

NC Wildlife - NRA Range/Backstop Guidelines

3.04.4.3 Benchrests

- A. **Material:** Benchrests or shooting benches may be built of wood, steel, or concrete and may be either permanent or movable. Specific designs on drawing A-33 incorporate maximum stability, an important factor in competitive benchrest shooting events. Precast concrete is recommended, offering long-term low-maintenance use. Support columns may be of steel or reinforced concrete. Wooden benchrests may be either permanently mounted on heavy timbers (drawing A-34) or movable. The only requirement is that benchrests be solid and sufficiently sturdy to provide a stable surface from which to shoot.
- b. **Configuration:** Designs vary according to specific use.
- c. **Size:** Overall bench sizes may vary, but height and stability must be exact for IBS or NBRSA competition. (NRA does not sanction benchrest competition.)

3.04.5 **Backstop/Bullet Impact Berm.** Various factors can effect the course, travel, deflection, bounce-back and ricochet of bullets or shot. The distances and measurements stated below are to be considered as guidelines only. This Source book does not represent or guarantee that a particular bullet or shot may not deflect, bounce-back or ricochet even if the guidelines below are met. Remember that you may be held responsible for the damage or injury caused from any bullet or shot that escapes the shooting range or that deflects, bounces back or ricochets, no matter how well your backstop, berm or baffles is constructed.

3.04.5.1 Main Backstop

- A. **Material:** Main backstops may be a natural hill or man-made earthworks, free of rocks and debris to a depth of 18 to 24 inches. In areas where removing rocks is impractical, steel backstops can be used or material trucked in for backstop construction. Another method used in rocky areas is to build a backstop with fill dirt or wood cribs as core material to minimize the cost of trucking in clean soil to finish the project. Any broken core material, or cribs must be covered with a minimum of 18" - 24" of soil and maintained to that depth. Where soil conditions permit the construction of earth berms, discarded material such as broken concrete, rocks, asphalt, bricks, etc., may be used for the core or interior of the backstop or berm. This technique saves on the amount of clean fill required for surface treatment.

All surface areas where bullets will strike must be rock free soil. Contact local agriculture agents for information on low, fast growing grasses common to the area to surface treat earthen backstops or berms. Crown vetch is a good choice in much of the United States, and it will aid in erosion control. DO NOT use railroad ties or stacked lumber or wood products for backstops. Bullets embedded in the wood can eventually cause lead buildup sufficient in size to cause backsplatter. Such backsplatter particles can travel up to fifty yards straight back to the firing line with sufficient force to cause injury.

CAUTION: Exposed automobile tires may cause bouncebacks where ammunition velocities are below 800 fps.

- B. **Configuration:** Sides should be sloped as steep as soil conditions will allow. Shallow slopes may call for the installation of either a horizontal bullet catcher or top wall to retain occasional ricochets.

- C. Size: Except for a 50 foot range, the suggested height for a backstop is 20 feet. Terrain features of significant size will alter or possibly even eliminate this requirement, especially in hilly or mountainous areas. Remember, where compaction procedures are not used, the fill material will settle, reducing the overall effective height by several feet. To counteract this, additional fill is required.

3.04.5.2 Intermediate Backstops

- 3.04.5.2.1 In some instances, such as in silhouette competition, intermediate backstops behind each bank of targets are required or desirable. Building these backstops for each specific distance is critical. Make every effort to contain those projectiles which strike the intermediate backstop and to provide an area where bullet strike is visible to the shooter or coach.

- A. Material: Rock and debris-free earth only. No steel (with the exception of steel backstops), railroad ties, cribbing, or other hardened material should be exposed to direct bullet strike. Steel plate backstops set at 45 degrees above the horizontal can be used effectively for smallbore rifle silhouette targets, except at 100 yards where bullet strikes are no longer visible. These steel backstops can be hinged, anchored in concrete, and when not in use, locked down in line with the horizontal surface of the ground. When other shooting activities are being fired on this range, the retracted steel plates should correspond to the horizontal grade to prevent damage to them and prevent ricochets from occurring off exposed edges of the steel.
- B. Configuration: Silhouette shooting events call for target support brackets set off the ground by a minimum of 6 inches. The intermediate berms must be high enough to provide a good impact area and yet low enough to provide good downrange visibility. Slopes on intermediate berms should not be less than 45 degrees. Earth used for these berms should be suitable for compaction in order to retain the steepest possible slopes. Where poor earth conditions exist, use sandbags to retain slopes.
- C. Size: Intermediate backstops should be a minimum of 2 feet higher than the center of the target.

3.04.5.3 Side Berms/Walls

- A. Material: Core material may be broken concrete, asphalt, rock-laden fill or other fill materials discarded by area contractors. Exercise caution since local soil conservation districts may restrict such use. Surface areas subjected to occasional bullet strikes must be rock and debris-free to a depth of at least 12 inches. As an alternative to earthen berms, masonry walls may be used. Precast concrete wall panels offer long-term use and ease of installation, and they are generally less expensive than earthworks.
- B. Configuration: Side berms need not be as high as the backstop, but they should have the same slope. For efficiency and cost savings construct all berms as a single project. Install concrete walls vertically.
- C. Size: Earthen side berms suggested height is 8 feet. **Caution:** Where soil conditions present a problem with compaction, additional material must be added to compensate for settlement. Wooden or concrete walls are recommended to be 8 feet high.

3.04.6 Baffles and Other Safety Barriers

3.04.6.1 Overhead Baffles

3.04.6.1.1 Overhead baffles are used to contain the flight of bullets to a specified area within the range. These overhead baffles are useful in areas where space is limited. Baffles are also described in sections on particular shooting activities (see drawings A/A-17, A-17, A-20, B/A-20, C-7, C-24, C-25, and C-62).

- A. Material: Construct baffles from a variety of materials, but make long-term low maintenance a design consideration. Reinforced concrete, steel, wood and high-impact, bullet-resistant plastics are some of the materials available.
- B. Configurations: Concrete panels should be pre-stressed, and a minimum of three (6) inches thick. To interrupt or redirect the flight of errant projectiles, set concrete panels in place either vertically or at a 25 degree angle as shown on drawings C-24 and C-25. Width of these concrete slabs depends upon the local concrete contractor's capabilities.
- C. Wood and metal used in a "sandwich" configuration with wood facing the shooter allows bullet penetration to the metal yet prevents backspatter. The off-side of the baffle panel is covered with a thin layer of wood to reduce sound generated by bullet strikes.
- D. High impact clear plastics may be used as baffle material for some calibers in areas where light is needed to improve visibility, but are also expensive. Such plastic prevents the escape of bullets and provides for natural illumination of the firing line area.
- E. Plywood can also be used for baffles. To do so, simply construct long boxes out of plywood and 2 inch x 6 inch lumber to be filled with a medium capable of stopping any bullet fired on the range, such as 3/4 inch crushed rock. Prior to baffle construction, select and test materials to be used in baffle construction to determine effectiveness for bullet containment.
- F. Size: Overhead baffles must extend the entire width of the firing line and connect to either a side wall or berm. Concrete slabs should be (4) feet wide, (3) inches thick and (16) feet in length. Build wood/steel laminated panels (16) feet long and (4) feet wide. Thickness depends on laminations required for a specific range.

3.04.6.2 Ground Baffles

- A. Material: Construct ground baffles from a combination of earth, steel, wood or concrete.
- B. Configuration: Install ground baffles vertically to coincide with overhead baffles or spaced effectively to eliminate or reduce horizontal surface areas exposed to direct fire. This reduces the possibility of ground generated ricochets. Steel ground baffles sloped toward the firing line have been used effectively to trap errant bullets. The ground baffle's top edge or that surface exposed to direct hits must be designed to reduce even more the possibility of ricochets escaping between overhead baffles. (Refer to *Typical Gound Baffle Section* on drawing A-21.)