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FEASIBILITY STUDY

ON

MODERNIZATION OF THE SHOOTING RANGE

FOR

THE MINISTRY OF INTERNAL AFFAIRS'

ACADEMY „STEFAN CEL MARE" OF THE REPUBLIC OF MOLDOVA

CHISINAU JULY 2023

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CONTENTS:

1. The list of abbreviations and terms.

AR 500/HARDOX – abrasion-resistant steel plate;
BLL – blood lead level;
controlled entrance - the entrance door is equipped with a lock that also enables remote closing and opening of the door, emergency opening and a sensor signalling its closing and opening;
dangerous zone - a part of the shooting hall where shooting is prohibited, limited by side protections, the border of the danger zone and the base of the main bullet trap;
firing line (FL) - a line on the actual plane of the shooting hall, parallel to the starting line, at least 3 m from it in the direction of the main bullet trap, from which shooters can start shooting;
HEPA – high-efficiency particulate air;
HVAC – heating, ventilating, and air conditioning;
main bullet trap - a set of devices and internal technical installations constituting the cover of the extreme wall of the shooting hall at the end of its axis and perpendicular to it, located parallel to the starting line of the shooting range behind the target zone located along this wall, used to stop projectiles fired towards targets, ensuring resistance to puncture and counteracting the ricochet phenomenon and meeting the requirement of the assumed service life of the structure,
output line (OL) – a line on the actual plane of the shooting hall, parallel to the starting line and distant from it by not less than 1 m in the direction of the main bullet trap;
permanent shooting stand - a place situated and marked visibly on the actual shooting hall, with the possibility of structural development, equipped according to training needs, from which shootings are carried out following the shooting program;
plenum - a horizontal reference plane in the shooting hall area, which is the primary plane used to determine the location of all elements of the shooting hall;
PPE – personal protective equipment;
RSO – Range Safety Officer;
RSO control room - a room enabling communication with the shooting hall and ensuring the service of the shooting range infrastructure;
real surface - the area of the floor of the shooting hall, which was made following the building design of the shooting range; if the floor surface is horizontal and flat, then the actual plane is understood as the base plane;
ricochet - a bullet whose movement takes place as a result of the phenomenon of ricocheting;
target - a stable or movable object with shapes, sizes and construction determined per the shooting training program, constituting the object of aiming and shooting understood as shooting at it by this program, equipped with a surface graphic formula enabling unambiguous evaluation of hits according to the criteria specified in the program shooting training; the purpose is also understood as specialized images visible to shooters and shooters in the form of pictures projected optically onto screen surfaces;
TRS – Target Retrieval System;
the phenomenon of ricocheting - the reflection of the bullet from the surface of the material hit by it, as a result of which the reflected bullet may pose a threat to human life or health or damage to the infrastructure of the shooting range;
shooting hall - a part of the building structure of the shooting range, separated by permanent partitions in the shape and size ensuring the implementation of the shooting training process, in which, under the rules of this training, elements essential and necessary for the proper and safe conduct of the shooting training process have been made and located;

variable shooting stand - any place on the actual surface of the shooting hall, located taking into account the geometry of safety, excluding the danger zone and permanent shooting stands if such has been designated in the shooting hall, where the shooter assumes a shooting stance by the shooting training program and shoots by this program, taking into account the movement in the shooting hall also provided for by this program;

target zone – a separate and marked part of the shooting hall, where fixed or movable targets are located, following the safety conditions and depending on the type of shooting;

the upper surface of the shooting hall - a horizontal plane drawn through the point of the lowest element of the specialist infrastructure appropriate for shooting training, suspended to the ceiling of the shooting hall, with the proviso that when determining this plane, targets and elements of devices suspended to driving mechanisms of moving targets are not taken into account;

warning signalling - a set of devices and elements of the shooting range's equipment, providing outsiders with light information about the ban on entering the shooting hall;

weapons cleaning room (WCR) - a room adapted and equipped for partial disassembly, cleaning and maintenance of weapons and safe checking of their discharge status;

side bullet trap - covers of the outer side walls of the shooting hall without devices and internal technical installations;

waiting room - a room intended for waiting for a call to shoot and for resting after shooting, equipped with equipment enabling communication between the people staying in it and the shooting service station;

ZPP - zinc protoporphyrin.

2. Introduction.

Shooting training plays a critical role in the training process of all Law Enforcement services. It is the most important subject from the group of practical vocational training subjects. A well-trained officer can operate firearms fluently and use them adequately. The knowledge and practical skills that will be acquired by the students of the "Stefan cel Mare" Police Academy will raise the level of security of the country and its citizens. The modernization project of the indoor shooting range, part of the Academy's equipment, serves this purpose.

The main assumptions of the project are:

(i) A comprehensive evaluation of the shooting range's current technical condition, beneficiary's capacity gaps and expectations;

(ii) based on performed evaluation, develop the conceptual component of the study by detailing technical specifications for the specialized equipment appropriate to the shooting range's technical parameters and beneficiary's needs; drafting the cost estimates for the procurement of the shooting range specialized equipment; estimation of the yearly average maintenance and operation costs for the post-modernization stage of the shooting range;

(iii) draft the feasibility study's final version incorporating all feasibility and sustainability recommendations and relevant annexes.

The project proposes several potential shooting range modernization scenarios with detailed justification, proposals for using selected construction and technological solutions with their explanation, and initial cost estimates for individual modernization scenarios.

The current legal acts were also analyzed regarding their compliance with the solution adopted in the European Union.

An analysis of the shooting training programs in force at the Academy was also carried out, and proposals for their modification were presented.

After the modernization, the shooting range will become a modern, multifunctional shooting range intended for training both young, future adepts of the service and their more experienced colleagues from special and counter-terrorist subunits. It will also be a representative place - a positive showcase of the Academy, where it will be possible to organize shooting competitions of both national and international characters.

3. Analysis of the current technical state of the shooting range.

The analysis of the current technical condition of the shooting range was carried out on April 18-21, 2023, during a study visit to the "Stefan cel Mare" Police Academy. The consultant, together with an employee of the Academy who has the qualifications of a civil engineer, jointly measured and inspected all the rooms of the shooting range. A cursory assessment of their technical condition and the degree of operational wear was also made. Photographic and video documentation was also prepared for design purposes.

The chapter presented below describes the current technical condition of the shooting range. All remarks and comments are illustrated and justified by appropriate photographic material.
The technical condition of individual rooms of the shooting range is as follows:

3.1 Shooting hall.

The shooting hall is 52.20 meters long and 11.30 to 11.40 meters wide. The height of the shooting hall ranges from 3.49 meters at the plenum to 3.56 meters at the bullet trap, indicating either poor dimensioning during the construction of the project or the floor collapsing by the bullet trap.
The entrance to the shooting hall is through one door, which is not blocked automatically by a solenoid jumper when the shooting starts. Also, the illuminated "Attention shooting" sign does not work. The hall contains different tools and furniture elements; while following the safety rules and good practices, everything in the shooting hall should be used exclusively for shooting.

To the left of the entrance door, space has been set aside for a shooting trainer to teach shooting using laser instruments. There is a position for two students. They cannot concentrate on their training because they do not have ear protectors, and every shot on the firing line made by their colleagues who are currently shooting with combat ammunition causes them to react to the bang and shrink back automatically.

Behind this stand is a stockpile of mattresses used as a shooting ground for lie-down position and tires used to complete the bullet trap. All these materials belong to the flammable group and should never be in the shooting hall area. Right from the entrance are the fuse boxes, and opposite them, a space has been set aside with 3 cupboards where the clothing and uniforms of the teaching staff working on the range are stored. Unfortunately, all these items are also flammable. In addition, the officers' clothing is contaminated with lead dust, which poses a massive risk to their health, as well as the health of their family, as they go home after work in this contaminated clothing. Above the entrance to the shooting hall, there is a metal scaffolding on which tires are placed, right in the passageway of the shooting range. In the event of a fire, they will immediately start to produce toxic

smoke and create a cloud through which it will be impossible to evacuate people from the shooting range. Thus they pose a lethal danger to the occupants of the shooting hall.

Behind the cabinets are the school benches and chairs, the space created for theory classes. All these things are made of flammable materials and should not be in the shooting hall. Opposite them, on the left side of the shooting hall, are the wooden desks on which the weapons used for training are presented, and the students sign the training documentation. Also, these items are not allowed in the shooting hall. To the right, about 20 meters away from the plenum, is the shooting range control centre - a wooden desk equipped with elements for switching on lights, sound, and visual signalling. It is constructed of flammable materials and is located on the firing line from 30 to 50 meters, i.e., it is exposed to damage by bullets fired by shooters.

3.2 Shooting hall floor.

The floor of the shooting hall is a concrete screed of unknown thickness. On top of this are glued rubber plates. Where the plates have peeled off, they have been fixed to the substrate with metal screws with metal washers, which poses a considerable risk of ricochets when the bullet changes its trajectory after bouncing off a metal object.

There is a space on the floor of the shooting hall for the motor of the moving target, which is protected by a metal flap and poses a massive risk of ricocheting.

A heating system is situated on the floor, and the framing is made of metal and the covering of wooden panels, i.e., flammable material. The heating system is made in a U-shape and runs for a total length of approximately 50 meters.

There are also non-operated 4 electrical boxes on the floor of the shooting hall to activate appearing targets.

At the end of the shooting hall, at the height of the target line, the ground is made of metal plates, under which there is space for the drive mechanisms of the transverse target and the appearing targets. The tool of the appearing targets is functional, while the mechanism of the transverse target is not functional due to broken drive lines.

Fire lines are open at distances from 10 to 50 meters on the ground of the shooting hall. The lines are permanently marked with red paint but **do not reflect the actual distance to the targets.**

3.3 Target line.

The target line is approximately 1 meter from the rear wall of the shooting hall. To the right on the line of targets is an apparent target station consisting of five rotating targets. The mechanism of the device - is operational. Above this mechanism is a so-called screen for shooting with a video projector. It is a canvas wrapped on a roll in an inoperable condition. Next to the main targets are dummies used for situational shooting. The total width of the shooting range is between 11.30 and 11.40 meters. On the left side of the shooting line, a transverse target drive mechanism is installed under the floor level. The electrics are in working condition; the mechanism is inoperative due to broken wires transferring the drive from the motor to the driving tool.


The target line comprises ten shooting positions about 80-90 centimetres apart. Even the lecturers feel that this is too short a distance for safe shooting, so, during practical classes, they shoot from every second shooting position, i.e., a maximum of five shooters shoot simultaneously.


3.4 Main bullet trap.

The main bullet trap is located across the entire width of the shooting hall. It is approximately 70 centimetres deep. It is a lamella-type bullet trap made of steel plates, in front of which an anti-bullet screen of rubber strips is mounted. The rubber belts are shot so much that they do not offer anti-bullet protection. The rubber defects are clogged with used car tires and pieces of wood. Shooting at rubber tires causes them to melt due to heat. Immediately remove all tires from the bullet trap. Until refurbishment has commenced, if there is no other option, shooting can be performed on used aircraft tires, which have increased resistance to abrasion and temperature. Of course, such a solution should only be used as a temporary measure. Shooting at a wooden bullet trap causes splinters, which any spark can ignite. It is a breach of all possible safety rules. The consultant assesses the degree of wear of the bullet trap at 100%.



3.5 Sidewalls.

The side walls are made of concrete and look solid. They are covered with sheets of cardboard extrusions to protect against noise. Metal screws connect them with washers made of sheet metal, which poses a significant danger of ricocheting. No ballistic protection of any kind against ricochets.


There is a stockpile of targets and target holders by the side walls - all flammable materials.

Hanging on the walls are teaching aids, overview diagrams, and information boards. Firstly- they are made of flammable materials. Secondly - they contain outdated information on old shooting methodology, dating back to the communist era, e.g., combat shooting from a sporting stance, which has no longer been taught for years. Thirdly- there can only be signs on the walls of the shooting hall indicating escape routes, opening fire lines, and where fire extinguishers are hung.

3.6 The ceiling of the shooting hall.

The ceiling of the shooting hall is made of concrete. The construction looks solid, but the leaking roof of the sports hall means that leaking water poses a danger to the electrical installation, which is located at ceiling level. Embedded in the ceiling structure are 8 concrete beams, 70 centimetres wide and 90 centimetres high, which form the overhead shades of the shooting hall. However, these curtains do not have any ballistic protection, only acoustic protection in the form of cardboard extrusions connected by metal screws, which is, as with the side walls, a hazardous solution.

Lighting is distributed on the ceiling. There are eight lighting points each on the 25m and 50m target lines, with four lighting points in the rest of the top. The ceiling is covered with acoustic cardboard extrusions. There is a lack of lighting and cardboard cover at a distance from the main bullet trap to the first shutter. No protection of the ceiling against ricochets. Target illumination and loudspeakers for the acoustic system are attached to the top.

3.7 Ventilation.

The ventilation system consists of two sets, the first located approximately 12 meters from the rear wall of the firing hall and the second at the firing line of 25 meters. Both locations start from the left side wall where the ventilation ducts leading to the outside are routed. Also outside are the

two propulsion motors and the exhaust ducts. The ventilation systems are arranged parallel to the top screens. They are not protected from bullets in any way and are located in the line of fire at distances of 30 to 50 meters. The entire system is damaged, shot, inefficient, and ineffective. Wires and motors are operable, and the remaining equipment of the system is no longer serviceable.

3.8 Heating.

The heating system is installed inside the floor of the U-shaped shooting hall. It consists of hot water pipes and radiators. The system is inoperable; the shooting range is currently not heated. The radiators are covered with flammable wood panels.

3.9 Fire system.

Describing the actual state, an effective fire protection system does not exist. Smoke and temperature detection detectors are not installed. No internal hydrants. No marking of escape routes. Four powder extinguishers are on the shooting range, weighing 8 kg, but there is no signage of their location. There is a so-called fire stand at the entrance to the shooting hall, consisting of a built-in box containing sand, a shovel, and a broom. The facility does not meet any fire safety standards.


3.10 Range safety officer station.

It is located on the right side of the shooting hall, approximately 20 meters from the plenum. It has a control system for lights, acoustics, rotating and moving targets, and sound signals. It cannot be operated when firing from a distance of more than 20 meters, as the system operator will be on the firing line. It also results in the possibility of damage to the device due to firing or ricocheting. The placement of the range manager position between the firing lines is unacceptable. Lack of a range manager - the person in charge and coordinating activities on the range.

3.11 Cleaning the shooting range.

A dedicated area for cleaning supplies to clean the shooting hall is lacking. Lack of a qualified, trained person to clean the shooting range. Lack of protective clothing and protective masks with HEPA filters. Lack of dedicated equipment to clean the shooting range. The current situation is that the students tend to the shooting range. They come to the shooting range with brooms they took from the dormitory. They start sweeping the range dry, which is categorically forbidden because they raise the remains of unburned gunpowder into the air causing a fire hazard. In addition, lead dust is lifted into the air, inhaled by the students, and deposited on their uniforms, posing a severe risk to their health. Students then wipe the floor of the firing range wet. They pour the used, lead-contaminated water directly onto the street, creating an environmental hazard. After finishing cleaning, they return to the dormitory with the brooms and rags used to clean the shooting range and clean their rooms with this equipment. This way, the entire dormitory and the students' clothes are contaminated with lead dust. There is a lack of awareness of the dangers caused by lead dust.

3.12 Classroom.

There is a room measuring 5.56 x 11.25 meters. Currently, a classroom is located there. However, due to current building regulations, the classroom should be located where there is no access to daylight, i.e., the possibility of installing windows. - natural lighting. If we want to keep this room and its functions in its current form, excellent artificial lighting and air conditioning/ventilation should be provided.


3.13 Room for instructors.

It is a room measuring 4.05 x 3.20 meters, accessed by a smaller room measuring 1.34x3.20 meters. As this room is in the basement, it has no window - no daylight. This room's sanitary and technical conditions exclude the possibility of people staying in it entirely.


3.14 Depot.

It is a room measuring 2.20 x 5.54 metres with an area of 12. 2 m^2. This room fully meets its purpose.


3.15 Staircase.

The staircase is a circulation route from the ground floor level to the basement, where the shooting hall is located. The staircase has a tread, the first landing being 1.22 meters wide and the second landing being 0.87 meters wide. These stairs are too narrow and do not meet the requirements

for emergency exits. Furthermore, in the expert's opinion, the possibility of completely dismantling the staircase for the duration of the renovation must be considered. Otherwise, it may not be possible to deliver building materials of adequate dimensions to the basement level. Once the renovation is completed, the staircase should be built anew, considering the regulations in force in Moldova regarding emergency exits.

4. Project feasibility studies

In this chapter, based on information obtained from the Moldovan side and his measurements during a study visit, the expert conducts a feasibility study on the modernization of the Shooting Range for the Ministry of Internal Affairs Academy "Stefan cel Mare" of the Republic of Moldova. The feasibility studies are carried out according to the TELOS methodology, widely used for business assessment of planned projects. This method focuses on the following five areas :

-T - technological;
- E- economic;
- L- legal;
- 0 - operational;
- S - scheduling.

Considering the technological aspect, the consultant was looking for answers to the following questions :

- Is the project rational?
- Is it technologically possible to implement the project?
- Is the project feasible at all?
- How should the project be made to meet the required standards?
- What kind of training is the shooting range intended for?
- What scope of renovation works is necessary to achieve the assumed effect?
- What materials and construction solutions should be used to make the project feasible?
- In the consultant's opinion, what will be the biggest problem and challenge in implementing the project?
- How should modernization works be carried out to use the potential of the shooting range fully?

In assessing the economic aspect, the following questions were focused on:

- Is the modernization in the proposed scenario financially acceptable to the decision-makers?
- Will constructing a new, mobile, container 25-metre, four-stand shooting range is not cheaper than renovating the existing shooting range?
- How to reduce shooting range modernization costs?
- What restrictions can be encountered during project implementation?

As the expert considered legal assessment, the following questions were starred :

- Do the current legal regulations regarding shooting training in organizational units subordinated to MIA need to be changed, and if so, in what direction?
- What other legislation should be reviewed and updated?
- Will the internal regulations of the Academy be subject to change?
- Should changes be made to the personnel structure of the Shooting Training Department?
- Is there legal protection for officers in the field of occupational diseases?

Focusing on the operational aspect, the expert was looking for answers to the following problems:
:

- Do the staff currently working as shooting training lecturers have the appropriate qualifications?
- What qualifications should a shooting training lecturer possess?
- Will the current shooting training programs require adjustment?
- How to modify the organization of shooting training classes to improve the teaching process?

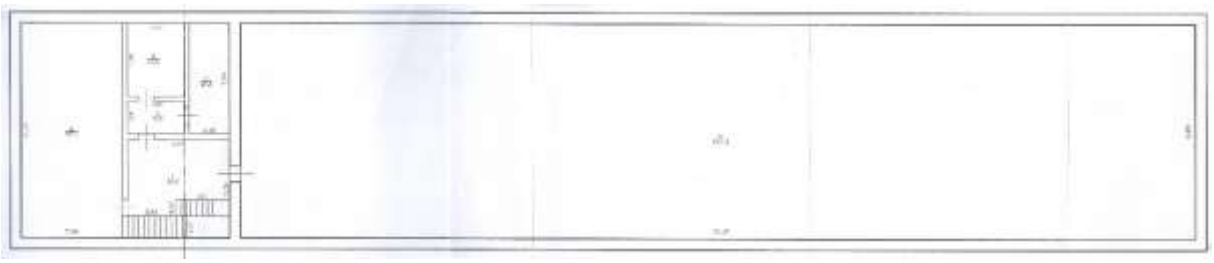
- Does the current employment status allow you to perform all the tasks assigned to the team?
- What kind of training should be included in teaching staff to acquire competencies appropriate to conduct shooting classes at all levels of education?
- What new procedures should be introduced to improve the teaching process at the modernized shooting range?
- Will the project affect the functioning of other organizational units of the Academy?

When assessing for schedulings, attempts were made to look for answers to the following questions :

- How much time may the project take?
- How to plan the implementation of individual stages of the project so that it is completed within the assumed time?
- What obstacles can we encounter during the implementation of the project, and how to avoid them?

4.1 Technological aspect of the feasibility study.

Considering the technological aspect, one question should be posed: is the project feasible at all? The consultant was hired to modernize the 55-meter shooting range, as stipulated in the contract terms. During the interview, the consultant agreed to carry out the project, provided that the study visit was conducted through personal visitation of the facility. The consultant, together with a construction engineer - an employee of the Academy, personally measured all the parameters of the shooting range. It turned out, confirmed on construction plans, that the total length of the shooting range is 52.20 meters from the plenum to the rear wall of the main bullet trap. It also turned out that the declared firing lines are not painted per the actual dimensions, so the 40-meter firing line is 38 meters from the target line, and the 50-meter line is 46 meters from the target line. To sum up, the **Academy currently does not possess a 50-metre shooting range.**



To modernize an existing shooting range, the following distances between individual lines must be maintained:
Plenum: - 0.00m;
Starting line - 1.00 m from the plenum;
Output line - 2.00 m from the starting line;
Firing line - minimum 3.00 meters from the starting line;
The distance from the firing line to the target line - 50.00 meters;
The distance from the target line to the base of the main bullet trap - 2.00 m;
The distance from the main bullet trap's base to the shooting hall's rear wall - 4.65/7 m.

TOTAL: 62.65/65 m.

To modernize the shooting range in the assumed form, the shooting hall must have a minimum length of 62.65 meters.

Therefore, the modernization of the shooting range under the conditions described in the TOR is impossible to implement.

I. „Based on the findings and conclusions formulated in the preliminary assessment, the International Consultant will draft the Feasibility Study on the modernization of the MIA/Police Academy's shooting range which will focus on the following aspects:

1) Develop the conceptual part of the feasibility study regarding the shooting range modernization with a particular focus on required specialized equipment and furniture for optimal functioning and **taking into consideration the physical parameters of the existing infrastructure**, number of potential beneficiaries, feasibility and sustainability aspects;

3) Based on conducted market research, elaborate and present minimum two scenarios for shooting range endowment, **using the relevant examples appropriate to the physical parameters of existing premises** and the needs of the MIA/Police Academy…." The examples will include sources, brand names, pictures, technical drawings and detailed technical specifications of each item, market costs, minimum operation requirements (power supply, ventilation and humidity requirements, low voltage systems etc.), including maintenance costs. **Recommend necessary adjustments of the existing physical infrastructure** if the case…."

In the case of our project, the concept of existing infrastructure does not exist at all. Four scenarios for the modernization of the existing shooting range were proposed, differing in the number of technical and social rooms and the size of the shooting hall depending on the adopted technological and construction solutions. The number and size of individual rooms, the number of window openings, the dimensions and direction of the door opening, the number of light points and their location in the shooting hall are unknown. Therefore, the consultant took the Border Guard Training Centre shooting range from Koszalin/Poland as a point of reference, currently the newest and most modern shooting range among all those managed by the Ministry of the Interior. All proposed solutions are documented with appropriate, photographic material.

The consultant would like to draw attention to the fact that the primary weapon of Law Enforcement in general service is a pistol. In both the European Union and the US, more than 90% of police interventions with firearms take place over short distances, mostly between 5 and 15 meters. These are the typical distances at which pistols and revolvers are used. The maximum length for police shooting with pistols and submachine guns should be 25 meters. Above this distance, there is a very high probability of shooting bystanders. For this reason, it is assumed that above this distance, a potential target will be a target for a sniper.

Therefore, during the study visit and meeting with representatives of the Ministry of the Interior, Stefan cel Mare Academy, UNDP and a representative of The Donor (US Embassy), the concept of creating a modern, multifunctional 25-meter shooting range was presented, enabling shooting training in the field of shooting by shooters after changing the position within the scope of 180 degrees every 90 degrees, e.g. starting shooting from the location in the axis of the shooting range in the zone of a separate lane for moving around during side shootings. In addition, the shooting range will be equipped with a system of mobile ballistic walls and movable bullet traps, allowing for the implementation of complex shooting scenarios in the form of a shooting house.

The shooting range designed in this way will ensure the implementation of training and combat shooting, both static and dynamic.

The following classes will be available in the new facility:

- basic training for students of the Academy;
- performing static, dynamic and situational shooting;
- performing complex shooting simulations for officers of special and counterterrorism subunits;
- periodic and annual shootings for MIA officers;
- organizing instructor courses;
- organization and conduct shooting competitions at national and international levels;
- organization of shooting workshops.

In the shooting range, the officers will be able to shoot with the following:
- pistols and revolvers;
- submachine guns;
- shotguns;
- rifles, firing only single fire from weapons with a maximum initial energy of up to 3600J.

General remarks after the site visit:

1. The shooting range does not meet the parameters of a 50-meter shooting range.
2. The shooting hall has no proper ventilation, heating and fire protection system.
3. The currently used electrical network is unsuitable for powering the modernized shooting range.
4. The existing shooting hall room should be used to create a multifunctional 25-meter shooting range in the form of a significant renovation.

To achieve the assumed effect, modernization in the form of a major overhaul should be carried out. The mere purchase of equipment does not solve any problem because proper installations, rooms and infrastructure must first be created to install the purchased equipment.

Therefore, in the consultant's opinion, much attention should also be paid to the shooting range technology and its construction solutions because only these will determine the project's success.

Recommendations:

1. Modernizing the shooting range as a significant renovation and creating a 25-meter shooting range that meets all safety standards is recommended.
2. The "old shooting range" area will be used as a new shooting hall, and teaching and social rooms will be designed depending on the selected modernization scenario.
3. The shooting hall will be heated with an HVAC system.
4. The RSO control room controls all target field control processes and shooting range operations.
5. The ends of all key installations will be installed in the RSO control room.
6. Entrance to the shooting hall is possible only through a two-door airlock equipped with bulletproof doors and controlled openings using electromagnetic jumpers.

A modern, multifunctional shooting range is naturally divided into two parts:

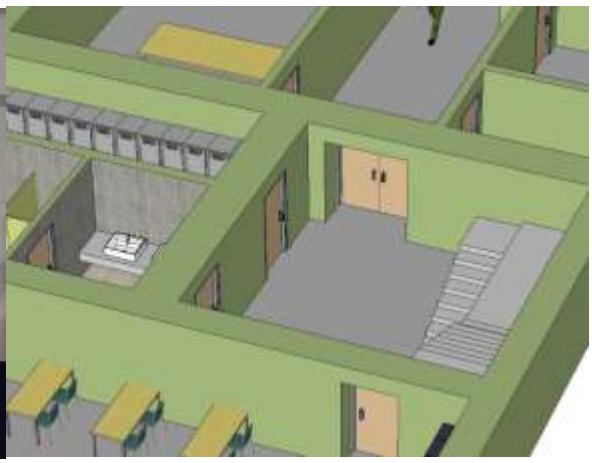
1) PART ONE - the room of the former shooting hall will consist of a shooting range and technical and service rooms:
1. shooting hall;
2. 2-door air lock;
3. technical corridor;
4. Range Safety Officer controls room;
5. waiting room;
6. cleaning weapons room;
7. technical room (electricity);
8. shooting trainer;
9. shield storage;
10. cleaning materials storage;

11. entrance hall.

2) PART TWO - intended for a classroom for theoretical classes and social rooms for students:

1) entrance hall with stairs;
2) classroom;
3) locker room;
4) locker room for instructors.

The boundary between these parts will be a structural wall, which is currently the starting wall of the shooting range. In this wall, the door opening should be widened to a width of about 2 meters, equipped with a double-leaf glazed door, which will also be a fire door, separating the first part from the second. Double-leaf doors will ensure efficient evacuation in rooms at risk in the event of a fire alarm.



In this part of the feasibility study, the consultant would like to present the proposed solutions regarding the technology and equipment that should be equipped in individual rooms.

It should be emphasized that all drawings and sketches prepared by the consultant are for illustrative purposes only. These are original visualizations of the proposed solutions.

Individual dimensions may vary depending on the technical applications proposed by respective companies that will potentially apply for tender. It is due to the technologies used. For example, when designing a main bullet trap, one company needs about 4.60 meters and side access to the rear face of the bullet trap, while the other company offers a 5.60-meter-long bullet trap, which requires an additional 1.5 meters at the rear for access to the hopper through which rubber granules are poured.

Thus, at the moment, it is impossible to measure the dimensions of the shooting range accurately.

The consultant suggests first selecting the main contractor for the shooting range equipment and then employing a local design office that will carry out the construction project strictly following the instructions provided by the contractor and the selected technologies.

1.1 Shooting hall.

First and foremost, the room of the shooting hall should be reduced to about 37.65 meters, which will allow for the construction of a multifunctional 25-meter shooting range. Currently, all walls of the shooting hall are made of reinforced concrete. Two new walls should be built: the first - the

plenum wall, through which the door to the shooting hall will lead, and the second - constituting the right edge of the technical corridor, leading to the rear wall of the main bullet trap.

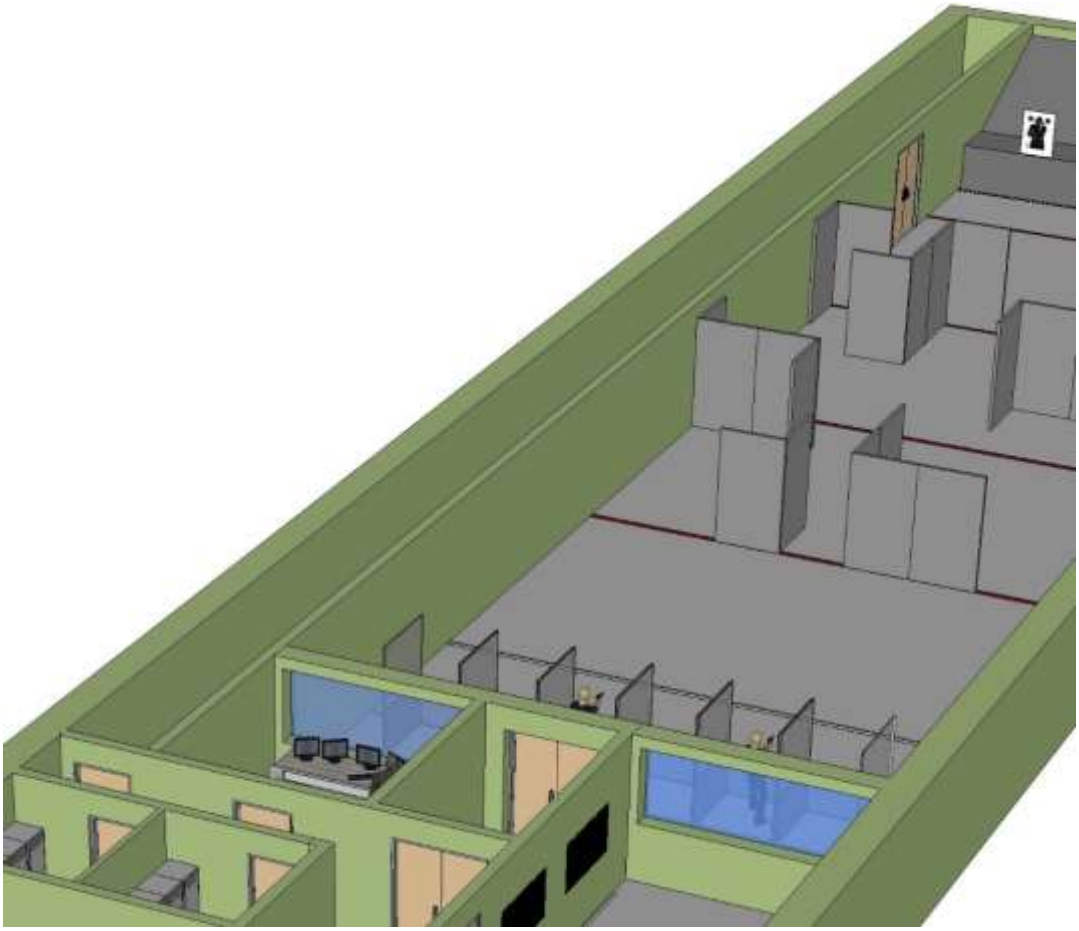


Fig. 1 View of the shooting hall with the technical corridor

Since the shooting range is located in the basement, the consultant considers it technologically difficult to pour reinforced concrete walls at the basement level. To solve this problem, making these two walls of concrete blocks with a thickness of 24 centimetres is proposed. They can be connected using cement mortar, but an even better effect can be obtained using adhesive mortar, which will result in no gaps between the blocks, i.e. durability of the structure. However, this project requires concrete blocks of excellent quality and exact dimensions.

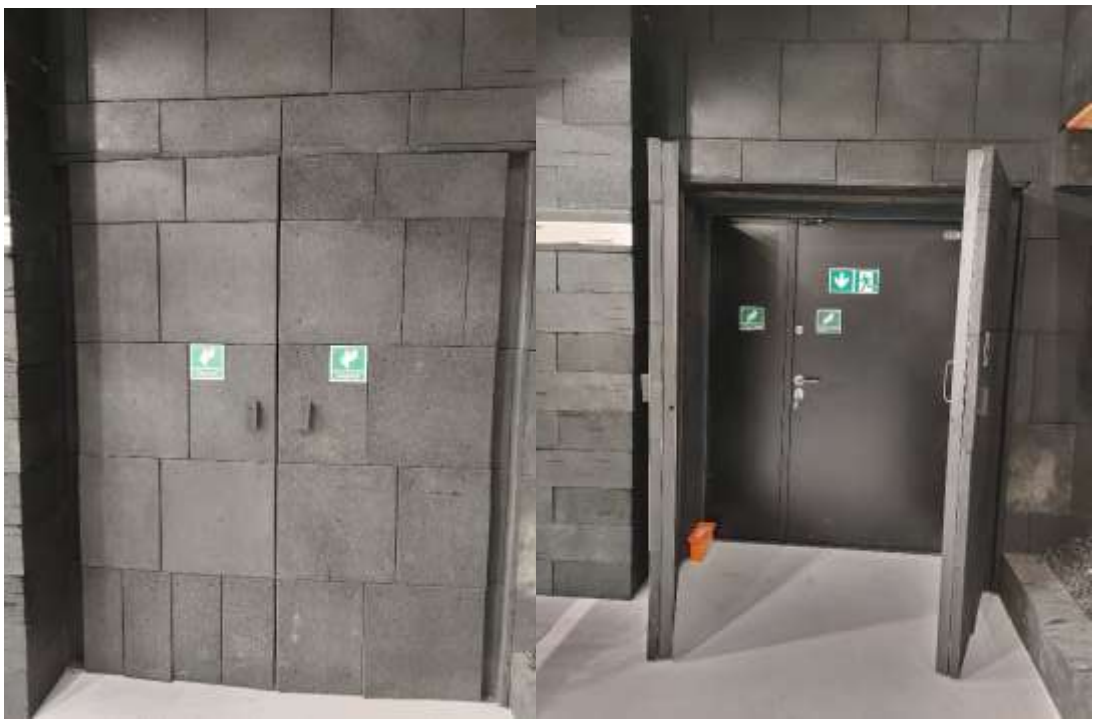
The indoor shooting range will be designed as a shooting range with six shooting stands located axially every 1.30 - 1.50 m and is intended for shooting at a distance of up to 25 m from various shooting positions - for fixed and appearing targets, located on a fixed line of 25 m targets and additional temporarily installed on the plane of the line of targets located every 5.0 m from the designated main or additional FL. 90 degrees, e.g. starting shooting from the location in the axis of the shooting range in the zone of a separate lane for moving during side shootings. The height of the structure of the side bullet traps made of layers of cover sheet mounted on the wall plane, anti-ricochet panels and ballistic system blocks is 220 cm, i.e. the height of the lower part of the upper barrier.

The maximum firing of the main and side bullet traps up to 200 cm above the finished level of the shooting range plane vertically and horizontally every 5.00 m and the firing angle of about 90 degrees. In addition, shooters can practice by shooting at mobile targets - upper ones enabling any target location in the range from 0.00 m to 25 m, and in the field of shooting at a transverse moving target - mobile located on the 25 m line. It is planned to install and use upper targets moving on longitudinal tracks and one transverse track - common for all stands and shooting - an element parallel to FL.

In addition, it is planned to equip the shooting range with a system of movable walls and mobile bullet traps, allowing for the implementation of complex tactical shooting in the form of activities in urbanized areas – a shooting house over a distance of 15m to 0.00m.

The shooting range ensures the implementation of preparatory exercises with small arms using blank and live ammunition and the implementation of training and combat shooting, both static and dynamic.

A technical corridor was located along the designed left-side wall - serving as a shelter. From this room, at the level of the foundation of the main bullet trap structure, safe access to the area of the covered structure of the main bullet trap was provided, as well as the operation of devices and the service of the elements of the shooting range located in the direct fire zone. Access to the technical corridor is provided from the side of the shooting hall through bulletproof doors with additional cladding in the form of anti-ricochet plates and thicknesses min. 5 cm and AR500 steel sheet, to the shooting range plane level - double doors, into the main bullet trap zone and the target line 25 m.



Entrance to the corridor through steel doors - technical entrance. In the construction zone of the main bullet trap, a technical door from the corridor space was designed to enable entry into the covered area of the lower downward structure of the main bullet trap to allow for cyclical checking of the technical condition of the structure.

All entrance doors to the shooting hall as well as the observation window in the RSO control room and waiting room, are made of a bullet-proof structure (glasses in the BR7 NS class[1] - non-shattering frames and construction elements of doors and frames must have equivalent equivalents); additionally, the technical doors in the direct fire zone at the main bullet trap have been secured with steel plates made of AR500 and anti-ricochet panels with a thickness of min. 5 cm.

[1] EN 1063, or CEN 1063, is a security glazing standard created by the European Committee for Standardization for measuring the protective strength of bullet-resistant glass. It is commonly used in conjunction with EN 1522 (Euronorm standard for Bullet Resistance in Windows, Doors, Shutters and Blinds) to form a ballistic classification system by which armored vehicles and structures are tested and rated. A similar classification system primarily used in the USA is NIJ Standard 0108, the U.S. National Institute of Justice's Standard for Ballistic Resistant Protective Materials which includes glass and armor plate.

Fig. 2 Controlled entrance to the shooting hall

All entrances to the shooting hall are secured with electromagnetic locks controlled from the RSO control room, preventing their opening by unauthorized persons during, for example, conducting a shooting exercise. At each door on the "into" and "out" side of the shooting hall, emergency release buttons for solenoid valves should be installed, to be opened only in justified cases.

On the door leading to the shooting hall, signs should be placed informing about entering the noise hazard zone and the need to use individual hearing protection kits. Over the entrance door to the shooting range, an illuminated sign "WARNING SHOOT" should be placed, activated when the armature in the shooting range door is closed and the training process begins.

1.1.2 The floor of the shooting hall.

The floor of the shooting hall should be even and provide adequate anti-ricochet protection. The existing heating system in the floor must be liquidated. The shooting range is heated using HVAC technology - heating, ventilation and air conditioning. This topic will be discussed in detail in the

heating and ventilation system section. The propulsion systems of the transverse and rotary targets located at the level of the main bullet trap must also be eliminated. The resulting losses should be filled with concrete. Also, in this case, the consultant sees the problem of delivering a sufficiently large amount of concrete to the level of the main bullet trap. The solution may be to fill the cavities with concrete foundation blocks and then pour them with concrete from a concrete mixer with a capacity of up to 200 litres, which can be transported to the basement level.

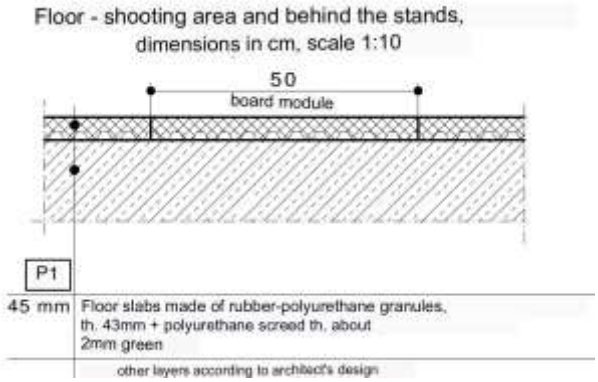


Fig. 3 An example of the floor of the shooting hall

The entire surface of the shooting zone should be lined with anti-ricochet floor tiles made of rubber and polyurethane, 4.3 cm thick. Apply a polyurethane screed, anti-slip, 0.2 cm thick, on the substrate prepared in this way. The screed is designed to efficiently and quickly collect unburned powder residues and other impurities from the floor layers, usually deposited in the unevenness of anti-ricochet boards.

At the same time, it will raise the floor level by 4,5 cm, which translates into further planning of the shooting range elements.

All necessary lines should be permanently painted on the floor of the shooting hall. Lines of fixed targets are planned at a distance of 5.0 to 25.0 m with a spacing of 0.00 m every 5 m from the firing line.

Target lines should be permanently marked on the shooting range ground with a line painted with white paint with a width of min. 10 cm of the entire width of the shooting range. On the walls, at the height of the painting (line markings), it is additionally necessary to paint at an altitude of about 160 cm above the floor (due to the use of the planes mentioned above as side bullet traps) with a description of a given line and an indication of the size of a specific boundary.

Lines of opening fire and additional lines of opening fire should be permanently marked on the shooting range ground with a line painted with red paint with a width of min. 10 cm across the entire width of the shooting range, along the length of the side bullet traps at a distance of 400 cm, along the course (along) of the shooting range axis, and marking the danger zone with a width of min. 50 cm - on both sides about the axis of the shooting range.

Line markings should be painted with a width of min. 10 cm, along the entire width of the shooting range in green or by sticking strips of rubber tape in this colour in the case of ad hoc markings, depending on the needs. Lines - starting and output located behind the FL should be permanently marked white.

Rectangular shooting station with external dimensions of 1.30 - 1.50x2.50 m. The range of the station should be painted with white paint on the finishing layers of the floor in a permanent manner.

1.1.3 Main bullet trap.

The main bullet trap consists of the proper bullet trap - a plane made of a steel plate covered with anti-ricochet granulate and an upper steel breaker.
The structure of the bullet trap is proposed to be designed from system I-beams mounted to linear, reinforced concrete foundations with cross-sectional dimensions of approximately 33x50 cm and to the plane of the rear wall with an axial spacing of 120 cm. A vertical reinforcement of the structure was designed at about 185 cm from the back wall behind the main bullet trap - a support made of a steel beam.

On the wall behind the main bullet trap, above the construction of the bottom plane, the lining should be made of AR 500 boards on a rubber base layer, thickness. 1.0 cm cushioning and reducing the impacts and vibrations transferred to the building structure. The sheet metal cladding should be done up to the ceiling level.

Above the structure of the bottom plane of the bullet trap, at the height of about 230 cm from the level of the finished floor, in the lowered section, a bullet breaker should be made, 200 cm

high, across the entire width of the shooting range - the breaker should be made of a welded structure of steel pipes 100x50x5 mm, installed in the structural system axially every 120 cm to the plane of the rear wall and the ceiling plane using system anchors. Pipe frames should be made at an angle of 60 degrees to the wall's vertical plane, and AR500 sheets should be installed.

The boards are fixed to the frames using welded or threaded rods for the AR500 plates. The bead-breaker sheet cladding should be horizontally fastened with wooden, impregnated square wooden timber with a cross-section of 6x10 cm, to which system anti-ricochet panels should be attached, 100 mm thick. min. 5 cm using system screws according to the technology of the selected manufacturer of anti-ricochet panels.

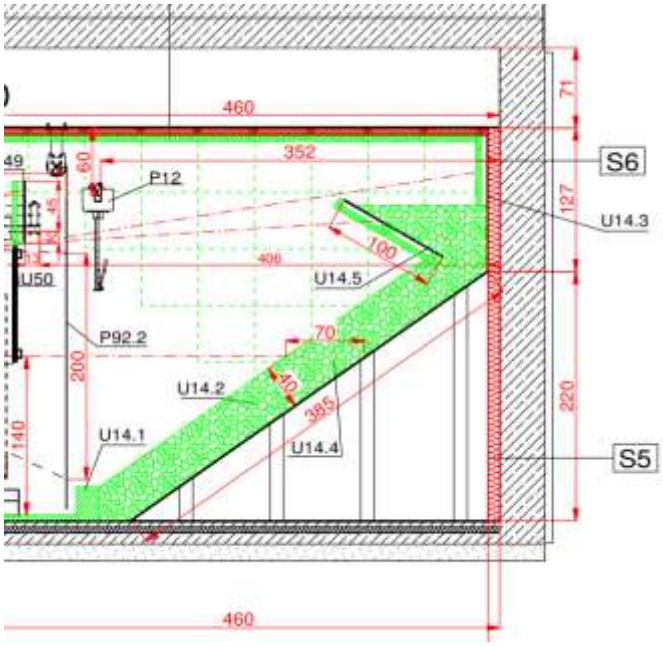


Fig. 4 An example of a main bullet trap made of rubber granulate

The lower plane and the space behind the upper breaker bar of the bullet trap should be filled with the system anti-ricochet granulate. The design of the upper breaker allows the granulate surplus to move downwards in the case of its losses from the upper part - by gravity. The lower plane of the main bullet trap should be covered with a layer of granulate with a thickness of not less than 40 cm. It will ensure a thickness of the anti-ricochet material equal to 100 cm with a horizontal shot, significantly reducing the projectile's destructive force concerning the bullet trap's structural elements. In the lower part of the bullet trap, at its base, the resistance of bulk masses made of ballistic system blocks with dimensions of, e.g. 20x30x50 cm should be made.

Additional protection of the wall plane up to the level of the ceiling linings should be made above the structure of the ball breaker AR 500 steel sheets with a hardness of minimum 500HB, thickness 1.6 cm fixed with a system structure. Covering with rubber-polyurethane plates – anti-ricochet with a thickness of 5 cm.

The second variant that can be used is the technology of glueing anti-ricochet rubber plates to the AR500 plate. The bullet trap is a rifle-rated trap constructed of a sloped, corrugated steel plate bed filled with granulated rubber media. A self-feeding hopper above the trap's target region replenishes the granular rubber material in the target area to provide a consistent depth for the best operational performance. This construction stops and captures rounds intact with virtually no lead dust or bullet fragmentation. It allows shooters to advance downrange and engage targets at extremely close distances, even at acute angles, without concern of ricochet or back splatter.

1.1.4 Side walls and their protection.

Sidewall design in two variants:

a) Reinforced - for energies up to 3800J - as a side bullet: steel sheet of hardness min. AR500, thickness 1.6 cm, anti-ricochet panels 5 cm, ballistic system blocks 30 cm thick, secured from the top with a stabilizing and pressure element - point-wise;
b) Normal - for energies up to 2200J - 5 cm thick rubber-polyurethane anti-ricochet panels.

Above the ballistic blocks, cover the surface with system acoustic wool covered with durable fibreglass fabric, as well as the surface of the walls from the plenum to the exit line thickness 4 cm.

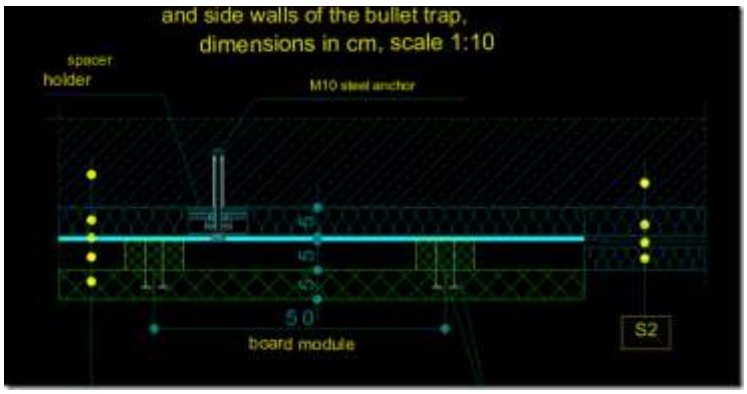


Fig. 5 An example of fixing panels with steel anchors and spacers

The side bullet trap is made with additional rubber polyurethane blocks with a system pressure structure. Blocks stacked 220 cm high, layer 30 cm thick. Pressure elements covered with wear-resistant steel sheet with increased hardness, min. 500HB gr. 12 mm and an anti-ricochet layer made of rubber-polyurethane plates. 1 module with an area of 50 x 220 cm - 11 blocks with a pressure element.

Second variant: a side wall is constructed of 3/8" AR 500 plate steel and ballistic rubber adhered directly to the front side of the steel wall surface. Ballistic rubber blocks stack in vertical rows in front of the steel and a wall where each vertical row is held in place with an adjustable clamping compression system. The bloc trap and all attached components are rated for rifle rounds up to 7.62/3.08 and all handgun rounds. This trap can be mounted against a solid wall or freestanding and is ideal for indoor and outdoor applications. The self-healing properties of the bloc trap seal the bullet's path after the round has penetrated the surface, so each shot is encapsulated inside the ballistic material, reducing airborne lead particles.

Above the ballistic blocks, the surface is covered with system acoustic wool covered with durable fibreglass fabric, as well as the surface of the walls from the plenum to the exit line thickness 4 cm.

1.1.5 Ceiling and overhead baffles.

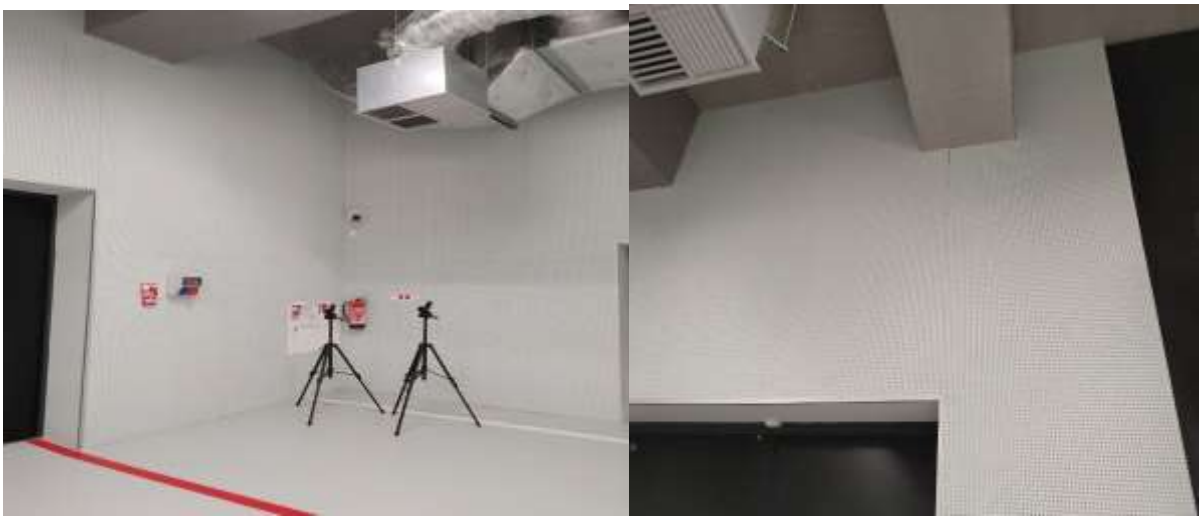
The overhead baffles are made of reinforced concrete and are spaced approximately 5.20 meters apart. They possess the following dimensions: height - 0.90 m, width - 0.70 m and pass through the entire width of the shooting hall. They should be clad on the FL side with AR 500 plates, complete formwork and system rubber-polyurethane anti-ricochet panels with a thickness of a minimum 5 cm. From the side of the main bullet trap, system holders or mounting rails should be made to which lighting and fire detectors will be attached.
The ceiling should be lined from FL to the main bullet trap with tightly impregnated boards 5 cm thick on a wooden grate. Then, lay the acoustic mineral wool with a thickness of 10 cm on the resulting layer.

The second proposal is a ceiling built of a 3/8-inch AR500 steel plate backer and 2-inch anti-ricochet ballistic rubber tiles adhered directly to the face of the ballistic steel. The safety ceiling is suspended from overhead and provides a safe shelter above all firing points. The safety ceiling is designed to bolt together and be suspended from a support structure supplied and installed by others, and all other mounting hardware will be included. The safety ceiling protects one of the most significant areas in a range where a misdirected shot could harm the shooter or damage overhead utility installations. The safety ceiling system provides anti-ricochet protection and offers noise abatement at the firing line to give a safer and quieter range environment.

1.1.6 Starting wall – plenum.

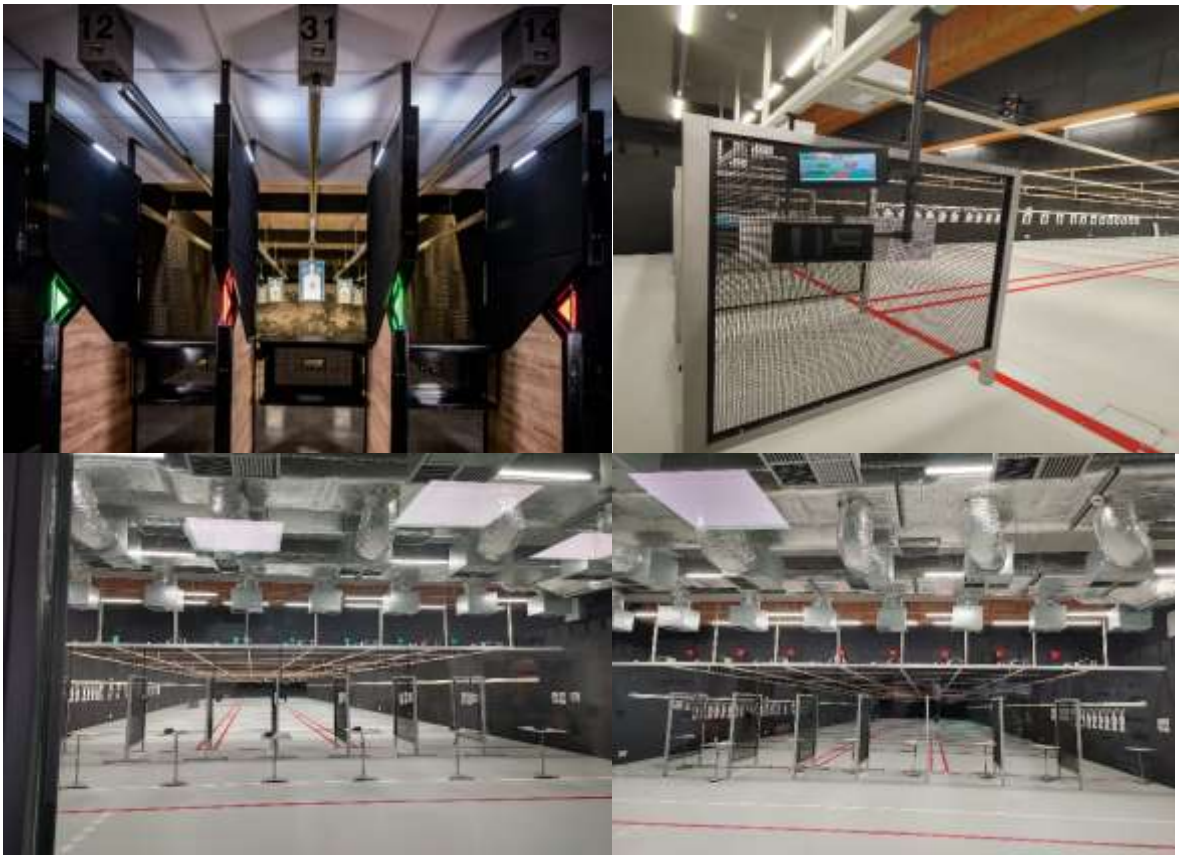
A completely new wall of 24 cm thick concrete blocks must be built, joined together with cement or adhesive mortar. The wall will be clad with acoustic mineral wool, 4 cm thick, in a light colour. The side walls from the plenum line to the starting line will also be covered with the same acoustic wool. 3 openings will be created in this wall: 1 for the entrance door leading from the airlock to the shooting hall and 2 window openings made of bulletproof tempered glass, non-shattering in the BR7 category - one for viewing the shooting hall from the RSO room, the other from the waiting room.

On this wall, loudspeaker outputs should be designed, ensuring listening to the commands issued from the RSO control room and signalling lights S1 and S2 informing about closing all doors leading to the shooting range and the possibility of starting shooting. (S1- entrance door to the shooting hall, S2 - all other technical doors of the shooting hall).



1.1.7 Shooting dividers.

There are planned 6 shooting dividers in the shooting hall. They should have dimensions of about 200x200cm, made of non-flammable PVC mesh or other transparent material—guaranteed non-flammability. The system wall is equipped with a monitor, control buttons and a table for weapons and ammunition. The shooting position number should be placed above each division, starting from the left side. In addition, over/back each shooting divider, there should be lighting indicating that shooting is possible - green, and shooting prohibited - red. The lighting is controlled and switched on by the control system with the RSO control room. The lighting is divided into two groups for all shooting positions. Switching on is done in groups, for all stations or every other station, depending on the number of trainees.



1.1.8 Ammunition point.

Behind the starting line of the shooting range, on the left side, it is proposed to designate and adequately equip a place with portable tables for the ammunition point, placed temporarily for the duration of the appropriate shootings.

1.1.9 Ventilation and heating.

First, the heating system located in the floor of the shooting hall should be removed. In the shooting hall, it is proposed to design a supply and exhaust ventilation and heating system with heat recovery, ensuring twenty air exchanges per hour. The air supplied in the winter covers heat losses, maintaining the assumed air parameters in the room.

Second, in the shooting hall layout, the air handling units supply the air to the collective supply duct, from which the air is provided to the supply line.

The exhaust is carried out through exhaust lines to a common duct and is further extracted by air handling units.

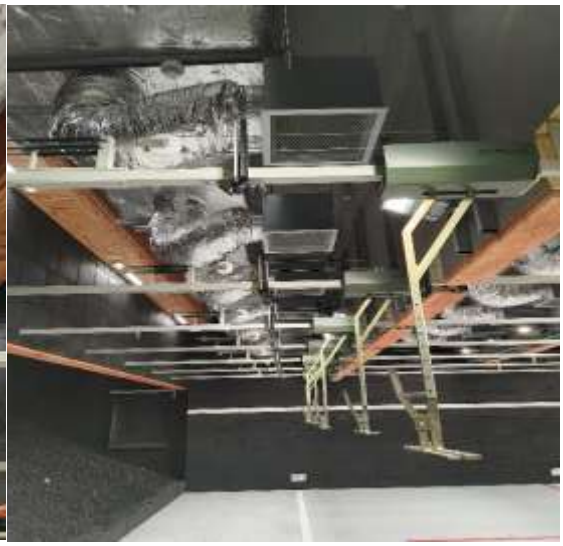
Third, negative pressure should be maintained in the shooting hall. Therefore, the control panel supporting the system should be designed to switch the exhaust system on first and then the supply. The minimum temperature in the shooting hall should be 16°C. During the start-up and adjustment of the system's operation, the supply air streams should be set lower than the exhaust air streams. Providing about 5% negative pressure in the shooting hall is necessary. It should be noted that the maintained negative pressure does not hinder the use of the room. The RSO control room carries out the air supply and heating control system.

Mechanical supply and exhaust ventilation are proposed. Ventilation that provides laminar air flow with a minimum speed of 0.25 m/s.

The air handling unit is in room ventilation mode when ventilation is not working. Units should be equipped with filters, air heaters, air coolers, and heat recovery (recuperators).

The shooting hall will be heated through ventilation systems.

A detailed offer for the execution of ventilation of the shooting hall, together with the proposed cost estimate, is **Annex No. 2B and 2C.**

1.1.10 Monitoring system.

It is proposed to equip the shooting hall with a camera system for monitoring and evaluating shootings. Two cameras placed on the entrance wall will monitor the behaviour of the firing shift at the shooting positions. It is also proposed to equip the shooting hall with a system of cameras integrated with the control computer, which will automatically read the shooting results and automatically enter them on the disk. After integrating the computer with the lecturers' electronic logbooks, grades will be automatically entered into the log after each shooting. This system guarantees full transparency, especially during exams or shooting competitions. Operation of all cameras from the RSO control room. The offer for equipping the shooting range with a video surveillance system is included in **Annexes 16 and 16A.**

The shooting hall should also be equipped with fire alarms. This issue will be discussed in detail later in the feasibility study when the proposed fire protection solutions for the entire building will be presented.

Summing up the technology and construction of the shooting hall designed in the above way, it is proposed to equip the shooting hall with modern, reliable and safe equipment and elements, ensuring the possibility of conducting shooting from a fixed and variable line of fire from ammunition with a maximum energy of 3800J (up to and including 7.62 NATO bullet).

SHOOTING HALL.

1. 6 target retrieval devices for shooting at fixed targets at 25 m - top rail version, with variable travel speed, controlled from a touch screen. It consists of a running track and a drive with a control system. Ability to stop at any distance, e.g. 5, 10, 15, 20,25 meters - microprocessor control. Driven by means of a drive cable or built-in autonomous battery-powered drive.
2. 1 transverse target retrieval system for shooting at moving targets, located on the 25 m line - upper rail version, with variable speed control. It consists of a running track and a drive with a control system. Possibility of stopping at any distance and adjusting the driving speed, as well as microprocessor control. Drive utilizing a driving cable.
3. 6 enemy-friend turntables with ballistic protection. Radio control, wireless power supply, 12/24 V DC battery.

4. 1 turntable for five shooting targets with control panel.
5. Optical jamming system in the form of strobe lighting and "police lights".
6. Smoke generator.
7. Acoustic Jamming System: Police sirens and other sounds are recorded and played back from the RSO.
8. 6 lights above the shooting stand indicating that the person can shoot - green, no shooting - red. Switching on is done in groups - for all stations from the RSO level.
9. 6 fixed non-bulletproof shooting dividers, approximately 200 cm high, transparent with safety glass glazing, protecting against shells fired from adjacent stations. Each station is equipped with a table for weapons and ammunition and a control panel supporting the target retrieval system.
10. 1 ammo dispensing table + chair + trash can.
11. 10 active SL hearing protection headphones.
12. 10 active SA headphones for students.
13. 20 safety glasses.
14. 2 wireless necktie microphones.

SHOOTING HALL FLOOR:

1. Rubber-polyurethane floor plate, 4.3 cm thick.
2. System polyurethane screed, fire-retardant, non-slip, about 0.20 cm thick, grey is recommended.
3. All necessary lines painted.

MAIN BULLET TRAP:

1. Certified rubber granules on a steel structure bullet trap, about 11,25 meters wide.
2. Ballistic rubber-polyurethane blocks with block dimensions of 20x30x50 cm, constituting the resistance of bulk masses.
3. Fire-retardant rubber granules in the class min. C-s3, layer thickness perpendicular to the sheet minimum. 40 cm, fraction about 20-40 mm. Granules are laid on a system steel structure covered with a steel sheet with a hardness of min. AR500, the thickness of 1 cm.
4. The top catcher is made of steel sheets with a hardness of min. AR500 thickness of 1.6 cm fixed with a system structure. Covering plates with rubber-polyurethane - anti-ricochet 5 cm thick.
5. The facing wall behind the bullet trap is made of steel sheets with a hardness of min. AR500, thickness 1.6 cm, fixed with a system structure. Covering with rubber- polyurethane plates - anti-ricochet with a thickness of 5 cm.

SIDE WALLS:

Sidewall design in two variants:

a) Reinforced - for energies up to 3800J - as a side bullet: steel sheet of hardness min. AR500, thickness 1.6 cm, anti-ricochet panels 5 cm, ballistic system blocks 30 cm thick, secured from the top with a stabilizing and pressure element - point-wise;
b) Normal - for energies up to 2200J - 5 cm thick rubber-polyurethane anti-ricochet panels.
Above the ballistic blocks, cover the surface with system acoustic wool covered with durable fibreglass fabric, as well as the surface of the walls from the plenum to the exit line thickness 4 cm.

ENTRANCE WALL:

1. Bulletproof entrance door in class FB7[2], double-leaf, symmetrical. Electromagnetic lock 24 V DC, equipped with door closers, opening control with light signalling. The door is glazed with bulletproof glass BR7.
2. The observation window from the RSO control room is made of a bullet-proof structure - glass in the BR-7 class - shatterproof; the frames are to have equivalent equivalents.
3. The observation window in the waiting room is made of a bullet-proof structure - glass in the BR-7 class - shatterproof; the frames are to have equivalent equivalents.
4. The wall is soundproofed with system acoustic wool with durable fibreglass fabric, 4 cm thick.
5. 2 horn speakers with a power of 15W.
6. Signalling system whether individual circuits are closed and shooting is allowed.

CEILING AND OVERHEAD BAFFLES:

1. It is proposed that from the firing line to the main bullet trap to line the ceiling with tightly impregnated boards, 5 cm thick, laid on a wooden grate.
2. Acoustic insulation of ceilings - mineral wool with durable fibreglass fabric, acoustic, thickness 4 cm, wool cover in black or grey.
3. Overhead baffles - cladding of reinforced concrete elements of the ceiling - AR500 sheet, thickness 1,6 cm, and system rubber-polyurethane anti-ricochet panels, 5 cm thick.
4. Vertical thermal and soundproof insulation made of dry-laid mineral wool boards, 4 cm thick, with a durable glass fibre fabric.

LIGHTING:

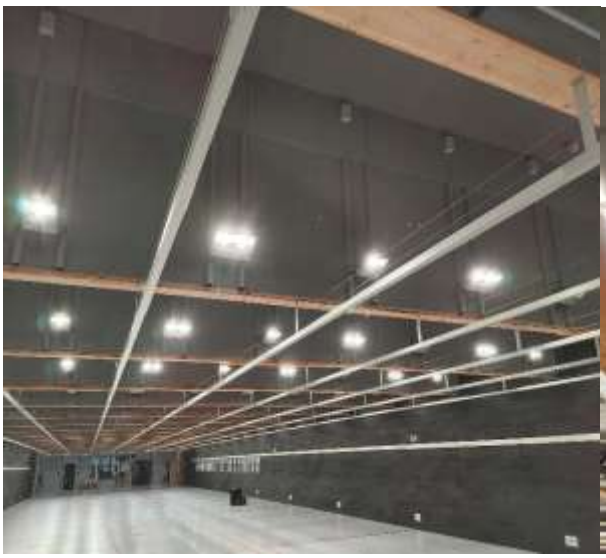
It is proposed to put 4/8 light points on the back of each cover with IP66 parameters—the possibility to turn on the lighting on each firing line separately. The light intensity can be adjusted. Ability to highlight "night" targets. Additionally, evacuation lighting is operating for a minimum 1 hour. According to the ISSF regulations and the recommendations of the IEC technical committee, the required level of target lighting intensity at shooting ranges should be up to 1500Lx at the main bullet trap and on the target lines and 150Lx for general lighting of the shooting range. At shooting positions, the lighting intensity should be 300lx. For lighting targets, shooting zones of light sources with a colour temperature of approx. 5000...6000 ^{0}K, other rooms approx. 3000 ^{0}K. General colour rendering index Ra=80. The maximum luminance ratio in zones directly adjacent to each other should not exceed 1 to 5. Illumination uniformity 0.4...0.65. To illuminate the targets and targets with daylight, it is recommended to use asymmetric wide-beam projectors with a LED light source of at least 128W power; the projectors should be mounted on the upper screens from the side of the targets. Illumination of targets for lines from 5m to 25m; for each line, 4 projectors switched on simultaneously on the control panel of the RSO control room. Dynamic lighting should be performed using projectors of the DALI LED type with a power of 35W, with the possibility of adjusting the lighting intensity by 0 to 300lx with lighting intensity regulators (dimmers), regulated by potentiometers that will be mounted in the RSO control room and at the entrance door to the shooting range.
The general lighting of the shooting range should be designed with 36W (2x18W) ceiling luminaires.
The lighting of the shooting positions should be designed with ceiling luminaires with a power of 44W (2x22W) so that the lighting intensity at the shooting positions is 300lx. In addition to general lighting, the designated luminaires will act as emergency and evacuation lighting. These luminaires should be

[2] EN 1522 FB = testing of armoured non-transparent materials (eg joinery, steel plates) EN = European standard

equipped with emergency modules supporting the power supply for at least 1 hour. All luminaires in the shooting hall should possess IP 66 and IK08.

The lighting of the other rooms of the shooting range.

Ceiling-mounted luminaires with LED light sources. Suspended ceilings have been designed in the training and social part. Therefore, this type of lighting can be used in the training and social part where suspended ceilings will be installed.
In bathrooms and technical rooms, luminaires with a minimum protection level of IP54 should be used; in sanitary rooms and storage rooms, IP44 downlight luminaires have been designed.




1.2 2- DOOR AIR LOCK.

The airlock consists of two double doors, about 2 m wide. The entrance door to the shooting hall is made in BR7 bulletproof technology, and the frames must also meet these parameters. The second door to the shooting hall - glazed aluminium, grey. Over the entrance to the shooting hall, an illuminated, automatically activated inscription "WARNING SHOOT" should be installed at the start of shooting training.


An electromagnetic jumper should be installed in the doors, released by the staff in the shooting control room and, in emergency cases, inside the shooting hall. On the entrance door, an inscription and marking should be made about using personal hearing protectors when performing shooting. The floor is made of porcelain tiles. Remember to make a drop of about 5 cm from the plenum line to the second entrance door so as not to create any stairs that would hinder the movement and access of cleaning machines (the ground of the shooting range has been raised by 5 cm). Suspended ceiling at the height of about 2.50 m of a metal structure filled with mineral fibre boards 60x60 cm. The walls are made of porous ceramics, 11.5 cm thick, covered with cement-lime plaster and smooth plaster.

1.3 TECHNICAL CORRIDOR.

Along the left wall of the shooting hall, a technical hallway will be constructed for safe access into the zone of the main bullet trap and covered structure and for servicing the equipment and elements of the shooting range located in the direct firing zone. Access to the corridor area is provided from the side of the shooting hall through bulletproof doors with additional lining in the form of anti-bullet plates of min. 5 cm and steel sheets type AR 500 plate-steel, on the level of the shooting range plane - double-leaf, into the zone of the main shooting range and the 25m target line.

Corridor entrance - technical entrance. In the construction zone of the main bullet trap, a technical door is designed from the corridor space to allow access into the covered area of the lower drop structure of the main bullet trap to enable cyclic checking of the technical condition of the structure and detection of any deformations, damages or voids. Width about 1.20-1.30 cm.

The floor is made of porcelain tiles. The walls on both sides are panelled with pebble plaster, 1.60 m high. Suspended ceiling at the height of about 2.50 m of a metal structure with mineral fibre board filling. One specialist steel entrance door, 24 V DC electromagnet lock - opening control with light signalling.

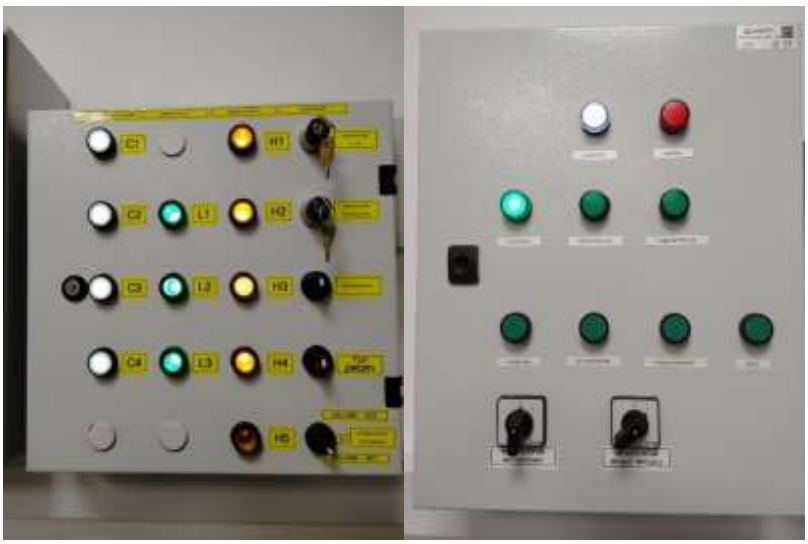
It is allowed to liquidate the technical corridor if the main bullet trap version without the hopper is selected and it is under the applicable fire regulations.

1.4 RANGE SAFETY OFFICER CONTROL ROOM.

It is the most crucial room in the entire shooting range facility. It should be designed so that all devices of the shooting range can be controlled directly from this place.

Therefore, in this room should be installed:
- control panel for ventilation, supply and heating systems;

- central control panel for shooting hall lighting systems as a whole, for each shooting line separately, for night shooting, strobe lighting, and police signals;



- monitoring centre of the shooting hall and technical and training rooms;

- target retrieval control system;
- telephone and computer line;
- a system for signalling all electromagnetic jumpers informing them about closing the door and the possibility of starting shooting;

- a computer system enabling target field operation and automatic counting of shooting results;

- audio system for issuing commands, communication with functionaries in the shooting hall and waiting room, as well as enabling the disruption of shooting with previously prepared CDs: police sirens, sounds of screams, shootings, etc.

The room should be equipped with a non-opening window measuring approximately 250x200 cm, made of bullet-proof glass in the BR7 class. Also, the frames of this window must meet the same bulletproof conditions. This window will provide a direct view of the shooting hall and ongoing observation of all activities by RSO.

It is allowed to resign from the proposed solution, provided that video monitoring cameras are adequately installed, giving insight into the entire space of the shooting hall.

The room walls should be made of porous ceramics, 11.5 cm thick, covered with cement-lime plaster and smooth plaster. The ceiling is suspended at the height of about 2.50 m of a metal structure with mineral fibre board filling. Glazed aluminium doors in grey or silver.

The RSO control room should be equipped with the following:

1. 2 desks and 4 chairs.
2. Central computer with a monitor to operate the shooting range, target field, and monitoring system.
3. Lighting, sound and alarm control system.
4. Audio sound system: e.g. 120W RMS class PA amplifier with less than 1% distortion. One balanced XLR input and one unbalanced RCA input. The amplifier is equipped with impregnated transformers, a forced ventilation system, and protection circuits against short circuits, distortion, and overheating.
5. Electromagnetic jumpers control.

6. Two installation systems for issuing commands:
   a) Listening installation using active hearing protectors with a microphone (SA) - equipped with a call answering and volume control button and a microphone with adequate compensation of ambient sounds;
   b) A wireless communication system based on portable radiotelephones (RDT) or similar solutions.
7. Object switchboards.
8. In addition, a stretcher and a first aid kit because there is no room in the shooting range dedicated to a paramedic.

1.5 WAITING ROOM.

This place is dedicated to the shift awaiting its subsequent firing. It can also do pre-shooting briefings, discuss post-shooting activities, or hold briefings for shooting competitions. Also, this room will be equipped with a non-opening window measuring approximately 250x200 cm, made of bulletproof glass in class BR7. Also, the frames of this window must meet the same bulletproof conditions. This window will provide a direct view of the shooting hall and ongoing observation of all activities performed by the shooters. As in other rooms, the walls should be made of porous ceramics, 11.5 cm thick, covered with cement-lime plaster and a finishing coat. Suspended ceiling at about 2.50 m of a metal structure with mineral fibre board filling. The floor is made of porcelain tiles.

This room will be equipped with an 80/100-inch television monitor synchronized with the RSO central computer. On the TV screen, it will be possible to display the results and the current observation of the results obtained by the shooting shift. In addition, it is proposed to equip this room with a multimedia board on which it will be possible to play various presentations on the characteristics of weapons, scenarios of individual shooting exercises, or a situational briefing before tactical and shooting activities in the shooting house.

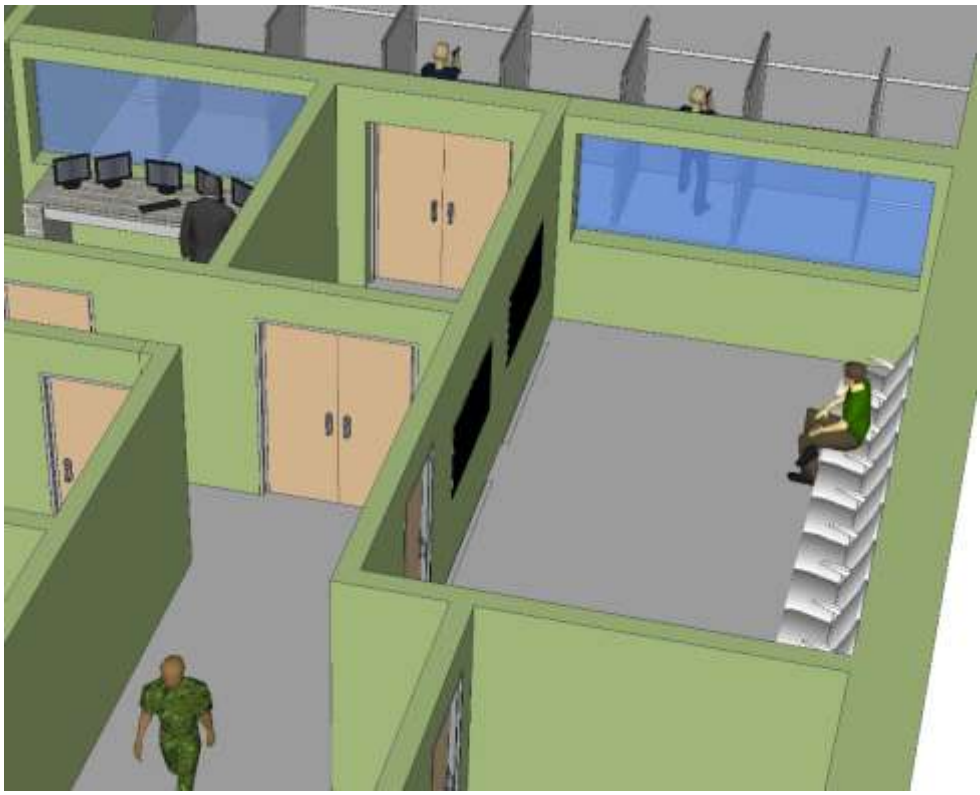


Fig. 6 An example of a waiting room visualization with a bulletproof window providing an insight into the shooting hall

Equipment of this room:

1. Non-opening window with dimensions of 250x200 cm - bulletproof in class BR7 NS.
2. An 80/100” TV set connected to the camera system allows viewing the target field and continuously analysing the shooting results.
3. 1 desk and 1 chair for the instructor.
4. 1 multimedia board.
5. 28 seats for students.
6. 1 school board.
7. 1 trash can.
8. Glazed aluminium door, steel or grey.

1.6 CLEANING WEAPON ROOM.

It is a place dedicated to cleaning firearms after a shooting. The walls should be made of porous ceramics, 24 cm thick, covered with cement-lime plaster and a finishing coat. The side walls should have panelling made of pebble plaster, 1.60 m high. A thicker partition wall is proposed to install a fire hydrant in this place. Suspended ceiling at about 2.50 m of a metal structure with mineral fibre board filling. The floor is made of polyurethane screed.

Suggested room equipment:

1. 1 device for safe unloading of weapons.

2. 2 gun cleaning tables.

3. 1 basket for dirty rags and 1 for clean ones.
4. 1 sink with a faucet with a timed water supply.

5. 1 soap dispenser.
6. Paper towel dispenser.
7. Full doors - wooden, panelled, steel frames, with a ventilation grille.

1.7 TECHNICAL ROOM (ELECTRIC).

This room is in line with the cleaning weapons room; therefore, it will be made of the same thickness of porous ceramics - 24 cm. Suspended ceiling at about 2.50 m of a metal structure with mineral fibre board filling. The floor is made of an antisatic screed. Walls - cement-lime plasters and latex paint. This space will contain the main power switchboard and all fuses and switchboards that do not have to be in the RSO room.

1.8 SHOOTING TRAINER ROOM:

This area is dedicated to installing the already existing aiming trainer system. It will be installed in a specially dedicated room, allowing students to use this device with total concentration. Suspended ceiling at about 2.50 m of a metal structure with mineral fibre board filling. PVC floor. Porous ceramic wall, 11.5 cm.

Suggested room equipment:

1. Full doors - wooden, panelled, steel frames, with a ventilation grille.
2. 3 school desks.
3. 1 chair.

1.9 SHIELD STORAGE:

It is planned to store shooting targets, mobile bullet traps and other devices used to operate the shooting range in this room. Walls made of 11.5 cm porous ceramics, covered with cement-lime plaster. Panelling with oil paint should be made up to a height of 1.60 m. Solid doors - wooden, plate, steel frames, with ventilation grille. Suspended ceiling at an altitude of about 2.50 m of a metal structure with mineral fibre board filling. 2 storage racks up to 2m high, consisting of 4-5 shelves.

1.10 CLEANING MATERIALS STORAGE:

It is a specially dedicated room for storing an industrial vacuum cleaner, scrubber dryer and other equipment and chemicals needed to keep the shooting range clean. The walls are made of porous ceramics, 11.5 cm thick. Up to a height of 1.40 cm, a wall is made of ceramic tiles above cement-lime plaster and putty. Suspended ceiling at an altitude of about 2.50 m of a metal structure with mineral fibre board filling.

Suggested equipment:

1. Solid doors - wooden, plate, steel frames, with ventilation grille.
2. 1 storage rack up to 2m high, consisting of 4-5 shelves.
3. 2 metal cabinets: 1 for cleaning products, the other for working clothes for the cleaner.
4. Forced ventilation.

5. 1 industrial vacuum cleaner for working with hazardous and explosive dust.
6. 1 industrial scrubber.
7. 1 shell collecting device.
8. 3 sets for cleaning and cleaning: 1 for the shooting range, 2 for the gun cleaning room, 3 for classrooms, social and storage spaces.

1.11 ENTRANCE HALL.

The entrance hall connects all the rooms of the former "old" shooting hall into one passageway. The floor will be made of stoneware tiles, the walls will be covered with cement-lime plaster, and in addition to the height of 1.60 cm, panelling will be made of pebble plaster. Suspended ceiling at an altitude of about 2.50 m of a metal structure with mineral fibre board filling. A fire hydrant will be installed in the hall at the height of the CWR.

2. THE SECOND PART OF THE SHOOTING RANGE WILL CONSIST OF THE FOLLOWING:

1) entrance hall with stairs;
2) lecture hall;
3) locker room for students;
4) locker room for instructors.

2.1 ENTRANCE HALL WITH STAIRS.

The hall is the main communication point leading to the shooting range. First, the stairs should be widened to meet all the evacuation and fire regulations parameters. All cabinets with power connections and fuses should be removed from there and redesigned so that all the systems listed earlier are in the RSO control room and the rest in the technical room. In the hall, a fire control panel and a two-door aluminium door, glazed to the "old part of the shooting range", should be installed, constituting a fire barrier.

The walls should be covered with cement-lime plaster, and in addition to the height of 1.60 cm, the panelling should be made of pebble plaster. Above this height, it is recommended to make a finishing coat.

2.2 CLASSROOM.

It is proposed to leave the classroom in its place, but it requires a significant renovation. Unfortunately, the walls are covered with wood-like veneer, which is highly flammable and a fire hazard. In addition, the classroom is located in the basement, so it requires the installation of excellent quality lighting and ventilation/air conditioning. A suspended ceiling should be installed at about 2.60 m of a metal structure with a mineral fibre board filling the room. Around the side walls, making panelling of stone plaster with a height of 1.60 m is recommended. The floor should be made of PVC flooring.

Fig. 7 Visualisation of the classroom

The classroom should be equipped with the following:

1. Lighting and ventilation/air conditioning system.
2. 1 multimedia board.
3. 1 school board.
4. A computer.
5. 1 multimedia projector with a speaker.
6. 1 desk and 1 chair for the teacher.
7. School benches and chairs for 28 students.
8. Full wooden doors.
9. Wastebasket.

2.3 LOCKER ROOM.

This social room will be created on the site of the existing warehouse. Its creation will allow for the safe storage of students' jackets and backpacks currently stored in the shooting hall. In place of the presently located switchboards, the entrance door to this room should be forged. A suspended ceiling should be installed in the room at about 2.60 m of a metal structure filled with mineral fibre

boards. Around the side walls, making panelling of stone plaster with a height of 1.60 m is recommended. The floor should be made of porcelain tiles. In the locker room, hanger -benches for 28 people and a waste bin should be placed. Full doors - wooden, panelled, steel frames, with a ventilation grille.

2.4 Locker room for instructors.

It is recommended to create a room where lecturers can keep their uniforms and personal belongings and change into them for official activities. This room is planned to be equipped with 8 wardrobes and one bench.

FIRE PROTECTION INSTALLATION.

It is crucial to design and build an effective fire protection system that ensures the fire safety of the entire facility. The installation should be equipped with a control panel located in the main hall, a minimum of 2 hydrants 30m long (it is suggested to place the one on the CWR wall and the second in the technical corridor next to the main bullet trap), a system of smoke and temperature detectors located not only in the shooting hall and other rooms with 220v voltage but also in the sewers ventilation installations, where unburned powder residues may ignite.

At the entrance to the shooting range, there should be a fire switch in a special IP55 plug-in housing with a door that can be broken with a glass equipped with a control button. The shooting range should also be equipped with powder extinguishers and clear markings of escape routes. The fire control panel should also be connected to the control station of the Academy's duty service and, if so provided by local regulations, to the nearest fire brigade unit.


The fire protection system should be equipped with the following:

1. 1 fire control panel.
2. 2 internal hydrants equipped with a semi-rigid pressed hose, 30 m long.
3. Fire protection system made of double galvanized steel pipes threaded. Hydrant pipes should be run in the floors.
4. 2kg ABC powder fire extinguishers, 1 piece for every 100 m2 of the surface. They can be of different sizes while maintaining safety standards.
5. Smoke detectors.
6. Temperature detectors.
7. Markings of escape routes.
8. At the entrance to the shooting range, install a typical fire switch in a special IP55 plug-in housing with a door that can be broken with a glass, equipped with a control button.
9. 3 alarm sirens: in the shooting hall, in the main entrance and outside the building.

The shooting range designed in the manner proposed by the consultant, based on examples from the European police and border guards, guarantees its full functionality and multitasking.

The proposed solutions and technologies may differ slightly, but they must not reduce the safety parameters of the shooting range.

In the consultant's opinion, any attempt to match the new equipment to the existing installations and construction solutions will be a waste of funds allocated for this investment. Only the execution of a general overhaul and installing new technological solutions guarantee the project's success.

During the study visit, the consultant drew attention to one element, also described in the UNDP technical report, namely the leaking roof of the sports hall, which causes short circuits in the electrical installation at the shooting range level. There is also no vertical insulation of the foundation walls, and the building has no drainage or rainwater drainage system. The scope of these works should also be taken into account during project implementation.

Summing up the proposed scope of changes, the consultant would like to point out the most important things again:

1. The shooting hall will be designed as a shooting range with 3 bullet traps, allowing for shooting within a radius of 180 degrees.

2. The main bullet trap will be made of rubber granulate; the side bullet traps will be made of rubber-polyurethane ballistic blocks.
3. Additional equipment will be a system of sliding walls enabling the implementation of complex tactical and shooting exercises in the form of a shooting house.
4. Entrances to the shooting hall are controlled only through doors equipped with electromagnetic jumpers. Emergency release buttons for electromagnetic jumpers should be installed at each entry on the side to and from the shooting range.
5. The shooting hall will be equipped with a system of fixed, moving and appearing targets adapted to the applicable shooting programs.
6. The shooting hall will be equipped with a main, emergency and strobe lighting system and "police-type lights".
7. In all other rooms, apart from the main hall, it is proposed to install system-suspended ceilings of metal construction with mineral fibre boards sized 60x60cm. In the "old part of the shooting range", they will be at a height of about 2.50 m due to the two overhead baffles on the ceiling, which lower the room to a height of 2.56 cm. In other rooms, they will be at an altitude of about 2.60 cm. In the toilet and cleaning material storage, it is recommended to install boards with increased resistance to moisture.
8. The entrance to the shooting hall will be through a two-door airlock. In the entrance lock, the floor should be laid with a slope of 5 cm towards the corridor to level the floor and allow the cleaning machines to enter the shooting hall.
9. A newly designed ventilation and supply system will heat the shooting hall. The remaining rooms of the shooting range should be heated with panel radiators. Forced ventilation must be installed in the CWR. It is not allowed for the ventilation supplying the shooting hall to serve other shooting range rooms.
10. All new cables are proposed to be installed in the space between the ceiling and the suspended ceiling.
11. In the RSO control room, it is necessary to design the endings of all installations that serve the direct service of the shooting hall.
12. Porous ceramics with the finishing method proposed for each room.
13. The shooting range must be equipped with a modern, efficient fire protection system.
14. It is also necessary to design a new electrical installation, supplying electricity to the newly created rooms.
15. The shooting range has specially designed technical rooms for storing targets, cleaning materials and devices to keep the shooting range clean, and a particular room where the main power switchgear and all installations not operated from the RSO level should be installed.
16. A video-monitoring system operated from the RSO level will cover the shooting range.
17. The shooting range also has three training and additional rooms for students: a waiting room - intended for people waiting for their turn to shoot; a shooting trainer - where the person can shoot with laser devices and CWR, where shooters can clean their weapon immediately after leaving the shooting hall.
18. The lecture hall was designed as a modern didactic room with a multimedia board and adequate lighting and heating system.
19. All materials and devices must have appropriate certificates. Other solutions are acceptable, provided that the safety parameters of the shooting range are maintained.

4.2 Economic aspect of the feasibility study.

Analyzing the economic aspect of the proposed modernization of the indoor shooting range, we should first consider that the project will radically differ from the initially assumed version. Well, the modernization of the shooting range as a 50-meter shooting range turned out to be impossible to implement for the reasons described by the consultant earlier. A new, 25-metre indoor shooting range should be practically created along with training and social facilities. For this purpose, new partitions must be built to create new rooms. New fire protection, electrical, computer, communication, heating, lighting, ventilation and monitoring systems should be made from scratch. In the expert's opinion, all the above activities will ultimately be cheaper than the previously assumed cost of modernizing the 50-meter shooting range. It is because the most expensive modernization cost is the equipment of the shooting hall. Why will the costs be lower?

1. Half the AR 500 steel sheets and rubber-polyurethane anti-ricochet panels will be used to make the side bullet traps.
2. The floor area of the shooting hall will also be reduced by half, so the anti-ricochet floor panels will also be needed by half. Reducing the surface of the polyurethane screed will also contribute to reducing costs.
3. The cost of creating a ventilation system will also be lower because the exhaust turbines will be less powerful, and the ventilation ducts will be shorter.
4. Also, the entire system of six TRSs will be 25m shorter each and cheaper.
5. The situation regarding lighting will be similar - fewer light points and power cables.
6. Overhead baffles - should be made 2 less than assumed.
7. In addition, the anti-ricochet and acoustic protection of the ceiling will also be smaller than the assumed size.

To further reduce costs, the consultant proposes to hire a local construction company as a subcontractor, which will perform all construction and renovation works, preparing the facility to assemble specialist equipment.

During the modernization of the dormitory for students of the Training Center for Younger Specialists in Czerkasy (Ukraine), to speed up the pace of work and reduce costs, a large part of the demolition work was done by students in their free time. It is proposed to use a similar solution for this modernization.

Considering the economic aspect, it should also be considered whether constructing a new, mobile 4-station container shooting range will not be cheaper than the modernization of the existing one. A detailed cost analysis will be presented later in the study in the section on potential scenarios.

If the decision-makers and the Donor decide to build a new, mobile container shooting range, then in place of the currently existing shooting range, a room for learning tactics and intervention techniques can be created at a relatively low cost. In this case, a complete sports infrastructure would be created: in the basement part intended for learning self-defence and tactics and intervention techniques, in the ground floor part - a hall typical for sports activities.

Tab.1 Pricing according to Scenario 1

No.	Type of equipment	Unit Price	Quantity	Total Price
1	Target retrieval system - longitudinal	5500	6	33000
2	Target retrieval system - transverse	7850	1	7850
3	Five target turntable station with a bulletproof cover	6550	1	6550
4	Universal system for situational shooting with a computer hit registration system	35500	1	35500
5	Adjustable workstation table	253	6	1518
6	Lane Dividers	5800	6	34800
7	Granular Rubber Bullet Trap	75000	1	75000
8	Wooden adjustable field screen - big	395	4	1580
9	Wooden adjustable field screen - small	242	4	968
10	Overhead baffles	11400	8	91200
11	Shell container	145	2	290
12	Missile container	170	1	170
13	Waste container	100	1	100
14	Gun clearing trap	1200	1	1200
15	Trolley-shield stand	500	1	500
16	Trolley platform transport	200	1	200
17	Police lights	1500	2	3000
18	Smoke generator	1400	1	1400
19	RGB LED strobe	1200	2	2400
20	Explosion-proof vacuum cleaner	6000	1	6000
21	Ammo-Up Push Brass Collector	599	1	599
22	Cleaning machine scrub dryer	3514	1	3514
23	Shooting googles	35	20	700
24	Hearing protection for instructors	640	10	6400
25	Hearing protection for students	213	10	2130
26	Tactical gloves for instructors	19	10	190
27	Earplugs	150	2	300
28	Taker for fixing shields	10	5	50
29	Staples 1000 pcs.	2	10	20
30	Installation of acoustic dampening of the SR - walls in the area of stands and to the firing line m2	159	63,2	10048,8
31	Installation of the acoustic damping - walls in the shooting zone and above the side bullet traps m2	143	99,5	14228,5
32	Wall cladding of the SR - shooting zone - wall protection at the main/side bullet trap, up to a height of 2,5/3,5 m m2	155	115	17825
33	Wall cladding of the SR - the stands area- additional protection of the walls at the stands, up to a height of 2,5 m m2	155	10	1550
34	Wall cladding of the SR - the stands area- additional protection of the walls at the stands, up to a height of 2,5 m m2	27	25	675

35	Wall cladding of the SR - shooting zone - a rear wall of the bullet trap up to a height of 220 cm - additional insulating wool m2	159	14,6	2321,4
36	SR acoustic insulation - shooting range ceiling m2	132	324	42768
37	SR acoustic insulation - shooting range ceiling over bullet trap m2	159	60,8	9667,2
38	Floor m2	132	358,9	47374,8
39	Set of doors	20000	1	20000
40	Bulletproof window	25460	2	50920
41	Electric installation with lightning	62297	1	62297
42	Air handling unit with a capacity of 35,000 m3/h + Carel automation + service 36 months	123000	1	123000
43	Ventilation ducts/Fittings/Intakes/Exhausts	49000	1	49000
44	Duckts treatment with monarplan membrane	17000	1	17000
45	Heat pump condensing unit refrigeration system service 36 months	83000	1	83000
46	Insulation of ventilation ducts	23000	1	23000
47	Supply plenum/exhaust grilles	46000	1	46000
48	Mounting materials/suspension systems/jacks	17000	1	17000
49	Installation of the ventilation system with start-up	109000	1	109000
50	Fire protection system	15000	1	15000
51	Videomonitoring system	15000	1	15000
52	Access control system	2500	1	2500
53	Classroom's furniture set	7500	1	7500
54	Classroom's equipment	2500	1	2500
55	RSO - 2 tables and chairs	1260	1	1260
56	RSO- amplifier	1400	1	1400
57	RSO- horn loudspeaker	58	2	116
58	RSO- Motorola set	638	1	638
59	RSO- tie microphone	21	2	42
60	CMS - metal cabinet	550	1	550
61	CMS- storage shelf	40	1	40
62	CMS - cleaning trolley	95	3	285
63	Shield storage - shield shelf	45	2	90
64	Weapon cleaning table	480	2	960
65	Locker room for students-four-compartment social wardrobe	180	7	1260
66	Locker room for instructors - social wardrobe	215	8	1720
67	Ventilation system/heating pump for remaining spaces	65000	1	65000
68	Security signalling system	2500	1	2500
69	Low Current Networks	5000	1	5000
70	Shipping estimate	25000	1	25000
				1212165,7

Tab.2 Pricing according to Scenario 2

No.	Type of equipment	Unit Price	Quantity	Total Price
1	Target retrieval system - longitudinal	5500	6	33000
2	Target retrieval system - transverse	7850	1	7850
3	Five target turntable station with a bulletproof cover	6550	1	6550
4	Universal system for situational shooting with a computer hit registration system	35500	1	35500
5	Portable bullet trap	2350	4	9400
6	Moving walls to the shooting house - set	119500	1	119500
7	Adjustable workstation table	253	6	1518
8	Lane Dividers	5800	6	34800
9	Granular Rubber Bullet Trap	85000	1	85000
10	Wooden adjustable field screen - big	395	4	1580
11	Wooden adjustable field screen - small	242	4	968
12	Overhead baffles	11400	8	91200
13	Shell container	145	2	290
14	Missile container	170	1	170
15	Waste container	100	1	100
16	Gun clearing trap	1200	1	1200
17	Trolley-shield stand	500	1	500
18	Trolley platform transport	200	1	200
19	Police lights	1500	2	3000
20	Smoke generator	1400	1	1400
21	RGB LED strobe	1200	2	2400
22	Explosion-proof vacuum cleaner	6000	1	6000
23	Ammo-Up Push Brass Collector	599	1	599
24	Cleaning machine scrub dryer	3514	1	3514
25	Shooting googles	35	20	700
26	Hearing protection for instructors	640	10	6400
27	Hearing protection for students	213	10	2130
28	Tactical gloves for instructors	19	10	190
29	Earplugs	150	2	300
30	Taker for fixing shields	10	5	50
31	Staples 1000 pcs.	2	10	20
32	Installation of acoustic dampening of the SR - walls in the area of stands and to the firing line m2	159	63,2	10048,8
33	Installation of the acoustic damping - walls in the shooting zone and above the side bullet traps m2	143	99,5	14228,5
34	Wall cladding of the SR - shooting zone - wall protection at the main/side bullet trap, up to a height of 2,5/3,5 m m2	1040	115	119600
35	Wall cladding of the SR - the stands area- additional protection of the walls at the stands, up to a height of 2,5 m m2	155	10	1550
36	Wall cladding of the SR - the stands area- additional protection of the walls at the stands, up to a height of 2,5 m m2	27	25	675

37	Wall cladding of the SR - shooting zone - a rear wall of the bullet trap up to a height of 220 cm - additional insulating wool m2	159	14,6	2321,4
38	SR acoustic insulation - shooting range ceiling m2	132	324	42768
39	SR acoustic insulation - shooting range ceiling over bullet trap m2	159	60,8	9667,2
40	Floor m2	132	378,9	50014,8
41	Set of doors	20000	1	20000
42	Bulletproof window	25460	2	50920
43	Electric installation with lightning	62297	1	62297
44	Air handling unit with a capacity of 35,000 m3/h + Carel automation + service 36 months	123000	1	123000
45	Ventilation ducts/Fittings/Intakes/Exhausts	49000	1	49000
46	Duckts treatment with monarplan membrane	17000	1	17000
47	Heat pump condensing unit refrigeration system service 36 months	83000	1	83000
48	Insulation of ventilation ducts	23000	1	23000
49	Supply plenum/exhaust grilles	46000	1	46000
50	Mounting materials/suspension systems/jacks	17000	1	17000
51	Installation of the ventilation system with start-up	109000	1	109000
52	Fire protection system	15000	1	15000
53	Videomonitoring system	15000	1	15000
54	Access control system	2500	1	2500
55	Classroom's furniture set	7500	1	7500
56	Classroom's equipment	2500	1	2500
57	RSO - 2 tables and chairs	1260	1	1260
58	RSO- amplifier	1400	1	1400
59	RSO- horn loudspeaker	58	2	116
60	RSO- Motorola set	638	1	638
61	RSO- tie microphone	21	2	42
62	CMS - metal cabinet	550	1	550
63	CMS- storage shelf	40	1	40
64	CMS - cleaning trolley	95	3	285
65	Shield storage - shield shelf	45	2	90
66	Weapon cleaning table	480	2	960
67	Locker room for students-four-compartment social wardrobe	180	7	1260
68	Locker room for instructors - social wardrobe	215	8	1720
69	Ventilation system/heating pump for remaining spaces	65000	1	65000
70	Security signalling system	2500	1	2500
71	Low Current Networks	5000	1	5000
72	Shipping Estimate	25000	1	25000
				1455480,7

Tab. 3 Pricing according to Scenario 3A – with multifunctional interactive shooting range

No.	Type of equipment	Unit Price	Quantity	Total Price
1	Target retrieval system - longitudinal	5500	6	33000
2	Target retrieval system - transverse	7850	1	7850
3	Five target turntable station with a bulletproof cover	6550	1	6550
4	Universal system for situational shooting with a computer hit registration system	35500	1	35500
5	Portable bullet trap	2350	6	14100
6	Moving walls to the shooting house-set	119500	1	119500
7	Adjustable workstation table	253	6	1518
8	Lane Dividers	5800	6	34800
9	Granular Rubber Bullet Trap	85000	1	85000
10	Wooden adjustable field screen - big	395	4	1580
11	Wooden adjustable field screen - small	242	4	968
12	Overhead baffles	11400	8	91200
13	Side bullet trap -additional rubber blocks 50x30x20cm	1320	60	79200
14	Shell container	145	2	290
15	Missile container	170	1	170
16	Waste container	100	1	100
17	Gun clearing trap	1200	1	1200
18	Trolley-shield stand	500	1	500
19	Trolley platform transport	200	1	200
20	Smoke generator	1400	1	1400
21	Police lights	1500	2	3000
22	RGB LED strobe	1200	2	2400
23	Explosion-proof vacuum cleaner	6000	1	6000
24	Ammo-Up Push Brass Collector	599	1	599
25	Cleaning machine scrub dryer	3514	1	3514
26	Shooting googles	35	20	700
27	Hearing protection for instructors	640	10	6400
28	Hearing protection for students	213	10	2130
29	Tactical gloves for instructors	19	10	190
30	Earplugs	150	2	300
31	Taker for fixing shields	10	5	50
32	Staples 1000 pcs.	2	10	20
33	Installation of acoustic dampening of the SR - walls in the area of stands and to the firing line m2	159	63,2	10048,8
34	Installation of the acoustic damping - walls in the shooting zone and above the side bullet traps m2	143	99,5	14228,5
35	Wall cladding of the SR - shooting zone - wall protection at the main/side bullet trap, up to a height of 2,5/3,5 m m2	1040	115	119600
36	Wall cladding of the SR - the stands area- additional protection of the walls at the stands, up to a height of 2,5 m m2	155	10	1550

37	Wall cladding of the SR - the stands area- additional protection of the walls at the stands, up to a height of 2,5 m m2	27	25	675
38	Wall cladding of the SR - shooting zone - a rear wall of the bullet trap up to a height of 220 cm - additional insulating wool m2	159	14,6	2321,4
39	SR acoustic insulation - shooting range ceiling m2	132	324	42768
40	SR acoustic insulation - shooting range ceiling over bullet trap m2	159	60,8	9667,2
41	Floor m2	132	378,9	50014,8
42	Set of doors	20000	1	20000
43	Bulletproof window	25460	1	25460
44	Electric installation with lightning	62297	1	62297
45	Air handling unit with a capacity of 40,000 m3/h + Carel automation + service 36 months	150000	1	150000
46	Ventilation ducts/Fittings/Intakes/Exhausts	49000	1	49000
47	Duckts treatment with monarplan membrane	17000	1	17000
48	Heat pump condensing unit refrigeration system service 36 months	83000	1	83000
49	Insulation of ventilation ducts	23000	1	23000
50	Supply plenum/exhaust grilles	46000	1	46000
51	Mounting materials/suspension systems/jacks	17000	1	17000
52	Installation of the ventilation system with start-up	109000	1	109000
53	Fire protection system	15000	1	15000
54	Videomonitoring system	15000	1	15000
55	Access control system	2500	1	2500
56	Classroom's furniture set	7500	1	7500
57	Classroom's equipment	2500	1	2500
58	RSO - 2 tables and chairs	1260	1	1260
59	RSO- amplifier	1400	1	1400
60	RSO- horn loudspeaker	58	2	116
61	RSO- Motorola set	638	1	638
62	RSO- tie microphone	21	2	42
63	CMS - metal cabinet	550	1	550
64	CMS- storage shelf	40	1	40
65	CMS - cleaning trolley	95	3	285
66	Shield storage - shield shelf	45	2	90
67	MILO- interactive training system with 3 screens	235000	1	235000
68	Implementation of additional scenarios according to the needs of the ordering party (10 films)	5000	1	5000
69	ISR - equipment	29546	1	29546
70	ISR - building and plumbing components	71097	1	71097
71	Ventilation ducts/shapes/intakes/outlets	23 000	1	23000
72	Treatment of channels with monarplan membrane	9 000	1	9000
73	Insulation of ventilation ducts	12 000	1	12000
74	Supply plenum/exhaust grilles	23 000	1	23000
75	Mounting materials/suspension systems/lifts	9 000	1	9000

76	Ventilation system/Heating pump for remaining spaces	65 000	1	65000
77	Low Current Network	5 000	1	5000
78	Security signalling system	2500	1	2500
79	Shipping Estimate	25000	1	25000
				1953623,7

Tab. 4 Pricing according to Scenario 3B – with an interactive laser shooting range

No.	Type of equipment	Unit Price	Quantity	Total Price
1	Target retrieval system - longitudinal	5500	6	33000
2	Target retrieval system - transverse	7850	1	7850
3	Five target turntable station with a bulletproof cover	6550	1	6550
4	Universal system for situational shooting with a computer hit registration system	35500	1	35500
5	Portable bullet trap	2350	6	14100
6	Moving walls to the shooting house-set	119500	1	119500
7	Adjustable workstation table	253	6	1518
8	Lane Dividers	5800	6	34800
9	Granular Rubber Bullet Trap	85000	1	85000
10	Wooden adjustable field screen - big	395	4	1580
11	Wooden adjustable field screen - small	242	4	968
12	Overhead baffles	11400	8	91200
13	Side bullet trap -additional rubber blocks 50x30x20cm	1320	60	79200
14	Shell container	145	2	290
15	Missile container	170	1	170
16	Waste container	100	1	100
17	Gun clearing trap	1200	1	1200
18	Trolley - shield stand	500	1	500
19	Trolley platform transport	200	1	200
20	Smoke generator	1400	1	1400
21	Police lights	1500	2	3000
22	RGB LED strobe	1200	2	2400
23	Explosion-proof vacuum cleaner	6000	1	6000
24	Ammo-Up Push Brass Collector	599	1	599
25	Cleaning machine scrub dryer	3514	1	3514
26	Shooting googles	35	20	700
27	Hearing protection for instructors	640	10	6400
28	Hearing protection for students	213	10	2130
29	Tactical gloves for instructors	19	10	190
30	Earplugs	150	2	300
31	Taker for fixing shields	10	5	50
32	Staples 1000 pcs.	2	10	20
33	Installation of acoustic dampening of the SR - walls in the area of stands and to the firing line m2	159	63,2	10048,8
34	Installation of the acoustic damping - walls in the shooting zone and above the side bullet traps m2	143	99,5	14228,5
35	Wall cladding of the SR - shooting zone - wall protection at the main/side bullet trap, up to a height of 2,5/3,5 m m2	1040	115	119600
36	Wall cladding of the SR - the stands area- additional protection of the walls at the stands, up to a height of 2,5 m m2	155	10	1550

37	Wall cladding of the SR - the stands area- additional protection of the walls at the stands, up to a height of 2,5 m m2	27	25	675
38	Wall cladding of the SR - shooting zone - a rear wall of the bullet trap up to a height of 220 cm - additional insulating wool m2	159	14,6	2321,4
39	SR acoustic insulation - shooting range ceiling m2	132	324	42768
40	SR acoustic insulation - shooting range ceiling over bullet trap m2	159	60,8	9667,2
41	Floor m2	132	378,9	50014,8
42	Set of doors	20000	1	20000
43	Bulletproof window	25460	1	25460
44	Electric installation with lightning	62297	1	62297
45	Air handling unit with a capacity of 35,000 m3/h + Carel automation + service 36 months	123000	1	123000
46	Ventilation ducts/Fittings/Intakes/Exhausts	49000	1	49000
47	Duckts treatment with monarplan membrane	17000	1	17000
48	Heat pump condensing unit refrigeration system service 36 months	83000	1	83000
49	Insulation of ventilation ducts	23000	1	23000
50	Supply plenum/exhaust grilles	46000	1	46000
51	Mounting materials/suspension systems/jacks	17000	1	17000
52	Installation of the ventilation system with start-up	109000	1	109000
53	Fire protection system	15000	1	15000
54	Videomonitoring system	15000	1	15000
55	Access control system	2500	1	2500
56	Classroom's furniture set	7500	1	7500
57	Classroom's equipment	2500	1	2500
58	RSO - 2 tables and chairs	1260	1	1260
59	RSO- amplifier	1400	1	1400
60	RSO- horn loudspeaker	58	2	116
61	RSO- Motorola set	638	1	638
62	RSO- tie microphone	21	2	42
63	CMS - metal cabinet	550	1	550
64	CMS- storage shelf	40	1	40
65	CMS - cleaning trolley	95	3	285
66	Shield storage - shield shelf	45	2	90
67	MILO- interactive laser training system with 3 screens	150000	1	150000
68	Implementation of additional scenarios according to the needs of the ordering party	5000	1	5000
69	Ventilation system/Heating pump for remaining spaces	65 000	1	65000
70	Low Current Network	5 000	1	5000
71	Security signalling system	2500	1	2500
72	Shipping Estimate	25000	1	25000
				1664980,7

All prices proposed in scenarios 1-3 are net prices.
The costings produced do not include the following:

1. Air handling unit:
   a) Electricity supply to equipment;
   b) Roof and wall flashings;
   c) Roof penetration flashings;
   d) Support structure for equipment on the roof;
   e) Costs of hiring a crane;
   f) Fire dampers for ventilation equipment.
2. The cost of ventilating the rest of the shooting range.
3. The costs of carrying out the construction project and obtaining all the required building permits.
4. Customs and taxes.
5. Costs of dismantling the existing shooting range infrastructure.
6. Building preparation costs for the installation of the shooting range equipment and other facilities:
   a) Levelling of the shooting hall floor;
   b) Building new rooms, walls and ceilings;
   c) Implementation of all necessary installations.

A 36-month warranty on the air handling units is included in the price. It is planned to change the HVAC filters once a year. The warranty for the shooting hall equipment ranges from 12 to 36 months, depending on the bidder.

The price of the shooting range presented in scenario No.4 is 1,400,000 EURO or 1,498,000 USD. It is the net price.

The price does not include the following:
- taxes and customs duties;
- the cost of renting a crane at the construction site for a period of approximately two weeks;
- the cost of preparing the substrate;
- costs of transport and accommodation of the assembly team.

There is a possibility to order a shooting range in the basic version, i.e. without a medical point, waiting room and gun cleaning room). Then the shooting range will be cheaper by EUR 200,000, i.e. USD 1,284,000 net.
Before the arrival of the installation team, the local subcontractor must prepare the subfloor. The ground for the foundation of the shooting range should be levelled and mechanically hardened. Then concrete slabs are placed on it. 15 cm (alternatively, it is possible to pour concrete footings). Then, steel profiles (e.g. IPE240 I-beam) are laid, on which the shooting range is mounted.
Most importantly, the steel beams are all laid on the same level.
For weak, cohesive, watered soils, clays, clays, silts, and peats, the soil should be replaced to a depth with sand bedding mechanically compacted to Id min. 0.6. Each time, it is recommended to prepare a geotechnical opinion at the planned location of the shooting range. A power connection must also be brought to the construction site.

Power.

The Most-5/25 shooting range has a peak power of 94kW, and 250A protection is needed.
When it comes to electricity consumption, it is a very individual matter. It depends on many factors, mainly the summer and winter weather conditions, the time of training (operational ventilation), and the time of keeping the shooting range ready (parking ventilation). The firm proposes to assume that the energy demand for regular use and weather conditions ranges from 28kW to 44kW.

The annual cost of maintaining the facility.

The cost depends on electricity rates in Moldova. The calculations assumed teaching classes every day for four hours over 11 months—one month out of operation due to summer holidays at the Academy.

Energy consumption is 70 kWh.

4.3 Legal aspect of the feasibility study.

The consultant made the feasibility section presented below study, an analysis of selected legal acts provided by the Local Consultant. The information obtained by the consultant during the study visit shows that the most important legal act regarding shooting training is **Order No. 222 of July 20, 2017, on the approval of the Regulation on shooting instruction in the Ministry of Internal Affairs, supplemented by order no. 251 of June 11, 2021, Concerning the amendments Regulation on the instruction training within the Ministry of Internal Affairs, approved by MAI Order No 222/2017.**

Point 3.

3) shooting leader - specialist with duties in the field of shooting instruction or MAI employee with experience in the field, who directly organizes and conducts shooting sessions in the shooting range or shooting;

3) conducătorul tragerii - specialist cu atribuţii în domeniul instrucţiei tragerii sau angajat al MAI cu experienţă în domeniul respectiv, care organizează şi desfâşoară nemijlocit şedinţele de tragere ăn poligon sau tir;

I propose a complete record stating that the shooting leader may only be a person who possesses the state or departmental shooting instructor license. A record in its current form stipulates that the person should have the experience; however, there is no mention of the qualifications to be a shooting leader.

Point 26.

26. Până la începerea exerciţiilor de tragere, conducătorul tragerii:

1) comunică tema, scopul şi ordinea desfâşurării şedinţei;

2)indică în site locul de aliniere a trăgătorilor, poziţiile de tragere pentru trâgători, aliniamentele de tragere şi încetare a focului;

3) indică direcţiile de tragere interzise;

4) aduce la cunoştinţă măsurile de siguranţă.

26. Before firing exercises begin, the firing leader:

1) communicate the theme, purpose and order of the session;

2) indicate in the field the place where the shooters will line up, the firing positions for the shooters, and the firing and cease-fire lines;

3) indicate the prohibited firing directions;

4) information on safety measures.

I recommend adding point 5 - makes revive of weapons and ammunition before the start and after completion of shooting.

Point 62.

62. Integrated exercises are initially organized by conducting several practical exercises, using training weapons **(paintballs where appropriate)**, and firing with combat cartridges will be allowed if the shooters have acquired the appropriate skills and the shooting range/range allows for such exercises.

62.Exerciţiile integrate sunt organize initial prin desfăşurarea mai multor exerciţii practice, cu utilizarea armelor de instrucţie **(după caz, gloanţe cu vopsea),** iar tragerile cu cartuşe de luptă se vor permite in cazul in care trăgătorii au obţinut deprinderile corespunzătoare şi tirul/poligonul permite desfăşurarea

acestor exerciţii.

It is proposed to clarify this provision with the possibility of using FX dye ammunition. It is a commonly used system of dyeing ammunition, during which replicas of weapons that are equipped with organizational units are used. According to this record, only paintball guns are allowed.

Point 85.

85. In the process of handling firearms in the range/shooting range, MAI employees shall respect the following basic safety rules:
9) in the event of a misfire, jamming of mechanisms or other technical malfunction when firing, the shooter stops firing, maintains the firing position without manipulating the firearm, raises the hand without the gun up (reactive hand) and waits for orders from the firing leader.

85. în processul mânuirii armei de foe m poligon/tir, angajaţn MAI respecta următoarele reguli fundamentale de securitate:
9) în caz de rateu, blocarea mecanismelor sau alte defecte tehnice la executarea tragerilor, trăgătorul încetează tragerea şi păstrează poziţia de tragere fară a manipula arma, ridică mâna fără arma sus (mâna reactivă) şi aşte aptă ordinele conducătorului tragerii.

The shooter should remove weapon jams alone because such a situation may occur during daily official duties. Therefore, it is proposed to add a provision allowing for self-removal of the jam after obtaining the consent of the shooting leader.

Point 86.

86. MAI employees shall observe the following safety measures during shooting:
3) during firing, they do not show haste and nervousness;

86. Angajaţii MAI respectă următoarele măsuri de siguranţă în timpul tragerilor:
3) în timpul of tragedy nu manifestă grabă şi nervozitate;

It is recommended to delete this record. Generally speaking, the whole idea of dynamic and situational shooting is to perform specific shooting within a strictly defined time limit, often very short. The main goal of these shootings is to develop the habit of the so-called „muscle memory", i.e. to develop the practice of automatism. It can only be achieved by introducing time constraints and putting the shooter in a state of slight stress, such as several targets or changing the shooting position or magazine while firing.

Point 88.

88. MAI employees are categorically forbidden:
6) to point the weapon at people, whether the weapon is loaded or not;

88. Angajaţilor MAI li se interzice categoric:
6) să îndrepte arma spre oameni, indiferent dacă arma este încărcată sau nu;

The following wording is proposed:

6) point firearms at other people, except when conducting shooting training:

a) shotless,
b) with the use of dyeing ammunition.

The current wording of the provision **excludes any exercises with the use of dye ammunition**, as well as conducting non-shooting tactical activities because it prohibits aiming firearms at helpers, which is crucial during the training of special and counterterrorist units.

In addition to point 88, it is also recommended to introduce a provision in sub-section 10 with the following wording:

10) when another shooter crosses the cease-fire line.

It is critical for situational and tactical shooting when shooters shoot from variable fire lines.

There should also be a record of working/duty time.

The shooting instructor may conduct shooting training, programmed or checking shooting, and shooting competitions up to 6 lesson hours per day.

In the EU, this results directly from occupational health and safety regulations. Over this time, the teacher may be tired and distracted, leading to an accident.

Regulation of the functioning of the shooting range of the "Stefan cel Mare" MIA Academy.

Point II is proposed to be supplemented with the following provisions:

Classes conducted as part of the shooting training are aimed at familiarizing with the construction and rules of use and safe handling of small arms and ammunition, and in particular with:

1) shooting stances;
2) gun handling techniques;
3) ripping aiming devices;
4) pulling the trigger of small arms;
5) breathing techniques used when firing small arms.

Classes conducted as part of shooting training are aimed at developing proper habits and behaviours necessary when using small arms, in particular:

1) moving around with small arms, drawing firearms and taking shooting positions;
2) reloading guns by various means;
3) changing magazines in different shooting positions;
4) the use of curtains and additional sources of lighting;
5) clearing firearms jams.

In point IV, point 11, add: piercing and chemicals.

The decision does not include the duties of the firing and ammunition manager.

A record should also be made of what types of firearms and shooting stances are acceptable on the range. For example, this record:

Shooting with firearms is divided into:

1) static shooting, the aim of which is to teach basic shooting techniques and activities related to the safe handling of small arms;
2) rapid shooting, the aim of which is to improve shooting techniques during shooting with firearms conducted within limited time limits;
3) dynamic shooting, the purpose of which is to improve shooting techniques during shooting with guns conducted with FL variables;
4)situational shooting, the aim of which is to improve shooting techniques during shooting with firearms conducted in limited time limits from FL variables;

5) special shooting, the purpose of which is to improve the shooting techniques necessary to perform tasks requiring skills that go beyond the scope of shooting with firearms specified in points 1 - 4;
6) tactical shooting aims to improve the team shooting techniques referred to in point 5.

2. Shooting with firearms, referred to in par. 1 points 5 and 6 are carried out only by officers performing special activities specified in the provisions on the performance of special activities by MIA officers.
3. If it is necessary to conduct shootings with firearms other than those listed, it is required to develop a detailed description specifying the shooting conditions.
4. The description in question is approved by the Rector of the Academy.

Decision No. HG293/2014 of April 23, 2014, approving the regulation for the civil weapons and ammunition system.

271. La intrarea in tirule de trager , staff care urmeaza are effectueze activităţi de porter trebuie are summer in register de evident prevăzut la pct . 274 si 275, pantry and certificate faptul ca au luat cunoştinţă de conţinutul regulations de organize si funcţionare and tirului de porter si se obligation să -i respect prevederile.

This point should be changed in such a way that it does not apply to students of the Academy and schools subordinated to the MIA and the Ministry of Defense who have passed the theory test in the field of safety rules applicable at shooting ranges. Moreover, this provision should exclude all participants in the shootings of the above-mentioned ministries when these shootings are organised.

272. Personnel care urmeaza are effectueze activităţi de porter cu Alt tipuri de army decit goals pantry care sint authorize sau pe care le au in arrived trebuie are Urmeze un course de siguranţă in utilize , effect de personalul de specialitate din frame tirului de trager , respectiv de instructorii in tirule de porter .

For this reason, the consultant believes that the Academy should possess all types of weapons used by the uniformed services in Moldova, and the instructors should be able to handle all types of weapons at the Academy's disposal.

300. captatorul de gloanţe – in cazul thirurilor de porter interior , aesthetic compus dintr -o perdea de decelerare constitution dintr -o perdea de kiss cu inserts textila cu grosimea de min 8 mm, care accoperă about perdea de lanţuri de oţel sau de pays de oţel disuse in jaluzea , si din captatorul proprio -zis. Atit system de jaluzele , cit si wage principală de oţel , trebuie are asigure deflectarea gloanţelor spray podeaua polygonal .

Currently, this record is invalid. It applies only to lamellar bullet traps. Actually, the most popular and safe are bullet traps made of rubber granulate and rubber-polyurethane bullet traps. They are also the cheapest to maintain. It is currently the most popular and safest solution used in the USA and the European Union. Keeping this regulation makes the renovation of the shooting range according to the proposed standards impossible to carry out. It applies to all scenarios.

Ordon Cu privire la approbarea Instrucțiunilor Privind utility și funcționarea thirurilor din gestiunea subdivision of MAI.

În scopul asigurarii securității in impulse desfășurării ședințelor de trageri cu arma de foc , elaborării unei Instrucțiuni cu privire la cerințele de utilare și funcționare a sălilor de tragere (tir) în MAI subdivisions,

16. Se recomandă de fixat pe pereții laterali din preajma aliniamentului de așteptare panouri demonstrative cu poziții de tragere , părțile componente a armamentului din dotare , măsurile de siguranță , cît și obligațiunile persoanelor care asigură desfășurarea tragicor .

It is proposed to repeal this provision in its entirety. In the shooting hall, no flammable items may be present.

THE RISK OF LEAD POISONING.

In the Preliminary Needs Assessment Report, the consultant declared that he devoted more attention to the problems of lead contamination of the body and related regulations in the feasibility study. In the EU countries, the risk of lead dust was a severe problem a few years ago.

Lead can enter the body by being inhaled or by being swallowed. Lead can be inhaled when lead dust, mist, or fumes are in the air. Particles of lead can be swallowed if lead gets on a shooter's hands or face. When lead enters the bloodstream, it circulates throughout the body. The lead is stored in the organs and bones. Stored lead is released back into the bloodstream over time. The amount of lead in the blood can be measured. This test is called a blood lead level. A second test, the zinc protoporphyrin, measures long-term lead storage in the body. Lead that has been absorbed can affect many critical body systems. In high enough concentrations, lead has been shown to damage the brain, nerves, red blood cells, kidneys and reproductive systems. Depending on the intensity and frequency of exposure, symptoms can manifest suddenly in the case of acute lead poisoning or gradually in the case of chronic lead poisoning.

The most significant potential source of airborne lead at the firing line is caused by the hot flames of burning gunpowder acting on the exposed lead base of a projectile.

Maintenance of range equipment may cause settled lead dust to become airborne. Improper cleaning of a range may also cause lead dust to become airborne. **Dry sweeping** is a dangerous practice that significantly increases airborne lead levels.

The annual health examinations of the instructors working at the shooting ranges in Poland showed a significant level of exceeding the blood lead standards. It was caused by using lead ammunition for shooting and the insufficient operation of the old ventilation systems. For example, many systemic countermeasures have been taken in Poland. First of all, instructors who had exceeded the lead level in their blood were removed from work at shooting ranges, sometimes even for half a year. They were directed to perform other duties until they recovered. All MIA indoor shooting ranges have been included in the modernization program, primarily replacing the ventilation system with a modern, effective one equipped with HEPA filters. In addition, a decision was made to purchase only lead-free ammunition. Currently, lead ammunition can only be fired at open shooting ranges.

All instructors working at shooting ranges undergo mandatory medical examinations once a year.

One of the tests is laboratory tests, which consists of the following tests:

a) determinations of BLL – blood lead level;
b) hematocrit, haemoglobin;
c) peripheral smear morphology and red cell indices;
d) levels of ZPP - zinc protoporphyrin;
e) Routine urinalysis (specific gravity, sugar, protein determinations, microscopic examination);
f) blood urea nitrogen;
g) serum creatinine.

Any deviations from the standard exclude the instructor from conducting shooting classes.

The same research applies to shooting range cleaning personnel.

It is recommended to introduce similar solutions in all formations subordinated to MIA.

In addition, new legal regulations should be established introducing new standards of fees for instructors conducting shooting in the form of specialized uniforms intended only for the performance of official duties at the shooting range. Suggested: tactical shoes and pants, T-shirt and sweatshirt with the instructor inscription, cap and tactical gloves.

I also recommend introducing a provision establishing 5 days of additional paid holiday leave for working in harmful conditions.

4.4 Operational aspect of the feasibility study.

For the operational aspect of the feasibility study, the consultant would like to start with an analysis of the training programs currently in force at the Academy. Please do not take this as criticism but as an objective analysis by an external expert. As an expert, I was employed by the Frontex Agency to work on the Core Common Curriculum for Border Guarding, where I dealt with training programs in the land border module, including shooting training, as well as tactics and techniques of intervention. I was also a representative of the Polish Border Guard in another Frontex project - Sectoral Qualification Framework, where we described in detail the necessary qualifications and competencies to occupy specific service positions. In addition, I was employed as a consultant in the New Face of the Border Project implemented for the Ukrainian Border Guard, in which, among other things, I modified the current training programs, including shooting training, adapting them to EU requirements. All comments and recommendations are impartial and objective and are used to consider how to introduce training program changes to improve teaching quality.

I YEAR.

UNITĂŢI DE CONŢINUT ŞI REPARTIZAREA ORIENTATIVĂ A ORELOR PE TEME DE STUDIU

Nr. d/o	Tema	ore			
		Curs	Seminare	Lecţii practice	Lucru individual
ANUL I, SEMESTRUL I					
1.	Măsurile de siguranţă la mânuirea armei.			4	
2.	Noţiuni despre balistica interioară şi exterioară.			2	
3.	Destinaţia şi construcţia generală a puştii mitralieră Kalaşnicov (RPK şi RPKS), cal. 7,62 mm și cal. 5,45 mm şi mitraliera Kalaşnicov (PK, PKS, PKB şi PKT), cal.7,62 mm.			6	
4.	Destinaţia şi construcţia generală a puştii cu lunetă Dragunov (SVD), cal.7,62 mm.			4	
5.	Grenadele de mînă: ofensive, defensive şi antitanc (RGD-5, RG-42, F-1,RCG-3).			2	
6.	Destinaţia şi construcţia generală a aruncătoarelor de grenade (RPG-7, AG-18 „Myxa”, GP-25).			2	
7.	Destinaţia şi proprietăţile de luptă a pistolului MŢ-1 (Margolin), cal.5,6 mm.			2	
8.	Destinaţia şi proprietăţile de luptă a pistolului Macarov cal. 9 mm.			8	
TOTAL: Semestrul I				**60**	**30**
SEMESTRUL II					
9.	Normativele la instrucţia tragerii cu pistolul Macarov cal. 9 mm.			4	
10.	Regulile şi procedeele de tragere din pistolul Macarov cal. 9 mm.			8	

11.	Executarea tragerii practice din arma cu ţeavă scurtă în tirul multimedia (Macarov).			4	
12.	Executarea tragerii practice din arma cu ţeavă scurtă (Macarov, MŢ-1).			14	
TOTAL: Semestrul II				**60**	**30**
TOTAL ANUL I DE STUDII				**120**	**60**

Starting the analysis of the first year of studies immediately, you can see the incorrectly counted didactic hours at first glance. The curriculum shows that there should be 60 during the year, and thirty for each semester, while 120 and 60 are entered, respectively.

There are no practical classes in the first semester. At this time, the student should already learn to assume shooting positions, load and unload magazines and weapons, and self-remove weapon jams. He should also be doing his first static shooting by now, as this is the essence of every officer's service. Instead, he learns theories about the construction of machine guns, sniper rifles, grenades and anti-tank grenade launchers, from which the student **will not fire a single shot during the 4 years of study.** Either these weapons should be introduced into shooting programs, or they should be abandoned altogether. If students need to be familiarized with these types of weapons, it might as well be done during a consultation or afternoon class.

Only during the second semester, after half a year at the Academy, do students have practical classes on disassembling and assembling pistols. In the consultant's opinion, after completing their first year of studies, students should already be shooting with the Makarov pistol and the Kalashnikov carbine.

II YEAR.

UNITĂŢI DE CONŢINUT ŞI REPARTIZAREA ORIENTATIVĂ A ORELOR PE TEME DE STUDIU

Nr. d/o	Tema	ore			
		Curs	Semi-nare	Lecţii practice	Lucru individual
ANUL II, SEMESTRUL III					
1.	Consolidarea cunoștințelor privind cunoașterea părții materiale, regulilor și procedeelor de tragere și exercițiilor la instrucția tragerii cu pistolul-mitralieră Kalașnicov cal.7,62 mm			2	
2.	Executarea tragerii practice din pistolul-mitralieră Kalașnicov cal.7,62 mm (AKM, AKMS)			4	
3.	Evidenţa, păstrarea, circulaţia, inventarierea, controlul şi reparaţia armamentului şi mijloacelor speciale în cadrul autorităţilor administrative şi instituţiile din subordinea MAI.			2	
4.	Recapitularea materialului cu privire la cunoaşterea părţii materiale a armamentului din dotare cu ţeava scurtă (pistolul Makarov 9 mm).			2	

5.	Regulamentul cu privire la instrucţia tragerii în cadrul MAI, aprobat prin ordinul MAI nr.222, din 20.07.2017.			2	
6.	Executarea tragerii practice din arma cu ţeavă scurtă în tirul multimedia (Macarov).			2	
7.	Executarea tragerii din armamentul cu ţeava scurtă.			16	
TOTAL: Semestru				**30**	

At the end of the third semester, students of the Academy are introduced to the essential legal act regulating shooting at the MIA. **This topic should be presented in the first semester of studies as one of the first classes.**

In addition, the study program does not provide any shooting classes in the fourth semester, which means that students will forget the acquired shooting skills and habits instead of consolidating the acquired shooting skills and practices.

III YEAR.

UNITĂȚI DE CONȚINUT ȘI REPREZENTAREA ORIENTATIVĂ
A ORELOR PE TEME DE STUDIU

Nr. d/o	Tema	Ore			
		curs	seminare	lecții practice	lucru individual
Anul III, Semestrul V					
1.	Regulamentul cu privire la regimul juridic al armamentului şi mijloacelor speciale din cadrul autorităţilor administrative (ordinul MAI nr.146 din 12 mai 2014).	-	-	6	-
2.	Consolidarea cunoştinţelor privind cunoaşterea părţii materiale, regulilor şi procedeelor de tragere şi exerciţiilor la instrucţia tragerii cu pistolul Macarov cal.9 mm.			4	
3.	Aplicarea și folosirea armei conform Legii nr.218 din 19.10.2012.			2	
4.	Executarea tragerii practice din arma cu ţeavă scurtă în tirul multimedia (Macarov).			4	
5.	Executarea tragerii din armamentul cu ţeava scurtă (pistolul Macarov).	-	-	14	-
	Total	-	-	30	-
Anul III, Semestrul VI					
6.	Circulaţia, păstrarea, mentenanţa şi casarea armamentului şi mijloacelor speciale (ordinul MAI nr.146 din 12 mai 2014).	-	-	4	-
7.	Aplicarea și folosirea armei conform Legii nr.218 din 19.10.2012.			2	
8.	Executarea tragerii practice din arma cu ţeavă scurtă în tirul multimedia (Macarov).			4	
9.	Executarea tragerii din armamentul cu ţeava scurtă (pistolul Macarov).	-	-	20	-
	Total	-	-	30	
TOTAL				60	

In the third year of studies, as many as 26 didactic hours are devoted to unnecessary things. First, all shooting regulations should be taught to students during their first semester. Later, the role of the lecturer is to enforce their knowledge from the students. From time to time, as part of the curriculum, they can take a written test on the knowledge of regulations and procedures, but I consider it unnecessary to spend 14 teaching hours on rules for a third-year student.

Secondly, the regulations on the circulation and inventory of firearms should be presented during the course of the subject: logistics, where all issues related to the trade-in equipment and property owned by MIA units should be discussed in detail.

Thirdly, allocating 8 teaching hours to classes on a multimedia trainer does not make sense for third-year students. It would be great if these classes were part of the first-year training program, while third-year students should have practice shooting with dye ammo, which would significantly take their marksmanship to the next level.

IV YEAR.

UNITĂȚI DE CONȚINUT ȘI REPREZENTAREA ORIENTATIVĂ A ORELOR PE TEME DE STUDIU

	Tema	ore			
		curs	seminare	lecții practice	lucru individual
Anul IV, Semestrul VII					
1.	Consolidarea cunoştinţelor privind cunoaşterea părţii materiale, regulilor şi procedeelor de tragere şi exerciţiilor la instrucţia tragerii cu pistolul Macarov cal.9 mm	-	-	2	-
2.	Codificările de alertă (ordinul MAI nr.311 din 17.11.2015).	-	-	2	-
3.	Executarea tragerii din armamentul cu ţeava scurtă (pistolul Macarov).	-	-	8	-
TOTAL		-	-	12	-
Total ore		-			-
		12			

When analyzing the fourth year of studies, it should be stated that the student stopped shooting this year. 8 teaching hours per semester means one shooting every month and a half, which is short for a future officer. In addition, topic 1 is a repetition of previous years of study knowledge and does not bring anything new to the education process. On the other hand, the topics related to the issue of alarm codes should be addressed in the earlier years of study.

CONCLUSIONS:

1. After graduating from the Academy, students lack fully developed shooting skills. **After four years of study, they have only 4 hours to shoot with the Kalashnikov carbine in the second year**. It is impossible to gain confidence in using this type of small arms in this way.
2. There is no shooting for the first six months of study. Instead, students learn the characteristics of weapons and armaments they will never fire at the Academy.
3. Training programs should be modified to create one coherent, interlocking component. The number of practical hours should be increased so that the student is confident in the skills

acquired at the Academy and can apply them appropriately in everyday service. Therefore, modifying training programs is essential for the project's complete success.

4. Modernizing the shooting range is only one of the elements of improving safety and the level of education. The second essential element is a well-trained officer. The third element is the lecturer, who is supposed to provide the student with knowledge of the appropriate quality.

In this way, we smoothly moved on to describing the **qualifications of the teaching staff** conducting shooting training classes.

Currently, shooting training is taught by eight lecturers. Two of them are retired; one has never received any training. On the other hand, one assistant started working at the shooting range immediately after graduating from the Academy, meaning he has no practical experience. Another lecturer has worked for 23 years, 19 of whom have been at the shooting range, and has never attended any training. The remaining lecturers **have never participated in a typical shooting course**. They have completed many training courses abroad: in Romania, the Netherlands, Ukraine, and Hungary, but these were training courses in tactics and intervention techniques with shooting elements. None had completed specific shooting training or civilian or departmental instructor qualifications.

The consultant knows we are discussing the Academy's prestige and the academic titles required for certain service positions. However, this should not apply to all chairs and faculties. Those teaching shooting training and intervention techniques should be experts in their subject. It does not require a doctorate or professor degree but, above all, practice. Teaching staff should be rejuvenated and equipped with the knowledge, competence, and skills to improve shooting training quality significantly.

First and foremost, a methodology course should be organized for all teaching staff. A system should be set up where all lecturers teach to the same pattern - for example if one lecturer is on sick leave, the students are assured that the person replacing them is teaching to precisely the same standards. Adopting the shooting training methodology in the Common Core Curriculum for Border Guarding developed by the FRONTEX Agency is proposed. This is a training methodology adopted by all formations involved in border guarding in the European Union, both typical border formations and police-type formations. For this training, the consultant can recommend one of the two instructors of the Polish Border Guard who have conducted such training for FRONTEX officers, one of whom was seconded to teach at the FRONTEX Partner Academy in Spain.

The lecturers should also receive team shooting training to use different arms in pairs. In addition, two of them should undergo at least one month of professional practice in the special unit "Fulger" to acquire the knowledge and skills necessary to organize shooting activities for special-purpose subdivisions. The remaining lecturers should also undergo professional practice in the organizational units of the Ministry of the Interior in those subdivisions where there is most often a potential risk of using firearms.

Organizing training in medical first aid, including the so-called 'red tactic,' or battlefield medicine, is also essential.

After rejuvenating the teaching staff and incorporating them into the improvement training system, it is proposed to send a group selected in this way for a study visit to one of the EU countries, where they will practically become familiar with the operation of a modern shooting range, as well as with the methodology of conducting classes according to European standards. Currently, there is no substantive justification for organizing a study visit.

The Stefan cel Mare Police Academy should possess a minimum of one copy of each weapon used by Ministry of Interior officers. The teaching staff should be familiar with every weapon arriving in Moldova, whether by purchase or donation from foreign institutions (for example, MP-5 submachine guns or M-4 rifles). Moreover, testing of such new weapons should take place at the Academy with the active participation of the teaching staff. (This is the situation in the Polish Border Guard). But this needs qualified teaching staff.

The organization of classes can also be improved. During the study visit, the consultant observed training sessions at the shooting range. He shared his comments and observations during a meeting with the management of the MIA and the Academy. The essential change is that students come to classes with weapons and ammunition previously taken from the appropriate weapons or ammunition depot. However, this requires changes to the procedures in force at the Academy. Weapons are personally collected and returned by the student only after they have been cleaned. The shells are collected and settled by the ammunition officer immediately after the end of the class.

It is proposed to adopt the following procedure:

Firearm.

Students are issued firearms from the weapons depot for shooting or other firearms classes. The basis for giving weapons is the Rector's Daily Order, in which the students are assigned weapons by name. A point to the Rector's Daily Order, at least one day before classes, is prepared by a depot worker or supervisor of students based on the following:

- schedule of classes approved for a given month by the Rector, which includes the training group, the date of classes and the instructor of shooting classes;
- a training program where the subject of the classes is included (i.e. what firearms should be given to the student on a specific topic).

Collecting from the weapons depot - entry in the weapons handover book, student's signature, each student confirms the collection of weapons for classes by name.

The student returns the weapon after class after cleaning it. The warehouseman confirms the collection of weapons from the student with his signature.

In some training centres, the numbering in the form of a bar code was placed on the weapon to streamline the procedure further. In this case, the warehouseman checks the weapon with a reader. The entire circulation of documentation takes place in electronic form.

Ammunition.

The basis for issuing ammunition for classes is the Rector's Daily Order. The point to the order (drawn up at least the day before the class) specifies:

- the basis on which the classes are carried out (class schedule, Training Program);
- the type of shooting;
- the amount of ammunition;
- the place of classes;
- the lecturer;
- ammunition (student from the training group that is shooting);
- medical protection.

The ammunition expenditure sheet is prepared based on the above order. On the card, it is necessary to enter the number of the Rector's Order where shooting is entered. The expense sheet is drawn up and signed by the teacher. After signing, the card goes to the appropriate logistics unit, is signed by the head of the technical section and is approved by the Rector or an authorized person. Then the card goes to the Armament Depot.

Ammunition is collected by the ammunition master (student) on the day of classes from the weapons depot and delivered to the place of classes.

After the class, he fills in the reverse side of the ammunition disbursement card by hand, where he accounts for ammunition consumption and gives it to the teacher for signature.

The shells and the remaining ammunition are transferred to the armament depot on the same day.

The instructor prepares a list of shooting results with grades and enters the subject of classes, grades and attendance of the training group in the e-log.

It is also recommended to make changes to the full-time structure of the didactic cell in which lecturers of shooting training work.

It is proposed to create two new positions: shooting range manager and cleaner/conservator. Both an officer and a civilian may be the shooting range manager. His duties will include supervising the entire shooting range facility, operating the shooting hall during program classes, managing and recording the equipment entrusted to him - shooting range equipment and accessories, ensuring the timeliness of periodic inspections, ordering targets, and cleaning materials. Generally speaking, he will be the host of this facility.

The second job position proposed to be created is cleaner/maintenance. This position is intended for a civilian employee. A specially trained person will use explosion-proof industrial vacuum cleaners with HEPA filters and other industrial cleaning equipment. This person will keep the entire shooting range facility clean, emphasising the shooting hall. The scope of duties of this person will also include all minor maintenance works that keep the facility in constant working order: minor plumbing, locksmith work, etc. A solution can be proposed in which this person will be responsible for order in the entire building, i.e., the shooting range and a sports hall. This solution will ensure the effective use of that person.

4.5 Scheduling aspect of the feasibility study.

When considering the scheduling aspect of the project, all possible factors must be taken into account. The first one is preparing a construction design and obtaining all the required permits for the modernization of the shooting range. The consultant believes that this project should be carried out in close cooperation with the main contractor and that the construction design, including all installations, should be carried out strictly under his instructions. In Poland, design works usually last about 2 months; therefore, a similar time frame is provided. It takes about 3 months to obtain all the necessary permits.

Ordering, manufacturing and preparing the shooting hall equipment and ventilation systems take 4-5 months from placing the order in the case of scenarios 1-3.

As for scenario 4, in this case, the production cycle of the shooting range is from 6 to 9 months, depending on the variant ordered.

During this time, the local subcontractor(s) should perform all demolition works, build new walls, and lay new installations for the planned equipment. It is proposed that these works should be carried out under the supervision of representatives of the main contractor. However, in the case of scenario 4, the local contractor must prepare the ground for the shooting range and provide all necessary installations, which is described in **Annexe No. 3.**

Installation of the shooting range equipment should take a maximum of 3 months. We should add about 2 months for the installation of ventilation devices. Also, in the case of scenario 4, the contractor declares the maximum duration of the installation process to be 2 months.
Trials and technical acceptance may take about a week.

In conclusion, it is expected that the total time for the modernisation of the shooting range should be approximately 1 year.

5. SWOT analysis.

STRENGTHS	WEAKNESSES
• solid, reinforced concrete construction; • determination of the management staff to modernize the shooting range.	• location of the object at the basement level; • the shallow ceiling and lowered overhead baffles; • very narrow shooting range width; • no water installation in the basement; • lack of isolation of the foundations and lack of drainage of the facility; • limited possibilities of bringing construction equipment to the basement level; • the difficulty of pouring reinforced concrete walls at the basement level; • the need to remove the entire heating system from the floor of the shooting hall; • complete replacement of ventilation and lighting systems; • no fire protection system.
OPPORTUNITIES	**THREATS**
• creation of the most modern multifunctional shooting range in MIA, meeting all safety standards; • expanding the Academy's educational offer with a shooting training system, including instructor training; • the possibility of organizing tactical shootings for special units; • the possibility of organizing workshops and shooting competitions at the national and international levels; • changing training programs to bring them in line with EU standards; • opportunity to train instructors according to the best standards.	• the difficulty of bringing construction equipment to the basement level; • problem with transporting the AR500 sheet to the basement level; • problem with delivering concrete blocks to the shooting range level.

The project's strengths include the concrete construction of the shooting range walls and overhead baffles. It should also be emphasized the strong will and determination of the MIA and the Academy's management to carry out the shooting range's modernisation.

Unfortunately, this is where the strengths of the project end.

The biggest problem and its weakness is the location of the shooting range.

It is located on the basement level with very narrow stairs and one only about 90 cm wide door. The door is set in a structural wall. Together, this causes complicated access for the construction team to the facility. Delivering individual construction machines to the basement level may even be impossible. The same applies to equipment elements: ventilation systems and main bullet trap construction. It will most likely have to dismantle the stairs and carve out the entrance to the shooting hall. Overhead baffles are very low concerning the base plane. They usually should be at a height of 3.50 – 4.50 meters. In this case, we have only 2.54 meters, which, after raising the floor with ricochet panels and a polyurethane screed, will reduce the height by another 5 cm. It creates a risk of ricochets and the possibility of damaging the TRS mechanisms, which in this particular case will be only 2-2.10 meters from the floor level. Unfortunately, we have no alternative as overhead baffles are made of reinforced concrete; moreover, they are impossible to remove because they are the base of the sports hall on the ground floor. Depending on the technology of the selected manufacturer, they will either be used as overhead baffles or covered with AR500 boards and anti-ricochet panels.

The weak points of the shooting range also include its width - only 11.40 meters. Assuming that the side walls will also act as side bullet traps, the width of the shooting range will be reduced by about 1 meter. The construction of the technical corridor and the new wall will take up additional space. This situation will be described in detail during the presentation of individual shooting range creation scenarios.

The heating system cannot be retrofitted - it must be removed entirely from the floor level, and the resulting cavities must be filled with concrete. The same applies to the holes left by the old propulsion mechanisms of bullet trap targets. The problem will be to deliver the right amount of concrete to the basement level.

There is also no water supply at the basement level, which will be necessary for the rooms intended for cleaning staff - access to running water is essential.

Considerable weakness is the general technical condition of the entire building. First, the building lacks drainage, threatening to flood the shooting range. It also lacks thermal insulation, resulting in heat loss and inflated shooting range heating costs after renovation. In addition, a leaking roof risks flooding the shooting range, mainly newly laid electrical installations, causing the risk of fire without any fire protection installation that must be created from scratch.

Modernizing the shooting range opens up new possibilities for the Academy. The most modern and best-equipped indoor shooting range in Moldova will be built. The Academy will be able to become a shooting training centre for all uniformed services subordinated to MIA. Properly prepared teaching staff will be able to organize improvement and specialist courses devoted to developing shooting skills for particular types of weapons. Organizing training for shooting instructors will be possible, which will unify and improve the training system throughout the ministry. With such a modernized training base, it will be possible to conduct tests of new types of weapons that will be added to the equipment. Organizing national and international competitions at an unprecedented level will be possible. Organizing shooting workshops with representatives of the best special formations (for example, American Navy Seals or Polish GROM) will be possible. And above all, the graduates of the Academy leaving its walls will be perfectly trained in the use of firearms, which is the most crucial thing in this project.

Moving on to the issues related to the threat to the implementation of the Project, one word comes in the first place – **THE DOOR.**

Extremely narrow and embedded in a reinforced concrete structural wall, they block access to the shooting hall for construction equipment and building materials. The only alternative is to remove them and make an opening wide enough to transport equipment. Another problem is **the stairs**, which make it practically impossible to deliver construction equipment to the basement level, such as a concrete mixer or a forklift. Equipment materials must be provided at the shooting hall level. **One bulletproof window weighs 850 kilograms, so a crane must transport it**. AR500 sheets also have their weight: 1 stack for a side bullet trap, about 1 meter wide, 2.5 meters high, weighing over 700 kg. There is no physical possibility of making it possible only by human forces. In addition, **the entrance door to the sports hall will have to be demolished to allow access to heavy equipment for unloading**, which should be considered in the design work. The construction of overhead baffles requires covering them with AR500 sheets, which can be done only with a specialized lift. All this means that already at the market research stage, many companies refused to implement it precisely because of the limited access to the construction site. A similar problem is the installation of ventilation at the basement level. The ventilation units are large, and the ventilation ducts are heavyweight; some companies refused due to the complicated implementation of the HVAC system at the basement level. They felt that it was too laborious and complex and that implementation by foreign staff would be too expensive for UNDP.

An additional problem is the lack of a fire protection system. It must be included in the design work because otherwise, no company will risk losing its reputation in the event of a fire, which can negatively impact the image of the general contractor.

However, after consultations and negotiations with companies specializing in the construction and renovation of shooting ranges, the consultant considers the project extremely difficult and complicated - but DOable. Negotiations regarding the submission of the offer are ongoing. I managed to convince reputable contractors with excellent reputations to submit a request to renovate the shooting range. Details and a description of the consultant are included in the individual attachments.

Please do not include Annexes 1-4 in the feasibility study. All information contained therein is confidential; each constitutes a specific individual offer for the project and is covered by trade secrets. Also, due to the delicacy of the negotiations, please do not disclose the names of the companies with which the negotiations were conducted.

6. The sustainability of the project.

Sustainability is the ability of an organization to continue its mission or program far into the future. All projects have to end eventually, but the project impact should continue.
When assessing the durability of the project in financial terms, first of all, it should be noted that thanks to the use of a highly durable main bullet trap made of rubber granulate, we get a practically maintenance-free product. Assuming that 50,000 rounds will be fired annually, the first cleaning of the bullet trap is planned in 8-9 years, making this equipment cost-free. The consultant ordered cleaning the bullet trap in his training centre to a specialized company once a year, but this was after about 300,000 rounds had been fired yearly. Depending on the contractor chosen, they offer a guarantee of between 12 and 36 months on the shooting range equipment. After this period, a comprehensive inspection of all shooting range equipment must be done annually. The average cost of such a service is approximately USD 7200 net. The price already includes transport and accommodation for the inspection team.
As far as the ventilation units are concerned, the guarantee will be valid for 36 months. During this time, it is planned to change the filters once a year. It is already included in the bidder's price. With an assumed shooting range use intensity of 50 000 shots per year, this is sufficient. However, the filters should be changed once a year after the warranty expires. The cost of such a service is approximately USD 4800 per filter, but with appropriate training, this task can be outsourced to a local company, which should cost no more than USD 1100. Alternatively, the shooting range equipment and cooling and heating maintenance can be outsourced to one specialised company, reducing costs.
Regarding electricity consumption costs, it has been assumed that classes at the shooting range are conducted every weekday for 4 hours a day over 11 months (1-month holiday break). In this case, the annual energy requirement will be approximately **120 000 kWh.**

An additional benefit will be the fact that so far, there have been two independent systems: ventilation and heating. The new shooting range will be ventilated and heated with the HVAC system, so there will be only one cost. In addition, to reduce the cost of electricity consumption in the future, it is recommended to install a heat pump, which will significantly reduce energy consumption. You can also install photovoltaic panels on the roof, lowering electricity consumption. To reduce operating costs to a minimum, it is necessary to perform drainage and insulation of foundations to minimize heat loss. It is also essential to employ two people for positions related to the operation of the shooting range who will be adequately prepared, trained, and responsible for its proper operation.

When analyzing the institutional sustainability of the project, one should emphasize the enormous increase in the prestige of the Academy. Having practically the most modern shooting training base in Moldova, the Academy will become a training centre for the entire MIA and perhaps other uniformed services. With excellent training facilities and qualified teaching staff, the Academy will be able to organize training, workshops, seminars and shooting competitions at the national and international levels. It will have an excellent base for testing weapons that are to be used by MIA subordinate units in the future. We must not forget about the fundamental goal of the Academy: its graduates will be perfectly prepared for the use of firearms. They will acquire knowledge, competencies and skills that have been unattainable to them so far. All this together will cause a student to leave the university walls to treat a service weapon as a standard work tool.

Considering the programmatic sustainability of the project, it should be emphasized that the Donor's crucial role is to help create training infrastructure and prepare the teaching Staff to conduct training. The main goal is to improve internal security in combating crimes, and smuggling, which will enhance state security and reduce crime.

7. Potential scenarios for the renovation of the shooting range.

Scenario No.1: CONSTRUCTING A 25M SHOOTING RANGE FOR STRAIGHT SHOOTING

The first scenario involves constructing a 25m shooting range for straight shooting. It is the simplest and cheapest version to implement. It will allow shooting at fixed and moving targets from fixed and variable firing lines. This version was previously featured in the Preliminary Needs Assessment Report and is a great solution when we are on a tight budget. Compared to other offers, it will be cheaper by about USD 350-400 thousand because there will be no need to install bullet traps on the side walls, only anti-ricochet panels. The cost of mobile walls for the shooting house is also gone. In this case, the technical corridor was created as a place of access to the rear part of the main bullet trap and as an additional emergency exit in the event of an emergency.

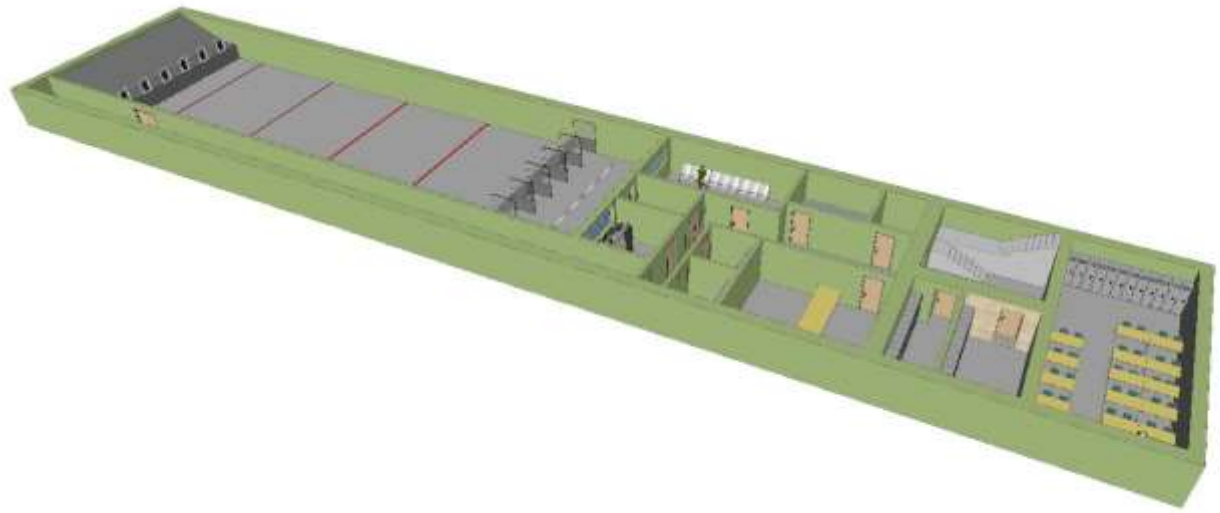


Fig. 8 Visualisation of the shooting range with the technical corridor

The shooting range will consist of the following:
- shooting hall;
-technical corridor;
-range safety officer control room;
- 2-door air lock;
- waiting room;
- shield storage;
- cleaning materials storage;
- cleaning weapon room;
- technical room;
- shooting trainer;
- locker room for students;
- locker room for instructors;
- classroom.

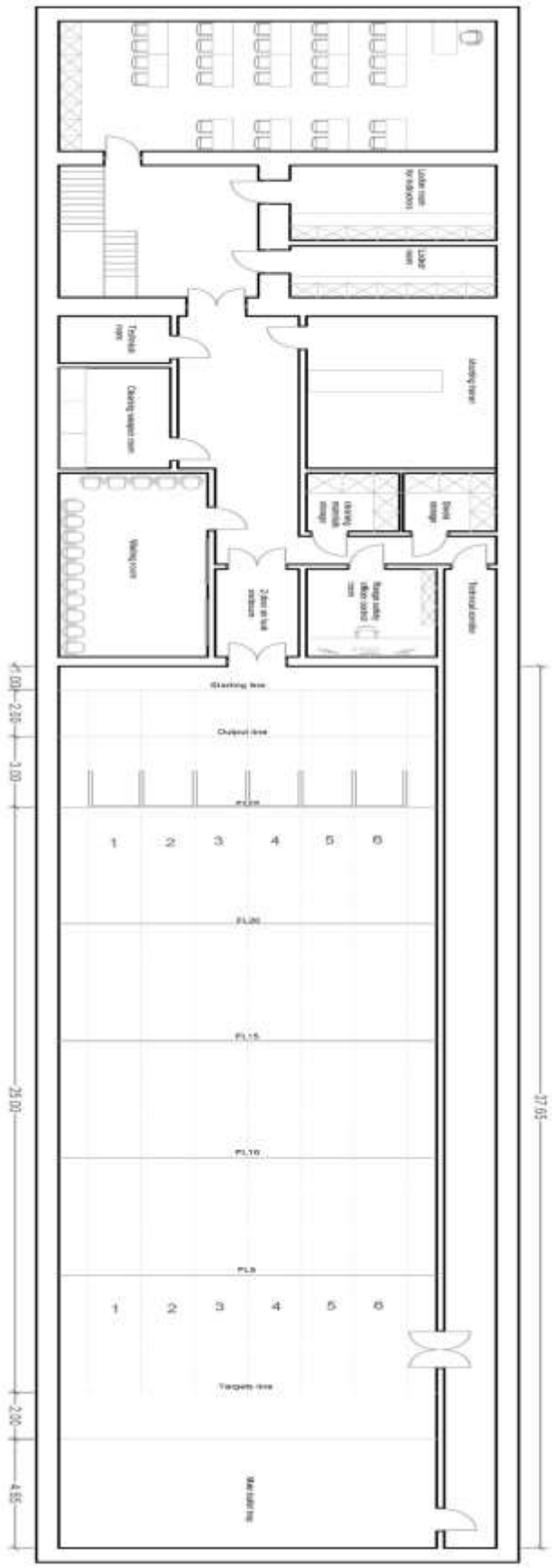


Fig. 9 Shooting range - scenario 1

The shooting hall will be equipped with 6 stand booths for straight shooting. In addition, shooters may train by shooting at moving targets - top targets allowing any target location from 0.00m to 25m, and at transverse moving targets - moving targets located at the 25m range. Mounting and use of top moving targets moving on longitudinal running tracks and one transverse track - familiar to all positions and shooters - element parallel to the opening fire line is envisaged. Opening fire lines every 5 meters from 0.00 to 25 metres. There will also be 3/6 appearing targets powered by battery/current and radio/manual control. The main bullet trap will is made of rubber pellets. It is widely used worldwide, providing high durability and low operating cost. Both the rubber granulation, and the cladding made of system anti-ricochet panels at the level of the upper bullet breaker are also acoustic protection against noise.
Along the left wall of the shooting hall, a technical corridor will be constructed for safe access into the zone of the main bullet trap and covered structure and for servicing the equipment and elements of the shooting range located in the direct firing zone. Access to the corridor area is provided from the side of the shooting hall through bulletproof doors with additional lining in the form of anti-bullet plates of min. 5 cm and steel sheet type AR 500 plate-steel minimum thickness of 1.2 cm, on the level of the shooting range plane - double-leaf, into the zone of the main shooting range and the 25 m target line.

Corridor entrance - technical entrance. In the construction zone of the main bullet trap, a technical door is designed from the corridor space to allow access into the covered area of the lower drop structure of the main bullet trap to enable cyclic checking of the technical condition of the structure and detection of any deformations, damages or voids.

The technical entrance allows consumables, e.g., targets or equipment, to keep the facility clean.
At each shooting position, there is to be a system of upper target pipes in a longitudinal arrangement with an individual and collective system of target control and localization for each position; additionally, at the end of the installation, on the 25 m target line, there is to be a transverse construction of the target track concealed behind a system - integrated ballistic shield. At each shooting position, a system partition of approximately 200x200 cm equipped with e.g., a system control panel for the upper target elements according to the technology of a selected target system manufacturer is to be constructed.

Range safety officer control room.

The RSO control room is designed to direct the shooting on the designed shooting range. On the shooting positions side, the stand has a non-opening window opening of approximately 250/200 cm, allowing a view of all shooting positions. The room of the stand contains all the elements enabling the operation and control of the equipment of the shooting range, as well as the elements of the equipment determining the safety of the trainees and the security of the facility, including video monitoring. The level of the designed floor makes it possible to observe the exercises being conducted without the observer having to "lean out." The glass in the window of the RSO control room is to be made in the class of resistance to shooting (bulletproof) - as non-splintering. The type of window frame profiles used may not be of a lower class of resistance to shooting than the glass used. Access to the RSO control room through an access control system that prevents unauthorized persons from entering the room. Access only with a properly programmed access card.

2-door airlock.

An illuminated "ATTENTION SHOOTING" sign, which is switched on automatically when shooting training begins, is to be installed above the entrance to the shooting hall.

Electromagnetic jumpers, which are released by the staff in the shooting control room and emergency cases inside the shooting hall, are to be installed in the doors. An inscription and signage on the entrance door about the need to use personal hearing protectors during the firing training connected by multimedia to the instructor and allowing direct contact with the trainee.
The entrance door to the shooting hall shall be of bulletproof construction. The door frames and their structural components must have equivalent bulletproof equivalents.

Waiting room.

It is the room where the shift will stay while waiting for their shooting order. On the shooting positions side, the station has a non-opening window opening of approximately 250/200 cm, allowing a view of all shooting positions. The window must be made of tempered glass. It provides an overview of the shooting hall. This room will be equipped with a 80/100" TV monitor, on which the results obtained at the individual shooting positions can be observed. Additional equipment will include a multimedia board. This room will be used for shooting analysis, pre-shooting briefings, competitions, etc.

Shield storage.

This room is planned to be equipped with a set of metal shelves on which shooting targets will be stored.

Cleaning materials storage.

This room is planned to be equipped with 2 metal cabinets: the first will hold chemicals for cleaning the facility, and the second will provide space for the cleaning person's work clothes. This room is also planned to have 1 set of metal shelves for cleaning products and a place where an industrial hoover and equipment for cleaning the shooting range premises can be stored.

Technical room.

It is the technical room where fuses and jumpers that need not be located in the RSO can be found.

Shooting trainer.

This room is intended to install and operate the existing shooting trainer system for instruction. It will provide a safe opportunity for students to learn on the laser trainer and allow them to focus on the quality of their shots without being distracted by other activities on the range.

Locker room for students.

Currently, the students store their jackets and bags in the shooting hall. In addition to being flammable, they are also contaminated with lead dust after shooting. Therefore, a dedicated area exclusively for students is proposed, with hangers for up to 28 people.

Locker room for instructors.

It is a social room equipped with 8 lockers and one bench.

Classroom.

A modern multimedia lecture hall for 28 students will be built in place of the existing classroom. The latest adult education standards will equip the room with a multimedia board with a projector, a computer for the lecturer and many other amenities. Details regarding the equipment proposed for this room are included in **Annex 10.**

It is also possible to implement this scenario without a technical corridor.

Scenario No. 2: CONSTRUCTION OF A MULTI-PURPOSE SHOOTING RANGE

The second option involves the construction of a multi-purpose shooting range, designed to be used for straight-shooting as well as sideways after changing positions in 180-degree increments of 90 degrees. In addition, the shooting range will be equipped with bulletproof adjustable walls on the firing line from 5 to 15 meters, allowing for tactical shooting in shooting house-type facilities.
It extends the concept presented earlier in the Preliminary Needs Assessment Report. It differs from the version shown in it in eliminating the technical corridor. This idea was created after consultations with potential contractors. The liquidation of the technological corridor expands the shooting range, making it safer. Shooting stands will be more distant from each other. There will be no need to build an additional wall of cement blocks, saving investment time and solving huge transportation problems.

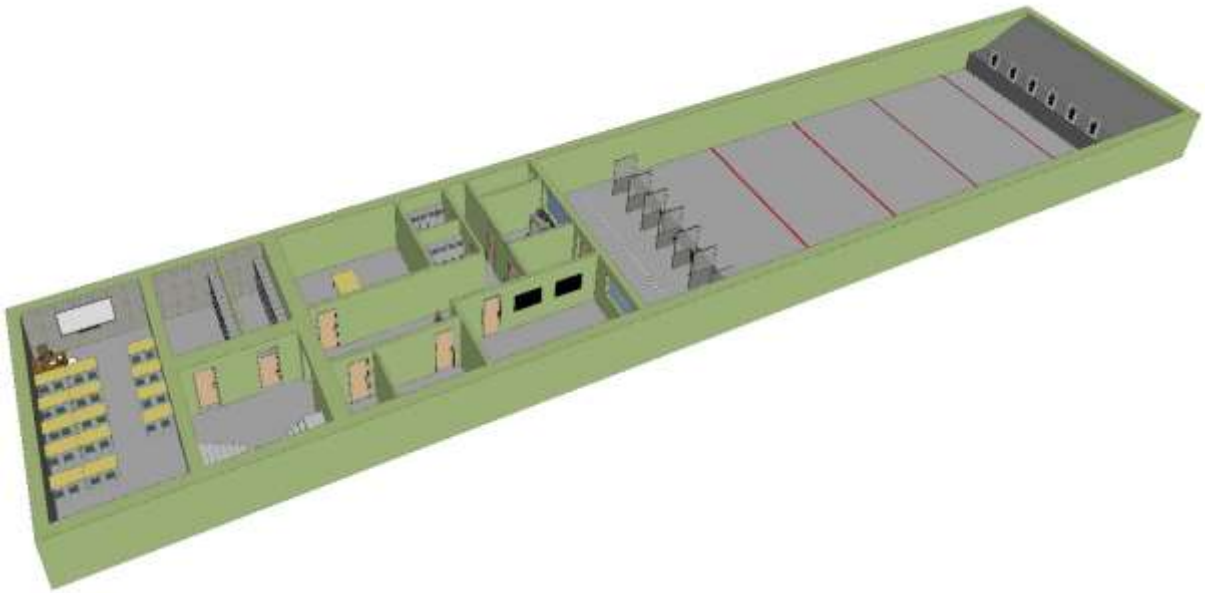


Fig. 10 Visualisation of the shooting range - Scenario 2

Below is a link to a website presenting a film of the Polish Border Guard shooting range, where similar technical solutions were used. The only difference is that the shooting line is 50 meters long, while in our variant, the length will be 25 meters.

https://www.youtube.com/watch?v=_yjWnC_EFPI

The link below shows a shooting range equipped with a moving walls system, which is part of the equipment of the Bieszczady Border Guard Unit in Przemyśl/Poland.

https://tebbex.pl/en/homepage/gallery/?type_0=gallery&album_gallery_id_0=121

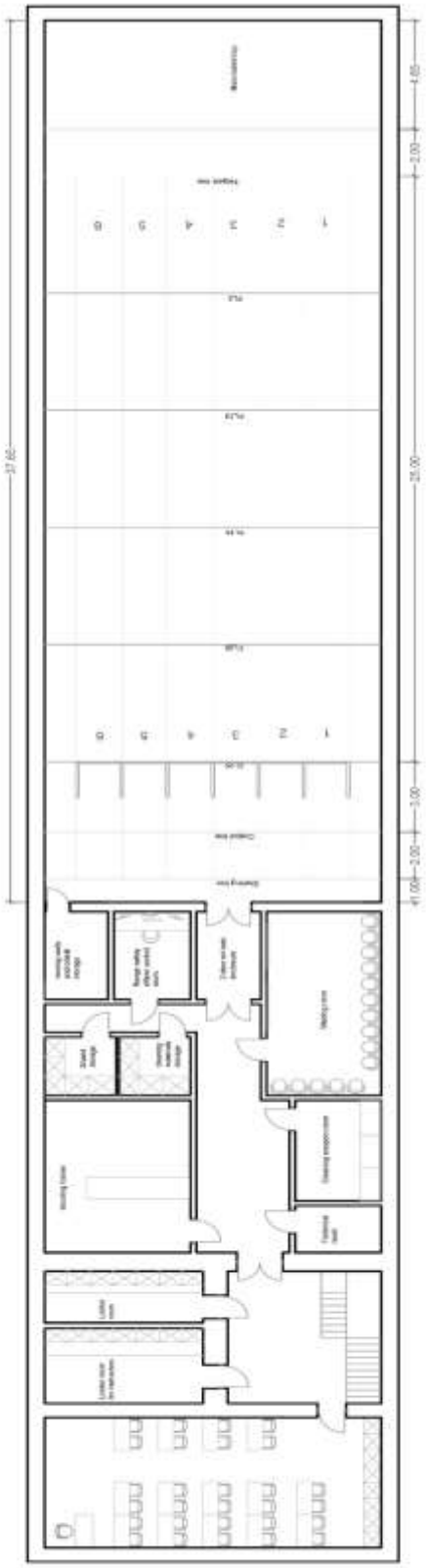


Fig. 11 Shooting range - scenario 2

The left-side bullet trap will be mounted directly to the left wall. Part of the mobile walls will be stored at the side walls of the shooting hall, as shown in the photo from the shooting range of the Bieszczady Border Guard Unit in Przemyśl. The remaining walls, mobile bullet traps and shields will be stored in a specially created technical room next to the plenum wall. A door with a height of about 2 meters will lead to this room, through which mobile walls can be transported. The main bullet trap will span the entire width of the shooting range. In the unanimous opinion of the contractors, there is no significant need for access to its rear part. It is made of AR500 sheet metal with such a solid thickness that it is almost impossible to pierce. The periodic inspection of the bullet trap will take place from the front. Also, the hopper's resignation means we gain an additional 1.5 meters of space in the shooting hall. Loss of rubber granulation will be added from the front. At the same time, we obtain other financial savings because there is no need to make double technical doors from the level of the technological corridor to the line of targets and technical doors leading to the rear part of the bullet trap.

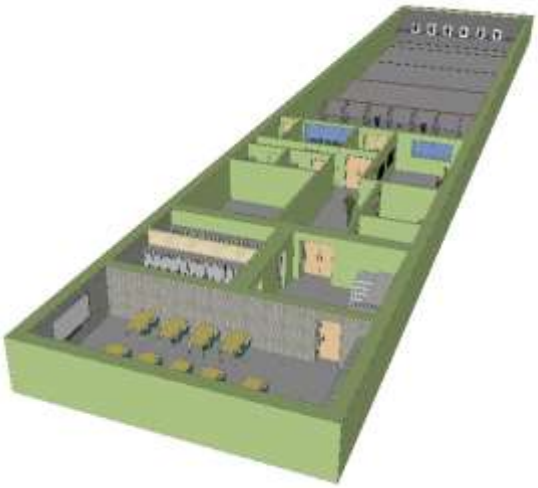


Fig. 12 Visualisation of the shooting range 2- Scenario 2

Both representatives of potential contractors and the consultant believe that one emergency exit in the case of a 25-meter shooting range is perfectly acceptable. Just check that it also complies with the local fire regulations. This task should be entrusted to a local design office, which will be selected to develop the construction project. It is also proposed to designate this room for additional handheld equipment storage or a locker room for lecturers to keep uniforms and civilian clothes. After the decision makers make the final decision, appropriate measures will be taken to propose furnishing this room by the final decision.

The shooting hall has been designed as a 25m shooting range with six shooting positions located axially at approximately 1.30 -1.50m intervals. It is intended for shooting at distances of up to 25m from various shooting stances at fixed and emerging targets located on a fixed 25m target line and additional ones installed ad hoc on the plane of the target line.

The construction of the side walls has been designed as a reinforced - side shooting range and allows for shooting training of shooters after a change of position within a range of 180 degrees every 90 degrees, e.g., starting shooting from a location in the axis of the shooting range in the zone of a separate lane for side shooting. The maximum firing of the main and side shooting lanes to a height of 200 cm above the finished level of the shooting range plane vertically and horizontally at approximately 4.00 m intervals and a firing angle of roughly 90 degrees. In addition, shooters may train by shooting at moving targets - top targets allowing any target location from 0.00m to 25m and shooting at laterally moving targets - moving targets located at the 25m range. It is envisaged to mount and use top moving targets moving on longitudinal running tracks and one transverse track - typical for all positions and shooters - element parallel to the FL.

The shooting house construction will consist of the installation of portable bulletproof walls. The 5 cm thick anti-bullet panels are located on both sides of the bullet trap plate. In addition, it is planned to purchase four free-standing mobile bullet traps, which can be set up in any configuration and thus create shooting scenarios as close to real life as possible. The portable bullet traps can be fired with ammunition with an initial energy of up to 3,600 J, the same as the other handguns on the range. With the proper positioning of the movable bullet walls, it is possible to achieve 360-degree shooting, which is extremely important when training special operations forces.

If the presented solution is accepted, a super-modern multifunctional shooting range will be created, allowing shooting in many directions. Creating a system of portable walls and mobile bullet traps will allow for the implementation the most complex tactical scenarios with live ammunition. Ideal conditions will be made for shooting training of special and anti-terrorist units.
The downside of this solution is its cost because both side walls must be lined with Armored Steel 500 panels along their entire length. Bringing many such panels to the basement level will be an additional problem. At the same time, the floor must be raised by 5 cm (anti-ricochet plates and polyurethane screed), and the upper curtains must be lowered by about 15 cm. The retrieval target system will cover an area of approximately 30 cm. So, the maximum shooting height is planned at 200 centimetres. **Above this height - shooting is forbidden due to the possibility of damaging the shooting range equipment.**

Scenario No. 3A: CONSTRUCTION OF A MULTI-PURPOSE SHOOTING RANGE WITH A MULTIFUNCTIONAL INTERACTIVE SHOOTING ROOM.

It is an entirely new idea, not been presented yet. This idea was inspired by the Project Manager, who expressed the view that the Academy plans to create an interactive shooting range for students in the future. He even indicated the place proposed by the Academy authorities - the second floor in the sports hall building. After the Local Consultant sent in the plans, the proposed location was impossible to implement.

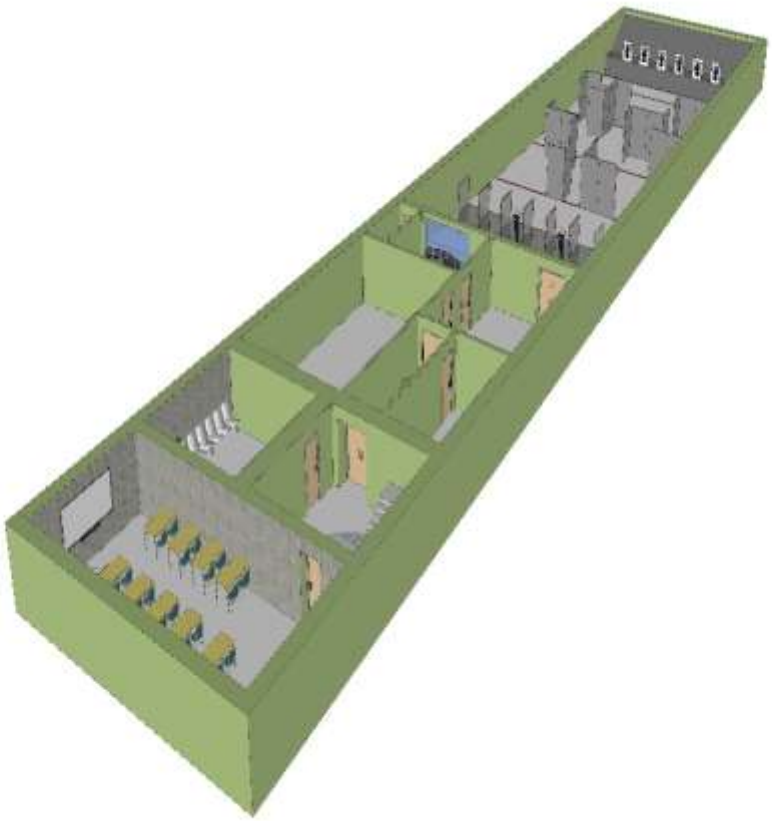


Fig. 13 Visualisation of Scenario 3A

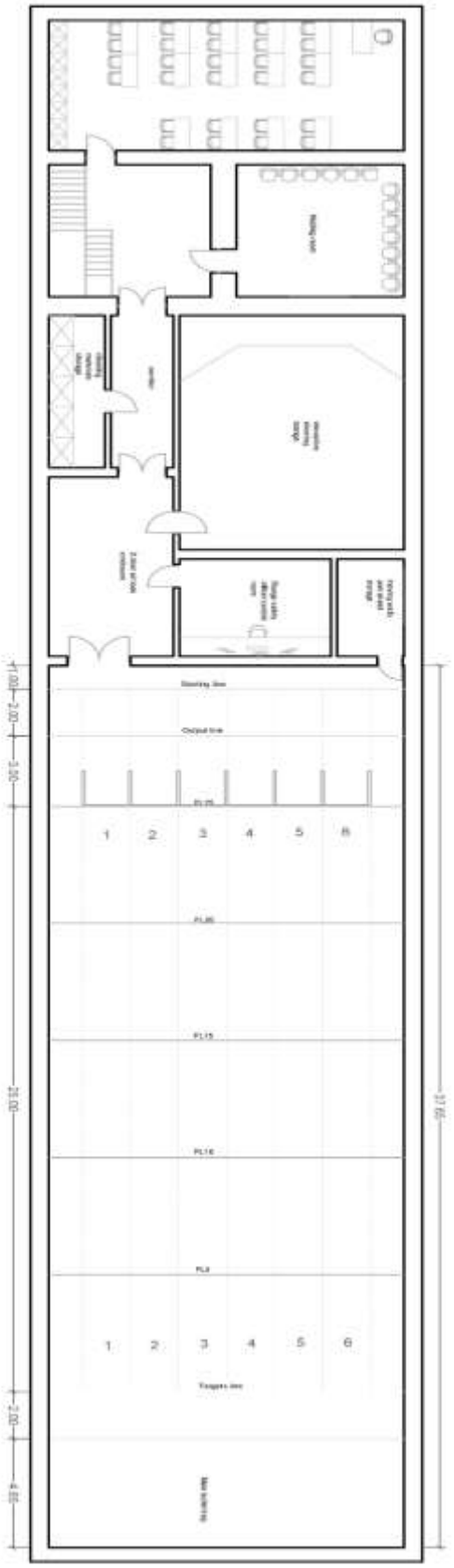


Fig. 14 Shooting range - scenario 3A

The walls are made of lime blocks, not cement blocks, so they do not meet the safety criteria. No self-respecting company will install live ammunition firing systems in these conditions. The solution is the existing reinforced concrete walls in the "old" shooting range. Part of the hall will be used for a new 25-meter shooting range, and the remaining amount has been used to create a space measuring approximately 6.5 x 10 meters, in which an interactive shooting range can be installed. Depending on the equipment level, we can achieve an angle of fire from 120 to about 300 degrees.

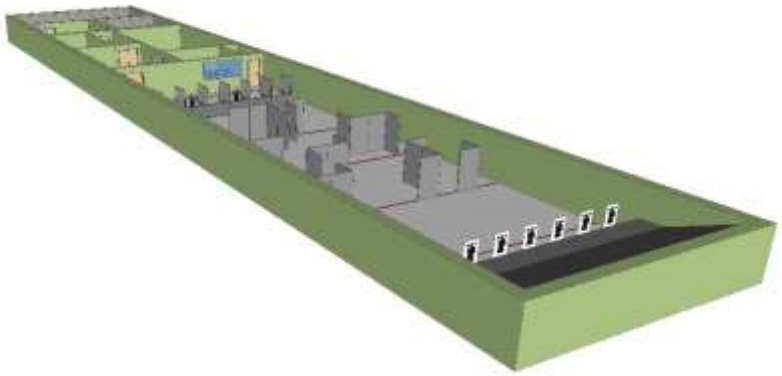


Fig. 15 Visualisation of Scenario 3A

Each general contractor cooperates with a different equipment manufacturer, and the technology will be selected by the company that wins the tender. Based on his experience, the consultant can recommend the American company MILO, whose solutions are commonly used by the Polish Police and Border Guard. The British Viper system also has excellent reviews.

Milo interactive training system on a 3-screen version is made in versions for shooting live ammunition and weapons with laser emitters. Various scenarios. Ability to train using weapons with laser inserts and mock-up weapons. Includes: software: containing a minimum of 800 video scenarios and CGI animated scenarios; shooting range simulation software, FOCUS3D scenario software; computer controller, tablet for system control with dedicated software, hd multimedia projector - 3 pcs, sound system, infrared beam laser detection camera - 3 pcs, thermal camera detecting live ammunition shots - 3 pcs, flashlight detection camera - 3 pcs, shooter observation camera with software - 1 set, self-blinding rubber screen - 3 pcs, cabling, 4 recoil kits for adaptation of combat

weapons to recoil (2 x rifle and 2 x pistol), bulletproof housings for projection modules and cable routes.

The proposed scenario will be the most expensive but the most justified from an economic point of view. Contrary to appearances, the project will bring significant savings.
Firstly, there will be no need to build two shooting ranges, just one in one facility.
Secondly, only one RSO safety room is enough to operate de facto two shooting ranges. The view of the main hall will be through a bulletproof window, while a camera system will monitor the situation in the interactive shooting room.
Thirdly, it only needs to build one 2-door airlock and 1 room for cleaning equipment, which is very important because the explosion-proof vacuum cleaner, which is very expensive, will be used on one level.

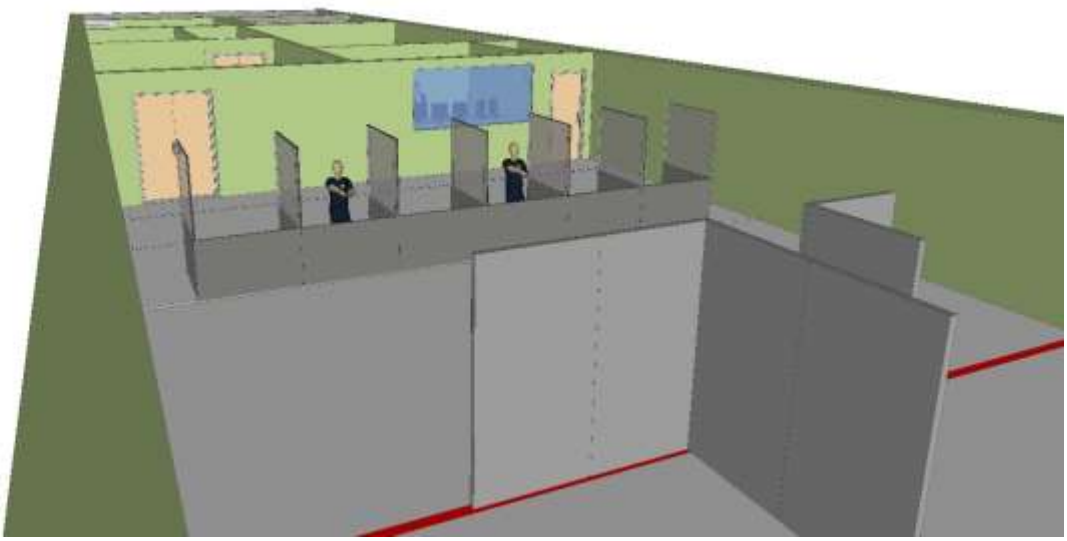


Fig. 16 Plenum wall - Scenario 3A

The waiting room will be moved next to the lecture hall. Students will observe the course of classes in the shooting halls through a system of cameras. The cleaning weapon room will be

eliminated, which doesn't matter much because there is one in the weapons depot anyway. It only needs to be retrofitted with a gun-clearing trap.

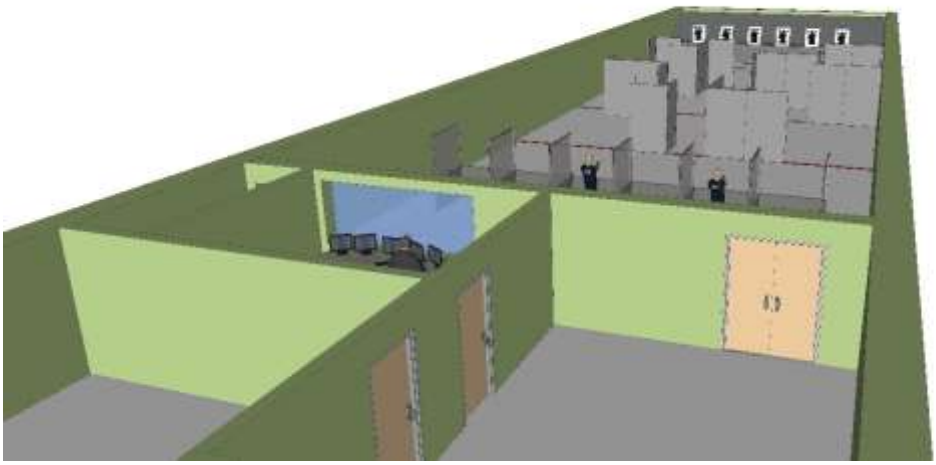


Fig. 17 Visualisation - Scenario 3A

The interactive shooting range will be multifunctional, where people can shoot live and laser weapons.
The photos below show the laser weapons used for training. In this particular case, the Polish Border Guard uses GLOCK 17 pistols and American M-4 and AR-14 carbines.

That solution will allow students to acquire practical skills in using firearms in tactical situations similar to real ones and simultaneously save the cost of purchasing live ammunition.

Advantages of the proposed solution:

1. Maximized use of the "old" shooting hall.
2. Control of 2 shooting ranges from one room.
3. Construction of only one airlock and one warehouse for equipment.
4. Moving the waiting room to another location means resigning from installing one bulletproof window, saving USD 26,000, which, for example, can be spent on purchasing laser weapons.

Scenario No. 3B: CONSTRUCTION OF A MULTI-PURPOSE SHOOTING RANGE WITH AN INTERACTIVE LASER SHOOTING ROOM.

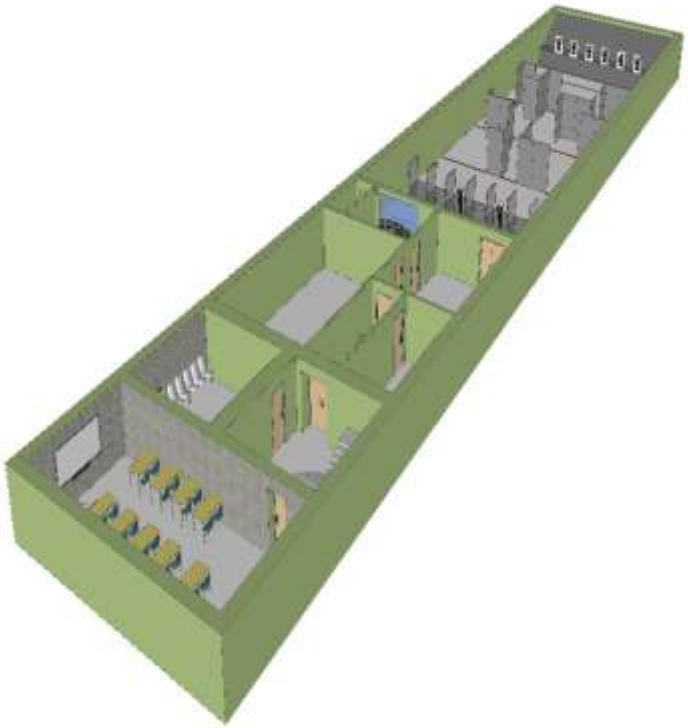


Fig. 18 Visualisation of Scenario 3B

It is a twin variant to the previously presented variant 3A. The only difference is replacing the multifunctional interactive shooting range with a shooting range designed exclusively for shooting with laser weapons, which makes this project variant much cheaper than its previous version.

https://www.youtube.com/watch?v=OonPjsaxuS4

The interactive Milo system proposed for installation will consist of a 3-screen version, providing the possibility of training using both properly adapted live firearms and replica weapons.

The system includes, among others, a control tablet with dedicated software containing at least 800 video scenarios and animated scenarios simulating a shooting range.

The essential elements are three screens, three multimedia projectors, and a sound system.

The link to the site presents a similar solution given below.

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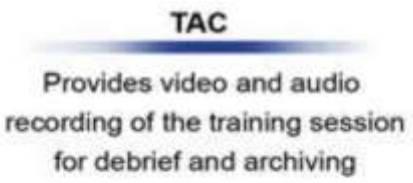


The system also includes three cameras detecting lasers emitting an infrared beam, three cameras detecting flashlights and one camera for observation of the shooter with the appropriate software. The system includes its full cabling.

The set also includes four sets of recoil kits for adapting combat weapons to recoil:

2 for the gun;

2 for the carbine.

Recoil kits are characterized by very high accuracy and are much more accurate than replicas of laser weapons. After appropriate adaptation, they allow a maximum of 5 minutes to exercise with personal weapons available to the shooter. So the result is a situation in which the shooter shoots with his personal weapon, which he uses daily for duty. All this together makes the training conditions as close to authentic as possible.

Optionally, the MILO Course Designer software can be a piece of additional equipment.

This software allows every service to independently create scripts and films dedicated to individual services and their expectations, changing the actors' language and the film's background. Properly trained technicians can constantly supplement the film database with their own movies created to meet the needs of individual formations subordinate to the MIA. The price of kit costs about USD 10,000; the price includes staff training. Because the cost estimate includes USD 5,000 for the production of additional ten films provided by the contractor of the shooting range technology, and the fact that the production of one script costs about USD 400, the purchase of this software seems to be the most rational and recommended.

The cost of USD 5,000 includes the cost of flight and accommodation for a technical team from the European Union, one day of shooting about 8 hours, and the production of 10 films - 5 different scenarios, each in two variants.
The link to the site presenting MILO Course Designer is shown below.

https://www.faac.com/milo/virtual/features/

The consultant recommends purchasing this software, which will allow you to be completely independent of an external scenario producer and, in the long term, will contribute to the cost-free creation of new scenarios for the needs of various services.

In scenarios 2, 3A and 3B, a portable wall system is envisaged to create a shooting house environment. Each wall will be approximately 250 cm high and 60 cm wide. The maximum firing height is 200-210 cm. The wall will be made of a HARDOX sheet and covered with rubber polyurethane plates on both sides.

The kit includes the following:

Straight wall - 50 pieces;
Left corner wall - 4 pieces;
Right corner wall - 4 pieces;
Wall connectors - 1 set;
Wall with a window - 4 pieces;
Wall with doors - 4 pieces.

Scenario No. 4: CONSTRUCTING A NEW MODULAR TACTICAL SHOOTING RANGE

This scenario was envisaged as an alternative if scenarios 1 - 3 proved not feasible.
The consultant assumes this possibility in the following situations:
- due to the very narrow staircase leading to the shooting range, it wasn't easy to deliver equipment and building materials to the basement level;
- for the same reason, the inability to provide suitable construction machinery and equipment at the basement level;
- the inability to renovate following current (rather than 1983) sanitary, fire, and evacuation regulations;
- lack of economic justification for refurbishment – we preliminary assume that the cost of creating a new shooting range will be cheaper than refurbishing an existing one.

The presented scenario involves constructing a modular tactical shooting range built from steel modules bolted together when placed on a hardened surface.

A 4-station modular shooting range is proposed with a shooting axis length of 25 meters.
The following modules are recommended:
- shooting stale module;
- shooting;
- bullet trap;
- ventilation;
- communication;
-3 logistics modules:
(a) the firing control module;
(b) waiting room;
(c) medical point and cleaning the weapon room.

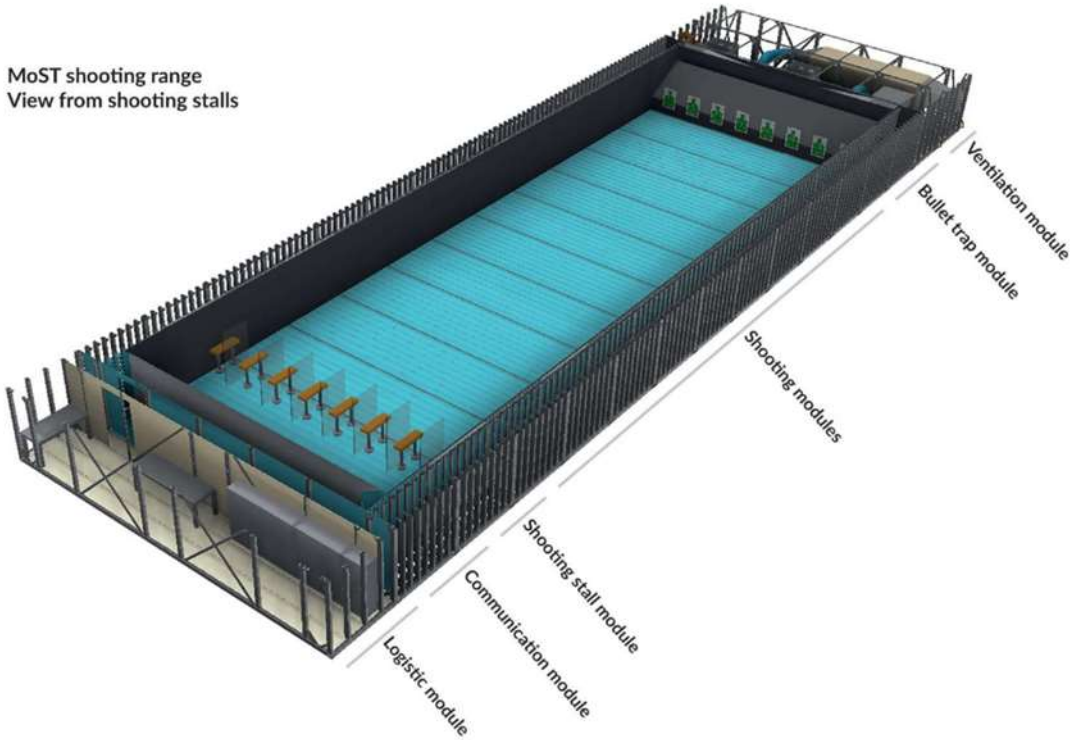
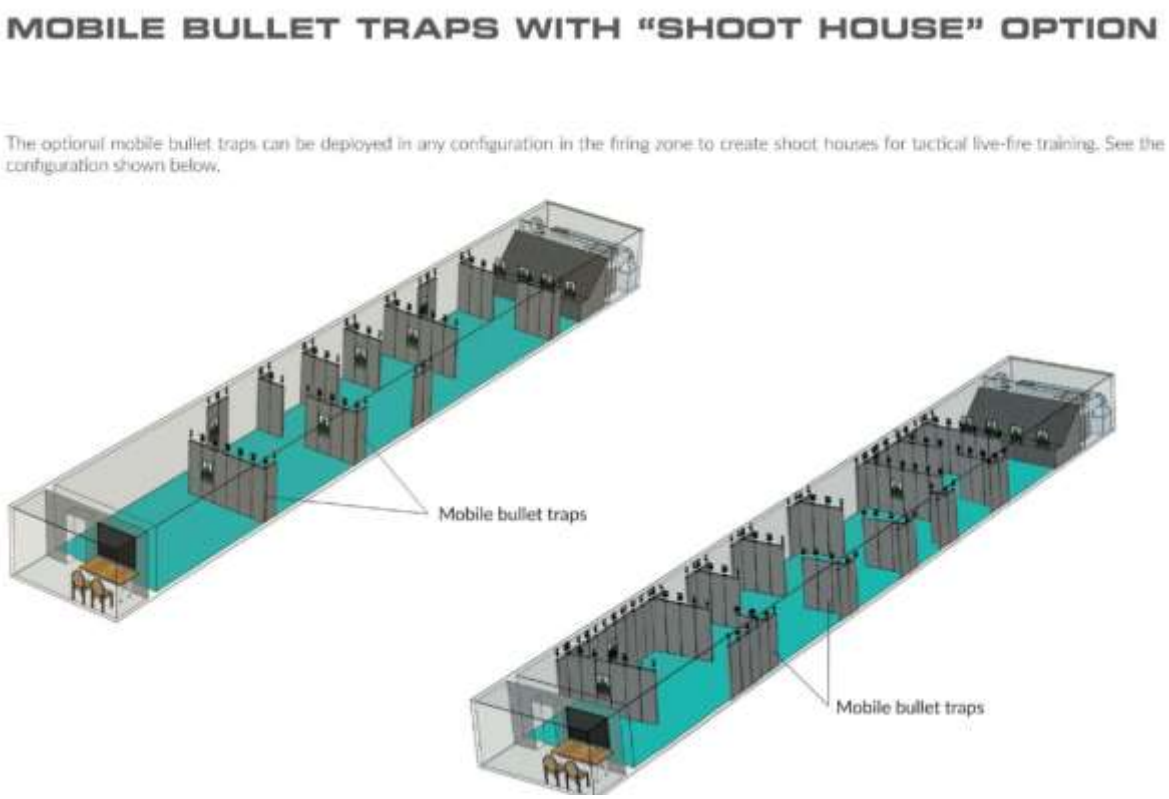


Fig. 19 Shooting range - Scenario 4

The modular tactical shooting range allows:

- the ability to fire ammunition with an initial projectile energy of up to 3600J;
- the possibility of firing automatic weapons;
- the possibility of creating a shooting house and shooting at 180 degrees with the use of mobile shotguns located in the shooting hall;
- the possibility of realizing varied shooting scenarios with the use of targets, strobe lighting, artificial fog, and sound effects;
- ventilation to guarantee the highest air purity during shooting, including the elimination of lead to the limit of quantification;
- air conditioning to maintain the proper air temperature all year round;
- protection of the external environment through the absence of dust emissions into the environment and low noise levels.



An offer has been submitted to construct this type of shooting range. It constitutes **Annex No. 3.**

CONCLUSIONS:

The consultant considers all four scenarios to be excellent. The first three scenarios assume the modernization of the existing shooting range. They differ depending on the solutions used, which affects the project's final price. Scenario number 1 will be the cheapest; version number 2 is optimal; scenario number 3A or 3B is the ideal scenario but the most expensive. Variant number 4 is proposed as an alternative in case it turns out that the modernization of the shooting range is impossible to implement due to the reasons described in the SWAT analysis or is economically unjustified, i.e. the construction of a new shooting range will be cheaper than the renovation of the existing one. The choice of the appropriate variant is left to the MIA management team, the Academy's management, and representatives of UNDP and the Donor. Depending on the decisions made by the decision-makers, the consultant will specify its actions to a specific scenario.

8. Market research and generic technical specifications.

Market research proved the most challenging undertaking in the entire feasibility study. The arms market is particular and hermetic. In this case, the market research did not consist of checking whether specific equipment could be purchased on the Internet but of complex negotiations with potential suppliers and contractors. Many companies immediately refused to cooperate due to the extremely high complexity of modernising the shooting range located in the basement. This topic was detailed in the SWAT study. They consider the scope of work too large, complex, and time-consuming. It is mainly the case with the ventilation system, which will pose the most problems at the basement level. Equally complicated will be the installation of the main bullet trap. In addition, they do not want to delegate their staff to a country where the internal and international situation is tense. The consultant mentioned this factor during his presentation, and unfortunately, the prediction came true. It is also important to remember that individual companies often have unique patented solutions and can only apply them in the market. In addition, respective companies have exclusive agreements with suppliers of particular technologies. Therefore, the UNDP Project Team needs to use as general terms as possible when developing the tender documentation and not the solution of one specific company, as this may lead to a situation where the tender has to be cancelled because only one bidder comes forward. For example, avoid a situation where the main contractor is forced to use technology used by a competitor. This situation may create a conflict of interest and result in the bidder's withdrawal. At a later stage of the work, the consultant provides his knowledge and experience. Moreover, some preliminary findings have already been made during the negotiations for such a complex upgrade. Safety issues at the shooting range were taken into account as a priority. In this type of tender, it is assumed that the general contractor provides all the shooting range technology, as accepted by the Employer. In addition, the scenarios presented by the consultant are only conceptual in nature. They are not designs within the meaning of the construction law. The actual design must be drawn up by a design office with the participation of engineers who are qualified to design in the following specialisations:

- architectural;
- structural engineering;
- installation in the field of sanitary and ventilation installations;
- installation in the field of electrical installations;
- installation in the field of fire protection systems.

As I do not believe that there is an office in the local market with adequate experience in the design of indoor shooting ranges, I suggest that a general contractor should first be put out to tender, who will then select a local design office with excellent references as a subcontractor, who, strictly following the general contractor's guidelines, will produce a proper construction design and obtain all the necessary permits. Failure to comply with the proposed recommendations may result in the fact that, if the construction project is created earlier, a company wishing to participate in the tender will not be able to do so because the product or system it offers will meet completely different parameters. So, for example, one company might offer a bullet trap of 4.65 metres wide, while another might offer 5.60 metres and an extra 1.50 metres for the hopper. Both companies are great, but adopting one dimension will affect everything about shooting range technology:

- a completely different number of AR500 panels, anti-ricochet and acoustic panels;
- different dimensions of the shooting hall substrate, i.e. a different number of anti-ricochet panels;
- overhead baffles located in entirely different places;
- ventilation system in a different place from the original;
- points of light on completely different opening lines of fire.

In addition, contractors have their own experiences with installing lighting. One company prefers 4 light points on this width of the shooting range, while another installs them at each shooting stand.

As far as the floor of the shooting hall is concerned, it should be covered with anti-ricochet panels, and all safety conditions will be met. This is the case, for example, at my shooting range at the Frontex Partner Academy in Luban. Alternatively, the panels can be covered with a 0.5 cm layer of polyurethane screed, which makes it easier to keep the shooting range clean and gives it a more aesthetic appearance. Again, both technologies are correct.

Negotiations secured three companies to submit written bids to modernise the shooting range. The offers are annexes 1-3 to the feasibility study. Annexe 4 is an analysis of the offers presented. The remaining annexes are the bids for individual equipment items for the shooting range.

Please do not include Annexes 1-4 in the feasibility study. Their information is a trade secret and should not be disclosed to outsiders until finalising the tender process. Particularly sensitive are data on prices and the technological solutions used. Please also do not disclose the names of the companies that submitted bids.

Analyzing the technical specification of equipment and accessories, please do not be guided by the price. There are different prices on the market for individual customers, which are different when dealing with a considerable investment. In some cases, the purchase of certain items of equipment is entirely impossible. It applies, for example, to AR500 plates. They are available only to companies licensed by the competent Ministry of the Interior in a given country. Also, to deliver these plates to Moldova, a special export license is required from these companies. A completely different price will apply to purchasing ten pieces of anti-ricochet panels and a different price to buying 500 m^2. Even in the case of the company that wins the tender, the price will be much lower than the market price because they are the producers of the individual materials. The general contractor has signed several contracts with subcontractors to supply individual elements included in the shooting range technology and endowment, therefore, can offer unheard-of prices on the retail market. The best solution is to choose a contractor to provide all the necessary products and materials to modernize the shooting range. First, please consider the prices given in Annexes 1-3 for analysis, and then the costs from the other Annexes, as they apply to individual systems and will be more expensive than those offered by the general contractor. However, they were submitted by proven, reliable and recognized companies that declared their willingness to cooperate in implementing our project.

8.1 SHOOTING HALL.

Bulletproof window.

It is a product completely unavailable on the market to the average buyer. Bulletproof windows are made only to order for a specific size. Steel profiles for indoor use, lacquered in RAL 9016 white, glazed with BR7 "S" class bullet-proof glass monolith in natural building glass colour, Dimensions: W 2500mm, H 2000mm - FIX glazed in the frame. Production time is approximately 8 weeks from order placement. The weight of one window is about 850 kg. In this case, the price for one piece is **USD 25,460 gross**. The price does not include transport and assembly. The offer for bulletproof windows is included in **Annex 5.**

Doors.

We still do not know how many doors and in what dimensions we will need. The amount will be determined only during the implementation of the construction project, in which the exact dimensions of individual doors, their characteristics and the direction of opening will be provided. The consultant established cooperation with a reputable company specialising in producing doors for the

defence industry and banking. All doors meet the highest fire, ballistic and acoustic safety standards, depending on the room type in which they are to be installed. In addition, it is possible to factory-install electromagnetic jumpers in selected doors. The company declares its total willingness to cooperate and help implement our project. The waiting time for the product from the moment of placing the order is about eight weeks. The consultant would like the shooting range to be a uniform whole, both in terms of architecture and visuals. Therefore, I recommend placing an order for all doors from one manufacturer. I offer all doors in grey RAL 9006. A detailed offer for the execution of doors is attached as **Annex 6**. The offer does not include transport and assembly costs. Catalogue cards of individual types of doors are included in **Annexes 7-9.**

Target retrieval system TTS-25

The device for transporting targets for pistol and rifle shooting for distances up to 100m TTS-25/50 type is designed for automatic target transport from the firing point to a selected length and can be used for sport, police and military shooting with short and long firearms. Target carriers are driven using steel cable. The drive unit is mounted above the firing points. TTS-25 is a modern microprocessor-controlled device with friendly software for easy operation.

Target Carrier System use prototype solutions not previously used in the devices currently manufactured in Europe, such as:

- wireless remote control;
- the ability to quickly and freely program shooting distance by the user from the remote control,
- the possibility of unusual shooting with a variable line of fire,
- the ability to shoot at running targets.

Basic equipment includes:

- power unit – including gear motor
- runway – including a running rail, steel rope stringing, end stops,
- trolley with a target holder,
- power and control unit using a microprocessor system,
- remote for control and programming of the device.

In the standard version – the device can stop at programmable distances, e.g. 10m, 15m, 20m, 25m (50m, 100m), with an accuracy of +/- 3 cm.

These distances are set individually by the user.

Basic specifications:

- power supply:
  – main circuit – 3 phase., 220/380V, 50Hz (option: 1 phase -220V)
  – control circuits – 220V 50Hz, 12V=, 5V=

- drive motor – two-speed, 3 phase 220/380V, 50Hz
- input power – Option 1 – 0,075/0,7 kW ; Option-2 – 0,075/0,55 kW
- current consumption – Option 1 – 0,84/1,73A Option 2 – 0,9/1,9A
- control – with remote control for the shooter
- protection classes – device Class I, control unit and remote Class II
- working conditions – temperature 0-70 C,
- trolley speed: – Option 1 -3,5m/s / 1,2 m/s; Option 2 – 7m/s / 1,2m/s

The device is controlled and programmed by wireless remote control. The target holder is divided into two parts, allowing to lift or completely unmount it if necessary. Distance selection is performed by pressing a small selection button on the front of the remote control or touchscreen when the carrier is at the firing point. As an option, a version of the conveyor moves in the path of a dual arc rail with target rotator functionality controlled wirelessly.

PRICE: 5500 USD.

Target retrieval system – transverse TTP – 25.

Running target moves transversely (optional: oblique) left and right with fixed speeds. Target carriers are driven using steel cable.
Basic equipment includes:

- power unit – including gear motor (option with speed regulation)
- runway – including a running rail, steel rope stringing, end stops,
- trolley with a target holder,
- power and control unit using a microprocessor system,
- remote for control.

Basic specifications:

- Power supply:
  – main circuit – 3 Phase., 220/380V, 50Hz (option 1 phase 230V)
- – control circuit – 12V/24V AC, DC,
- drive motor – two-speed, 3 phase 220/380V, 50Hz (option 1 phase 230V)
- input power – approx. 2,2 (0,8kW)
- control – from the desktop – the control pendant on the firing point operated by the shooter or auto trainer
- protection classes- I and II
- trolley speed:
  – a device mounted at a distance of 25 m – approx. 1 m/s and 2 m/s,
  – option – adjusted smoothly from the control unit

Using the mode switch user can choose the type of work – we can set a manual control or enable an automatic trainer. The simulator automatically initiates target movement at specified time intervals which can be easily adjusted using the knob to set a time appropriate for each shooter. Users can

change the trolley speed using Speed-selector, setting it to fast or slow. There is also a version of Target Carrier moving in the path of arc or dual rail with target rotator functionality controlled wirelessly.

PRICE: 7850 USD.

Five target turntable stations with a bulletproof cover.

The device type UOS-25 is designed for the automatic rotation of targets intended for shooting at 25m. The device can also be used for sports shootings in competitions. The device is made in two versions: the police and sports – with different machine frame heights. Additionally, each version can be made with 0-90 degrees or +/- 90 degrees target rotation. The device meets the regulation requirements of ISSF, ensures the smooth conduct of the competition and training, and secures their course if the device is appropriately used according to the instruction manual and safety regulations at the shooting range. The device in the standard version consists of a steel beam with five target frame holders set on two feet (optionally upper frame can be made foldable). On the lower beam, there is a drive unit mounted. On the side of the drive unit, there is a control unit. On one side of the front part of the control unit, there are rubber cable fittings for the power and control cables routing; on the other side, there is a fuse socket. Steel sheet covers to protect the drive and control units from the front, top and rear. Target screens (made from hardened polystyrene – 40 or polyurethane) are mounted in the aluminium frame holders.

The control device is an electronic control panel located at the firing point (lane). A shooter can connect a special starting rope to the control panel allowing the shooter to decide when to start. The control panels are described in detail in the enclosed manual of microprocessor control panels.

Desktop control systems are installed in an insulating housing made of plastic material. On the front panel are located switches which allow users to change shooting time and control the device UOS-25.

On the back of the control panel are a fuse socket, a socket for the device control cable and a socket for a starter rope. The panel is powered directly from the control unit installed on a UOS-25 device (DC 12V or AC 12V, 50Hz).

Basic specifications:

- device dimensions:
  – length -340 cm
  – width of the base – 80 cm
  – height – Approx. 50 cm
  – target height:
  a/police version- 176cm
  b/ sport version (max) – 100cm
- device weight – Approx. 70 kg
- power supply:
  – main circuits – 3-phase., 380/220V, 50Hz
  – control circuits – 220V, 50Hz; 12V, 50Hz;
- input power – Approx. 2,1kVA (5,3kVA)
- current consumption – 5,2/3,0A (13,9/8,0A)
- control – from the electronic panel operated by a judge or a shooter or in automatic mode

- Insulation class – I (control panel. II)

PRICE: 6550 USD

Universal system for situational shooting with a computer hit registration system.

USS system is designed for situational shooting at a firing range with short and long firearms and can be used for sport, law enforcement and military shooting. System configuration depends on customer needs and can consist of many targets with different functionality. Among the others, the manufacturer offer target devices with functionality: pop-up, rotating, pop-up with rotation, horizontal or vertical eject, and horizontal or vertical swing. USS is a modern computer-controlled system with friendly software facilitating the operation of the devices and enabling the creation of simple courses and complex tactical training scenarios. The system can be easily expanded with other target devices in the future.

The software used to control the USS system can also be used to control other systems installed on a shooting range: Target retrieval systems, lighting, ventilation, access control, etc.

All USS system target devices are battery-powered with wireless (or wired) communication enabling free arrangement at the shooting range and allowing users to create advanced complex training scenarios. The device can be equipped with hit detectors with a digital indication in control software. Several target holders are available depending on the type of material from which the target is made. Hit detection can be made in two options – hit sensor mounted to wooden or steel targets or multi-zone hit detection targets, where a hit is registered by a short circuit caused by a bullet.

Each set is made in individual order; therefore, it is possible to configure the system's completion freely. The swivel is available in a version with only the ENEMY-FRIEND rotation and a version with lifting. Two types of housing are available - plastic and full metal.
The shield holder is made in two versions - with attachment to a plate, e.g. from styrodur to which the shield is attached with a tacker, and in a version for plywood/board to which the shield is attached.
The bulletproof cover of the positioner is made as standard for energy up to 1000J, maximum of up to 10000J. Optionally, LED dial lighting is available (lighting can be programmed).
An optional shock hit sensor is available (the hit is registered in the computer system).
The computer controller includes:

- standard laptop;
- all-in-one computer with a 23-inch touch screen - for use in indoor facilities.

Description and characteristics of the device:

The basic version of the device includes:

- computer controller with software - set. 1
- turntable ENEMY-FRIEND (FALLING TARGET) - set . 6
- shield screens - 6 pcs
- cabling with converter and interfaces - set . 1
- power supply-charger - 1 pcs
- radio remote control - 1 pcs
- bulletproof cover

Basic technical data

- supply voltage: – 24V =
- drive motor - 24V=
- input power - approx. 200 W
- control - from a computer controller at the instructor's stand
- power supply – 230 V AC / 24 V DC
- working temperature - standard -10 - +60, optionally up to -40.
- weight: – turntable in a plastic casing – 25 kg
  – turntable in a metal housing – 42 kg
  – full bulletproof cover up to 1000J – 75 kg

PRICE: 35500 USD.

Hearing protection for instructors – 3M Peltor ComTac XPI with microphone – Green.

Professional hearing protectors with active noise reduction and two-way radio communication. The model is equipped with two high-frequency microphones to support the audibility of ambient sounds. Harmful sounds are limited to a safe level of 28 dB, and low frequencies are amplified.

The earmuffs can adjust the volume of heard sounds and conversations depending on the needs. The use of an advanced electronic system eliminates the formation of clicks. The model is equipped with a smooth-running reproduction system that prevents sudden drops in the level of the sound heard. You can activate and adjust the volume using the buttons on one cup.

Wide cushions insulate against noise very well. The lower part is profiled so the protectors do not interfere with the shooting. The headband evenly distributes the pressure on the head, which allows you to wear them for a long time without feeling unpleasant pressure. The extendable design makes it easy to adjust the protectors to the shape of the shooter's head. The model is compatible with most military helmets,

The Peltor ComTac XPI is powered by two AAA batteries, lasting approximately 200 hours of operation. Replacing them requires only removing the panel on the side of one of the earcups. The device is equipped with a low-energy warning system and an automatic shutdown function after 2 hours of non-use.

The earmuffs are equipped with a microphone on a rigid headband, which can be used as a headset for radio communication. After using the appropriate PTT adapter, the headphones work with most radiotelephones used by uniformed services and the army, e.g.

– Motorola GP340/360/380, GP344/388, Mototrbo, XTS5000,
– Harris,
– Radmor.

Technical data:

- Colour: Green
- Type: active protectors
- Power supply: 2 x AAA batteries
- Average battery life: 200 hours
- Weight: 340g

Manufacturer: Peltor, Sweden

Price: 640 USD per item.

Hearing protection for students – 3M Peltor SportTac – Olive.

Professional, active hearing protectors designed for shooting sports. Providing intelligent protection against noise. They also offer the possibility of connecting external audio devices and the function of adjusting the attenuation level. The model is equipped with built-in microphones,

supporting the audibility of ambient sounds. After exceeding the safe level of 85 dB, the electronic system turns off the microphones and suppresses noise.

SportTac amplifies sounds below 85 dB, thanks to which we hear better with earmuffs than without them. A great advantage is the ability to adjust the volume of heard sounds and conversations depending on the needs and the situation. The use of an advanced electronic system eliminates the formation of clicks. The model is also equipped with a smooth reproduction system that prevents sudden drops in the sound level.

The protectors are powered by two AAA batteries (mounted in one bowl). The manufacturer has used an automatic energy-saving mode that turns off the protectors after two hours of inactivity. It is also worth mentioning that the electronic system remembers the last volume settings and informs about a low battery level. The protectors can work up to 600 hours on one set of batteries.

Activation and volume adjustment are made using 3 large buttons. The lower part is profiled so the protectors do not interfere with the shooting. The wide cushions insulate against noise well and are easy to keep clean. The profiled headband evenly distributes the pressure on the head, thanks to which the protectors can be worn for a long time without feeling unpleasant pressure. The extendable design makes it easy to adjust the protectors to the shape of the shooter's head.

The set includes overlays in two colour variants.

Technical data

- Colour: olive + orange
- Type: active earmuffs
- Maximum working time: 600 h
- Power: 2 x AAA
- Weight: 318g
- Manufacturer: Peltor, Sweden

Price: 213 USD per item.

Tactical glasses – ESS ICE One – Clear

ICE™ (Interchangeable Component Eyeshield) is a lightweight, rimless design offering complete ballistic protection, an open field of vision, a first-class optical visor and adjustable temples. The modular design lets you replace any glasses element and attach a corrective insert.
All ICE™ series visors provide 100% UVA/UVB protection and exceed ANSI Z87.1-2010. In addition, the glasses successfully passed the MIL-PRF-31013 ballistic tests with a .15 calibre.

Special features:

- The modular design makes it possible to replace any element of the glasses: visor, temples or nose piece
- Damage and deformation-resistant ballistic visor of the first optical class with a thickness of 2.4 mm made of polycarbonate

- Visor free from any distortion and guaranteeing 100% protection against UVA and UVB radiation
- ToughZone™ technology to protect the visor from scratches
- Unlimited field of view, perfect for handling weapons
- Easy and rapid replacement of the visor, mounted using profiled cuts at the ends of the visor
- Flexible temples with PosiLock™ technology are adjustable in length, which perfectly adapts to the shape of the user's head
- Temples guarantee maximum comfort and no pressure points
- Comfortable, replaceable composite and silicone nose piece
- Possibility of mounting an additional elastic strap to protect the glasses against loss
- U-RX™, P-2B™ and Vice™ corrective inserts available

Filters: 100% UVA/UVB
Standards:
- under the American civil standard ANSI Z87.1 - 2010
- compliant with the US Army standard MIL-SPEC MIL-PRF-31013 (Clause 3.5.1.1)
- CE quality mark, by European standards EN 166:2001, EN 170 and EN 172
- frames by the European standard CE EN 166 FT
- visor compliant with the European standard CE 5-3.1 FT K N
- compliant with US Federal OSHA

Set contains:

- ICE™ temples
- Clear visor
- Black pouch made of microfiber, designed for storing and cleaning glasses.

Technical data:

Visor material: polycarbonate
Visor thickness: 2.4 mm
Viewfinder colour: clear, visible light transmission: 89%
Temple colour: black
Viewfinder dimensions:
-Length: 147mm
-Width at widest point: 48.1 mm
- Width at the nose assembly point: 19.5 mm
- Spacing of side mounting holes: 114.4 / 130.5 mm
Temple dimensions:
- Width at the hinge: 152 mm
- Temple thickness: 2.5 - 5 mm
Weight of complete glasses: 30 g
Single visor weight: 19 g
Nose weight: 3 g
Temple weight: 8 g
Manufacturer: ESS (Eye Safety Systems), USA

Price: 35 USD per item

Mechanix Wear FastFit Covert BLK tactical gloves for instructors.

Universal, comfortable tactical gloves designed to protect hands. The advantages of the FastFit model are the high flexibility and durability of the structure. In addition, the gloves adapt very well to the shape of the hand, ensuring high comfort at work.
The inner part (gripping side) is made of durable 0.6 mm synthetic leather that guarantees high dexterity. The material's structure allows you to operate mobile devices with each finger without removing the gloves. The upper part is made of breathable TrekDry® material that reduces hand sweating. An extended elastic cuff with a drawstring provides additional protection and secure hold of the gloves on the wrist. It also allows you to take off and put on gloves easily. The model is equipped with nylon loops for hanging.

The main features of the Mechanix FastFit gloves:

- equipped with TouchScreen technology - the ability to use touch screens without removing the gloves,
- TrekDry breathable material - high breathability and comfort of use even in the most challenging conditions,
- elastic cuffs that easily adjust to the user and provide protection against accidental slipping of the glove,
- reinforcement of the material of the index finger and thumb,
- an anatomical design that adapts to the user's hand to prevent the material from rolling up,
- made of durable synthetic leather with a thickness of only 0.6 mm, guaranteeing high dexterity,
- machine washable.

Mechanix gloves are perfect for survival trips, work in a car workshop, DIY, airsoft or paintball games. Mechanix gloves are also eagerly used by operators of special units.

The gloves meet the EN388-2121X protective standard in terms of resistance to mechanical action, which means:

- 2: abrasion resistance (on a scale of 0-4)
- 1: cut resistance (on a scale of 0-5)
- 2: tear resistance (on a scale of 0-4)
- 1: puncture resistance (on a scale of 0-4).

Technical data:

- Style: FastFit
- Colour: black
- Manufacturer: Mechanix Wear, USA

Price: 19 USD per item.

8.2 FIRE PROTECTION SYSTEM

The entire fire installation must be designed from scratch. The fire control panel size and the number and type of detectors will depend on the exact number of rooms from the scenario chosen. The location of fire detectors will depend on the adopted technological solutions in the shooting hall. Taking the equipment presented below as a reference point for the calculation is recommended.

After consultations with specialists in the fire industry, I suggest adopting a solution based on the systems described below.

ACSP-402 Fire alarm control panel

- 2 outputs for controlling conventional sirens
- output for controlling devices for transmitting fire alarms and fault signals
- 8 programmable relay output
- control of external devices
- output for controlling automatic fire protection devices
- output delays
- 4 programmable zones on the control panel mainboard (NO, NC)
- LEDs informing about the status of the control panel and external devices
- **built-in LCD display enabling:**
    - configuring the control panel
    - fire alarm display
    - displaying messages about blockages, tests and damages
    - viewing the list of current blockages, tests and damages
    - viewing the history of alarms and other events
- built-in piezoelectric transducer for sound signaling
- built-in USB port for connecting a computer
- supervising the status of external devices, e.g. for notification of fire alarms and damage
- support for the following addressable detection lines:
    - loop
    - radius
    - loop with branch (with radius)
- **up to 256 zones and 32 groups**

- grouping of sirens
- grouping of automatic and manual call points to divide the protected object has smaller areas
- grouping of automatic fire warning devices in sub-zones for the purposes of alarming variants in the zone
- linking with a group of actuation indicators, inputs and outputs
- connection option:
    - **APSP-402** repeater panel
    - **ACSP-ETH** module (expansion of the control panel with an Ethernet link)
    - **ACSP-RSI** module (bus optoisolation and printer connection)
- non-volatile memory for up to 9999 fire alarms
- non-volatile memory of 8999 events (including fire alarms)
- e-mail notification (requires **ACSP-ETH** module connection):
    - 4 addresses for notification
    - selection of event types to be notified
    - periodic diagnostic reports
- dedicated output for powering the **ACSP-ETH** and **ACSP-RSI modules**
- **automatic switching to emergency power supply (battery) in case of failure**
- support for **APS-318 switched-mode power supply** (main power supply)
- connector for connecting the power supply and the battery
- real time clock with battery backup
- battery charging system with temperature compensation of the charging voltage
- battery status check
- disconnecting a discharged battery
- 24V DC power output
- configuration using the buttons on the front panel of the control panel
- **ACSP Soft** program for configuring the control panel (USB port)
- operating temperature: -5°C ~ 55°C
- weight: 2.721 kg
- dimensions: 324x382x108 (width/height/length)
- warranty: 24 months

PRICE: 1905 USD

INTERNAL HYDRANT DN25 S-25-Z/W-GW-20/30 SUPRON

Internal DN25 hydrant hung with a 25mm semi-rigid hose with space for a fire extinguisher under the reel. Universal version: the possibility of connecting the same hydrant in the left or right version. The connection holes are blinded and allow connection to 1” and 2” power installations; they offer six connection options: from the side, back, and top. Working pressure from 0.2 to 1.2 MPa.

Hydrant composition:

• STANDARD hydrant cabinet made of black sheet painted with red (RAL 3000) or white (RAL 9003) facade paint, solid door; Thanks to the concealed hinge, the cabinet door can be opened 180º

• brass hydrant valve 25

• hose reel in RAL 30000 colour, tiltable by 180° with brass water axis and unwinding force regulator

• semi-rigid 25mm delivery hose, 30m long

• PWh-25 hydrant nozzle, permanently connected to the hose using an aluminium sleeve

• hose connecting the valve with the water axis; no clamps, all threaded connections

• PATENT lock

• marking: "Hydrant" and "Fire extinguisher" sign + information plate

• hydrant installation and maintenance manual

• instructions for connecting and changing the connections of the universal indoor hydrant

• Mounting • Surface mountingrecessed

• Dimensions (height/width/depth) • 800/700/250[mm]

• Recess dimensions (height/width/depth) • 820/720/260[mm]

• Supports (option) • 2 pcs x 650mm

• Bases (optional) • 2 pcs x 650mm

• Hose length • 20m or 30m

• Certificate • CNBOP

• Color • RAL 3000 or RAL 9003

PRICE: 445 USD

DMP-400 - Multi-sensor smoke and heat detector

• sensor: optical and thermal

• LED for optical signalling

• sensitivity of the smoke sensor regulated by the control panel (4 levels of sensitivity)

• double-sided short-circuit isolator

• optical chamber contamination detection

• possibility of connecting the WZ-110 activation indicator

• mounting in DB-400 socket (not included)
• power supply from the detection line
• double-sided short-circuit isolator
• dust cover included
• weight: 95g
• dimensions: ø108x54mm (diameter/height)
• Warranty: 24 months
PRICE: 93 USD

DB-400 - Base for addressable detectors

Ensuring continuity of the detection line in case of disconnection of the detector.
Easy disconnection of the detector from the detection line during periodic inspections or other service activities

- possibility of connecting wires of the detection line, run flush or surface mounted
- possibility of connecting a remote WZ-110 actuation indicator
- possibility of mounting on the industrial base PDB-100
- weight: 76g
- dimensions: 131x131x35mm (width/height/length)
- ACSP satellite

PRICE: 11 USD.

GPRS-A LTE SATEL Universal communication module

Monitoring module:

- Data transmission in LTE/HSPA+/EDGE/GPRS technology - depending on the capabilities of the mobile network
- Notifications: SMS, PUSH, CLIP
- Remote control of module outputs
- Complete with housing and antenna

PRICE: 167 USD.

ROP-400 - Manual call point

- reusable plastic visor
- LED diode for optical signalling
- special test/reset key (included)
- assembly: internal
- full compliance with the requirements of EN54 11:2001+A1:2005
- power supply from the monitoring loop
- double-sided short-circuit isolator
- optional mounting box ROP-BT or ROP-BS
- optional cover against accidental ROP-FLAP activation
- weight: 86g
- dimensions: 87x87x40mm (width/height/length)
- warranty: 24 months

PRICE: 59 USD

ROP-BS - Mounting box for ROP

- surface mounting without an additional installation box
- cooperation: ROP-110 and ROP-400

PRICE: 9 USD.

ROP-KEY-U - ROP key

Designed to work with ROP-110/PL, ROP-111/PL, ROP-400/PL, ROP-401/PL
Application:

- testing
- reset

The package contains 10 keys.

PRICE: 22 USD.

SPP-400 - Indoor fire alarm siren.

Signalling controlled by the control panel:

- different types of signalling for different alarm situations
- selection from 32 kinds of sound signalling
- acoustic signalling generated using a piezoelectric transducer
- internal use
- double-sided short-circuit isolator
- power supply from the monitoring loop
- weight: 224g

- dimensions: 108x108x87mm (width/height/length)
- warranty: 24 months

PRICE: 80 USD.

Battery 17Ah/12V GP12170

The CSB 17Ah/12V GP12170 has been designed with a service life of 4-6 years, intended for use in systems, SSWiN, smoke extraction systems, fire control panels, alarm systems, emergency lighting systems, and surveying tools. Made in AGM (absorbed glass mat) technology, the electrolyte is absorbed in high-porous glass fibre separators between the plates. Batteries made in AGM technology have lower internal resistance, which means higher voltage at the terminals and longer operating time, especially when discharged with high current.

- rated voltage: 12V
- capacity: 17Ah
- service life: 4-6 years
- maintenance-free AGM
- internal resistance: 23mΩ
- charging voltage:
- buffer: 13.5 ~ 13.8V
- cyclic: 14.4 ~ 15V
- charging current: max 2.16A
- dimensions: 181x76.2x167mm (width/length/height)
- weight: 6.1kg
- operating temperature: -15ºC ~ 50ºC
- VdS certificate
- warranty: 24 months

PRICE: 70 USD

Cable YnTKSYekw 2x2x0.8mm

Special cables for connecting telephone stations and teletransmission devices as well as data transmission utilizing analogue and digital signals in fire protection control and signalling systems. The cables are used primarily as transmission lines and power supply lines for line devices (sensors, line modules) in supervision lines of fire alarm systems and autonomous control systems for fire extinguishing and smoke extraction. The cables are used in installations used at the time "0" of the fire (the moment of fire detection by the detection panel). The cables are intended for signal transmission or triggering of auxiliary devices, which, in the event of fire detection, are activated by the fire alarm control panel (e.g., disconnecting comfort ventilation, bringing passenger lifts, switching off the facility's power supply).

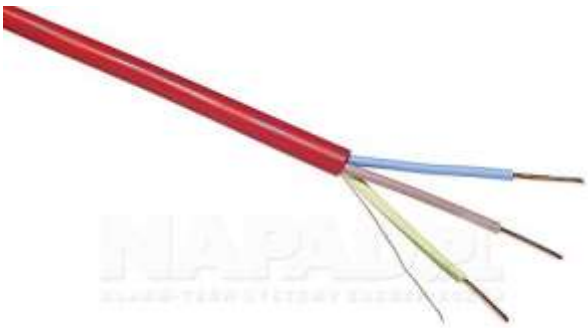
YnTKSYekw - Telecommunication (T) cable (K) station (S), with single-wire copper conductors, PVC insulation (Y) and flame retardant PVC sheath (Yn) and a common screen on the centre (ekw).

Code: 5185/1
YnTKSYekw cable for use in installations of alarm devices and fire protection systems number and diameter of veins: 2x2x0.8mm.

- conductors: single-wire copper
- center: parallel twisted pairs
- screen: metallised foil
- coating: special PVC, flame retardant, red
- CNBOP certificate: No. 3027/2015
- available rings: 100m, 200m, 300m

Price: 100 USD per 100 m.

HDGs cable PH90 3x2.5



Code: 7073
Fireproof, halogen-free power cable 300/500V for fire protection systems number and diameter of wires: 3x2.5mm.

- conductors: single-wire copper
- core: multicore cable
- coating: halogen-free polymer blend
- CNBOP technical evaluation

The Bitner HDGszo 3x 2.5mm power cable is characterized by increased insensitivity to mechanical damage and a certified level of thermal resistance. The product's high fire resistance and halogen-free design not only increase the time of maintaining the electrical functions of the cable in the event of a fire but also minimize the risk of spreading fire in the room. Thanks to its properties, the fire-resistant fire duct is recommended for implementing internal installations of places with above-standard fire safety requirements. Bitner halogen-free fire-resistant cables are used in emergency lighting installations, smoke extraction systems, alarm systems, signalling systems, voice alarm systems, control systems, fire alarm systems and fire automation, and other circuits ensuring safety. In fire conditions, these cables ensure the proper functioning of the installation for at least 90 minutes. (PH90) and durability of insulation for 180 min. (FE180). They do not emit toxic, suffocating gases and dense smoke during combustion. The cables are suitable for permanent installation inside buildings.

PRICE: 3,50 USD per 1 meter.

Powder fire extinguisher GP-6x ABC (6kg)

Extinguishing efficiency: 8A 34BC
Extinguishing agent weight: 1 kg
Total weight: approx. 1.90 kg
Type of extinguishing agent: DELEI FIRE ABC extinguishing powder
Operating time: min. 6 sec
Working pressure: 16 bar at 20°C
Application temperature range: -30°C +60°C

PRICE: 31 USD

Powder fire extinguisher GP-2x ABC (2kg)

Powder fire extinguisher with small capacity is used especially in fire protection of cars, offices and apartments. The fire extinguisher is designed to extinguish fires of solids, liquids, gases and electrical equipment under voltage up to 1000 V. This extinguisher extinguishes fires from the ABC group.

Type of extinguishing agent: DELEI FIRE ABC extinguishing powder
Working pressure: 16 bar at 20°C
Application temperature range: -30°C +60°C

PRICE: 16 USD.

8.3. VIDEO MONITORING AND ACCESS CONTROL SYSTEM.

PX-NVR3282H-A2 - network recorder

The PX-NVR3282H-A2 AI 4K recorder has been designed for comprehensive monitoring based on 32 IP cameras. The device comes from the latest series of IPOX AI recorders, where a special artificial intelligence algorithm was used. It enables the setting of perimeter protection (on two channels - implementation on the recorder's side) based on object recognition and intelligent search of recordings, including object recognition. The high input bitrate of 192Mbps allows for effective cooperation with cameras with a resolution of up to 12Mpx and ensures stable operation even in an extensive monitoring system. The image recorded by the device can be archived on two hard drives with a total capacity of 24TB (12TB/HDD).

PX-NVR3282H-A2 - IPOX AI IP recorder
video inputs: 32x IP channels
video outputs: 1x VGA, 2x HDMI (4K UHD/Full HD)
recording resolution:
4000×3000 (12Mpx) - AI functions disabled
3840×2160 (8Mpx) - with AI functions
bitrate: 192Mbit (in), 192Mbit (out)
compression format: H.265S/ H.265+/ H.264+/ H.265/ H.264
interface: 2x RS485
audio inputs/outputs: 1/1 (RCA)
alarm inputs/outputs: 8/4
network interface: 2x Ethernet RJ45 10/100/1000Mbps
disk support: 2x HDD Sata III (max. 24TB)
AI functions: perimeter protection (2 channels) or face detection and recognition (2 channels), object classification (human/vehicle)
image library management (32 databases, up to 10,000 photos)
support for cameras with image analytics, AI and ANPR (LPR) functions
support for two independent monitors (2 HDMI outputs)**
support for combined alarms (e.g. motion detection + analytics)
local playback max. up to 16 channels
window division: 1/4/9/16/25/32/36/1+5/1+7/1+12
one two-way audio track - intercom
sound recording from 32 IP cameras
integration with cash registers (POS)
cooperation with the NVMS 2.0 LITE application
compliance with the standard: ONVIF, RTSP
two-streaming: main and extra
support for P2P connections (NAT 2.0)
S.M.A.R.T. technology
picture view: Internet browsers: IE, Chrome, Edge, Opera, Firefox, etc.
mobile devices with systems: iOS, Android
warranty: 36 months
PRICE: 580 USD.

PX-DI4028/W - 4Mpx IP camera

PX-DI4028 is an IPOX turret camera. In the process of capturing the image, the device uses an innovative CMOS sensor that provides a natural representation of the observed scene at a resolution of 2560×1440 (4Mpx). The precise fixed-focus lens used in the device allows for quick adaptation of the camera, and the effective infrared system ensures reliable observation in changing lighting conditions. In addition, thanks to the integrated twilight sensor, the device automatically measures the level of lighting in the environment and precisely controls the operation of the illuminator. Intelligent camera management offers a number of useful image autocorrection functions and a rich catalogue of monitoring support systems.

PX-DI4028 - IPOX PRO camera
sensor: 1/3" 4MP Progressive Scan CMOS
resolution: 2560×1440 (4Mpx) @ 25/30fps
interface: Ethernet 10/100 Base-T PoE 802.3af
compression: H.265/ H.264
sensitivity: 0.02lux @ F1.6 (AGC ON), 0lux (IR LED ON)
Lens: 2.8mm @ F2.0
illuminator: 1 IR LED Black Glass (range up to 30m)
AWB, AGC, BLC, HLC, MIR, 3D DNR, DWDR, ROI, Defog
intelligent image analysis functions, built-in microphone
support: ONVIF, API
support for encrypted HTTPS protocol
available colours: white, graphite
systems: motion detection, privacy zones
processing speed and resolution: 25/30fps for 2560×1440 (4Mpx), 25/30fps for 2304×1296 (3Mpx)
25/30fps for 1920×1080 (1080p)
bitrate: 64Kbps ~ 5Mbps
image preview:
web browsers: IE
mobile devices with systems: iOS, Android
housing: tightness class (IP67), vandal-proof (IK10)
power supply: 12V DC or PoE 802.3af
warranty: 36 months

PRICE: 153 USD

PX-S18-P16-U1G-U1G/1F-TP150HI - switch PoE 16-port + 1 RJ45 + 1 RJ45/SFP – combo

The PX-S18-P16-U1G-U1G/1F-TP150HI switch is a PoE switch designed to power IP cameras operating in the IEEE802.3af/at and Hi-Poe standard (port 1-2). Signed by the IPOX brand, it is the latest version of technologically advanced products designed to function within the framework of IP monitoring structures. The switch on ports 1 to 16 has the function of automatic detection of devices powered in the PoE+/PoE++ standard. UpLink ports are used to connect other network devices via the RJ45 port or SFP slot. The front panel signalling the device's operating status is realized on LEDs. The use of the device is effortless, and thanks to the plug & play technique, the installation is hassle-free.

Interface:
2x Hi-PoE RJ45 ports (10/100Mbps, Auto MDI/MDX)
14x RJ45 PoE 802af/at (10/100Mbps, Auto MDI/MDX)
1x RJ45 UpLink port (10/100/1000Mbps)
1x RJ45 UpLink port (1000Mbps) or 1x SFP UpLink slot (1000Mbps) - Combo
PoE PSU power: 150W (Hi-PoE <60W - port 1~2, at<30W - port 3~16)
PoE range: 100m (normal mode), 250m (CCTV mode)
throughput: 20Gbps
3 operating modes (VLAN, normal, CCTV)
housing type: desktop / RACK (brackets included)
LED optical signalling of operation
protections: surge protection
simple installation and operation (plug and play)
terminal for connecting the protective conductor
power supply: AC 100V~240V
dimensions: 295x195x45mm (width/length/height)
warranty: 36 months

PRICE: 209 USD

W6406 - 19" rack cabinet - 600x450x6U

Hanging RACK cabinets are an ideal solution for computer networks, alarm systems, and CCTV and can also be widely used in sound and automation systems. Thanks to this, the devices are protected against accidental mechanical damage. RACK cabinets are easy and quick to assemble. They have a durable and reliable design with an aesthetic appearance, which in this case, allows the installation of devices up to 60 kg. The front door is made of tempered glass, which increases its mechanical and thermal strength. The rest of the walls are made of powder-coated sheet metal, which is resistant to rust, oxidation and paint abrasion. The side panels can be removed without using any tools (snap doors), giving even greater

access to the mounted devices. It is also possible to dismantle the rear part of the cabinet. The hanging RACK cabinet has been designed to mount the door left or right. The cabinet has various possibilities for cable entry in the rear part (top, bottom).

Hanging Rack 19"

- height: 6U
- standard: 19" rack
- dimensions: 600x450x370mm (width/depth/height)
- static load capacity: up to 60 kg
- maximum mounting depth: 392.5mm
- glazed front door
- latch side door (can be dismantled)
- removable cover in the back wall
- the possibility of mounting two fans in the ceiling
- possibility of mounting devices with a total height of 6U
- two sets of keys included
- includes mounting kit (12x basket with M6 screw and washer 4x pin with screw)
- protection class: IP20
- material: cold-rolled steel sheet SPCC, 1.2mm (mounting profile 2mm)
- cable openings in the back: from the top,from the bottom
- Vents:
- in the side walls
- on the front of the housing
- factory-assembled wardrobe or for self-assembly packed in one cardboard box
- available colors: black (RAL9005), light gray (RAL7035)
- warranty: 36 months

PRICE: 115 USD.

LM32-F200 - 31.5" monitor

Dahua LM32-F200 is a 31.5" Full HD monitor (1920x1080 pixels) with LED backlight, offering excellent colour reproduction and wide viewing angles. Its technical parameters ensure full comfort of use and excellent image quality. The dynamic contrast level is 1400:1, and the response time 8 ms. The LM32 F200 monitor is equipped with a signal input - digital (HDMI) and analogue (VGA) and two stereo speakers, and thanks to the compatibility with the VESA standard, it can also be hung on the wall. Adapted to 24/7 operation.

image diagonal: 31.5"
resolution: 1920x1080 (Full HD)
matrix type: TFT LCD (LED backlight)
screen format: 16:9
inputs: 1x HDMI, 1x VGA, 1x USB
contrast: 1400:1
response time: 8ms

brightness: 240cd/m2
2 built-in 4W speakers (stereo)
OSD menu (remote control or control buttons on the monitor)
automatic adjustment of the screen settings
mounting on stands or wall (VESA 75 standard)
weight: 3.9kg
dimensions: (width/length/height)
with base: 731.37x177.3x485.9mm
without stand: 731.37x67.54x432.61mm
warranty: 36 months
PRICE: 338 USD.

MC16-PAC-ST-1-KIT - access control kit in ST version

MC16-PAC-ST-1-KIT is a modern access control kit for one door, intended for use in the RACS 5 v2 system. The set includes a metal casing with a power supply and a network access controller. The set enables one double-sided door operation using MCT series readers, RACS CLK/DTA readers, PRT series readers or readers with the Wiegand interface. The readers and the lock are powered by the controller's power outputs, which can supply 0.2A and 1.0A, respectively. The entire system is powered by the 24V/2.2A power adapter included in the set.

cooperation only with VISO ST software
access control set for one door
two-way passage control
interface for 4 RACS CLK/DTA readers (PRT series)
interface for 4 Wiegand readers
deep discharge protection
tamper switch
protection class: IP20
0.2A power output
1.0A power output
battery charging 0.3A
space for a 7Ah battery
kit content:
network access controller MC16-PAC-ST-1
power supply LRS-50-24 - 24V DC/2.2A
metal housing ME14-24V
working conditions:
working temperature: 5°C ~ 40°C
humidity: 10%~95%
weight: 2.1kg
dimensions: 250x250x80mm (width/height/length)
warranty: 36 months

PRICE: 351 USD.

Indoor proximity reader with MCT82M keypad

The MCT82M is an identification terminal designed for use in the RACS 5 system. The device enables users to be recognized using 13.56 MHz MIFARE Ultralight/Classic proximity cards. The MCT82M terminal has an RS485 interface through which they are connected to the communication bus of the MC16 controller.

support for 13.56 MHz MIFARE Ultralight/Classic cards
work in terminal mode
power supply: 12V DC
reading range: up to 7 cm
communication interface: RS485
protection class: IP65
built-in touch keyboard
recognition of a long touchdown of the card
average current consumption: 65 mA
reading numbers: CSN, SSN, MSN
reading programmable card number: PCN
signal loudspeaker with adjustable sound level
three LED indicators
tamper sensor (Tamper)
detection of housing opening and detachment from the substrate
firmware update via RS485
in the MCT82M-IO model:
three NO/NC type parametric inputs
two transistor outputs with a load capacity of 150mA/15V
one relay output with a load capacity of 1.5A/30V
inputs can be operated in Double Wiring mode
input response time defined in the range: 50 ~ 5000 ms
defining the quiescent polarity of the output line
configuration via RS485 (RogerVDM)
working conditions:
working temperature: -10°C ~ +50°C
humidity: 10%~95%
weight: approx. 100g
dimensions (width/height/length):
standard stand: 85x85x22mm
thicker base: 85x85x37mm
warranty: 36 months

PRICE:110 USD.

8.4 RANGE SAFETY OFFICER CONTROL ROOM

Furniture.

The final dimensions of the desk can be determined only at the level of the architectural plan when the exact dimensions of this room are known. It is proposed to order a dedicated, custom-made desk from the same manufacturer to equip the classroom. It is also suggested that the colour scheme be the same.

Sound system.

Monacor PA-12040 Amplifier ELA 120 W 4-channel 4 zones.

Technical data:

- Output power: 4x120WRMS4x170WMAX
- MIC/Line: 5mV/4kOhm, 100mV/10kOhm
- 100 mV/30 kOhm line
- Tel: 40mV/5k ohms
- Speaker: 4 Ohms / 8 Ohms
- Monitor speaker: 8 Ohm/1 W
- Line (Zone): 1.7 V, bal.
- Line (Mix Out): 3.95V
- Frequency range: 50 to -17000 Hz
- Depth: +/-10dB/100Hz
- Pitch: +/-10dB/10kHz
- Interference Separation, Mic: >65dB
- Noise spacing, line >75 dB
- 1% distortion factor.
- Permissible working temperature: 0 - 40°C
- Power supply: 230V AC/50Hz/1200VA
- MIC/Line: 3 x jack/XLR Combo, balanced
- Line: 2 x RCA L/R
- Paging: Screw terminal
- Priority: Screw terminal
- Line (Zone): Screw terminal
- Line (Mix-Out): Screw terminal
- Headphones: 3.5mm stereo jack
- Loudspeaker (monitor): Screw terminal
- Loudspeaker (zone): Screw terminal

PRICE: 1140 USD

Monacor NR-33KS, horn loudspeaker IP66

Rated power 23W MAX/8Ω
Frequency response 275-7,000Hz
SPL (1W/1m) 106dB
Radiation angle (H/V) 100°/50° allow ambient temperature -20 °C to +50 °C
Dimensions 250x145x272mm
Weight 1.5kg
Additional features IP66, hard. artificial
Replacement coil IT-230/VC
Horn loudspeaker made of plastic, resistant to moisture.
Characteristics:

- Impedance 8Ω
- Resistant to strong water jets, IP66
- Universal use: outside and inside
- Durable ABS plastic housing
- Stainless steel mounting bracket and screws

PRICE: 58 USD.

Motorola RDX RDU4160d Radio Two Pack

The Motorola RDU4160d two-way radio offers 16 channels, 4 watts of power, is repeater capable, and provides coverage for up to 350,000 square feet or 30 floors. Transmit and receive frequencies can be individually selected from the 89 built-in UHF frequencies and 122 private line codes. Purchase this bundle and receive the following:

- Two Motorola RDX RDU4160d Two Way Radio.
- Two Ultra High Capacity (18.5 hours) Lithium Ion Battery
- Two Belt Clips
- Two Standard Drop-In Charging Tray w/ AC Adapters

PRICE: 638 USD per set.

Microphone BOYA BY-M1

- Transducer type: Capacitive
- Type of connectivity: Wire
- Directivity characteristics: Omnidirectional
- Destiny: Cameras and cameras, Tie and reporters, Smartphones
- Sensitivity [dB]:-thirty
- Impedance [ohms]: 1000
- Self-noise [dB]: 74
- Maximum frequency response [Hz]: 18000
- Minimum frequency response [Hz]: 65
- Mounting system: Clip
- Cable length [m]: 6
- Connector: 3.5mm jack
- Bluetooth: NO
- With speaker: NO
  Additional information:
- On/off button
- Included accessories: Battery, User manual, 3.5 mm jack cable, Clip, Anti-wind foam cap
- Guarantee: 24 months
- Weight [g]: 20.5
- Colour: Black
- Producer:
- BOYA

PRICE: 21 USD per item.

This room will also be equipped with a tablet and a control computer. The basic parameters of the devices should not be lower than the following:

Tablet:

Intel Core I5 processor or better
RAM memory min. 8GB
SSD capacity - min. 512GB
Screen diagonal min. 11.6"
Touchscreen
Microsoft Windows 10/11 system software

Housing construction - RUGGED - specially reinforced, resistant to dust and moisture.

Control computer:

Intel Core I5 processor or better
RAM memory min. 8GB
SSD capacity - min. 512GB
Microsoft Windows 10/11 system software + 23" touchscreen

8.5 CLEANING MATERIALS STORAGE

It is recommended to buy one of the two models of vacuums presented below.

Vacuum cleaner NT 80/1 M

Vacuum cleaner NT 80/1 M with the possibility of sucking water type B1, designed to work with explosives. Meets Directive 94/9 EC (ATEX) for working in potentially explosive areas (Zone 22). NT 80/1 B1 M is designed to remove class M dust hazardous to health, work in zone 22, and remove combustible dust. The vacuum cleaner is equipped with a cartridge filter with a large filtering surface, BIA-C approved for class M dust removal and the ability to work in zone 22. The NT 80/1 B1 M also has an exhaust air filter. The full functionality of the antistatic system is obtained after equipping the NT 80/1 B1 M with electrically conductive accessories. The vacuum cleaner has a tank with a capacity of 80 litres made of stainless steel.

Technical data

- Airflow (l/s) — 56
- Vacuum (mbar/kPa) — 235/23.5
- Tank capacity (l) — 80
- Maximum connection power (W) — max 1380
- Nominal diameter (mm) — 40

• Power cord (m)	• 10
• Sound pressure level (db(A))	• 70
• Weight (kg)	• 29.5
• Dimensions (L x W x H) (mm)	• 660x520x1078

Standard equipment

- Suction hose, 4 m
- Filter bag, Paper
- Wet/dry floor nozzle, 360 mm
- Crevice nozzle
- Antistatic system
- Stainless steel tank
- Cartridge filter, Papa
- fender strip
- Guide handle
- Security Class I
- Castor wheel with brake
- Dust class, M

PRICE: 3506 USD

Tiger-Vac 4D-35L Explosion Proof Vacuum, 5 HEPA Filters, Polyliner, and Accessory Kit.

Descriptions:

- The most flexible industrial cleaning tool a firing range can use:
- Explosion Proof Vacuum

- For housekeeping and general cleaning of firing ranges
- Can safely recover lead dust and unspent gunpowder
- Dual Bypass/Dual Speed Ametek® long life motors
- Includes 5 HEPA filters. Class H14. Individually factory tested.
- Stainless Steel Type 430 body and recovery tank.
- Manual Filter Shaker (MFS) with SD* Teflon Laminated Main Cloth Filter Assembly
- Detachable Filter Chamber and Recovery Tank for easy disposal of contaminated recovered materials
- Material to be recovered within a conductive polyliner recovery bag for easy disposal
- Front-mounted floor tool (28”/61cm wide) is included
- The onboard sidekick hose and wand are designed to improve the overall cleaning efficiency resulting in improved productivity
- Ideal for cleaning along vertical surfaces, removing debris from cracks and crevices, stray small calibre casings and those difficult-to-reach nooks and crannies in the bullet trap
- Dual suction inlets with gate valves allow the operator to easily “Shift and go” to switch from wide area floor cleaning to spot cleaning with our “sidekick” hose and wand.

Technical Specifications:

- Voltage @ 60Hz: 120 volts
- Type of Power: single phase
- Wattage: 2040 W
- Power: 2.7HP
- Amperage: 17 amps
- Airflow: 200 cfm
- Plug Type: 20 Amps Explosion Proof
- Noise Level: 76 dB(A)
- Tank Capacity: 9.2 gallons
- Suction Inlets: Two x 2”
- Machine Inlet: 38 mm
- Weight: 205 lbs.
- Cord Length: 33 feet
- Cart Type: Detachable Tank (DT)
- Filter Cleaning: Manual Filter Shaker (MFS)
- HEPA Filter: 99.9” Efficiency on 0.3 Micron

PRICE: 5999 USD

18” Ammo-Up Push Brass Collector

The 18-inch Brass model will pick up 9mm, 10mm, 40, 45 Auto, 38 Special, 357 SIG, .308 (7.62mm), .223 (5.56mm) and much more. The Ammo-Up will pick up all rifle and pistol brass except for the .22 rimfire. It has a pick-up width of 18 inches. The basket, ejector fingers and brackets have all been re-engineered for a better Ammo-Up. We added a front wheel with the new design to roll the machine backwards for those tight areas within your range. Devices have a removable basket for quick and easy brass disposal. When the basket is removed from the machine, you can dispose of the brass in any desired container.

Ideal surfaces are concrete, carpet, dirt, sand, and grass up to 4 inches long.

PRICE: 599 USD.

CLEANING MACHINE SCRUB DRYER FIMAP MMX 50BT 2009

PRICE: 3514 USD.

A detailed description of the device and technical data can be found in Annex No. 14.

Metal cabinet for cleaning products.

• Universal metal cabinet for storing cleaning agents. Cylinder lock, hanger bar.
• colour: grey RAL 7035
• door colour: grey RAL 7035
• dimensions H x W x D: 195 x 95 x 40 cm
• material: steel sheet, th. 0.8mm
• number of shelves: 4
• shelf load capacity: upper 40 kg, other 20 kg
• lock: cylindrical
• two keys included, surfaces finished with powder paint, assembled product

Parameter:

- Sheet thickness 8/10E
- Material STEEL
- Height (mm) 1950mm
- KEY locking type
- Width (mm) 950mm
- Welded type
- Depth (mm) 400mm
- EPOXY surface finish
- Construction colour GRAY
- Door colour GRAY
- RAL 7035
- Supplied mounted YES
- 10-year manufacturer's warranty for the customer

PRICE: 550 USD

Storage shelf

Specification:

- max. load per shelf: 175kg (total 875kg for the entire rack)
- number of shelves: 5
- materials: powder-coated galvanized steel 0.8mm, MDF board 4mm
- assembly: screwless (pressed in crossbars)
- weight: 13 kg

PRICE: 40 USD

Saturn cleaning trolley x 3.

Cleaning Set: Saturn trolley 2x25l + speedy mop 40cm + chemicals basket.

Cleaning set: SATURN trolley 2×20 litres with a basket for cleaning agents and MOP SPEEDY for a 40cm tape. Professional cleaning companies use it in service points, premises, schools, hospitals, and other public facilities.

The SATURN trolley has two buckets with a capacity of 20 litres. They are made of high-quality ABS plastic, characterized by high resistance to cracks. It uses a down-press type jaw press, thanks to which the wringing process is light. This press works with flat, string and Kentucky mops. The stroller has a chrome handle with which you can drive the stroller safely and comfortably. An additional advantage is that it is equipped with durable, stable wheels that do not scratch the ground while moving. All this ensures adequate work comfort.

PRICE: 95 USD.

8.6 SHIELD STORAGE.

Metal bookcase Metalkas BR20 80kg 200x100x40 x 2 pieces.

INFORMATION:

- Metalkas brand
- External depth [mm] 400
- Galvanized colour
- Number of Shelves 6
- load capacity 80
- Shelves - material STEEL
- Type of rack assembly Bolted
- External width [mm] 1000
- External height [mm] 2000
- Weight: 17.9 kg

Price: 45 USD

8.7 WAITING ROOM.

OTTIMAX Bench 4 - bench for four people x 7

TECHNICAL DATA:

- length: 216cm
- depth: 35cm
- height: 79.5 cm
- seat width: 40cm
- number of seats: 4 pcs.

PRICE: 180 USD per 1 bench

TV SET HISENSE 85A6BG 85" LED 4K VIDAA Dolby Vision HDMI 2.1

Basic information
Screen:

- 85" LED, UHD/4K, 3840 x 2160px
- Smart TV: Yes
- Android TV: NO

- Tuner: Analogue, DVB-C, DVB-S, DVB-S2, DVB-T, DVB-T2/HEVC/H.265
- Screen refresh rate: 60 Hz
- HDR (High Dynamic Range) technology: Dolby Vision, HDR10, HLG
- Connectors: HDMI x3, USB x2
- Functions: WiFi, DLNA, Bluetooth, Hisense VIDAA
- Case Color: Black

Picture

- Screen diagonal [inch]: 85
- Screen diagonal [cm]: 216
- Screen format: 16:9
- HD format: UHD/4K
- Screen Brightness: 400cd/m^2

PRICE: 1430 USD.

Avtek TT-Board 80 Pro interactive whiteboard- a set with a projector.

An interactive whiteboard with a projector is optimal for a large, interactive image. The 80-inch diagonal provides excellent visibility from a distance in the classroom.

Avtek PRO kit:

- ViewSonic PS501X Projector
- Avtek TT-BOARD 80 Pro interactive whiteboard
- Avtek WallMount Next 1200 holder
- AverMedia Live Streamer CAM 313 webcam PW313
- working diagonal 80"

- 4:3 aspect ratio
- shortcut bars on both sides of the board
- ceramic coating
- 3 years warranty

XGAViewSonic PS501X short throw projector:

- brightness 3600 lm
- Lamp life up to 15,000 hours in Eco mode
- high contrast 22,000:1
- connectors: 2 VGA, 1 HDMI
- warranty: 3 years for the projector and 1 year for the lamp (or 1000 h)

Avtek WallMount 1200 NEXT projector mount.

PRICE: 1550 USD

PREMIUM dry-wipe board.

PREMIUM dry-wipe board, white with a ceramic, magnetic surface, very light. Dimension 150 x 100 cm. The frame is made of an aluminium profile in silver.

A special coating, the so-called ceramic, has a thickness of 40 microns and is hardened in a metallurgical furnace at a temperature above 800 °C; thanks to this, it acquires excellent properties: very high hardness, extraordinary resistance to all kinds of scratches, abrasion and impacts (virtually indestructible).

The back of the board is reinforced with a galvanized sheet to ensure its stability, protecting against moisture and bending. In addition, the product is equipped with a convenient shelf that will fit all the necessary utensils.

Extremely easy and quick to assemble. The board can be hung both vertically and horizontally. Fastening elements included.

Price: 174 USD.

Curver Click-It 50L Silver/Graphite Tilting Waste Bin

Curver Click-It 50L Silver/Graphite Tilting Waste Bin

- Colour: Silver/Graphite
- Capacity: 50L
- Width: 335mm
- Length: 385mm
- Height: 635mm

- Material: ABS plastic

Price: 12 USD

8.8 CLEANING WEAPON ROOM.

One of the two Gun Clearing Trap models proposed below is suggested.

Guardian TS™ Gun Clearing Trap

- Wt. 151 lbs
- Unit height: 33.50”
- AR500 Backing
- Dura-Bloc insert
- Granular Rubber

Features:

- Handgun and rifle capable (7.62 / .308)
- Rubber granular & Dura-Bloc materials fill the steel housing
- Molded rubber opening prevents weapon scratching
- Can be used indoors or outdoors
- Integrated handles make for easy handling
- Wheels give the Guardian TS™ mobility
- Pre-drilled holes on the base are provided for fixed mounting

PRICE: 840 USD

Bullet trap AR-1.

Device for control of safe loading and unloading of firearms. The manufacturer gives a guarantee of up to 5000 incidents (shots). Bullet trap is a patented and tested product whose innovative design does not require ceramic, sand or rubber-wood inserts, which saves operating costs. Thanks to their small size, they can be used in small rooms and even cars. It is designed for uniformed services, security companies, private shooting ranges, ballistics laboratories, and private people who appreciate safety.

Application: The device safely absorbs shot energy with an initial energy of 3000 j (excluding armo, treamer and incenition bullets.

- gun- 9x19mm 584j
- machine gun- 9x19mm 584j
- revolver- .38 special 247 j- 451 j
- Ar 15- 5.56x45mm 1775j- 1798j
- Ak 47- 7.62x 39mm 1991j
- Mossberg 500- 12/70mm 2822j

Dimensions:

- height: 60cm
- width 41cm
- depth 10cm
- weight 34kg

PRICE: 905 USD.

Weapon cleaning table x 2.

It is a standard workbench, which has been additionally covered with a layer of rubber, polyurethane or other oil-resistant material.

Work table with 3 drawers, load capacity 1000 kg. A Provost workbench designed for every application: mechanics, electronics, metrology, electrical engineering, pharmaceutical assembly, and maintenance. Furniture made of thick steel sheets.

- Rigid construction, foldable with 2 stringers under the top.
- Legs with plastic end caps to protect the floor.
- Beechwood panel or laminate 1500 x 750 or 200 x 750 mm.
- Drawers on double-extension ball bearing slides.
- Drawer extension up to 100%.
- Maximum load per drawer 80 kg.
- Central lock with 2 keys.
- Colours: blue RAL 5012 and grey RAL 7035.

Price: 480 USD

Curver Click-It 50L Silver/Graphite Tilting Waste Bin x 2 (for dirty, oily rags and other rubbish)

Curver Click-It 50L Silver/Graphite Tilting Waste Bin

- Colour: Silver/Graphite
- Capacity: 50L
- Width: 335mm
- Length: 385mm
- Height: 635mm
- Material: ABS plastic

Price: 12 USD

The equipment of this room includes a sink with a battery, a soap dispenser and a paper towel dispenser.

8.9 SHOOTING TRAINER ROOM.

It is proposed to equip this room with 3 trapezoidal tables 140 centimetres wide and 1 chair for the instructor. Furniture of the same type and colour as classroom equipment.

8.10 CLASSROOM.

Furniture.

The consultant's idea is to make the entire facility a modern, harmonious, innovative space. That is why he established cooperation with a company that produces innovative furniture for didactic classes. It is planned that the classroom for shooting training will be the most modern, most representative lecture hall at the Academy. I suggest equipping it with trapezoidal tables 140 cm wide in green or blue. Such an order will allow for freely rearranging the tables and creating an appropriate arrangement depending on whether they will be lectures, workshops or seminars.

The offer for furniture is attached as **Annex 10.**

The consultant believes all rooms should form a harmonious whole, so he suggests equipping the RSO control room and the locker room for students with the same furniture from the same manufacturer.

After decision makers select the appropriate scenario and determine the final dimensions of the RSO control room, it will be possible to order custom-made desks for this room. There is also the possibility of any arrangement of the locker room. Therefore, if the authorities of the Academy had a different concept of furnishing the lecture hall with furniture than the one proposed by the consultant, the company's catalogues were included in Annexes 11-13, allowing for independent configuration of

the equipment of individual rooms. The consultant declares full assistance, cooperation and advice when choosing the right solution.

Multimedia board with a projector.

Avtek TT-Board 80 Pro interactive whiteboard- a set with a projector.

An interactive whiteboard with a projector is optimal for a large, interactive image. The 80-inch diagonal provides excellent visibility from a distance in the classroom.

Avtek PRO kit:

- ViewSonic PS501X Projector
- Avtek TT-BOARD 80 Pro interactive whiteboard
- Avtek WallMount Next 1200 holder
- AverMedia Live Streamer CAM 313 webcam PW313
- working diagonal 80"
- 4:3 aspect ratio
- shortcut bars on both sides of the board
- ceramic coating
- 3 years warranty

XGAViewSonic PS501X short throw projector:

- brightness 3600 lm
- Lamp life up to 15,000 hours in Eco mode
- high contrast 22,000:1
- connectors: 2 VGA, 1 HDMI
- warranty: 3 years for the projector and 1 year for the lamp (or 1000 h)

Avtek WallMount 1200 NEXT projector mount.

PRICE: 1550 USD

Chalkboard, green, ceramic PREMIUM-C 170x100 cm.

PREMIUM chalkboard, green with a ceramic surface, magnetic, very light.
Dimension 170 x 100 cm.

A special coating, the so-called ceramic, has a thickness of 40 microns and is hardened in a metallurgical furnace at a temperature above 800 ° C, thanks to which it acquires excellent properties: very high hardness, extraordinary resistance to all kinds of scratches, abrasion and impacts (almost indestructible). Elegant frame made of silver aluminium profile. The back of the board is reinforced with a galvanized sheet to ensure its stability, protecting against moisture and bending. In addition, the product is equipped with a convenient shelf across the entire width, which will fit all the necessary utensils. Extremely easy and quick to assemble. The board can be hung both vertically and horizontally. Fastening elements included.

PRICE: 197 USD.

Curver Click-It 50L Silver/Graphite Tilting Waste Bin

Curver Click-It 50L Silver/Graphite Tilting Waste Bin

- Colour: Silver/Graphite
- Capacity: 50L
- Width: 335mm
- Length: 385mm
- Height: 635mm
- Material: ABS plastic

Price: 12 USD

8.11 LOCKER ROOMS FOR STUDENTS AND LECTURERS.

It is proposed that the lockerrooms should also be equipped with a system of cabinets designed and delivered by the same manufacturer that will be selected to provide the classroom. Keeping this room in the same colour scheme as the classroom is also recommended.

9. Conclusions and recommendations.

1. The project is extremely difficult and technically complicated but feasible.
2. Please read the SWAT analysis carefully.
3. The feasibility study presented four scenarios for modernising the indoor shooting range.
4. The first three scenarios assume the modernization of the existing shooting range. Depending on the Investor's financial capabilities, they differ in the shooting hall's equipment level. In each scenario, the shooting hall is equipped with six shooting stations.
5. The fourth scenario was created as an alternative if the modernization of the shooting range turned out to be impossible for various technological or financial reasons. It assumes creating a mobile container tactical shooting range with four stands. Before making this decision, visiting the demonstration shooting range at the Manufacturer's headquarters is possible.
6. The construction design should be carried out only after the general contractor has been selected and the structural and technological solutions adopted by him have been approved:
   a) Dimensions of the main bullet trap and related distances from the plenum;
   b) Number and location of light sources;
   c) Placement of overhead baffles;
   d) The size and number of other technical and utility rooms as well as window and door openings, can be determined only after the final determination of the dimensions of the shooting hall and the selection of a specific scenario.
7. To accelerate the pace of construction works, avoid wasting time commuting and secure the safety of the modernization team, it is proposed to agree to the accommodation of the foreign construction team in dormitories on the premises of the Academy.
8. All installations, including electrical, must be designed from scratch. When designing installations, it should be done so that their control and the entire system of fuses and controls are placed in the RSO control room, allowing for complete control over the whole facility by RSO.
9. The fire protection and access control system should also be led to the room of the Academy's duty service.
10. The shooting hall will be heated and ventilated using HVAC technology. The remaining rooms are proposed to be heated with electric radiators supported by air conditioning systems. In this situation, it will not be necessary to design and install a central heating installation, but only an electrical installation, which will reduce investment costs but slightly increase later operating costs.
11. Heating the shooting hall and other rooms with the same ventilation system is forbidden.
12. It is recommended to insulate and drain the foundations and repair the leaking roof. Otherwise, the energy consumption will be much higher than assumed, and there will still be a risk of flooding the shooting range.
13. Annexes 1-3 contain comprehensive offers for modernising the shooting range. They were submitted by reputable companies with extensive international experience and excellent references. The analysis of the submitted offers is included in Annex 4.
14. The other annexes offer individual elements of the shooting range's equipment and furnishings. They are estimates and indicative because we do not yet know the final dimensions of the shooting range and delivery dates. However, all of them were submitted by proven, reputable companies that declared their help and cooperation during the implementation of the Project in Moldova.

15. When making final arrangements by decision-makers, please consider the bids submitted by bidders in the first place. Perhaps something looks very attractive on the Internet but will be unattainable to us. Several reputable companies refused to cooperate or withdrew at the last minute. This is detailed in the SWAT analysis and the market research chapter.
16. The time during which the shooting range will be modernized should be spent on reviewing the teaching staff to rejuvenate it and select appropriate candidates, and then include them in the system of improvement and specialist training so that after the renovation, an entirely professional teaching staff works at the shooting range.
17. Also, this time should be used to make the necessary changes to the currently applicable legal acts, as well as it is recommended to modify the existing shooting training programs.
18. It is also recommended to change the structure of the didactic unit dealing with shooting training and to introduce two new positions: shooting range manager and cleaner-conservator.

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11. List of annexes:

Annex No. 1 –offer No. 1 for shooting range modernisation rev. 1
Annex No. 1A - offer No. 1 for shooting range modernisation rev. 2
Annex No. 2 - offer No. 2 for shooting range modernisation
Annex No. 2A – offer translation No. 2
Annex No. 2B – offer for ventilation pl ver.
Annex No. 2C – offer for ventialtion eng. ver.
Annex No. 2D – offer for technology -1 pl ver.
Annex No. 2E – offer for technology -2 pl ver.
Annex No. 2F – offer for technology eng. ver.
Annex No. 3 - offer No. 3 for shooting range modernisation
Annex No. 3A – catalogue card for offer No. 3
Annex No. 4 - analysis of Offers 1-3
Annex No. 5 - offer for bulletproof windows
Annex No. 5A - offer translation No. 5
Annex No. 6 – offer for the doors
Annex No. 7 – catalogue card for bulletproof doors
Annex No. 8 - catalogue card for reinforced light double-leaf door
Annex No. 9 - catalogue card for reinforced light single-leaf door
Annex No. 10 - offer for furniture for the classroom
Annex No. 11 - innovative furniture for Classrooms
Annex No. 12 - trapezoidal furniture catalogue
Annex No. 13- lockers catalogue
Annex No. 14 - cleaning machine scrub dryer Fimap mmx 50bt 2009
Annex No. 15 – offer for fire protection system
Annex No. 15A – offer translation No. 15
Annex No. 16 – offer for monitoring system
Annex No. 16A – offer translation No. 16
Annex No. 17 – access control offer
Annex No. 17A – offer translation No.17
Annex No. 18 – offer for an electric system with lightning
Annex No.18 A – offer translation No. 18
Annex No. 19 – Milo Range Catalogue