

Blind Hex Equation

Obstacle	Number of Blind Hexes Created by a Firer at higher elevation shooting over an Obstacle at a Target at lower elevation	or	Minimum # Of Blind Hexes	
Non-Cliff Crest Line	$2 * \text{Height of Obstacle} + \frac{\text{Range (FRD)}}{5} - \text{Height of Firer} - \text{Height of Target}$	or	0	Whichever is Larger
All Others	$2 * \text{Height of Obstacle} + \frac{\text{Range (FRD)}}{5} - \text{Height of Firer} - \text{Height of Target} + 1$		1	

- Height of an Obstacle = base level of Obstacle's hex + full-level height of that terrain type (FRD) [EX: Woods rising from a Level 1 hex has an Obstacle Height of 2 levels. A Two-Story House (B23.22) rising from a level -1 hex has an Obstacle Height of 0.]
- Range is range in hexes from Firer to Obstacle.
- LOS is reciprocal (A6.5), so this applies even if Firer is at lower elevation and Target is at higher elevation.

LOS Never Exists If

- Combination of Smoke/LV/LOS Hindrances is ≥ 6 (B.10)
- Target unit is outside NVR (E1.101) [EXC: Gunflash (E1.81), Illuminated Locations (E1.9), moving vehicles at Night (E1.14); units in Illuminated Locations have LOS only to other Illuminated Locations and Gunflashes]
- LOS crosses unbreached Rowhouse Bar (B23.71) or Factory Interior Wall (O5.3)
- Intervening obstacle height > height of firer *and* target (A6.2) unless obstacle is in firer or target's hex
- Units inside Pillbox have no LOS to Aerial targets (E9.31, B30.2), outside the Pillbox CA, or Locations in their own hex that are not at the same level (B30.2)

Half-Level Obstacles (A6.21)

- Cactus Hedge/Patch, Dune Crest, Hedge, Hillock, Hillside Wall/Hedge, Roadblock, Rubble, Seawall, Wall
- Block **same-level** LOS *through* (not *into* or *out of*) that hex [EXC: a unit Entrenched behind a Half-Level Obstacle or Paddy Bank has no LOS to same-level non-adjacent hexes (B27.2)]
- Do not cause Blind hexes or block LOS to/from a higher level hex

Depressions (A6.3)

- Gully, Stream, Sunken Road, Wadi
- LOS exists to unit IN a Depression only if the Depression Location is not Blind to the firer and either:
 - The LOS goes through continuous Depression hexsides, or
 - The firing unit has a height advantage in levels which is \geq the range in hexes, not counting intervening Depression hexsides, or
 - The firer is Aerial (E7.25)

LOS-Specific Fire Attack Effects

- Across a cliff to adjacent lower level hex: vehicle armament, IFE, ordnance NA (B11.31) [EXC: LATW other than PIAT]
- Across a cliff hexside to adjacent higher level hex: only AA weapon, MG counter, ATR, PIAT, Inherent Small Arms (B11.32)
- PIAT firing at lower-level target in same or adjacent hex is NA (C13.61)
- Units inside a Pillbox firing at own hex are limited to CC, Thrown DC, vertices of the Pillbox CA, or PBF vs units currently crossing the CA hexsides.
- PBF is NA when firing at adjacent unit that is 2 or more levels higher than the firer
- OT AFV crews have CE DRM reduced by 1 for Air Bursts (B13.3) and for each level of firer's height advantage > the range (D6.61); such an AFV is treated as unarmored (D5.311). If the CE DRM is reduced to 0, the crew is Vulnerable even if BU and is subject to IFT attack results instead of normal stun/Recall.

Aerial LOS (E7.25)

- Aerial Range = 2x normal range (E.5); LV hindrances do apply
- Aerial firer can always see into a Depression, barring LOS obstacles creating a Blind Hex
- Full-level Obstacles create only one Blind hex; the Blind Hex created by Bocage is the hex the Bocage is in
- Aerial LOS crossing a full-level obstacle always creates only one Blind Hex (E7.25)

Atypical LOS - LOS drawn to:

- A hex vertex [EX: Bypass Movement (A4.34, D2.32), Rowhouse Bypass (B23.71), Climbing (B11.42)]
- An entire hexside [EX: Underbelly Hits (D4.3), Snap Shot (A8.15)]
- Some other in-hex point [EX: Road Movement (A4.132)]

Proof that the Blind Hex Equation Really Works:

This simple formula comes from adding up the contributions from four separate rules (A6.4-.43) and simplifying the terms. To my mind, spelling out the separate contributions from each of those four rules is a hassle, does little to improve players' insight into the Blind Hex process, and doesn't look as nice on paper. In my opinion, it's much easier to use a simple equation that you know is correct rather than suffer through explicitly calculating each Blind Hex contribution from A6.4-.43 and then adding them up.

The # of blind hexes created by an obstacle is spelled out in rules A6.4, 6.41, 6.42, and 6.43. Rule B10.23 really doesn't add anything, as far as I can see, except some examples of Crest Line Blind Hexes. Let's go through each of A6.4-.43 one by one and then add up all the contributions at the end.

First, a note. The height of an obstacle (Ho) is equal to the height of that obstacle terrain type (Htt) plus the height of the base level that the obstacle sits on (Hb). $H_o = H_{tt} + H_b$

EX: a single-story building sitting on a Level 2 hex has an obstacle height of 3. A Bamboo hex sitting in a Level -1 valley has an obstacle height of 1, since Bamboo is a 2-level LOS obstacle.

Another note - since LOS is reciprocal, I'm going to simplify my life and say that the firer is sitting at the higher level and the target is sitting on the lower level. It's much easier to say "Firer's Height" than "Higher level Height". OK, now we run through the factors in A6.4-.43

A6.4 - Creates blind hexes equal to the full-level height equivalent of the obstacle. Although not specifically spelled out here, I'm betting dollars to donuts that "height equivalent of the obstacle" refers to the height of that obstacle's terrain type, or Htt, rather than Ho. You'll see why in a minute.

A6.41 - The Range factor. Creates blind hexes equal to the range from the firer to the obstacle, divided by 5, FRD. No problem.

A6.42 - Firer Height Advantage. For every elevation advantage > 1 level over an obstacle, reduce the number of blind hexes by 1, to a minimum of one. Unless the obstacle is a non-Cliff Crest Line, in which case you can reduce the number of blind hexes to zero.

This works out to be $H_o - H_f + 1$, with the minimums being tacked on at the end of the calculation, where we say "it's either this number of blind hexes or 0 for non-Cliff crestlines or 1 for all other obstacles, whichever is larger". So a level 2 firer firing over a level 1 obstacle does not reduce the number of blind hexes due to this rule. Level 3 firer firing over a level 1 obstacle reduces the number of blind hexes by one, since $3-1-1 = 1$.

A6.43 - Target Height Deficit. For every level difference between the base level of the obstacle and the target height, add one to the number of blind hexes. Unless the obstacle is a non-Cliff crest line, in which case you ignore the first level of difference. This works out to $H_b - (H_t + 1)$ blind hexes for non-cliff crestlines and $H_b - H_t$ for all other obstacles.

OK, let's add up all of these contributions.

	[A6.4 + A6.41 + A6.42 + A6.43]				or Minimum
non-cliff	+ Range/5				
Crestline	Htt	(FRD)	+Ho-Hf+1	+Hb-Ht-1	0
All others	Htt	+ Range/5 (FRD)	+Ho-Hf+1	+Hb-Ht	1

OK. Now we add up all the terms and use the fact that $H_o = H_b + H_{tt}$. Let's call the Range term R because it's pretty simple.

$$\begin{aligned}
 \text{Non-cliff Crestline} &= H_{tt} + R + H_o - H_f + 1 + H_b - H_t - 1 && \text{or 0, whichever is larger.} \\
 &= H_{tt} + R + H_o + H_b - H_f - H_t && (\text{etc}) \\
 &= H_{tt} + R + H_o + H_o - H_{tt} - H_f - H_t && (\text{etc}) \\
 &= 2*H_o + R - H_f - H_t && (\text{etc})
 \end{aligned}$$

$$\begin{aligned}
 \text{All Others} &= H_{tt} + R + H_o - H_f + 1 + H_b - H_t && \text{or 1, whichever is larger.} \\
 &= H_o + R + (H_b + H_{tt}) - H_f - H_t + 1 && (\text{etc}) \\
 &= H_o + R + H_o - H_f - H_t + 1 && (\text{etc}) \\
 &= 2*H_o + R - H_f - H_t + 1 && (\text{etc})
 \end{aligned}$$

So that's where the blind hex equation comes from.

Now. If A6.4 refers to Ho when it talks about the "height of the obstacle", then the above equations become:

$$\begin{aligned}
 \text{Non-Cliff Crestline} &= 3*H_o + R - H_f - H_t \\
 \text{All Others} &= 2*H_o + R - H_f - H_t + 1
 \end{aligned}$$

Unfortunately, this is simply wrong. For the case where a Level 2 firer shoots over a level 1 crest line 5 hexes away at a target at level 0, the first equation above would give $3*1 + 1 - 2 - 0 = 2$ blind hexes, which is not correct. The simple form of the blind hex equation above gives $2*1 + 1 - 2 - 0 = 1$ blind hex, which is correct.