

Shelling of the town of Kirovsk using Grad MLRS on February 7, 2015.

PUBLIC INVESTIGATION

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ABBREVIATIONS

UAF - Ukrainian Armed Forces

OSCE - Organization for Security and Cooperation in Europe

HES - high explosive fragmentation shell

LPR - Luhansk People's Republic

SMBr - Separate Mechanized Brigade

PREAMBLE

In February 2015, active hostilities took place in the Donbass. As of February 6, fighting continued in the Debaltseve direction with local shelling of settlements. Since the beginning of February, Kirovsk, the LPR, was subjected to regular artillery shelling; the contact line passed about four kilometers from this town. On February 6, Ukrainian Armed Formations (hereinafter UAF) took advantage of the ceasefire agreements to prepare a counter-attack along the entire front line¹.

And already on February 7, 2015, the UAF began active shelling of the settlements in the LPR, preparing an offensive in the direction of the 31st and 29th checkpoints, which were controlled by the armed formations of the LPR².

In the morning of February 7, Kirovsk came under artillery fire. Civilian facilities were damaged: a school, two kindergartens, a boiler station, a technical college, a consumer services center, and a museum. Significant damage was done to the housing stock.³ **At least eight people were injured as a result of the shelling⁴.**

This artillery shelling was commented in the press center of the operational command North of the Ukrainian Armed Forces as follows: “In Kirovsk, the Luhansk Region, the Ukrainian military hit the militant armament train with precision guided munitions”⁵.

¹ Summary reports from the Novorossiia militia as of February 7, 2015. [published on 11.02.2015] Pravda-TV website. URL: <https://www.pravda-tv.ru/2015/02/11/122253/svodki-ot-opolcheniya-novorossii-na-11-fevralya-2015> (accessed on 21.03.2022).

² Summary reports from the Novorossiia militia as of February 8, 2015. [published on 11.02.2015] Pravda-TV website. URL: <https://www.pravda-tv.ru/2015/02/11/122253/svodki-ot-opolcheniya-novorossii-na-11-fevralya-2015> (accessed on 21.03.2022).

³ Terrible consequences of shelling in Kirovsk [published on 08.02.2015] Criminal TV URL: <https://kriminal.tv/news/gutkie-posledstvija-artobstrela-v-kirovske.html> (accessed on 21.03.2022).

⁴ SHELLING OF KIROVSK. 07.02.2015 EIGHT CIVILIANS SUFFERED. [published on 09.02.2015] My Kirovsk. URL: <http://mykirovsk.com/video/obstrel-g-kirovska-07-02-2015-postradali.htm> (accessed on 21.03.2022).

⁵ Fighters of anti-terrorist operation “blew up” militants’ ammunition depot in Kirovsk [published on 07.02.2015] TSN URL: <https://tsn.ua/ato/biyci-ato-visadili-v-povitrya-sklad-boyepripasiv-boyovikiv-u-kirovsku-407794.html> (accessed on 21.03.2022).

INCIDENT LOCATION

This investigation will consider the above shelling of the town of Kirovsk, which occurred on February 7, 2015 at approximately 09:30 a.m. local time⁶, carried out with the use of Grad MLRS.

After analyzing the eyewitnesses' testimony, the photo and video materials, we were able to identify **eleven places** of artillery shell hits (see Fig. 1).

Shell hit 1 (see Fig. 2). The shell hit the eastern corner of the roof of the boiler station, located between school No. 2 (at 23, 60 years of October Quarter) and kindergarten No. 4 "Nadezhda" (at 24, 60 years of October Quarter). As a result of the projectile detonation, part of the roof and the wall near the eastern side of the building was destroyed. Also, equipment was partially destroyed and damaged inside the boiler station⁷.

Shell hit 2 (see Fig. 3, Fig. 4, Fig. 5). The shell hit the roof in the central part of the building of kindergarten No. 4 "Nadezhda" (at 24, 60 years of October Quarter). As a result of the projectile detonation, a through hole was formed in the roof, part of the ceilings of the kindergarten music hall collapsed, causing damage to the premises.

Shell hit 3 (see Fig. 6). The shell hit the northern part of the roof of residential building No. 4, 60 years of October Quarter, near the third entrance. As a result of the projectile detonation, the roof was damaged a few meters south-west of the northern corner of the building.

Shell hit 4 (see Fig. 7, Fig. 8). The shell hit the roof of *Kirovchanka* consumer services center (at 3A, 60 years of October Quarter). As a result of the projectile detonation, part of the roof was destroyed.

Shell hit 5 (see Fig. 9, Fig. 10). The shell hit the ground surface in the car parking area, about 50 meters north-east of the eastern corner of the building extension at 10, XXIII Party Congress Street. The projectile detonation resulted in a shell crater in the ground near the safety fencing.

⁶ Terrible consequences of shelling in Kirovsk [published on 08.02.2015] Criminal TV URL: <https://kriminal.tv/news/gutkie-posledstvija-artobstrela-v-kirovske.html> (accessed on 21.03.2022).

⁷ 07.02.2015 Shelling of Kirovsk from Grad MLRS. Eight Civilians Suffered. [published on 08.02.2015] YouTube Video hosting. URL: <https://youtu.be/4DgeCQSBQhc> (accessed on 21.03.2022).

Shell hit 6 (see Fig. 11, Fig. 12, Fig. 13, Fig. 14). The shell hit the roof of residential building about several meters to the south-east of the southern corner of residential building No. 12 in 50 Years of the USSR Quarter. As a result of the projectile detonation, part of the roof near the southern corner of the building was destroyed, a through hole was formed in the ceiling slab. Metal fragments of the missile part (hereinafter referred to as MP) of the MLRS rocket were found at the shell hit site.

Shell hit 7 (see Fig. 15, Fig. 16, Fig. 17, Fig. 18, Fig. 19). The shell hit the roof of the south-western building of the technical college (at 10, Borisova Str.). As a result of the projectile detonation, the roof near the south-eastern wall of the building was destroyed, a through hole was formed in the roof, part of classroom ceilings collapsed, damaging the premises.

Shell hit 8 (see Fig. 20). The shell hit the asphalt surface about 20 meters to the south of the western corner of residential building No. 1 in 50 Years of the USSR Quarter. The projectile detonation resulted in a shell crater in the asphalt pavement.

Shell hit 9 (see Fig. 21, Fig. 22). The shell hit the northern wall of the residential building at 3A, Poguleeva Str. As a result of the projectile detonation, a through hole was formed in the wall at the level of the attic floor, a few meters to the north-west of the second entrance. The MP remains of an MLRS projectile were found near the shell hit site.

Shell hit 10 (see Fig. 23, Fig. 24). The shell hit the ground surface between the second and third entrances, a few meters from the residential building at 3A, Poguleeva Str. The projectile detonation resulted in a shell crater in the ground with metal fragments in the crater center, identified as the remains of the MLRS projectile MP.

Shell hit 11 (see Fig. 25). The shell hit the ground surface northern from the back of the residential building at 3B, Poguleeva Str. As a result of the projectile detonation, a crater was created in the ground about 12 meters south-west of the northern corner of the building.

WEAPON TYPE

Evidence of using rocket artillery

The remnants of the rocket part of the 9K51 Grad MLRS projectile were found near the shell hit 10 (see Fig. 26).

There were holes of a specific shape on the remnants of the rocket part of the MLRS projectile found at the site of the shell hit No. 9. These holes located at the point of fin attachment to the body. Other remnants of the rocket part of the MLRS projectile with specific holes were also found in the area of the shelling (see 27). Such holes are characteristic precisely of 9K51 Grad MLRS shells. Let us consider the dummy stabilizer control units for MLRS shells used in the war in Donbass to confirm this thesis: 300-mm 9K58 Smerch (Windspout), 220-mm 9K57 Uragan (Hurricane) and 122-mm 9K51 Grad (Hail).

As can be seen in Fig. 28 and Fig. 29 three identical rectangular holes located at the same distance from each other are typical for attaching fins to the rocket part of the Smerch MLRS projectiles.

In turn, the stabilizer control unit of the Uragan MLRS projectile also has three identical rectangular holes. However, they are located at different distances on these shells. And one of the holes (located in the middle) is smaller than the other two (see Fig. 30 and Fig. 31).

Proceeding from the above illustrations of the dummy stabilizer control unit for the Smerch and Uragan MLRS projectiles, we can argue that the remnants of the projectile rocket part found around shell hit No. 9 were not fired from the Smerch or Uragan MLRSs.

Moreover, the same holes can be seen on the remains of the unexploded Grad projectile found near Krasnohorovka (see Fig. 32), and on the drawing of the 9K51 Grad MLRS projectile stabilizer unit (see Fig. 33).

9K51 Grad Multiple Launch Rocket System

The projectile for firing from 9K51 Grad MLRS consists of a fuze, head and rocket parts. As a result of contact with an obstacle, the detonator initiates an explosion of the shell head, which scatters into fragments (see Fig. 34).

The rocket often remains more or less intact, though deformed. It is usually found either inside the shell crater, or in the immediate vicinity of it. For clarity, we present the design and technical characteristics of the most common projectile used for firing from the 9K51 Grad MLRS (see Fig. 35).

PROBABLE SECTOR OF SHELLING

Direction

We went to the incident location and examined all the shell hit sites. In the case of shell hit 8, we were able to establish that the main scatter of fragments left a clearly defined mark on the buildings located near the shell hit:

- on the car wash building (at 8, Pravda Str.) (see Fig. 36) the trace from the main scatter of fragments is in contact with the ground surface at a distance of 1/5 of the total width of the wall from the northern corner of the building;

- on the residential building (at 1, 50 years of the USSR Quarter), the line of the fragmentation trail is in contact with the ground surface under the balconies (see. Fig. 37); At the same time, this point is located approximately in the middle between two structural ledges of the roof of the building.

On the satellite image, we can see the aforementioned structural ledges, and the car wash building. These findings allow us to mark the above points on the satellite image and draw a line between them (see Fig. 38), which is perpendicular to the direction of the projectile flight. Thus, it can be argued that the shelling was carried out from the north to south along the azimuth of 10 degrees.

Firing range

According to Rosoboronexport, the firing range of the 9K51 Grad MLRS using the most common types of M-21-OF Soviet-made unguided high-explosive fragmentation projectiles exceeds 20.1 km⁸. In addition, the minimum firing range is 5 km⁹.

⁸ M-21OF 122 mm unguided high-explosive fragmentation rocket projectile (ind. 9M22Y) Rosoboronexport URL: <https://roe.ru/catalog/sukhoputnye-vosyka/boepripasy/m-21of/> (accessed on 29.11.2021)

⁹ “Grad” MLRS: history and performance characteristics. Gunsfriend URL: <https://gunsfriend.ru/rszo-grad-bm-21-tehniceskie-harakteristiki-tth-opisanie-i-istoria-sozdania-reaktivnoj-sistemy-zalpovogo-ogna-dalnost-ustanvki/> (accessed on 29.11.2021).

Thus, taking into account the azimuth of 10 degrees and an error of plus or minus 15 degrees, and also regarding the firing range from 5 km to 21.1 km, we can map the shelling sector (see Fig. 39).

The sector represents a truncated triangle of Bobrovo, Muratovo, Donetsk and Golubovske. Moreover, artillery systems were located in the immediate vicinity of the line of demarcation.

The map of hostilities as of February 7, 2015, published on the Voice of Sevastopol website, makes it possible to draw a line of demarcation on the diagram (see Fig. 40). This demarcation line divides the sector in the lower part. It is important to understand that the deployment of artillery systems such as the 9K51 Grad MLRS at a distance closer than 3-5 km from the demarcation line is not advisable, as this carries the threat of their destruction by the enemy.

Thus, the most likely shelling sector looks like a truncated triangle, limited in the upper (northern) part by settlements: Bobrovo – Nizhneye, and in the lower (southern) part by the Bakhmut highway (the highway connecting Luhansk and Lysichansk).

MILITARY PRESENCE

Based on open-source data, the 24th Separate Mechanized Brigade of the Ukrainian Ground Forces (hereinafter referred to as the 24th SMBr) was deployed in the above sector in 2014 – 2015¹⁰.

The Ukrainian version of Wikipedia states that since 2014 the 24th SMBr has had a rocket artillery battalion. Considering the facts described above, it can be assumed that this division was armed with the 9K51 Grad MLRS.¹¹

The presence of the Grad MLRS in service with the 24th SMBr is confirmed by the video footage titled “24th Iron Brigade”, published on November 5, 2014¹². The video shows the Grad MLRS, moreover, it even shows the moments of launching MLRS rockets, which, referring to the title of the video, belong to the 24th SMBr (see

Fig. 46). In addition, road signs that indicate the cities of Donbass can be seen in the photographs from the video; the servicemen of the 24th SMBr posed for pictures in front of these signs in mid-2014 (see Fig. 47).

There are names of particular persons in the commentaries to the video who may know more information about this brigade: Yuri Gura, Sasha Rapatskoy, Rustam Ahmedov, Lilia Klykova, Iva Sava, Sergei Stanislavsky (see Fig. 45).

It is worth noting the negligence of Ukrainian military personnel in matters of choosing a target for shelling. In a video on the “Fifth” Ukrainian TV channel¹³, spotter of the self-propelled artillery battalion of the 24th SMBr Andrey Nagorny talks about the fire adjustment methods: “We had everything in plain sight: I climbed a tree, then I was lifted in a bucket. We had a tractor, I was lifted over a tree in a tractor bucket, and peered out there).

¹⁰ 24th Mechanized Brigade (Ukraine). Wikipedia Free Encyclopedia. URL: [https://en.wikipedia.org/wiki/24th_Mechanized_Brigade_\(Ukraine\)](https://en.wikipedia.org/wiki/24th_Mechanized_Brigade_(Ukraine)) (accessed on 21.03.2022).

¹¹ 24th Mechanized Brigade (Ukraine). Wikipedia Free Encyclopedia. URL: [https://en.wikipedia.org/wiki/24th_Mechanized_Brigade_\(Ukraine\)](https://en.wikipedia.org/wiki/24th_Mechanized_Brigade_(Ukraine)) (accessed on 21.03.2022).

¹² 24 Iron Brigade [published on 05.11.2014] YouTube Video hosting. URL: <https://youtu.be/CzENzFhQBIs> (accessed on 21.03.2022).

¹³ “Gods of War”: how artillerymen liberated Ukrainian cities in 2014-2015 | Unimagined stories. YouTube Video hosting. URL: <https://youtu.be/RjVUq71ChII> (accessed on 21.03.2022).

The presence of Grad MLRS in the 24th SMBr is also confirmed by the video entitled “Battery of BM-21 122-mm 9K51 Grad MLRS combat vehicles of the Ukrainian 24th SMBr inflicts artillery strike”, which was published on January 18, 2017¹⁴. It shows servicemen firing from the Grad MLRS (see Fig. 49).

Thus, the video of the “Fifth” Ukrainian TV channel “Gods of War”: how artillerymen liberated Ukrainian cities in 2014-2015 | Unimagined Stories” tells the story of how the 24th SMBr conducted warfare in the Luhansk direction¹⁵. At first, the 24th SMBr was engaged in combat operations in Slavyansk, after the summer campaign near Slavyansk, the 24th SMBr took up positions on the Bakhmut highway near the 31st and 29th checkpoints (see Fig. 41)¹⁶. The Bakhmutka is a highway connecting Luhansk and Lysichansk¹⁷. There, the 24th SMBr was in action in January and February 2015, in the immediate vicinity of the sector of our interest¹⁸. In addition, one of the bases of the 24th SMBr was located in the village of Krymske¹⁹.

This information is also confirmed in the article “24 SMBr during battles in Luhansk and Donetsk regions”, published on January 21, 2020 on the Ukrainian website “TSN”²⁰.

In addition, the presence of the 24th SMBr in the sector from which the shelling of Kirovsk was conducted on February 7, 2015, is also confirmed by the Ukrainian

¹⁴ Battery of BM-21 122-mm 9K51 Grad MLRS combat vehicles of the Ukrainian 24th SMBr inflicts artillery strike [published on 18.01.2017] YouTube Video hosting. URL: <https://youtu.be/hN9m6GZWHlo> (accessed on 21.03.2022).

¹⁵ “Gods of War”: how artillerymen liberated Ukrainian cities in 2014-2015 | Unimagined stories. YouTube Video hosting. URL: <https://youtu.be/RjVUq71ChII> (accessed on 21.03.2022).

¹⁶ Reports from the forefront. The 24th Separate Brigade. Part 2 [published on 29.12.2014] YouTube Video hosting. URL: <https://youtu.be/mYEmo5LxwmE> (accessed on 21.03.2022).

Reports from the forefront. The 24th Separate Brigade. Part 1 [published on 28.12.2014] Informator.media. URL: <https://informator.media/archives/57661> (accessed on 21.03.2022).

¹⁷ About the battles on the Bakhmutka [published on 19.01.2015] LiveJournal Online Journal Service. URL: <https://alexzgr1970.livejournal.com/2195534.html> (accessed on 21.03.2022).

¹⁸ 24Th SMBr during battles in the Luhansk and Donetsk Regions. TSN website. URL: https://tsn.ua/blogi/themes/o_voine/24-SMBr-pid-chas-boyiv-v-luganskiy-ta-doneckiy-oblastyah-1478340.html (accessed on 21.03.2022).

¹⁹ Battles for the Bakhmutka [Ukrainian version] “Wikipedia” Internet encyclopedia. URL: https://uk.m.wikipedia.org/wiki/Бої_за_Бахмутку ((accessed on 21.03.2022).

²⁰ 24Th SMBr during battles in the Luhansk and Donetsk Regions. TSN website. URL: https://tsn.ua/blogi/themes/o_voine/24-SMBr-pid-chas-boyiv-v-luganskiy-ta-doneckiy-oblastyah-1478340.html (accessed on 21.03.2022).

Internet resource “*Book of memory of those perished for Ukraine*”²¹. The resource contains information that in the period from January 20 to March 2, 2015, **six servicemen** of the 24th SMBr died in the sector of interest to us (see Fig. 43, Fig. 44).

Thus, all the above facts confirm that on February 7, 2015, the units of the 24th SMBr of the Ukrainian Ground Forces were present in the sector from which the shelling of Kirovsk was carried out. Moreover, the 24th SMBr was armed with 9K51 Grad MLRS.

From September 2010 to March 2015, the 24th SMBr was under the command of Colonel Alexander Pavlyuk (see Fig. 50)²². It is noteworthy that he was later awarded the military rank of Major General. He was also promoted to commander of the troops of the Operational Command West²³.

²¹ 24th Separate Mechanized Brigade. Internet resource “Book of memory of those perished for Ukraine”. URL: <https://memorybook.org.ua/units/24br.htm> (accessed on 21.03.2022).

²² 24th Mechanized Brigade (Ukraine). Wikipedia Internet Encyclopedia. URL: [https://en.wikipedia.org/wiki/24th_Mechanized_Brigade_\(Ukraine\)](https://en.wikipedia.org/wiki/24th_Mechanized_Brigade_(Ukraine)) (accessed on 21.03.2022).

²³ Operational Command West [Ukrainian version] “Wikipedia” Internet Encyclopedia. URL: https://uk.m.wikipedia.org/wiki/Оперативне_командування_«Захід» (accessed on 21.03.2022).

CONCLUSIONS

It follows from the above that on February 7, 2015 at 09:30 am local time, the town of Kirovsk was subjected to shelling with the use of 122mm caliber rockets fired from 9K51 Grad MLRS. The projectiles flew from north to south. A densely populated residential area came under fire, and civilian facilities were damaged: a school, two kindergartens, a boiler station, a technical college, a consumer services center, and a museum. Significant damage was done to the housing stock.

The 24th SMBr of the UAF was located in the sector from which the shelling was carried out. This Ukrainian armed group was armed with 9K51 Grad MLRS. Colonel Alexander Pavlyuk undertook the general command of the 24th SMBr. Precisely he is responsible for the actions of his subordinates.

It was also determined that Andrey Nagorny, a spotter of the self-propelled artillery battalion of the 24th SMBr, may have information about the episode in question.

LEGAL QUALIFICATIONS

Indiscriminate shelling of a densely populated residential area, 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 Common **Art. 3 of the Geneva Conventions** of 12 August 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, the following acts are and shall remain prohibited at any time and in any place whatsoever with respect to the above-mentioned persons: violence to life and person, in particular murder of all kinds, mutilation, cruel treatment and torture.

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49. A dummy stabilizer control unit for the Smerch MLRS rocket projectile. Missilery. URL: https://missilery.info/files/m/s.gurov/Russia/Smerch/rockets/Tail_assembly/16._blok_stabilizatora_krs_dlya_rszo_smerchc_s.v.gurov_.jpg
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ANNEXES

Annex 1

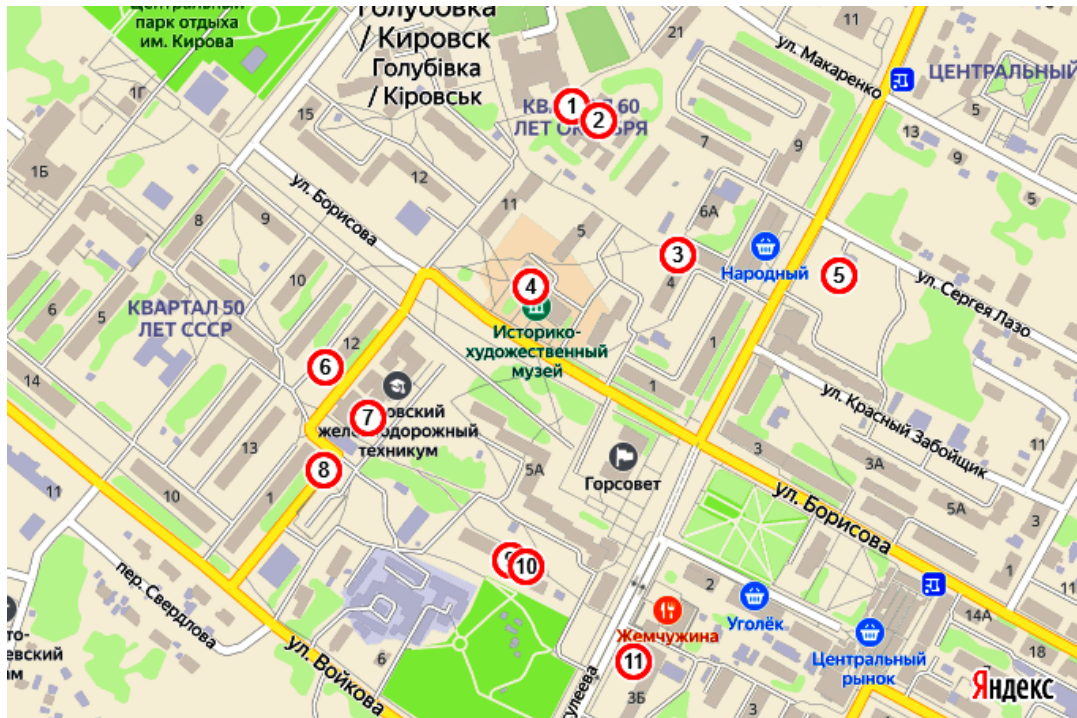


Fig. 1 - The scheme of shelling of the town of Kirovsk that occurred on February 07, 2015 at about 09:30 a.m., local time.



Fig. 2 – Destroyed eastern corner of the boiler station roof as a result of shell hit 1²⁴.

²⁴ 7.02.2015 Once again, Ukrainian death squads fired on the city of Kirovsk. Luhansk Region [published on 08.02.2014] VKontakte Social Network. URL: https://vk.com/wall-77617369_2672 (accessed on 21.03.2022).



Fig. 3 – The through hole in the roof of the kindergarten as a result of shell hit 2²⁵.



Fig. 4 -The ceiling of the music hall of the kindergarten collapsed as a result of shell hit 2²⁶.

²⁵ Kindergarten No. 4 after the shelling [published on 08.02.2015] VKontakte Social Network. URL: https://vk.com/wall-37213546_70250 (accessed on 21.03.2022).

²⁶ The kindergarten near school No. 2. [published on 08.02.2015] VKontakte Social Network. URL: https://vk.com/wall-77617369_2674 (accessed on 21.03.2022).



Fig. 5 – The trail of a shell hit 2 on the kindergarten roof on the satellite image dated 10.04.2015.



Fig. 6 – The roof damaged by shell hit 3²⁷.

²⁷ Sender: Andrey Lukashov, 4, 60 years of October Quarter [published on 08.02.2015] VKontakte Social Network. URL: https://vk.com/wall-37213546_70317 (accessed on 21.03.2022).



Fig. 7 – The roof of the Kirovchanka consumer services center damaged by shell hit 4²⁸.

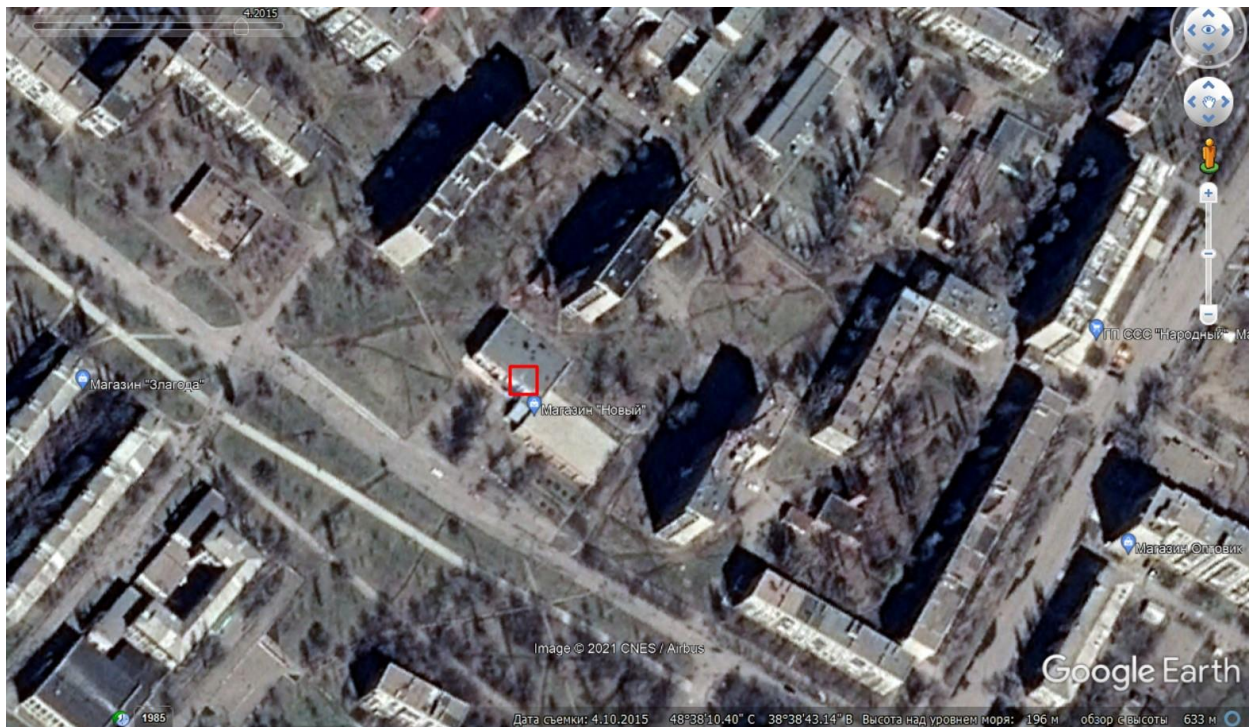


Fig. 8 – The trail of a shell hit 4 in the roof of Kirovchanka consumer services center on the satellite image dated 10.04.2015.

²⁸ 7.02.2015 Once again, Ukrainian death squads fired on the city of Kirovsk. Luhansk Region [published on 08.02.2014] VKontakte Social Network. URL: https://vk.com/wall-77617369_2672 (accessed on 21.03.2022).



Fig. 9 – The shell crater found at the site of shell hit 5²⁹.



Fig. 10 – The trail of shell hit 5 on the satellite image dated 10.04.2015.

²⁹ 7.02.2015 Once again, Ukrainian death squads fired on the city of Kirovsk. Luhansk Region (Continued) [published on 08.02.2015] VKontakte Social Network. URL: https://vk.com/wall-77617369_2673 (accessed on 21.03.2022).



Fig. 11 – View of the roof destroyed as a result of shell hit 6³⁰.



Fig. 12 – The roof damaged by shell hit 6³¹.

³⁰ 7.02.2015 Once again, Ukrainian death squads fired on the city of Kirovsk. Luhansk Region (Continued) [published on 08.02.2015] VKontakte Social Network. URL: https://vk.com/wall-77617369_2673 (accessed on 21.03.2022).

³¹ 07.02.2015 Shelling of Kirovsk from Grad MLRS. Eight Civilians Suffered. [published on 08.02.2015] YouTube Video hosting. URL: <https://youtu.be/4DgeCQSBQhc> (accessed on 21.03.2022).



Fig. 13 – The shell crater found at the site of shell hit 6³².

³² Effects of shelling of town of Kirovsk 7, Ghost Brigade (Taliban Division) [published on 07.02.2015] Odnoklassniki Social Network. URL: <https://ok.ru/video/20227230222> (accessed on 21.03.2022).



Fig. 14 - Metal fragments of an MLRS projectile MP, found at the site of shell hit 6³³.

³³ Effects of shelling of town of Kirovsk 7, Ghost Brigade (Taliban Division) [published on 07.02.2015] Odnoklassniki Social Network. URL: <https://ok.ru/video/20227230222> (accessed on 21.03.2022).



Fig. 15 – The roof of the technical college damaged by shell hit 7³⁴.



Fig. 16 – The through hole in the roof of the technical college damaged as a result of shell hit 7³⁵.

³⁴ Technical College. Roof [published on 08.02.2015] VKontakte Social Network. URL: https://vk.com/wall-37213546_70691 (accessed on 21.03.2022).

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Fig. 17 – Ceiling of the training class in the technical college, which collapsed as a result of shell hit 7³⁶.



Fig. 18 - Metal fragments of a MLRS projectile MP found at the site of shell hit 7³⁷.

³⁶ Sender: Nikolay Kovnirov Technical college, 3rd floor, the wing next to the car wash [published on 08.02.2015] VKontakte Social Network. URL: https://vk.com/wall-37213546_70324 (accessed on 21.03.2022).

³⁷ Effects of shelling of town of Kirovsk 2, Ghost Brigade (Taliban Division) [published on 07.02.2015] Odnoklassniki Social Network. URL: <https://ok.ru/video/20189874702> (accessed on 21.03.2022).



Fig. 19 – The trail of shell hit 7 in the roof the technical college on the satellite image dated 10.04.2015.



Fig. 20 – A crater from shell hit 8³⁸.

³⁸ 7.02.2015 Once again, Ukrainian death squads fired on the city of Kirovsk. Luhansk Region [published on 08.02.2014] VKontakte Social Network. URL: https://vk.com/wall-77617369_2672 (accessed on 21.03.2022).



Fig. 21 – The through hole in the wall of the residential building as a result of shell hit 9³⁹.



Fig. 22 - MP remains of a MLRS projectile in a crater found at the site of shell hit 9⁴⁰.

³⁹ 3A Pogulyaeva Str. [published on 09.02.2015] VKontakte Social Network. URL: https://vk.com/wall-37213546?day=09022015&w=wall-37213546_71020 (accessed on 21.03.2022).

⁴⁰ 3A Pogulyaeva Str. [published on 09.02.2015] VKontakte Social Network. URL: https://vk.com/wall-37213546?day=09022015&w=wall-37213546_71020 (accessed on 21.03.2022).



Fig. 23 – Shell hit 10⁴¹.



Fig. 24 – A crater with the remains of a MLRS projectile MP created as a result of shell hit 10⁴².

⁴¹ 7.02.2015 Once again, Ukrainian death squads fired on the town of Kirovsk. Luhansk Region [published on 08.02.2014] VKontakte Social Network. URL: https://vk.com/wall-77617369_2672 (accessed on 21.03.2022).

⁴² 07.02.2015 Shelling of Kirovsk from Grad MLRS. Eight Civilians Suffered. [published on 08.02.2015] YouTube Video hosting. URL: <https://youtu.be/4DgeCQSBQhc> (accessed on 21.03.2022).



Fig. 25 – A crater from shell hit 11⁴³.



Fig. 26 - Remains of the rocket part of the 9K51 Grad MLRS projectile found at the site of shell hit 9⁴⁴.

⁴³ 7.02.2015 Once again, Ukrainian death squads fired on the town of Kirovsk. Luhansk Region (Continued) [published on 08.02.2015] VKontakte Social Network. URL: https://vk.com/wall-77617369_2673 (accessed on 21.03.2022).

⁴⁴ 7.02.2015 Once again, Ukrainian death squads fired on the city of Kirovsk. Luhansk Region (Continued) [published on 08.02.2015] VKontakte Social Network. URL: https://vk.com/wall-77617369_2673 (accessed on 21.03.2022).



Fig. 27 - Remains of the rocket part of the 9K51 Grad MLRS projectile found at the site of shelling on 07.02.2015 in Kirovsk. The hole of the characteristic shape can be seen in the left figure; the hole of the characteristic shape, the rocket fin assembly and the embossed number “1355” are quite visible on the right.⁴⁵

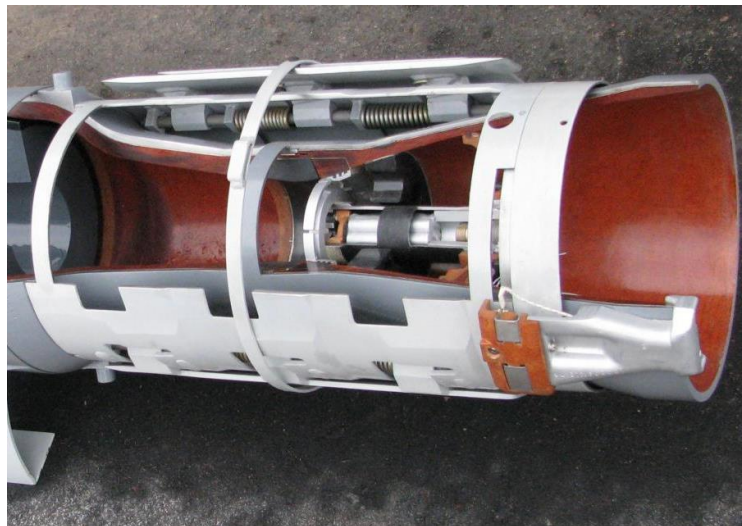


Fig. 28 - View of the tail assembly of the cutaway model of the Smerch MLRS projectile⁴⁶.

⁴⁵ Effects of shelling of town of Kirovsk 9, Ghost Brigade (Taliban Division) [published on 07.02.2015] Odnoklassniki Social Network. URL: <https://ok.ru/video/20195641870> (accessed on 21.03.2022).

⁴⁶ View of the tail assembly of the cutaway model of the Smerch MLRS projectile (Russia). Missilery. URL: https://missilery.info/files/m/s.gurov/Russia/Smerch/rockets/Tail_assembly/img_7745redcopy.jpg

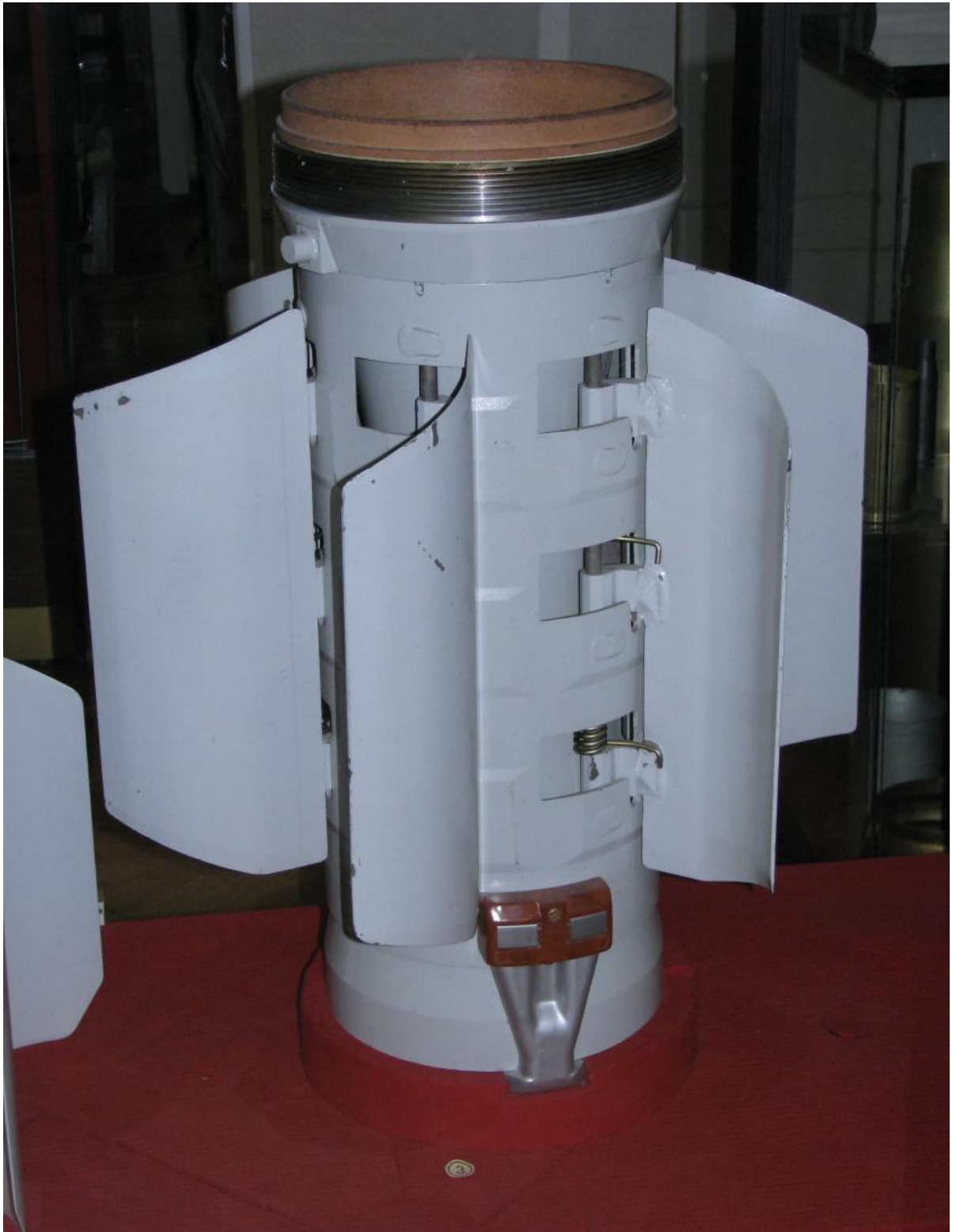


Fig. 29 - A dummy stabilizer control unit for the Smerch MLRS projectile⁴⁷.

⁴⁷ A dummy stabilizer control unit for the Smerch MLRS rocket projectile. Missilery. URL: https://missilery.info/files/m/s.gurov/Russia/Smerch/rockets/Tail_assembly/16._blok_stabilizatora_krs_dlya_rszo_smerchc_s.v.gurov_.jpg



Fig. 30 – A dummy stabilizer control unit for the Uragan MLRS projectile⁴⁸.

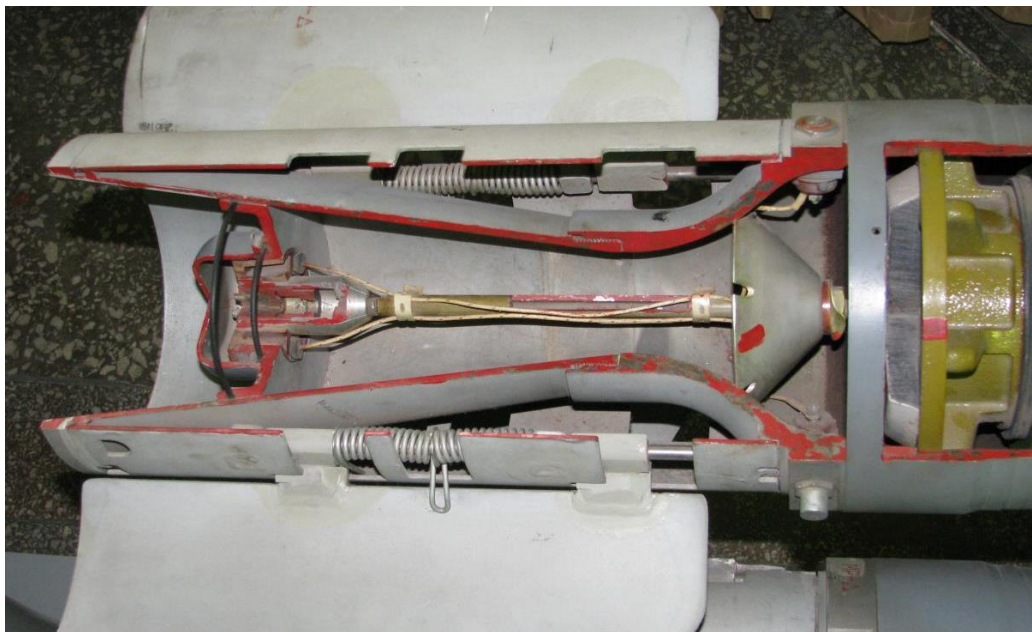


Fig. 31 – View of the tail assembly of the cutaway model of the Uragan MLRS projectile⁴⁹.

⁴⁸ A dummy stabilizer control unit for the unguided Uragan MLRS projectile. Missilery URL: https://missilery.info/files/m/s.gurov/Russia/Uragan/rockets/10._maket_bloka_stabilizatora_nurs_rszo_uragan_c_s.v.gurov_.jpg

⁴⁹ View of the tail assembly of the cutaway model of the Uragan MLRS projectile (with a nozzle cluster view). Missilery URL: https://missilery.info/files/m/s.gurov/Russia/Uragan/rockets/tail_assembly_uragan.jpg



Fig. 32 – The remains of the 9K51 Grad MLRS projectile found near Krasnohorovka town on 28.08.2016.⁵⁰

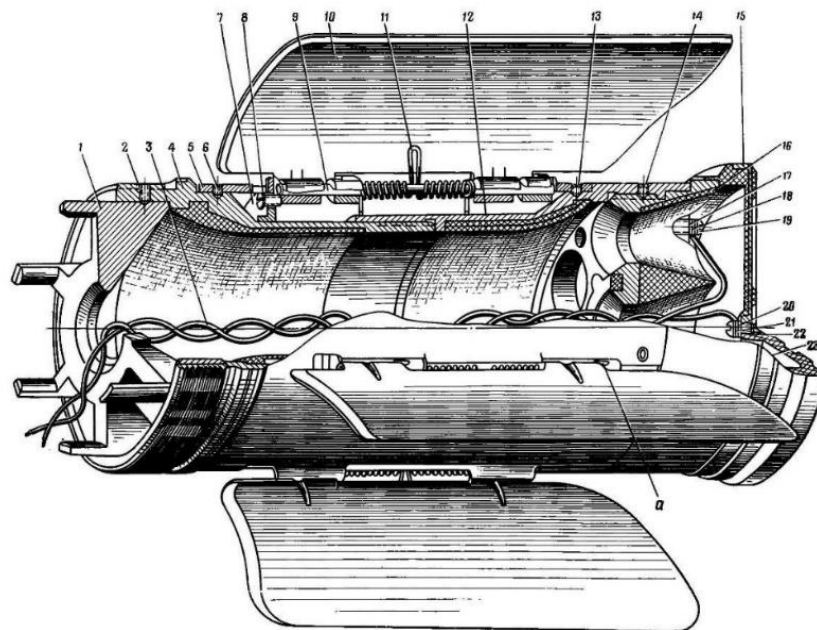


Рис. 101. Блок стабилизатора:
 1 – хвостовая диафрагма; 2 – установочный винт; 3 – провод; 4 – передний конус; 5 – обтекатель; 6 – установочный винт; 7 – кольцо; 8 – винт; 9 – ось; 10 – лопасть стабилизатора; 11 – пружина; 12 – задний конус; 13 – установочный винт; 14 – установочный винт; 15 – контактный сектор; 16 – крышка сошка; 17 – шайба; 18 – пружинная шайба; 19 – контактный винт; 20 – шайба; 21 – пружинная шайба; 22 – контактный винт; 23 – контактная крышка; а – паз

Fig. 33 – The drawing of the 9K51 Grad MLRS projectile stabilizer unit from the book *BM-21 GRAD*⁵¹.

⁵⁰ Militants fired Krasnohorivka with Grad MLRSs in the Donetsk Region – Joint Centre for Control and Coordination. Public TV. URL: <https://hromadske.ua/posts/boiovyky-obstrilialy-z-hradiv-krasnohorivku-na-donechchyni-stskk> (published on 28.08.2016).

⁵¹ Gun in Russia – BM-21 GRAD. Russian motor books 2002. 37 p.

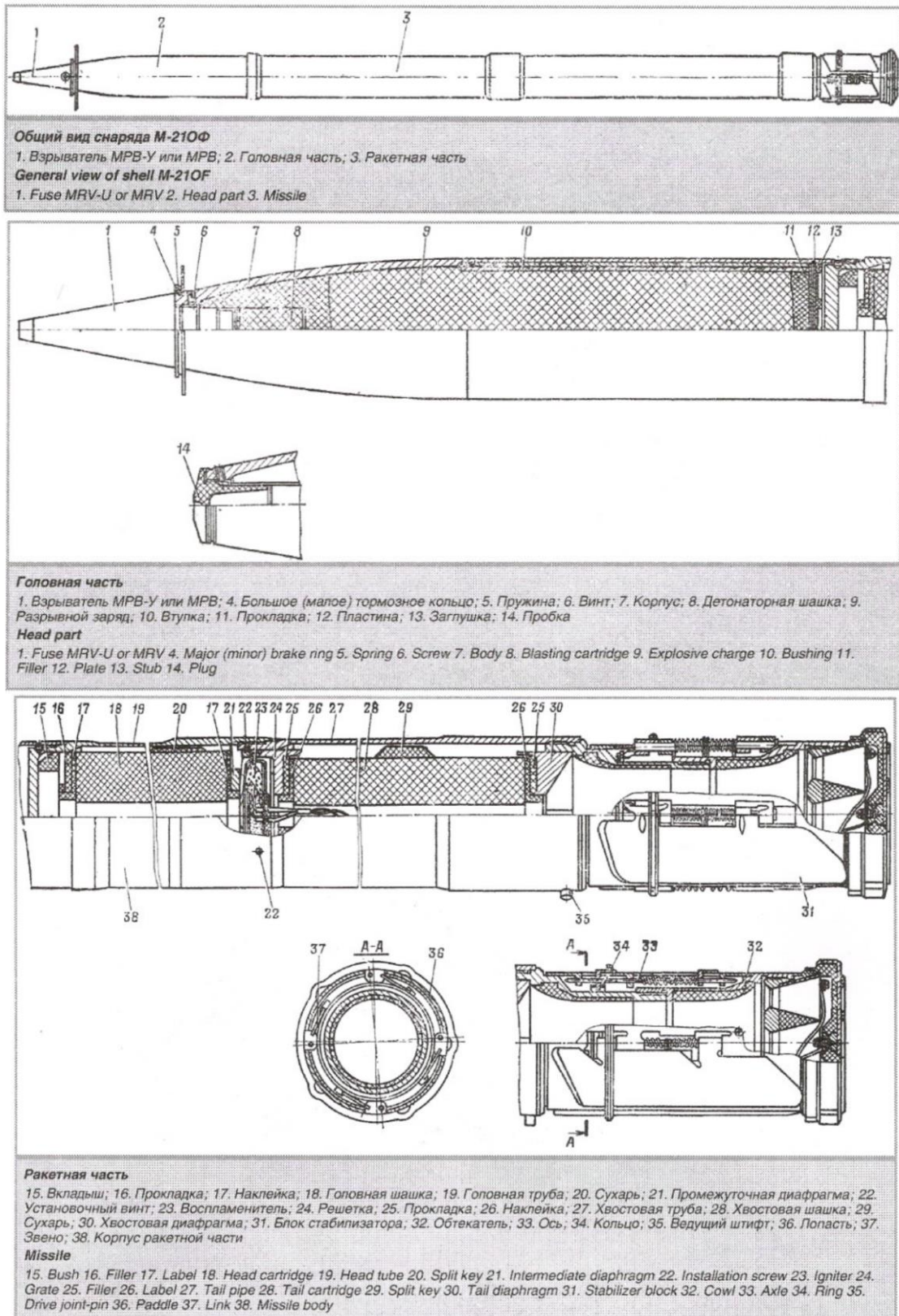


Fig. 34 - M-21OF projectile design (a high explosive fragmentation projectile, used for firing from 9K51 Grad MLRS)⁵².

⁵² Gun in Russia – BM-21 GRAD. Russian motor books 2002. 37 p.

Калибр, мм	122
Длина снаряда со взрывателем, мм	2870
Тип головной части	осколочно-фугасная
Вес, кг:	
- окончательно снаряженного снаряда	66
- снаряда в укупорке	100
- головной части	18.4
- взрывчатого вещества в головной части	6.4
- порохового заряда	20.45
Наибольшая скорость снаряда при нормальных условиях, м/с	690
Дальность стрельбы, м :	
- максимальная	20400
- с большим тормозным кольцом	до 12000
- с малым тормозным кольцом	от 12000 до 16000
Температурный диапазон применения снаряда, °С	-40 – +50
Габаритные размеры укупорки, мм	2810x290x254

Fig. 35 - Technical characteristics of the unguided M-21OF rocket projectile⁵³.

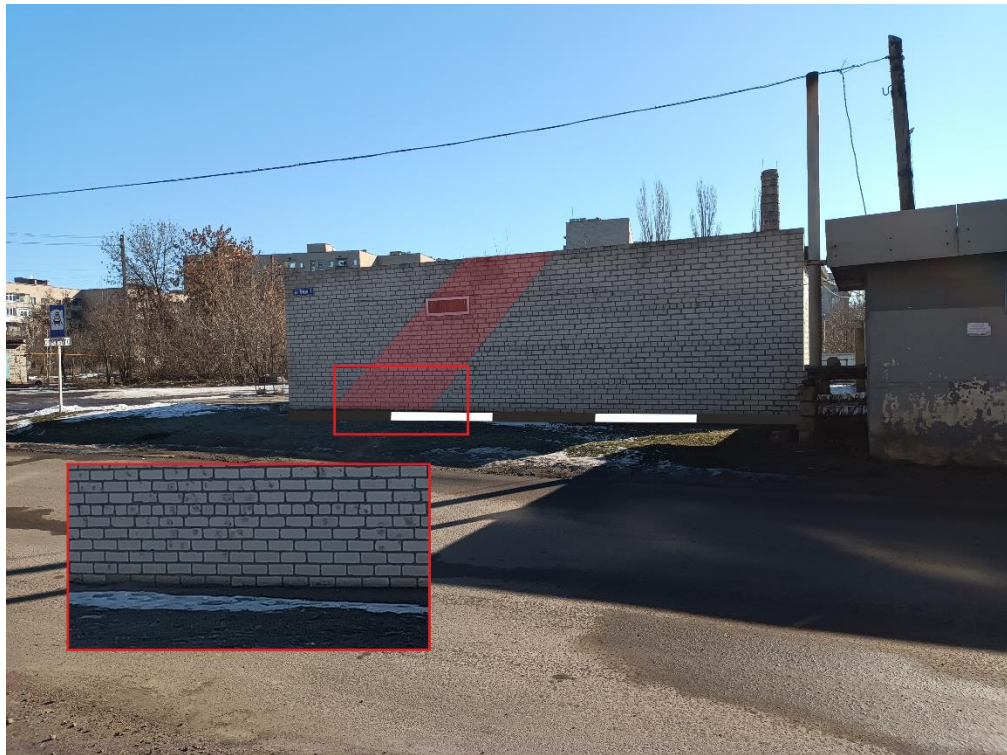


Fig. 36 – The line of the main scatter of fragments on the car wash building as a result of shell hit 8.

⁵³ Mechanized combat vehicle BM-21. Technical description. Book 1. Moscow: Voenizdat, 1971. Pp. 7, 8, 91; Mechanized combat vehicle BM-21. Technical description and operating instructions manual. 3rd edn., stereotyped. Moscow: Armament. Politics. Conversion, 2002. Pp. 5-6.



Fig. 37 - The line of the main scatter of fragments on the residential building as a result of shell hit 8.

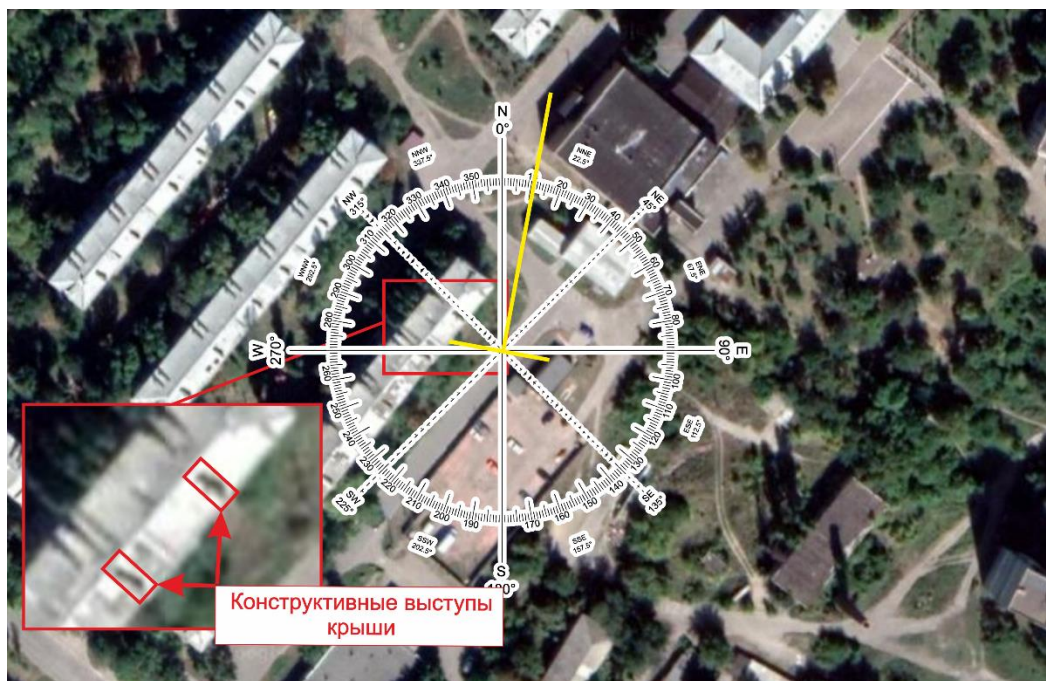


Fig. 38 – Determination of the direction from which the shelling was carried out on February 07, 2015.

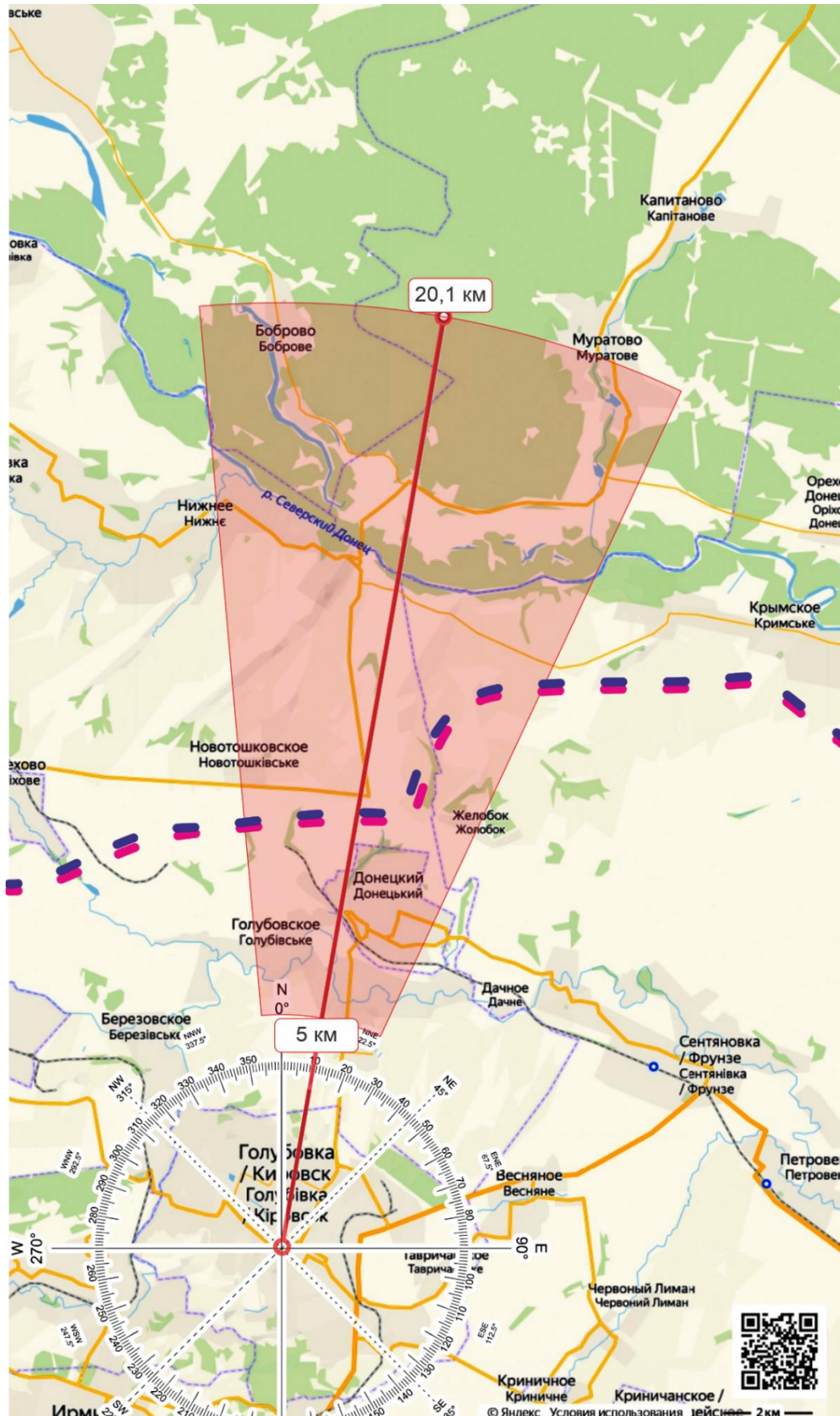


Fig. 39 – The sector from which the shelling of Kirovsk was carried out on February 7, 2015.

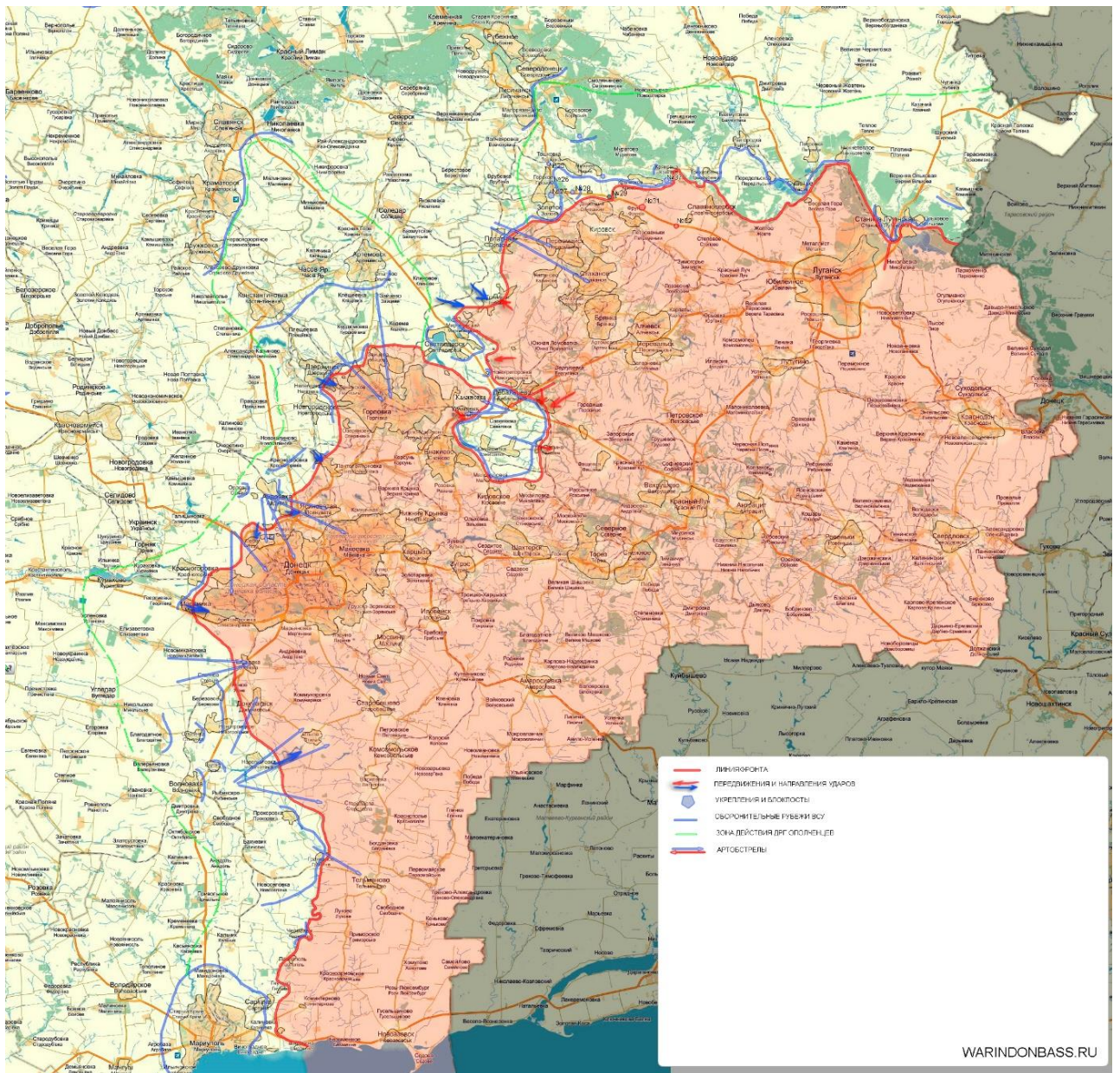


Fig. 40 – Map of hostilities as of February 07, 2015⁵⁴.

⁵⁴ Map of hostilities in Novorossiia as of February 07, 2015 [published on 08.02.2015] Voice of Sevastopol website. URL: <http://voicesevas.ru/maps/9631-karta-boevyh-deystviy-v-novorossii-na-7-fevralya-ot-warindonbass.html> (accessed on 21.03.2022).

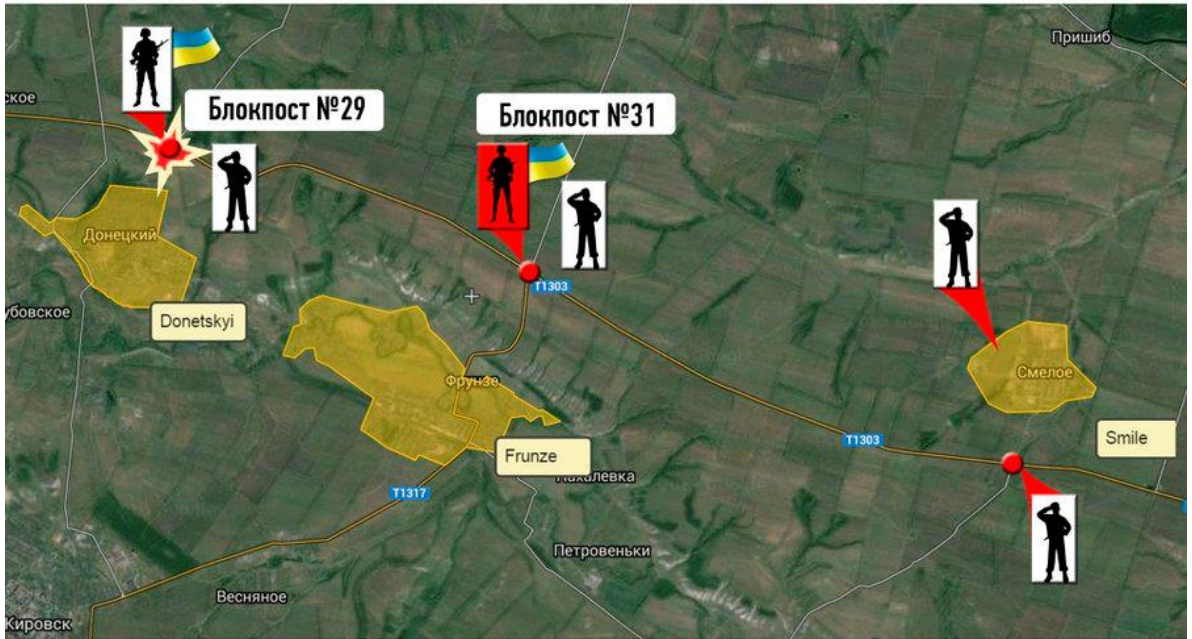


Fig. 41 – Checkpoints No. 29 and 31⁵⁵.

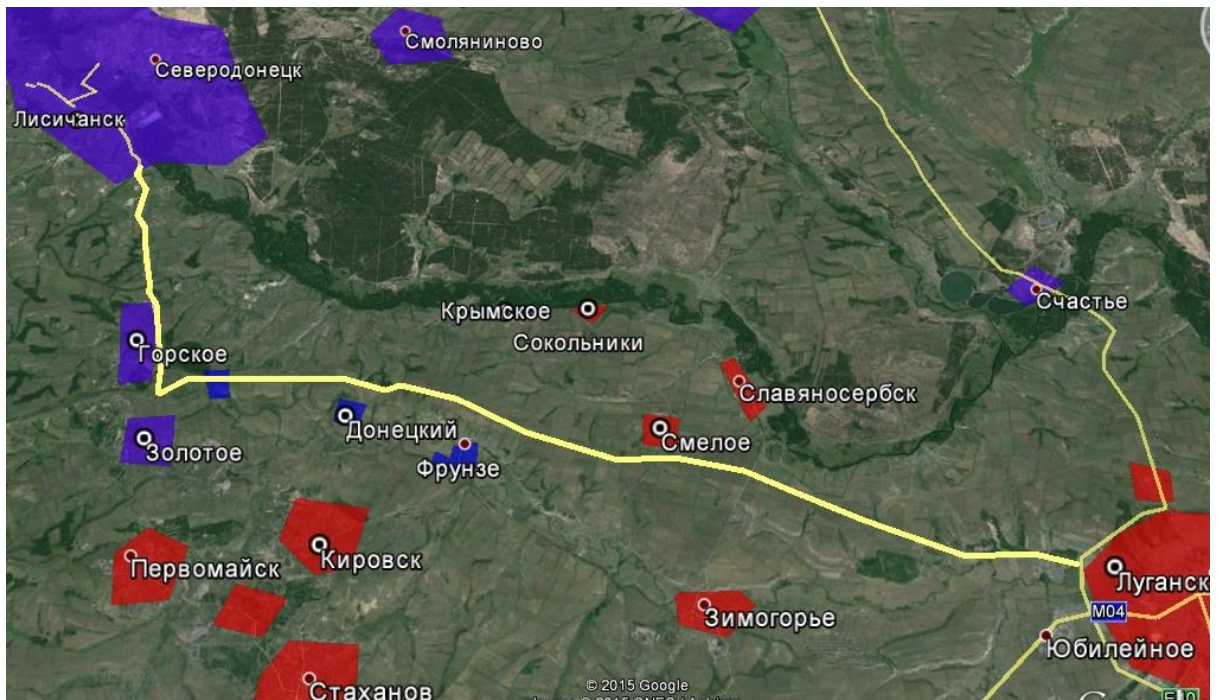


Fig. 42 – Bakhmutka - the highway connecting Luhansk and Lysichansk, marked with a thick yellow line⁵⁶.

⁵⁵ One Ukrainian fighter was killed and six were wounded at 31st checkpoint [published on 21.01.2015] Twitter Social Network. URL: <https://twitter.com/hromadskeua/status/557881843761315840> (accessed on 21.03.2022).

⁵⁶ About the battles on the Bakhmutka [published on 19.01.2015] LiveJournal Online Journal Service. URL: <https://alexzgr1970.livejournal.com/2195534.html> (accessed on 21.03.2022).

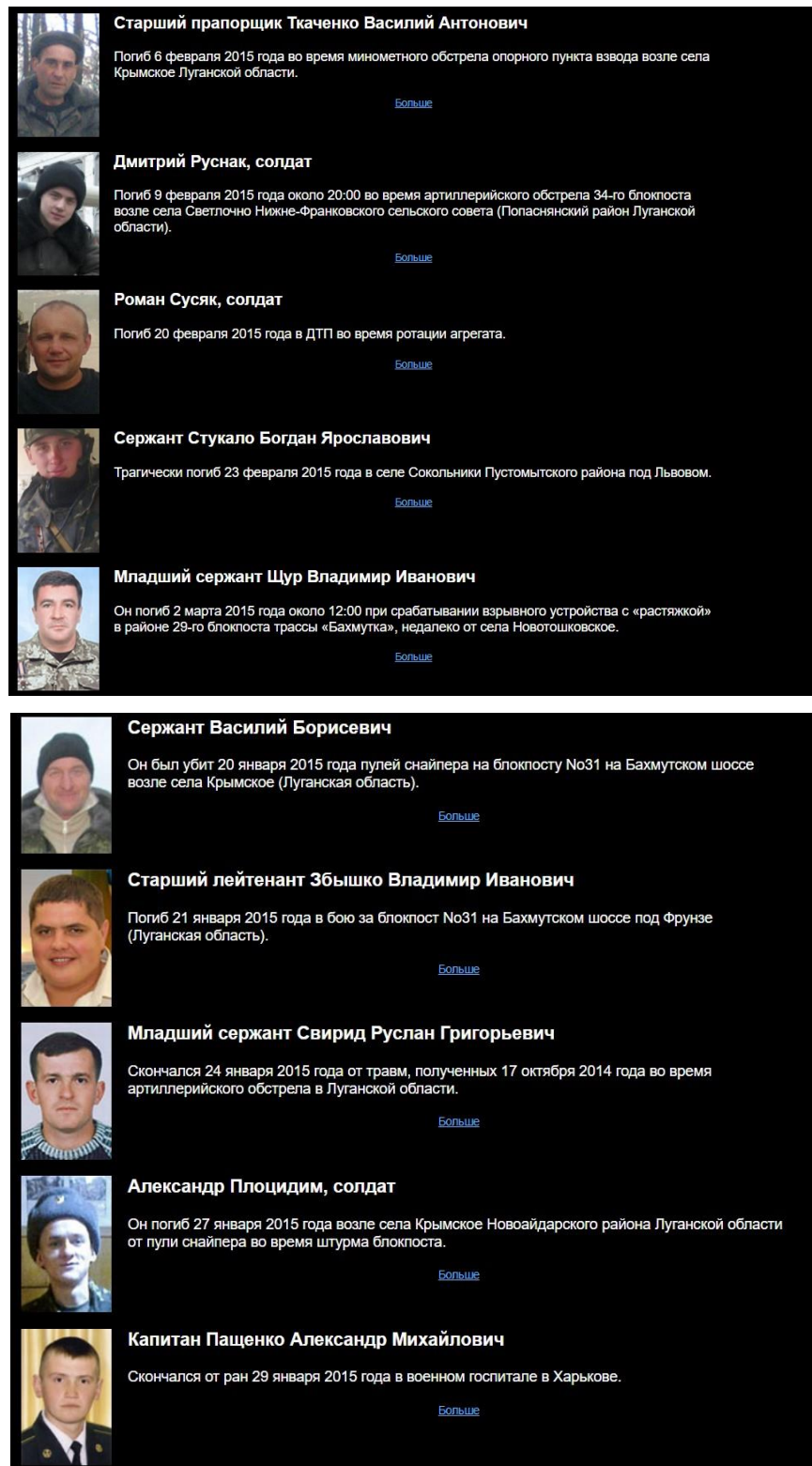


Fig. 43 – Dead military personnel of the 24th SМBr⁵⁷.

⁵⁷ 24th Separate Mechanized Brigade. Internet resource “Book of memory of those perished for Ukraine”. URL: <https://memorybook.org.ua/units/24br.htm> (accessed on 21.03.2022).



Fig. 44 – Military personnel of the 24th SMBr died at the beginning of 2015⁵⁸.

⁵⁸ 24th Separate Mechanized Brigade. Internet resource “Book of memory of those perished for Ukraine”. URL: <https://memorybook.org.ua/units/24br.htm> (accessed on 21.03.2022).

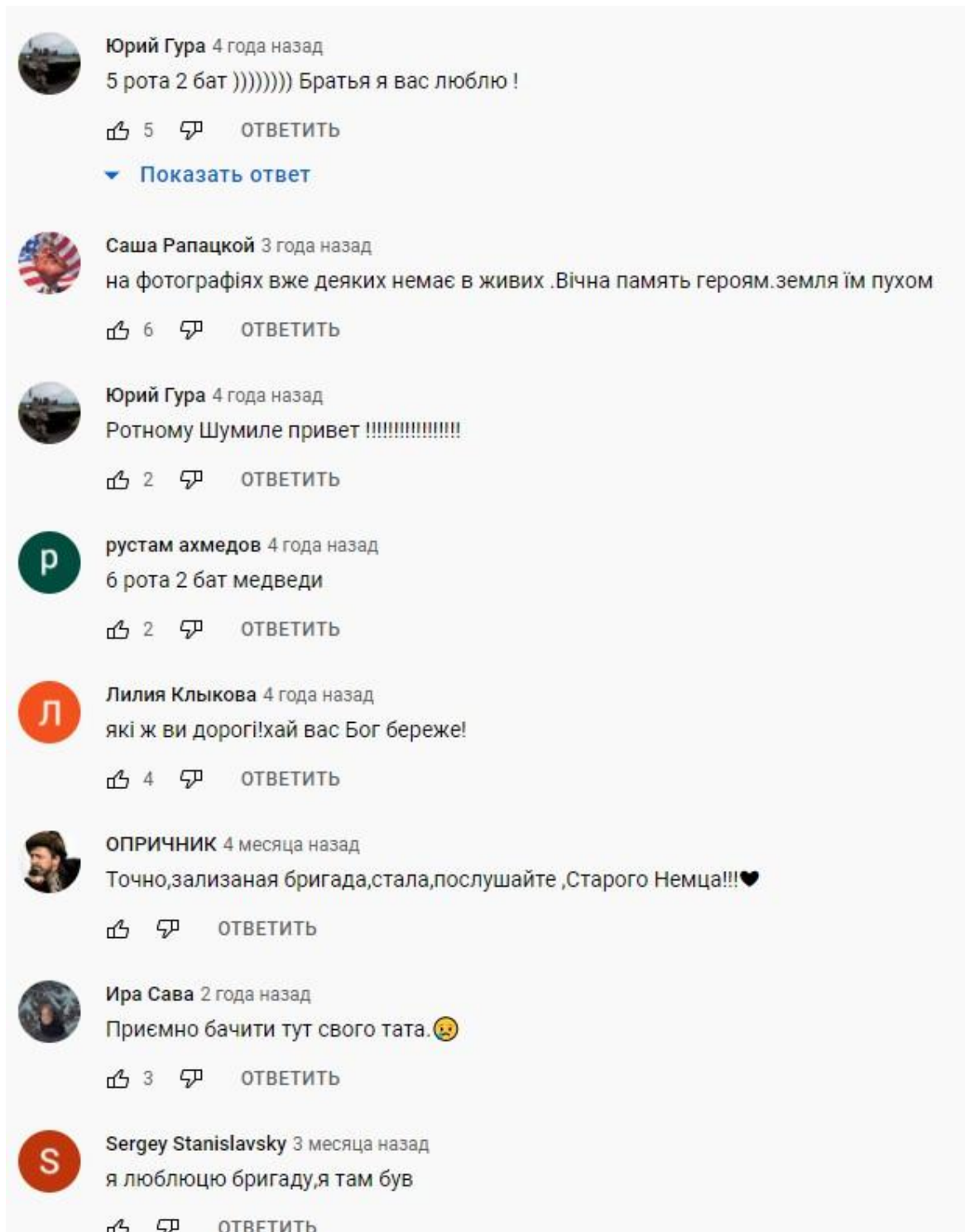


Fig. 45 – People’s commentaries under the video “24th Iron Brigade”⁵⁹.

⁵⁹ The Iron Brigade [published on 05.11.2014] YouTube Video hosting. URL: <https://youtu.be/CzENzFhQBIs> (accessed on 21.03.2022).



Fig. 46 – Grad MLRS in service with the self-propelled artillery division of the 24th SМBr⁶⁰.

⁶⁰ The Iron Brigade [published on 05.11.2014] YouTube Video hosting. URL: <https://youtu.be/CzENzFhQBIs> (accessed on 21.03.2022).



Fig. 47 -Road signs indicating the towns where the self-propelled artillery division of the 24th SMBR was deployed in the mid-2014⁶¹.

⁶¹ The Iron Brigade [published on 05.11.2014] YouTube Video hosting. URL: <https://youtu.be/CzENzFhQBIs> (accessed on 21.03.2022).



Fig. 48 - Spotter of the self-propelled artillery battalion of the 24th SBr Andrey Nagorny⁶².



Fig. 49 - Grad MLRS in service with the self-propelled artillery division of the 24th SBr⁶³.

⁶² “Gods of War”: how artillerymen liberated Ukrainian cities in 2014-2015 | Unimagined stories. YouTube Video hosting. URL: <https://youtu.be/RjVUq71ChII> (accessed on 21.03.2022).

⁶³ Battery of BM-21 122-mm 9K51 Grad MLRS combat vehicles of the Ukrainian 24th SBr inflicts artillery strike [published on 18.01.2017] YouTube Video hosting. URL: <https://youtu.be/hN9m6GZWHlo> (accessed on 21.03.2022).



Fig. 50 - Commander of the 24th SBr (Ukraine), Colonel Alexander Pavlyuk⁶⁴.

⁶⁴ The Ukrainian "Iron Brigade" is ready for combat operations (photo). Galician Correspondent URL: <https://gk-press.if.ua/x11441/> (accessed on 20.03.2022).