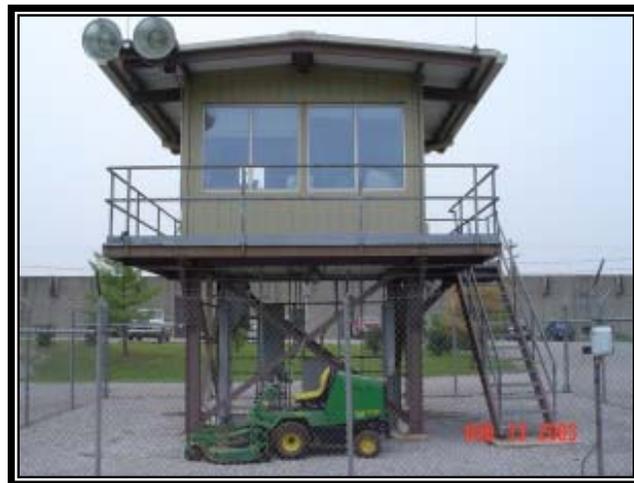


RANGE OPERATION CENTER (ROC) -Tower



Examples of the ROC-Tower

Function: The control room houses the Range Control Station (RCS), Data Termination Rack (DTR), optional Master Data Panel (MDP), instrumentation equipment, communications equipment, Power Panel (PP), Heating/Ventilation/Air Conditioning (HVAC), and also accommodates range personnel.

General: The ROC-Tower will be positioned near the baseline. The height to the floor of the control room will be one flight above ground per the standard design. (No observation decks are required). The ROC-Tower will be designed with deep roof overhangs and pull-down shades as well as other measures to reduce solar glare. All windows in the ROC-Tower are to be sliding windows in order to facilitate cleaning. The ROC-Tower may require a FAA aircraft warning light on the roof. A permanent ladder is also included to facilitate the changing of the roof lights. Security fencing will surround the ROC- Tower.

Design Drawings: See the ROCA Details in the Appendix of this document.

Siting Criteria: The ROC-Tower will be located approximately 15 to 50 meters behind the baseline in an area that provides an unobstructed view of the entire baseline. This location must have visibility of as much of the downrange area that is economically practical. The console operator must have an unobstructed view of the firing line and down range.

Typical Configuration:

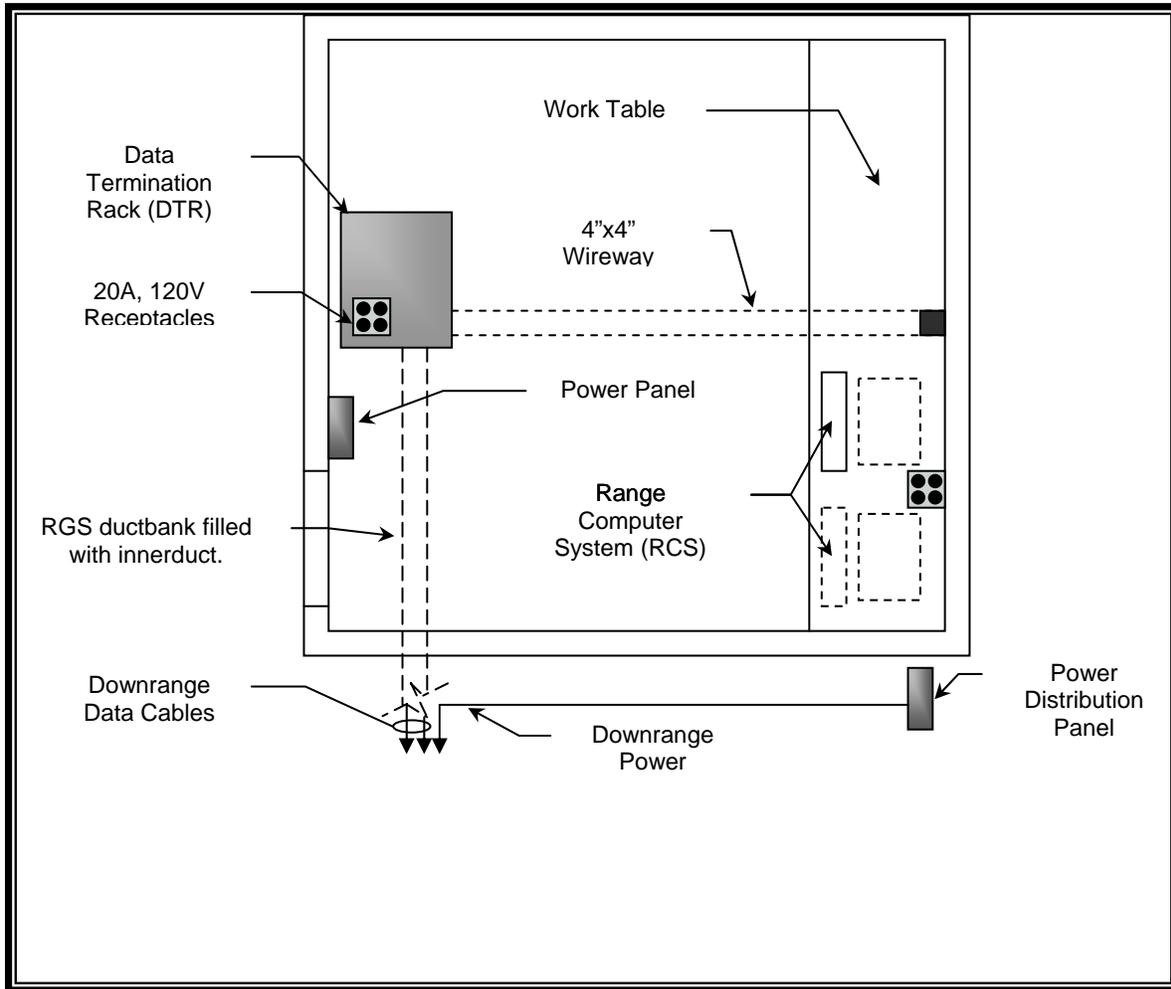
Size:	23.04 square meters (248.06 square feet)
Occupancy:	3
Foundation:	Concrete spread footings with grade beam
Shell:	Structural steel frame with insulated metal sandwich panels
Roof:	Insulated Standing Seam Metal Roof (SSMR) system
Doors:	Insulated hollow metal
Windows:	Aluminum frame with polycarbonate glazing
Interior Finishes:	Metal liner panel
HVAC:	Site adapt
Standard Lighting:	Fluorescent
Special Lighting:	Red lens or red lamps
Lightning Protection:	Mast equipment protection
Power:	120/240Vac, single phase, 3-wire secondary
Telephone:	Standard Voice Cable (optional)
Misc:	Built-in work table

Electrical/Communications: This section discusses electrical/communication considerations unique to this specific structure type. Downrange power, communication, load, transformers, trenching requirements, etc., are discussed elsewhere in this manual.

General: Electrical power distribution will conform to the Architectural Engineering Institute (AEI) and the Technical Manual (TM) 5-811-1. Voltage regulation and/or metering may be required. The voltage supplied must be maintained within 5 percent at a frequency of 60 Hz, +/-0.5; the design agency will verify the power supply for each site.

Power/Voice/Data to the Site: Single- or three-phase primary electrical service will be extended to the range site. Voice and data are optional.

ROC-Control Tower: Electrical service to the ROC-Tower will be 120/240Volt, single-phase or three-phase, 60 Hz. Surge suppression devices will be provided at the service entrance for protection of the ROC-Tower distribution system. The ROC-Tower



Representative ROC-Tower Layout (Not to Scale)

power panel (PP) will have separate circuits for lighting, convenience outlets, communications, and heating/ventilation/air conditioning, and heating/ventilation/air conditioning (HVAC) equipment. (See example below). Additionally, two dedicated 120 V, 20 amp duplex outlets on separate circuits/circuit breakers should be provided for each data termination rack/master data panel (DTR/MDP). Lighting will consist of fluorescent lighting and lights with red lamps or lenses for night operation with protected switching to prevent accidental illumination of white lights during these operations.

Grounding/Lightning Protection: Grounding and lightning protection system are required for safety. The ROC-Tower ground system will consist of a buried, No. 4/0 American Wire Gauge (AWG), stranded, copper conductor and ground rods all interconnected to yield a resistance of 25 ohms or less. The ground

rod will be located near each tower leg. The lightning protection system may be provided as a mast-style system or air terminals located on the building structure. All air terminals down conductors will be run on the tower's structural steel. The structural members will electrically interconnect the tower roof and floor. Cable connections and connections to the ground rods and structural steel will be exothermically welded. The DTR/MDP ground points will be connected to a Single Ground Point (SGP) with at least a No. 6 AWG, insulated, stranded, copper cable. The SGP will be connected to the ground system with at least a No. 4/0 AWG, bare, copper cable. Any additional DTRs or MDPs should be bonded together with that same type and size copper ground.

Environmental: The indoor temperature for the operational equipment should be between 60°F (15.5°C) and 80°F (26.7°C). The non operating equipment should be between -40°F (-40°C) and 158°F (70°C). Humidity should be with in 50% +/- 10% (non-condensing).

Telephone Communication: Telephone communications are not a requirement, but if desired, they must be coordinated with the local installation Directorate of Information Management (DOIM).

Communication-Targetry Control: Downrange targets will be connected to the DTR with direct burial fiber optic or category 5e or better (copper) cabling via conduit; conduit shall be filled with innerduct for future expansion. The DTR is an enclosed equipment rack where all downrange cables are terminated in a cross-connect panel. If fiber optic cabling is used, it must be terminated with industry standard, type SC connectors. If CAT 5E or better cable is used, it must be terminated with male RJ45 connectors, and the data circuits shall be protected by a listed primary protector. All cabling must be terminated and tested.

Other Procurement-Army (OPA) funded communications equipment will share DTR rack space or an MDP may be installed when space is not available in the DTR. The OPA funded equipment shall interface directly with all MCD provided hardware. The OPA-funded equipment will convert the fiber optic cables to industry standard, copper network cable and will provide network switching for connection of range targetry and associated systems with the Range Control System (RCS). The target/command and control system will be Ethernet-based.

In instances that voice and data connections located interior to the facility are required, it should be noted these voice and data cables shall be terminated in a data termination panel separate from the data termination panels housing the terminations for the target equipment data connections.

Electrical Targetry Control:
For ranges from 0 to 300m deep, each lane will be powered individually from the ROC-Tower Power Distribution Panel. Lanes and targets on ranges greater than 300m deep will be powered from downrange power centers (PC) located on the range.



Public Address (PA) System:
Small arms ranges require a PA system to maintain safety on the firing line. This system will originate in the ROC, with speakers mounted on the ROC and poles along the firing line as required. There is not an Army standard for the PA system; the designer will need to ensure that the customer's PA requirements are met.

White Light - Red Light: Due to night firing requirements, all lighting within the ROC and along the baseline will need to be in both white and red lighting to ensure range operations. White light is required for range set-up, emergencies, and cleaning up "brass", red light is required during training, so as not to ruin the soldiers night vision. This system will originate in the ROC, with lights mounted on the ROC and poles along the firing line as required. Protected switching must be provided to prevent accidental illumination of white lights during night operations. Where necessary, low-level, in-ground lights (similar to airfield markers), may be used for vehicle parking areas and walkways. There is not an Army standard for the lighting system; the designer will need to ensure that the customer's lighting requirements are met.

