

# Ghouta chemical attack

Locations / impact angles

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Location “location 4” at 33.520415° 36.356117°

The UNSC report A/67/997–S/2013/553 states on page 25:

**Considerations on the likely trajectory of the rockets**

Of the five impact sites investigated by the mission, three do not present physical characteristics allowing a successful study of the trajectories followed by the rockets involved, due to the configuration of the impact places. However, Impact site number 1 (Moadamiyah) and Impact site number 4 (Ein Tarma) provide sufficient evidence to determine, with a sufficient degree of accuracy, the likely trajectory of the projectiles.

and on page 26

**Impact Site Number 4**

The munition related to this impact site by observed and measured characteristics indicatively matches a 330 mm caliber, artillery rocket. The projectile, in the last stage of its trajectory, hit the surface in an area of earthy, relatively soft, ground where the shaft/engine of the projectile remained dug in, undisturbed until investigated.

The said shaft/engine, presenting no form of lateral bending, pointed precisely in a bearing of 285 degrees that, again, represent a reverse azimuth to the trajectory followed by the rocket during its flight. It can be, thus, concluded that the original azimuth of the rocket trajectory had an azimuth of 105 degrees, in an East/Southeast trajectory.

According to page 22 this angle was measured at a visited site in Ein Tarma in the open field close to the visited roof impact site. We located the roof with the help of a Syrian photographer and therefore assumed that the OPCW Impact site #4 is the same site that is shown in the pictures on page 23 because this site is indeed close to the roof in the open field in Ein Tarma at geolocation 33.520498° 36.355988°.





If the angle measured by the OPCW is true then rocket and wall would confine an angle of only  $8^\circ$ . The line of sight along the rocket trajectory would show a higher building (magenta) in the east of the impact in the background. That's obviously not the case. The confined angle between rocket and wall is much larger than  $8^\circ$ .



The line of sight along the rocket trajectory points in the direction where the northern facades in the shadow meet the western facades in the sun



as proven by the well known videos. But the video is edited. It shows the rocket almost from behind with a tree in the background:



While the movement further to the right is edited, another frame shows the rocket and slightly from the other side. The facades in the background are lighted by the sun:



The line of sight from the rocket to the tree has an angle of  $138^\circ$ . The line of sight from the rocket to the lighted facade has an angle of  $134^\circ$ . The bearing for this rocket can be described as  $136 \pm 2^\circ$ .



The red area in the following image represents the probable launch area for an assumed angle of  $136^{\circ} \pm 2^{\circ}$  and a range of 2km:



Videos: <http://brown-moses.blogspot.com/2013/09/un-inspectors-examine-unidentified.html>

Location „Sheeps“ 33.524265° 36.359485°

Impact point: Note the visible edge of an elongated piece of metal in the crater. To the right of the crater is a long metal cylinder pointing towards the camera.

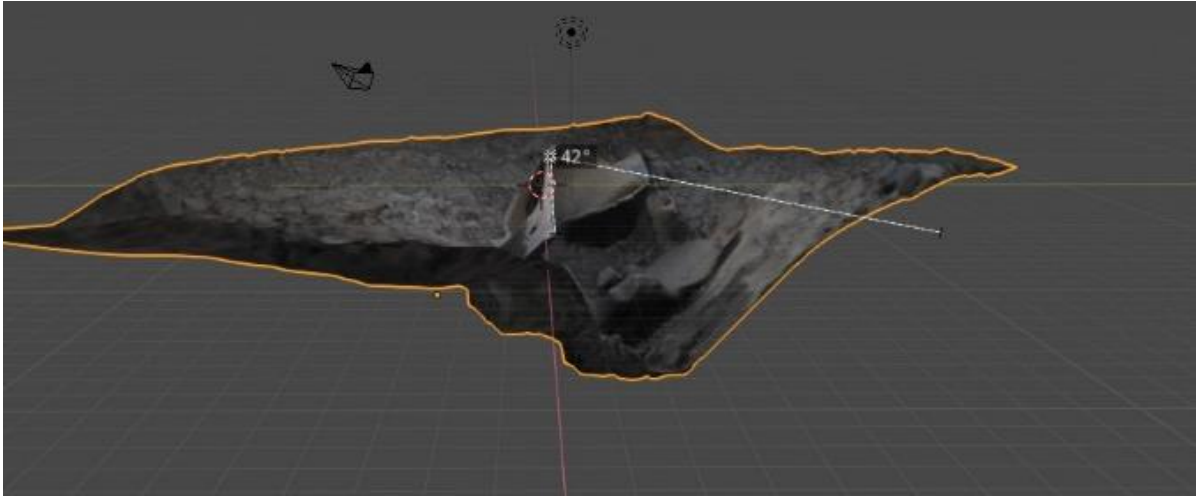


The edge of the metal piece in the crater points approximately in the direction of impact.



Due to the angle of the camera, the true angle could be a little larger than  $\sim 41^\circ$ .

A re-creation of the crater as a 3D model using Autodesk point-cloud technology reveals a true angle of  $42^\circ$  measured in top view.



Estimation:



Note that the blue line points to the centre of the protruding part of the building wall.



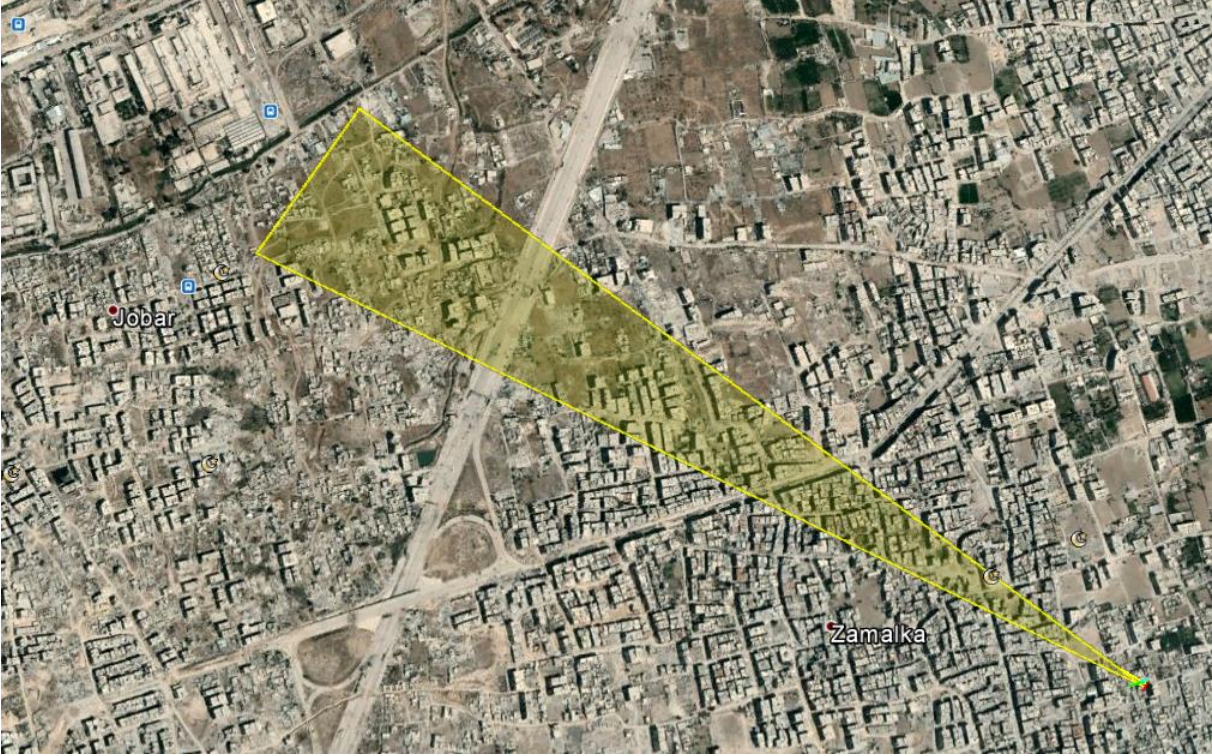
Also note the debris along the building wall (in the above image) and the damaged roof edge in the following image:



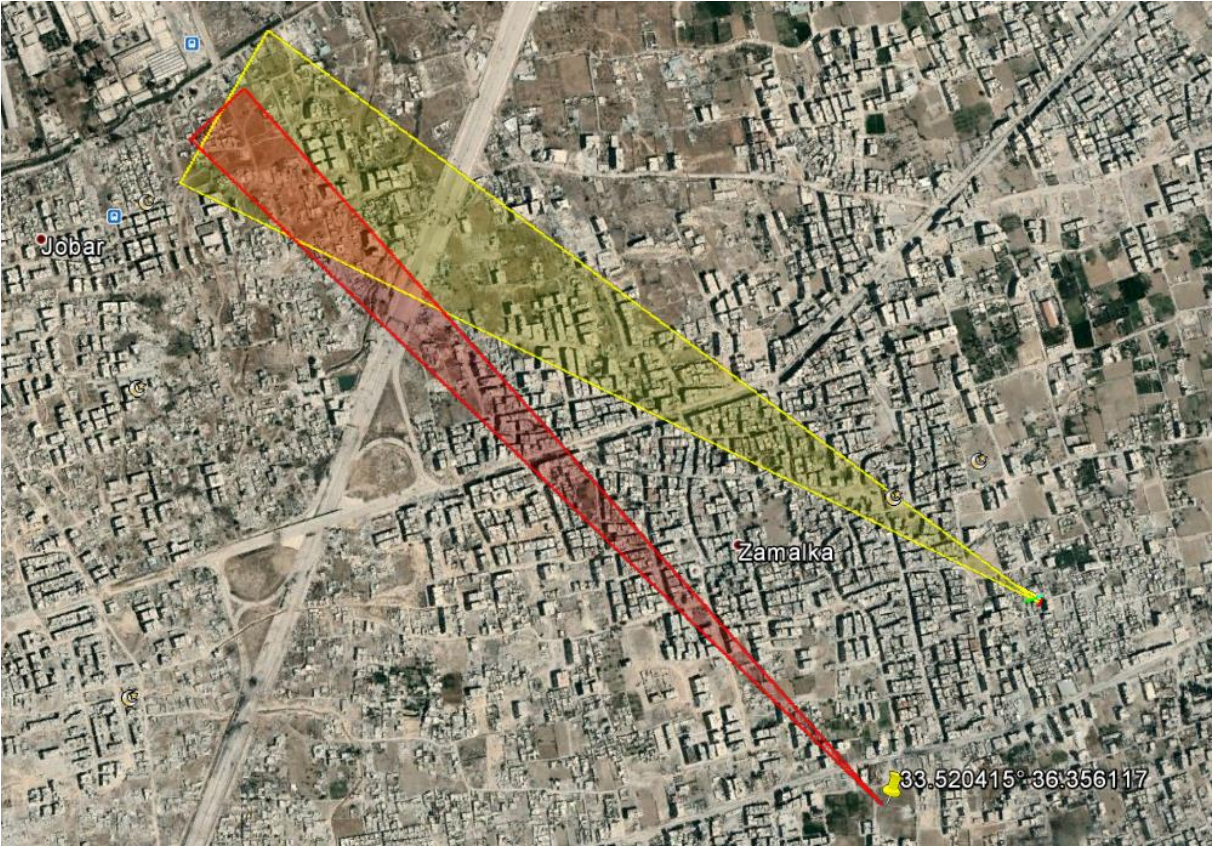


The azimuth of the crater is approx.  $121^\circ$  ( $301^\circ$ ) or a little smaller due to the camera angle of the crater close up image. The angle could be a little larger considering a small error of the blue line.

The yellow area is the probable launch area assuming a range of 2km and an angle of  $301^{\circ} \pm 5^{\circ}$ :



combined areas:

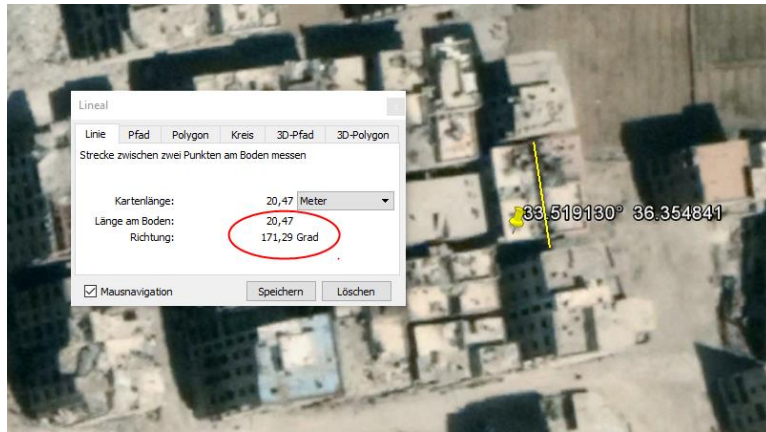


Location "Roof" 33.519130° 36.354841°

With the help of the following photo we were able to locate the roof:



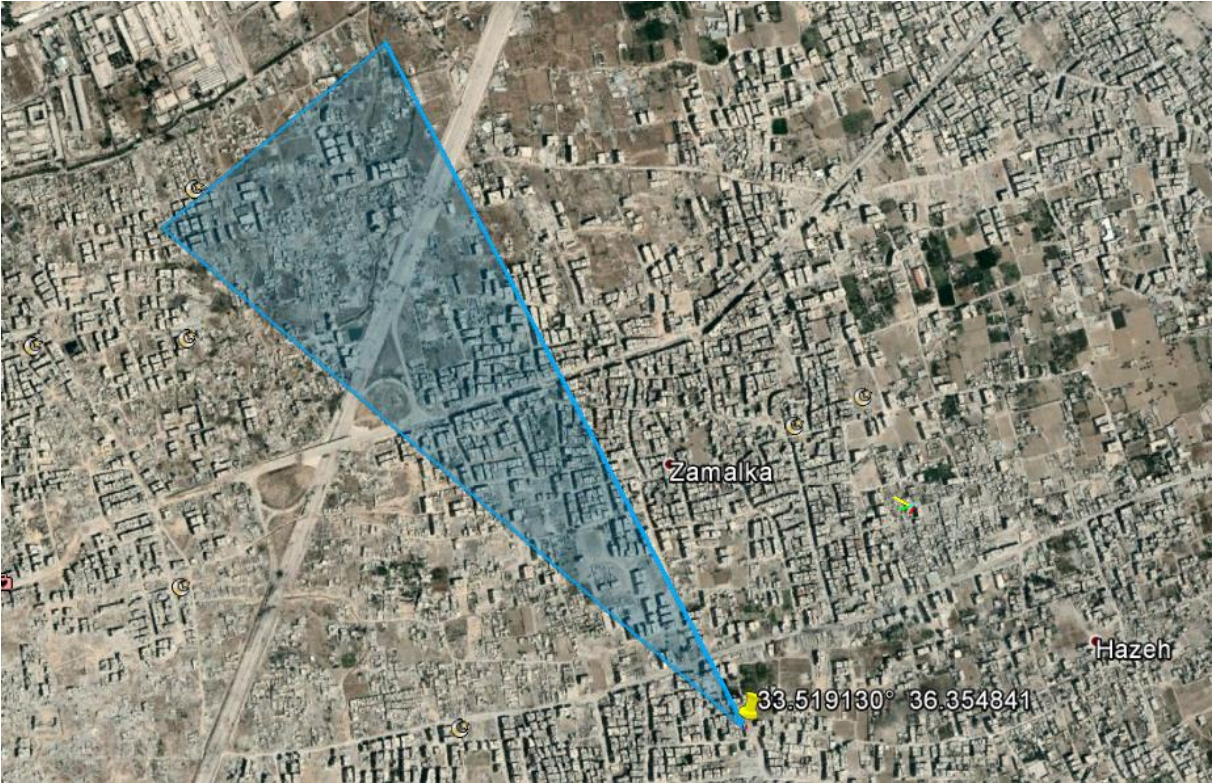
The rocket apparently penetrated the western outer wall and caused a crater inside the small roof building. On impact, the engine seems to have rotated its fins around the crater, penetrating the south wall.



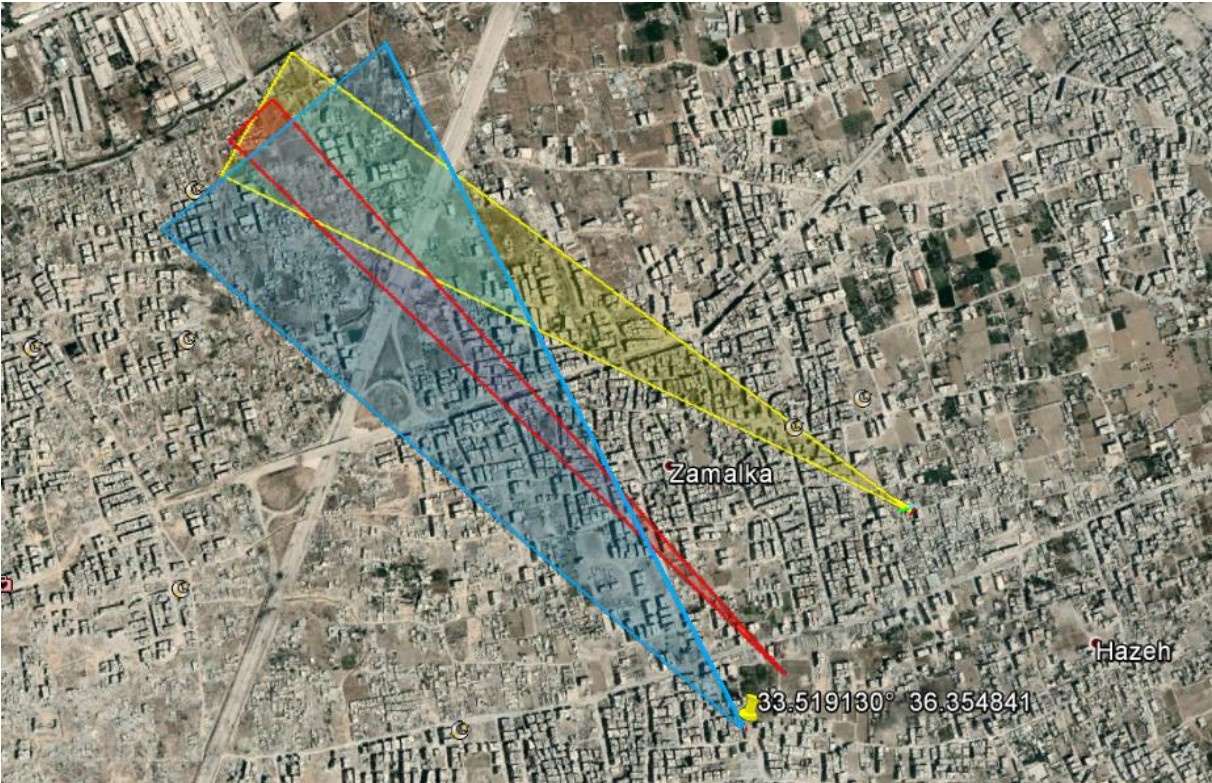
The penetrated west wall has an angle of about  $171^\circ$ . To penetrate this wall, we assume that the angle of the trajectory must not exceed  $154^\circ$ , otherwise the body and fins would also have had to damage the north wall so that the rocket could penetrate the building. Since the west wall may have distracted the rocket a little from the flight path, smaller angles of the flight path are possible.



The blue area is the probable launch area assuming a range of 2km and an angle of 154° maximum.



Combined areas:



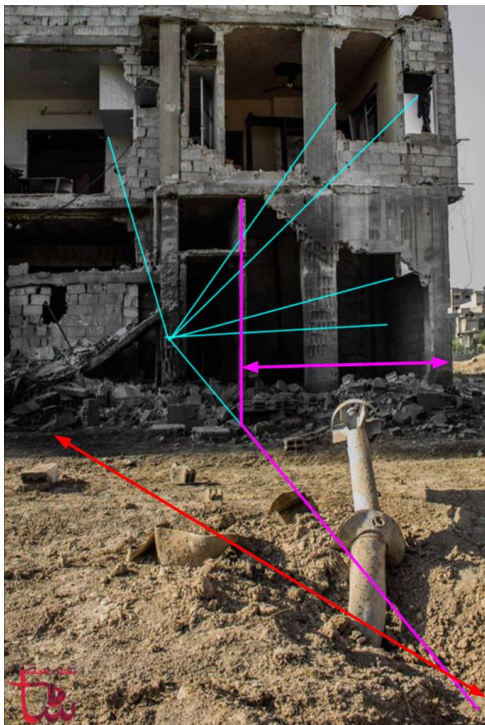
Location "Field" 33.520730° 36.357350°



There is no known pictorial material that would allow a reliable determination of the impact angle. Nevertheless, one can read from the videos that the crater is located between the third and fourth row of fields opposite the protruding part of the building, about 3/4 of the width of this part of the building from the west side to the east.



Camera turns on the spot

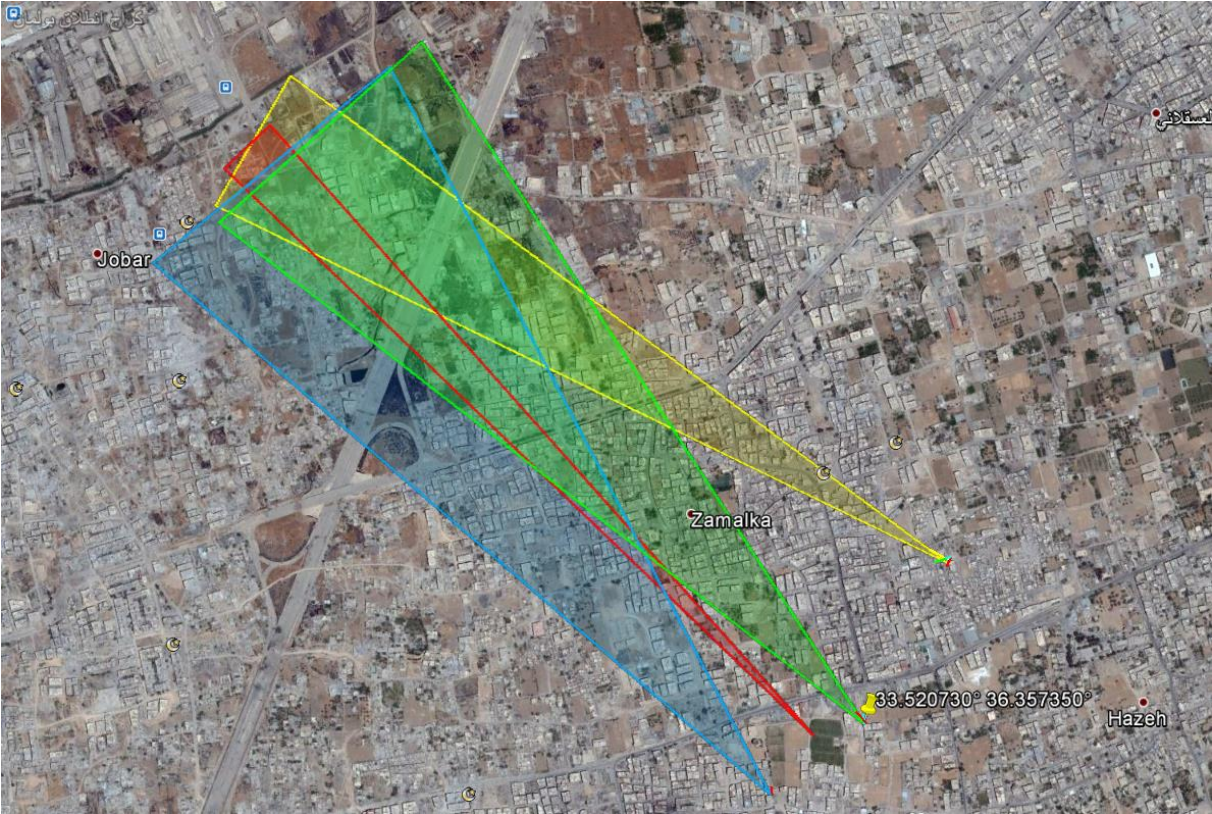


The longitudinal direction of the crater then points approximately to the next supporting wall of the part of the building adjoining to the east. In this way the angle can be estimated at least roughly by 137°.

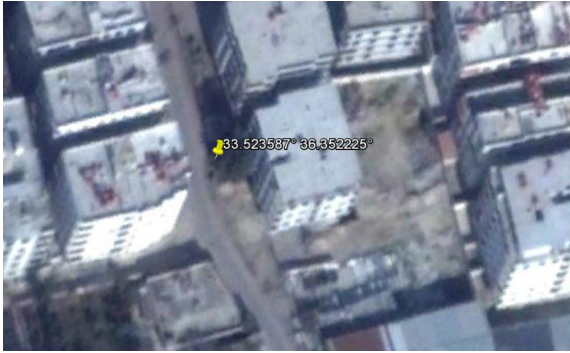
The green area is the probable launch area assuming a range of 2km and an angle of  $137^{\circ} \pm 10^{\circ}$ .



Combined areas:



Location “shutter door” 33.523587° 36.352225°



We identified the impact site as near the north-west corner of the house shown above, immediately north of the tree that existed there back in 2013.

Here, too, only a rough north-western direction can be determined. However, the point of impact lies between the already determined trajectories.



The special thing about this impact site is not only the apparently smaller range, but above all the unusual remnant, which obviously does not originate from a Volcano rocket.



<https://www.youtube.com/watch?v=kOKKHVMWHmw>



This remnant is obviously of smaller diameter (estimated 25-30cm), also has two ports but no visible connection to a rocket motor as known from smaller IRAMs.



*Outer side*



*Inner side*

Apparently, this ammunition contained a whitish substance similar to a Volcano missile used in Daraya, January 4, 2013 (see Appendix).

Location "Wall2" 33.525367° 36.362166°



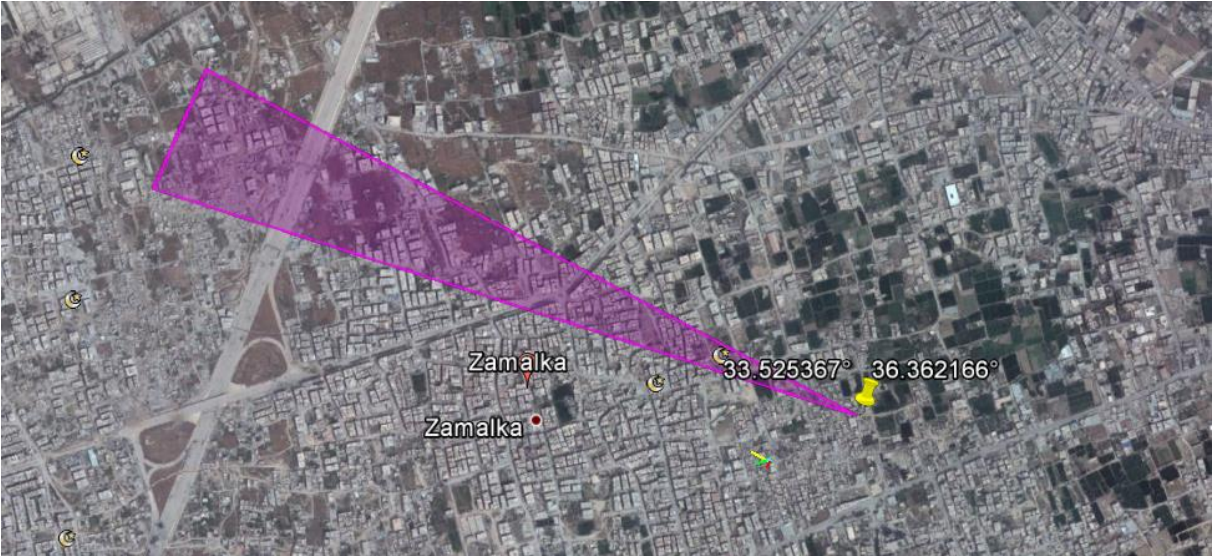
Also this angle of impact can only be estimated approximately. The standard length of a brick seems to be the most suitable.

Accordingly, the crater and its angle with the wall form a right-angled triangle of about 3 stone lengths (adjacent) and 1.8 stone lengths (opposite).

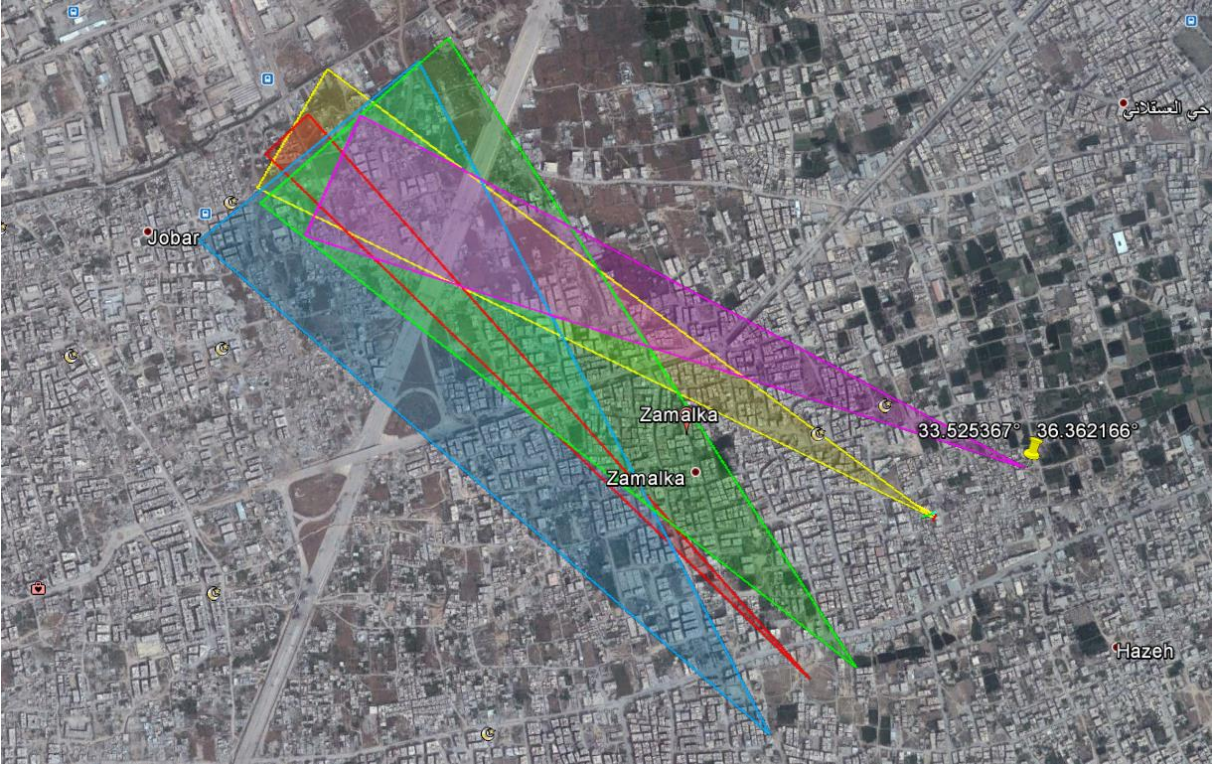


Accordingly, the wall with the crater encloses an angle of approximately  $\text{ArcTan}(1.8/3) = 31^\circ$ . The wall has an angle of  $82^\circ$  ( $262^\circ$ ), so the angle of the trajectory can be assumed to be close to  $293^\circ$ .

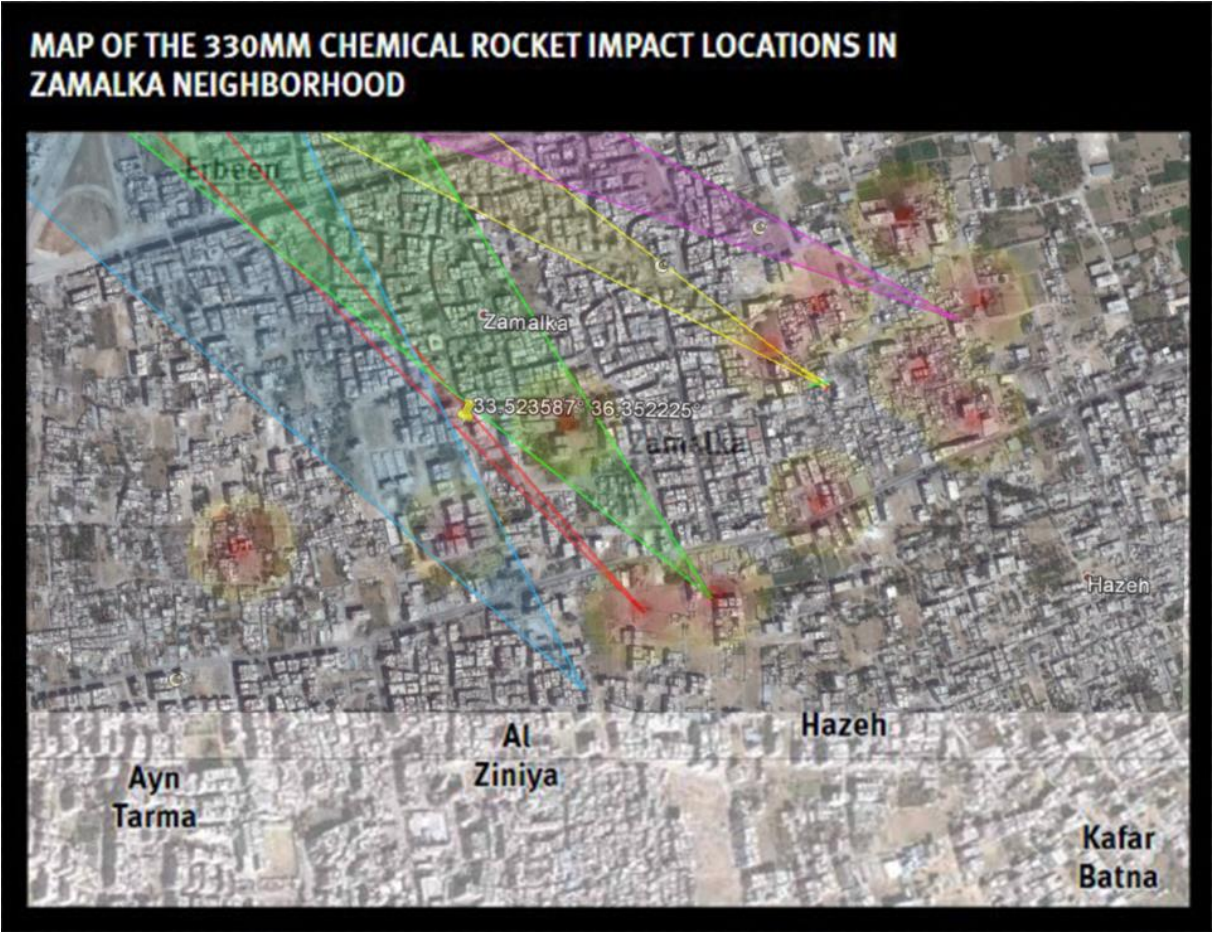
The pink area is the probable launch area assuming a range of 2km and an angle of  $293^{\circ} \pm 5^{\circ}$ .



Combined areas:



Comparison to initial reported impact points



## Appendix

Daraya, 1-4-2013:



Remarkable about this point of impact is the conspicuous white liquid, as well as the seemingly very flat angle of impact, which could indicate a very short flight distance. The whitish substance could be a clue to hexamine. However, the payload of this rocket apparently neither was sarin nor any other toxic substance, as the rocket was filmed apparently shortly after impact while visible vapor still ascended from the point of impact.

