STATIONARY INFANTRY TARGET (SIT) CLUSTERS

SIT Clusters During Construction

General: The standard SIT emplacement utilizes a concrete emplacement with a geotextile/gravel drainage layer, a treated railroad tie front wall protection and a protective earthen berm. Installations may prefer other materials, which are acceptable as long as compatibility with target equipment, equipment protection and durability issues are satisfied. Low rounds are normally captured by the compacted earthen berm. If a round skims the top of the berm, the treated railroad tie front wall protection will capture the round before the round can damage the concrete emplacement. All permanent electrical and communication boxes are mounted on the front wall or close proximity to protect them from rounds that might skim over the top lip of the concrete emplacement. The target mechanism will be located on the floor of the emplacement as far forward as practical to minimize its potential to be hit by a low round, yet still allow access to the electrical/data boxes. SITs can be placed above- or below-grade.

Below Grade Emplacement. The optimum situation is to utilize below grade emplacements. They blend with the natural terrain and do not divulge the target position profile to the soldier/firer. Unfortunately, below-grade emplacements present several design issues as follows:

a. Drainage. On flat or down-slope emplacements, a lower elevation toward which to drain the emplacement must be available nearby; on up-slope

emplacements, provisions must be made to prevent natural slope drainage from entering the emplacement. It is difficult on below-grade emplacements to achieve positive drainage.

b. Unexploded Ordnance (UXO). UXO disturbance potential increases with the depth of excavation. While an above-grade emplacement might only require disturbing the surface to 150mm (6 inches) below natural grade, a below grade emplacement will require approximately a meter of excavation.

c. Line-of-Sight. Line-of-Sight between the soldier/firer and the target emplacement may not be possible utilizing the natural terrain.

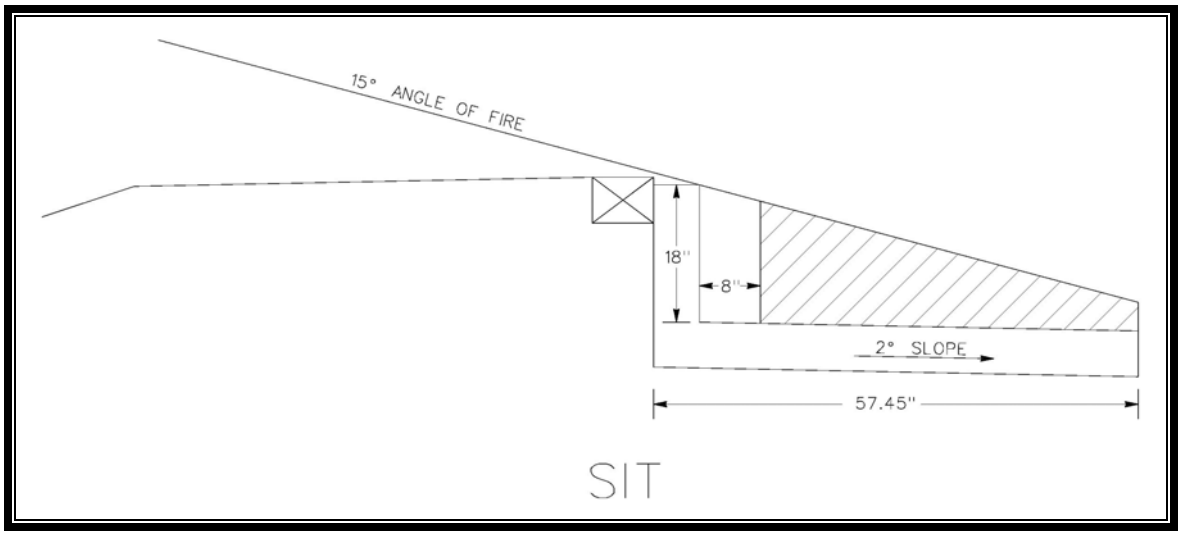
d. Other Debris. Below grade emplacements will also gather sand, dirt, trash and any wind blown objects which can cause maintenance problems. Some installations constructed covers to help keep debris from accumulating in the emplacement.

Above-Grade Emplacement. Above-grade Emplacements are more common in range construction due to their ease of drainage, ease of obtaining line-of-sight, and small disturbance to the existing grade. The disadvantage of an above-ground emplacement is the emplacement profile easily recognized by the soldier/firer.

The designer should discuss with the Installation whether they desire above- or below-grade SIT emplacements, while ensuring that the Installation understands the design issues and costs associated with either choice.

Configuration: The SIT emplacement configuration is shown in the Civil Details in the Appendix of this document. The emplacement design is configured for the ballistic characteristics of the M16 & M4 rifles (5.56-mm projectile).

Wall Height: The front wall height is determined based on a maximum angle of fire above level. The angle of fire is the path of the projectile versus the top of the front wall of the emplacement. The wall height is valid for angles of fire between 0^o and approximately 15^o. If the range has a greater angle of fire, the designer will have to calculate the wall height and coordinate with the targetry installer to provide longer lifting arms. See sketch below.



Front Wall Height

Berm Criteria: Protective berm thicknesses are determined by using the design curves in the Appendix of this document.

These berm thicknesses are based upon weapon type, soil compactive effort, and the in-place soil density. However, the designer must also coordinate with the range trainer or user in order to determine the appropriate berm width for each target, since individual target sites may dictate added target protection. For example, when SIT emplacements are sited in front of or behind a Moving Armor Target (MAT) or Stationary Armor Target (SAT), the emplacements need to be designed to withstand the largest weapon system that will engage that group of targets.

Historical experience shows that, under normal usage, well-compacted berms designed with the recommended widths and well compacted, require maintenance on 6-month cycles.

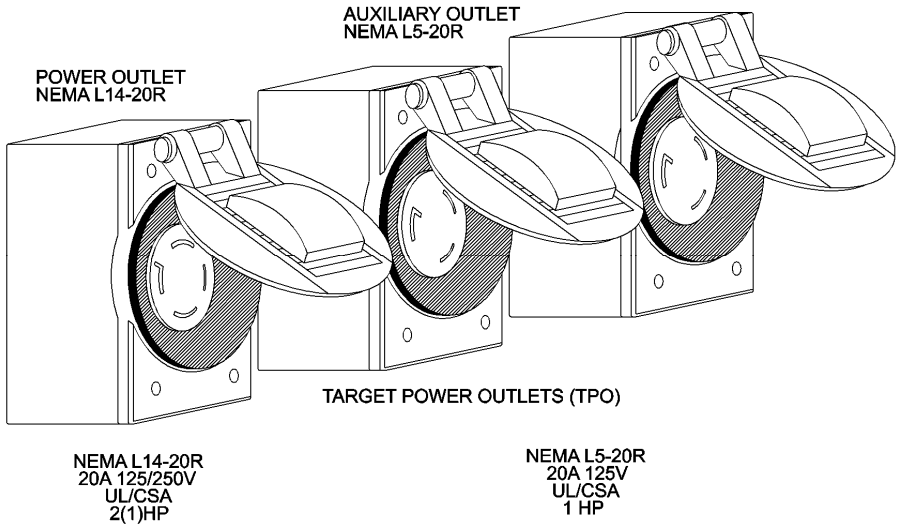
Electrical/Communications: This section discusses electrical/communication considerations unique to this specific emplacement type. Downrange power, communication, transformers, trenching requirements, etc., are discussed in the Downrange Distribution Section of this document.

See the standard SIT and MIT section for additional information on these emplacements.

Target Emplacement Wall Configuration: All conduits and/or cables should enter and exit from the side or rear of the emplacement. This cable routing helps to minimize damage to the cables from range operations and maintenance crews performing berm repair. The Load Center (LC) houses the secondary power cable and provides feed-thru capability for the power cable to the next adjoining LC. The LC also contains circuit breakers to provide power to the Target Power Receptacle (TPR),

Auxiliary Power Receptacles (APR), Maintenance Receptacle (MR), and the Target Data Receptacle (TDR). Depending upon the network design the Master Target Data Panel (MTDP) or Target Data Panel (TDP) can house the fiber optic splicing, cross-connect panel, category 5e or better (copper) cabling, a combination of fiber and copper cables, or simply the copper cabling and the TDR [All Military Construction (MILCON) funded]. A 254mm (10") x 254mm (10") area on the interior left-hand side of the MTDP/TDP shall be reserved for use by others. All fiber optic cabling shall be terminated with SC type connectors and the category 5e or better cable shall be terminated with the appropriately rated male RJ45 connectors. All copper cabling terminated inside the MTDP/TDP shall be a minimum of 457mm (18") in length and fiber cabling shall have a minimum one meter service loop. The MTDP or TDP also provides space for Other Procurement-Army (OPA) funded equipment which includes the fiber optic jumpers, switch/media converter, target data outlet. All boxes and receptacles on the front wall of the emplacement should be mounted no higher than two inches from the top of the emplacement wall; this protects the boxes and receptacles from low rounds that might skim the top of the emplacement wall. See Electrical Details in the Appendix of this document for detailed mounting requirements.

Target Outlets. All target power and target data receptacles shall be weatherproof regardless of whether the outlet is in use. The standard TPR configuration is shown below.



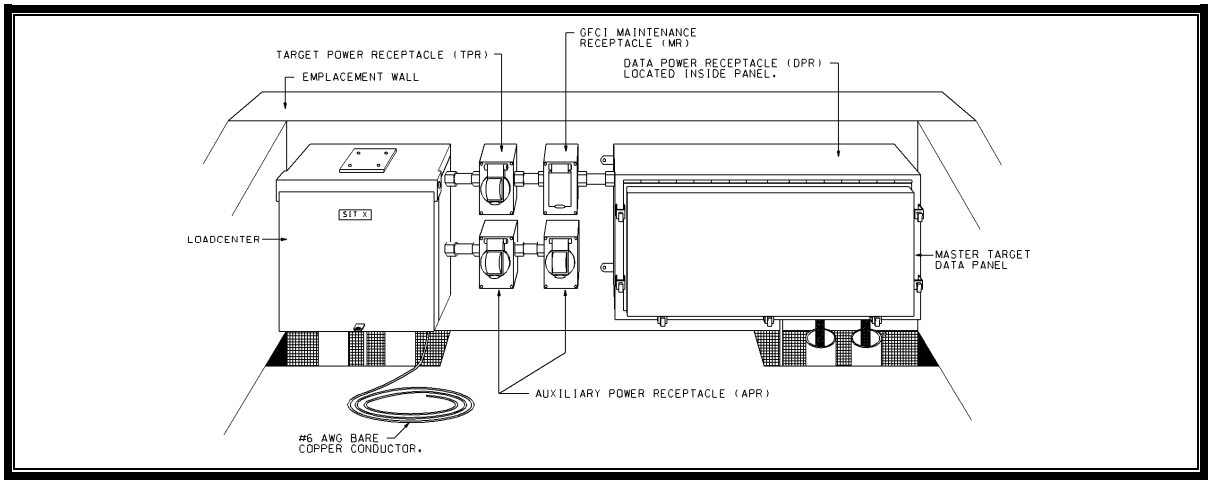
TARGET POWER RECEPTACLE (TPR) AUXILIARY **POWER RECEPTACLE (APR)**

TARGET POWER RECEPTACLE	AUXILIARY POWER RECEPTACLE	FIBER OPTIC CABLE CONNECTORS	CATEGORY 5E OR BETTER CABLE CONNECTORS

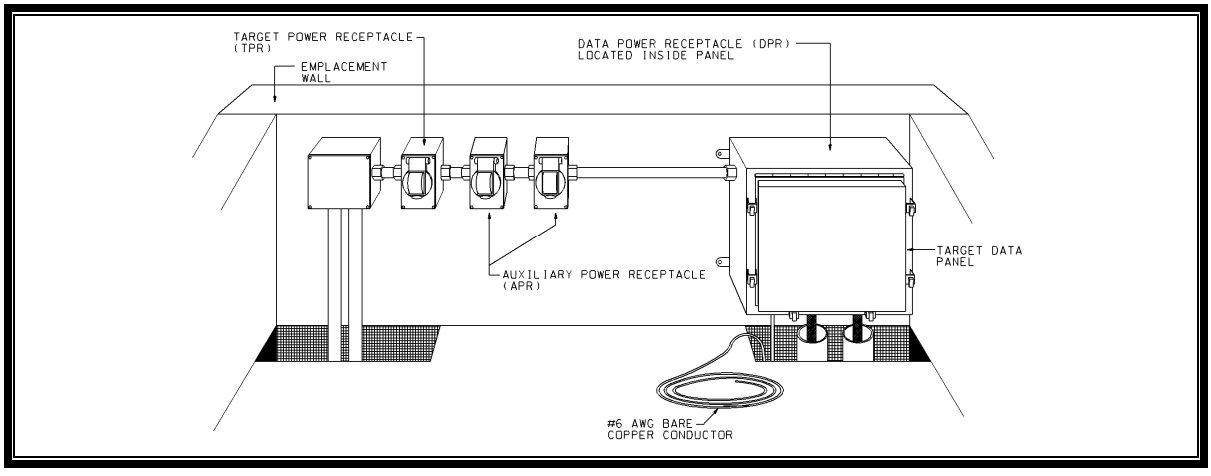
NEMA L14-20R	NEMA L5-20R	Type “SC”	MALE, RJ45

EMPLACEMENT TYPE	POWER FEED TYPE	PEAK	STATIC LOAD	DESIGN LOAD
SIT with Thermal Blanket	120/240V, Single Phase	700VA while raising or lowering target. Add 260VA if Thermal Blanket is utilized.	50VA Thermal Blanket 260VA **Total**	960VA **960VA**

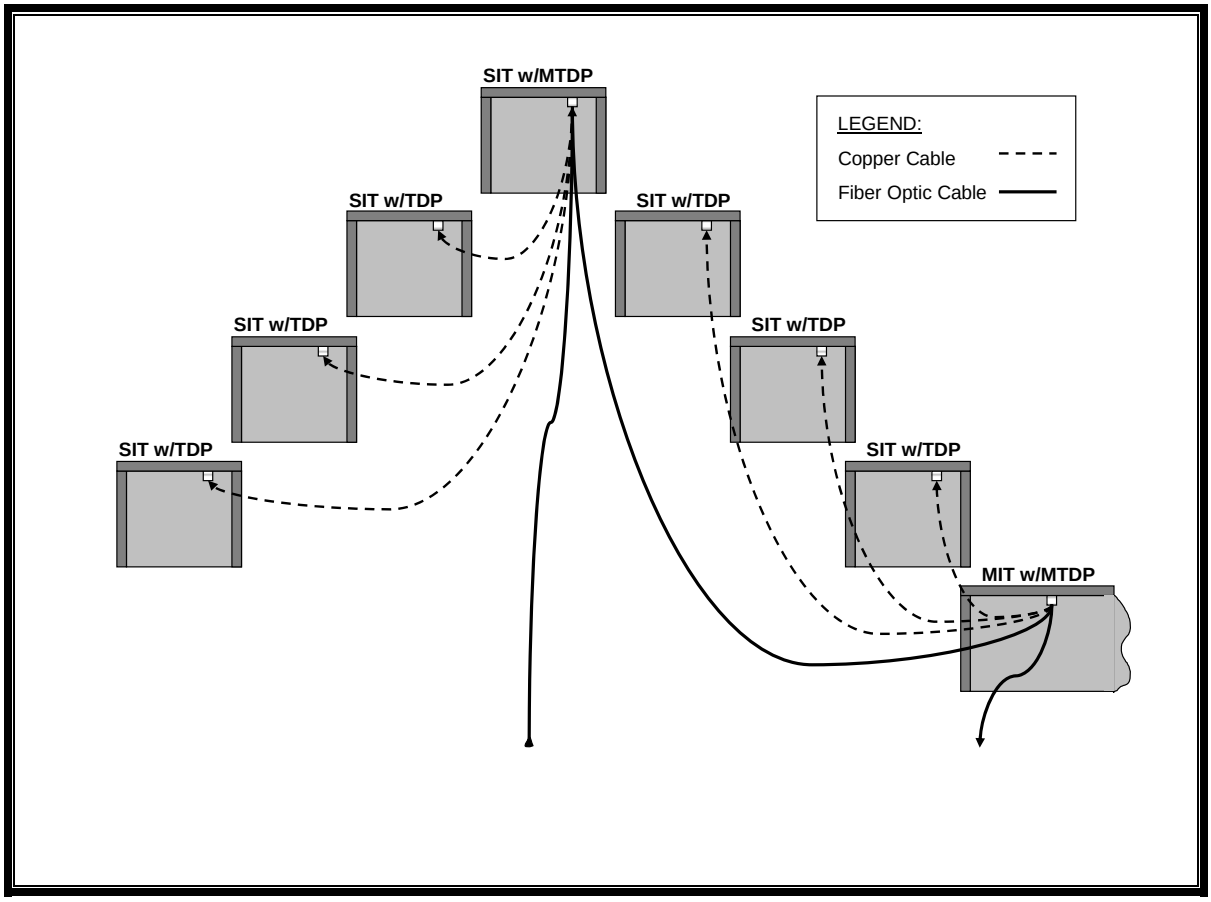
SIT Emplacement Target Power Table



Representative Master SIT Elevation Drawing (Not to Scale)

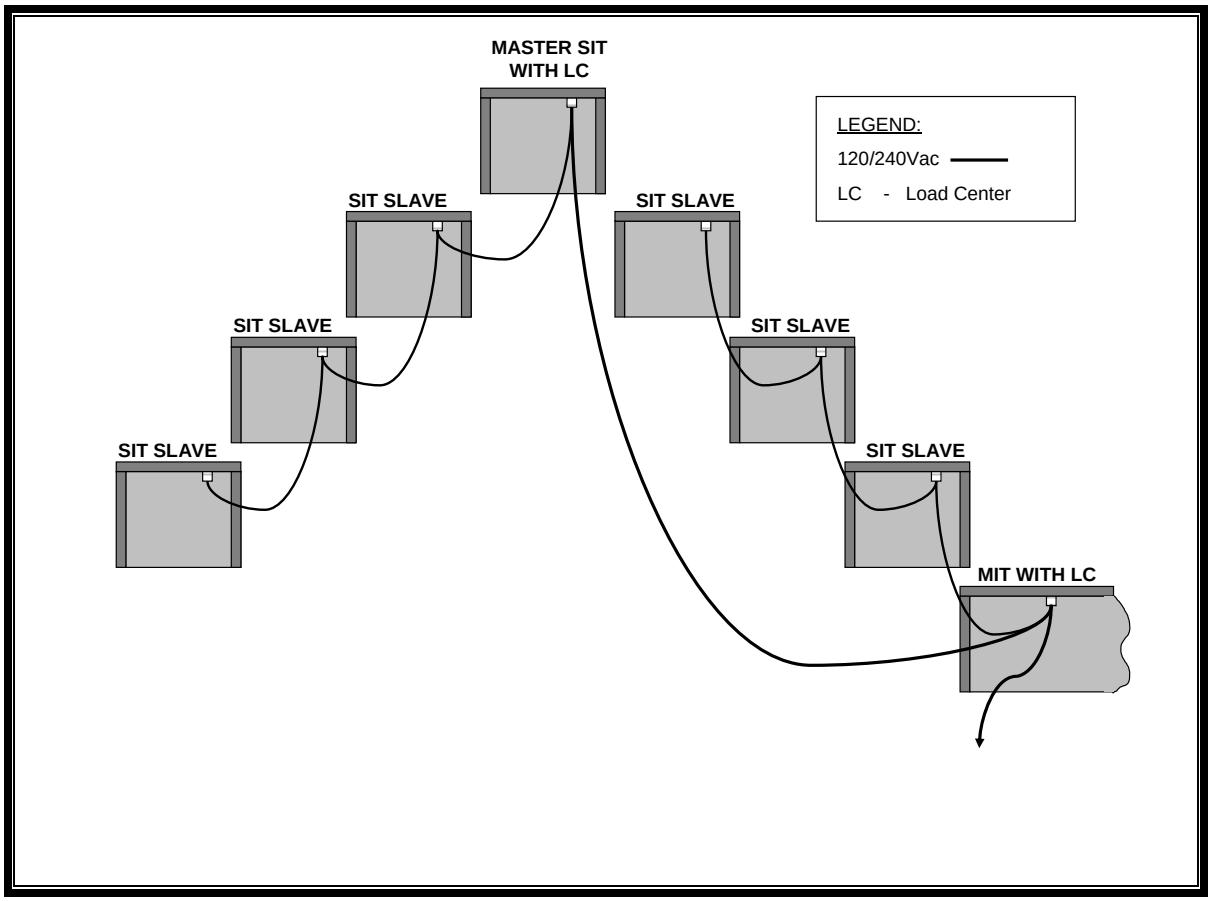


Representative Slave SIT Plan Drawing (Not to Scale)



Representative SIT Cluster Communication Drawing #1 (Not to Scale)

SIT Cluster Drawing #1: Fiber optic cable shall be routed to the SIT with MTDP and then looped to the MIT with MTDP for continuation to the next emplacement if required. Order is not significant when choosing either the SIT with MTDP or MIT with MTDP to route the cable to first. Whatever order is most advantageous to the design should be employed. From the MTDP at the SIT and MIT, individual category 5e or better cabling will be pulled to each Target Data Panel (TDP) and terminated with male RJ45 connectors. The category 5e or better cables shall be looped through the TDPs in a minimum 25mm (1 inch) conduit. The fiber optic cables are installed in a single 38mm (1.5 inches) conduit to the MDTP. Innerduct is not required since a seal is required at the opening of the 38mm conduit in the MTDP.



Representative SIT Cluster Power Drawing #2 (Not to Scale)

SIT Cluster Drawing #2: The secondary power cable is routed to MIT with NEMA 3R LC and then looped to the Master SIT with NEMA 4 or 6P LC. Order is not significant when choosing either the Master SIT or MIT to route the cable to first. Whatever order is most advantageous to the design should be employed. From the NEMA 4 or 6P LC at the SIT and the NEMA 3R LC at the MIT, power cables will feed three additional emplacements as shown in the drawing above.

Miscellaneous Information:

a. Construction Materials. These emplacements have been successfully deployed when made out of wood in non-rot regions (i.e., Alaska).

b. Weather Considerations. In regions with large quantities of blowing sand or snow, consideration should be given to providing elevated target mechanism platforms and emplacement covers. The elevated target mechanism platform allows for shoveling out snow and sand, while the emplacement cover keeps accumulation of blown or fallen material to a minimum. Emplacement covers are usually constructed of wood and moved by hand before and after each training exercise.

c. Emplacement Protection. Though not endorsed by Army safety doctrine (DA PAM 385-63, DA PAM 385-64), some installations still favor skip plates on their MIT emplacements. Skip plates are hardened steel angles mounted to the top-front wall lip of a MIT emplacement. The concept is based on the theory that a round that hitting low will hit the skip plate and skip (ricochet) away from the target emplacement in lieu of hitting the emplacement's front concrete wall or protective treated timber beams, thus lowering long-term maintenance costs. Since the skip plate induces ricochet, it is not recommended. Installation Safety and ATSC must approve the use of skip plates.

d. Simulation Devices. Some types of training may require Night Muzzle Flash Simulators and Hostile Fire Simulators (HFS). These devices are to be used with the MIT emplacement. A night muzzle flash simulator is a flashlight-type device that is mounted on the target mechanism or coffin and flashes on the target to visually simulate enemy fire. Night muzzle flash simulators are self-contained units provided and installed by the target provider; no special design is required. The Hostile Fire Simulators can be built into the MIT emplacement or have their own emplacement next to the MIT.