EXPLOSIVES SAFETY BULLETIN

U.S. Army Technical Center for Explosives Safety (USATCES)
McAlester, OK 74501

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LOW TECH AMMUNITION HOLDING AREA (AHA) DESIGN TOOL

The following article is written for those that have some experience in explosives safety quantity distance, such as: Safety Professionals, Quality Assurance Specialist Ammunition Surveillance (QASAS) personnel, Logistics Assistance Representatives (Ammo LARs), MOS 55B, or AHA managers.

If you need to establish a new AHA or redesign an existing AHA and do it quickly, then this might be the tool for you. This tool will allow a user to see how many ammunition storage locations can 'fit' into a given space and still maintain magazine distance. The tool does not address exposures exterior to the AHA (what is at risk either from or to the AHA). It just allows the user to figure out how much ammunition storage can be safety sited into a given area. Once the internal designs are complete, a review of structures and locations exterior to the AHA must be done to assure there are no quantity distance violations. Information on required inhabited building distance and public traffic route requirements is contained in DA Pam 385-64, Ammunition and Explosives Safety Standards.

The ***Explosives Safety Bulletin*** targets the ammunition/explosives community. It is published quarterly by the U.S. Army Technical Center for Explosives Safety (USATCES), SJMAC-ESM, 1 C Tree Road, Bldg 35, McAlester, OK 74501. If you wish to submit an article or have any questions regarding the bulletin, please email bulletin@dac.army.mil. To subscribe/unsubscribe or correct your email address, use this bulletin form.

Using the tool:

1. Measure the interior dimensions of the AHA. Use the most accurate means available. A laser rangefinder, measuring wheel or tape measure is great. GPS is good provided you catch enough satellites for an accurate measurement. Using scale maps is good but it is recommended that these distances be verified on the ground. Using a vehicle odometer or pacing a distance off is only good for 'a swag' and needs to be verified by more accurate means.

2. Getting started:

a. Make a scale drawing of the available space. The scale this tool uses is 1 inch equals 200 feet. So, a rectangular AHA that has a length of 2000 feet and a width of 1200 feet would scale out on paper to be a rectangle 10 inches by 6 inches. Make multiple copies of this scale drawing so that you can try several different plans.

b. It will be helpful to make the templates out of transparencies, if available. This will allow the user to easily position the template particularly near the exterior edges of the AHA. Check the scale on the templates. The templates have a scale verification tab. This scale verification tab should measure one inch long. If the scale verification tab in not one inch long, then the printer or copier used has distorted the scale and the templates should not be used.

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c. Cut out the attached templates along the dotted lines. Cut out the centers of the templates (the center of the template is the ammunition storage site).

3. Design Types—Use the cut-out templates on the scale diagram of the AHA to develop several storage plans. It is recommended that at least 3 plans be developed, these are:

a. Low Cost AHA—Use only unbarricaded distance templates. The chief advantage of this plan is that it is relatively inexpensive to implement and can be constructed quickly.

b. High Capacity AHA—Use barricaded distance templates. This plan requires barricades to be constructed. It is neither fast nor cheap, but does significantly increase the storage capacity at the AHA.

c. Hybrid AHA—Uses a combination of barricaded, unbarricaded and basic load holding area (BLAHA) storage locations. This plan is generally a better fit to the mission than the other two plans. While preparing the Low Cost AHA and the High Capacity AHA, chances are you will notice what works good from the other two plans and can incorporate the good features into the Hybrid AHA plan.

4. **Using the templates:**

a. First, draw a standoff from the AHA boundary. Security generally wants an interior perimeter road and doesn't want the ammo on the fence line. That standoff will probably be 25 or 50 feet. Using the 1-inch equals 200 feet that is 1/8 or 1/4 inch on the interior of the AHA. This security standoff can double as an access route to the ammunition storage locations and a firebreak.

b. Second, place the selected template in one of the corners of the scale AHA diagram. Mark the ammunition storage location (the center cut-out of the template) on the AHA diagram. Move the template so that the edge of the template arc touches the previous marked site and mark this site. Move the template again until the edge of the arc touches the previous site and mark this site. Continue placing additional storage locations until there is no space to fit another storage site.

c. After you've developed at least the first two plans. Check for exterior inhabited building distance (IBD) or public traffic route distance (PTR) relationships. You may have to leave some sites empty or limit them to only HD 1.4 ammunition to avoid IBD or PTR violations.

5. **Limitations, considerations and notes:**

a. Barricades and Barricaded distances

(1) It is generally impractical to barricade all four sides of an ammunition storage site. While it can be done, in order for vehicles to enter and maneuver in the ammunition storage location, one side of the ammunition storage location will probably need to remain open (unbarricaded). The templates were developed with barricades on three sides and unbarricaded on one side. For this reason, the barricaded sites have slightly larger interior dimensions than the unbarricaded sites, which could be approached from any direction.

(2) The barricades need to be higher than the ammunition by a factor of 1-foot in height for every 27 feet of run based on the most distant ammunition in storage to the barricade. This is

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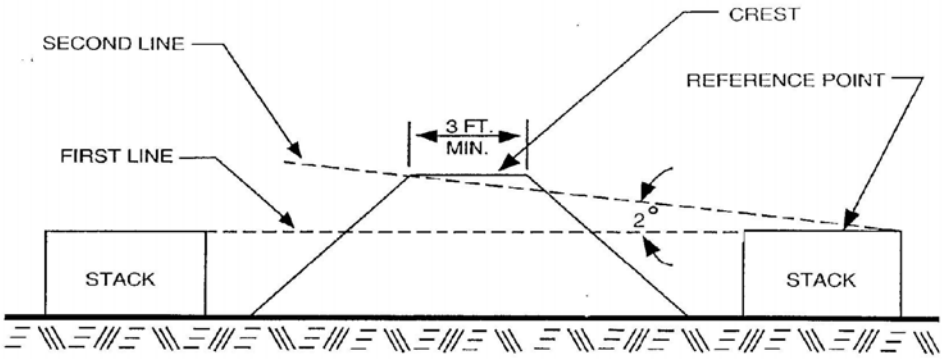
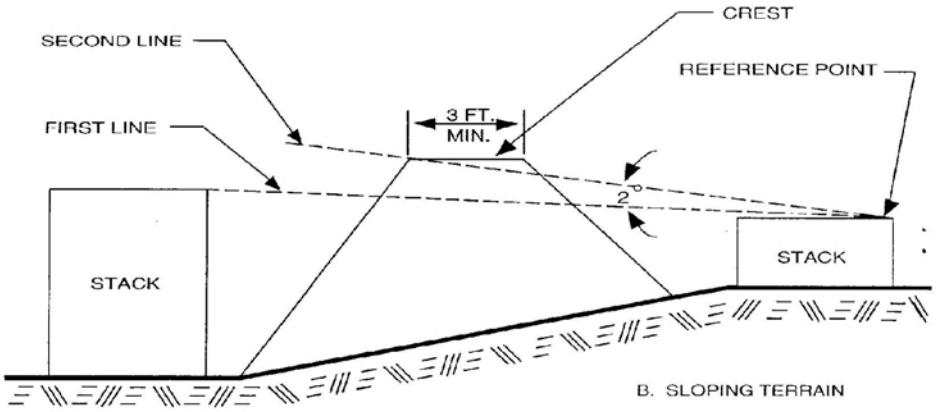
called the 2 degree rule and is shown in the diagrams below. This means that ammunition 100 feet away from a barricade requires a barricade that is 3.75 feet higher than the height of ammunition in storage (100 divided by 27 equals roughly 3.75 feet with some wiggle room). Ammunition can be as high as 8 feet in an 8.5 foot high ISO shipping container. For this example, ammunition stacked 8 feet high in a container with a 100 foot run to the barricade will require a barricade 12 feet tall (8 + 3.75 = 11.75'). The further away the ammunition is from the barricade the taller a barricade must be.

(3) When designing more than one row of barricaded storage areas, it is advisable to orient the storage locations rear-to-rear rather than front-to-rear. This will require less real estate and will result in two rows close together, and then a large empty space (unbarricaded distance) to the next set of storage locations. Orienting the storage structures front-to-rear will require unbarricaded distances from the open front or high barricades on the barricaded storage location.

(4) For BLAHA storage, it is advisable to construct at least 11-foot high barricades that are



A. LEVEL TERRAIN



B. SLOPING TERRAIN

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47 feet wide at the base (50 feet was used on the templates). New barricades are required to have 1 foot of rise to 2 feet of run (a 1-to-2 slope). The required distance between two barricaded BLAHA storage sites, each sited for 8,800 lbs, is 41 feet. Constructing the barricades of this width at the base will insure that ammunition won't be placed too close to ammunition in adjacent cells.

b. When combining barricaded and unbarricaded sites, use the unbarricaded template. The unbarricaded distance is required unless the barricade is high enough to meet requirements.

c. Storing some HD 1.2.1 ammunition requires 300 feet minimum to other aboveground storage locations. So, when developing plans, be sure to include some storage locations that are a minimum of 300 feet away from other storage locations. If all storage locations are less than 300 feet away from each other, you could not store these 1.2.1 items in the AHA.

6. Template selection and design—The net explosives weights (NEWs) selected for the templates are numbers that are typically encountered during AHA and BLAHA operations. But the user is not limited to these numbers and these templates. The user can design additional templates. Just determine how much space is needed to place the ammunition (keeping in mind MHE maneuver requirements) and using a compass and scale scribe the required magazine distance arc from the edges of that storage location. The table below has required distances for various NEWs of hazard division 1.1.

USATCES
Risk Management Division
DSN 956-8756
Comm (918) 420-8756
Questions/Comments: Explosives Safety Bulletin

NEW (LBs)	Mag Unbarricaded	Mag Barricaded	Public Traffic Route	Inhabited Building Distance
8,800 (BLAHA)	248 ft	41 ft	751 ft	1146/1250*
10,000	237	129	750	1250
20,000	300	163	750	1250
30,000	342	186	750	1250
50,000	405	221	884	1474
90,000	493	269	1080	1800

* When using BLAHA QD, the required IBD and PTR is dependant on the type of facility at risk. Barracks, installation critical facilities and the installation boundary require the application of default fragment distances, 1250 feet. Non-critical facilities internal to the installation for example, a motor pool, a laundry, or a dining facility could be located at 1146 feet.

USATCES APPLICATIONS

Joint Hazardous Classification System (JHCS) (login required). On-line database containing final classification data.

Explosives Safety Mishap Analysis Module (ESMAM) (login required). Contains reports of explosive mishaps and malfunctions for all services of DOD.

Chemical and Biological Event Reporting (CBERS) (login required).

Webcat. On-line catalog listing collections we have to include technical reports, journals, archival documents, and accident reports.

Explosives Safety Bulletin. Listing of all bulletins by table of contents or full text.

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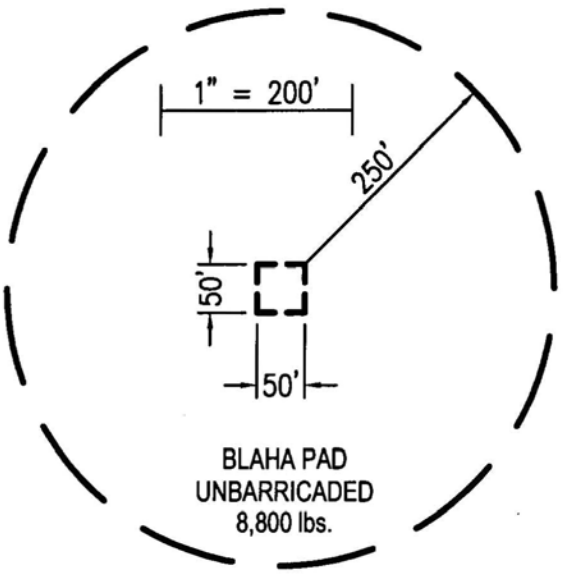
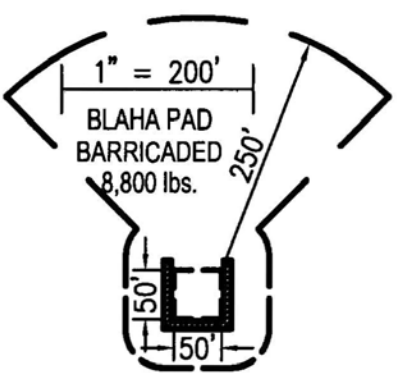
Website: https://www3.dac.army.mil/es

Explosives Safety Mishap Analysis Module (ESMAM)/Joint Hazard Classification System (JHCS) database link: https://www3.dac.army.mil/esidb/login/Default.asp


1" = 200'
250'
50'
50'
BLAHA PAD
UNBARRICADED
8,800 lbs.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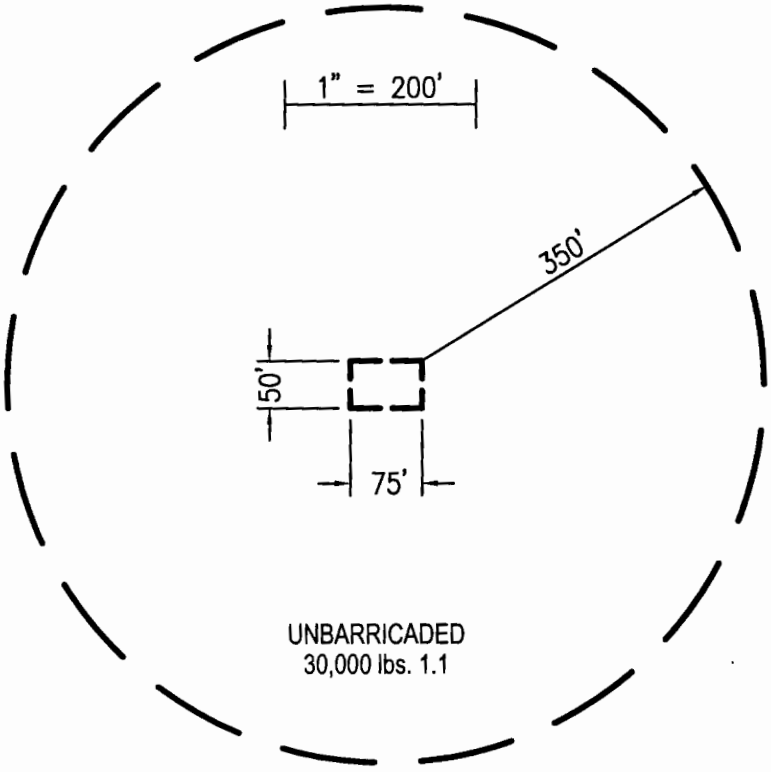
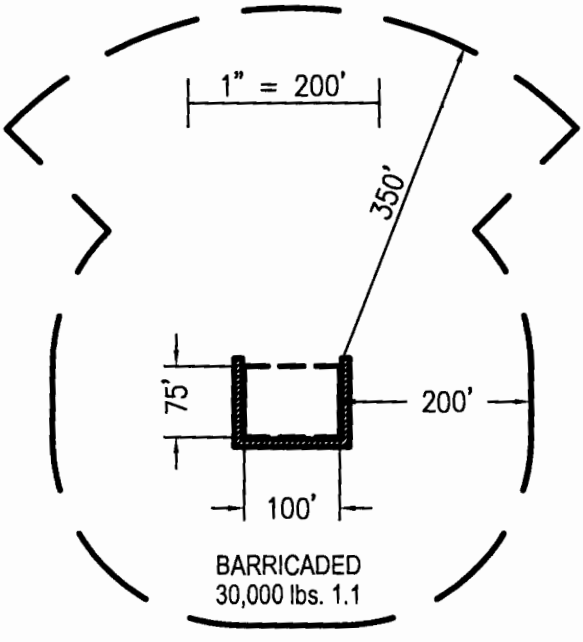
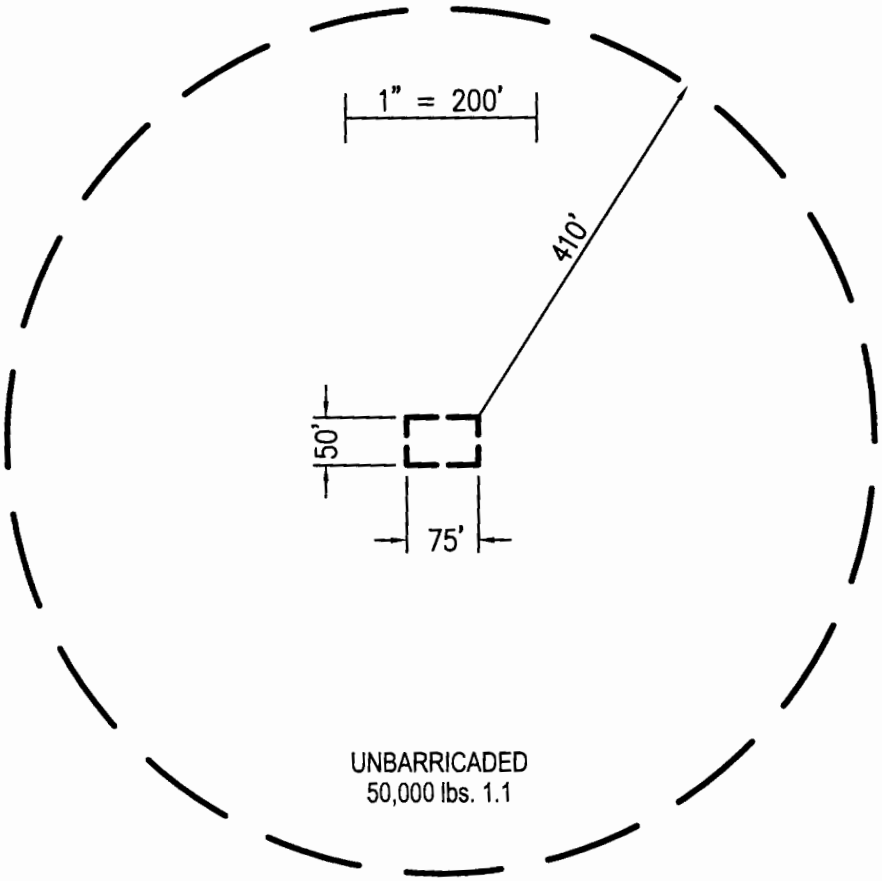
BLAHA PAD
BARRICADED
8,800 lbs.
250'
50'
50'



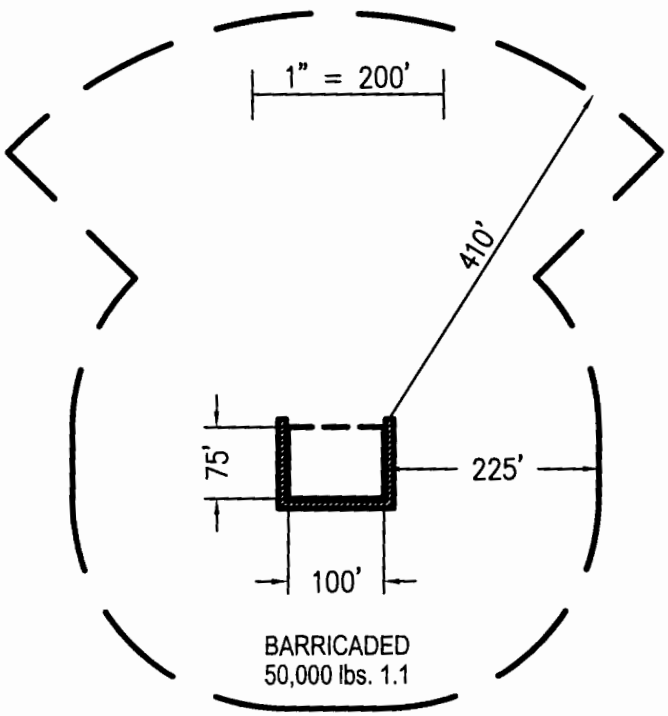
UNBARRICADED
30,000 lbs. 1.1



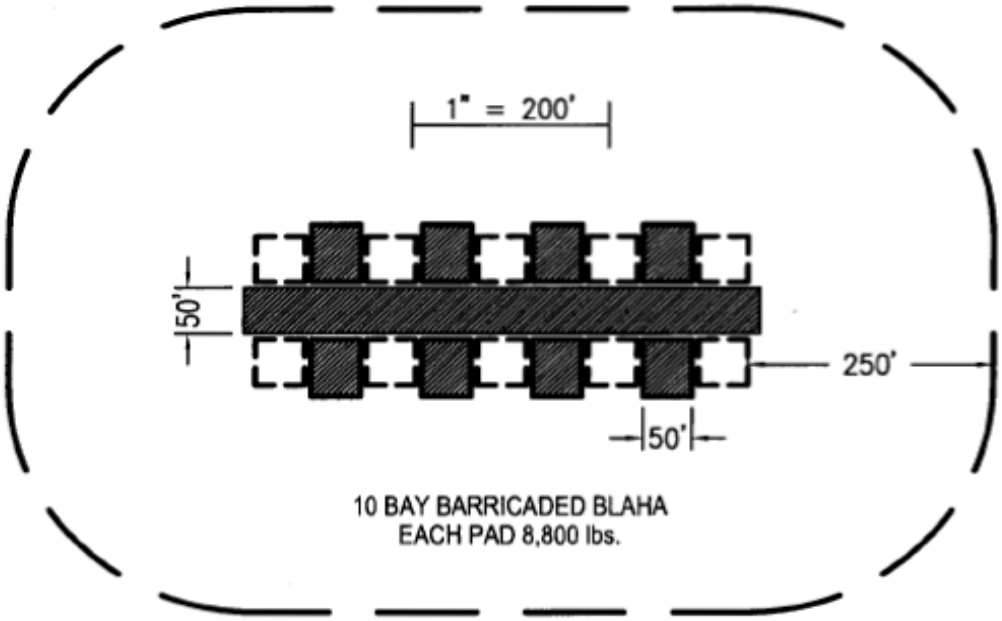
BARRICADED
30,000 lbs. 1.1



UNBARRICADED
50,000 lbs. 1.1



BARRICADED
50,000 lbs. 1.1



10 BAY BARRICADED BLAHA
EACH PAD 8,800 lbs.

BARRICADED TO EACH OTHER, BUT NOT FROM
EXTERIOR STORAGE LOCATIONS.