

Rear of Total Containment Trap (TCT) – Supported by cables from ceiling.



Some cables are strung around steel girders or cross braces.



In this range, the ceiling or roof was just steel cladding (non-ballistic safe), so the TCT, HVAC and baffles had to be supported from the roof girder system.

Here we see the main air input ducting. There are two input “funnels” routing air to the HEPPA filters installed outside the building – shown in the next two 2 photos.



These are massive air handling units, but required to keep the range air clean and recirculated.

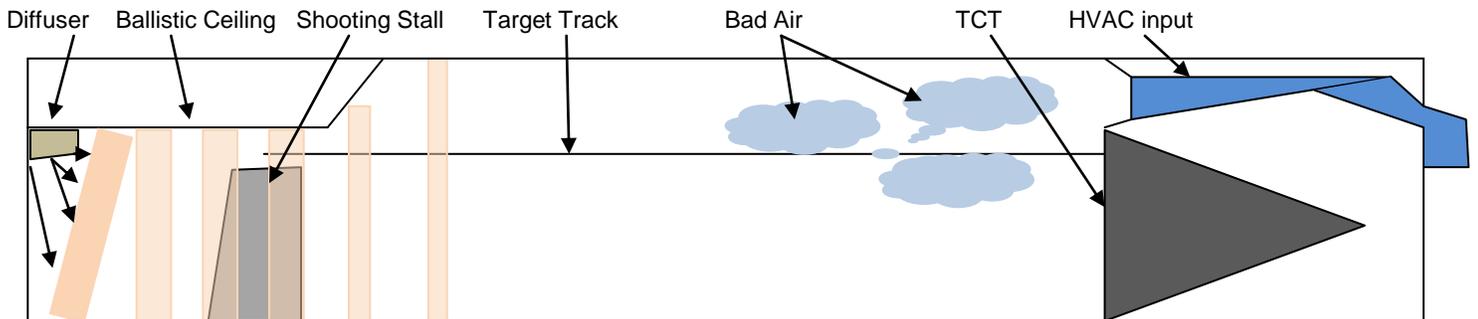




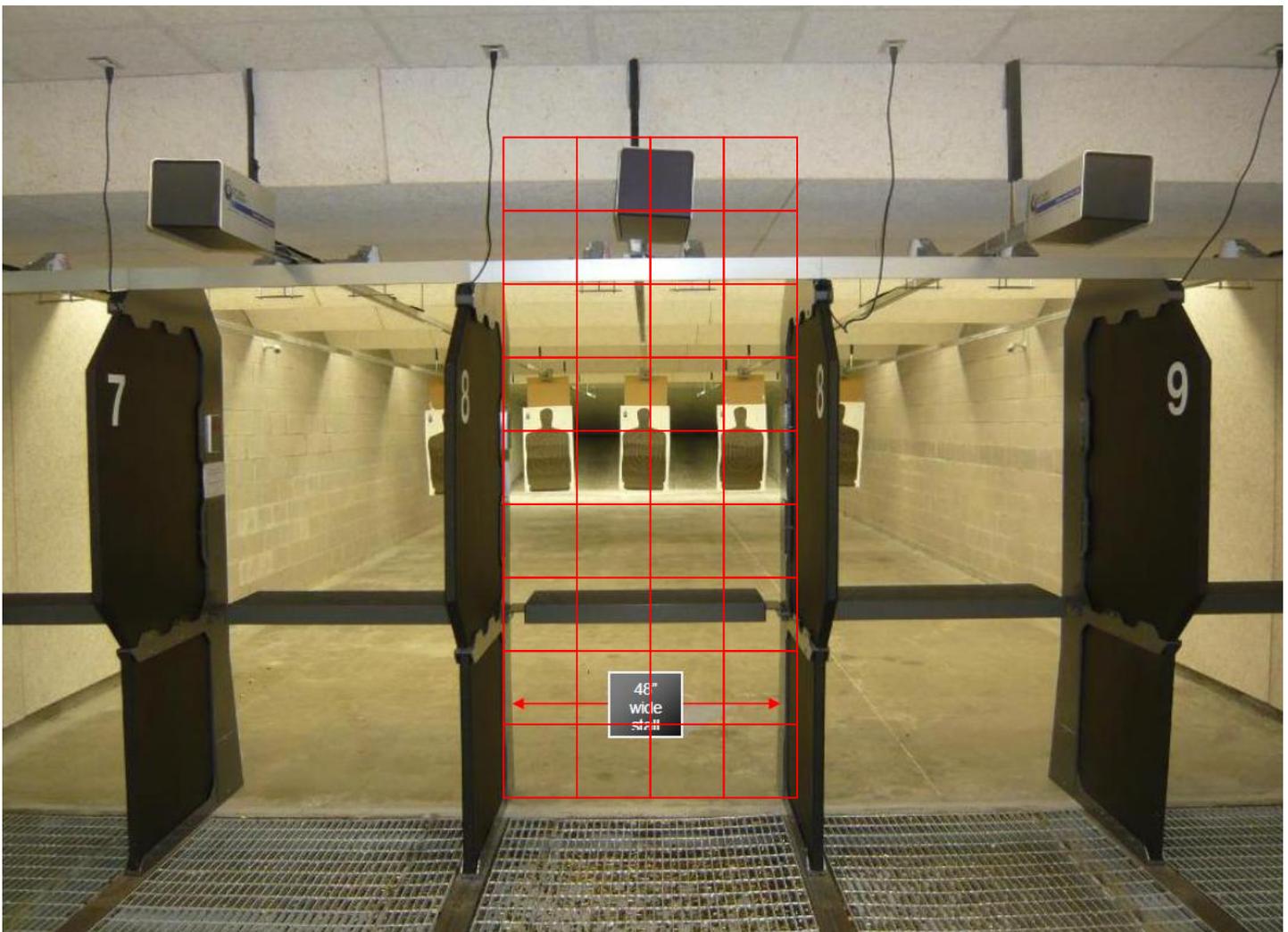
Air is re-circulated back to the diffusers behind the shooting line.



There is a requirement that air has to pass by the shooters in a non-turbulent fashion. This is to ensure that any smoke or particulates are swept down range without circulating around the shooter's private, breathing area. Also, it prevents dust from settling on the shooter's equipment, range bags etc.. To achieve this, a "wall" of air has to be formed behind the shooter, then moved down range. With standard HVAC outlets this is not possible and various forms of diffusers can be used, usually custom designed to suit the height and depth of the range area behind the shooter.



Diffuser creates a wall of air that passes down range at 75cfm per square foot of range area. As shown below, each red square would need 75 cubic feet per minute of air passing downrange in a "Non turbulent" path. (That's a lot of air!)



So, for a range as above – this five stall section would need $5 \times 4 \times 9 \times 75 = 13,500$ CFM of clean air. Hence the large air handlers as shown in the previous photographs.

There are various designs for the diffusers – some shown below....

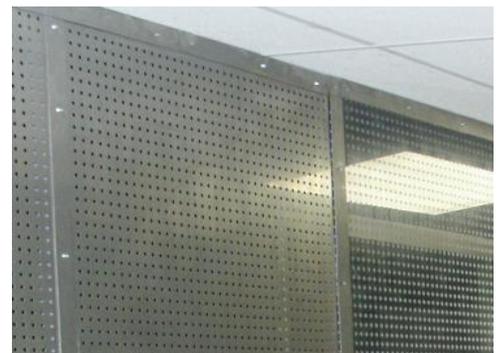


There should be at least 10 feet between the diffuser and the shooting stall to ensure a correctly formed "wall" of air going past the shooter down range.

This section that splits to fit around the control room is very inefficient as there is only three feet between the diffuser and the shooting stall. Air turbulence is common in this club with clothes and shooting bags often smelling of smoke and covered in particulates.



One alternative to a ceiling diffuser is to have a perforated rear wall so the air immediately forms a "wall" of air as it enters the rear of the range.



The most efficient are the units I designed for the 25m and 50m underground ranges in Abu Dhabi.



Shown above is the rear of the 50 meter rifle range. The booths are 5 feet deep and there is 12 feet behind the booth to allow ample forming area for the air-wall to be created.