



Downrange Power & Data Distribution



Live Fire Exercise Shoothouse



RANGE AND TRAINING LAND PROGRAM – MANDATORY CENTER OF EXPERTISE

U.S. ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE

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General

The shoothouse will be considered and treated as one training building. The layout of the structure will include training rooms, corridors, and an electrical room. A catwalk will be installed on the interior of the shoothouse. This catwalk structure will be used for the installation of the target outlets and the conduit carrying power and data to the target outlets and maintenance receptacles throughout the shoothouse.

The electrical room shall open exterior to the shoot house. The electrical room shall be sealed to prevent water from entering room.

All MCA provided/installed conduits shall be rigid galvanized steel. All conduit penetrations thru the walls shall be sealed to provide rodent protection.

Power

The shoothouse will be served by 120/240V, 1 phase, 3-wire secondary power. Voltage drop calculations shall be completed and submitted with the design for review. The designer shall ensure the voltage drop calculations are consistent with the allowable voltage drop defined by the National Electric Code standards and the Army Technical Manuals. Coated rigid steel conduit shall extend a minimum of 1524 mm (5') outside the building for all power circuits entering and leaving the structure.

The electrical room will house the panel board with a minimum of 32 spaces. All electrical and mechanical equipment located within the shoot house and the electrical room will be powered by this panel board. 20A, 2-pole breakers will be installed in the panel board for the target power outlets. The designer shall ensure the total target outlet volt amps placed on a single 20A circuit does not exceed the circuit breaker's trip rating. A good rule of thumb is the placement of no more than four single target power outlets on one 20A circuit. 20A, single pole breakers shall be provided for the camera/speaker outlets. A maximum of 5 camera/speaker outlets shall be installed on each 20A circuit.



Lighting

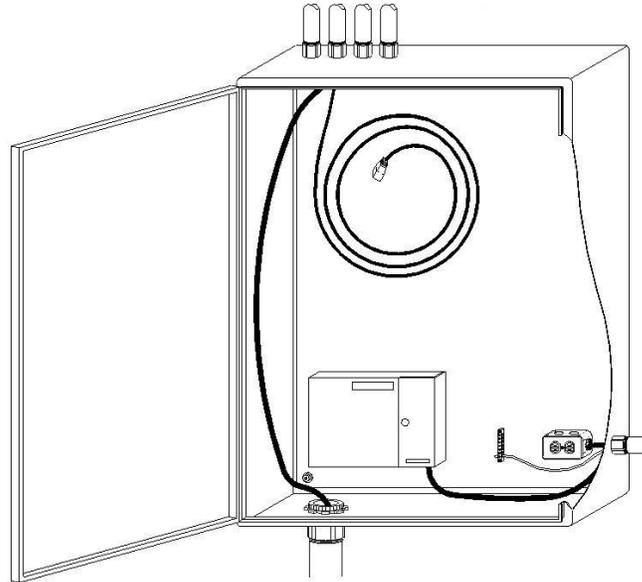
Interior illumination levels in the shoot house shall be designed for 30 Foot Candles at 2.5 feet ensuring safe movement within the building. Pendant style white interior lighting will be installed in locations so that there is no interference with the OPA provided/installed video cameras. The light fixture lamps used inside the Live Fire Shoothouse shall have a correlated color temperature (CCT) value greater than 4000 K. The interior lighting will be fed thru a lighting contactor that utilizes an H-O-A switch for both remote and local control. The design shall provide a lighting schematic stating the size of the contactor and illustrating how the contactor controls the interior lights. OPA will provide and install panic buttons and control wiring to the lighting contactor. The panic buttons will be connected through the MCA provided/installed lighting contactor. There will be a total of 7 panic buttons on the catwalk and 4 panic buttons by the Shoothouse doors. The conduit, junction boxes, and panic button boxes will be MCA provided and installed. The conduit shall be continuous from the panic button boxes back to the data enclosure and a conduit shall connect the lighting contactor with the data enclosure. The panic button boxes shall be FD type boxes with blank face plates. See sheet SHH-E-1 for location of panic button boxes. The design shall provide a mounting detail for the pendant mounted interior fixtures; consideration should be taken in the fixture mounting design so that there is no swaying of the fixtures due to environmental forces (i.e. wind, concussions from training). Lighting will be installed in the electrical room based on IES recommended lighting levels. Exterior lighting is provided on separate switches located near points of egress.

Data

Data shall be provided as a minimum 12-strand direct-buried, single mode fiber optic cable with a metallic armored jacket. The fiber optic cable shall extend from the AAR (After Action Review) structure to the Shoothouse wall mounted data enclosure. A coated rigid steel conduit extended a minimum of 1524 mm (5') from the structure will be installed for all data circuits entering or leaving the Shoothouse structure. Innerduct shall be installed in conduits where fiber optic cable enters the building. The design shall ensure no splices of the fiber optic cable are allowed between termination points.

The shoothouse data enclosure shall be a NEMA 4 wall-mounted enclosure sized at 3' wide x 4' high x 10" deep. The fiber optic patch panel shall be located in the bottom left-hand corner of the data enclosure. The designer shall ensure this patch panel does not exceed 9.5" high x 13.5" wide section of the data enclosure. All strands of the fiber optic cable shall be terminated on the fiber patch panel using SC type connectors. The SC connectors shall be individually and permanently labeled showing cable destinations. The design shall ensure the installation contractor does not exceed the minimum bend radius of the optical cable (i.e., 10 times the diameter of the cable under no load conditions) and there is no micro-bending (pinching) of the fiber cable.

A dedicated 120V, 20A duplex receptacle shall be installed in the bottom right-hand corner of the data enclosure. The designer shall ensure the space required in the data enclosure is minimized for the location of this receptacle.



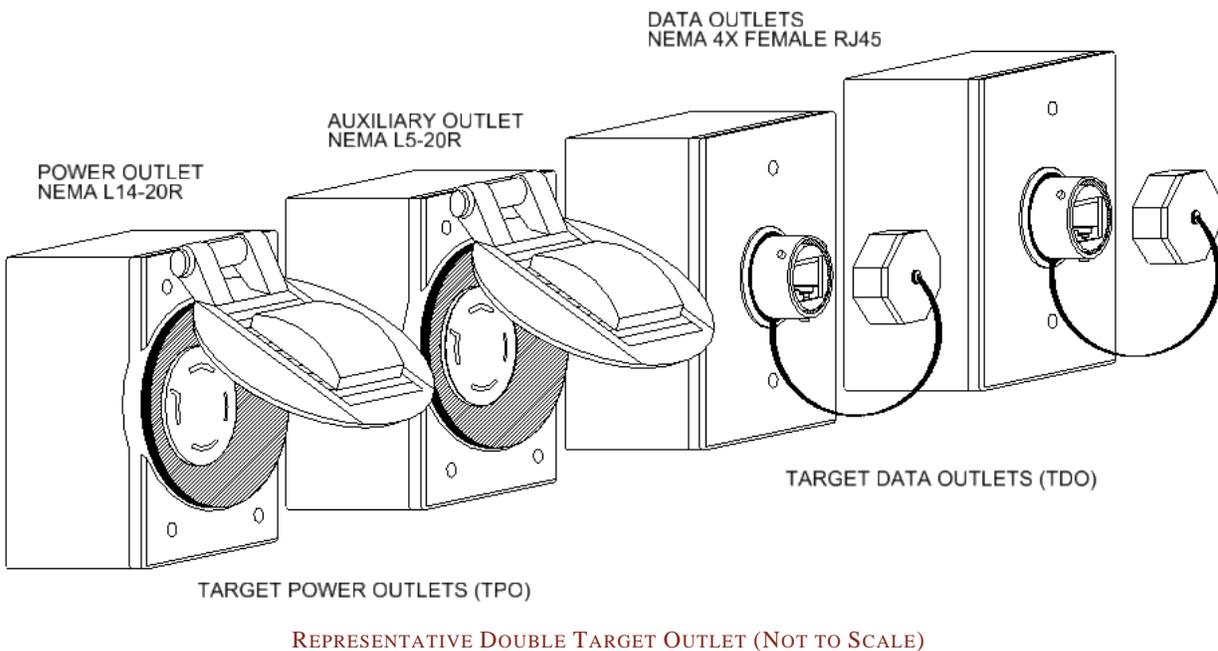
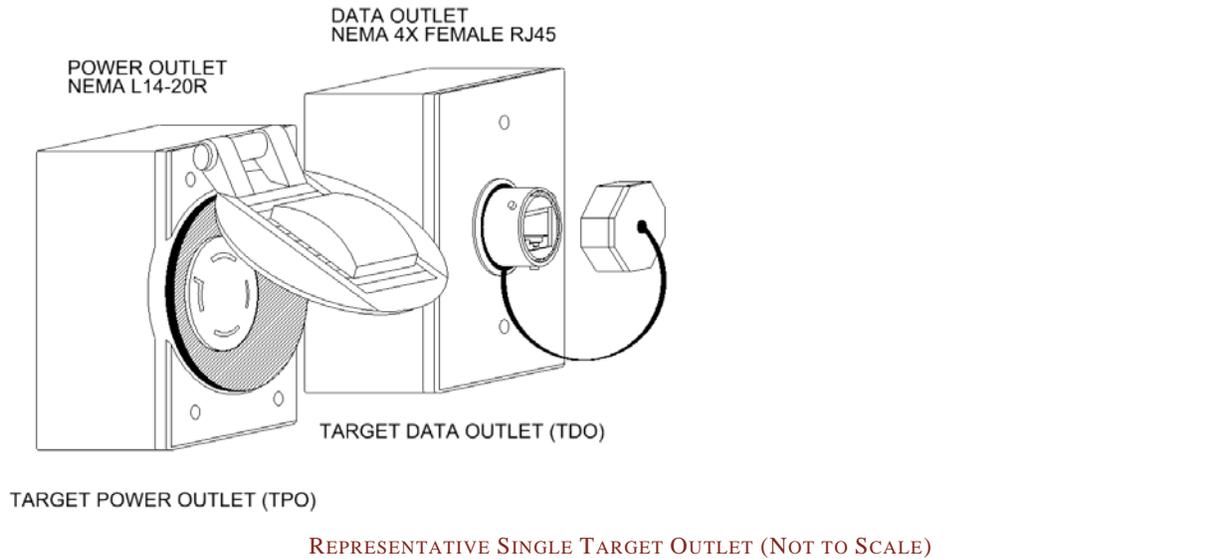
All CAT 6 data cables serving target/camera/speaker outlets throughout the shoothouse shall be routed into the data enclosure. The CAT 6 cables shall be terminated with male RJ-45 connectors, and this cable shall be routed so that a two meter service loop is available within the data enclosure. Service loop should be routed around interior perimeter of enclosure to maximize the available space for installation of future equipment. All data cables shall be permanently tagged adjacent to the applicable conduit penetration stating the cable destination.

All remaining space in the data enclosure is reserved for equipment to be installed by others. The designer shall ensure this required space is left available for future equipment.

Outlets

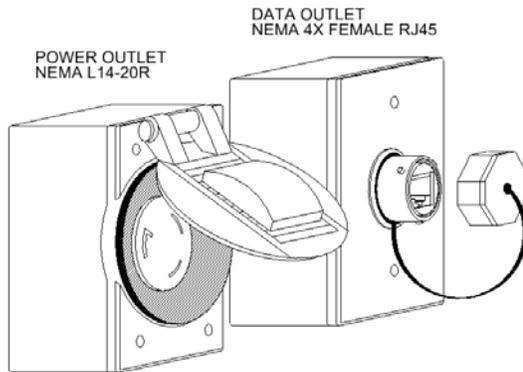
The shoothouse design will install 4 double target outlets and 14 single target outlets. A single UTO (Universal Target Outlet) is defined as a NEMA L14-20R and one NEMA 4X female RJ-45 outlet with screw on dust cover for data. A double UTO is defined as two NEMA L14-20R and two RJ-45 outlets for data. The NEMA L14-20R outlet shall be provided in a single gang weatherproof enclosure with a weatherproof while in use outlet cover. While in use outlet cover shall have an ethylene propylene gasket around throat of receptacle to prevent the entrance of moisture and dirt with cover open and plug inserted. The NEMA 4X, RJ-45 data outlet shall be an Amphenol RJ Field ¼ turn bayonet style female outlet in a weatherproof enclosure with a connector cap and gasket. Amphenol outlet part number is RJF21G and shall be installed in code “A” configuration according to manufacturer’s specifications. Data outlets will be Government provided and contractor installed. Delivery of data outlets will be coordinated during the Construction Compliance Inspection (CCI). The target and data outlets shall be

located around the shoot house catwalk per the revised SHH-E-1 plan. Maintenance receptacles shall be mounted on the catwalk frame 450mm (18”) above the catwalk and spaced no more than 25 feet apart. These maintenance receptacles shall be 120V, 20A, GFCI duplex receptacles with weatherproof covers. One, 120V, 20A, GFCI, duplex receptacle shall be installed in the electrical room for maintenance purposes.



The shoothouse design will install 16 camera outlets and 4 speaker outlets. Camera/speaker outlet is defined as a NEMA L5-20R and one NEMA 4X female RJ-45 outlet with screw on dust cover for data. The NEMA L5-20R outlet shall be provided in a single gang weatherproof enclosure with a weatherproof while in use outlet cover. While in use outlet cover shall have an

ethylene propylene gasket around throat of receptacle to prevent the entrance of moisture and dirt with cover open and plug inserted. The NEMA 4X, RJ-45 data outlet shall be an Amphenol RJ Field ¼ turn bayonet style female outlet in a weatherproof enclosure with a connector cap and gasket. Amphenol outlet part number is RJF21G and shall be installed in code “A” configuration according to manufacturer’s specifications. Data outlets will be Government provided and contractor installed. Delivery of data outlets will be coordinated during the Construction Compliance Inspection (CCI). The camera/speaker outlets shall be mounted to the ceiling or to the suspended camera grid if provided per SHH-E-1 plan.



REPRESENTATIVE CAMERA / SPEAKER OUTLET (NOT TO SCALE)

Grounding

A grounding system will be installed for this structure in accordance with NFPA 70, the National Electric Code, and all other applicable standards. The wall-mounted data enclosure shall be provided with ground lugs to the metallic back plate. A minimum #6 AWG green insulated ground cable shall be used to bond the data enclosure back plate to the power ground. The design shall provide adequate definition of this system on the plans and with the use of the specifications.

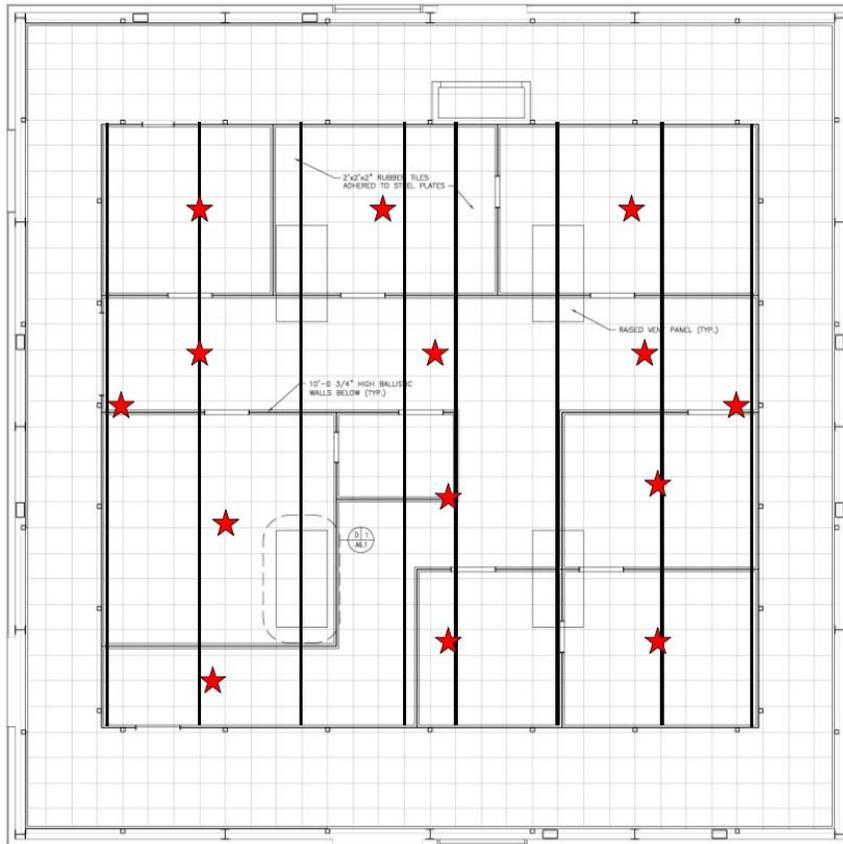
Lightning Protection

The shoot house requires a lightning protection system. This system shall be roof mounted air terminals, roof conductors, and down conductors installed per the NFPA 780 guidance. The design shall provide adequate definition of this system on the plans and with the use of the specifications.

Camera Mounting Provisions

The construction contract for a Live Fire Shoothouse includes a system for mounting cameras and speakers to the roof structure. Provide a grid of 1 5/8” deep industry standard slotted channels (i.e. Unistrut). Install eight sections that span the length of the training building. Design

each slotted channel to support 1500 lbs, minimum; assume each camera or speaker installed by the OPA contract weighs 50 lbs. Do not install the lighting system for the shoothouse on the slotted channel system. Install the grid at a height that will not allow the lights to be lower than the video cameras. See the sample layout below of the grid system installed over a standard Live Fire Shoothouse training building.



★ Camera/Speaker Location
(50 lb. weight loads)
— 1 5/8" slotted channel

Climate Control

The standard method of climate control is ventilation cooling and is to be provided via an exhaust fan and a motorized damper/louver combination in the electrical room of the Shoothouse. The designer shall provide a thermostatically controlled exhaust fan. Controls shall activate fan and louver/damper operation at a thermostat setpoint of 100° F (37.8° C). The required fan capacity (cfm) shall be determined by using HVAC load calculations, and shall be based on the removal of 3,000 Btu/hr exhaust heat from the rack mounted HVAC unit and the envelope loads for the facility. The exhaust fan and louver location shall be selected to optimize cross ventilation of the room. The electrical design shall incorporate the mechanical equipment loads and provide circuit breakers, conduit, conductor, and power receptacles applicable to the climate control equipment.