This document is intended as a rough example of the costs and decisions when planning a range. It is in no way complete, and a full definition / design / operation would be completed by the Shooting Academy.

Indoor Rifle / Pistol Range – 25meter / 50meter

What's required?

Why should I build an indoor range? There are many answers to this question, I guess first is because I like to shoot and, other people like to shoot. But, is there a need and are there sufficient shooters to support it? Without a heavy throughput of "spending" shooters it won't work!

Let's first look at the cost element: See what it's going to cost to get it open.

A good figure to start with is around **half million dollars –** not including the building!

Now break that down….

One of the most expensive elements is the air filtration system. This is an essential part of the range and is closely controlled and monitored by EPA, NIOSH and OSHA – they have very strict rules and requirements. Approximate cost for this system, apart from any heating or air conditioning, is around $25,000 per lane.

Second, is the range equipment: Shooting stalls, target retriever system, baffles and bullet trap. Again, "ball-park" figures, for a 25m is $25,500 - $47,600 (**PER LANE)**

Before examining the equipment, let's take a look at the building…….

The simple solution…. 25m - Concrete box, with low concrete ceiling, – HVAC trunking exterior to range, non tactical.. Then we are at the low end $18,218 per lane. (Using a Rubber Bullet Trap).

If we have a "tin" roof, or the HVAC runs below the concrete roof, or we have a concrete roof that is more than 10' high, then we need to add to this a set of AR500 overhead baffles - $6,500 per lane!

If we have a "tin shed" (or stucco on frame), then we need to enclose the range with 8" concrete block filled walls, with a concrete roof, **or** install baffles (wall and ceiling). (Poured concrete walls are OK at 6"). The side walls can be ¼" mild steel, but you would need the overhead baffle set of ¼" AR500.
[The difference in steel quality is because of the "hit-angle" – a wall hit may be a glancing 5° a ceiling hit could be 80°]

Now, let's side track and see who's using the range…..

If we have fixed firing positions (shooting stalls) we only need a ballistic ceiling over the stalls and a couple of downrange baffles, but…. If we want to let SWAT, POLICE, CIA, FBI etc to use the range as a "tactical" range (i.e. they will walk downrange towards the targets, forward of the shooting stalls), then we need to install tactical baffles to contain errant rounds. (We switch from 9 rows of baffles to 21 rows) – Now we add another $6,000 per lane for the extra baffles.

Bullet Trap…. The cheapest way is a rubber (granulated) trap ($1,400 per foot or $7,000 per lane). This type of trap requires careful and regular maintenance (See below). If you go for a TCT (Total Containment Trap) – this is the top-of-the-line trap. All rounds are contained and there is no "down-time" to service the trap and the collection of spent rounds. The TCT trap sucks air through a narrow throat, collecting all splatter fragments and dust, and filters it through a DCU (Dust Collection Unit). The air is then routed through the "normal" air filtration system (HEPPA filters) back to the range. As HEPPA filters can cost around $30,000 per year to replace, the DCU cuts these costs significantly.

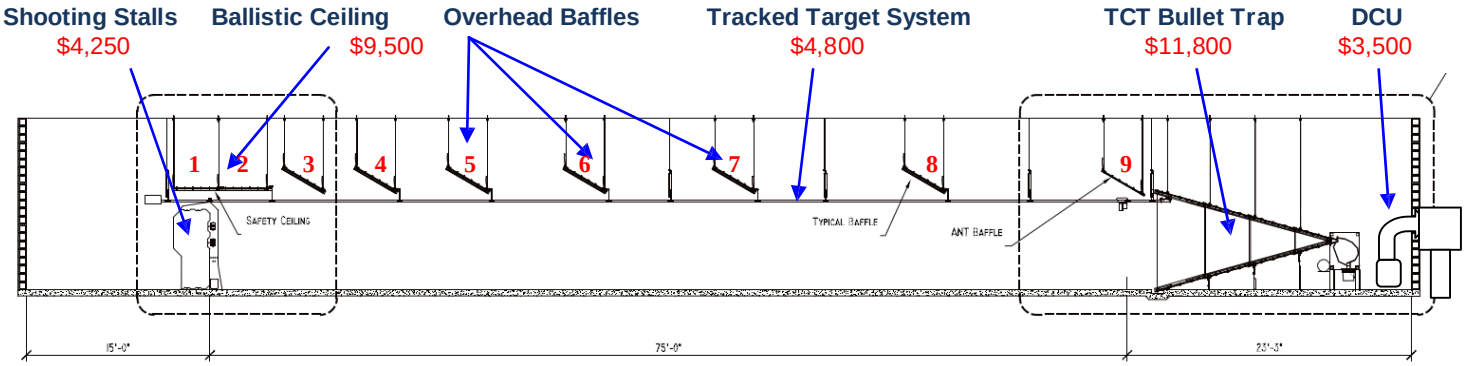
[One point to note: With a TCT there is no "down-time" at the range. Projectiles are routed through the trap, collected in buckets, and the dust / splatter fragmentation is filtered and collected before the contaminated air reaches the filtration system. With alternative, cheaper systems : i.e. rubber trap, you have to vacuum the target paper shreds, daily, to prevent them being imbedded into the rubber or clogging the filtration system, plus there comes a time where the rubber particles have to be sifted to remove the spent rounds. Apart from the time spent sifting the rubber, there is a "settling time" where the air inside the range has to settle… (When you sift the rubber, a considerable amount of dust is circulated into the air. If you run the filtration system you will overload the filters and there will be a significant cost to prematurely replace them.. Same for sand... Plus…. During the 10 day "cleaning / settling period" you have a closed range - no income!]

As you can see there are many options, determined by:

Type of building
Type of shooting (rifle / pistol - stalls / tactical)
Type of ceiling
Height of ceiling
HVAC routing
Type of walls
Type of target System
Type of Bullet Trap
Length of building – 25 yards for targets – 10' for rubber trap / 21' for TCT

(Please note: These prices are a guideline and are for equipment ONLY – no building, no filtration, no HVAC)

Let's take an example below….This is a Pistol Only - 25 yard 12' ceiling requiring overhead baffles and a TCT with DCU
Prices are per 4 ' lane



Per lane price would be : $4,250 + $9,500 + $4,800 + $11,800 + $3,500 = $33,870 per lane 10 lanes = $338,700

Same scenario with a low concrete ceiling (take off baffles 3 – 8) -$6,400 per lane 10 lanes = $274,700

Use rubber trap ($6,000 per lane) in place of TCT and DCU take off $17,300 per lane 10 lanes = $214,000

At the other end is going to 50 yard rifle / tactical with high ceiling and using a TCT with DCU
Per lane price would be :

Shooting Stalls	Ballistic Ceiling	Overhead Baffles	Tracked Target System	TCT Bullet Trap	DCU
$4,250	$25,175		$4,800	$11,800	$3,500

Ten lane would approximate to: 10 x ($4,250 + $25,175 + $4,800 + $3,500) = **$377,250**

NOTE: On top of these prices are, Filtration, HVAC (Approx. $25,000 per lane.)

Air Filtration Package.

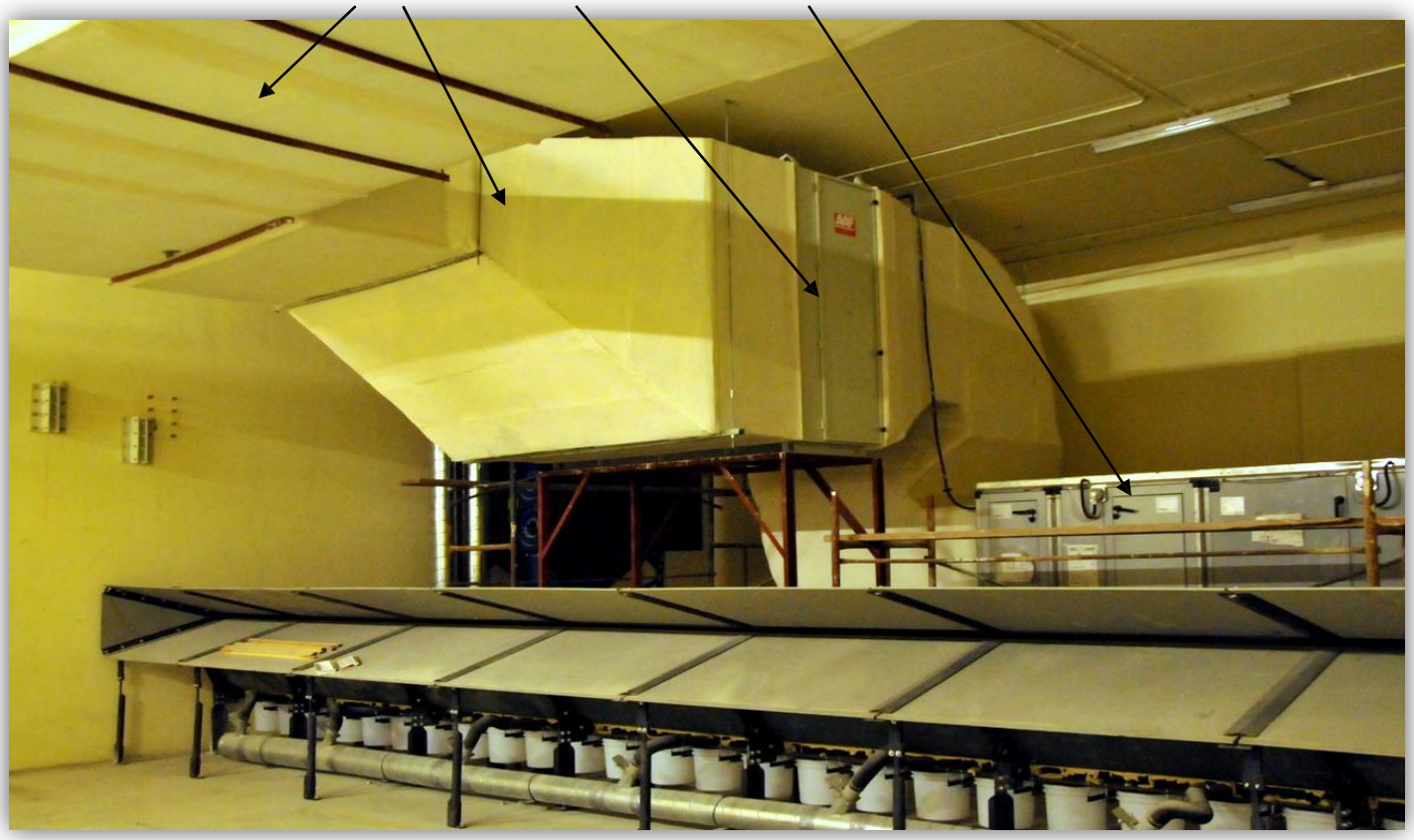
As mentioned earlier, the air-filtration and HVAC (Air conditioning [hot/cold]), is a significant cost.

The figure I gave as a “ball-park” for the filtration is around $250,000 for a 25 yard 10 lane range, including normal HVAC costs.

To show an example, look at the following photographs of the air handling at the rear of the range…. (25 lane range)

These are the input ducts, sucking range air over the top of the bullet trap. About 75% - 85% goes over the top, 15% - 25% through the bullet trap (Total Containment Trap) If a rubber bullet trap is used, 100% goes over the top.

Below is a photo of the air return ducts, carbon filter and HEPPA filter unit behind the “unfinished” bullet trap.



This photo shows the filtration of a 25 yard 10 lane range before the bullet trap was installed.

Here's the fresh air intake outside the building

If a DCU Dust Collection Unit is installed we add this.

Behind the shooting stalls there must be air diffusers forming a curtain of air to prevent pockets of swirling air.

Following, is an extract from the

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Center for Disease Control
National Institute for Occupational Safety and Health
Division of Technical Services
Cincinnati, Ohio 45202

Their full document contains paragraphs on….
SOURCES OF CONTAMINATION
TOXICOLOGY AND HYGIENIC STANDARDS
ENVIRONMENTAL STUDY PROCEDURES AND INSTRUMENTATION
INDOOR FIRING RANGE DESIGN CONSIDERATIONS
(Ventilation – Noise – Psychological – Floors – Maintenance)
RECIRCULATION OF RANGE AIR

The notes below are their….

RECOMMENDATIONS AND DESIGN CONSIDERATIONS

Recommendations and design considerations to reduce and/or eliminate the health hazards associated with indoor firing ranges the following design, considerations and work practices are recommended.

Design Considerations

1. An optimum air supply would be 75 fpm at the firing line.
The minimum air supply must be 50 fpm at the firing line.
2. Filtered and conditioned air must be introduced behind the firing line to guarantee an evenly distributed flow of air through the shooting positions.
3. Supplied air inlets should be placed approximately 15 feet behind the shooters position.
4. The entire range facility should be maintained at a slightly negative pressure with respect to adjacent areas to prevent the escape of contaminants. This criteria suggests that exhaust air should exceed supplied air by 10%.
5. For maximum efficiency, exhaust ducts should be located behind and at the apex of the bullet trap.
An alternative location is to place the exhaust ducts on the side walls slightly in front of the apex of the trap.
6. A minimum down range conveying velocity of 35 fpm must be maintained.
7. When the 75 fpm rate is used, a minimum of 25% of the air should be exhausted 15-20 feet down range of shooting position and the remaining 75% at the bullet trap.
8. When the 50 fpm rate is used, 100% of the air should be exhausted down range at the bullet trap.
9. Each range should have its own ventilation- system to prevent the circulation of contaminated air to other areas of the building.
10. The supply and exhaust systems must be electrically interlocked, thereby eliminating the error of turning one system on and not the other. The system should operate on one fan speed only and not on variable speeds.
11. Each range should be equipped with a floor drain and trap to facilitate cleaning by wet methods.
The drain location should be approximately 20 feet down range of the firing line. The floor should slope 2-3 inches toward the drain.
12. To minimize the effect of peak sound pressure levels on individuals on the range, all reflecting walls should be covered with high efficiency sound absorbing material such as fiberglass insulation covered with perforated aluminum or steel sheets with openings equivalent to 10-15% of the area to permit sound absorption. The

coverings should be designed to permit easy access to the acoustical material for periodic replacement.
The floors directly behind the shooting booths should be covered with acoustical flooring (carpet that has good acoustical absorption characteristics].
13. Range officer quarters should be acoustically treated to reduce noise levels.
14. The bullet trap should never be anchored or attached to any structural support for the building.
The energy of the bullet striking the trap can be transmitted as noise and vibration throughout the building.
15. The walls and surroundings could be painted in soft, contrasting pastel colors to reduce the dungeon effect.
16. The range should be equipped with range officer's quarters, areas for cleaning of weapons and storing materials, and with toilet and washing facilities.
17. All air being exhausted from the range should be filtered using a High Efficiency Particulate Filter (HEPA) or equivalent.

Work Practices

1. The ventilation system should be in operation at all times while the range is in use and during clean-up.
2. Sweeping the range should be accomplished by vacuum cleaning or wet methods. Use of a hand broom, even with dust suppression compounds, should be prohibited.
3. At all times while cleaning, repairing, or reclaiming lead in the bullet trap, a NIOSH approved respirator for the removal of lead dust and fumes must be worn.
4. Proper ear protection should be provided for and worn by all individuals inside the firing area. The ear protectors should be selected on the basis of offering maximum protection.
5. Ear plugs when worn must be properly fitted.
6. In case of extremely loud weapons, both plugs and muffs should be worn simultaneously.
7. A hearing conservation program should be instituted and yearly audiometric examinations given.
8. A rotation system should be instituted for the range officer position. It is suggested that one month of duty be followed by three months of alternate activity. This change is suggested not only to alleviate any possible lead absorption and prevent its accumulation, since this should be minimal following the engineering changes, but to prevent undue psychological stresses associated with the position.
9. Eating, drinking, and smoking in the range should be prohibited.
10. A specific schedule must be established to perform maintenance and repair work to keep the range facilities operational and free of hazardous conditions.

How do we pay for it?

A shooting range on its own will never pay for its operation, (sustainability), let alone repay the capital investment!

So, what do we have to do? About 70% - 80% of funds required to run a shooting range must be generated **off** the range.

First a Pro-shop.. The Pro-shop has to sell guns, ammunition, targets, accessories and clothing.

Second… Courses, training, instruction, self defense, etc – these require a classroom off the range.

Third.. Police, SWAT, military – offer the range to local authorities.

For funding of the initial development, study the options of memberships. If the area / population can support it, there are very good membership models to follow.

For example, The Club shown below in AZ is possibly the most profitable gun club in the country. It has 5 indoor ranges, a massive pro-shop, and classrooms. It was built without spending a penny! All funds were generated by pre-selling memberships before a spade was in the ground. The club is so successful it is building a second in another area of town.

Titanium memberships were sold at $10,500 and $200 per month, with Red, White and Blue, Family and Standard memberships down scaled from there. (Minimum monthly fee is $29 per month)
Titanium members enjoy a luxury, exclusive, clubroom, priority shooting, and one dedicated 10 lane range. Titanium Memberships are re-saleable, they can be resold to waiting customers and the club takes a $250 transfer fee.

Below are some photographs of the Club.