical and Electronics Engineers</td>
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<td>IES</td>
<td>Illumination Engineering Society</td>
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<tr>
<td>IH</td>
<td>Industrial Hygiene</td>
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<td>ISMS</td>
<td>Integrated Safety Management System</td>
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<td>LFSH</td>
<td>Live Fire Shoot House</td>
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<tr>
<td>MBMA</td>
<td>Metal Building Manufacturer’s Association</td>
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<td>MSA</td>
<td>Mission Support Alliance, LLC</td>
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<td>MSC</td>
<td>Mission Support Contract</td>
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<tr>
<td>NATO</td>
<td>North Atlantic Treaty Organization</td>
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<td>NEPA</td>
<td>National Environmental Policy Act</td>
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<td>NFPA</td>
<td>National Fire Protection Association</td>
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<td>NPH</td>
<td>Natural Phenomena Hazards</td>
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<tr>
<td>NRTL</td>
<td>Nationally Recognized Testing Laboratory</td>
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<tr>
<td>OSHA</td>
<td>Occupational, Safety, and Health Administration</td>
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<tr>
<td>PTA</td>
<td>Patrol Training Academy</td>
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<tr>
<td>SEPA</td>
<td>State and Environmental Policy Act</td>
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<tr>
<td>SSC</td>
<td>Systems, Structures, and Components</td>
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<tr>
<td>TRF</td>
<td>Tactical Response Force</td>
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<td>UL</td>
<td>Underwriters Laboratories</td>
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<td>WAC</td>
<td>Washington Administrative Code</td>
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1.0 INTRODUCTION

1.1 Background

The Hanford Site was first established during the early 1940’s to support the United States Government during World War II. Since its inception, the Hanford Site has required armed forces to protect the work occurring at Hanford. Security was provided by the military and internal police force until the 1950’s after which the military was pulled out of Hanford and Hanford Patrol was created. Hanford Patrol is responsible for protecting special nuclear materials, government property, classified information, and safeguarding the lives of all Site personnel.

Hanford Patrol established the Patrol Training Academy (PTA) in the 1970’s to support continual development of the highly trained protective security forces. In order to continue protecting the Hanford Site during the ongoing Cleanup Mission, Hanford Patrol must meet the requirements established in the Contractor Requirements Document (CRD) of U.S. Department of Energy Order (DOE O) 473.3, Protection Program Operations, including maintaining a Tactical Response Force (TRF). The TRF goes through rigorous training in defensive and offensive tactical operations that continually evolve to meet current and projected threats to Hanford. One of the important elements of the TRF training includes a Live Fire Shoot House (LFSH). The current PTA LFSH was the first constructed in the U.S. Department of Energy (DOE) Complex 30+ years ago and expanded capability is needed.

1.2 Scope, Mission, and Justification

The scope of Project S-245 is to design, procure and construct a new LFSH facility at the PTA. The LFSH facility consists of a covered concrete pad, enclosure steel panel walls and steel roof, the LFSH with Elevated Observation and Control Platform (EOCP), as well as the supporting infrastructure, lighting, and heat/environmental controls.

The existing LFSH is 30+ years old and the size and layout no longer reflects many of the newer operational facilities on the site. This limits the instructor’s ability to provide training in a realistic environment. New LFSH designs are modular and provide instructors unlimited size and configuration options. The existing LFSH, at its current demand, requires frequent maintenance to ensure the safety of trainees and instructors. Continued degradation at this use rate will eventually lead to a prolonged closure for significant repairs. This may cause noncompliance with the CRD. For these reasons, a new LFSH facility is required.

1.3 Site Location

The proposed location of the new LFSH facility is adjacent to PTA Range 5. Figure 1 shows the new LFSH facility west of the existing LFSH (building number 633) in a previously disturbed gravel area, south of the firing range. The exact location will be determined during the design process, upon completion of soils analysis, review of existing site utilities and infrastructure, and after Site Evaluation approval.
1.4 Facility Classification

The LFSH facility serves as an advanced tactical training facility for the Hanford Patrol. It does not house Safety Significant or Safety Class equipment. The LFSH facility is categorized as a Risk Category II structure per Chapter 16 of the International Building Code (IBC) and Chapter 1 of the American Society of Civil Engineers (ASCE) 7 Standard. It does not fall under the Federal Emergency Management Agency (FEMA) category of an Essential and Critical Building. The quality level for the LFSH facility is General Services, QL-3.

2.0 FUNCTIONS

This document defines the Functional Requirements and Design Criteria (FRDC) for the new LFSH facility.

2.1 Process, Production Requirements

The LFSH facility serves as an advanced tactical training facility for the Hanford PTA. There are no process/production requirements.
2.2 Operational Effectiveness Requirements

The LFSH facility is to be operationally effective year-round, 24 hours a day.

2.3 Preferred Technology

There are three (3) major components that make up the LFSH facility. These include the concrete foundation, the LFSH, and the overhead roof structure. The LFSH component, which includes the shoot house ballistic walls, doors, floors, and EOCP, is designed by a vendor specializing in LFSH design and construction.

2.4 Materials of Construction

The foundation is to be reinforced concrete. Materials for construction of the LFSH include plywood, solid wood, and steel. Metal components of the EOCP are hot dip galvanized steel. The overhead roof structure is constructed of steel. The exterior of the facility uses 12 ft. high steel wall panels and nylon netting to keep land crawling animals and birds outside the facility.

2.5 Identification of Studies, Analyses, and Other Reports

There are no related studies, analyses, or reports associated with this Project.

2.6 Unique Testing and Inspection Requirements

The LFSH component of the facility will require a Quality Assurance Inspection Plan.

2.7 Design Life

The LFSH will see extensive use due to the weapons training (i.e., gun fire, diversionary devices). The life of the LFSH may vary depending on type of training and frequency of use. However, it is expected the LFSH shall have a minimum design life of 10 years. The LFSH vendor shall provide a maintenance manual for the LFSH and spare parts for the LFSH components that are known to require periodic replacement.

2.8 Special Safeguards and Security Requirements

There is no special nuclear material or radiological materials associated with the LFSH facility. Therefore, there are no special Safeguards and Security requirements.

2.9 Health, Safety, and Environment

2.9.1 Radiological Control

The new LFSH facility conceptual location is a non-radiological controlled area. There are no radiological considerations for this Project.
2.9.2 **Industrial Hygiene**

There are no unique Industrial Hygiene (IH) issues associated with the design of the new LFSH facility. IH involvement in the construction process may consist of monitoring for cold stress, heat stress, air monitoring, and air sampling.

2.9.3 **Industrial Safety**

Safety is a top priority for Mission Support Alliance, LLC (MSA). Safety should be a consideration in all aspects of the design, construction and operation of the new LFSH facility. The Project shall follow all core functions and guiding principles of the Integrated Safety Management System (ISMS) and industry best practices.

2.9.4 **Environmental**

The design and construction will consider environmental aspects primarily related to the National Environmental Policy Act (NEPA) process. In particular, attention will be given to minimizing impact to any areas of old growth sagebrush and the impact to any biological communities (i.e. nesting birds, etc.) during the construction effort. The project design will minimize hazardous and non-hazardous waste generation and the use of hazardous materials during construction, operation and closure. All work shall be performed safely, in a manner that ensures adequate protection for employees, the public, and the environment as described in MSC-RD-EI-15332, *Environmental Protection Requirements* and in conjunction with MSC-PRO-EI-15333, *Environmental Protection Process*.

2.9.5 **Waste Management**

Waste will be managed in accordance with the Hanford Site and MSA specific procedures. Recycling and/or re-use of materials generated during this Project must be considered. All Subcontractor related products and materials, hazardous or non-hazardous, must be removed from the job site upon completion of the work in accordance with proper waste disposal methods.

3.0 **PROJECT INPUTS**

3.1 **Description of Existing System(s)**

The LFSH facility is a new construction project. There are no modifications to existing systems, structures, and components (SSC), or design baselines.

3.2 **Physical and System Interfaces**

The following site related physical interfaces exist:

- Water Supply – None
- Sewer – None
- Electrical Power – Existing 12.4kV power along ILA LANE
- Access Roads – Access to the site is available along ILA LANE after passing through the shooting range entry gate.

3.3 Design Assumptions

The following assumptions apply to the area where the new LFSH facility is to be constructed. Verification of these assumptions is required prior to start of construction.

- It is assumed that the soil supporting the LFSH facility is suitable for the loading of the new LFSH facility and any related construction activities. This assumption will need to be verified with a soil study.
- It is assumed that there are no in ground pipe, conduit, or structures. This assumption will need to be verified with a complete review for potential unforeseen in ground objects.

3.4 Design Constraints

No design constraints are identified for the new LFSH facility.

4.0 DESIGN CRITERIA

4.1 General Criteria

4.1.1 Design Specific Quality Assurance Requirements

There is no safety significant or safety class equipment. The facility and equipment shall be rated as General Service (GS) Quality Level 3 (QL-3) in accordance with MSC-PRO-QA-259, Graded Approach and MSC-PLN-QA-599, Quality Assurance Program Description.

The A/E shall maintain and implement a Quality Program to the extent applicable to scope of work. Documentation of the A/E’s Quality Program shall remain current and on record with MSA’s Acquisition Management Organization. Any changes to their approved Quality Program shall be submitted to the Contract Specialist in writing for review and approval by MSA.

4.1.2 Requirements for Flexibility and Future Expansion

The new LFSH facility shall have 100% spare power in the power feed so that if additional lighting or heating is required in the future, power is readily accessible.

4.1.3 Verification and Validation Strategy

Design verification shall be performed using MSC-PRO-ENG-8336, Design Verification.
4.1.4 Approach to Natural Phenomenon

Natural Phenomena Hazards (NPH) analysis and design shall be in accordance with DOE Standard DOE-STD-1020-2012, *Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities*. The LFSH facility is a non-nuclear facility. Requirements for non-nuclear facilities are described in Section 2.1 of DOE-STD-1020-2012. Section 1.3 of DOE-STD-1020-2012 gives guidance on use of standards referenced within DOE-STD-1020-2012 (regarding use of revisions/editions).

NPH loading and criteria is also addressed in MSA Standard MSC-STD-ENG-097, *MSC Engineering Design Codes, Standards and Site Specific Design Parameters*. The LFSH facility is considered a Performance Category PC1 facility (see Table 1 of MSC-STD-ENG-097). The governing codes and standards are listed in Section 5.0 of this document.

4.1.5 System Status Indicators

This section is not applicable to the new LFSH facility.

4.1.6 Fire Protection Requirements

The fire protection requirements for the LFSH facility are:

- Use of fire retardant treated plywood meeting the requirements of NFPA 703. Fire retardant plywood type is limited to pressure-impregnated only (not coated).

- Fire extinguishers will be provided at the facility to provide immediate manual fire suppression capability.

4.2 Facility Criteria

4.2.1 Architectural and Civil/Structural

This section defines the architectural and civil/structural criteria for each component of the new LFSH facility. Conceptual layout for the LFSH facility is provided in Attachment 1. Codes and standards for the LFSH are listed in Section 5.0 of this FRDC.

4.2.1.1 LFSH Facility – Building Exterior

The LFSH facility is a partially enclosed steel structure. The exterior of the facility uses 12 ft. high steel panel walls and nylon netting (connected from the wall panels to the edges of roof) to keep land crawling animals and birds out of the facility. The steel roof protects the interior from the outside elements (e.g., sun, rain, snow). See Section 4.2.1.4 of this document for description of the steel roof.
Access into the facility is available on the building south side and egress doors are available on the building west and east side. The main door, located on the building south side, opens to a concrete pad that extends far enough to allow placement of a standard 40 ft. conex box. The conex pad will be sized for a minimum of 10 ft. spacing between structures. The egress doors on the building west and east sides open to concrete pads. A rolling steel door is provided on the building east side. The rolling steel door is a manual chain type rolling door (no power) and not insulated. See Attachment 1, Figure A for additional detail on these components.

The color of the building exterior shall be tan or approved equal.

4.2.1.2 LFSH Facility – Building Interior

The LFSH (which includes the EOCP) is housed inside the facility. See Section 4.2.1.5 of this document for description of the LFSH component.

The building interior has two (2) lighting systems. The first lighting system uses indoor flood lights (ceiling mounted) to light the inside of the facility. The light switches for this system are installed at three (3) locations: (1) on the EOCP, in close proximity to the stairs; (2) on the EOCP, near the eastern wall of Room #7; and (3) near the main entrance door on the building south side. The second lighting system is dedicated to lighting the LFSH rooms/hallways during training activities. See Section 4.2.1.5 of this document for description of this lighting system.

A sufficient number for electrical receptacles are to be provided inside the facility (in addition to those provided in the LFSH) for maintenance type activities. Electrical receptacles are to be fixed to the steel structure. See Section 4.2.1.5 of this document for description of the electrical receptacles inside the LFSH.

4.2.1.3 Reinforced Concrete Foundation

The concrete foundation footprint is 80 ft. by 120 ft. with a depth sufficient for the loading. The concrete surface shall have a broom finish to minimize slip and tripping hazards. An efficient method of draining precipitation that falls inside the facility (near the edges of the foundation) will be incorporated to the reinforced concrete foundation design.

4.2.1.4 Overhead Steel Roof Structure

The overhead steel roof structure spans over the entire 80 ft. by 120 ft. footprint of the LFSH foundation. Per Section 4.2.4.4 in DOE-STD-1066-2012, the roof assembly shall be entirely non-combustible or meet the requirements for a Class 1 metal roof per Factory Mutual (FM) Data Sheet 1-31 (see Section 5.1). Snow guards will be used along the eaves of the roof.
4.2.1.5 Live Fire Shoot House

The LFSH (which includes the ballistic walls, doors, floors, and EOCP) is designed by a vendor specializing in LFSH design and construction. Construction of ballistic walls, doors, roof, floors, and the EOCP shall be in accordance with DOE’s Range Design Criteria, Section 6, “Live Fire Shoot House” (see Section 5.2). The general floor plan of the LFSH is shown in Attachment 1, Figure A and Figure B.

In addition to the DOE’s Range Design Criteria, the following requirements apply to the LFSH:

A. General: LFSH ballistic proof components are to be certified to support North Atlantic Treaty Organization (NATO) 7.62 mm ball ammunition. This will require use of steel that is 500 Brinell or greater.

B. Ballistic Walls: Only the outer most walls are exterior walls. All other walls are considered interior walls.

1) All plywood used for wall construction shall be fire retardant treated plywood (see Section 4.1.6 for additional requirements). Since the LFSH is a partially enclosed facility, the plywood will be considered exposed to weather.

2) 4 ft. fiber reinforced plastic (FRP) shall be affixed to the plywood in rooms and hallways to prevent gear from scratching plywood walls.

3) Wall height shall be 12 ft.

4) All interior walls and the inside-face of exterior walls will have a 12 inch wide red stripe along the top. This red strip represents the “No Fire Zone.”

5) LFSH Exterior Wall Construction: Four (4) layer construction consisting of:

   ¾” thick exterior grade plywood (face of wall outside LFSH)
   ¼” thick Brinell 500 or greater steel
   ¾” to 1 ½” of air space
   ¾” thick exterior grade plywood (face of wall inside LFSH)
6) Interior Wall Construction: Five (5) layer construction consisting of:

- ¾” thick exterior grade plywood
- ¾” to 1 ½” of air space
- ¼” thick Brinell 500 or greater steel
- ¾” to 1 ½” of air space
- ¾” thick exterior grade plywood

C. Movable Partitions

1) Three (3) movable partitions will be located as shown in the LFSH floor plan (see Attachment 1, Figure A).

2) Composition and construction will be identical to that of interior walls (to allow line of fire from both sides of partition wall).

3) Movable partitions will be suspended by overhead track.

4) Width of each movable partition will be sufficient to seal hallways and ensure no gaps between movable partition and LFSH walls.

D. Doors: All doors for the LFSH shall be standard solid wood doors. See LFSH floor plan in Attachment 1 for location, type (single or double), and door swing orientation.

E. Windows: Two (2) windows shall be provided as shown in Attachment 1, Figure A. Windows shall have ballistic shielding to cover them when not in use. One window (as identified in Attachment 1, Figure A) shall be breachable. Breaching components shall allow for easy replacement of expended part.

F. Room and Hallway Lighting

1) Lighting suspended from ceiling shall be provided in sufficient number of locations to eliminate shadows in rooms. For lighting below the EOCP, lighting may be on walls.

2) Lighting shall have explosion resistant enclosures or will be mounted in a manner to protect against the shock wave of flash bangs.
3) Lighting for each room shall be controlled by on/off light switch installed by each door in the room (flush mount).

4) Lighting for each hallway shall be controlled by on/off light switch installed at the ends of the hallway (flush mount).

5) For each room, a master light control shall be provided, with on/off switch and dimmer, on EOCP for instructor to control light in room. The master light control for each room shall be located on EOCP in close proximity to the room it controls.

G. Electrical Receptacles

1) All electrical receptacles for the LFSH shall be fixed to the underside of the EOCP.

2) Provide electrical receptacles near the entrance to each room.

H. EOCP

1) Light controls for the facility and each LFSH room shall be mounted on the EOCP as described in Section 4.2.1.2 and Section 4.2.1.5.F, respectively.

2) EOCP shall be 8 ft. wide and cruciform in shape, located above the LFSH Hallways 10, 11, and 12 (See Attachment 1, Figure B) to ensure activities throughout the LFSH can be observed. A 4 ft. wide extension leading to Room #6 (See Attachment 1, Figure B) is required to observe activities in Room #6.

3) Two (2) fire escape ladders are located on the north and west ends of the EOCP to provide secondary means of egress.

4) EOCP required to support multiple observers at a single time.

5) Metal components to be hot dip galvanized steel.

6) EOCP floor consists of open grating.

7) EOCP shall have metal guardrails.

8) Radiant electric heaters shall be placed running along the inside of the EOCP to keep personnel on the EOCP warm during cold weather. See Attachment 1, Figure B.

9) EOCP shall have ballistic proof plating (consisting of Brinell 500 steel) on the outside of the EOCP guardrails. This is not a...
requirement per DOE’s *Range Design Criteria*, but added as additional protection for personnel on EOCP. Ballistic proof plating to vertically from metal grating to top of the guardrail and horizontally along entire EOCP railing.

10) **EOCP access via one (1) stairway**, located on east side of the LFSH (as shown in Attachment 1, Figure A and B). Stairways shall have metal handrails and open grating treads and landings.

11) The EOCP and stairways will meet the requirements of Title 29 Code of Federal Regulations (CFR) Part 1910, and 1926. **NOTE:** These parts of Title 29 CFR have undergone recent revisions. Special attention is pointed to the following requirements:

1) Provide stairs, a ladder or a ramp for elevated areas that are accessed routinely and inspect as necessary to ensure they are maintained in a safe condition. [Reference 29 CFR Part 1910.22(c) and 29 CFR Part 1926.1051(a)].

2) Provide handrails for stairs with four (4) or more risers or those over 30 inches high, whichever is less. Handrails are installed between 30-38 inches as measured from the leading edge of the stair tread to the top surface of the handrail. [Reference 29 CFR Part 1910.28(b)(11), 29 CFR Part 1910.29(f), and 29 CFR 1926.1052(c)].

3) Ensure handrails are smooth surfaced with a shape that allows employees to firmly grasp and are installed with a minimum clearance of 2.25 inches from any other object. [Reference 29 CFR Part 1910.29(f)].

4) Ensure that a landing is provided when a door or gate opens up directly onto a stairway. The landing shall be at least as wide as the stairway and be a minimum of 30 inches in length measured in the direction of travel. The swing of the door or gate shall not reduce the usable depth of the landing to: less than 20 inches for platforms installed prior to January 17, 2017; or less than 22 inches for platforms installed on or after January 17, 2017. [Reference 29 CFR Part 1910.25(b) and 29 CFR Part 1926.1052(a)(4)].

5) Ensure stairs have uniform riser heights and tread depths. After January 17, 2017, standard stairs shall be installed at an angle between 30—50 degrees from the horizontal and have a maximum riser height of 9.5 inches and a minimum
tread depth of 9.5 inches. [Reference 29 CFR Part 1910.25(b) and 29 CFR Part 1910.25(c)].

6) Ensure a guard rail or stair rail system is installed on stairway landings that are 4 feet or more above a lower level. Stair rail systems installed after January 17, 2017 shall not be less than 42 inches measured from the leading edge of the stair tread to the top rail. [Reference 29 CFR Part 1910.28(b)(11)].

I. Exterior Baffle Walls

1) Four (4) exterior baffle walls shall be located as shown in the LFSH floor plan (see Attachment 1, Figure A).

2) Composition and construction is identical to that of exterior walls (line of fire from one side only).

3) Sized to eliminate line of fire from the associated opening.

4.2.2 Heating, Ventilation, and Air Conditioning

The LFSH facility will not contain a Heating, Ventilation, and Air Conditioning system. Radiant electric heaters shall be installed along the EOCP.

4.2.3 Utility Requirements

The only utility connected to the LFSH facility is electric power.

4.2.4 Maintenance

Reliability, availability, maintainability, and serviceability of the LFSH shall be considered in all aspects of design and installation.

Aspects to consider include, but are not limited to:

- Systems and subsystems shall be as functionally, mechanically, electrically, and electronically independent as practical
- Maintenance support services (e.g. electrical receptacles) shall be accessible
- Reduce to a minimum the incidence of preventive and corrective maintenance
- Minimize maintenance complexity
- Minimize the time requirements for maintenance
• Minimize the equipment and tools required for maintenance
• Design shall preclude the introduction of hazardous conditions during maintenance procedures (e.g. activities requiring lockout/tagout)
• Capacity of replacement or re-serviceability items
• Personnel and equipment mobility aids and restraints shall be provided
• Minimize maintenance requiring special skills
• General accessibility to perform inspections and maintenance on items
• Equipment and personnel protection.

The design disciplines will identify and prepare an owner/operator maintenance schedule/manual for the selected exterior and interior materials and equipment specified in the final design construction documents. Specialty design effort (e.g. emergency and site communications) will direct long term planning and maintenance requirements.

4.3 Modifications to Existing Facility

The LFSH facility is a new construction project. There are no modifications to existing SSCs and design baselines.

4.4 Equipment, Controls, and Automation

Lighting controls and heating equipment for the LFSH facility are described in Section 4.2.1.2 and Section 4.2.1.5. All electrical control panels and electrical equipment (a general term including material, fittings, devices, appliances, luminaries [fixtures], apparatus, etc. used as a part of, or in connection with, an electrical installation) incorporated into the LFSH facility design shall be labeled by an organization currently recognized by Occupational, Safety, and Health Administration (OSHA) as a Nationally Recognized Testing Laboratory (NRTL), with the following clarifications.

• The Canadian Standard Association (CSA) is not a recognized OSHA approved NRTL marking unless the label includes “US” or “NRTL.”
• The European Union CE Markings Directive 93/68EEC is not a recognized OSHA approved NRTL marking.
• The International Electrotechnical Commission (IEC), IEC Standard 60529 for enclosures (IPxx), is not recognized as an acceptable OSHA approved NRTL label.

Bullet-resisting equipment is to meet the requirements of Underwriters Laboratories (UL) 752, Level 5 and Level 8.
4.5 **Operational Requirements**

The LFSH facility shall be operationally effective year-round, 24 hours a day.

4.6 **Decontamination and Decommissioning**

The LFSH is a new construction project and is a non-nuclear facility. Therefore, this section is not applicable.

5.0 **CODES AND STANDARDS**

5.1 **Code of Record**

Approval of this FRDC, revision 0 shall establish the code of record.

<table>
<thead>
<tr>
<th><strong>Table 1. Code of Record</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>American Concrete Institute (ACI)</strong></td>
</tr>
<tr>
<td><strong>American Institute of Steel Construction (AISC)</strong></td>
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<tr>
<td><strong>American Society of Civil Engineers (ASCE)</strong></td>
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<tr>
<td><strong>American Welding Society (AWS)</strong></td>
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<tr>
<td><strong>FM Global Property Loss Prevention Data Sheets</strong></td>
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<tr>
<td><strong>Illuminating Engineering Society (IES)</strong></td>
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</table>
## Functional Requirements and Design Criteria

### National Fire Protection Association (NFPA)

<table>
<thead>
<tr>
<th>Number</th>
<th>Title</th>
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<tbody>
<tr>
<td>NFPA 1-2015</td>
<td>Fire Code</td>
</tr>
<tr>
<td>NFPA 10-2018</td>
<td>Standard for Portable Fire Extinguishers</td>
</tr>
<tr>
<td>NFPA 70-2017</td>
<td>National Electrical Code®</td>
</tr>
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<td>NFPA 70E-2009</td>
<td>Standard for Electrical Safety in the Workplace®</td>
</tr>
<tr>
<td>NFPA 72-2016</td>
<td>National Fire Alarm and Signaling Code</td>
</tr>
<tr>
<td>NFPA 90A-2018</td>
<td>Standard for the Installation of Air Conditioning and Ventilating Systems</td>
</tr>
<tr>
<td>NFPA 241-2013</td>
<td>Standard for Safeguarding Construction, Alteration, and Demolition Operations</td>
</tr>
<tr>
<td>NFPA 703-2018</td>
<td>Standard for Fire Retardant-Treated Wood and Fire-Retardant Coatings for Building Materials</td>
</tr>
<tr>
<td>NFPA 780-2017</td>
<td>Standard for the Installation of Lightning Protection Systems</td>
</tr>
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</table>

### 5.2 Regulations, Orders, and Standards

#### Table 2. Regulations, Orders and Standards

<table>
<thead>
<tr>
<th>Number</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>29 CFR 1910</td>
<td>OSHA</td>
</tr>
<tr>
<td>29 CFR 1926</td>
<td>Safety and Health Regulations for Construction</td>
</tr>
<tr>
<td>40 CFR 1500-1508</td>
<td>NEPA</td>
</tr>
<tr>
<td>DOE O 420.1C, Chg. 1, Attachments 1 and 2 (Chapters II and IV only)</td>
<td>Facility Safety Chapter II. Fire Protection Chapter IV. Natural Phenomena Hazards Mitigation</td>
</tr>
<tr>
<td>DOE O 473.3</td>
<td>Protection Program Operations</td>
</tr>
<tr>
<td>DOE-0359, Rev. 2</td>
<td>Hanford Site Electrical Safety Program (HSESP)</td>
</tr>
<tr>
<td>DOE-STD-1020-2012</td>
<td>Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities</td>
</tr>
<tr>
<td>DOE-STD-1066-2012</td>
<td>Fire Protection</td>
</tr>
<tr>
<td>HNF-36174, Rev. 5</td>
<td>DOE Fire Protection Handbook – Hanford Chapter</td>
</tr>
<tr>
<td>MSC-STD-ENG-097</td>
<td>MSC Engineering Design Codes, Standards and Site Specific Design Parameters</td>
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<tr>
<td>U.S. DOE Range Design Criteria, Section 6</td>
<td>Range Design Criteria Section 6. Live Fire Shoot House</td>
</tr>
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</table>

[https://energy.gov/ea/downloads/range-design-criteria-june-4-2012](https://energy.gov/ea/downloads/range-design-criteria-june-4-2012)

Per email DM/AP 10/26/2017
5.3 Washington Administrative Code and Revised Code of Washington Requirements

**Table 3. National Consensus Standards**

<table>
<thead>
<tr>
<th>WAC No.</th>
<th>Title</th>
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<tbody>
<tr>
<td>RCW Chapter 19.27</td>
<td>State Building Code</td>
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<tr>
<td>WAC 197-11</td>
<td>State and Environmental Policy Act (SEPA)</td>
</tr>
<tr>
<td>WAC 296-46B</td>
<td>Electrical Safety Standards, Administration and Installation</td>
</tr>
<tr>
<td>WAC Title 51</td>
<td>Department of Enterprise Services (Building Code Council)</td>
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</table>

5.4 National Consensus Standards

**Table 4. National Consensus Standards**

<table>
<thead>
<tr>
<th>Institution</th>
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<tbody>
<tr>
<td><strong>American National Standards Institute (ANSI)</strong></td>
<td></td>
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<tr>
<td>ANSI Y32.9, 1972</td>
<td>American National Standard Graphic Symbols for Electrical Wiring and Layout Diagrams Used in Architecture and Building Construction</td>
</tr>
<tr>
<td><strong>American Welding Society (AWS)</strong></td>
<td></td>
</tr>
<tr>
<td>AWS QC1</td>
<td>Standard for AWS Certification of Welding Inspectors</td>
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<tr>
<td><strong>Institute of Electrical and Electronics Engineers (IEEE)</strong></td>
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<tr>
<td>IEEE C57.12.00</td>
<td>Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers</td>
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<tr>
<td>IEEE C57.12.01</td>
<td>Standard for General Requirements for Dry-Type Distribution and Power Transformers Including Those with Solid Cast and/or Resin-Encapsulated Windings</td>
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<tr>
<td>IEEE STD 141™</td>
<td>Recommended Practice for Electric Power Distribution for Industrial Plants (Red Book™)</td>
</tr>
<tr>
<td>IEEE STD 142™</td>
<td>Recommended Practice for Grounding of Industrial and Commercial Power Systems (Green Book™)</td>
</tr>
<tr>
<td>IEEE STD 242™</td>
<td>Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems (Buff Book™)</td>
</tr>
<tr>
<td>IEEE STD 399™</td>
<td>Recommended Practice for Industrial and Commercial Power Systems Analysis (Brown Book™)</td>
</tr>
<tr>
<td>IEEE STD 446™</td>
<td>Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications (Orange Book™)</td>
</tr>
<tr>
<td>IEEE STD 493™</td>
<td>Recommended Practice for the Design of Reliable Industrial and Commercial Power Systems (Gold Book™)</td>
</tr>
</tbody>
</table>
5.5 Sustainability Requirements

The new LFSH does not meet the threshold for additional sustainability requirements.

6.0 REFERENCES

- DOE O 473.3, *Protection Program Operations*
- DOE-STD-1020-2012, *Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities*
- MSC-PLN-QA-599, *Quality Assurance Program Description*
- MSC-PRO-EI-15333, *Environmental Protection Processes*
- MSC-PRO-ENG-8336, *Design Verification*
- MSC-PRO-QA-259, *Graded Approach*
- MSC-RD-EI-15332, *Environmental Protection Requirements*
- MSC-STD-ENG-097, *MSC Engineering Design Codes, Standards and Site Specific Design Parameters*
ATTACHMENT 1

LFSH Facility Conceptual Floor Plan

The conceptual LFSH facility floor plan is provided in this attachment (see Figure A for lower level and Figure B for EOCP). Table A shows approximate sizes for each room/hall for the conceptual LFSH facility. These room/hall sizes are subject to change by the LFSH specialty vendor during their design process of the LFSH. Note that the LFSH is not centered on the foundation. Rather, the LFSH is shifted to the building north side to allow for instructor(s)-trainee congregation just outside Exterior Baffle Wall #4; and shifted to the building west side to allow adequate walking space around the EOCP stairway.

<table>
<thead>
<tr>
<th>Area</th>
<th>Approximately Size</th>
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<tbody>
<tr>
<td>Room #1</td>
<td>15’-6” x 27’</td>
</tr>
<tr>
<td>Room #2</td>
<td>18’-6” x 31’</td>
</tr>
<tr>
<td>Room #3</td>
<td>22’-6” x 15’</td>
</tr>
<tr>
<td>Room #4</td>
<td>18’-6” x 22’</td>
</tr>
<tr>
<td>Room #5</td>
<td>26’-6” x 27’</td>
</tr>
<tr>
<td>Room #6</td>
<td>12’ x 12’</td>
</tr>
<tr>
<td>Room #7</td>
<td>12’ x 10’</td>
</tr>
<tr>
<td>Room #8</td>
<td>27’ x 7’-6”</td>
</tr>
<tr>
<td>Hall #9</td>
<td>4’ wide</td>
</tr>
<tr>
<td>Hall #10</td>
<td>8’ wide</td>
</tr>
<tr>
<td>Hall #11</td>
<td>8’ wide</td>
</tr>
<tr>
<td>Hall #12</td>
<td>8’ wide</td>
</tr>
<tr>
<td>Hall #13</td>
<td>4’ wide</td>
</tr>
<tr>
<td>Hall #14</td>
<td>4’ wide</td>
</tr>
<tr>
<td>Hall #15</td>
<td>4’ wide</td>
</tr>
<tr>
<td>Hall #16</td>
<td>4’ wide</td>
</tr>
</tbody>
</table>
**Figure A.** Conceptual Floor Plan for the new LFSH Facility (Lower Level)
Figure B. Conceptual Floor Plan for the new LFSH Facility (EOCP)