

MOVING ARMOR TARGET (MAT)



General: The moving armor target (MAT) is a training device that supports tank, antitank, Bradley Fighting Vehicle (BFV), and aerial gunnery training. The MAT consists of three major subassemblies: the conveyance-way, the target carrier, and the target elevating mechanism which is supplied by Other Procurement-Army (OPA). The target mechanism travels approximately 350 meters and is protected from direct fire or crossfire by berms or trenches. Associated equipment includes a Battlefield Effects Simulator (BES), and an optional storage bunker. The MAT requires 240-volt, single-phase power for the mover and associated controls. Because the MAT requires a large berm, the MAT emplacement can be used as a power center from which smaller, near by target arrays can be subfed. Military Construction, (MILCON) provides power and communications to the MAT. The targetry equipment contractor ties into the power and communications.

MAT Storage Structure (Optional): If used, the MAT storage structure must be located at the end of the track nearest the firing point. This structure can vary in construction from a hardened-earth-covered bunker to a lean-to structure. This structure is designed for storage of the idle armor moving target assembly, target spare parts, and downrange power panels is an option the using agency should consider. This section of the track is un-powered. The structure, if needed, will be designed in accordance with the physical security requirements of the using agency and must provide sufficient space for equipment so that the contractor can install the MAT system components. The floor of the structure may be composed of reinforced concrete slab or ballast. If a slab is used, a cutout area for the track system must be provided. Regardless of the flooring system

used, the top of the rail elevation must be coordinated with the design of the building or lean-to so that the rail will not interfere with the operation of the doors.

MAT Emplacement: Each MAT conveyance-way will be approximately 350 meters long and should be oriented approximately 45 degrees to the engagement point. The MAT must be protected by berms or trenches from direct fire or crossfire. The protective structure must be high enough to protect the target mechanism without obscuring any targets. When a retaining wall is part of the protection, the wall must be checked for stability and structural adequacy for the particular site characteristics. See Civil Details in the Appendix of this document.

General Requirements. The roadbed for the MAT consists of (1) a prepared, compacted subgrade that may include a filter layer, (2) an aggregate pavement, and (3) the target specific conveyance system. The range construction contractor will be responsible for preparing the subgrade, which consists of a minimum 6 inches gravel layer, per the Civil Details in the Appendix. The targetry equipment contractor will be responsible for all construction above subgrade specific to his targetry system. See the Civil and Electrical Details in the Appendix of this document for more information.

Roadbed Section. The roadbed section and the materials used in its construction have been designated as a design interface. A typical section of the MAT roadbed is shown in Figure 1, below. The portions of the roadbed that are of concern to the range construction contractor are described below.

Subgrade. The top 300 millimeters (12 inches) of the subgrade should be compacted as specified in ASTM D1557, Method D. The subgrade should be compacted to 90-percent laboratory maximum dry density for cohesive soils and to 95-percent laboratory maximum dry density for cohesionless soils. As shown in Figure 1, the top of the subgrade should be sloped toward the back of the emplacement away from the protective wall in order to facilitate drainage. In addition, the top of the subgrade at the protective wall must be a minimum of 1.53 meters (60 inches) below the top of the retaining wall for tank gunnery, 1.83 meters (72 inches) for aerial gunnery.

Conveyance Way:

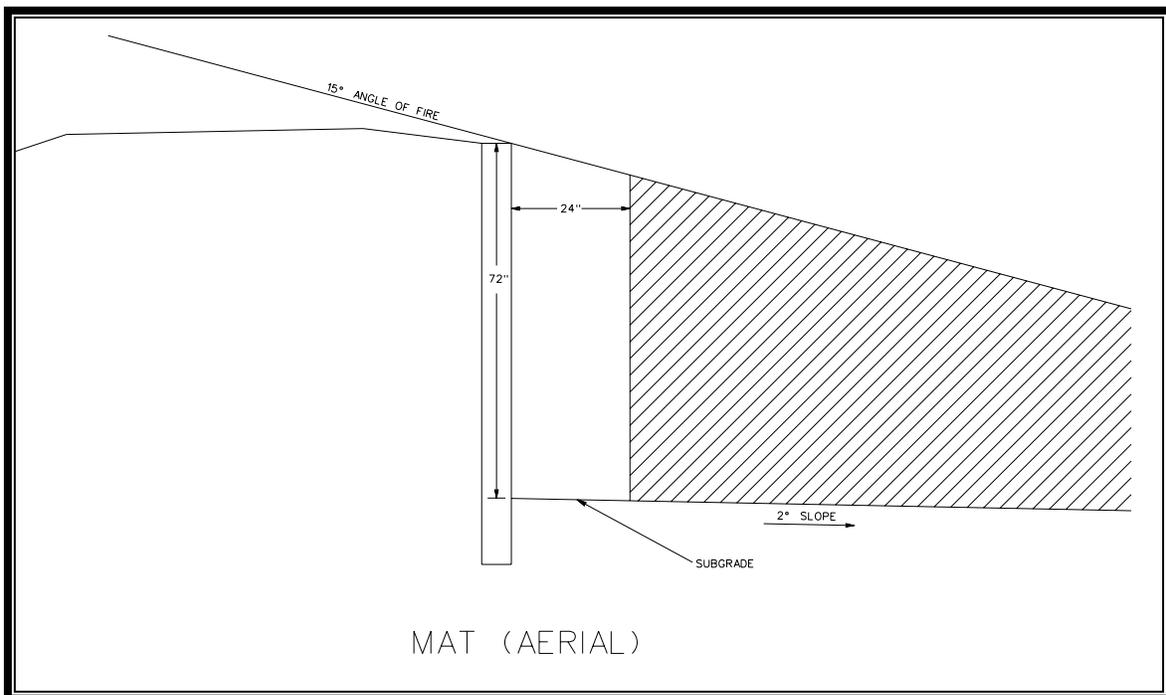
- a. The retaining wall for the MAT is designed using site-specific parameters.
- b. The minimum turning radius must be 152 meters (500 feet)
- c. The maximum grade of the track must be 10 percent.
- d. The last 40 meters (131 feet) at each end of the track must be straight with a slope of zero to plus or minus 1 percent.

Berm Criteria: The recommended protective berm widths of the MAT emplacements are determined by the Target Protection Curves which are located in the Appendix of this document.

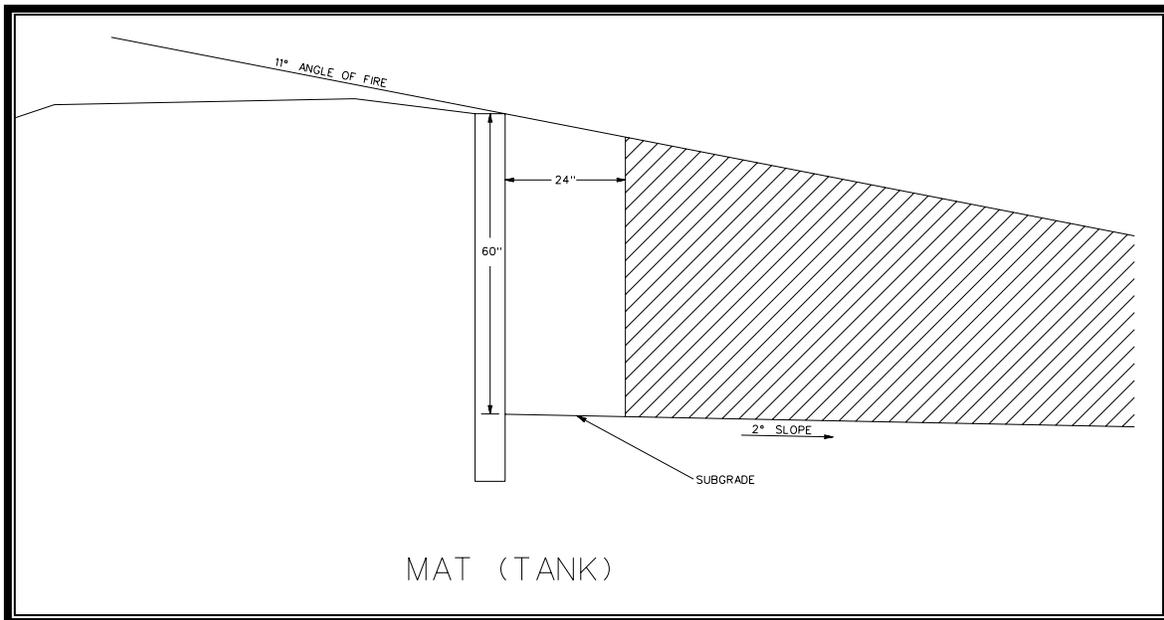
These berm widths (thicknesses) are based upon weapon type, soil compactive effort, and the in-place soil density. However, the designer must also coordinate with the range trainer or user in order to determine the appropriate berm width for each target, since individual target sites may dictate added target protection. Historical experience shows that, under normal usage, well-compacted berms designed with the recommended widths require maintenance on 6-month cycles.



Representative MAT Photos



MAT Aerial Angle of Fire

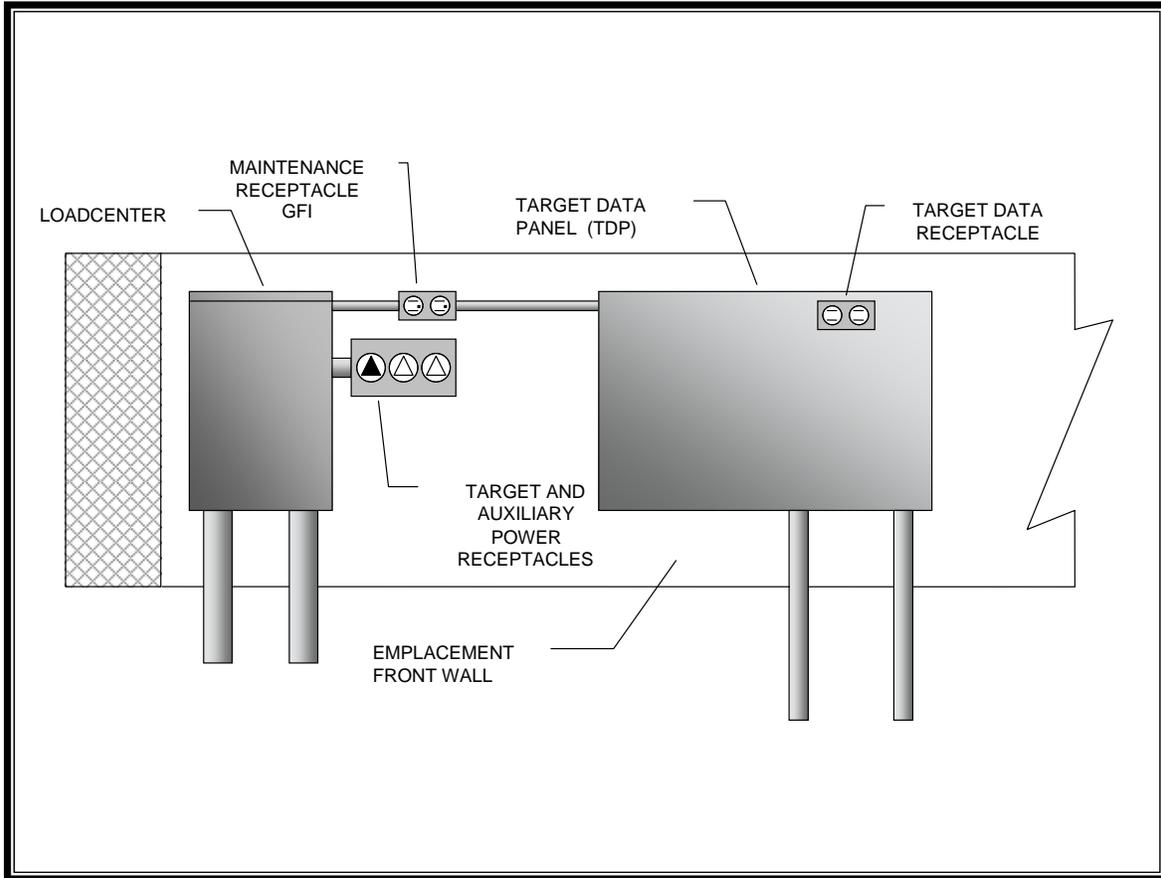


MAT Tank Angle of Fire

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

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 receptacles (AR), maintenance receptacle (MR) shall be a Ground Fault Interceptor (GFI) receptacle, 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 Defense (MCD) 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 18" in length. 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 can includes the fiber optic jumpers, switch/media converter, target data outlet, and category 5e or better network cables. 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.



Representative MAT Elevation Drawing (Not to Scale)

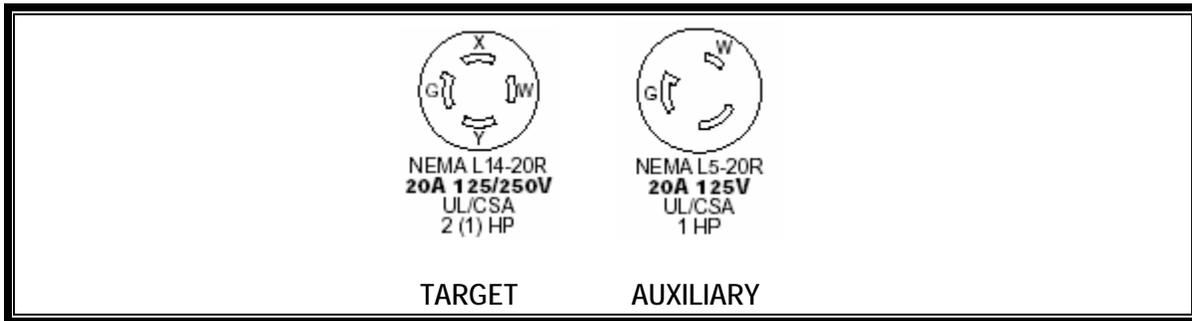
MAT Emplacement Power Table

EMPLACEMENT TYPE	POWER FEED TYPE	PEAK	STATIC LOAD	DESIGN LOAD
MAT with Thermal Blanket	120/240VAC Single Phase	3.8kVA during system charging.	100VA	3.8kVA
Total Design Load				3.8kVA

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

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

MAT Emplacement Target Interface Specifics



Target Power Receptacle (TPR) – Auxiliary Receptacle (AR)