

# **Shelling of Voroshilovskiy District, Donetsk using 155 mm rifled artillery on August 23, 2022**

*PUBLIC INVESTIGATION*

*Donetsk 24.11.2022*

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## **ABBREVIATIONS**

UAF - Ukrainian Armed Forces

DPR - Donetsk People's Republic

LPR - Luhansk People's Republic

IMBr - Independent Mechanized Brigade

RF - the Russian Federation

SMO - Special Military Operation

UAF - Ukrainian Armed Formations

OC - operational capabilities

SPM - self-propelled mortar

JCCC - Joint Centre for Control and Coordination

## PREAMBLE

On February 24, 2022, the Russian Federation launched a special military operation in Ukraine, (hereinafter referred to as SMO). Vladimir Putin called its goal “to protect people who have been subjected to genocide by the Kyiv regime for eight years”<sup>1</sup>. According to the Minister of Defense of the Russian Federation, as of July 3, through the efforts of the Armed Forces of the Russian Federation, the LPR and the DPR, the entire territory of the LPR was liberated, which was one of the primary tasks of the SMO.<sup>2</sup> However, part of the DPR territory was still under the control of the Ukrainian security forces.

In the vicinity of Donetsk, units of the DPR people’s militia constantly carried out offensive operations, with the support of the armed forces of the Russian Federation. The Ukrainian armed formations (hereinafter referred to as UAF), in turn, shelled the territory controlled by the allied forces. In this situation, not only military, but also civilian objects became targets.

Thus, on August 22, after a short lull in hostilities, the UAF resumed massive shelling of the cities of the DPR, including the capital of the Republic - Donetsk<sup>3</sup>.

On August 23, 2022, at 11:37<sup>4</sup> Moscow time, the UAF fired the first series of artillery shells at the Voroshilovskiy district of Donetsk. Likewise, shelling was repeated at 11:51<sup>5</sup> and at 12:07<sup>6</sup>.

The incident resulted in the following **casualties**:

- a man born in 2004;

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<sup>1</sup> Message of the President of the Russian Federation (published on 24.02.2022) Official website of the President of the Russian Federation URL: <http://kremlin.ru/events/president/news/67843/videos> (accessed on 06.07.2022)

<sup>2</sup> Russia claims key city in punishing conquest of eastern Ukraine (published on 03.07.2022) The Washington Post URL: <https://www.washingtonpost.com/world/2022/07/03/lyschansk-uhansk-russia-ukraine-war/> (accessed on 06.07.2022)

<sup>3</sup> The operational lines of the DPR JCCC received additional information about civilian casualties as a result of the shelling by the UAF of the cities of the Republic (published on 22.08.2022) Telegram channel of the DNR JCCC: official activities report. URL: [https://t.me/DNR\\_SCKK/10101](https://t.me/DNR_SCKK/10101) (accessed on 01.09.2022)

<sup>4</sup> Shelling was recorded from the UAF side in the direction (published on 29.08.2022) online the DNR JCCC. URL: [https://t.me/online\\_dnr\\_sckk/15823](https://t.me/online_dnr_sckk/15823) (accessed on 01.09.2022)

<sup>5</sup> Shelling was recorded from the UAF side in the direction (published on 29.08.2022) online the DNR JCCC. URL: [https://t.me/online\\_dnr\\_sckk/15824](https://t.me/online_dnr_sckk/15824) (accessed on 01.09.2022)

<sup>6</sup> Shelling was recorded from the UAF side in the direction (published on 29.08.2022) online the DNR JCCC. URL: [https://t.me/online\\_dnr\\_sckk/15826](https://t.me/online_dnr_sckk/15826) (accessed on 01.09.2022)

- a man born in 1971;
- a man born in 1997;<sup>7</sup>
- a man born in 1991;<sup>8</sup>

In addition, as a result of these attacks, the following people were **injured**:

- a woman born in 1955,
- a woman born in 1964,
- a woman born in 1980,
- a woman born in 1986,
- a woman born in 1953,
- a man born in 1972;
- a man born in 1983;
- a man born in 1964;
- a man born in 1972;
- a man born in 1976;<sup>9 10</sup>

This investigation will examine in detail a series of attacks on the Voroshilovski district of Donetsk, carried out with the use of 155 mm rifled artillery, on August 23, 2022.

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<sup>7</sup> The operational lines of the DPR JCCC received information about civilian casualties in the cities of the Republic (published on 23.08.2022) Telegram channel of the DNR JCCC: official activities report, URL: [https://t.me/DNR\\_SCKK/10106](https://t.me/DNR_SCKK/10106) (accessed on 01.09.2022)

<sup>8</sup> According to the operational lines of the DPR JCCC as of August 23 (published on 23.08.2022) Telegram channel of the DNR JCCC: official activities report. URL: [https://t.me/DNR\\_SCKK/10108](https://t.me/DNR_SCKK/10108) (accessed on 01.09.2022)

<sup>9</sup> According to the operational lines of the DPR JCCC as of August 23 (published on 23.08.2022) Telegram channel of the DNR JCCC: official activities report. URL: [https://t.me/DNR\\_SCKK/10108](https://t.me/DNR_SCKK/10108) (accessed on 01.09.2022)

<sup>10</sup> According to the operational lines of the DPR JCCC as of August 23 (published on 23.08.2022) Telegram channel of the DNR JCCC: official activities report. URL: [https://t.me/DNR\\_SCKK/10107](https://t.me/DNR_SCKK/10107) (accessed on 01.09.2022)

## INCIDENT LOCATION

After examining the incident location, interviewing eyewitnesses and collecting materials from open sources, we managed to establish **nine** traces of the artillery ammunition detonation (see Fig. 1).

**Shell hit 1** In this case, the shell hit the roof of the residential building at 4, Constitution Square over the entrance number 6. As a result of the explosion, a through hole was formed in the roof. The owner of the destroyed apartment did not give us access for detailed recording, however, the hole formed as a result of the projectile detonation was clearly visible from the outside (see Fig. 2).

**Shell hit 2** The shell came into contact with the wall of the residential building at 4, Constitution Square, tangentially, as a result of which the ammunition broke into several parts and the explosion did not occur. An oblong hole was formed on the wall of the ledge of entrance No. 3, and the balconies were also damaged (see Fig. 3). A cylindrical hollow metal object was found above the ground, next to the damaged balcony structures, it was identified as part of an artillery shell (see Fig. 4). The diameter of the object is 155 mm, the length is 290 mm. There is a copper belt with traces of rifling in its central part.

**Shell hit 3** (see Fig. 5) is located on the lawn between the residential building at 3 Constitution Square and the Kalmius River (about 15-20 m east of the building and 10 m west of the road). The trace is a shell crater (of oval shape) on the soil 1.5-2 m in a diameter and up to 15 cm deep; it has a characteristic hole in the center with a diameter of about 16 cm, formed by a detonating fuze that continued its movement along the projectile flight path after its detonation. There is no grass around the crater. Fragmentation grooves up to 2 m long are observed to the south-east of the crater; the north-western edge of the crater is elevated.

**Shell hit 4** In this case, the projectile hit the north-western corner of the roof of the “Kalmius” consumer services center at 1, Constitution Square<sup>11</sup>. As a result

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<sup>11</sup> Shelling effects of the “Kalmius” consumer services centre (published on 22.08.2022) Typical Donetsk Telegram Channel. URL: <https://t.me/itsdonetsk/27417> (accessed on 05.09.2022).

of the projectile detonation, a through hole was formed in the concrete structures of the roof (see Fig. 6).

**Shell hit 5** The projectile hit the entrance pavilion structure of the “Central” Hotel, located at 87 Artyoma St. (see Fig. 7). As a result of the projectile detonation, the metal structures of the pavilion were damaged, in addition, people in passing cars were injured.

**Shell hit 6** This shell hit is out of the general pattern of the incident location, because fragments characteristic of HIMARS MLRS rockets were found on the site (see Fig. 8). **We will not consider this shell hit**, however, to complete the picture of what happened, we will also describe it. The trace represents a significant destruction of the premises on the top floor of the administration building of the Head of the Donetsk People’s Republic, located at 7B Pushkina Blvd (see Fig. 9).

**Shell hit 7** was found on the asphalt paving of the road of 25th-anniversary of the Red Army Ave. in Donetsk, between the residential buildings at 69a and 71 Chelyuskintsev Str. It is a clearly defined trace from the explosion on the asphalt surface (see Fig10). The center of the explosion is an oval pothole up to 5 cm deep, located in the south-eastern part of the track, from which fragmentation grooves diverge, most of them are located on the north-western side of the track.

**Shell hit 8** was found on the road surface between the tram rails, approximately 7-10 m north of the north-western corner of the residential building at 55, Chelyuskintsev Street. It is a clearly defined trace from the explosion on the asphalt surface (see Fig. 11). The center of the explosion is an oval pothole up to 5 cm deep, located in the south-eastern part of the track, from which fragmentation grooves diverge, most of them are located on the north-western side of the track.

**Shell hit 9** In this case, the projectile hit the north-western corner of the roof of the “Kalmius” consumer services center at 2, Dzerzhinskogo Avenue<sup>12</sup>. As a result of the projectile detonation, part of the roof was destroyed.

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<sup>12</sup> 2, Dzerzhinskogo - house hit (published on 23.08.2022) Code red-Donetsk Z Telegram Channel. URL: [https://t.me/chp\\_donetsk\\_z/28613](https://t.me/chp_donetsk_z/28613) (accessed on 05.09.2022).

All artillery ammunition detonation sites are identified, and summarized in a photo table (see Fig. 13, Fig. 14) their coordinates are displayed in the table (see *Table 1*), and mapped using the Yandex map service (see Fig. 1).



## **WEAPON TYPE**

### **Projectile debris**

A fragment of an unexploded rifled artillery shell in the form of a cylindrical object was found at shell hit 2 (see Fig. 4). This object has a diameter of 155 mm, and there is a 37-mm-wide copper belt with traces of rifling in its central part. A metal partition with a nozzle-shaped hole is located inside the object.

This object can be identified as the propulsion part of a semi-self propelled projectile. The warhead of this projectile was not found at the site and, according to local residents, it had been disarmed and removed by employees of the Ministry of Emergency Situations before our arrival at the incident location.

This allows us to assert that the 155-mm rifled artillery was used in the case under consideration, and that semi-self propelled projectiles were used.

In addition, eyewitnesses published photos of the debris from the missile part of the semi-self propelled projectile with its characteristic wide copper belt, found at the location of shell hit 4 (see Fig. 18).

In the yard of residential building at 153a, Chelyuskintsev Street, eyewitnesses found the inner partition of the semi-self propelled projectile missile part (see Fig. 19). A similar fragment was also found near the residential building at 4, Constitution Square from the side of Ilyicha Ave. (see Fig. 20).

The debris of a rifled artillery shell identical to the debris of an unexploded projectile at the location of shell hit 2 were also found during the examination of shell hit 3 (see Fig. 15). In addition, a truncated cone-shaped metal object was found at the bottom of the detonating fuze groove. It bears a screw and the inscription "DELAY" in English (see Fig. 16). The position of this screw determines the duration of the delay between the contact of the projectile fore end with the surface and its detonation; hence, we can conclude that this object is the detonating fuze.

It is also important to mention that shells made in the USSR and post-Soviet countries are marked with numbers and Cyrillic, and the inscription “DELAY” is in Latin characters, which tells us about the use of foreign weapons.

Having studied the design features of this fuze, and comparing it with the fuze found during the survey of another incident location, we came to the conclusion that this is the main fuze for 105-mm and 155-mm shells used by NATO member countries – M739A1 (see Fig. 17)

It is noteworthy that the 155-mm weapons were not developed and produced either in the territory of the USSR or in the territory of the post-Soviet countries; they are an artillery standard adopted exclusively in NATO member countries.

Having studied the 155-mm shells used by the NATO bloc<sup>13</sup>, we came to the conclusion that the shell fragments we found correspond to only one semi-self propelled projectile, namely the M549 projectile or its upgraded version M549A1.

### **Deliveries of 155-mm rifled artillery to Ukraine**

The first deliveries of 155-mm shells to Ukraine took place from **Canada** on April 22, 2022, since then they have gained some distribution in the UAF arsenal<sup>14</sup>.

**Deliveries from Australia:** On April 27, 2022, the Australian government announced the delivery of six M777 howitzers and their ammunition to Ukraine.<sup>15</sup>

**Deliveries from the USA:**

1. On April 13, 2022, the Pentagon announced that they would transfer 18 M777 howitzers to Ukraine<sup>16</sup>.

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<sup>13</sup> 155mm Artillery Projectiles. Global Security URL: <https://www.globalsecurity.org/military/systems/munitions/155.htm> (accessed on 24.11.2022)

<sup>14</sup> Canada sends four pieces of field artillery to Ukraine as country braces for renewed Russian attack (published on 22.04.2022) CBC URL <https://www.cbc.ca/news/politics/ukraine-m777-howitzer-russia-heavy-artillery-1.6427762> (accessed on 05.09.2022)

<sup>15</sup> Australia to Deliver Six M777 Howitzers to Ukraine (published on 27.04.2022) The Defense Post URL: <https://www.thedefensepost.com/2022/04/27/australia-m777-howitzers-ukraine/> (accessed on 30.10.2022)

<sup>16</sup> Pentagon holds briefing as Biden announces additional \$800M in security assistance to Ukraine (published on 13.04.2022) CBS News URL: <https://www.youtube.com/watch?v=7tOuhNKsiy4> (accessed on 30.10.2022)

2. On April 21, 2022, US President Biden declared that the United States would supply Ukraine with 72 155-mm M777 howitzers and 144,000 ammunition for them<sup>17</sup>.
3. On May 19, 2022, the United States approved a package of assistance to Ukraine, which included eighteen 155-mm M777 howitzers<sup>18</sup>
4. On June 1, 2022, US President Biden declared the allocation of additional military assistance, which included ammunition for 155-mm howitzers<sup>19</sup>
5. On June 15, 2022, US President Biden announced the provision of military assistance to Ukraine, which includes 18 M777 howitzers and ammunition for them.<sup>20</sup>

Deliveries from the **UK**: On July 21, 2022, British Secretary of Defense Ben Wallace announced an aid package to Ukraine, which included 20 units of M109 155-mm self-propelled guns<sup>21</sup>.

Deliveries from **France**: On July 21, 2022, French President Emmanuel Macron informed about the provision of 155-mm self-propelled CAESAR guns to Ukraine<sup>22</sup>.

Deliveries from **Italy**: On May 13, 2022, the Italian newspaper *La Repubblica* announced the supply of 155-mm FH 70 howitzers to Ukraine<sup>23</sup>

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<sup>17</sup> Biden: The United States to supply Ukraine with heavy artillery and drones (published on 21.04.2022) BBC News URL: <https://web.archive.org/web/20220422102858/https://www.bbc.com/russian/news-61181352> (accessed on 30.10.2022)

<sup>18</sup> US approves \$40bn Ukraine aid package (published on 20.05.2022) DW URL: <https://web.archive.org/web/20220520101418/https://amp.dw.com/ru/ssha-utverdili-paket-pomoshhi-ukraine-na-40-mlrd-dollarov/a-61871367> (accessed on 30.10.2022)

<sup>19</sup> The Ukrainian party to decide for itself at what distances to use American HIMARS multiple launch rocket systems (published on 02.06.2022) Eastern Variant URL: <https://web.archive.org/web/20220602165223/https://v-variant.com.ua/ukrayna-sama-budet-reshat-kak-daleko-streliat-yz-amerykanskykh-himars-posol-ssha/> (accessed on 30.10.2022)

<sup>20</sup> The United States will allocate an additional \$450 million military aid package to Ukraine: what will be included (published on 23.06.2022) UNIAN Information Agency URL: <https://web.archive.org/web/20220623221128/https://www.unian.net/world/voennaya-pomoshch-ukraine-ssha-vydelyat-eshche-450-millionov-novosti-mira-11877204.html> (accessed on 30.10.2022)

<sup>21</sup> M109 self-propelled guns, L119 howitzers, UAVs and ammunition: what's in the new UK aid package (published on 21.07.2022) The Page URL: <https://thepage.ua/news/voennaya-pomosh-ukraine-chto-nam-daet-velikobritaniya> (accessed on 30.10.2022)

<sup>22</sup> France sends heavy weapons to Ukraine for the first time (published on 22.04.2022) Vedomosti URL: <https://web.archive.org/web/20220422124911/https://www.vedomosti.ru/politics/news/2022/04/22/919351-frantsiya-vpervie-otpravit-tyazhelie> (accessed on 30.10.2022)

<sup>23</sup> Il governo italiano pronto a fornire artiglieria pesante all'Ucraina (published on 16.05.2022) La Repubblica URL: [https://web.archive.org/web/20220516060657/https://www.repubblica.it/politica/2022/05/13/news/armi\\_italiane\\_dotazioni\\_ucraina\\_guerra-349242188/](https://web.archive.org/web/20220516060657/https://www.repubblica.it/politica/2022/05/13/news/armi_italiane_dotazioni_ucraina_guerra-349242188/) (accessed on 30.10.2022)

Deliveries from **the Netherlands**: On April 19, 2022, Dutch Prime Minister Mark Rutte announced the transfer of German 155-mm PzH 2000 self-propelled guns to Ukraine<sup>24</sup>, and the delivery of three additional PzH 2000 in June<sup>25</sup>.

Deliveries from **Norway**: On April 28, 2022, Norway withdrew twenty 155-mm M109A3GN howitzers from its warehouses intending to transfer them to Ukraine<sup>26</sup>.

## **M549 Ammunition**

155-MM M549/M549A1 (see Fig. 21) is a separate loading ammunition with a two-piece forged body. The forward shell body is constructed from high-fragmentation steel (HF1) and is of a low-drag aerodynamic profile. The rocket-motor body makes up the rear of the shell, it is constructed from 4340 steel. The motor body weighs 13.5 kg (approximately 3.175 kg of which is propellant), is 266.7 mm long and is encircled by a welded overlay copper driving band and obturator band, both protected during storage and transportation by a polycarbonate composition grommet. At the front of the projectile, the fuze cavity is protected during transportation by an energy-absorbing lifting plug, which protects the fuze area from damage during storage, transit and handling. Before loading, the lifting plug is replaced by a fuze, and the protector cap over the rocket-motor nozzle is removed; the 155 mm M549/M549A1 HERA is not intended to be fired in the 'rocket-off' mode. On-target effects are enhanced by the HF-1 steel body of the shell. The 155-mm M549 forward shell body is filled with a nominal 7.26 kg of Composition B. The M549A1 filler is 6.8 kg of cast TNT. At the instant of firing, the propellant gases ignite a pyrotechnic delay train in the rocket motor. The delay

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<sup>24</sup> Netherlands Prime Minister Mark Rutte Pledges More Military Aid, Heavy Weapons to Ukraine (published on 19.04.2022) Republic world URL: <https://www.republicworld.com/world-news/russia-ukraine-crisis/netherlands-prime-minister-mark-rutte-pledges-more-military-aid-heavy-weapons-to-ukraine-articleshow.html> (accessed on 30.10.2022)

<sup>25</sup> Going Dutch Revisited: Dutch Military Aid To Ukraine (published on 09.09.2022) // ORYX URL: <https://www.oryxspioenkop.com/2022/09/going-dutch-revisited-dutch-military.html> (accessed on 30.10.2022)

<sup>26</sup> Norway to provide Ukraine with M109A3GN 155mm tracked self-propelled howitzers (published on 01.05.2022) Army Recognition URL: [https://www.armyrecognition.com/defense\\_news\\_may\\_2022\\_global\\_security\\_army\\_industry/norway\\_to\\_provide\\_ukrain\\_e\\_with\\_m109a3gn\\_155mm\\_tracked\\_self-propelled\\_howitzers.html](https://www.armyrecognition.com/defense_news_may_2022_global_security_army_industry/norway_to_provide_ukrain_e_with_m109a3gn_155mm_tracked_self-propelled_howitzers.html) (accessed on 30.10.2022)

burns for approximately seven seconds. By the end of these seven seconds, the end of the delay train reaches the primary igniter of the rocket and subsequently lights two propellant grains in the motor via an igniter pellet.

**Specifications:**

Weight without fuze 43.6 kg (96 lbs)

Body material: forged steel

Primer: M82

Explosive content:

M549: 7.26 kg (16 lbs) Composition B

M549A1: 6.8 kg (15 lbs) TNT

Length 87.35 cm (34.39 inches)

Body diameter: 154.89 mm

Driving band diameter:

Fuzes (with supplemental charge)

Fuzes (without supplemental charge)

Firing range: 30.1 km<sup>27</sup>

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<sup>27</sup> ARMY AMMUNITION DATA SHEETS ARTILLERY AMMUNITION GUNS, HOWITZERS, MORTARS, RECOILLESS RIFLES, GRENADE LAUNCHERS, AND ARTILLERY FUZES (published on 04.1994) TECHNICAL MANUAL URL: <https://ru.scribd.com/doc/18119197/TM-43-0001-28-Army-Ammunition> (accessed on 30.10.2022)

## DETERMINATION OF THE SHELLING SECTOR

### Shelling Direction

In cases of shell hits 3, 7 and 9, clear traces from the detonation of shells remained on the surface, they are identified as craters from shelling at a high incidence angle (see Fig. 22). This enabled us to determine the direction from which the shelling was carried out using the fragmentation grooves method<sup>28</sup>.

Grooves of lateral scattering of fragments were located around the crater. If we set conditional points at the ends of the lines of lateral scatter of fragments, then join them with a line segment, determine its midpoint, and plot a straight line between the crater center and the midpoint of the fragment scatter that we have determined, the straight line obtained will indicate the shelling direction. Thus, in the case of shell hit 3, the azimuth was 319 degrees (see Fig. 23).

Exploring similarly the crater on an asphalt pavement along the 25th Anniversary of the Red Army Ave., between the residential buildings at 69a and 71, Chelyuskintsev Street (shell hit 7), we determined the shelling direction azimuth to be 318 degrees (see Fig. 24).

And finally, in the case of shell hit 9, the azimuth was 320 degrees (see Fig. 25).

Let us take the rounded value of the shelling direction azimuth - 320 degrees, for this investigation.

This direction is also indirectly confirmed by the traces of the destructed entrance No. 3 of the residential building at 4, Constitution Square (see Fig. 3), located on the north-western side. In addition, damage to the wall of this residential building enables us to assert that the projectile incidence angle was approximately 60 degrees (see Fig. 26). This suggests that the shelling could be carried out from a distance close to the maximum.

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<sup>28</sup> ANALYSIS OF CRATERS FROM HIGH-EXPLOSIVE SHELL HITS "Fair Defense" Non-Government Organization URL: <https://oosz.su/node/157> (published on 24.11.2022)

Also, the correctness of the determined direction is confirmed by the fact that the shells hits can be inscribed in ellipses, elongated along the shelling direction. There are two such ellipses (see Fig. 1): Shell hits 1-4 and shell hits 5-7. Shell hit 9 was apparently the result of a single shot. As already mentioned above, this shelling consisted of 3 volleys.

### **Firing range**

In accordance with the performance characteristics of the M549 projectile, the maximum firing range in our case is 30 km. In addition, we know that the projectile incidence angle is approximately 60 degrees. The latter suggests that the projectile was fired from the gun at an angle close to 45 degrees, i.e., the projectile was fired at the maximum distance for the used powder charge.

Unfortunately, we were unable to find firing tables for rifled artillery guns from NATO member countries. However, based on the firing tables of Soviet-style guns with similar characteristics, it can be stated that artillery fire conducted with an exit angle close to 45 degrees is not fired from a distance of less than 10 km.

Based on the determined shelling direction (320 degrees) and firing range (10-30 km), we can map the sector from which the shelling of the Voroshilovskiy district of the city of Donetsk was carried out on August 23, 2022. In addition, based on the maps of the armed confrontation<sup>29</sup> in Ukraine, we can plot the line of demarcation on the map (see Fig. 27).

The obtained scheme shows that the sector from which the shelling was carried out was in the territory controlled by the UAF. Additionally, it is worth noting once again that the M549 projectile has a caliber of 155mm, which corresponds to the artillery caliber standardized by NATO, whose members actively supplied weapons to Ukraine. This shell could not be used by Russia and its allies,

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<sup>29</sup> Map of the Special Military Operation in Ukraine. LOSTARMOUR URL: <https://lostarmour.info/> (published on 24.11.2022)

as they do not use shells of this caliber. This primarily means that the projectile was fired from the territory controlled by Ukraine, far from the line of contact, since it is not advisable to deploy such heavy weapons in the immediate vicinity of the front line.



## MILITARY PRESENCE

As far back as at the beginning of 2015, positions of artillerymen of the 55th IMBr of the Armed Forces of Ukraine were equipped near Avdeyevka. This unit was armed with 152-mm long-range 2A65 Msta-B howitzers. We had already written about this in the investigation “Shelling of Kyevsky District, Donetsk using rifled artillery on September 20, 2015”<sup>30</sup>.

Thus, for example, traces of artillery work near Avdeyevka are clearly visible in a satellite image dated February 21, 2015. In addition, in the release of the Ukrainian TV show Brave Hearts dated October 14, 2015, the battery commander of the 55th IMBr with the San Sanych code name was featured (see Fig. 28). In the course of the plot, he demonstrated the position just above Avdeyevka on the map, from where his unit was firing towards Donetsk<sup>31</sup> (see Fig. 29).

It is noteworthy that the 2A65 Msta-B howitzer is similar in its characteristics to NATO 155-mm guns. For this reason, it seems likely that the decision was made to re-equip this particular unit.

The representative office of the DPR in the JCCC, in turn, blamed the 110th Specialized Rifle Brigade of the Armed Forces of Ukraine for the shelling under consideration. Thus, communication dated August 24, 2022 says: “This is the area of responsibility of the 110th Separate Mechanized Brigade (commander - Colonel Yevhen Kurash).”<sup>32</sup>

However, open sources contain very little information about Ukrainian units located today in the area west of Avdeyevka. In our understanding, we will be able to obtain more detailed information in the future.

At the same time, the fact remains undoubted that the highest military-political leadership of Ukraine is responsible for the illegal actions of the UAF, namely:

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<sup>30</sup> <https://lostarmour.info/articles/obstrel-goroda-kievskogo-rayona-goroda-donecka-s-primeneniem-narezhnoy-artillerii-20-yanvarya-2015-goda/>

<sup>31</sup> Brave hearts. Gunners. YouTube Video hosting. URL: <https://youtu.be/DFwCG19BArs?t=2295> (accessed on 07.10.2021).

<sup>32</sup> Recording the consequences of the shelling of the Voroshilovskiy district of Donetsk on August 23, 2022. Telegram-Channel of the JCCC DNR. URL: [https://t.me/DNR\\_SCKK/10133](https://t.me/DNR_SCKK/10133) (accessed on 24.11.2022)

President and Supreme Commander-in-Chief **Volodymyr Zelensky** and  
Commander-in-Chief of the Armed Forces of Ukraine **Valery Zaluzhnyy**.

## CONCLUSIONS

As follows from the above, on August 23, 2022, from approximately 11:30 to 12:00 (Moscow time), the Voroshilovskiy district of Donetsk came under artillery fire using NATO-standard 155-mm rifled artillery ammunition. The shells flew in a direction from north-west to south-east (azimuth 320 degrees). The shelling was carried out using M549 or M549A1 155-mm semi-self propelled ammunition.

The shelling sector was entirely controlled by the UAF. 155-mm artillery guns are in service with only one of the parties to the conflict, namely Ukraine.

All shell hits fell on densely populated residential areas of the city and led to damage to civilian objects, death and injury to civilians. Thus, the principles of selectivity and proportionality were violated.

The highest military and political leaders of Ukraine are responsible for the illegal actions of the UAF, namely: President and Supreme Commander-in-Chief **Volodymyr Zelensky** and Commander-in-Chief of the Armed Forces of Ukraine **Valery Zaluzhnyy**.

## LEGAL QUALIFICATIONS

Indiscriminate shelling of a densely populated residential area in the town of Makeyevka, in which civilians were killed and injured, is a crime for which responsibility is provided by the norms of national legislation of Ukraine and by the norms of international law.

In compliance with **Art. 438 of the Criminal Code of Ukraine**, for “... use of methods of the warfare prohibited by international instruments, or any other violations of rules of the warfare recognized by international instruments consented to be binding by the Verkhovna Rada (Parliament) of Ukraine, and also giving an order to commit any such actions”, shall be punishable by imprisonment for a term of eight to twelve years., and if he same acts accompanied with an intended murder, shall be punishable by imprisonment for a term of ten to fifteen years, or life imprisonment.

In compliance with **Art. 13 of Additional Protocol II to the Geneva Conventions** of 12 August 1949, concerning the protection of victims of armed conflicts of a non-international character, dated 8 June 1977: “The civilian population as such, as well as individual civilians, shall not be the object of attack. Acts or threats of violence the primary purpose of which is to spread terror among the civilian population are prohibited”.

In compliance with **Rule 71 of Customary International Humanitarian Law** (Volume 1, ICRC, 2006): “States must never make civilians the object of attack and must consequently never use weapons that are incapable of distinguishing between civilian and military targets”

“The use of weapons which are by nature indiscriminate is prohibited”.

In compliance with **Art. 3 common to all Geneva Conventions of August 12, 1949**, , extending its effect to non-international armed conflicts, “persons taking no active part in the hostilities, including members of armed forces who have laid down their arms and those placed ‘hors de combat’ by sickness, wounds, detention, or any other cause, shall in all circumstances be treated humanely, without any

adverse distinction founded on race, colour, religion or faith, sex, birth or wealth, or any other similar criteria”.

To this end, violence to life and person, in particular murder of all kinds and mutilation, are prohibited inter alia with respect to the above-mentioned persons.

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# ANNEXES

## Annex 1

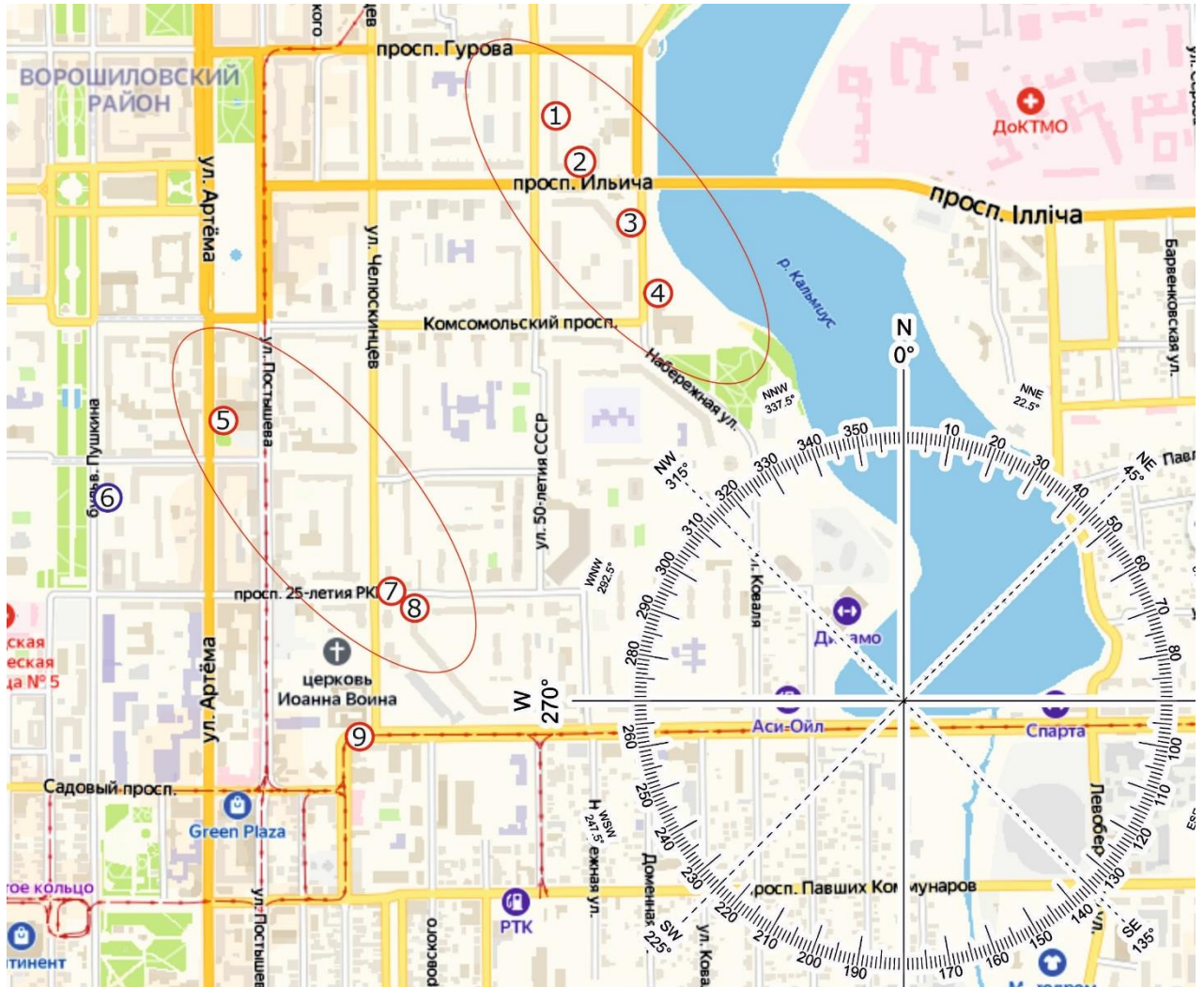


Fig. 1 – The scheme of shelling of the Voroshilovskiy district, Donetsk, which happened on August 23, 2022 12:20.





*Fig. 2 – A hole in the roof at 4, Constitution Square.*



*Fig. 3 – Damage to the wall of the residential building at 4, Constitution Square.*





*Fig. 4 – The remains of an unexploded projectile found at 4, Constitution Square.*





*Fig. 5 – An artillery shell explosion crater next to the residential building at 3, Constitution Square.*



*Fig. 6 – Damage to the roof of the “Kalmius” consumer services center<sup>33</sup>.*

<sup>33</sup> Shelling effects of the “Kalmius” consumer services centre (published on 23.08.2022) Typical Donetsk Telegram channel URL: <https://t.me/itsdonetsk/27437> (accessed on 24.11.2022)





*Fig. 7 – Damage to the entrance pavilion of the Central Hotel.*



*Fig. 8 – Fragments found on August 23, 2022 near the building of the administration of the Head of the DPR<sup>34</sup>.*

<sup>34</sup> The enemy subjected the center of Donetsk to massive shelling from NATO weapons (published on 23.08.2022) DPR JCCC Telegram Channel. URL: [https://t.me/DNR\\_SCKK/10104](https://t.me/DNR_SCKK/10104) (accessed on 24.11.2022)





*Fig. 9 – Destruction of the upper floor of the residential building at 7B Pushkina Blvd.*

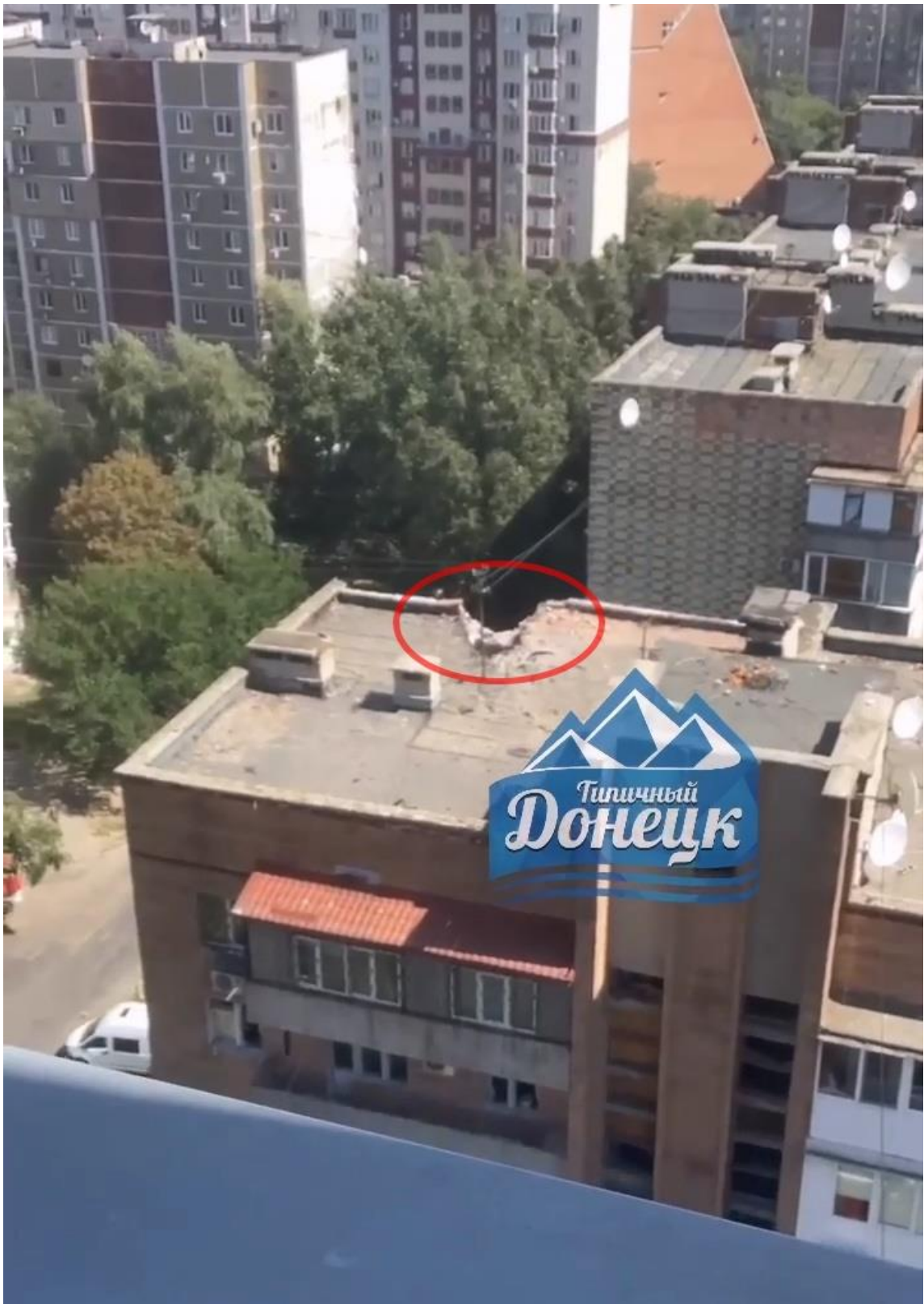


*Fig10 – A crater at the crossing of Chelyuskintsev Str. and the 25Th anniversary of the Red Army Ave.*





*Fig. 11 – An artillery shell explosion crater between the tram rails next to the residential building at 55, Chelyuskintsev Str.*



*Fig. 12 – Damage to the roof of the residential building at 2, Dzerzhinskogo Ave.<sup>35</sup>.*

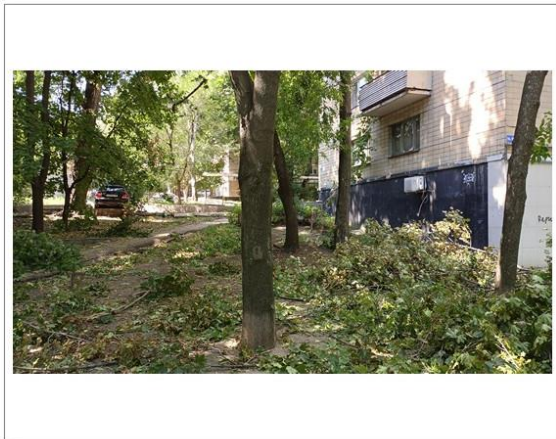
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<sup>35</sup>Incoming strike to the roof of the residential building at the 25th Anniversary of the Red Army Ave. (published on 23.08.2022) Typical Donetsk Telegram Channel. [URL:https://t.me/itsdonetsk/27371](https://t.me/itsdonetsk/27371) (accessed on 24.11.2022)

*Table 1 – Coordinates of photos of FSM traces*

No.	Photo	Coordinates:
1	2022-08-23 12-49-29	48.003196, 37.811668
2	2022-08-23 13-09-05	48.001479, 37.814031
3	2022-08-23 13-42-36	48.002400, 37.812892
4	2022-08-23 13-59-02	48.003063, 37.812302
5	2022-08-23 14-30-26	47.995818, 37.808664
6	2022-08-23 14-43-29	47.993660, 37.808015
7	2022-09-05_10-37-11	47.998474, 37.804777
8	2022-09-05_11-18-40	47.997370, 37.802251
9	photo_2022-09-08_15-35-36	47.995524, 37.809126
10	photo_2022-09-08_15-37-09	47.999986, 37.814885

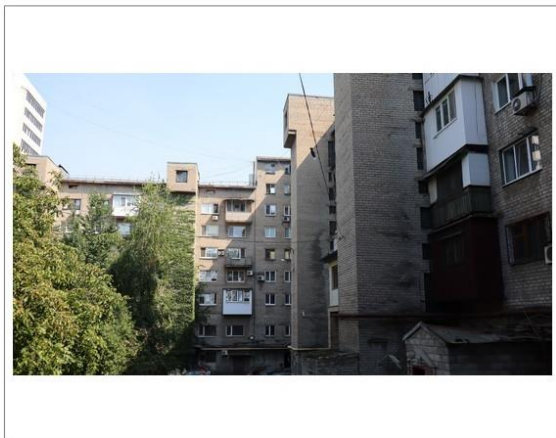




2022-08-23 12-49-29



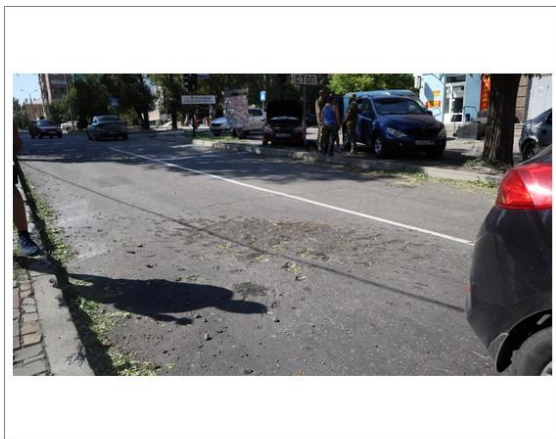
2022-08-23 13-09-05



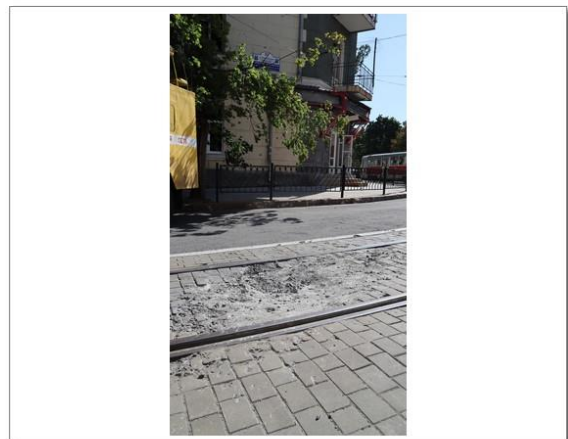
2022-08-23 13-42-36



2022-08-23 13-59-02



2022-08-23 14-30-26



2022-08-23 14-43-29

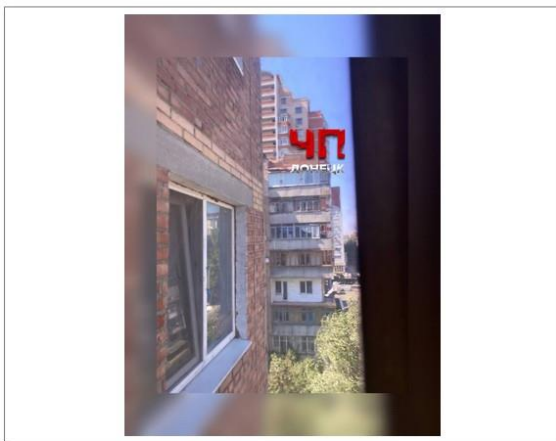
*Fig. 13 – Photo table for recording FSM explosion traces (sheet 1)*



2022-09-05\_10-37-11



2022-09-05\_11-18-40



photo\_2022-09-08\_15-35-36



photo\_2022-09-08\_15-37-09

*Fig. 14 – Photo table for recording FSM explosion traces (sheet 2)*





*Fig. 15 – The debris of a shell found at shall hit 4 (between the residential building at 3, Constitution Square and the Kalmius River).*





*Fig. 16 – Detonating fuze found at the site of shell hit 4.*



*Fig. 17 – The main detonating fuze of NATO member countries for M739A1 105-mm and 155-mm ammunition<sup>36</sup>.*

<sup>36</sup> NDIA 60th Annual Fuze Conference, May 9-11, 2017. Conventional Fuze Improvements URL: <https://ndiastorage.blob.core.usgovcloudapi.net/ndia/2017/fuze/Amadio19340.pdf> (accessed on 30.10.2022)





*Fig. 18 – A shell fragment found on the roof of the “Kalmius” consumer services centre<sup>37</sup>.*



*Fig. 19 – A shell fragment found in the yard of the residential building at 153a, Chelyuskintsev Street<sup>38</sup>.*

<sup>37</sup> Shelling effects of the “Kalmius” consumer services centre (published on 24.11.2022) Typical Donetsk Telegram Channel. URL: <https://t.me/itsdonetsk/27437> (accessed on 24.11.2022)

<sup>38</sup> A fragment at 153A Chelyuskintsev Str. (published on 24.11.2022) Typical Donetsk Telegram Channel. URL: <https://t.me/itsdonetsk/27429> (accessed on 24.11.2022)





Fig. 20 – A shell fragment found next to the the yard of the residential building at 4, Constitution Square<sup>39</sup>.

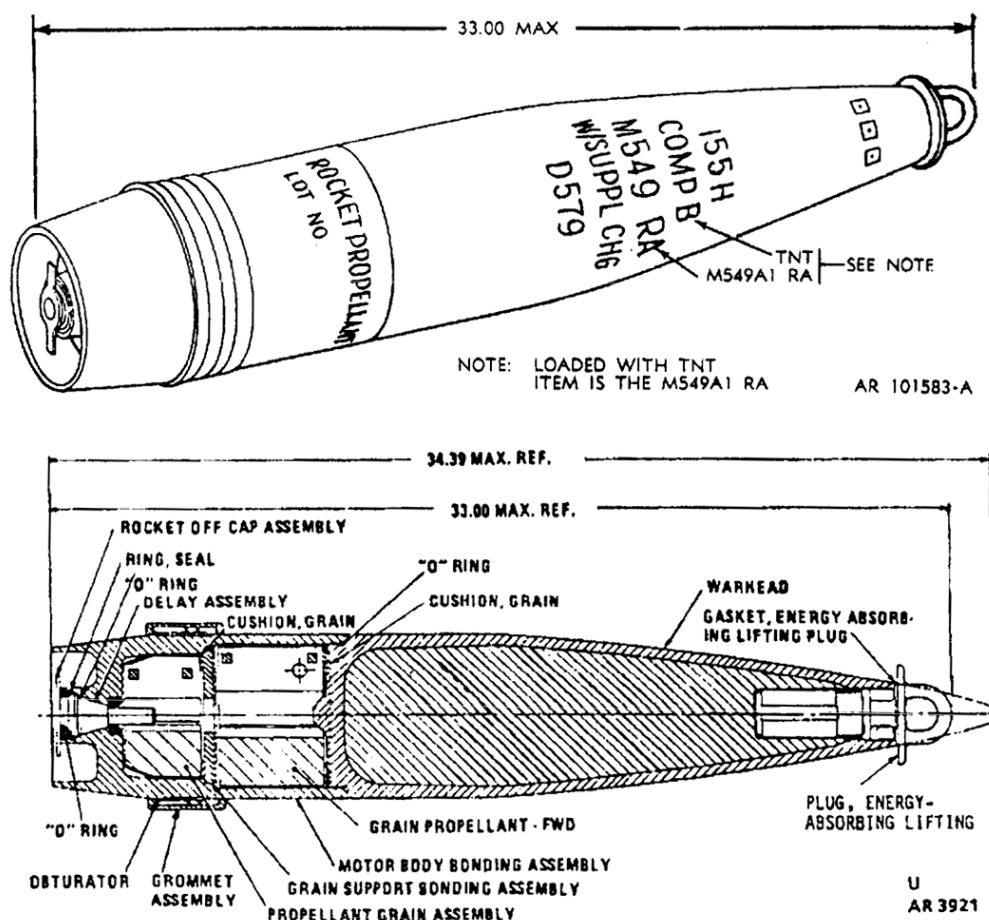


Fig. 21 – M549/M549A1 155 mm ammunition<sup>40</sup>.

<sup>39</sup> A fragment in Ilycha Ave (published on 24.11.2022) Typical Donetsk Telegram Channel. URL: <https://t.me/itsdonetsk/27396> (accessed on 24.11.2022)

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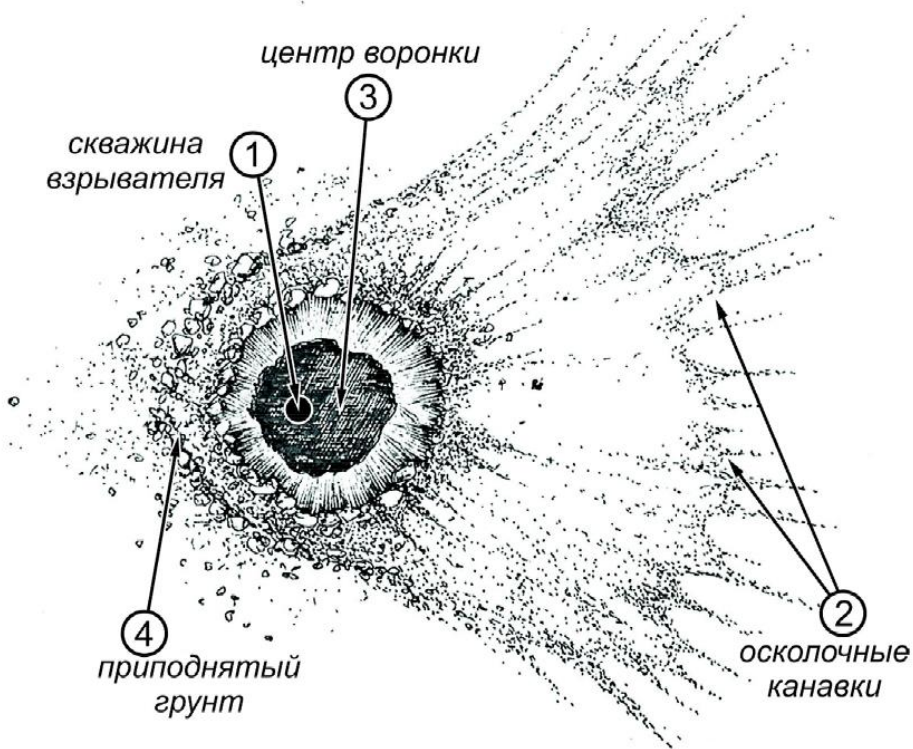


Fig. 22 – A crater from the projectile that hit the surface at a high striking angle<sup>41</sup>.



Fig. 23 - Determination of the shelling direction as exemplified by shell hit 3.

<sup>41</sup> ANALYSIS OF CRATERS FROM HIGH-EXPLOSIVE SHELL HITS. "Fair Defense" Non-Government Organization URL: <https://oosz.su/node/157> (published on 24.11.2022)





*Fig. 24 – Fire direction determination in the case of shell hit 7.*



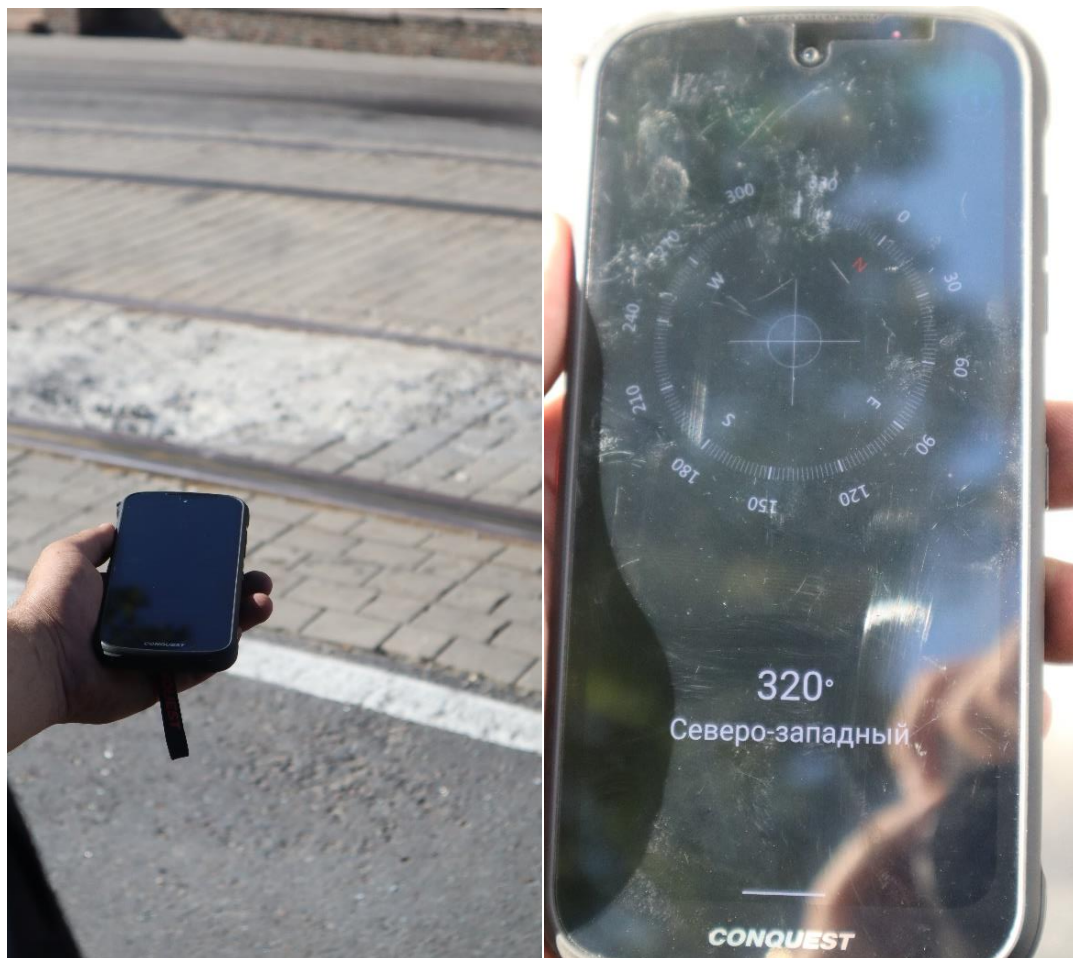


Fig. 25 – Fire direction determination in the case of shell hit 9.



Fig. 26 – Determining the angle of impact with a horizontal surface.

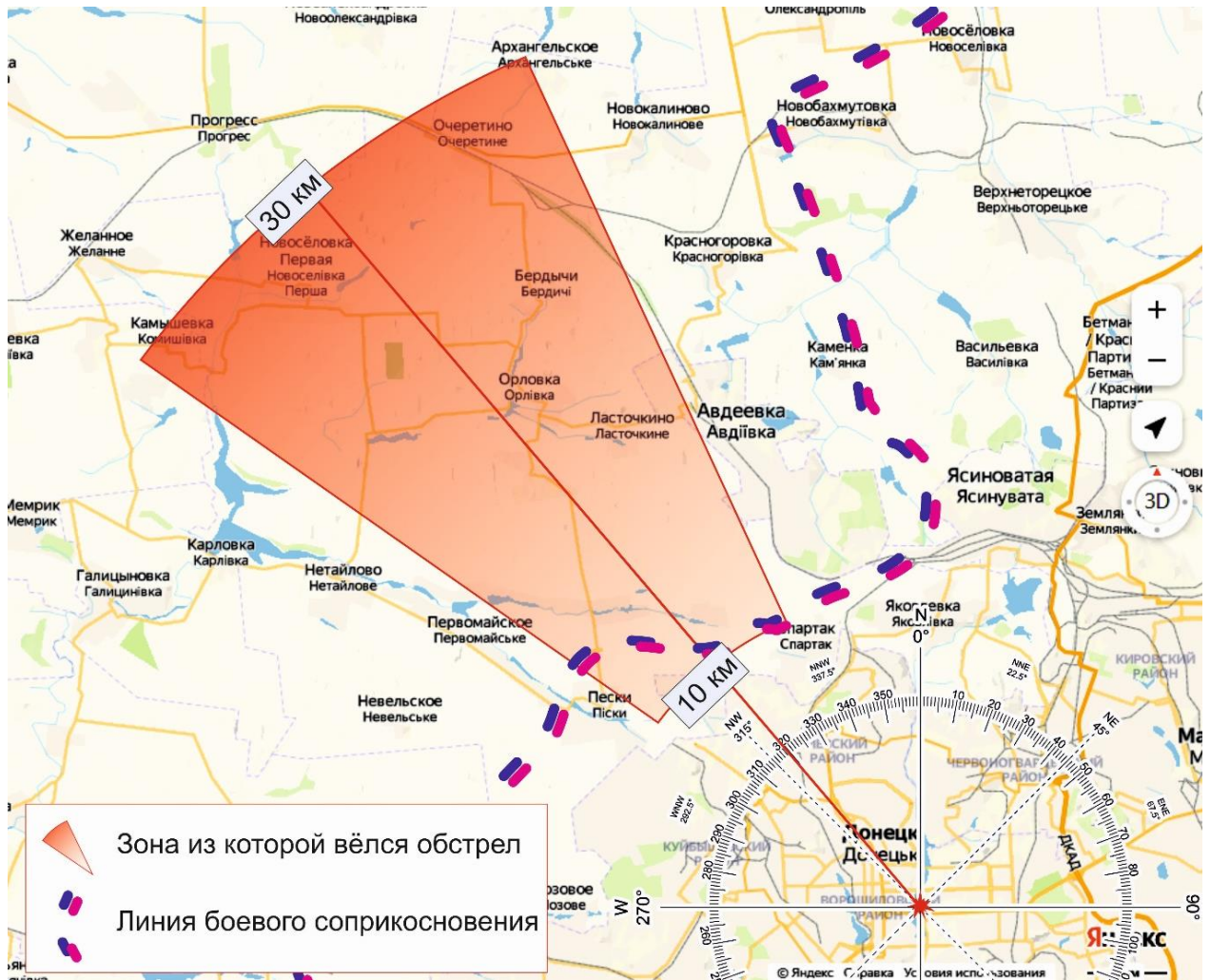


Fig. 27 – A scheme of the shelling sector.





Fig. 28 - Battery commander of the 55th SMBr with a code name San Sanych



Fig. 29 – ‘San Sanych’ shows the position of the Ukrainian artillery behind Avdeyevka.