

## SPACE TYPE: FIRING RANGE

### Construction Criteria

The unit costs for Firing Range space types are based on the construction quality and design features in the following table. This information has been generally organized under Uniformat headings. Items marked with a  have a space-related cost impact on the building shell and core.

Category	
<b>Shell Superstructure</b>	
<i>Floor Construction</i>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> 8" thick reinforced concrete with ¼" slope per foot from firing line to target line; secondary slab located on neoprene cushioning</li> </ul>
<b>Interior Construction</b>	
<i>General</i>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> ¼" steel plate attached to steel structure (beams 10' - 0" OC) with lateral bracing; 2" of acoustical foam on the underside for sound isolation</li> <li><input checked="" type="checkbox"/> Protective ceiling shield shall extend a minimum of 18' - 0" in front of firing line and 3' - 0" behind the firing line to protect the shooter from ricochet and backscatter caused by stray bullets and to consist of ½" thick plywood mounted to a steel back plate; provide a 1½" air space between the wood and the ceiling materials; provide 24" by 48" glue-on acoustical ceiling tile on the face of the plywood</li> <li><input checked="" type="checkbox"/> Ceiling baffles to be 10-gauge sheet metal covered 2" plywood and installed at right angles to the firing line; provide at least 8' - 0" of clearance and be angled to deflect the bullet down to the floor, spaced to provide at least ½' overlap of coverage for the line of fire between the preceding and succeeding baffles</li> <li><input checked="" type="checkbox"/> Light baffles shall protect all lights within 40' - 0" downrange of the firing line to be 10 gauge steel with 2" plywood sacrificial cladding; all lights located further downrange shall be protected with .25" steel plate</li> </ul>
<i>Partitions</i>	
<i>Bullet Backstop</i>	<ul style="list-style-type: none"> <li>■ Core-filled CMU with sacrificial cladding to prevent ricochets and trap bullets with no openings in the zone directly behind the firing lanes</li> </ul>
<i>Range Walls</i>	<ul style="list-style-type: none"> <li>■ All perimeter walls to have double wall construction with core-filled CMU wall to structure on the inside for ballistic protection and 2 layers GWB on metal stud on outside face with acoustical insulation for acoustical separation</li> <li>■ Side walls to be core-filled CMU</li> <li><input checked="" type="checkbox"/> Rear wall to be an air supply plenum wall with core-filled CMU on the suite exterior and GWB facing the firing line; provide air diffusers equal to 10% total wall area</li> <li>■ Deflectors at all protrusions in the firing lanes, including structural columns, pipes and conduits, equipment, outlet boxes, and changes in level to be constructed of 10 gauge steel with 2" of sacrificial plywood cladding</li> <li>■ Shields at all non-ballistic walls and canopies to be constructed of ¼" steel plate with ½" sacrificial plywood cladding</li> </ul>
<i>Storage Bins</i>	<ul style="list-style-type: none"> <li>■ Structural slab-to-slab</li> <li>■ 14 gauge expanded steel 2" diamond mesh panels welded on metal frames</li> </ul>
<i>Suite Perimeter and Public Corridor</i>	<ul style="list-style-type: none"> <li>■ Structural slab-to-slab</li> <li>■ One layer 5/8" GWB both sides on metal studs at 24" OC</li> <li>■ Acoustical insulation</li> </ul>

Category	
	<ul style="list-style-type: none"> <li>■ 40 STC</li> </ul>
Category	
<b>Doors</b>	
<i>General</i>	<ul style="list-style-type: none"> <li>■ Solid core 1¾" hardwood veneer doors 3'- 0" (w) by 7'- 0" (h)</li> <li>■ Door frames will be a minimum 14 gauge metal frame construction</li> <li>■ Hardware to be latch sets with levers</li> </ul>
<i>Range Area</i>	<ul style="list-style-type: none"> <li>■ Solid core 1¾" hardwood veneer doors 3'- 0" (w) by 7'- 0" (h) with ¼" metal plate face with an additional ½" plywood sacrificial cladding face</li> <li>■ Door frames will be a minimum ¼" metal frame construction with ½" plywood sacrificial cladding face</li> <li>■ Hardware to be latch sets with levers</li> <li>■ Power connections, conduit and boxes for door position and latch keeper magnetic switches with conduit to control point monitored by the range commander and connected to range alarm system to notify users that an open door unsafe condition exists; wiring and equipment by tenant</li> </ul>
<b>Interior Glazing</b>	
<i>Control Room</i>	<ul style="list-style-type: none"> <li>■ Bullet resistant glass in 14 gauge metal frame window</li> </ul>
<b>Signage</b>	
<i>Suite Entrance</i>	<ul style="list-style-type: none"> <li>■ Hazard and caution signage at suite entrance. Room identification signage to be raised acrylic letters mounted beside the door with ADAAG compliant tactile Braille signage modules</li> </ul>
<i>Room Signage System</i>	<ul style="list-style-type: none"> <li>■ Signage for life safety and public convenience (toilets) within the functional areas of the tenant will be included in the unit costs and will be modular vinyl lettering on plastic laminate signage frame system with ADAAG compliant tactile Braille vinyl signage modules</li> <li>■ Signage requirements within the tenant demised space related to their function will be provided by tenant</li> </ul>
<b>Interior Finishes</b>	
<i>Walls</i>	<ul style="list-style-type: none"> <li>■ Low VOC semi-gloss enamel paint with vinyl cove base</li> </ul>
<i>Floors</i>	<ul style="list-style-type: none"> <li>■ Epoxy paint with smooth unobstructed finish</li> </ul>
<i>Ceilings</i>	
<i>Control Room, Storage</i>	<ul style="list-style-type: none"> <li>■ Suspended 24" x 24" acoustical tile ceiling provided as part of building shell and core provisions</li> </ul>
<i>Gun Cleaning, Locker Rooms</i>	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Plaster</li> </ul>
<b>Plumbing</b>	
<i>Gun Cleaning</i>	<ul style="list-style-type: none"> <li>■ Eyewash station</li> <li>■ Stainless steel sink with lever faucets connected to the sanitary sewer system</li> </ul>
<i>Firing Range</i>	<ul style="list-style-type: none"> <li>■ Provide a recessed trench drain with the leading edge above the firing line to the trailing edge to avoid ballistic back-splatter of stray fire from trench drain edges;</li> </ul>

Category	
	trench drain to drain into a lead trap for decontamination of the run off
<b>HVAC</b>	
<i>Air Distribution System</i>	
<i>Air Handling Unit</i>	<ul style="list-style-type: none"> <li>☑ Dedicated system specifically engineered for firing ranges (such as that developed by “Shooting Ranges International”) shall be provided</li> </ul>
<i>Air Supply</i>	<ul style="list-style-type: none"> <li>☑ The optimum air supply across the firing line is 75 FPM with a minimum acceptable airflow of 50 FPM; maintain airflow at 2-30 FPM at a point halfway between the firing line and the bullet trap</li> <li>☑ Lead sensors at supply ducts in adjoining spaces to assure the ventilation systems are working correctly</li> <li>☑ Armories must have 15-minute Class M emergency vault ventilators and ventilator ports per UL 680 Emergency Vault Ventilators and Ports and shall allow for the supply of 10 CFM of outside air per 100 SF; ventilator port shall provide a minimum of 2 SF of openings in case of power failure; port shall be protected by a minimum woven steel rod of <math>\frac{3}{8}</math>” or larger steel bars at 6” or less on center or a 6 gauge steel mesh in 2” diamond pattern grille</li> </ul>
<i>Exhaust Air</i>	<ul style="list-style-type: none"> <li>☑ 100% exhaust from firing lane areas, ammunition storage areas, and weapons cleaning areas</li> </ul>
<i>Lead Contamination Control</i>	<ul style="list-style-type: none"> <li>☑ Exhaust pre-filtering auto-advance rolling filter with an average synthetic dust arrestance of 83% and HEPA or equivalent filter; provide system monitor and alarm for pressure drop beyond system specifications</li> </ul>
<i>Thermostat Controls</i>	<ul style="list-style-type: none"> <li>■ One thermostat per zone</li> <li>■ Provide setback thermostat even in areas of 24 hr operation with override control by building shell and core BAS</li> </ul>
<b>Fire Protection</b>	
<i>Fire Suppression</i>	<ul style="list-style-type: none"> <li>■ Sprinkler system is part of the building shell and core provisions; assume that Tenant Improvements require relocation of 10% sprinkler heads</li> <li>■ Fire and smoke dampers to be provided in rated walls</li> </ul>
<i>Fire and Smoke Detection</i>	<ul style="list-style-type: none"> <li>■ One smoke and heat detection devices in each occupiable space</li> <li>■ One fire alarm pull station by each egress point for each suite</li> </ul>
<i>Fire Alarms</i>	<ul style="list-style-type: none"> <li>■ Audible and visible (strobe) alarm in each occupiable space</li> </ul>
<b>Electrical</b>	
<i>Electrical Outlets</i>	
<i>General</i>	<ul style="list-style-type: none"> <li>■ Wall mounted duplex outlets every 50’- 0” OC</li> </ul>
<i>Firing Booths</i>	<ul style="list-style-type: none"> <li>■ Conduit and boxes for alarm and communications systems and target retrieval controls provided as part of the Tenant Improvement unit costs; communications and target control system provided by tenant</li> </ul>
<i>Range Commander</i>	<ul style="list-style-type: none"> <li>■ Conduit and boxes for console mounted electrical connections for target control and scoring computer equipment, range alarm equipment, and communication equipment provided as part of Tenant Improvement unit costs; communications and target control system provided by tenant</li> </ul>

<b>Category</b>	
<i>Cleaning Bench</i>	<ul style="list-style-type: none"> <li>■ One duplex back splash mounted outlet every 48" of counter run, and one duplex outlet with dedicated line</li> <li>■ One recessed wall duplex outlet for clock</li> <li>■ Provide special power as required for pneumatic cleaning equipment</li> </ul>
<b>Lighting</b>	
<i>General</i>	<ul style="list-style-type: none"> <li>☑ Continuous bank of fluorescent lights running the full width of the range at 20'- 0" OC with supplemental halogen at every 10'- 0"</li> <li>☑ All fluorescent fixtures shall have VDT-compatible parabolic lenses to concentrate light on the horizontal plane and reduce glare on wall surfaces</li> <li>☑ Fluorescent fixtures to have color-rendering index of 85 and a temperature index of 3500 Kelvin</li> <li>■ Switch control at entrance to range</li> <li>☑ Lights controlled by firing range control system to vary lighting schemes for different shooting situations</li> </ul>
<i>Target Lighting</i>	<ul style="list-style-type: none"> <li>☑ Lights must be placed on each side of each target carrier, starting approximately 18'- 0" from the firing line and extending to within approximately 8'- 0"</li> <li>☑ Lights are to be metal halide on swivel ceiling mounts concealed behind ballistic baffles</li> </ul>
<i>Shooting Booth</i>	<ul style="list-style-type: none"> <li>☑ Sight illuminator incandescent dimmable lights with swivel mounts attached to overhead booth cross member</li> </ul>
<i>Range Master</i>	<ul style="list-style-type: none"> <li>☑ Dimmable parabolic fluorescent 24" (w) by 48" (l) suspended fixtures located every 200 SF</li> </ul>
<b>Telephone and Communication Outlets</b>	
<i>General</i>	<ul style="list-style-type: none"> <li>■ Conduit and pathways for services from the core to the tenant demised space provided as part of the building shell and core provisions; conduit and boxes within the tenant suite are part of the Tenant Improvement unit costs</li> <li>■ Conduit and outlet boxes are provided as part of the tenant improvement unit costs; telephone systems and data LAN systems provided by tenant; Target systems and firing line electronic security system are included in the Tenant Improvement unit costs; computer control systems and wiring are provided by the tenant</li> <li>■ Conduit and boxes for one data connection for every firing lane target control mechanism provided as part of Tenant Improvement unit costs; equipment and wiring provided by tenant</li> <li>■ One ceiling mounted PA speaker for every 20 lineal feet along firing line provided as part of Tenant Improvement unit costs</li> </ul>
<i>Firing Booth</i>	<ul style="list-style-type: none"> <li>■ Intercom speaker with audio and visual notification provided as part of Tenant Improvement unit costs</li> </ul>
<i>Range Command</i>	<ul style="list-style-type: none"> <li>■ Conduit and boxes for one telephone line and intercom base station provided as part of Tenant Improvement unit costs; equipment and wiring provided by tenant</li> <li>■ Conduit and boxes for data connections to target control and scoring computer systems provided as part of Tenant Improvement unit costs; equipment and wiring provided by tenant</li> </ul>
<b>Firing Range Electronic Systems</b>	
<i>Target Control</i>	<ul style="list-style-type: none"> <li>■ Conduit, boxes, and console for the target carrier system including a master control console for the range master microprocessor system provided as part of</li> </ul>

Category	
<i>Systems</i>	the Tenant Improvement unit costs; equipment and wiring will be provided by the tenant
<i>Firing Line Security System</i>	<ul style="list-style-type: none"> <li>■ Electronic firing line security system provided as part of the Tenant Improvement unit costs</li> <li>■ Two-way intercom communication system from each shooting booth to range master with a visual call indicator light provided as part of the Tenant Improvement unit costs</li> </ul>
<i>Security Systems and Duress Alarms</i>	
<i>Range Entrance</i>	<ul style="list-style-type: none"> <li>■ Keypad door control provided as part of the Tenant Improvement unit costs</li> <li>■ Duress alarm</li> </ul>
<b>Equipment</b>	
<i>Bullet Trap</i>	<ul style="list-style-type: none"> <li>■ Bullet trap provided as part of the Tenant Improvement unit costs</li> <li>■ Dry funnel trap with a deceleration chamber with vacuum</li> </ul>
<i>Target Systems</i>	<ul style="list-style-type: none"> <li>■ Target carrier systems provided as part of the Tenant Improvement unit costs; the master control system provided by tenant</li> <li>■ Ceiling mounted monorail type retrieval system shall be installed for target placement on the firing line, with drive motors located above the shooting panel; The target car, which rides along a suspended monorail, shall be capable of movement from the firing booth down range, stopping at fixed increments; Target functions, including dual face target movement (180-degree friend/foe), and face edge movement (90 degree) will be considered a special feature and not included in the base unit costs; Target carriers should handle various target frames and target heights; The system will include target frames to support the targets; Target actuators for rotating the target will be considered a special feature on not included in the base unit costs</li> <li>■ Electronic control equipment and cabling to be provided by tenant</li> </ul>
<i>Shooting Booths</i>	<ul style="list-style-type: none"> <li>■ Booths consist of booth panels that divide each firing position, blast panels that extend forward from the booth panel, and cross tied by overhead wire raceways</li> <li>■ Pylon-type panels of 10-gauge steel plate covered with 2" of softwood</li> <li>■ Blast panels of rigid acoustical material to reduce muzzle blast effects attach to each booth panel.</li> <li>■ Each blast panel shall extend 24" downrange no more than 18" to the rear of the firing line, and at least 72" above the floor</li> <li>■ Blast panels should be removable for servicing of the electronic controls and accessories.</li> <li>■ The booths shall be furnished with cross members that horizontally tie all of the stalls together and provide mounting capacity for the target retrieval motors and related hardware; horizontal ties shall serve as raceways for the target retrieval drive unit and booth wiring; ties shall attach to tubular vertical supports in the walls</li> <li>■ Electronic control equipment and cabling to be provided by tenant</li> </ul>
<i>Gun Cleaning</i>	<ul style="list-style-type: none"> <li>■ Pneumatic air system with quick-attach couplings and control valve at each cleaning station included in Tenant Improvement Unit Costs</li> <li>■ Stainless steel self-closing waste receptacle marked for contaminated waste provided by tenant</li> <li>■ Wall mounted UL rated flammable storage cabinet for storage of cleaning supplies provided by tenant, mounting included in Tenant Improvement unit costs</li> <li>■ Gun discharge barrel will be provided by the tenant</li> </ul>

Category	
<b>Furnishings</b>	
<i>Casework</i>	
<i>General</i>	<ul style="list-style-type: none"><li>■ All millwork to be AWI custom grade plastic laminate veneer panels and plastic laminate tops with solid hardwood dimensional lumber</li><li>■ Shelving to be modular metal shelving system</li></ul>
<i>Gun Cleaning</i>	<ul style="list-style-type: none"><li>■ Plastic laminate counter</li></ul>