PRV 160114 C April 16th, 2016

TECHNICAL ASSESSMENT

EXPLOSION AT TUZLA MAY 25th, 1995

Mission from :

Mr. Milorad KONSTANTINOVIC - Attorney

ON BEHALF OF THE DEFENSE OF General Novak DJUKIC

MISSION DATED FEBRUARY 9th, 2016

EXPERT

Pierre LAURENT
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MISSION

The request for expert assessment was placed by Attorney Milorad KONSTANTINOVIC on behalf of the defense team of General Novak DJUKIC, former officer of the VRS (Army of the Republic of Srpska).

This request is in relation with the alleged shelling of TUZLA "Kapija Square" on May 25th, 1995 in which 71 persons died or were fatally wounded and in which dozens of others were injured. Being at that time, as a colonel, head of OTG (Ozren tactical group), Novak DJUKIC was brought to Court for having allegedly ordered a 130 mm artillery projectile to be fired towards the town of TUZLA on May 25th, 1995 - 20:55.

We have accepted the mission under the usual conditions regarding deontology of experts in France i.e. independence and probity as per the rules of "Fédération Nationale des Compagnies d'Experts Judiciaires" (National Federation of Judicial Experts associations).

The request of Attorney Milorad KONSTANTINOVIC is shown here after.

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Belgrade, 09 February 2016

Laurent Pierre, ballistics and Pyrotechnics expert
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Subject: Request for conducting ballistic expertise

By authorization of head of defense team of General Novak Djukic, attorney Milorad Ivosevic from Banja Luka, and as a member of defense team, I give you request for providing expert assessment about circumstances and earlier determined facts in case of explosion on locality "Kapija", in the city of Tuzla, on 25 may 1995.

Goal of expertise is to give your expert assessment as to whether the killing and the destruction on Kapija square were caused by the impact of a 130mm cannon projectile next to the "NIK" store, as determined by Final Verdict of the Court.

In order to fulfil your task you will receive relevant documentation including photo-documentation and reports from the Court, maps, Firing Tables, reports from ballistic expert Prof. Berko ZECEVIC or translation in English of these documents.

You are invited to attend experimental test(s) which will be taking place in Nikinci proving ground on February 10th, 2016. The purpose of this experiment is mainly to duplicate the explosion on the crime scene on Tuzlan Kapija as determined by Prof. ZECEVIC, whose opinion the Court has fully accepted, and on whose opinion the Verdict was based, so that you can experimentally assess the results which are achieved by the projectile explosion on impact.

On this occasion, you should take measurements and photos as required. We will do our outmost to provide additional data which you may think necessary for your work and calculations.

Our wish is that you could write a Report detailing your findings and comparing the results of the performed test with the facts as determined by the prosecution expert.

In this Report, you are invited to make any comments or inferences that might help the pursuit of the truth.

For the defense team,
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[illegible]4-890
Milorad Konstantinovic

CONSULTANT CREDENTIALS

As an engineering trainee in Fluid Mechanics, Mechanics and Energetics with Institut National Polytechnique de Grenoble (Grenoble National Polytechnic Institute), we had internship at the research center of SNPE (Société Nationale des Poudres et Explosifs / National Company for powders and Explosives, now EURENCO), situated in Le Bouchet (suburb of Paris). The subject of study was the projection of metal layers by detonation of explosives, especially high impulse explosives.

Following ground-to-ground artillery officer training at military academy of Draguignan, we served our time in the Army at 41st RAMA (regiment of the French Marines equipped with 155 mm town artillery pieces). We held the rank of Reserve Captain in the French Army then in the Gendarmerie Nationale.

As an engineering graduate, we worked as an ammunition project manager with the former LUCHAIRE Défense company (now NEXTER Ammunitions), in charge of designing a range of Bullet Trap Rifle grenades (BTRG), especially for the French Army. This company was also a major provider for artillery projectiles including long-range base bleed types for which the company had patents.

We also held positions mostly related to process engineering with CORNING GLASS (specialty glass provider of Pyrex and vitroceramics) and with VALLOUREC (provider of specialty steel tubing).

We have been nominated expert in Pyrotechnics by the appeal Court of Limoges in 1997 and then Ballistics, Arms and Ammunition expert in 1998. Nominations have been regularly renewed since by Appeal Court of Reims and now Paris. We have been a full time consultant in these fields since 2006. While mostly working on cases involving small arms, we have been involved in a number of cases in relation with accidents in the military (artillery, explosions) but also in terrorist or war related events (bomb attack on Raffick HARRIRI convoy at Beirut Lebanon for STL The Hague, shelling in Homs Syria during which a French journalist wad killed, attack on the French Embassy in Kinsasha, DRC). We currently help the VINCI Construction Company to design the ballistic protections of the future international shooting range of CHATEAUROUX.

As regard the current mission, we were never involved beforehand and in any way with the accused, the victims or with any organisation having interest in the case.

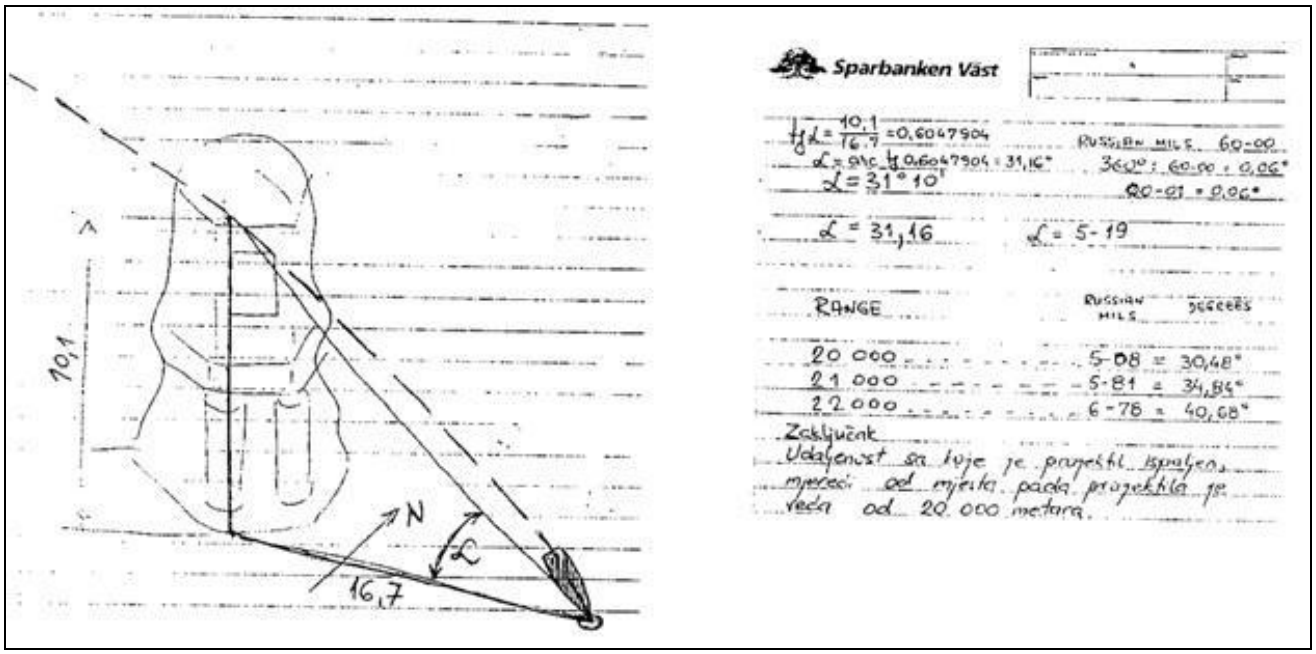
DOCUMENTATION REVIEW

INITIAL INQUIRY

Based on Police sketches and photos, a crater in front of the NIK building is identified as the burst point (or BP) of an explosion. The burst point is situated at 2,65 meters from south corner of NIK building and at 5,60 m from the north-east corner of NIK building (sketch by Chief Inspector tech. Nedim Mutapčic). Diameter of the crater is 50 centimeters. The NIK building front from which the measurements are taken is 6,5 m or 6,55 m wide depending on the documents (6,55 m according to crim. tech Irfan Dzinovic and investigative judge).

No isometric photos were taken to confirm relative positions of car and crater. But the photos are good enough to locate the crater just in front of the inside of the right front wheel of a GOLF car. That was before the car was moved back presumably for further examination of the crater.

The following day, UNPROFOR staff declared a shell might have fallen from an azimuth of 270°±10° and that angle of fall (AoF) was more that 31,16° in order to be able to fly over Obuca Beograd building.



Metal fragments are said to have been found in the crater, elsewhere and also in some of the victims. Fragments from the crater are said to have been set aside. To this point, it is not clear whether these fragments from the crater were separated from others fragments, registered, how they were confirmed as belonging to a 130 millimeters projectile or if they were presented to Court. The same applies to the fragments retrieved from the deceased bodies by the medical forensic staff.

It is to be noted that the investigative judge issued a written orders to insure that fragments would be collected and accounted for.

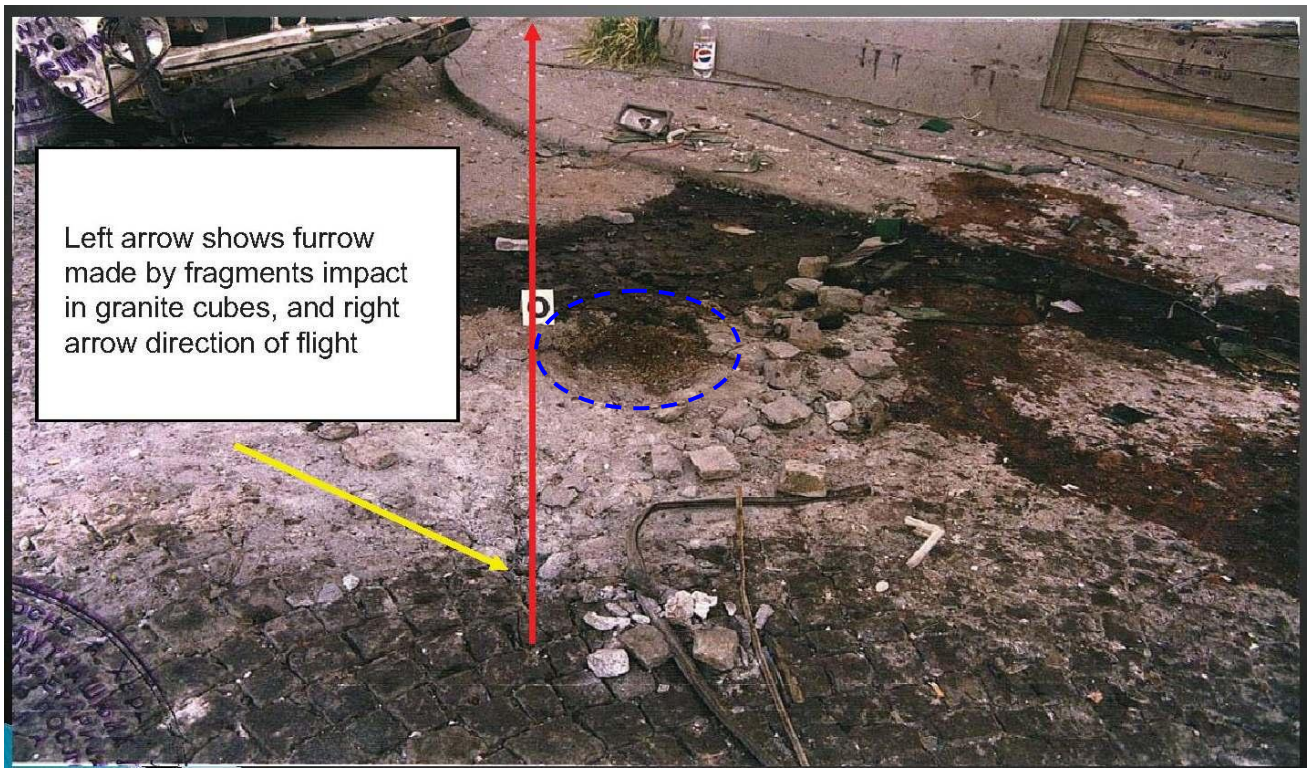
EXPERT REPORT BY Prof. Berko ZECEVIC

On 27th Nov.2007, Prof. Berko ZECEVIC was commissioned by the Prosecution of Bosnia and Herzegovina in order to investigate further. His expert report was completed 3 weeks later on December 21st, 2007.

Our understanding of the report is as follows :

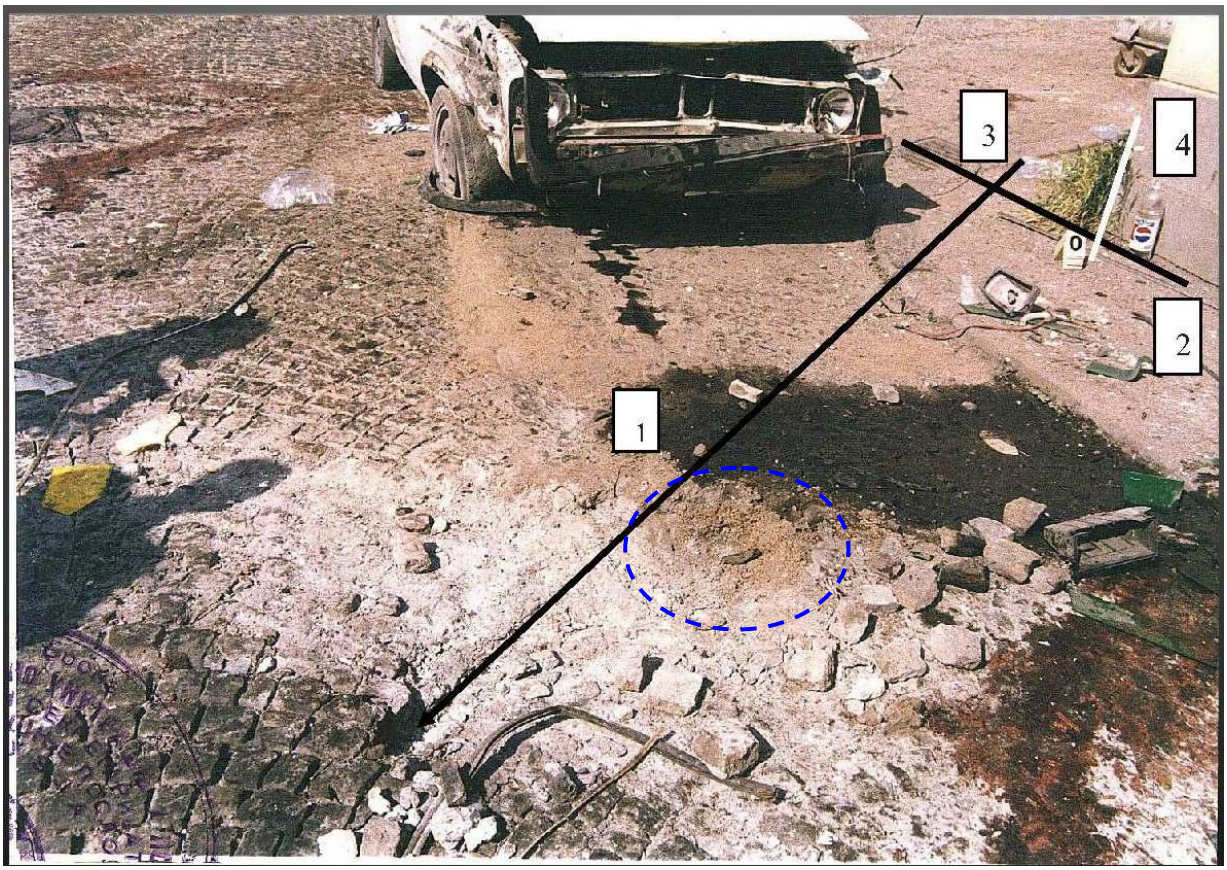
- Based on identification of some fragments Prof Berko ZECEVIC concludes that a 130 mm projectile had fallen next to the front right side of vehicle VW GOLF parked in front of NIK building.
- On non-isometric photos, Prof Berko ZECEVIC identifies a "furrow" on the pavement in the vicinity of the crater. Following calculations from this furrow in which he uses the coordinates of the crater, data from geodetic service and assumes some of the tolerances (front of NIK building (45° ±1°), width of sidewalk (1150 to 1200 mm) and dimension "a" of the corner sidewalk (700 to 900 mm)), the projectile should have flown in from azimuth 271 ° ± 2,5°, i.e. from West to East. Assumptions for the calculations were made because the square had been fully renovated since. Sidewalks and curbs, as they were in 1995, have all but disappeared from the scene.
- Prof Berko ZECEVIC performed a reconstruction of the crime scene at TUZLA. In doing so, he positioned a Volkswagen GOLF car next to the NIK building and experimented with a 130 mm projectile that he posted fuze down on the point identified as the centre of explosion (2,65 m from south corner and at 5,60 m from north-east corner of NIK building).

- Prof Berko ZECEVIC set to place the car at 0,47 m from the NIK building while the front of the car was advanced 1,3 m beyond the south corner. This means that the car is parked, according to Prof Berko ZECEVIC, beyond the curb with the left wheel well into the sideway. Based on the position Prof Berko ZECEVIC gave to the car, he finds that the angle of fall of the projectile had to be at least a steep 62° so that the projectile could hit the ground at the proper point without touching the car.
- Based on this minimum angle of fall, Prof Berko ZECEVIC computed that the 130 mm round must have been targeted at maximum range using maximum load of powder from a M46 cannon. Twelve years after the facts, Prof Berko ZECEVIC claims he found traces of truck tracks and dug-in firebase in the countryside at the position he calculated.



Position of furrow according to Prof. Berko ZECEVIC (in red),
it is noted that the would be furrow is not aligned with the crater (in blue)

Comments in the white square and red line are from Prof. Berko ZECEVIC



Position of furrow according to Prof. Berko ZECEVIC (in black),
Again, it is clear that the alleged furrow is not aligned with the crater (in blue)

Reconstruction of a 130 mm incoming projectile arrival with AoF = 62°
(as positioned by Prof. Berko ZECEVIC)

It is noted that Prof. Berko ZECEVIC placed the car at 0,47 m form the NIK building. It is not known why Prof. Berko ZECEVIC places the car that near the wall. He considers himself that the sidewalk is 1,15 m wide. This point is important because there is graphic proofs in the next chapter that the car was alongside the sideway and not half onto the sideway as described by Prof. Berko ZECEVIC. We would not dispute that the width of the sideway may be a little bit less than 1,15 m, say 1,0 m for example, but in no case the side walk width was near 0,47 m.

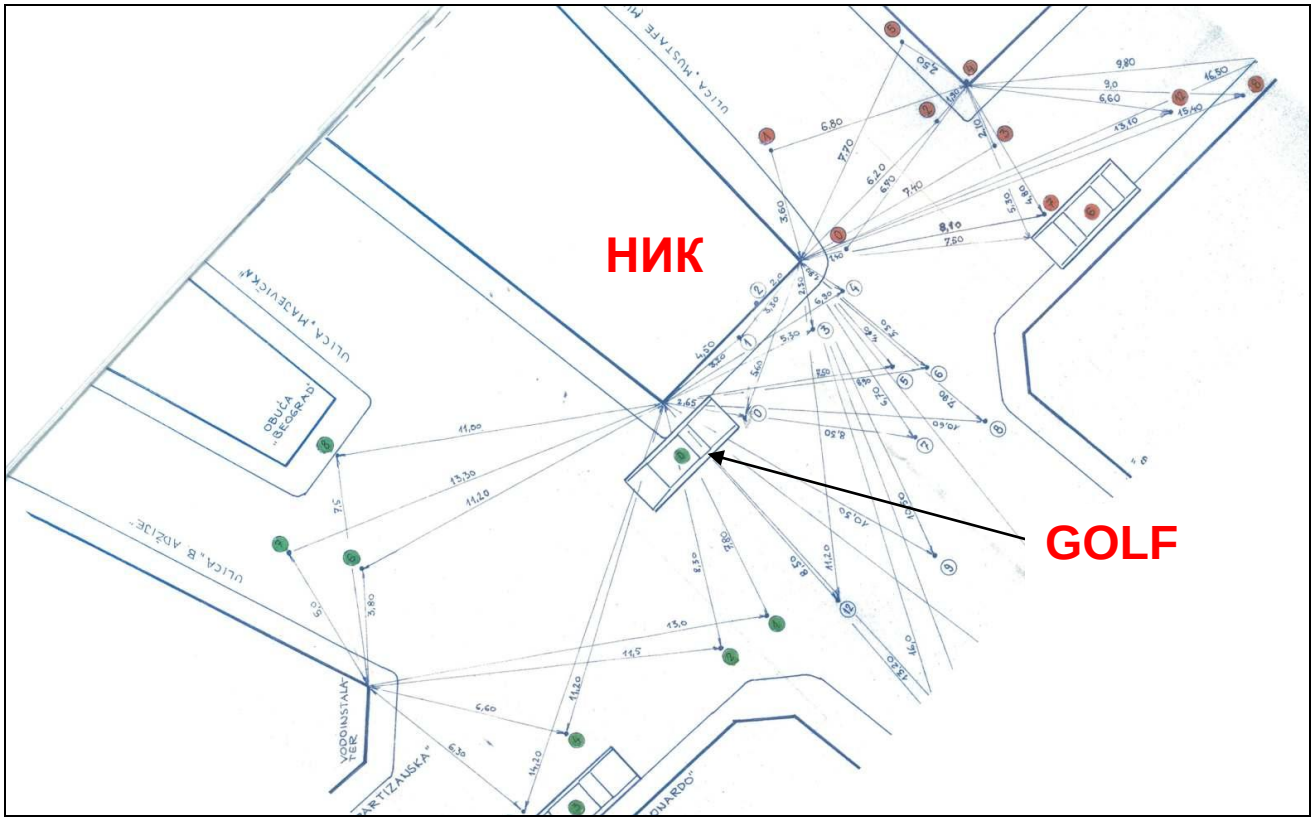
This is a big issue because, to comply with the actual photos of the crime scene, we would be bound to move the car about 0,5 m sideway towards the square (to the left on the above photo). Then, the projectile would have to be set vertically in a way that it is simply not possible from a ballistic point of view unless the projectile is used as an IED.

Furthermore, if we were to move the car sideways and back to insure a proper position of the crater in front of the right wheel, then it becomes impossible to account for the trajectories of fragments that are supposed to punch holes in the right aisle of the GOLF car as shown on the photos.

GOLF car right aisle (crime scene)

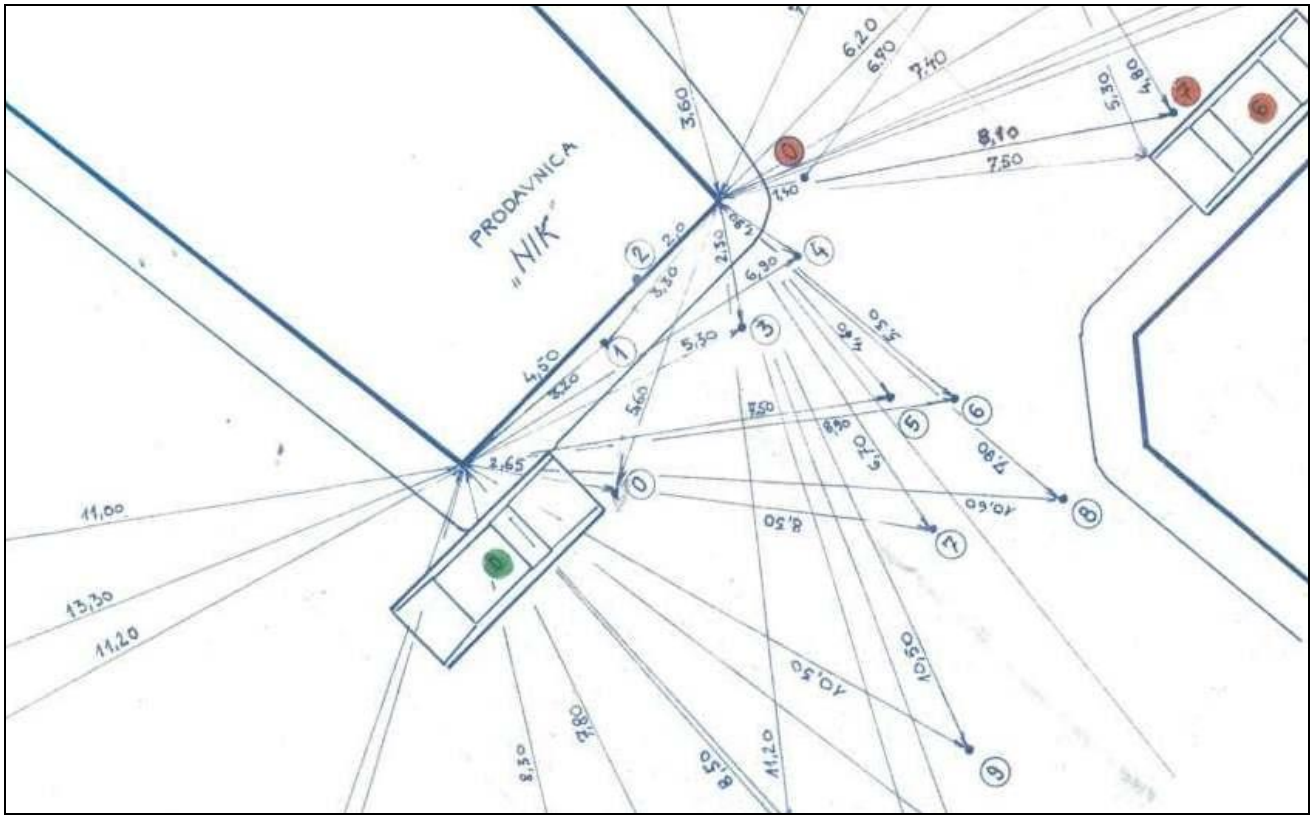
ACTUAL POSITION OF THE GOLF CAR

On a sketch here below, extracted from a sketch drawn by the local Police after the attack, the GOLF car is shown with its left side aligned with the curb.

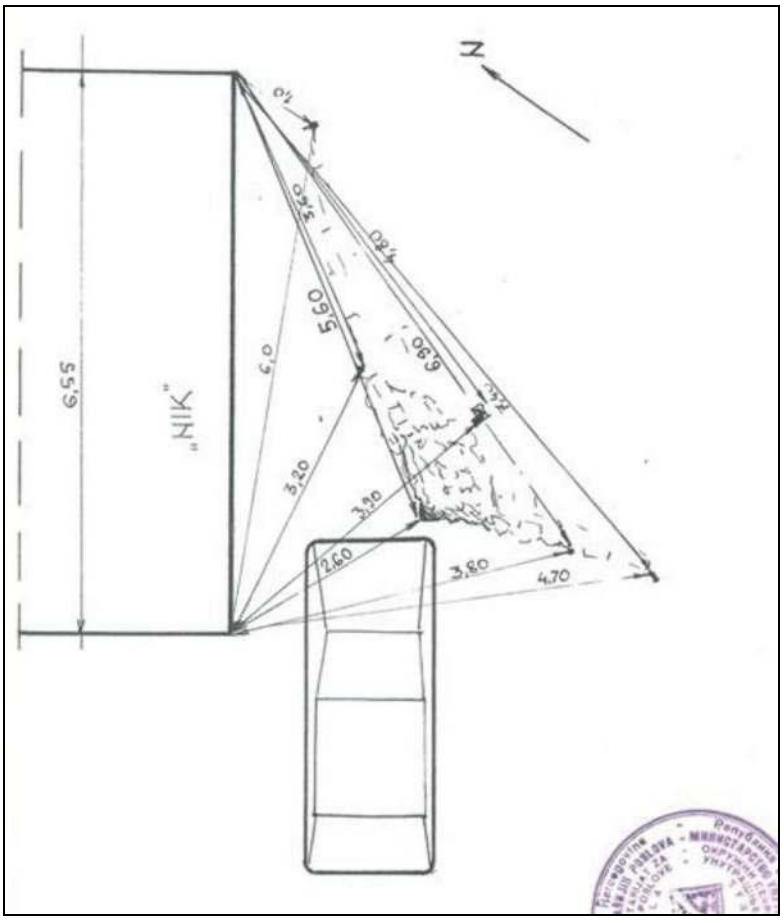


Position of the GOLF car alongside the sideway according to crime scene investigations

(sketch by Chief Inspector Nedim Mutapčic)



Close-up on the sketch by the Police (Chief Inspector Nedim Mutapčic)

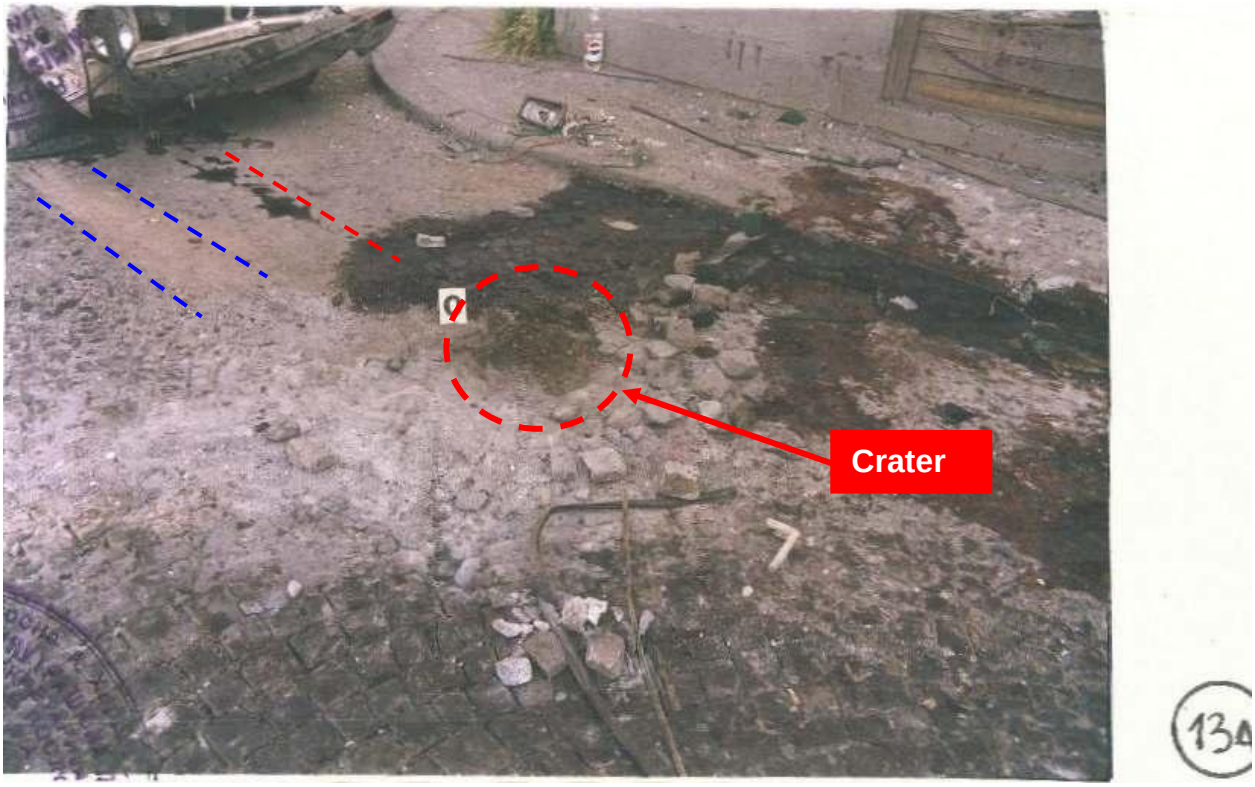


Close-up on another sketch by the Police (crim. tech. Irfan Džinović),
within 5 cm, the measurements are the same at those from Chief Inspector Nedim Mutapčic

By direct scaling on the sketch, distance between the car and the wall is around 0,9 m, not 0,47 m

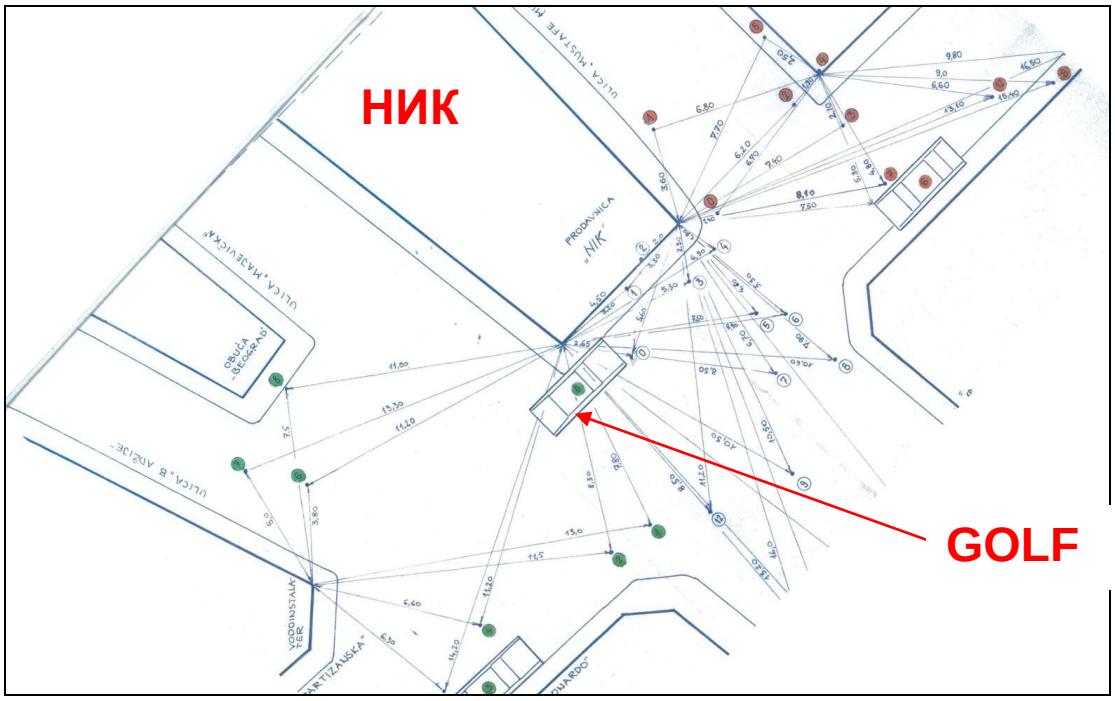
This position of the car alongside of the sideway is also confirmed by the extract of a video which was shot in the night of the event (here after) and also by a photo that was taken after the car was pulled back from the crater (trace left by the wheel in the dust, oil dipping in a straight line).

Extract of a video shot before the GOLF car was displaced

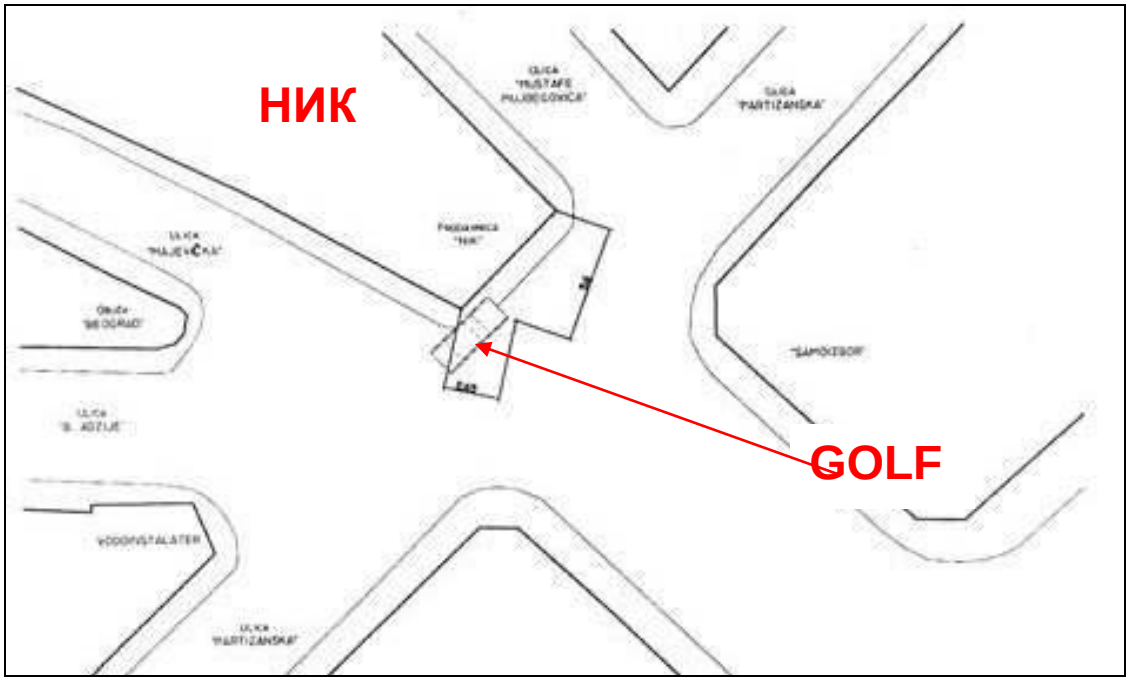


Traces that show that the car was alongside the curb

Therefore, there is no reason or evidence why Prof. Berko ZECEVIC should position the GOLF car half way into the sideway as he did in his report and during his reconstruction. But it is noted that positioning the car the way he did was the only way to obtain an angle of fall more or less compatible with a long-range arrival of a 130 mm projectile from the West.



Undisputed position of the GOLF car alongside the sideway according to crime scene investigators sketches, photos and film

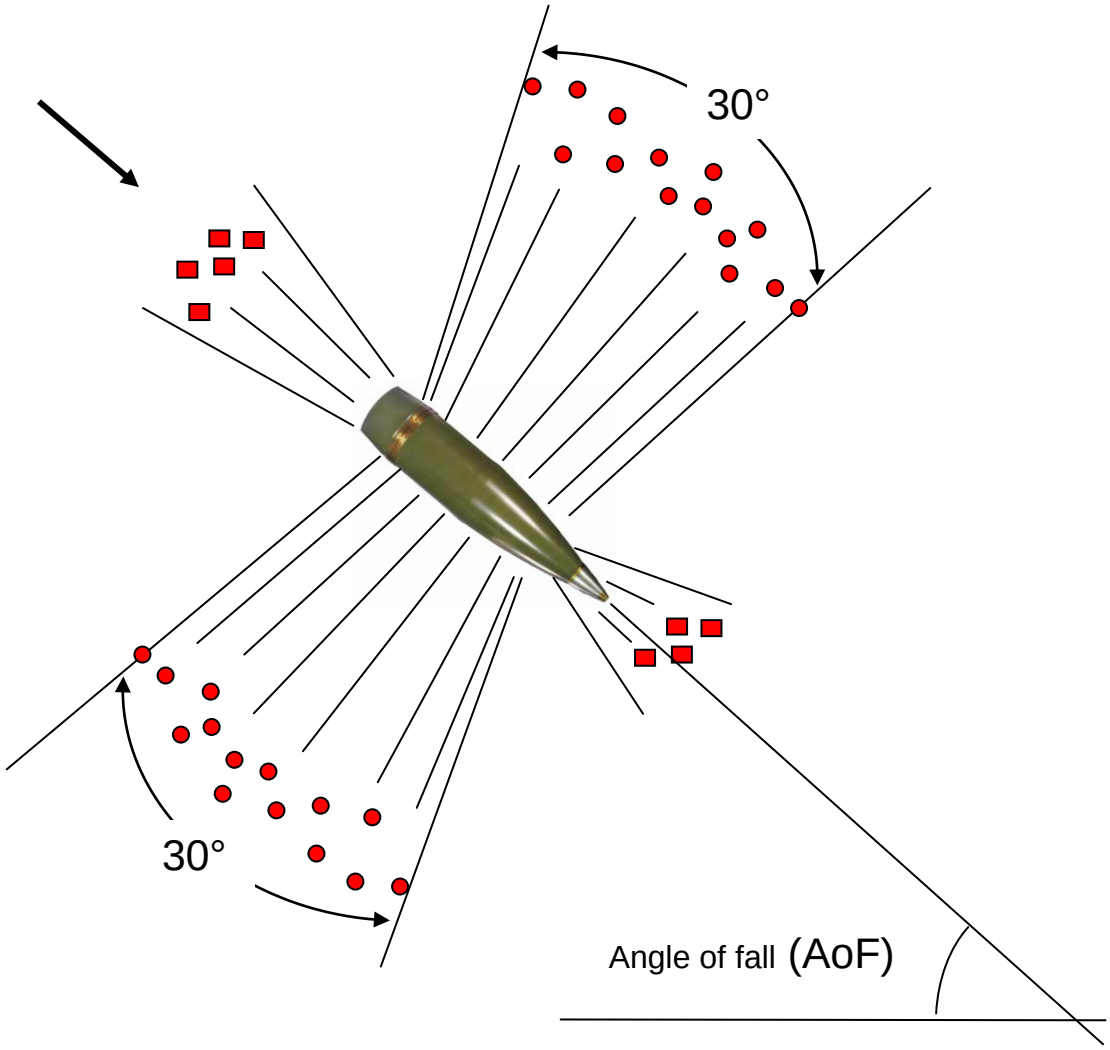


Positioning of the GOLF car as per reconstruction on site by Prof. Berko ZECEVIC (sketch N° 59 page 52 of Prof. ZECEVIC Report)
The position of the bust point is taken from Chief Inspector Nedim Mutapčic
<u>but</u> the car has clearly been deliberately moved towards the wall by Prof. ZECEVIC

PATTERN OF FRAGMENT SPREAD

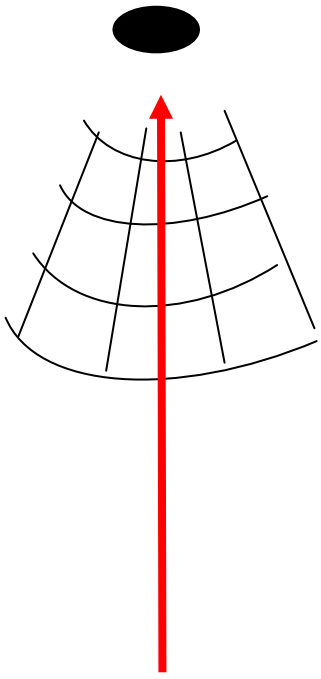
A 130 mm projectile contains 3,64 kg of high explosive TNT. Upon impact, such a projectile is designed to spread numerous and lethal steel fragments (5000 ?) upon the effect of detonation of 3,64 kg of TNT.

The effect of the projectile is mainly achieved by the kinetic energy of numerous lateral fragments which are calibrated in inflict damage both to soft skin targets and armoured vehicles. The spread of lateral fragment forms a pattern which is typically ± 15° as per sketch here after. The fragments spreading from the base (tail spread) or the nose (nose spread) are fewer. They have little interest from a tactical point of view when impact fuses are used since these fragments are directed towards the earth or towards the sky.

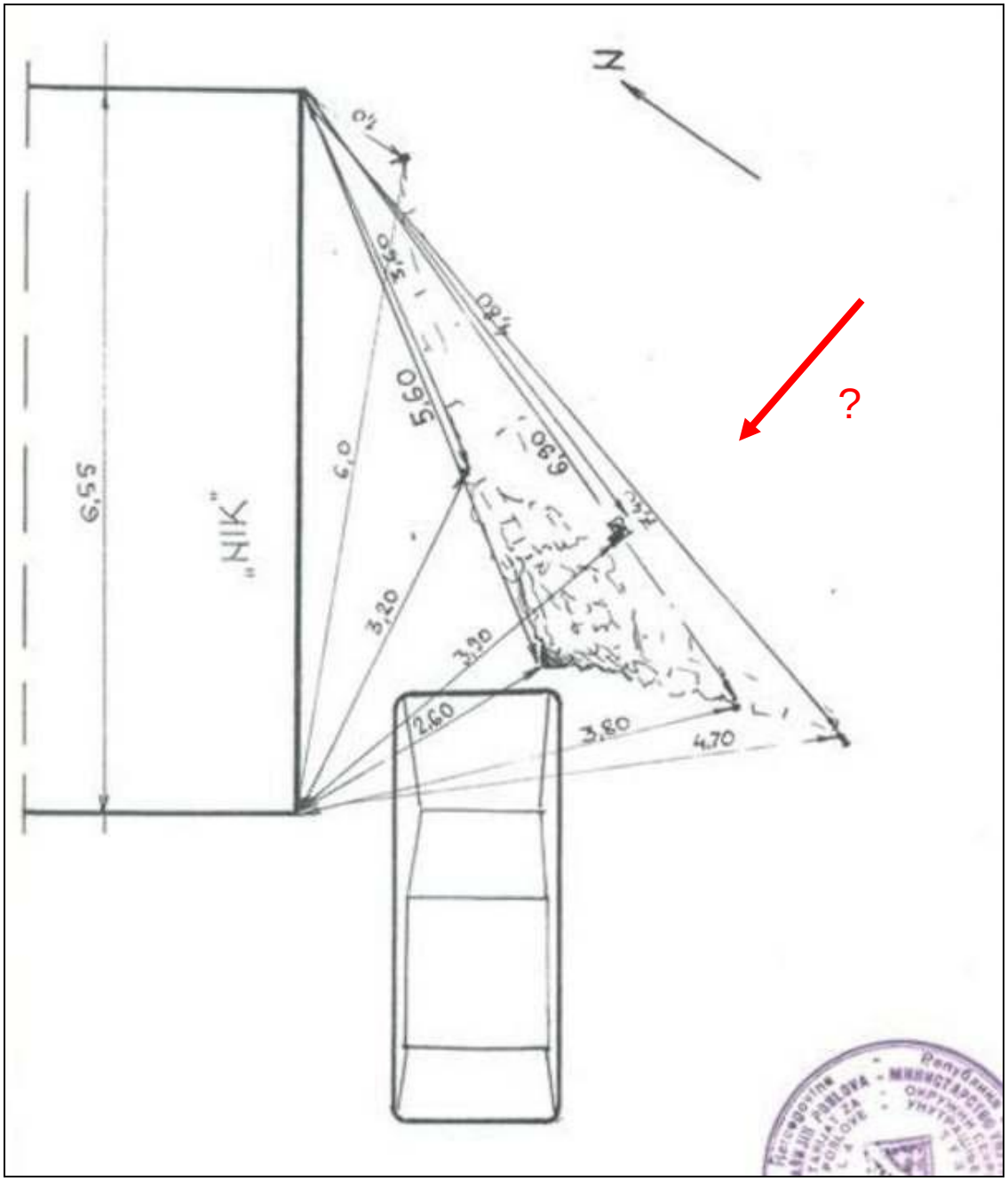


As already described by Prof. Berko ZECEVIC, the "killing zone" of the lateral fragments depends on the "angle of fall" (AoF).

Depending on the Angle of Fall (AoF), traces may be left on the soil that indicates the direction from which the projectile was coming. We show here below an example of an impact on concrete for which the incoming direction is fairly obvious.



If we were to interpret the sketch of crim. tech. Irfan Džinović in that way, it might be envisioned that a projectile came from the East.

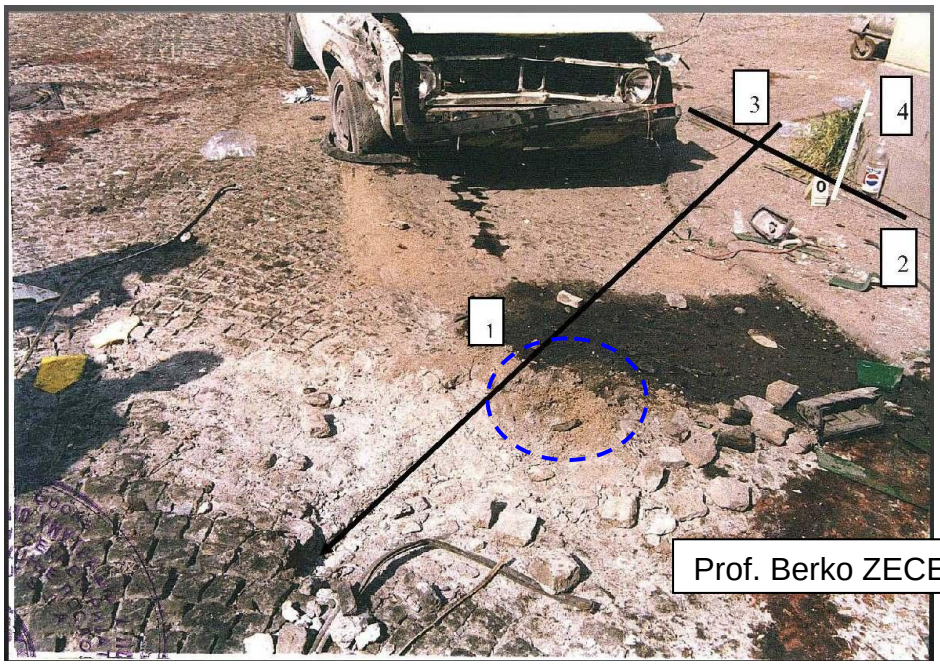


Based only on sketch by the Police (crim. tech. Irfan Džinović), we might be led to thing a projectile came from the east

But it would be very unwise to assert such a thing since the photos show a fairly round crater.

By the same token, the granite blocks were mainly ejected from the crater toward the North East...which would be compatible with an impact coming from the South West. Again it would be unwise to assert such an idea. The blocks have to come from the crater but do not follow a clear pattern.

As for the identification of a "furrow" based on photos, comparing the two photos here after, it seems more related to the morning shade on granite block interstices than anything else. It is not aligned with the round crater and it is too far away to have been created by the explosion of a single projectile.

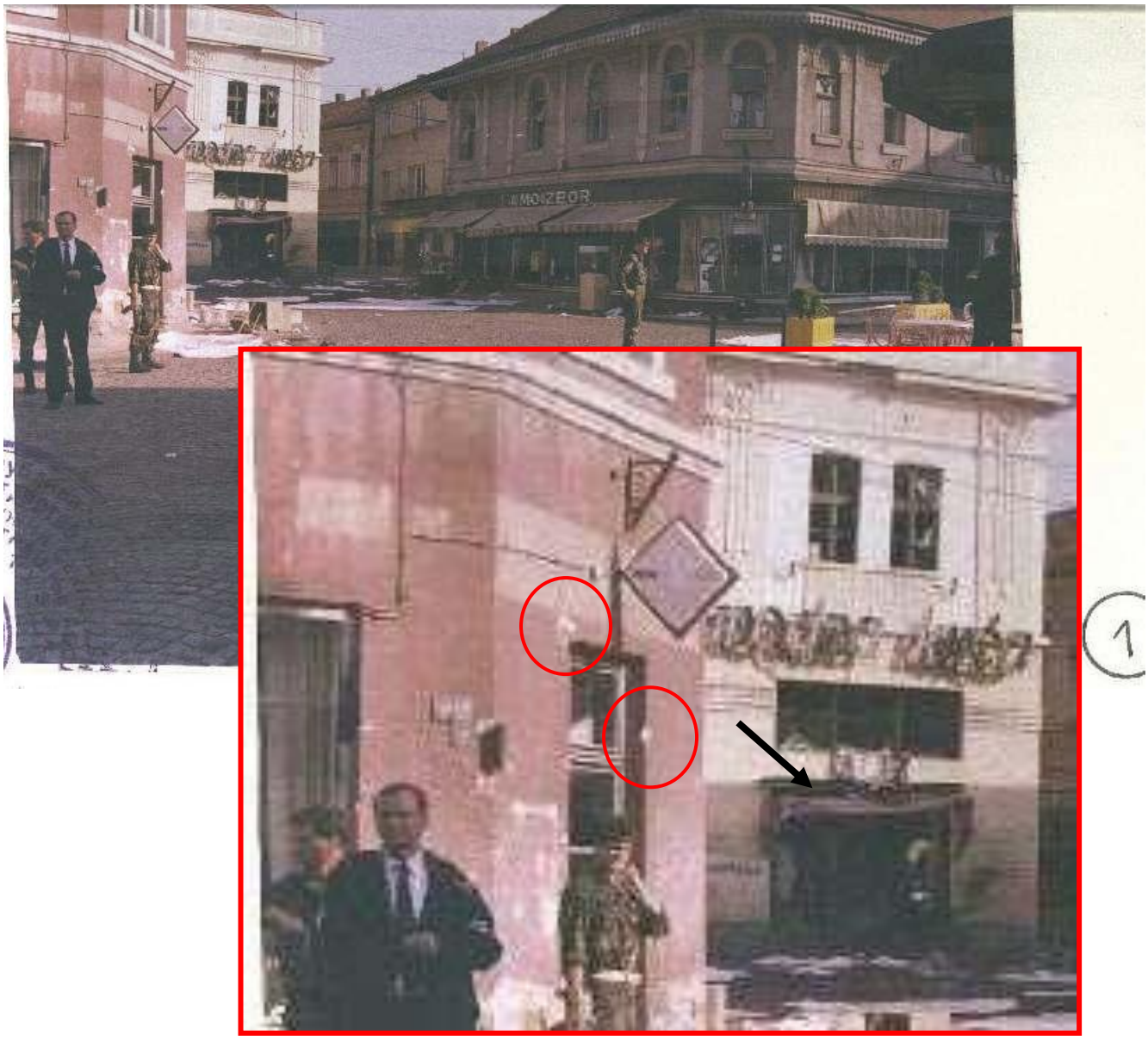


Prof. Berko ZECEVIC's furrow

INTERROGATION REGARDING DEAD ANGLE IMPACTS ?

EAST CORNER OF LEONARDO BUILDING (BIH LOTTERY)

We have interrogation as regard two photos taken the day after the facts. Here after, we show what look like impacts which are seen on a corner. But, fragments coming from the NIK building cannot reach this corner.



The photos are of poor quality, but what is seen is not some kind of photo artefacts since the same details appear on both photos.

NORTH-EAST SIDE OF NIK BUILDING

We have the same interrogation regarding the north-east side of the NIK building where there should not be any impact of fragments.

North-east side of actual NIK building after the event

CORNER BETWEEN KAPIJA SQUARE AND NICOLAS TESLA STREET

Depending on the internal structure of the building, we have interrogations regarding impacts and glazing damage at the south corner of the building samoizbor. This corner is definitely out of sight from the centre of explosion. "Ricochets" are not a sufficient explanation for a number of impacts still to be seen of the photo here after (photo 20 from the Police album).

Corner Kapija Square / Nicolas Tesla street (photo 20 of Police album)

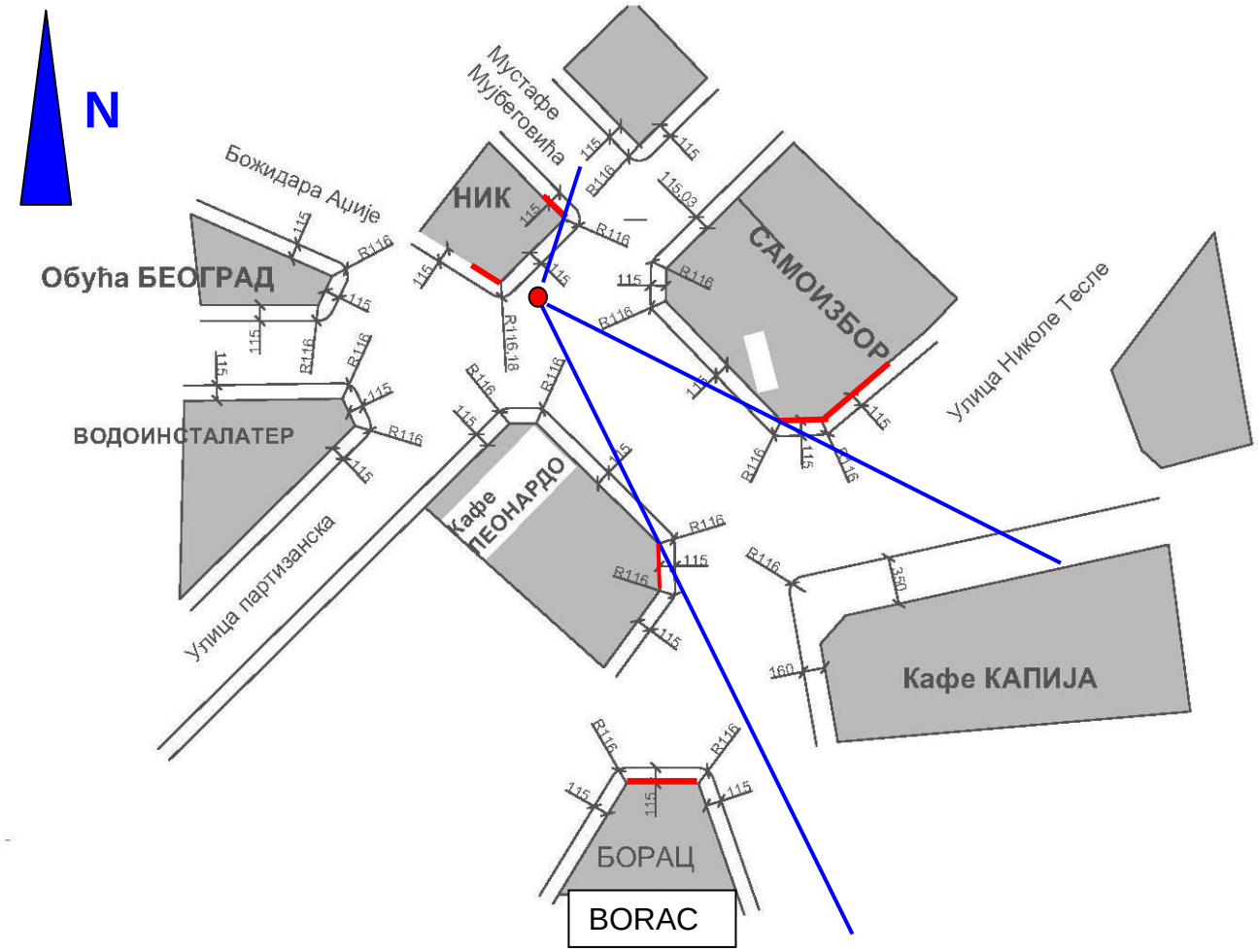
BORAC BUILDING

Referring to Prof. ZECEVIC report (p9/94), impacts were noted on the Borac store, causing damage 50 m away from the explosion. But, this store is completely out of sight from the explosion crater and impacts by fragments are not supposed to be possible there.

OUT OF SIGHT IMPACTS - SYNTHESIS

On the sketch here after, in red, are shown places where there should not be any impact from fragments coming from the explosion at the NIK building. Yet, we are sure there are some on the south corner of the building samoizbor and on the Borac building. We suspect there might be some impacts on others places where they are not expected.

These findings might cast a different light on the entire case but were not investigated by Prof. ZECEVIC.



INJURIES

MODE OF ACTION OF ARTILLERY PROJECTILES

The amount of explosive (3,64 kg) in a 130 mm projectile is not sufficient to create destructive and lethal shock wave at more than a few meters depending on wave reflexions on soil or walls. Yet, if a victim were to be in such a vicinity of the explosion, lethal injuries would be induced from the shock wave (blast effect) notably on the internal organs such as lungs. At near contact, parts of the body may also be torn apart, which will show on the photos. In the case of a 130 mm artillery projectile, assuming a victim is very near the burst point, chances are that these blast injuries (visible or invisible) with add up to injuries caused by fragments.

The reason is that 130 mm artillery projectile effectiveness comes essentially from the high speed steel fragments that result from the explosion. The steel comes from the outside casing of the projectile (around 30 kg of steel), which is much more that the weight of the TNT explosive itself. This has been described in detail in the report by Prof. Berko ZECEVIC.

The biggest and heavier fragments are mostly from the base and the nose. They are not numerous (250 ?). Most of them end up in soil or in the air because of the angle of fall of the projectile. The few heavy fragments that might travel towards victims will be far and apart. Yet they can create massive injuries, removal of limbs etc...

Therefore, most of the casualties are expected to be from middle size fragments which are numerous and laterally spread. In terms of weights, these fragments can be compared with light weapons projectiles ranging from buckshot (2 grams) to shotgun slug (30 grams). Similarly, the energy of each fragment will be in the same range as projectiles for light weapons (i-e 100 to 5000 Joules).

One must consider that the volumic mass of steel is less than the density of lead, that the fragments are irregular in shape and that they are not gyroscopically stabilized. Fragment will loose their energy quicker than rifle bullets. Most of the injuries should show an entrance wound irregular in shape and with centimetric dimensions. As can be seen with certain rifle rounds, there might also be some dramatic injuries at shorter distances, with heavier fragments and especially when the head is impacted. But yet, it is expected that those injuries with massive tissue losses with be few when compared to the "normal" injuries.

ANALYSIS OF PHOTOS

We were presented with photo documentation and sketches of the deceased victims numbered from 1 to 71. Only a few photos were taken of each victim, which does not allow for an in-depth analysis.

The photos confirm that most of the victims suffered penetrating wounds from impact(s) by some sort of projectiles or fragments.

On a few victims, there is a total destruction of the trunk and/or abdomen (45, 53, 56, 62). These types of injuries (at least for 53, 56, 62) are typical of an intense blast effect, which can only occur at a near contact distance from the explosion. For victim 62, the entire body is bizarrely destroyed from the legs to the head. For victim 45, the main injury seems to be ballistic but the projectile had to be massive and energetic.

On about 30 other victims, we find massive injuries up to situations where arms, legs, shoulders were torn off the bodies with major tissue losses.

Artillery projectile fragments are certainly able to inflict such casualties, some of which can be explained by the short distance from the explosion. For example, victim N° 39 was supposed to be at 3 m from the explosion and both of his legs were torn out. But we are surprised by the high percentage of such casualties compared with the total number of casualties.

We are also surprised by the fact that about 10 victims are stained with what seems to be soot. Normally, visible contamination with soot from an artillery projectile is contained within a 3 / 4 meters radius. In the current case, soot is visible on quite a number of victims but also on the far corner of the NIK building.

EXPERIMENT ON FEB. 10th, 2016

MEASUREMENTS

Travelling on February 9th, 2016, we were to attend real full-scale experiment on NIKINCI proving ground as of February 10th, 2016.

The crime scene has been reproduced there on 1/1 scale including :

- NIK building (made in concrete),
- to the left, both building on each side of Partizanska street (made of wooden planks + sheet metal),
- to the right, buildings Café Leonardo (wooden planks + sheet metal) and "Vodoinstalater". Note : Building "Obuca Beograd" is not reproduced.
- to the front, on both sides of the square, building "café Leonardo" down to Lutrija BIH corner (wooden plank and sheet metal) and building samoizbor,
- at the end of the square, opposite from the NIK building, "café Kapija" (wooden planks).

Next to the NIK building, sidewalks have been reproduced, as well as the granite blocks pavement of the square up to "Leonardo" and samoizbor corners. Granite blocks are of similar size compared with the ones at TUZLA. They are set on a bed of sand and separated by what looks like soft cement. Further down toward the KAPIJA café, the square has been left without granite blocks and the soil was left in a raw condition.

In front of NIK building, width of sidewalk is set at 1,15 m as per Prof. Berko ZECEVIC report quoting registry data.

Measurements were taken by Joseph SHARON (Israeli Expert) and myself. They closely match the dimensions of the crime scene. Though, the width of NIK building is slightly off at 6,62 m instead of 6,55 m. **This offset will be accounted for when replacing the position of crater as per the findings of the Police**.

PROPER RULES OF SIMILITUDE

Assuming the projectile is of similar type and construction (especially steel characteristics), an explosion on a 1/1 scale is bound to produce fairly realistic results in terms of fragments dispersion pattern.

The question is more about the way the mock-up city was constructed in terms of shock wave effects. Reflexion of shock waves is not supposed to be the same between actual concrete buildings and wooden panels.

Therefore, to validate the way the mock-up city was constructed, we have to confirm at which distance the shock wave ceases to have significant effects. In the case of a 130 mm projectile, we can consider that one third of the energy goes into kinetic energy of fragments and two third participate to the classical blast wave that have thoroughly and numerically been described by various authors (Baker, Kigery, Kinney-Graham, Dufourneau etc...). On the next page, based on the Kinney-Graham equations for free air burst, we have tabulated the overpressure along with the theoretical reflected pressure that happens when the incident shock wave encounters a fixed and massive obstacle such as a concrete wall.

Considering that the blast wave may start to cause significant blast injuries for 1 bar of incident overpressure and 2 bars of reflected pressure, it can be seen from the table here after that the people are safe from the blast itself at distances bigger than 5,5 m, regardless of blast wave reflections.

In conclusion, it was advisable to build the mock-up NIK building as a masonry work because it was within 5,5 m of the burst point. And this is what was done with the proper opening and windows that have an impact on blast wave reflections.

All other building were situated at more than 9 m from the burst point. It was perfectly proper to build them in wood and without any opening since blast wave effects could be disregarded at these distances.

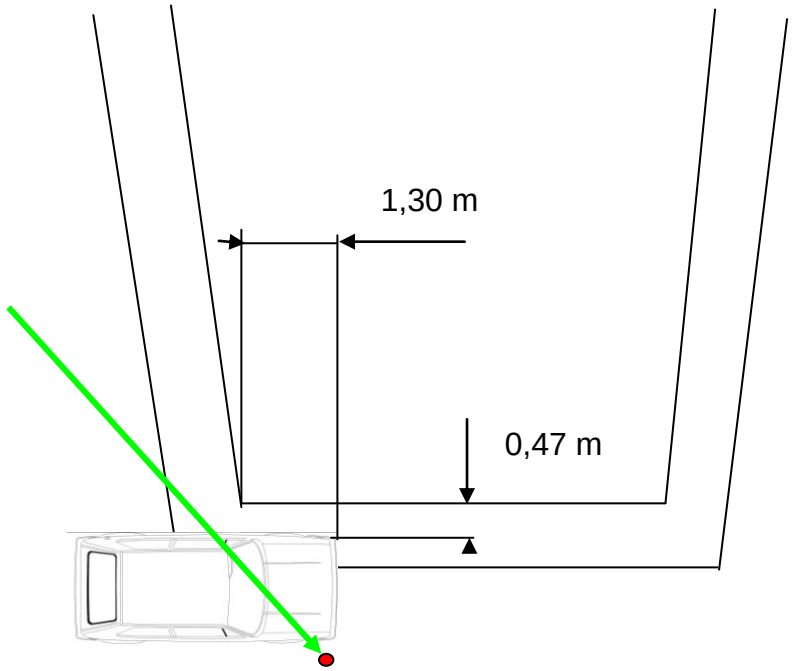
distance (m) from BP	scaled distance ($m/kg^{-1/3}$)	scaled impulsion (bar*ms/kg 1/3)	Incident impulse (Pa.s)	delta P (bar)	Reflected pressure (bar)
0,2	0,15	3,3	440,5	223,8	1750,4
0,4	0,30	1,5	197,8	92,4	701,0
0,6	0,45	1,3	174,7	48,2	350,2
0,8	0,60	1,3	169,0	28,6	196,2
1,0	0,74	1,2	165,1	18,5	118,4
1,2	0,89	1,2	160,9	12,7	75,4
1,4	1,04	1,2	156,0	9,1	50,1
1,6	1,19	1,1	150,4	6,8	34,6
1,8	1,34	1,1	144,2	5,2	24,7
2,0	1,49	1,0	137,8	4,1	18,2
2,2	1,64	1,0	131,3	3,3	13,8
2,4	1,79	0,9	124,9	2,7	10,8
2,6	1,93	0,9	118,8	2,2	8,6
2,8	2,08	0,8	112,9	1,9	7,1
3,0	2,23	0,8	107,3	1,6	5,9
3,2	2,38	0,8	102,1	1,4	5,1
3,4	2,53	0,7	97,3	1,2	4,4
3,6	2,68	0,7	92,8	1,0	3,9
3,8	2,83	0,7	88,7	0,9	3,5
4,0	2,98	0,6	84,8	0,8	3,2
4,2	3,13	0,6	81,2	0,7	2,9
4,4	3,27	0,6	77,9	0,7	2,7
4,6	3,42	0,6	74,8	0,6	2,5
4,8	3,57	0,5	71,9	0,6	2,4
5,0	3,72	0,5	69,3	0,5	2,2
5,2	3,87	0,5	66,8	0,5	2,1
5,4	4,02	0,5	64,4	0,4	2,0
5,6	4,17	0,5	62,3	0,4	2,0
5,8	4,32	0,4	60,2	0,4	1,9
6,0	4,46	0,4	58,3	0,4	1,8

Table based on Kinney & Graham equations

PROJECTILE PLACEMENT

On February 10th, 2016, everything was set so that the activation of the 130 mm OF-projectile would duplicate in the best possible manner the scenario presented by Prof. Berko ZECEVIC.

The projectile used for the experiment is a regular Russian HE projectile OF 482M 130 mm projectile with nose pointing as if the projectile was travelling from azimuth 271°. Point of impact is set as in reconstruction by Prof. Berko ZECEVIC, i-e the point of impact is at 2,65 m from south corner and at 5,60 m from north-east corner of NIK building in accordance with the files of investigative judge. The car was placed at 0,47 m and 1,30 m from the NIK building facade as in reconstruction by Prof. Berko ZECEVIC. Angle of fall was set at 62° by ourselves using our own clinometer. By doing this, the projectile is touching the GOLF Mk 1 right front aisle.



Note : ***we have to point out that the car was placed at 0,47 m from the wall only because Prof. ZECEVIC did so.***

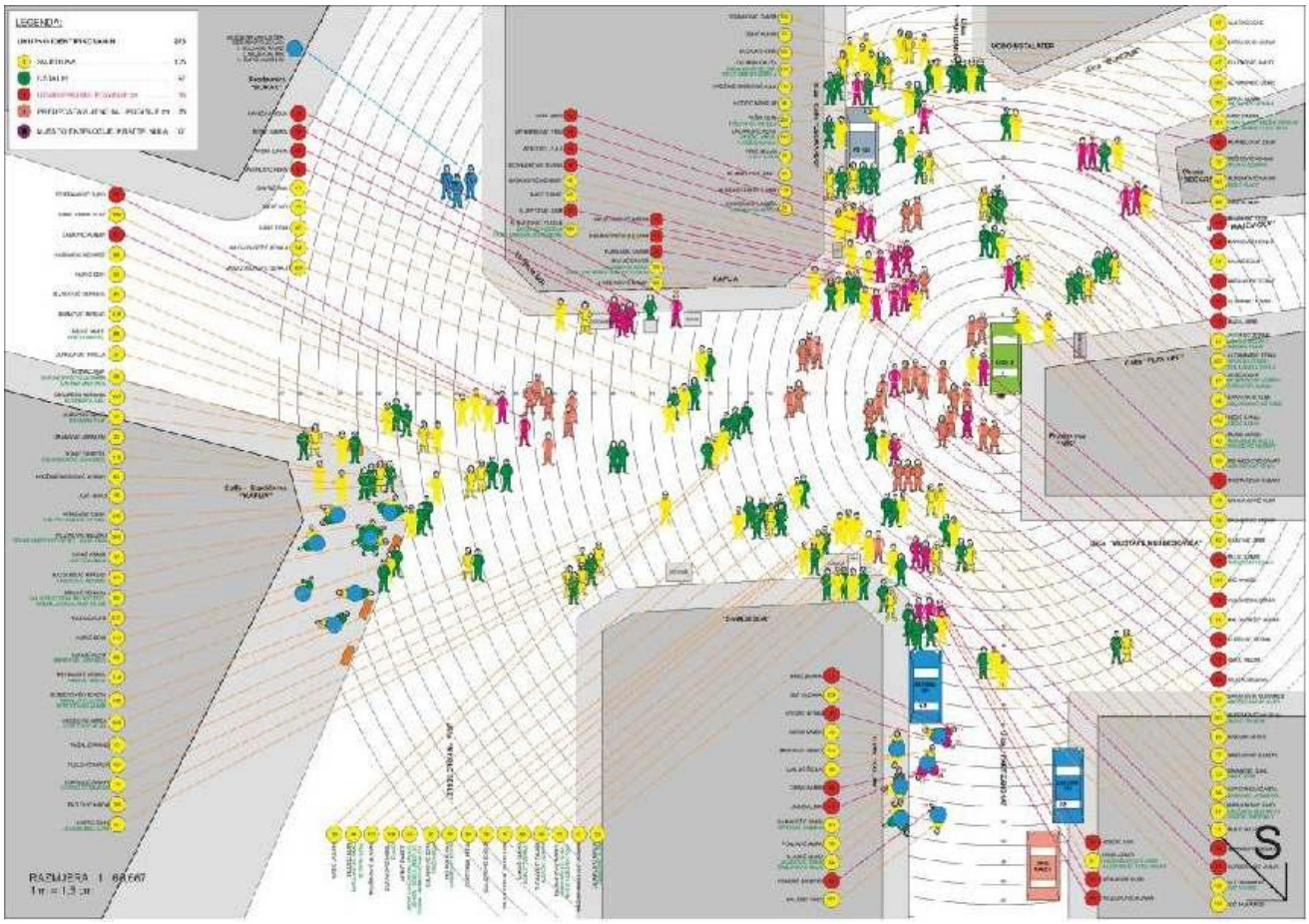
Projectile placement (photo from behind)

Projectile placement (photo from the side)

Projectile placement (photo from front)
The projectile touches the aisle of the car

VICTIMS PLACEMENT

Wooden dolls were placed at locations where it is thought people died with a certain degree of certainty. They were numbered according to the numbers that were attributed to the victims. These locations were counter-validated by Israeli expert Joseph SHARON based on various data from videos, photos or witness statement.



Sketch of victims placement (only red figures are the ones who died and have a reliable placement at the moment of explosion)

RESULTS - GOLF CAR

The front and the front right of the test vehicle suffered much more damages that in the event which took place May 25th, 1995.

The car in Kapija Square in 1995 just after the blast...

...compared with the GOLF car destroyed by the experiment on Feb. 10th, 2016

Furthermore, the car in our experiment moved back between 0,9 m and 1,20 m depending on where the measurement is taken. Also, the car in our experiment was pushed aside against the wall of NIK building (side movement of about 0,47 m). On the contrary, there is no sign that the car in Kapija had moved back or toward the wall due to the detonation.

Photo showing that the car was moved sideways by the blast

All in all, the car in Kapija Square suffered very limited damages compared with the test car used in the experiment dated Feb. 10th, 2016. This is despite the fact that the scene was set identically to Prof. Berko ZECEVIC findings and that the car was exactly the same one.

Beyond the fact that Prof. Berko ZECEVIC had to position deliberately the car at 0,47 m from the wall to allow for an angle of fall (AoF) of the necessary magnitude, the experiment dated Feb. 10th, 2016 confirms that his scenario is not compatible with the effects that 130 mm projectile should have had on the car at that distance.

RESULTS - NIK BUILDING WINDOWS

The front NIK store window in Kapija Square had its glazing broken. On the north side of the shop at least one of the two smaller windows had its glazing broken as well. The display dummies in the shop remained in their upright position. Windows frame were not displaced in the event in Kapija Square.

Store window of the actual NIK building after the event, note how the window frame is still in place, and also that the display dummies are still in their upright position

South-West side of the actual NIK building after the event

North-East side of actual NIK building after the event

During the test on Feb. 10th, 2016, all glazing is gone but also the wooden frame of the store window. The display dummies have fallen.

We have no information about how strongly was constructed the frame of the windows in Kapija. Only based on visual comparison, the damages seems to have been much more important during the experiment dated Feb. 10th, 2016.

Store window of NIK building :
results of explosion during experiment at NIKINCI Feb. 10th, 2016

RESULTS - NIK BUILDING SOUTH CORNER

After the experimentation, fairly high up on the mock-up NIK building south corner, there are impacts that come from heavy fragments from the tail of the projectile. Such impacts were not to be seen in the actual case in Kapija.

Experiment dated Feb. 10th, 2016 - spread of tail fragments from the 130 mm projectile

No trace of tail fragment impacts in 1995 on South corner of the actual NIK building

RESULTS - SPREAD OF LATERAL FRAGMENTS

Here are some photos of the impacts of fragments on various buildings :

Impacts on the north side of the mock-up NIK building

Impacts on the building across the M. Mujbegovica Street.
Some fragments went through the side windows of NIK building.

Numerous impacts are identified at the top of the corner of Samoizbor building, but dolls at the corner have been touched as well.

The direct danger zone gets higher and higher with distance from point of explosion

"Safe" zone along Samoizbor building is compatible with the lack of known victims there, but it do not match with the huge damages on and in the Samoizbor building

The zone further down north Partizanska street (in red) is supposed to be safe but 4 people suffered fatal injuries there

In our experiment, only one doll was touched

The north corner of Leonardo building is littered with impacts.
The dolls are touched in the experiment, which is in line with what happened in Kapija square.

This car positioned in front of Leonardo café was hit by a number of fragments, which is compatible with the impacts on the dolls. In the real case at TUZLA, the victims were hit in the same manner but not the car. The car might not have been there at all at the moment of the explosion

The zone further down the square from Leonardo building north corner is safer with only one doll touched. At TUZLA, 4 people died.

East corner of Leonardo café building (Lutrija BIH) was untouched in the experiment, which is normal since this side is not in line of sight from the explosion crater

Across the square (36 m from burst point, café Kapija was virtually untouched by fragments during the experiment,

In the real case, about 40 victims were injured, half of them in the lower legs and feet, 3 victims at least died, numerous fragments touched the glazing, the tables...

Impacts were found on the flower pots, tables, Kapija café building.

Note : the yellow flower pot in the forefront is facing Lutrija BIH

RESULTS - CRATER

During the experiment, no real crater was formed

When an impact fuze 130 mm projectile lands on hard stone or concrete, there is virtually no crater as such due to the explosion, just traces and a small indent due to the fuze impact.

Similarly, granite cubes are very hard and we did not expect much of a crater. At least, we were not able to create one under the condition of the test. Nevertheless, the softer material between the cubes was partly ejected by the blast. This material can be found at the bottom of the NIK building as shown on the image here after.

Accumulation of dirt on NIK building coming essentially for the material that was between the granite cubes

CONDUCT OF INQUIRY

In a time of war, faced with a dramatic event with so many victims, it is difficult to expect perfect recording of all the evidences and testimonies. Also, it is difficult to expect a "freeze" of the crime scene when the urge is to attend the wounded.

Yet, it is found that the Police drew sketches, took photos etc...which are as many valuable materials for the inquiry. Also, the investigating judge gave proper orders such as collecting the fragments that he suspected would be found. A video taken just after the facts gives also some clues, for example on the fact that the GOLF car was indeed next to the NIK building as reported in the sketches of the police.

As already mentioned, we are concerned about the chain of custody of the ballistic fragments which were retrieved from the scene and the bodies. At the very least, it would be interesting to check who collected the fragments, how they were conditioned, stored etc...In such a case, the collecting officer has to be heard to ascertain the way the fragments were collected. Also, considering the way and speed at which Prof. Berko ZECEVIC conducted his expertise 12 years later, were these fragments actually examined by him ? After 12 years, those fragments do not seem rusty on the photos. Were they kept in an ultra dry environment ? Were they cleaned with a rust removing solution ?

As regards the dead and wounded, the photos and sketches do not give much information on each case. We were not able to see the RX, medical records and the autopsy reports. It would be valuable to obtains these documents and interview the doctors. This would be valuable information since there are no explanation as regards some impacts in walls that are out of sight of the explosion site or as regards peculiar injuries to some victims.

CONCLUSIONS

π FRAGMENTS

- **Fragments presumably coming from an artillery projectile were retrieved from the crime scene and especially from the crater. Traceability of these important pieces of evidence may leave to be desired since reference numbers of seals were not ascertained and the number of fragments examined by Prof. Berko ZECEVIC does not fit records and photos. Nevertheless, these evidences tend to confirm that the explosion at Kapija Square was caused by a 130 mm artillery projectile.**

π SHELLING OF TUZLA AIRPORT

- **According to an UNMO HQ report, TUZLA airstrip (10 km south of TUZLA city) was shelled on evening May 25th, 1995 from the South-East (Jelovo Brdo) by 130 mm cannon(s). The shelling lasted from 19:10 to 20:58 according to the UNPROFOR report.**

- **Explosion at TUZLA, Kapija square, took place at 20:55. TUZLA is within reach of canons allegedly dug in at Jelovo Brdo. The airport is not within reach of canons allegedly dug in at 27 km west of TUZLA.**

π IMPACT ON WALLS AT TUZLA

- **Many of the impacts on the walls at TUZLA can be joined by a straight line coming from the detonation point next to the NIK building.**

- **But, some fragments have hit in places that were out of sight from the point of explosion, which is not normal. To date, these abnormal findings have not been investigated.**

- **Worse, while mentioning the abnormal impacts on the Borac building, Prof. ZECEVIC did not pinpoint that these were in conflict with the scenario he gives for the event, i-e. the arrival of a 130 mm projectile arriving from the west and hitting next to the NIK building.**

π COMPUTATION OF TRAJECTORY BY Prof. ZECEVIC

- **At the end of 2007, Working on photos, Prof. Berko ZECEVIC discovered a "furrow" from which he computed the azimuth of arrival of a artillery 130 mm projectile using some assumptions, especially on the width of sidewalks. Prof. Berko ZECEVIC concluded that a 130 mm projectile flew in from the west at maximum range from a M 46 130 mm cannon. According to Prof. Berko ZECEVIC, the projectile hit the ground next to a VW GOLF car that was parked in front of the NIK store. The angle of fall at least 62°.**

- **We cannot agree that it was possible to determine any direction of arrival. Photos are of poor quality and non-isometric. Traces on the granite blocks are multidirectional. The "furrow" is not aligned with the crater centre, which means it is not a "furrow" in the first place (even assuming that a projectile with an angle of fall as steep as 62° still creates a furrow).**

- **Besides, Prof. Berko ZECEVIC uses the coordinates of the crater to compute an azimuth from his "furrow", which is not correct from a mathematical standpoint.**

- **In reconstruction of the case in TUZLA, for the projectile to be able to arrive with an angle of fall of 62° above the GOLF, Prof. ZECEVIC has to move that car sideway by at least half a meter toward the NIK building. Therefore we observe that Prof. ZECEVIC deduces the position of the car from the intended angle of fall instead of computing the minimum angle of fall from the known position of the car.**

- **Measurements, photos and videos are there to prove that the position given by Prof ZECEVIC for the GOLF car is not correct. If the car is properly situated as per the photos, the projectile would have to arrive vertically, which no gyro-stabilised projectile can do.**

- **As will be seen in the next paragraph, the experimentation made according to Prof ZECEVIC reconstruction confirms that there is a problem. In the experimentation, the GOLF car is laterally pushed away from the point of detonation, which was not the case at TUZLA. Also, the car in the experiment suffers much more damages than the one in TUZLA. Further more, the spread of the fragments does not explain how some people were hit in certain locations.**

π MOCK-UP KAPIJA SQUARE AT NIKINCI

- **Based on Hopkinson-Cranz similitude laws (scaled laws), it is not possible to test all the aspects of a complex pyrotechnical event without setting a 1/1 scale experiment.**

- **A 1/1 scale mock-up of the Kapija square was therefore built on the NIKINCI proving ground near Belgrade. Only the NIK building was constructed of masonry including the proper openings, windows etc....The other buildings were made of wooden and sheet metal with no openings whatsoever. But the behaviour of the wooden structure is not the same as the behaviour of the real building as regard response to blast wave. Considering this, we have computed that the distance of the other buildings is much greater than the danger distance threshold of the shock waves, including their possible reflections. Therefore, the way the mock-up Kapija square was designed is correct for the purpose of the experiment.**

- **Along with our colleague Joseph SHARON from Israel, we were able to measure the buildings and confirm that the reconstruction at NIKINCI duplicates closely the real Kapinja square. The width of NIK building is 6,62 m instead of 6,55 m. This was carefully taken into consideration when positioning the crater.**

π THE EXPERIMENT ON FEBRUARY 10th, 2016

- **Wooden dolls (simulating deceased victims) and cars were placed where they were meant to be on the site. Proper positioning was confirmed by expert M. J. Sharon.**

- **The experiment was set as per the conclusions of Prof. Berko ZECEVIC. The GOLF car was of the same type as the one in TUZLA.**

- **Upon the explosion, the GOLF car was violently pushed back and sideways. The amount of destruction on the car was much more that what was experienced in TUZLA. This in itself confirms that the scenario of Prof. Berko ZECEVIC is not correct.**

- **The tail spread of fragments inflicted damages high up the wall of the NIK building, which was not the case in TUZLA.**

- **The spread of fragments to the nearest corner of Leonardo and Samoizbor buildings inflict heavy casualties to the wooden dolls as it was in TUZLA. In any case, this is not illogical because these corners are very near the centre of explosion. But the experiment fails to reproduce heavy casualties down to Gulam café and East of Leonardo café building. No hit is recorded at Kapija Café, the fragments fly above the building.**

- **No real crater was formed on the surface of the granite cubes.**

π CONCLUSIONS SUMMARY

- **At the end of 2007, prosecution expert Prof. Berko ZECEVIC determined that a 130 mm projectile flew in from the West at maximum range from a M 46 cannon. The projectile is supposed to have arrived with an angle of fall at least equal to 62° over the bonnet of the GOLF car parked alongside the NIK building.**

- **The position of the crater and the position of the GOLF next to the NIK building were well established by the Police in 1995.**

- **We are concerned about the way Prof. Berko ZECEVIC carried out his expert mission. During the reconstruction of the crime scene, he did not place the GOLF car according to the measurements, sketches, photos and video of the Police. This would have made the arrival of a long-range 130 mm projectile from the West simply impossible. Instead, he moved the GOLF car sideways half a meter towards the NIK building, which gave him the minimum angle of fall that his scenario puts forwards. Computation of an arrival azimuth is then performed from a non-obvious "furrow" that he sees on photos and that he mixed with the coordinates of the crater. And the "furrow" is not even aligned with the crater ?**

- **Things are to be checked regarding the chain of custody of the fragments and how UNPROFOR knew right away that a 130 mm cannon had been used. It is also necessary to check if Prof. Berko ZECEVIC actually examined the fragments, which is not clear from his report. In the meantime and based on the assessment of Prof. Berko ZECEVIC, it is assumed for now that the fragments were coming for a 130 mm HE projectile. From photos, it is confirmed that most of the deceased were hit by fragments.**

- **The experimentation at NIKINCI dated feb. 10th, 2016 was conducted according to the scenario of Prof. Berko ZECEVIC.**

- **The experiment confirms that a 130 mm HE projectile can cause quite a large number of casualties in the conditions prevailing at TUZLA on May 25th, 1995. Yet, it is not understood how numerous people can be hit at the Kapija café and at Gulam café and how some walls which are out of sight from the burst point can show impacts.**

- **De facto, the resulting spread of fragments during the experiment (tail fragments up the mock-up Nick building, absence of fragment at the Kapija Café...) is fairly different from what really happened in TUZLA.**

- **The experimentation also showed that the explosion of a 130 mm projectile as per the scenario of Prof. Berko ZECEVIC would result in pushing the GOLF car and inflicting huge damages to that car. This is not was happened on May 25th, 1995 at TUZLA.**

- **Such results might perhaps be reached with a projectile that would be set vertically (preferably base on the ground to create a crater) but this configuration is not feasible unless the projectile is used as an IED. And even though, there is still no explanation about the low damages on the GOLF car in TUZLA and about some impacts in dead angles that need further investigation.**

Having completed this report, it is sent to the defense team by electronic mail and paper mail the same day. The defense team may use this final report and transmit it as required by the legal process.

It is noted that, regardless of work still to be performed, new leads or facts have been put forward in the current report :

- The placement of the GOLF and the ballistic angle of fall described by Prof. Berko ZECEVIC do not correspond to what actually happened in Kapija :

- **the Police files and photos prove that Prof. ZECEVIC places his GOLF car much nearer to the wall of NIK building. But it was noted that it was the only way for him to achieve a projectile angle of fall more or less compatible with the position of a cannon situated at 27 km west of TUZLA,**
- **it was proved experimentally that the projectile fragments do not go where they need to in order to cause the casualties and destruction as in TUZLA,**
- **the destructions of the GOLF in TUZLA are far less than expected.**

- some impacts in walls in TUZLA are found where there should not be any, being out of sight from the explosion centre (dead angle or blind spot effect). Prof. ZECEVIC, who mentions such impacts on the BORAC building, did not investigate these discrepancies even though they may cast a totally different light on the case.

Pierre LAURENT
April 16th, 2016