

## **REPORT**

### **Based on the results of the review of the design and cost estimate documentation**

**Project:** “New construction of a civil defense shelter—a dual-purpose structure with protective properties as a radiation shelter for the needs of the S.F. Rusova Oleshnya Lyceum of the Dobryanska Village Council, located at: 4-A Shkilna St., Oleshnya village, Chernihiv District, Chernihiv Region.”

#### **Design stage:**

Stage “P” (Project)

#### **Scope of work performed:**

Review of design and cost estimate documentation at the “P” stage,  
including the cost estimate section

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## **1. GENERAL INFORMATION**

### **1.1. Purpose of the Work**

The purpose of reviewing the design and cost estimate documentation is to assess the compliance of design solutions with current regulatory requirements, verify consistency among the individual sections of the project, and ensure that the cost estimate aligns with the adopted design solutions.

The review was conducted to identify potential technical and financial risks and to minimize possible negative consequences during the project's implementation.

### **1.2. Scope of Work Performed**

As part of the work performed, an analysis of the design and cost estimate documentation at the "P" stage was conducted, including the cost estimate section, specifically:

- analysis of the adopted design decisions;
- verification of consistency between individual sections of the project documentation;
- verifying that the scope of work complies with the design solutions;
- verifying the application of cost estimates;
- logical and arithmetic verification of cost estimates.

The verification was performed **exclusively on the basis of materials provided by the Client**. Prior to commencing the verification of the design and cost estimate documentation, a site visit was conducted on June 10, 2025, to assess the actual condition of the site.

### **1.3. List of sections of the design and cost estimate documentation that were reviewed**

As part of the verification, the design and cost estimate documentation for stage "P" of PP "ARDI KA" was reviewed, which includes the following sections and volumes:

- 1. 02 - 2024 – AR**
- 2. 02 – 2024 KB**
- 3. 02 – 2024 - VK**
- 4. Technical report on engineering and geodetic surveys**
- 5. Report on engineering-geological surveys**
- 6. 02-2024-ETR1**
- 7. 02-2024-ETR.2**
- 8. 02 – 2024 - ZVK**
- 9. 02-2024-ZTP**

10. 02-24-ITZ CZ
11. 02-2024-OV
12. 02-2024-OV1.PZ
13. 02-2024-POB
14. 14-2024SPZ-SP
15. 24-2024SKS-SP
16. 02-2024-RCHE
17. 02-2024-TM.PZ
18. 02-2024-TX
19. Estimates

#### 1.4. Limitations and Disclaimers

This review of the design and cost estimate documentation was performed **exclusively for the Client's needs** with the aim of minimizing technical and financial risks during the subsequent implementation of the project.

This review does not constitute a state-level expert evaluation of the design documentation and does not replace the procedures for project approval or authorization.

The Contractor's liability is limited to the scope of the design and cost estimate documentation provided and does not extend to decisions or materials that were not submitted for review.

#### 1.5. Level of detail of the review

The review of the design and cost estimate documentation was conducted **during the "P" (Design) phase** and included an analysis of design solutions, spatial planning, structural, and engineering solutions, as well as their consistency across the various sections of the project.

#### 1.6. Use of the Review Results

The results of this review of the design and cost estimate documentation have been prepared **exclusively for the Client's needs** and are intended for use as analytical and advisory information to support management decision-making and minimize potential technical and financial risks during the subsequent implementation of the project.

This report is not a document establishing mandatory requirements, does not provide any guarantees regarding the project's implementation, and may not be used as a basis for decision-making by other parties without the Contractor's consent.

## **2. REGULATORY AND METHODOLOGICAL FRAMEWORK**

### **2.1. General Provisions**

The review of the design and cost estimate documentation was conducted in accordance with regulatory and methodological documents mandatory for use in Ukraine and **in effect at the time of the review**.

- DBN V.2.6-220:2017 Roofs of Buildings and Structures
- DBN V.1.1-12:2014 Construction in Seismic Areas of Ukraine
- DBN V.1.1-7:2016 Fire Safety of Construction Projects
- DBN V.2.2-10:2022 Healthcare facilities. General provisions
- DBN V.2.2-5:2023 Civil defense shelters
- DBN V.2.2-40:2018 Inclusivity of buildings and structures
- DBN B.2.2-12:2019 Planning and Development of Territories
- DBN A.3.1-5:2016 Organization of Construction Production
- DBN V.2.6-156:2010 Concrete and Reinforced Concrete Structures Made of Heavy Concrete.
- DBN V.2.6-98:2009 Concrete and Reinforced Concrete Structures.
- DBN A.3.2-2-2009 Occupational Health and Safety in Construction
- PUE:2017 Rules for the Installation of Electrical Systems
- DBN V.2.5-28-2018 Design Standards. Natural and Artificial Lighting
- DSTU-N B V.2.5-40:2009 "Design and Installation of Water Supply and sewerage systems made of plastic pipes"
- DBN V.2.5-64:2012 "Internal Water Supply and Sewerage. Part I.
- DBN V.2.5-67:2013 "Heating, Ventilation, and Air Conditioning";
- DBN V.2.2-10:2022 "Healthcare Facilities";
- DBN V.2.2-9-2018 "Public Buildings and Structures";
- DBN V.2.2-28:2010 "Administrative and Public Service Buildings";
- DBN V.2.6-31:2022 "Thermal Insulation of Buildings"
- NAPB A.01.001-2014 "Fire Safety Regulations in Ukraine";
- DSTU B A.2.4-42:2009 Telecommunications. Wired Communication Systems
- DSTU EN 62305-4:2012 Electrical and electronic systems located in buildings and structures
- DBN A 2.2-3-2014 "Composition, Procedure for the Development, Coordination, and Approval of Design Documentation for Construction";
- DSTU 9243.4:2023 "System of Project Documentation for Construction. Basic requirements for project documentation";
- DSTU 9243.10:2023 "Rules for the Preparation of Specifications for Equipment, Products, and materials";
- PUE "Rules for the Installation of Electrical Installations";

- DSTU ISO 14001-2006 "Environmental management systems. Composition and description of elements, guidelines for their application";
- Law of Ukraine "On Occupational Safety";
- Law of Ukraine "On Environmental Protection"
- DSTU EN 62305-1:2012 "Lightning Protection. Part 1. General Principles";
- DSTU EN 62305-2:2012 "Lightning Protection. Part 2. Risk Management"
- DSTU 9190:2022 "ENERGY EFFICIENCY OF BUILDINGS. Method for calculating energy consumption for heating, cooling, ventilation, lighting, and hot water supply";
- DSTU – N B A.2.2-13:2015 "Energy Efficiency of Buildings. Guidelines for Conducting Energy Assessments of Buildings";
- DSTU – N B V 2.2-27-2010 "Buildings and Structures. Guidelines for Calculating Solar Insolation of Civil Buildings."
- DSTU 9243.4:2023 System of design documentation for construction. Basic requirements for design documentation;
- DSTU 9243.10:2023 System of design documentation for construction. Rules for preparing specifications for equipment and construction products;
- POE "Rules for Electrical Installations."

During the performance of the work, an approach of independent technical review of the design documentation was applied, taking into account generally accepted engineering practice, without replacing or duplicating the procedures of state expert review of the design documentation.

## **2.2. Regulatory documents in the field of design**

During the review of design solutions, the requirements of the current State Building Codes of Ukraine (DBN), State Standards of Ukraine (DSTU), as well as other regulatory and technical documents governing the design, reconstruction, and operation of buildings and structures of the relevant functional purpose were applied.

## **2.3. Regulatory Documents Governing the Determination of Construction Costs**

The review of the cost estimate section of the design and cost estimate documentation was conducted in accordance with **the Cost Estimate Standards of Ukraine**, specifically using **the Guidelines for Determining Construction Costs**, approved in 2021, DBN A.2.2-3:2014, as well as other applicable regulatory and methodological documents in the field of construction pricing, which are mandatory for use within Ukraine.

## **2.4. Methodological Approaches to the Review**

The review of the design and cost estimate documentation was conducted using the following methodological approaches:

- analysis of the compliance of design solutions with the requirements of applicable regulatory documents;
- verification of consistency between individual sections of the design documentation;
- comparison of design solutions with the cost estimate;
- verification of the validity of the scope of work;
- logical and arithmetic verification of cost estimates.

## 2.5. Limitations on the Application of Regulatory and Methodological Guidelines

Regulatory and methodological documents were applied **within the scope of the “P” (Design) stage** and taking into account the volume and composition of materials provided by the Client for review.

## 3. GENERAL COMMENTS

1. Design solutions regarding the creation of conditions for unimpeded access for persons with disabilities and other persons with reduced mobility should be specified in the design documentation in a separate section (basis: “Procedure for the Development of Design Documentation for the Construction of Facilities, paragraph 9.”)

9. Проектна документація на будівництво об’єктів розробляється з урахуванням вимог містобудівної документації, вихідних даних на проектування та дотриманням вимог законодавства, будівельних норм, нормативно-правових актів з охорони праці, зокрема, [Мінімальних вимог з охорони праці на тимчасових або мобільних будівельних майданчиках](#), затверджених наказом Міністерства соціальної політики України від 23 червня 2017 року № 1050, зареєстрованих в Міністерстві юстиції України 08 вересня 2017 року за № 1111/30979, нормативних документів, обов’язковість застосування яких встановлена нормативно-правовими актами, у тому числі вимог нормативів з питань створення умов для безперешкодного доступу для осіб з інвалідністю та інших маломобільних груп населення ([проектні рішення щодо врахування вимог зі створення умов для безперешкодного доступу для осіб з інвалідністю та інших маломобільних груп населення зазначаються в проектній документації окремим розділом](#)), вимог з питань інженерно-технічних заходів цивільного захисту, відповідно до [частини десятої](#) статті 31 Закону України «Про регулювання містобудівної діяльності».

*{Абзац перший пункту 9 із змінами, внесеними згідно з Наказами Міністерства регіонального розвитку, будівництва та житлово-комунального господарства [№ 174 від 12.07.2018](#), [№ 112 від 17.05.2019](#), в редакції Наказу Міністерства розвитку громад, територій та інфраструктури [№ 903 від 05.10.2023](#)}*

2. In accordance with the Design Assignment, Section 21, Item 2, “Develop ‘Working Drawings (in sufficient detail to carry out construction and installation work)’”—relevant comments are provided.
3. Section KB – Concrete (Reinforced Concrete) Structures. This section should specify only the structures. However, this section also includes architectural solutions (AR) and architectural-construction solutions (AB)—see DSTU 9243.4:2023, Table A.2. If the designer nevertheless combines AR and CB drawings, then this section is designated as Section AB. The composition

of the main set of working drawings for architectural solutions is defined in Section 5.1 of DSTU 9243.7:2023. The composition of the main set of working drawings for building structures is defined in Section 6.1 of DSTU 9243.7:2023. All sets must be compiled in accordance with the standards. The design bureau must not contain the following drawings Section A-A (sheet 15), masonry plan (sheet 14), floor plan (sheet 12), section 2-2 (sheet 05), section 1-1 (sheet 04), masonry plan (sheet 03), roof plan (sheet 18), etc.

4. According to the design brief, the project envisages the new construction of a dual-purpose structure (DPS). The project defines the primary functional purpose (Section PZ, Sheet 35) as follows: “In peacetime, the protective structure—a dual-purpose structure with the protective properties of a radiation shelter—is used to house sports sections for boxing, table tennis, etc.” According to Section 5.3 of DBN V.2.2-5:2023, dual-purpose structures must simultaneously meet the requirements established by building codes in accordance with both functional purposes of such structures. Therefore, spatial planning solutions must also be developed in accordance with the requirements of Amendment No. 1 to DBN V.2.2-13-2003 “Buildings and Structures. Sports and Physical Culture and Health Facilities.” This project does not meet the requirements of DBN V.2.2-13-2003 “Buildings and Structures. Sports and Physical Culture and Health Facilities.”

The placement of boxing and tennis sections requires either a multipurpose sports hall (intended for alternating activities in various sports) or the design of separate halls (see sections 3.6 and 3.63 of DBN V.2.2-13-2003). Table 2 lists the indicators for these types.

#### **4. NOTES BY SECTION**

##### **4.1 Section AR code 02 - 2024 – AR**

###### ***Sheet AR-01; AR-02***

1. The formatting does not comply with the requirements of DSTU 9243.4:2023 “SYSTEM OF DESIGN DOCUMENTATION FOR CONSTRUCTION. Basic Requirements for Design Documentation,” section 5.2.5. Correct the titles of the schedules.
2. The list of referenced and attached documents shall be organized by sections in accordance with Section 5.2.8 of DSTU 9243.4:2023. Note: References to building codes and design regulations are not included.
3. Justify the inclusion of the “List of working drawings for the TH set” on the sheet. First, this is a separate section. Second, it is missing from Section AR.
4. Specify “General Instructions” in accordance with the requirements of 5.2.9 DSTU 9243.4:2023 (based on clause 5.2.5 of DSTU 9243.4:2023). In the General Data section, provide information in accordance with clause 5.2.2 of DSTU 9243.7:2023.

###### ***Sheet AR-04***

5. It is not possible to determine what is indicated on the drawing as: “P I” – “P IV”; add symbols and references to the corresponding section sheet. The KB section mistakenly includes floor types



that correspond to the markings indicated on the AR drawing (“P I” – “P IV”); however, this contradicts design standards and complicates the understanding of the AR section’s designations.

6. Justify the absence of protective screens (Section 6.4 of DBN V.2.2-5:2023) According to Section 7.5.3.6 of DBN V.2.2-5:2023, door openings with protective entrance doors, evacuation exits elevated above the surface, leading to an internal protected SPP with protective properties of a PRU, must provide the necessary protection against ionizing radiation in the event of radioactive contamination of the area or the effects of conventional weapons, and must prevent their direct entry into the protected premises. To this end, 90° turns (one or two) should be provided along the access routes, or protective screen walls should be installed opposite the door opening. The vestibule 7 cannot be counted as a “turn” since it has a door leading to the electrical room.

7. The clear width of the corridor (used for evacuation) does not meet the requirements of Section 7.1.4 of DBN V.2.2-5:2023. The design specifies a width of 1.8 m, but handrails are installed on the corridor walls, and their mounting must comply with the requirements of DBN V.2.2.40:2018 as specified in Section 7.1.4 of DBN V.2.2-5:2023, namely Figures 5c and 5d—the clear width is determined in this case between the handrails.

8. The room height is designed to be 2.5 m. However, the room height required for the specific sport has not been taken into account (“In peacetime, a protective structure—a dual-purpose facility with the protective properties of a radiation shelter—is used to house sports sections for boxing, table tennis, etc.” (PZ Letter 35). When determining the height of SPP premises, one should also take into account the requirements imposed on facilities—in accordance with their functional purpose, which is not related to ensuring protection and reducing the impact of hazardous factors on people—based on Section 7.1.5 of DBN V.2.2-5:2023. Design the height of the premises taking into account the requirements of Section 3.6 and Tables 2 and 3.63 of Table 9 of DBN V.2.2-13-2003 (boxing—4 m, table tennis—4 m).

9. Water collection pits must be installed at the entrances to the sports hall (clause 7.5.3.8 of DBN V.2.2-5:2023).

10. According to Section 7.4.2 of DBN V.2.2-5:2023, sanitary and hygiene facilities shall be designed in accordance with state sanitary norms and regulations, DBN V.2.2-9, and DBN V.2.2.40:2018.

Since preschool-aged children are accommodated in the preschool educational institution, clause 8.2.5 of DBN V.2.2-5:2023 specifies requirements for restroom facilities specifically for this age group (for example, child-sized toilets are installed). According to Section 8.2.6 of DBN V.2.2-5:2023, requirements for restroom facilities in general secondary education institutions are already specified (different age group of children and different requirements for sanitary equipment). The design must take all of this into account. Additionally, according to paragraph 31 of SR2205 SANITARY REGULATIONS for general secondary education institutions, restrooms for grades 1–4 must be equipped with child-sized toilets. The project does not account for this.

11. The design must provide for a “multi-purpose sanitary and hygiene facility” (DBN V.2.2-5:2023, Section 7.4.4: For new construction of protective structures and civil defense facilities, it is mandatory to provide at least one multi-purpose sanitary-hygiene facility in accordance with the

requirements of DBN V.2.2-40:2018 (one such facility for every 200 people); para. 7.4.5 The number and types of sanitary-hygiene facilities in educational institutions are listed in , Section 11 of these standards). According to sections 8.2.5 and 8.2.6, a sanitary and hygiene facility with a shower area is required. Remove the term “restroom for people with disabilities”—such a designation does not exist under the standards. Room 18 consists of three spaces: a corridor, a staff restroom, and a universal sanitary facility—these spaces have brick partitions from floor to ceiling, so they are separate rooms (the spaces would be considered a single unit if the design had included sanitary partitions). All these rooms must be listed in the schedule with separate designations.

12. The multipurpose sanitary facility with a shower area (designated as a restroom for people with disabilities) does not comply with the requirements of DBN V.2.2-40:2018, Amendment 2. The corridor leading to the entrance of the aforementioned room also does not comply with the standards (explanations and justifications are provided in the Appendix to these comments).

13. Public restrooms (women’s and men’s) do not comply with the requirements of Section 11.5 of DBN V.2.2-40:2018 (Amendment 2) and Section 6.63 of DBN V.2.2-3:2018 Educational Institutions. (minimum dimensions of toilet stalls, passageways, and distances between fixtures). Explanations and justifications are provided in the Appendix to these comments.

14. Justify the absence of a room for cleaning supplies. Paragraph 8.2.1 of DBN V.2.2-5:2023 refers to SR2205 SANITARY REGULATIONS for general secondary education institutions.

*Приміщення допоміжного та підсобного призначення*

30. Для зберігання прибирального інвентарю та приготування дезінфекційних розчинів необхідно передбачити окремі приміщення, недоступні для учнів і сторонніх відвідувачів. Приміщення повинні бути обладнані ефективною системою вентиляції. Інвентар має бути промаркований. Для прибирання санітарних вузлів виділяється окремий інвентар та засоби прибирання, які зберігаються окремо.

Sanitary facilities must include built-in cabinets for cleaning supplies (Section 6.63 of DBN V.2.2-3:2018).

15. The dimension between axes 1–13 is 27,500 mm, while in the GP-3 drawings it is 27,700 mm. The dimension between axes A–G is 17,500 mm, while in the GP-3 drawings it is 17,700 mm. Correct the discrepancy in the GP section.

16. The entrance to the PRU in axes B-G near axis 13 has an elevation of 0.000, which corresponds to an absolute elevation of 140.60, while on the GP-4 drawing, the entrance has an absolute elevation of 140.20; that is, access to the PRU must be via a ramp. According to the requirements of DBN V.2.2-40:2018 “Buildings and Structures. Inclusiveness of Buildings and Structures,” the ramp must have guardrails on both sides with handrails; the handrails must be positioned at heights of 0.7 m and 0.9 m. The ramp surface must be rough (non-slip) to prevent slipping when wet; the slope of the external ramp surface must be 8% (1:12).

17. The location of section 2-2 must be between axes 9-10 to correspond to the drawings on sheet AR-08. The location of the section is incorrectly shown on the plan.

18. In sections 11–12 near section A, the 1000×1000×1500 (h) pit for the heating network inlet, as shown in drawing OV-3, is not shown.

19. Cross-sections at the entrances to the PRU, i.e., the ceiling above the entrance, have not been designed.

20. The filling of the 505×1255 opening in rooms 11 and 23 has not been designed.

21. How do DMP-1 doors differ from DMP-2 doors? On AR-09. If the doors are identical in properties and dimensions, they should be marked with the same designation.

22. The DMP-3L doors on axis 12 should be DMP-3P, right-hand rather than left-hand. The door opening direction is incorrectly specified.

23. The DM-1L door on the plan is incorrectly shown with both left and right openings, and the DM-1 on the plan is shown with both right and left openings; the designation does not match the opening direction.

***Sheet AR-05; AR-06***

24. Specify the slope of the embankment cut. In the notes, provide instructions regarding measures to reinforce the earthen cut against erosion and scouring.



25. Facade A-G: entrance to the PRU at elevation -0.100; according to GP-4, entrance to the PRU at elevation -0.400.

### ***Sheet AR-07; AR-08***

26. On sections 1-1 and 2-2, the waterproofing is designed as 4 mm thick Ceresit CP 43 bitumen-polymer. According to the engineering-geological survey report, the area is classified as potentially subject to flooding by groundwater. In accordance with Section 15.3 of DBN V.2.2-5:2023 “CIVIL DEFENSE PROTECTIVE STRUCTURES,” bitumen-polymer waterproofing must be installed in at least two layers, and the total thickness must be at least 6 mm.

27. The roof is designed with 4 mm thick Ceresit CP 43 bitumen-polymer waterproofing. It is preferable to use roll materials or PVC membranes for the roof, as they are stronger and more resistant to mechanical damage.

28. In section 2-2, the linear dimensions are doubled, which does not correspond to the dimensions on the plans.

29. In the sections, the floor elevation is +2.500, and the thickness of the monolithic floor slab is 450 mm. In the HVAC section, the floor elevation is +2.700, and the floor slab thickness is 400 mm. In the HVAC section, the bottom of the air ducts is at elevation +2.250, and the air duct height is 350 mm ( $2.250 + 0.350 = 2.600$ ). These discrepancies cause errors and require additional work during installation.

### ***Sheet AR-09***

30. Specifications for exterior and interior doors – the provided specification (table) is incorrect with regard to defining design solutions. The column labeled +/- 0.000 contains numbers; one must infer that this represents a quantity. The designations for door openings do not comply with DSTU EN 14351-1:2020 and DSTU EN 14351-2:2020; not all designations are provided. The designation “DZ 1” is listed outside the specification—why is it not in the table? According to Section 5.3.6 of DSTU 9243.7:2023, “Floor plans shall include specifications for the infill of window, door, and other openings, as well as panel partitions, which are marked on plans, sections, and elevations, in accordance with Form I.1 or I.2 of Appendix I, DSTU 9243.4. Provide the specification and indicate the name in accordance with design standards.

31. Schemes for filling door openings. The dimensions of the door unit must not coincide with the dimensions of the door opening. The dimensions indicate that the entire width is the “door leaf”—therefore, the scheme depicts the door leaf across the full width of the door opening; the door frame is not shown. Taking this comment into account, align the dimensions of the door opening fillings with the door openings in the design bureau’s set. Calculate the width of the door opening, taking into account the standard clear passage widths according to the standards (900 mm...1000 mm, etc.), and the arrangement of the sealing joint where the frames meet the jambs. In the specifications, add a reference to the DSTU for the relevant door types and specify the installation guidelines.

32. For the DMP 3L model, the specification lists a width of 900 mm, but the diagram shows a double-leaf door with a total width of 1300 mm. Bring into compliance. DM1L—4 units per plan—verify.

33. Note 2 – The manufacturer of door openings specifies the dimensions of the openings by drawing up an acceptance and transfer report.

34. Add the note: “Doors on MGN traffic routes shall be equipped with devices to hold the door leaf in the open position.”

### Sheet AR-11

35. Add specifications for the infill of window and door openings marked on the plan, sections, and elevations in accordance with Section 5.3.6 of DSTU 9243.7:2023, using Form I.1 or I.2 of Appendix I of DSTU 9243.4. Provide a reference to the sheet containing the room finishing schedule and floor details.

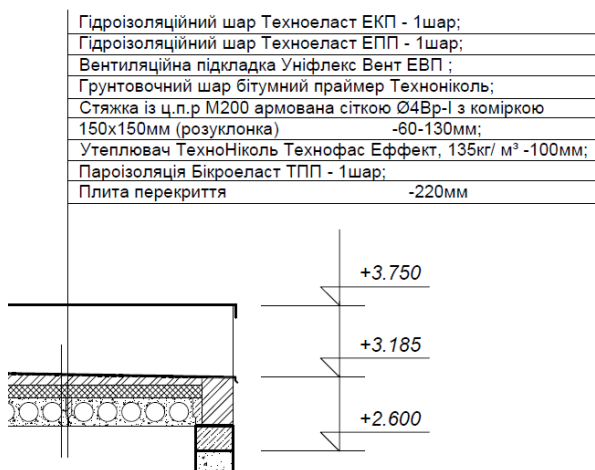
36. On the plan along axes B and 2, the openings for ventilation grilles shown in drawings OV1-3 are not indicated.

37. Along axis 1, the door type is DMP. Exterior doors must be metal, but not fire-rated.

38. The plan does not show the 1000x1000x1500(h) drainage pit as per the TM drawings.

### Sheet AR-13.

39. Justify the presence of insulation. Since exterior insulation is not provided for. The floor structure also lacks insulation, but it is shown on the drawing. Bring everything into compliance.



40. Provide waterproofing for the exterior aerated concrete walls in the basement area, as well as horizontal waterproofing at the transition from the foundation to the walls (clause 5.1.10 of DSTU-N B V.2.6-202:2015) – note 7 on sheet KB-13, specify in detail the location with reference to the assembly and sheet.

41. Provide vertical waterproofing of the upper part of the foundation in accordance with Section 5.1.11 of DSTU-N B V.2.6-202:2015.

42. On section A-A, the dimensions in the axes have been doubled, which does not correspond to the plan.

## ***Sheet AR-14***

43. The placement of tactile tiles (TS – tactile strips) violates standards; they are inconvenient and dangerous for people with permanent or temporary visual impairments (etc.), do not provide sufficient information, and are disorienting. Warning, guiding, and informational TS are incorrectly applied. The specifics of the spatial layout have not been taken into account—design must be developed considering the arrangement of furniture and functional purpose.

43.1 The types of traffic signs must be indicated in the symbols in accordance with Section 8.2.3 of DBN V.2.2.40:2018, Amendment 2.

43.2 Warning traffic signs must have a width corresponding to the width of the obstacle in the path of travel. The start of a warning traffic sign must be located no less than 0.2 m and no more than 0.8 m from the obstacle (Figure 30a) (clause 8.2.10 of DBN V.2.2.40:2018, Amendment 2).

43.3 The locations for installing warning signs shall be determined in accordance with Section 8.2.10 of DBN V.2.2.40:2018, Amendment 2; the purpose of installation is specified in Section 8.2.9. The aforementioned sections do not contain information regarding installation in front of doors. Paragraph 8.2.10 of DBN V.2.2.40:2018, Amendment 2, specifies only in front of entrance doors (under appropriate conditions).

43.4 Justify the installation of a warning (or informational) traffic sign in front of a 1300 mm passage.

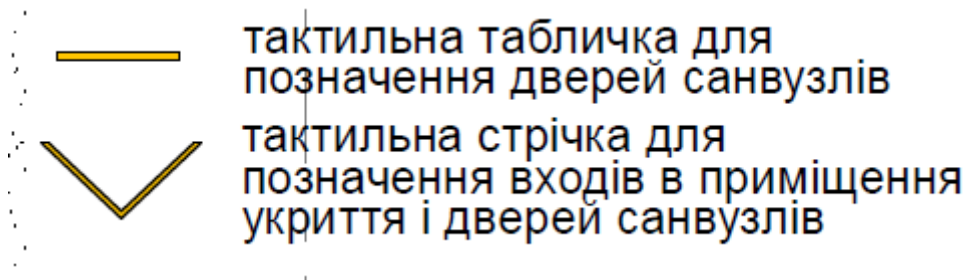
43.5 Guide rail for TS, Section 8.2.11 of DBN V.2.2.40:2018, Amendment 2. Special directional TS must be 0.3 m wide (0.4 m is permitted) and consist of raised longitudinal ridges or ribs parallel to each other and to the direction of travel. The design shows two strips of unknown width.

43.6 Vehicle guideways inside buildings shall be used only to designate routes connecting the entrance area with the main functional zones: service and information points, elevators, stairs, etc. (Section 8.2.13 of DBN V.2.2.40:2018, Amendment 2). In the design, this involves designating traffic routes along the corridor from the entrance to the opposite exit with interruptions (breaks at doorways and 1.3-meter-wide passageways). Special tactile guides may be installed in corridors (passages) wider than 7 m—corridors of this width are not provided for in the spatial planning solutions. Therefore, standard accessibility elements must be used—standard indoor tactile strips (clause 8.24; 8.2.5 of DBN V.2.2.40:2018, Amendment 2)

43.6.1 Incorrect application and dimensions of informational tactile strips—turns of more than 45 degrees and/or branches of the guiding tactile strip are marked with a rectangular informational tactile strip with a side length of 0.6 m–0.9 m and a relief in the form of truncated cones, hemispheres, squares, etc., with a height of 0.004 m–0.005 m (Figure 36a).

According to the comments on sheet AR-14 regarding the installation of special tactile guides, standard tactile strips must be installed. In corridors along traffic routes, handrails are installed in accordance with DBN V.2.2-5:2023—these are already standard informational accessibility guidance elements (see Figs. 37, 38 of DBN V.2.2.40:2018, Rev. 2). Recommendations regarding specific parameters, solutions, and locations for installing tactile guidance systems are provided in Appendix G of DBN V.2.2.40:2018, Amendment 2.

#### **44. Location of tactile plates and entrance markings.**



According to Section 8.3 of DBN V.2.2.40:2018, Amendment 2, the design must include tactile information signs. For example, a “Layout Plan for Tactile Information Signs.” This plan must clearly specify which specific tactile information signs are used, the requirements for their installation locations, and the information they convey. Recommendations regarding specific parameters, solutions, and installation locations are provided in Appendix G.

Sections 8.3.4 and 8.4.3.1 – requirements for outdoor tactile signs

Section 8.3.5; Section 11.7 – requirements for indoor tactile signs

Section 8.3.5; Section 11.7 – requirements for signs near doors

45. Use of visual accessibility elements (VAA) (Section 8.4 of DBN V.2.2.40:2018, Amendment 2). Contrast ratios are achieved through the use of specialized and standard (universal) solutions (Section 8.4.1). Recommendations regarding specific parameters and solutions for the use of contrast ratios are provided in Appendix G of DBN V.2.2.40:2018, Amendment 2.

In accordance with the above points, the design must provide clear information regarding the installation of the TIP. It is not necessary to mark room entrances with tape—in new construction, design solutions can ensure a contrasting color scheme: the door color should contrast with the exterior facade of the building; ensure that the door panel color does not match the colors of other exterior/interior elements; the door panel color must not match the wall color—all of this need only be noted in the remarks on the relevant sheets.

46. According to Section 7.1.4 of DBN V.2.2-5:2023, handrails should be installed at a height of 0.9 m on the walls of corridor sections serving as evacuation routes. The dimensions and mounting of the handrails must comply with the requirements of DBN V.2.2-40. The color of the handrails must contrast with the color of the wall on which they are installed. Provide handrails.

47. All sanitary and hygiene facilities must be included in a separate section titled “Creating Conditions for Unimpeded Access for Persons with Disabilities and Other Persons with Limited

Mobility” on an enlarged scale. Specify all equipment and accessibility features in accordance with DBN V.2.2-5:2023; DBN V.2.2.40:2018, Amendment 2.

4.2 Section KB code 02 – 2024 KB

Sheet KB-01

- 1. The list of referenced and attached documents shall be compiled by sections in accordance with clause 5.2.8 of DSTU 9243.4:2023. Please note: References to building codes and design standards are not provided.
- 2. The list of working drawings (not drawings; see DSTU 9243.4:2023) includes sheets AB-1, etc. No such section was developed in the project. Bring into compliance. See also comment No. 3, General Comments.

Sheet KB-02

- 3. The data provided does not contain sufficient information. The axis layout is performed in the GP section.

Sheet KB-03

- 4. The masonry plan is to be provided in the AB/AR section.
  - 4.1 List of lintels (in the project: lintels). Please note: examples of how to fill out the lintel list, specifications for lintel elements, and specifications for filling elements for lintels and openings are provided in Appendix B. (Section 5.3.6 of DSTU 9243.7:2023). For the layout of of lintels, see sections 6.3.2 and 6.3.8 of DSTU 9243.7:2023. The term “PERETINOK” is not used anywhere. Correct the names according to the specified sections.

4.2 The provided list does not contain complete and clear information.

ВІДОМІСТЬ ПЕРЕТИНОК					
МАРКА ПОЗ.	ЕСКІЗ	НАЙМЕНУВАННЯ ПО СЕРІЇ	КІЛ. ШТ.	КІЛЬКІСТЬ МАРОК	
				укриття	ВСЬОГО
/7-1		2ПБ 16-2-п	2	1	1
/7-2		1ПБ 10-1	1	5	5
/7-3		1ПБ 13-1	1	3	3

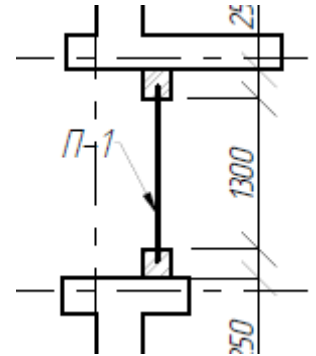
- P-1 is listed as both the grade and the position. This is incorrect: The grade of the lintel is specified according to DSTU B V.2.6-55:2008, while the position of the lintel is indicated on the plan as P-1...P-3.
- Does the specified quantity refer to the grade or the position?



- Please justify the column “NUMBER OF BRIDGES” for the roof?
- There is no data regarding the standards for lintels (according to DSTU B V.2.6-55:2008)
- Unit weight data in kg is missing (required for cost estimate documentation)

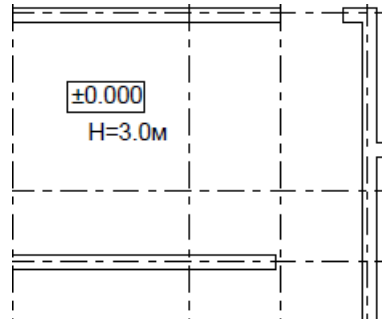
Based on the errors indicated in the provided information, prepare the “List of Lintels” and the “Specification of Lintel Elements” in accordance with Appendix B of DSTU 9243.7:2023.

In accordance with Section 6.3.8 of DSTU 9243.7:2023, on the lintel layout diagram, complete the lintel schedule in accordance with Form 4 and the lintel element specification in accordance with Form 5. Examples of how to complete the lintel schedule and lintel element specification are provided in Appendix B.



4.3 Wall thickness dimensions are missing. According to AR-04, the thickness is 250 mm. Indicate all wall thicknesses on the masonry plan.

5. On the structural plan, the room height is 3.0 m, which does not correspond to the 2.5 m dimensions shown on this sheet.



6. Note 2 specifies the grade of ceramic brick as M75. According to Section 14.3.2 of DBN V.2.2-5:2023 “CIVIL DEFENSE PROTECTIVE STRUCTURES,” materials with a compressive strength of at least 10 MPa, i.e., grade M100, must be used in masonry and reinforced masonry structures.
7. Section A-A is section 1-1 on sheet KB-04. Inconsistency in the numbering of sections in adjacent sections of the project.
8. Section B-B is section 2-2 on sheet KB-05. The location of section 2-2 must be between axes 9-10 to correspond to the drawings on sheet KB-05. Inconsistency in the numbering of sections in adjacent sections of the project.

#### ***Sheet KB-04; KB-05***

9. The same drawings are provided in AR-7,8. In the KB (concrete structures) set, the section indicates architectural design specifications. Align the section with the KB designation specified in the main title block

10. In sections 1-1 and 2-2, the waterproofing is designed as 4 mm thick Ceresit CP 43 bitumen-polymer. In accordance with Section 15.3 of DBN V.2.2-5:2023 “CIVIL DEFENSE PROTECTIVE STRUCTURES,” bitumen-polymer waterproofing must be installed in at least two layers, and the total thickness must be at least 6 mm.
11. The roof is designed with 4 mm thick Ceresit CP 43 bitumen-polymer waterproofing. It is preferable to use roll materials or PVC membranes for the roof, as they are stronger and more resistant to mechanical damage.
12. In section 2-2, the dimensions are doubled, which does not correspond to the plan.

#### ***Sheet KB-06***

13. The solutions shown in sections 1-1 and 2-2 correspond to the AB set, not the KB set. Additionally, in section 2-2, the floor layers are not shown on the floor plan. At the same time, the layer of “cement-based waterproofing coating, 2 layers” (“Extend 200 mm up the walls”)—the brand of waterproofing is not specified. It states: “Screed made of M150 concrete reinforced with Ø3VRI mesh (100×100 mm).” Based on experience and established practice, the M150 grade is ineffective and expensive to purchase, prone to cracking as it gains strength, and does not meet the design loads on the floor. The grade must be reduced to M100. Reinforce with 4 Vp 100/100 mesh. For concrete preparation under the foundation slab, “Ceresit CP 43 bitumen-polymer waterproofing” was used. It is necessary to replace this expensive material with bitumen roofing felt.
14. In the list of materials for the foundation slab and preparation, remove the notation “Approximate weight of A500C reinforcement,” which creates ambiguity in the information.
15. On the FMP-1 foundation slab diagram, in axes 11-12 near axis A, the 1000x1000x1500(h) pit for the heating network inlet, as per drawing OV-3, is not shown. The cross-section of the foundation slab at the pit location has not been designed.
16. In section 2-2, the wall thickness has been increased fourfold (1200 mm), which does not comply with the plan for KB-03.
17. The top of the foundation slab at the entrance to the PRU in the B-G axes cannot be at elevation -0.120, since according to the GP-4 drawings, the entrance elevation is at -0.400 (absolute 140.20).
18. The FMP-1 foundation slab is designed with a thickness of 400 mm at elevation -0.520. The K-1 sewer networks on the VK-3 drawings are designed at elevations -0.100, -0.340, -0.480, and -0.600. The sewer networks run within the foundation slab, making it impossible to ensure the watertightness of the PRU floor waterproofing. Laying K1 pipes within the foundation slab structure also complicates the concrete pouring process. It is possible to lay the sewer networks within the floor structure along the walls in a separate trench in the floor and design a manhole in the foundation slab at the point where the networks exit the reinforced concrete slab.

#### ***Sheet KB-07***

19. The drawing incorrectly shows the protective layer of the lower and upper zones of the foundation slab. The correct dimension is measured from the concrete surface to the surface of the first reinforcing bar.
20. The instructions provide an outdated and ineffective solution: “6. The design position of the lower reinforcement is ensured by installing cement-sand fasteners.” For many years, plastic fasteners have been used for this purpose, as they do not crack or deform during installation work. In the bill of materials, specify the quantity of Sh-1 and F-1, as well as their weight.

#### ***Sheet KB-08***

21. The reinforcement of wall corner joints with horizontal reinforcement is not shown. Missing: formwork plan, slab reinforcement plans. Provide a list of reinforcement for walls and floor slabs.

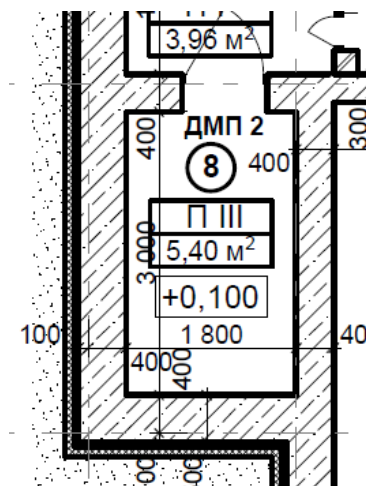
#### ***Sheet KB-10***

22. The specified consumption of A500C and A240C reinforcement for monolithic walls is 14 tons, which is clearly insufficient. Considering the reinforcement grades and reinforcement density, the consumption of reinforcement for monolithic walls should be approximately 25 tons.

#### ***Sheet KB-12***

23. Floor details do not belong in the design manual. Move them to the appropriate section with a reference to the relevant sheets (where the floor types are specified).

23.1 When this sheet is viewed in conjunction with Sheet AR-04, the floor grade designations on the plan do not match those in the schedule.



- 23.2 In Room 8 on AR-04, the floor elevation is +0.100. This is not reflected in the floor schedule. In the floor structure III, the total thickness is specified as 120 mm, while on KB-11, the foundation slab elevation is 0.120. Thus, it is impossible to achieve an elevation of +0.100 when constructing the floors and foundation slab.

### ***Sheet KB-13***

24. The foundation plan for the boiler room does not show a 1000x1000x1500(h) drainage pit as per the TM drawings.
25. The weight of A500C rebar for the strip foundation is specified as 20 tons in the specifications, which is clearly an exaggeration. The rebar consumption for the strip foundation is no more than 300 kg.

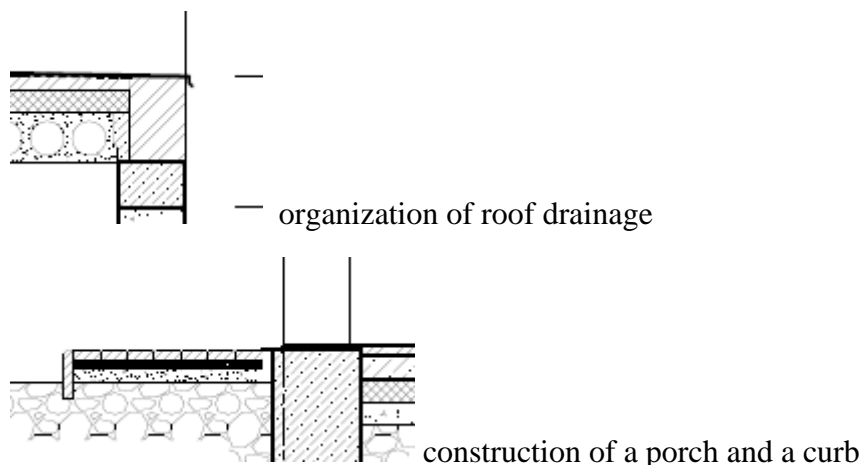
### ***Sheet KB-14***

26. The list of lintels shall be prepared in accordance with Section 6.3.8 of DSTU 9243.7:2023.
27. The scope of work for the construction of walls from aerated concrete blocks and a brick parapet (as per the sections) is missing.
28. The masonry plan along axis B does not show openings for ventilation grilles, which are present in drawings OV1-3, and lintels above them have not been designed.
29. No spatial metal structure for the chimney and concrete foundation beneath it has been designed. The F300/360 chimney consists of prefabricated double-layer heat-insulated chimney pipes and fittings from the company "VERSIA-LUX" according to drawings OV1.
30. The furnace is designed with a solid-fuel boiler. The GP drawings do not provide for a storage area for firewood or coal for the solid-fuel boiler.

### ***Sheet KB-15***

31. Section A-A corresponds to set AR or AB, but not KB.

To determine design solutions and scope of work, add components according to the fragments listed below:



32. The center-to-center distance has been doubled, which does not correspond to the plan on KB-14.

### ***Sheet KB-17***

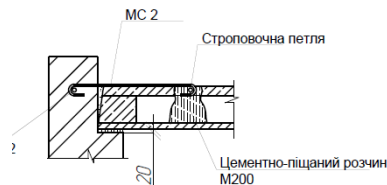
33. The floor plan does not show a Ø250 opening for the exhaust ventilation system according to drawings OV1-3. The opening must be made in the monolithic section between the slabs, as it is not possible to make a Ø250 opening in hollow-core slabs.

34. It is not possible to clearly and correctly understand the provided design solutions.

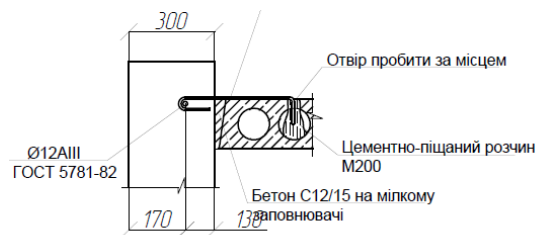
34.1 Mark the details on the provided plan and add axes to the details.

34.2 At node 2 and its section 2-2, indicate the depth of support for the roof slab. According to section 2-2, the support is shown on brickwork (as indicated by the hatching since there are no labels), but on other sections and nodes (other sheets), a monolithic belt is shown.

#### 2-2



34.3 Detail 1 and its section 1-1. In section 1-1, the construction of the 300 mm thick slab into which the reinforcement is embedded is unclear.



According to the sections above, the monolithic belt is located below the floor slab. Above the monolithic belt is brickwork.

Bring the reinforcement designations into compliance with current standards.

Based on the comments above: the provided drawings do not correspond to each other, and the structural solutions are unclear (since different nodes and sections are shown).

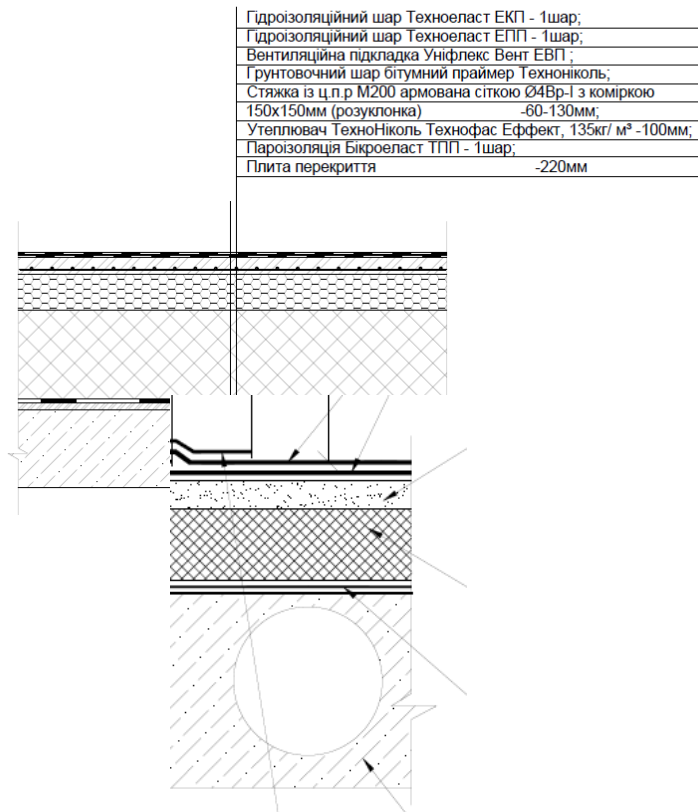
### **Sheet KB-18**

35 The scope of work for roof installation is missing (include all materials for installing the parapet, the connection to the parapet, and the installation of the edge element for roof drainage)

34.1 This cross-section shows two types of insulation (hatched), but the list includes only one with a thickness of 100 mm.

Justify the insulation in of wall Justify the screed! Also, the section does not to the cross-the parapet

### Вузол влаштування покрівлі

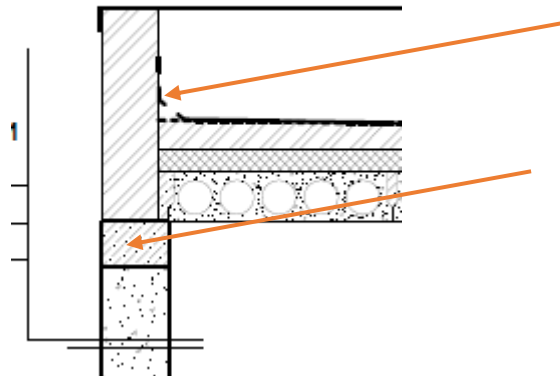


roof the absence insulation. use of M200 cross-diagram correspond section at wall node:

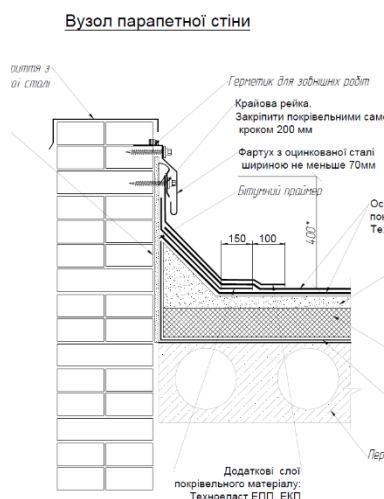
34.2 Mark the details on the corresponding cross-sections in accordance with Section 6.22 of DSTU 9243.4:2023

34.3 Discrepancy between the node and the cross-section

Section 1-1



Joint at KB-18.



- No monolithic belt, hatching does not match, support of the floor slab is unclear.
- 36 On the roof plan along axis 2, there must be a roof overhang in the absence of organized drainage. According to Section 10.1 of DBN V.2.6-220:2017 “Roofing of Buildings and Structures,” unorganized drainage should be provided by equipping the roof with eaves of the required dimensions and by mandatorily installing a drainage area around the building with a width of at least 1 m.

#### 4.3 Section Explanatory Note, code 02-2024-PZ-ZP

1. In Section 2, on page 29, the thickness of the exterior walls is specified as 300 mm, which does not correspond to the AR and KB drawings, where the thickness of the exterior walls is 500 mm.
2. Section 2, page 29, specifies the thickness of the reinforced concrete floor slab as 300 mm, which does not correspond to the AR and KB drawings, where the thickness of the floor slab is 450 mm.
3. In the section on natural and climatic conditions on page 3:
  - the standard snow load is 1690 Pa, which does not correspond to the value on page 56 (1800 Pa) and DBN V.1.2.2:2006 “Loads and Effects,” Fig. 8.1, Zone 6 – 1800 Pa;
  - Standard wind load: 370 Pa, which does not correspond to the value of 400 Pa on page 56 or DBN V.1.2.2:2006 “Loads and Effects,” Fig. 9.1, Zone 2 – 450 Pa;
  - wind load during icing 180 Pa, which does not correspond to the value in DBN V.1.2.2:2006 “Loads and Effects,” Fig. 10.2, Zone 2 – 200 Pa;
  - ice wall thickness 15 mm, which does not correspond to the value in DBN V.1.2.2:2006 “Loads and Effects,” Fig. 10.1, Zone 2: 16 mm.
4. Sheet PZ-ZP-51. Section 10-1-1. This section contains a reference to DBN V.2.5-23:2010 (and further in the text of the explanatory note), which will be replaced as of January 1, 2026, by DBN V.2.5-23:2025. Please take note.
5. Sheet PZ-ZP-51. Section 10-1-1. Reactive power compensation is required for electricity consumers with a permitted capacity greater than 50 kW, not 30 kVar. Violation of the requirements of Section 15.1 of DBN V.2.5-23:2025. Bring into compliance.

#### 4.4 Section GP code 02 – 2024 – GP

##### *GP Sheet-1*

1. The list of referenced and attached documents shall be compiled by sections in accordance with Section 5.2.8 of DSTU 9243.4:2023. Please note: References to building codes and design standards are not provided.
2. There are no scopes of work for the removal of trees, shrubs, etc.
3. To protect the lawn and prevent dirt and plant debris from entering the pavement where pedestrian zones, paths, and sidewalks meet the lawn, a garden curb must be installed that rises at least 0.05– m above the lawn level at a distance of no less than 0.5 m (Section 9.7.2 of DBN V.2.2-5:2011). Ensure compliance with this provision.
4. The project does not specify protective measures to increase the stability of the slope (embankment) of the cover.
5. Clause 5.3.4 of DBN V.2.3-5:2018 (as amended): “Between sidewalks and adjacent embankment or cut slopes, as well as retaining walls higher than 1 m, a shoulder with a width of at least 0.5 m shall be provided. For embankment heights exceeding 2 m, first-group road barriers must be installed on sidewalks facing the roadway (while maintaining the width of the pedestrian zone). Guardrails for pedestrians shall be installed on the side of the embankment slope.” Ensure compliance with these requirements.

#### 4.5 Section , Technical Code 02-2024-TX

1. The arrangement of classroom furniture does not comply with relevant sanitary requirements. Justification is provided in the Appendix to the comments.
2. There are no spaces for students with special educational needs
3. According to paragraph 33 of SR2205, to ensure sanitary and domestic needs, reserve water tanks (containers) shall be installed in sanitary facilities with a capacity corresponding to the number of participants in the educational process simultaneously present in the premises of civil defense facilities, calculated at no less than 5 liters per person. Indicate the locations of the reserve water tanks (containers) in the restrooms.
4. Ensure a passage width of 1.8 m between the cabinets and the wall (Room 6 and the adjacent corridor with cabinets) in accordance with Section 11.17 of DBN V.2.2.40:2018,

(для санітарних вузлів, душ, туалетів, пісуарів тощо).

**11.17** Ширину проходів між рядами шафів слід приймати не менше ніж, м:

- для кабін душових закритих і відкритих, умивальників групових і одиночних, туалетів, пісуарів 1,8;
- для шаф гардеробних з лавами (з урахуванням лав)..... 2,4;
- те саме без лав..... 1,8.

Рекомендується застосування водопровідних кранів важільної або натискної дії, а за можливості, керованих електронними системами.

Amendment 2.



#### **4.6 Section Electrical Solutions, code 02-2024-ETR1**

1. Sheet ETR1-2. The list of referenced documents includes standard series from the Soviet Union and CIS eras that are no longer in effect. These series may be used only as reference material, not as referenced documents.

2. Sheet ETR1-3. The AO3 emergency lighting group line must be installed using cable with fire resistance class P 30. Violation of the requirements of DBN V.2.5-23:2025, Table 7.2. Bring into compliance.

3. Sheet ETR1-8. The cross-sections of power cables and pipe diameters specified on this sheet do not correspond to Sheet ETR1-3. Bring into compliance.

4. Sheet ETR1.S-1. The DES design with a standard 32-liter tank provides power to the PRU for 9 hours at 75% load and 12 hours at 50% load, which does not comply with the requirements of Section 11.6.4 of DBN V.2.2-5:2023.

#### **4.7 Section Electrical solutions, code 02-2024-ETR.2 (boiler room)**

1. Sheet ETR.2-1. Revise the general data sheet in accordance with the requirements of clause 5.2.5 of DSTU 9243.4:2023. In the general instructions, provide summary data on the installed and rated capacities of power electrical equipment in accordance with the requirements of clause 5.3 of DSTU B A.2.4-21:2008, as well as the usable area of lighting spaces, the installed lighting capacity, and the number of luminaires in accordance with the requirements of clause 4.3 of DSTU B A.2.4-24:2008. A list of types of work for which completion certificates for concealed work must be prepared in accordance with the requirements of clause 5.2.9 of DSTU 9243.4:2023. Outdated terminology has been used in the general guidelines, which was already abolished in Chapter 1.7 of PUE:2007. The terms “neutralization,” “neutral working conductor,” and “neutral protective conductor” should be removed from the project. The terms “neutral” and “protective” conductors are in use in accordance with Chapter 1.7 of PUE:2017 and DSTU B V.2.5-82:2016. Bring into compliance.

2. Sheet ETR.2-2. The schematic diagram does not comply with the requirements of Section 5.5 and Appendix B of DSTU B A.2.4-21:2008 (data on starting devices is missing; sections of the network marked as 2, but with no information on their construction; designations of electrical loads are missing, etc.). Bring into compliance.

3. Sheet ETR.2-4. The electrical lighting layout plan does not comply with the requirements of current regulatory documents; it must be prepared in accordance with the requirements of Section 4.4.3 and Appendix A of DSTU B A.2.4-24:2008.

4. Sheet ETR.2-5. Include technical instructions on the plan regarding the method of laying the M power cable, reference dimensions, and planned and existing utilities that cross the cable line or are laid adjacent to it. Maintain distances from utilities, building foundations, and structures in accordance with the requirements of Chapter 2.3 of PUE-2017.

5. General note regarding Sections ETR1 and ETR.2. External electrical networks must be combined into a separate section in accordance with Appendix A, Table A.2 of DSTU 9243.4:2023. The drawing symbols for this section of the project shall be EP.

#### **Master Plan**

1. The master plan section does not specify the location of buildings and structures in the site plan, nor does it indicate the location of the stationary diesel power plant (DPP), the site for the DPP, fencing, access roads for refueling with fuel and lubricants, etc. in accordance with the requirements of Sections 6.2, 14.5, 14.6, 15.3 of DBN B.2.2-12:2019. The placement of the DPP shall be carried out in accordance with the requirements of Order No. 474 of the Ministry of Internal Affairs of Ukraine dated July 11, 2024.

#### **Concrete (reinforced concrete) structures**

1. There are no design solutions for the installation of a stationary diesel power plant (DPP) in accordance with DBN V.2.1-10:2018 and the DPP manufacturer's requirements, nor for the installation of safeguards against unauthorized access by children to the potentially hazardous DPP facility on the premises of the educational institution.

#### **4.8 Section: Fire Protection Systems, code 14-2024SPZ**

1. Sheet SPZ.RK-1. Revise the general data sheet in accordance with the requirements of clause 5.2.5 of DSTU 9243.4:2023. Bring into compliance.

2. Sheet SPF.RK-2. Provide a visual and audible fire alarm system in the shelter room, item 2, as per the schedule, similar to that in the shelter room, item 1, as per the schedule. Violation of the requirements of Section 9.1.3 of DBN V.2.5-56:2014, as amended.

3. Sheet SPZ.RK-3. The project does not provide for the transmission of fire alarm signals to the main building's fire alarm system. Violation of the requirements of clause 10.16 of DBN V.2.2-5:2023.

#### **4.9 Section Structured Cabling System, code 24-2024SKS**

1. Sheet 24-2024SKS-PZ-4. Outdated terminology is used, which was already abolished in Chapter 1.7 of PUE:2007. The term "neutralization" must be removed from the project. The terms "neutral" and "protective" conductors apply in accordance with Chapter 1.7 of PUE:2017 and DSTU B V.2.5-82:2016. Bring into compliance.

2. Sheet SKS.RK-1. Revise the general data sheet in accordance with the requirements of clause 5.2.5 of DSTU 9243.4:2023. In the general instructions, remove references to RM4-200-82 and DBN V.2.5-27-2006, which are no longer in effect. DSTU B V.2.5-82:2016 has replaced DBN V.2.5-27-2006. Bring into compliance.

3. 2. Sheets SKS.RK-1, 2, 3, SKS.SO-1. Correct the designation of the SKS drawing set in the main title block (stamp) from SPZ to SKS. Bring into compliance.

#### **4.10 Section VK code 02 – 2024 - VK**

General data sheet:

1. Requirements for the preparation of VK drawings have been violated. DBN V.2.5-64:2012, Section 4.3: "In the general instructions included in the general data for working drawings of the 'VK' type, in addition to the information required by DSTU B A.2.4-4, the following shall be provided:
  - references to regulatory documents used to calculate water supply and sewerage systems;

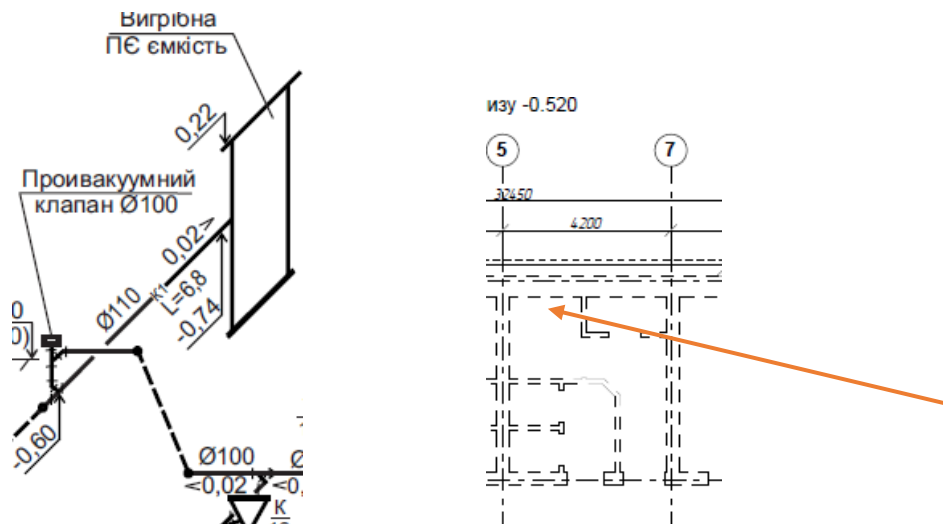
- key indicators for "VK" series working drawings, presented in a table in Form 2;
  - system installation specifications;
  - requirements for the manufacture, installation, painting, and insulation of pipelines;
  - special requirements for system installations (e.g., explosion hazard, acid resistance)."
2. VK-1. General Instructions. The following state standards are no longer in effect: DBN B.2.2-12:2018, DSTU BA.2.4-4:2009. Sheet VK. SO.- 2, 3  
A reference is provided to the obsolete regulatory document DSTU B V.2.7-144:2007.
  3. In accordance with DSTU 9243.4:2023, Section 5.1.3; Chapter 10 and Section B1 of Appendix B, prepare the title page, confirm the Chief Architect/Chief Engineer, and the signature of the Chief Architect (Chief Engineer)  
of the design organization must be personally certified with a seal indicating the registration number of the architect's (design engineer's) qualification certificate and the issuing authority.
  4. The drawings were prepared in violation of DSTU B A.2.4-32:2008: Section 3.6 (Pipeline Diameter Designation),  
clause 4.1 "General data for working drawings of the VK series, in addition to the data specified in DSTU B A.2.4-4, shall include data on industrial water consumption and drainage";  
clause 5.2.5 "Water supply system diagrams shall indicate: the dimensions of horizontal pipeline sections where breaks are present;"
  5. Section VK does not address any pipe penetration details through ceilings, walls, or partitions. No details for sleeves are provided, nor are there any instructions regarding the sealing of penetrations in accordance with fire safety standards. The installation heights of couplings connecting to the equipment to which the networks are connected are not specified.
  6. VK-1. Correctly specify the name of the certificate for the closure of concealed work, which is listed as "certificates of concealed work" in the general instructions, in accordance with the requirements of Appendix K of DBN A.3.1-5:2016.
  7. VK-2,3. Specify the alignment of pipeline B1 along axes 2;A-D, as air ducts run through this area according to set OV-7.
  8. Sheet VK. SO.-3. Specify the type of sewer pipes (e.g., PVC) and include a reference to the standard for these pipes.
  9. VK. SO.-3—specify the type of foot/shoe disinfection tubs, and also show the installation layout, taking into account that the tub is installed in the location of an emergency exit. If a pit is required, reflect these solutions in the construction drawings and architectural drawings, taking into account accessibility requirements.
  10. The HVAC section has not developed design solutions for the installation and connection of a drinking water storage tank (in fact, the section does not provide for the supply of drinking water to the fire protection building), in accordance with the decision set forth in Section 02-2024-ITZ-PZ, Sheet 14. Section 2.4: *"The project provides for 1 drinking water storage tank with a capacity of 600 L, a height of 1,850 mm, a diameter of 660 mm, and a neck diameter of 370 mm, based on a calculation of 2 L of drinking water per person for 2 days."* Regulatory justification: DBN V.2.2-5:2023, Section 11.3.2.
  11. Section PZ-49: "The project provides for two tanks with a capacity of 200 L, Ø500, h=1220 mm, and each tank is separately equipped with a submersible vibrating pump "Lukon OVM 60" N=0.25 kW for supplying water to the fire hydrant assembly. The firefighting water

supply networks are constructed of galvanized steel water and gas pipes with rolled threads in accordance with GOST 3262-75." However, VK-3 shows a single tank for firefighting purposes, PE 1000 L, Ø1060, with a pressure-boosting unit GRUNDFOS JP 3-42 PM1 BBVP. Inconsistency in design solutions regarding one of the key safety indicators.

12. Different sections of the project provide varying figures regarding the number of people to be accommodated (Design Specifications: 150 people; VK-2:-112 people and 213 people), which leads to discrepancies in the calculations of water reserves, the selection of tanks, and pumping equipment, thereby violating the requirements of DBN V.2.2-5:2023. It is necessary to standardize the shelter capacity to a single value in all sections and recalculate the reserves, pumps, and tanks.
13. The design documentation uses different types and diameters of fire hose reel sets (PKK Ø19 / Ø25 / Ø50), as well as different configurations for these sets. At the same time, inconsistencies were identified between the explanatory note, drawings, and specifications, which contradicts the requirements of DBN V.2.2-5:2023 regarding the uniformity of design solutions. To rectify this violation, the solutions must be standardized by adopting a single type of fire hose reel set with consistent representation in all sections of the documentation.
14. According to DBN V.2.2-5:2023, Section 11.3.5, "Flow tanks and pipes through which water circulates must have thermal and vapor insulation." However, neither the specifications nor the drawings provide for pipe insulation.
15. Section SZ or VK does not address the automation of the fire suppression system as required by DBN V.2.2-5:2023, Section 11.3.7: "Pump startup shall be provided for both locally and remotely (via buttons located in the fire hydrant cabinet enclosures)." Thus, the start-up of the fire pump in the fire hydrant cabinet is not provided for.
16. According to DBN V.2.2-5:2023, Section 11.3.7, "Installation of the pump, including the control cabinet, and placement of the emergency tank (reservoir) shall be provided in a protected space of a protective structure or fire compartment, in a separate room separated from adjacent areas by a Type 1 fire partition with appropriate filling of openings. This room may be combined with another technical room of the protective structure or fire protection system, but its fire hazard category must not exceed category D (except for cylinder-based systems)."  
However, this requirement is not met by the design. Thus, room 15 (where the fire protection water storage tank and pump are installed), according to AR-04, has no door to the ventilation chamber of Room 11; furthermore, according to DBN V.1.1-7:2016, Table 1 "Minimum Fire Resistance Classes for Building Structures," REI 60 is specified for self-supporting walls. Contrary to this, AR-04 specifies a door from room 15 to room 16 with a fire resistance rating of EI 45, which contradicts the requirement of DBN V.2.2-5:2023, section 11.3.7, regarding a "Type 1 fire partition"—the door must have a rating of EI 60.
17. According to the ZVK-2 plan, the connection of the furnace to the B1 network is shown. However, the ZVK section does not include any detailed drawings, specifications are not provided, and the water supply inlet to the furnace is not shown in the construction drawings

#### 4.11 Section K1

1. VK-3. The axonometric diagram shows the elevations for the installation of PVC sewer pipes. However, they have different values (-0.48, -0.10, etc.). If they are laid in the floor, then according to KB-12, the floor construction thickness is only 120 mm. It is unclear how the K1 pipes can be laid in the floor. And if the K1 pipes (according to the instructions provided in VK.PZ-4) are laid above the floor, the different elevation markings for the pipes on VK-3 become unclear. Furthermore, at the sewer outlet connection to the septic tank



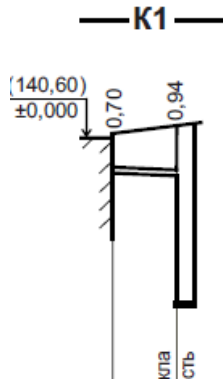
shows a height difference of 40 cm lower. For this, the design section must provide for a sump, which has not been done. This will create additional work that cannot be performed during the sewer installation phase.

2. DBN V.2.2-5:2023, Section 11.4.6, has been violated: "Ventilation of the sewer network of protective structures and dual-purpose structures is not provided for." However, in the VK section, an anti-vacuum valve is installed on K1, which is essentially a ventilation valve.



3. Section BK specifies the installation of a well (B1) at the shelter's entry points, and a two-layer plastic septic tank ( $V=5 \text{ m}^3$ ,  $O1890$ ,  $h=2960$ , "Litolan") at point K1. However, neither the VK section nor the ZVK section provides instructions for installation work, nor does it include cross-sections to illustrate network connections or manhole construction. This results in additional work and unforeseen costs during installation.
4. Section PZ-3 states that: "the standard depth of seasonal soil freezing is 1.0 m; the maximum depth of soil freezing is 1.2 m." However, according to the K1 network profile on ZVK-3, the depth from the ground surface to the bottom of the K1 pipe trench ranges

from 0.7 m to 0.94 m.



This violation of the burial depth of the gravity-fed K1 network will certainly lead to an emergency situation when the pipe freezes.

5. There are no specific details regarding the routing and sealing of pipelines B1 and K1 through the foundations of the PRU building and the boiler room, as well as the connection of pipe K1 to the plastic septic tank. No sealing assembly is provided for the passage of pipeline B1 into well 1. The proposed complex 7373-3 in ZVK.S-1 involves the use of materials and technologies from 1973.
6. Section BK does not show or provide instructions regarding installation assemblies and work. Fastening assemblies, penetration assemblies, fire-resistant couplings for plastic pipelines, intersections with other utilities, equipment marking.

#### 4.12 HVAC Section Code 02 – 2024 - HVAC

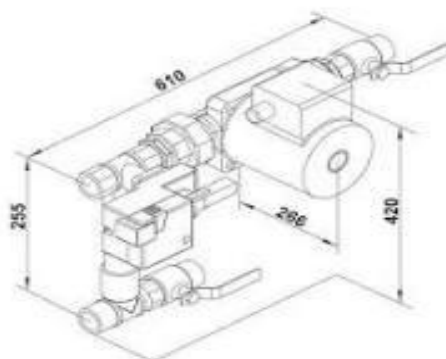
1. OV.PZ-unnumbered. The section states: “Calculated heat demand for ventilation (heat supply to the ventilation system PZ) – 64.40 kW.” This contradicts Section ZTP-1, where the same figure is listed as 67.4 kW. In addition, Section ZTP specifies that “The calculated heat demand for the PRU premises is 86.80 kW,” yet Section TM-1 contradicts this figure: “The calculated heat demand for all consumers is 85.60 kW.” These discrepancies indicate an imbalance in the calculations used to select the equipment and determine the key indicators in the OV, ZTP, and TM sections.
2. Requirements for the preparation of HVAC drawings have been violated. DSTU B A.2.4-41:2009, Section 5.1.1: “The general data for HVAC working drawings shall include:
  - a list of working drawings for the main set in accordance with Form 1 of DSTU B A.2.4-4;
  - a list of referenced and attached documents, prepared in accordance with Form 2 of DSTU B A.2.4-4;
  - a layout diagram of system installations;
  - system specifications;
  - general instructions;
  - symbols that are not defined by national standards and whose meanings are not specified on other sheets of the main set of working drawings;
  - a complete list of heating devices
3. In accordance with DSTU 9243.4:2023, Section 5.1.3; Section 10 and B1 of Appendix B,

prepare a title page, confirm the Chief Architect/Chief Engineer, and the signature of the Chief Engineer (Chief Architect) of the design organization must be personally certified with a seal indicating the registration number of the architect's (design engineer's) qualification certificate and the issuing authority.

4. The stamps on the drawings in the HVAC section lack the following signatures: Chief Architect, Chief Engineer, Director, Reviewed, Quality Control.
5. Ambiguities were found in the air exchange tables: different supply and exhaust values are specified for the shelter zone, while the overall balance is formally set to "zero" without an explanation of the systems' operating modes, which contradicts the requirements of DBN V.2.2-5:2023. It is necessary to balance the air exchange for each system and each room, providing the corresponding calculations and explanations
6. Section OV-1 incorrectly specifies the design outdoor air temperature as -23. According to DSTU-N B V.1.1-27:2010 "Building Climatology," Table 2 for the Chernihiv region, the temperature of the coldest five-day period is -24°C with a probability of 0.92 and -28°C with a probability of 0.98.
7. OV-1,2. The explanatory note and the table of key indicators in the working drawings contain contradictory data regarding heat consumption for ventilation.
8. OV-3. A steel niche is shown in the monolithic wall for the installation of a control unit. However, this niche is not accounted for in section KB-10. This creates additional work and compromises the load-bearing capacity of the wall as a result of cutting through the reinforcement when cutting out a niche 200 mm deep.
9. None of the AR or KB drawings account for or show openings for the installation of ventilation ducts (between rooms 11-10; 23-22; 6-to the outside). The pit shown on axes 11-12; A-B of the HVAC section is missing from the AR and KB sections. Ventilation openings in the floor slab for ventilation shafts in rooms 11 and 23 are missing from the AR and KB sections.
10. OV-3. Notes: "3. Drainage pit (1000×1000×1500H mm) to be covered with ***a removable, insulated lid equipped with a lock.***" ***This is*** a peculiar design decision, given the purpose of the pit and the need for access to monitor the condition of the drainage pump inside it.
11. OV-4. Notes: "3. Lay design pipelines T1/T2 concealed within the floor and wall structures of the rooms, and insulated with 9.0 mm insulation." Incorrect decision regarding the installation of heating pipes within wall structures. Given the diameter of the pipes and the insulation, this cannot be implemented in monolithic walls.
12. The HVAC drawings (especially the floor plans) do not show room elevations, which negatively affects the review and ease of reviewing the design documentation.
13. In the specifications of section OV-11, vestibules 7 and 11 are designated as "airlock vestibules," unlike in section AR-04. However, these vestibules have neither an airlock nor doors connecting to the vestibules 3 and 9. However, according to DBN V.1.1-7:2016, "3.8 A fire-resistant vestibule-airlock is a volumetric element of a part of a room, separated from other parts of the room by fire barriers and located directly at the entrances (exits) to the room, stairwell, or elevator shaft. The purpose of a fire-resistant vestibule is to prevent the spread of fire and its hazardous factors beyond the premises or into the interior of the premises." Furthermore, failure to provide a vestibule-airlock directly contradicts DBN V.2.2-5:2023, Section 11.2.1.26: "To ensure separate exits from the shelter or emergency shelter to the surface and re-entry during filtered ventilation mode,

ventilation of the vestibule or vestibule-airlock at one of the entrances.”

14. OV-3. The shown sump is located at axes 11-12; A-B. The bottom elevation of the sump is indicated as 139.30. The note provided is “see section ZTP.” In section ZTP-3, on the route profile, the elevation for the pipeline entry is indicated as 139.44. Thus, 0.14 meters remain for installing the drainage pump. This is insufficient for the working part of the Wilo pump. Furthermore, the connection for this pump is missing in section VK-2. This creates additional work and financial burdens.
15. OV-6. The piping layout for the control unit is shown. However, Sheet 3 shows a metal cabinet ( ) measuring 1000\*1200\*200 mm into which this unit is supposed to be integrated. The expert is certain that the piping for the unit will not fit into this cabinet.



16. This violates the requirement of DBN V.2.2-5:2023, Section 11.2.1.26: “Ventilation of the vestibule (airlock) must be provided by the method of airflow due to a pressure differential into the shelter/SPP using pressure relief valves, the installation of which must be provided for on the inner and outer walls of the vestibule (airlock), with an explosion-proof device installed on the external overpressure valve (OPV) or directly from the filter ventilation system.” In the OV section, airlocks 4 and 7 are not equipped with overpressure valves.
17. The requirement of DBN V.2.2-5:2023, Section 11.2.1.31, has been violated: “The design documentation shall specify all sealing planes (lines, zones) of the shelter/SPP and the means ensuring sealing at entrances and points where utilities pass through.” Such data is not provided in the OV section.
18. The requirement regarding temperature parameters in main rooms 1 and 2 has been violated. A temperature of +22°C is specified. However, according to DBN V.2.2-5:2023, Tables 11.2 and 11.8, this temperature should be +25°C.
19. The calculations of heat loads do not account for heat generated by people, electric lighting, electrical power equipment, and regenerative devices. DBN V.2.2-5:2023, Section 11.2.1.14. The heat absorption of building envelopes has not been accounted for.
20. In the design of the VS and PS shafts, the requirement of DBN V.2.2-5:2023, Section 11.2.1.18, has been violated; specifically, no condensate drainage has been designed upstream of the explosion-proof device.
21. Exhaust ventilation (VEsh) is provided from the electrical switchboard room, which is vented through the ceiling to the outside. However, no air supply is provided in accordance with DBN V.2.2-5:2023 , Section 11.2.1.25.
22. Use of protective sections (MZS and SZS) :



The explanatory note and diagrams OV-9, 10 indicate that these sections are designed to prevent the destructive effects of air shock waves in the ventilation system and are equipped with protective devices of the MZS (Small Protective Section) and SZS (Protective Section) types.

However, while engineering solutions regarding the airtightness of the air ducts in the ventilation system are present, there is no design solution regarding the mounting assemblies for the protective sections (MZS and SZS) in the design section.

23. Sheets OV-7 do not show devices for air overflow or removal from airlocks (KNTM (KIDM)-100 overpressure valves, or separate exhaust satellite ducts). The Equipment Specification (OV.S) lists 4 KVVБ1-3 valves, used exclusively on the main supply and exhaust shafts.

Since the doors to airlocks 4 and 7 are specified as airtight (DBN V.2.2-5:2023, Section 7.5.2.3 “To ensure the airtightness of the SPP with the protective properties of the shelter, evacuation exits must be equipped with airlocks, airlock-slides, airtight-protective and airtight doors”), in the absence of pressure-regulating devices (KNT), creating the required positive pressure in these zones is technically impossible.

Make corrections to the OV section:

Ensure air pressure in the airlocks in accordance with the requirements of DBN V.2.2-5:2023.

Add excess pressure valves (KNT) or autonomous exhaust ducts for the specified rooms to sheets OV-7, OV-9, and the Equipment Specification.

24. The AK (complex automation) section is missing. To account for the requirements of automated operation of ventilation systems. The supply air system (Pz-1, Pz-2) draws air from the street at a temperature of -23°C (according to the design). In winter, the Pz-1,2 supply unit may simply freeze the water heater, as there is no automation to shut off the air supply when the water temperature drops. If the power suddenly goes out in winter or the circulation pump stops, the water in the heater’s tubes will freeze within 3–5 minutes. This will cause the copper tubes to burst and flood the ventilation chamber. The HVAC section must include a freeze protection thermostat that instantly closes the air damper and activates the pump if the return coolant temperature drops below +20°C or the air temperature after the heater drops below +5°C.
25. The HVAC section specifications include valves, but the ETR section lacks their connection diagrams. When the fan is turned off, the damper must automatically close tightly to prevent cold air from cooling the shelter space by natural draft.
26. The design includes a water control unit, but lacks a temperature sensor in the air duct. For regulating air temperature.

#### **4.13 Section TM, OV1, ZTP (furnace)**

General question. According to the technical specifications of the TRIO UNI PLUS 97 kW boiler, solid fuel is fed into the boiler manually in the furnace. A single full load of the fuel hopper in the boiler is sufficient for 12 hours. However, it remains unclear how this aligns with the requirements of DBN V.2.2-5:2023 regarding the calculated time people can remain in a shelter with fire-resistant properties for 48 hours. Who will maintain the operation of the heating system in the furnace room?

1. According to DSTU 9243.4:2023, Section 5.1.3; Chapter 10 and Section B1 of Appendix B (all sections of the project), the title page must be completed, the GIP/GAP must be confirmed, and the signature of the GAP (GIP) of the design organization must be personally certified with a seal, which includes information on the registration number of the architect's (design engineer's) qualification certificate and who issued it.
2. TM.PZ. The stamp lacks the signatures of the Chief Architect, Chief Engineer, Director, Reviewed by, and Quality Control.
3. TM.PZ. The section lacks the project composition, table of contents, and information about the project participants.
4. TM.PZ. The explanatory note does not specify the environmental conditions for operation.
5. According to section TM-3, two drainage pits, PD-1 and PD-2, are provided in the foundation slab; however, these pits are not specified in sections KB-14 and KB-15. This creates additional work and financial burdens.
6. TM.PZ. According to the manufacturer's information, the dimensions of the Altep Trio Uni Plus 97 kW boiler are incorrectly specified. In section TM: 1600×940 mm; manufacturer's dimensions: 1840×940 mm (<https://tpt.com.ua/ua/>).
7. TM.PZ-1. General Instructions. The following obsolete regulatory documents are listed: GOST 10704-91, GOST 10705-80, GOST 380-88, GOST 8734-75, GOST 8733-74, GOST 1050-88, GOST 3262-75\*, series 3.900-9 (RF), 4.903-14, 4.904-69 (RF) are not in effect in Ukraine; NPAOP 0.00-1.11-98.
8. Section TM.PZ does not provide for a drain well to empty the heating network. This will have a negative impact on operation.
9. OV1.PZ "For the values of heat transfer resistances of the boiler room's envelope structures, see Section AB." Such data is not specified in Sections AR and KB.
10. OV1.PZ-1,2. The general instructions state: "The design indoor air temperature in the boiler room is +10°C."; however, on sheet 2, the symbols indicate: "Design indoor temperature for heating (winter) +16°C." There is a contradiction in the key data in section OV.1.
11. OV.1-2. The boiler room heating diagram does not show pipe fasteners, pipe insulation, pipe length, or pipe installation height.
12. ZTP-3. According to the provided heat pipeline profile, the entry of two pipelines, T1 and T2, into the boiler room is at a depth of 1.11 m from ground level. However, the TM or KB section does not include a pit at this depth within the boiler room. At the same time, in the TM section, this pit is shown schematically and marked PD-2. Furthermore, in the KB-15 section, the cross-section indicates that the foundation depth of the boiler room is 1.050 m below ground level. The decision regarding the entry of pipes T1 and T2 at the bottom of the boiler room foundation is unclear. Furthermore, it is unclear how this sump is supposed to accommodate such a volume of water and what depth it should have, given its location. I propose constructing a separate external sump. Furthermore, according to ZTP-3, note 4: "Install fixed supports NO-1 and NO-2 in the designated locations within the building foundation openings"—this will be impossible to implement, as there simply will be no opening in the boiler room foundation.
13. OV.1-2. At node "I," the radiator installation height is not shown; the node does not correspond to the diagram (transit pipes are shown at the node and terminal pipes on the

diagram; the connection method differs in both cases).

14. OV.1 -3. The 0.000 plan shows openings in the walls: two supply air openings PE1, an opening for a 350 mm diameter chimney pipe, and an opening in the floor slab for the exhaust system BE1. However, in the AR section, the design bureau has not developed or shown these openings. The design bureau has not developed the superstructure assemblies at the location of VE1, through the floor slab, and the waterproofing connection assemblies ( ).
15. OV.1.S-1. The materials specification does not specify insulation for the pipes indicated in OV.1-1 “Design piping for the heating system—steel, electric-welded, DSTU 8943:2019, with exposed installation and two coats of PF-115 enamel paint over a layer of GF-210 primer, and external thermal insulation 9.0 mm thick.”
16. OV.1.C-1. The specification for the chimney does not specify the metal to be used for the spatial reinforcement structure for the 7-meter section of the chimney. Furthermore, the Design Bureau has not developed this structure.
17. OV1-2. Paragraph 4 of the General Instructions provides for the installation of a radiator in a niche to be constructed in a 300 mm thick aerated concrete wall. Clarify the feasibility of this solution and add it to the design section.
18. OV1-3. Note 2 states: “For the mounting base for the D-Z250mm deflector of the VE1 system, see sections AB and KZ of this design.” These sections are missing from the design, and this component is not included in the design documentation
19. The OV1.S-2 specification contains references to obsolete standards: GOST 19903-74, GOST 14918-80; correct to current standards.
20. TM-4. The diameters of the shut-off valves specified in the automatic makeup unit specification do not correspond to the diameters of the supply and discharge pipes.
21. Section TM.PZ lacks calculations for heating network diameters, as well as guidelines regarding environmental protection measures, occupational safety, and safety precautions.
22. Section TM.PZ lacks technical specifications for the installation of the boiler room, and requirements for the boiler room and operational restrictions are not defined.
23. PZ. According to the requirements of DSTU 8855:2019, when calculating consequence classes, the consequence class for the freestanding boiler room building was erroneously not determined.
24. ZTP-3. On the T1, T2 network profile, an unclear linear dimension of 34 meters is shown from NO-1 to KP-1. However, this distance is incorrect because in the table below the profile, it is 17 meters.
25. ZTP-3. According to the T1, T2 network profile, the pipes from the boiler house are introduced into the shelter structure at an elevation of –0.86 meters above ground level, which corresponds to an absolute elevation of **139.44**. However, according to KB-06, the bottom of the foundation slab is 0.52 meters below the 0.000 elevation, which corresponds to an absolute elevation of **140.08**. Thus, the T1 and T2 network entry point is 0.64 meters below the bottom of the foundation slab. Given this location of the entry point, the following must be installed: - a steel sleeve at the entry point under the foundation; -- a pit at the entry point inside room “6” with a depth of at least 1 meter. However, the KB section does not provide for any structural elements in the foundation slab.

- Furthermore, this directly contradicts DBN V.2.2-5:2023, Section 11.1.4: “Utility service entries must be accessible for inspection and repair from inside the shelter.”
26. The TM section does not include a design for the entry point into the B1 and T/T2 boiler rooms.  
Likewise, no corresponding entry node has been designed in the KB section of the T1/T2 network.
  27. TM-2. According to the notes in Section 6: “In the boiler room, provide a floor slope of 0.01 toward drainage pits PD-1 and PD-2 (see Section AB),” however, Section AB lacks any specifications or design details (as does Section AB itself). At the same time, the purpose of these PD-1 and PD-2 pits is unclear, as it is not described.
  28. Section TM does not show the diagrams of supports NO-1 and NO-2.
  29. Section TM does not provide symbols for equipment and piping, nor does it provide cross-sections with wall projections of the piping network.
  30. The TM section does not provide calculations for: annual fuel consumption, total flue gas flow, and thermal loads on the boiler room.
  31. TM-unnumbered. Explanatory note, General Data sheet.  
The following obsolete regulatory documents are cited: GOST 10704-91 "Assortment," GOST 10705-80 (Group B) "Technical Conditions" for VSt. 3sp4 steel per GOST 380-88, and pipes per GOST 8734-75 "Assortment," GOST 8733-74 (Group B) for steel 20 GOST 1050-88, and for pipes per GOST 3262-75\* for steel St.3sp GOST 380-88. Correct according to the data provided in the specification for this section. NPAOP 0.00-1.11-98 is not in effect in Ukraine as of 2018.
  32. TM-No. General Data Sheet. Specify the operating pressure in the heat supply pipelines to determine the test pressure.
  33. TM-4. There are no design solutions for the manufacture of: “hydraulic distributor GR DN50/159×4.5 mm,” water heating system manifold (KL-SO), (K7 according to the schematic diagram); according to the specification, these must be manufactured during installation.

#### **4.14 Section Section of the Technical Specifications (ITZ)**

1. The title page is missing in accordance with the requirements of clause 5.1.4 of DSTU 9243.4:2023.
2. The section table of contents is not formatted in accordance with the requirements of clause 10.5 of DSTU 9243.4:2023.
3. Section General Provisions, page 8. References to the source data for the development of the ITZ section are missing.
4. Section General Provisions, page 8. The list of general data is incomplete as required by Annex A to DSTU 8773:2018; information is missing regarding specific master plan drawings, architectural drawings, and drawings of engineering systems for the shelter on which the ITZ section was based.
5. Sheet 10, Section 1.3 states: “The planning solutions provide for separate rooms for visitors to the educational institution and staff rooms.” Project 02-2024-AR does not provide for separate rooms for students and separate rooms for staff.
6. Sheet 10, Section 1.3 states: “The main entrances to the shelter are distributed at ground

level. One entrance is a ramp for people with reduced mobility; the other entrance is a stairwell.” The design solutions specified are missing from Section 02-2024-AR.

7. Sheet 10, Section 1.3 states: “The building’s exterior and load-bearing walls are monolithic. The exterior walls are 300 mm thick. The exterior walls are waterproofed and insulated. See section AR. The roof is flat, made of monolithic reinforced concrete 300 mm thick, and is insulated and waterproofed. See section AR. These solutions do not correspond to those specified in sections 02-2024-AR and 02-2024-AR, namely:  
The thickness of the exterior walls is 500 mm, and that of the interior walls is 300 and 400 mm.
8. Sheet 13, Section 2.3 states: “At the points where cable groups cross fire barriers, special sealing diaphragms are provided to ensure the standard fire resistance rating of the fire barriers or the fire resistance of the cable penetrations.” The specific design solutions (assemblies) indicated ( ) are not included in Section 02-2024-ETR1.
9. Sheet 14. Section 2.4. Sheet 23, Section 3.2. Phrase: “The design provides for 1 drinking water storage tank with a capacity of 600 L, a height of 1,850 mm, a diameter of 660 mm, and a neck diameter of 370 mm, based on a calculation of 2 L of drinking water per person for 2 days.” This design solution is missing from Section 02-2024-VK. The phrase is repeated several times later in the text.
10. Sheet 14, Section 2.4 states: “Hot water supply in the shelter—from an M-50-liter electric storage water heater.” This design solution does not correspond to the provisions of Section 02-2024-VK, which calls for two water heaters (V=30 L and V=75 L), taking into account the shower stall. Clarification is required.
11. Sheet 26, Section 3.5 states: “Air supply to the shelter is provided by the P-I supply system with an electric fan and a water heater. The system is also equipped with a filter and a shut-off valve.” The name of the supply system is incorrect; according to 02-2024-OV, the system is called Pz-1 with a backup system Pz-2.
12. Sheet 26. Section 3.5 states: “In restrooms and other shelter rooms, the design provides for the installation of exhaust systems B-1 and B-2, with air discharged outside, 2.0 m above ground level (system B-1), and 1.0 m above the roof (system B-2).” The names of the systems according to 02-2024-OV are Vz and Vt, which discharge air into the VSh exhaust shaft.
13. Section 3.7, Sheet 29 states: “The shelter provides for rooms for persons to be sheltered:  
- Room No. 1 – 59 people (44 chairs with folding footrests, 15 chairs), 44 students in grades 5–11, 15 staff members;  
- Room No. 2 – 55 people (18 tables with 36 children’s chairs, 4 three-tiered pull-out children’s beds, 20 chairs), 23 elementary school students, 11 children from the “Malyatko” studio, 20 employees”;  
The quantity and type of furniture do not correspond to 02-2024-SO.
14. Section 3.7, Sheet 30 states: “Telephone service for the construction site is designed for landline/mobile phones. Landline telephone networks are laid underground; cable passages are sealed with cable mastic.” The section on telephone installation with design solutions regarding landline telephone communication has not been submitted for review.
15. Section 3.7, Sheet 30 states: “The civil defense shelter is additionally equipped with:  
- 1 container for food storage;  
- backup artificial lighting (electric lanterns, candles, kerosene lamps, etc.);  
- primary fire extinguishing equipment:

- VP-5 fire extinguisher – 2 units;
- VVK-5 fire extinguisher – 4 units.”

Section 02-2024-TX of the project and specification 02-2024-SO do not provide for food storage containers. The specified type of fire extinguishers contradicts Section 10.18 of DBN V.2.2-5:2023 (Main rooms of protective structures and civil defense facilities must be equipped with water-based and/or water-foam fire extinguishers). This phrase is repeated several times later in the text.

16. Section 4.4.2, Sheet 51. The specified solutions for waterproofing the foundation slab and building walls do not comply with the solutions in the Design Bureau section.
17. Sheet 53. The master plan shown on the sheet does not comply with Section 02-2024-GP in the following respects:
  - Design area.
  - Existing additional basketball court.
  - Location and dimensions of pedestrian walkways.
18. Sheet 58. Appendix 4. The list of equipment required for the protective structure does not comply with Section 02-2024 SO.
19. The graphic materials for the ITZ section required by clause 5.7 of DSTU 8773:2018 are missing, namely:
  - site plans indicating the designed facility and civil defense structures (if any), indicating the distance to the construction site and nearby facilities, settlements, and transportation routes that would fall within the impact zone in the event of an accident at this facility, as well as the boundaries of potential hazard zones and emergency zones defined in the design solutions, with an indication of the number of people in these zones;
  - other drawings (plans and sections of buildings and structures, plans, route profiles, schematic diagrams of technological processes, diagrams of utility networks and systems) containing information regarding the design solutions of the ITZ Civil Defense section.

### **Appendix to the Comments**

1. Standards and provisions regarding the design of premises for physical education and health-improvement activities.

DBN V.2.2-13-2003 SPORTS AND PHYSICAL EDUCATION AND HEALTH  
FACILITIES

3.63 Приміщення для фізкультурно-оздоровчих занять з допоміжними приміщеннями для їх обслуговування можуть проектуватися в окремо розташованих будинках, входити до складу спортивних корпусів, а також бути прибудованими або вбудованими у будинки іншого призначення.

Розміри та одночасну пропускну спроможність приміщень залежно від призначення за видами занять, що у них проводяться, слід приймати за таблицею 9.

Таблиця 9

Вид занять	Розміри, м		Найменша висота до низу виступних конструкцій стелі, м	Пропускна спроможність, люд.
	довжина	ширина		
1	2	3	4	5
1. Групові заняття із загальної фізичної підготовки	24	12	6	35
	18	12	4,8*)	26
		9		20
2. Ритмічна гімнастика, хореографія	12	12	3,9	25
	9	9		15
3. Настільний теніс	6	4	2,7	4
4. Елементи боротьби	12	9	3,9	10
5. Заняття з використанням тренажерів та снарядів для розвитку сили та витривалості	Із розрахунку 4 м <sup>2</sup> на кожний вид обладнання або снаряд, але не менше 20 м <sup>2</sup> **)		3,9***)	Одна на кожну одиницю обладнання чи снаряд

\*) У вбудованих приміщеннях і при реконструкції існуючих приміщень допускається:

а) зміна розмірів площі, наведеної в таблиці, але не менше ніж до 140 м<sup>2</sup>; при цьому пропускну спроможність приймають з розрахунку 8 м на одного, хто займається;

б) зменшення висоти до 4,2 м.

\*\*) Ширина приміщення повинна бути не менше 3 м.

\*\*\*) У вбудованих приміщеннях і при реконструкції допускається зменшення висоти до висоти поверху будинку.

**Примітка.** У випадках, коли проведення фізкультурно-оздоровчих занять, зазначених у таблиці, передбачено проектом у спортивних залах, пропускну спроможність для фізкультурно-оздоровчих занять приймають, як для спортивних залів.

Auxiliary rooms are accepted in accordance with Table 11 (Section 3.74).

The capacity must be determined. Based on this data, the hall area and, in particular, the areas of the facilities—changing rooms, restrooms, and showers—are calculated. Showers are designed as separate facilities (men’s and women’s). There is no room for storing sports equipment (when the facility is used as a sports and recreation center). And when the facility is used in peacetime for physical education and health activities (tennis, boxing, etc.), there is no “storage room for furniture and equipment.” This, of course, could be a single room. There is no room for cleaning equipment.

## 2. Standards and references regarding the design and placement of furniture.

### HEALTH

### REGULATIONS

for general secondary education institutions stipulates:

**According to paragraph 33**, when equipping the premises of civil defense facilities for the organization of the educational process, it is recommended to take into account the requirements of the “Classrooms” subsection of this section.

Classrooms:

12. Навчальні меблі повинні бути без гострих кутів, сколів тощо. Пошкоджені та зношені меблі підлягають своєчасній заміні. Поверхня навчальних меблів має бути стійкою до дії мийних та дезінфекційних засобів.

Рекомендовано, щоб розміщення робочих столів учнів у навчальних приміщеннях було таким, яке забезпечуватиме лівостороннє природне освітлення робочих місць. Допускається кругове або інше розміщення робочих столів учнів за умови забезпечення достатнього рівня освітленості робочих місць учнів.

У разі розміщення робочих столів учнів рядами необхідно розміщувати меблі у класній кімнаті прямокутної конфігурації з дотриманням таких відстаней:

між зовнішньою стіною і першим рядом робочих столів учнів 0,6-0,7 м (в будівлях із цегли допускаються 0,5 м);

між рядами двомісних робочих столів учнів) - не менше 0,6 м;

між III рядом робочих столів учнів і внутрішньою стіною або шафами, які стоять біля стіни, не менше 0,7 м; Відновити

між переднім робочим столом учнів і демонстраційним столом не менше 0,8 м;

від передньої стіни з класною дошкою до передніх робочих столів учнів не менше 2,4-2,6 м;

від задніх робочих столів учнів до задньої стіни не менше 0,65 м (якщо задня стіна зовнішня - не менше 1,0 м);

від задніх робочих столів учнів до шаф, які стоять вздовж заднього краю стіни - не менше 0,8 м;

між столом педагогічного працівника і переднім робочим столом учнів - не менше 0,5 м;

найбільша відстань останнього місця від класної дошки - 9 м;

висота нижнього краю дошки над підлогою для учнів першого класу 0,7-0,8 м, 2-4 класів - 0,75-0,8 м, 5-11(12) класів - 0,8-0,9 м.



ДОДАТОК В  
(обов'язковий)

**ВІДСТАНЬ МІЖ ОБЛАДНАННЯМ І ВИМОГИ ЩОДО УМОВ ВИДИМОСТІ У КЛАСАХ,  
НАВЧАЛЬНИХ КАБІНЕТАХ ТА ЛАБОРАТОРІЯХ, АУДИТОРІЯХ**

**Таблиця В.1** - Відстань між обладнанням у навчальних кабінетах та лабораторіях

Найменування виміру	Відстань (не менше ніж), см
Між учнівськими столами в ряді	50
Між аудиторними столами в ряді	70
Між рядами одномісних учнівських столів	50
Між рядами двомісних учнівських столів	60
Між рядами креслярських столів, а також між рядами аудиторних столів при парному розташуванні в ряді	70
Між рядами учнівських (аудиторних) столів і зовнішньою поздовжньою стіною	70
Між рядами учнівських (аудиторних) столів та внутрішньою поздовжньою стіною, шафами (уздовж внутрішньої поздовжньої стіни)	50*
Між учнівськими столами при їх парному розташуванні в ряді	10
Між креслярськими столами при їх парному розташуванні в ряді	20-40
Між лабораторними столами при одному ряді працюючих	80
Те саме при двох рядах працюючих	140
Від задніх учнівських столів до задньої (внутрішньої) стіни (перегородки)	65**
Те саме до задньої стіни, що є зовнішньою, та при розташуванні шаф уздовж задньої стіни (перегородки)	100**
Від останнього ряду аудиторних та креслярських столів до задньої стіни або вмонтованих шаф, обладнання для моделей і макетів	80**
Від останнього ряду лабораторних столів до задньої стіни або вмонтованих шаф	80-100**
Від передньої стіни з класною дошкою до передніх двомісних столів	240
Те саме до аудиторних і лабораторних столів (за наявності демонстраційного столу)	255
Від демонстраційного столу до класної дошки	100
Від першого ряду навчальних столів до демонстраційного столу	80

\* Збільшується на 40 см при розташуванні входу в приміщення в поздовжній стіні біля останніх столів.

\*\* Збільшується до 120 см при розташуванні входу в задній стіні або в поздовжній стіні біля останніх столів.

**Таблиця В.2** - Вимоги щодо умов видимості класної дошки в навчальних кабінетах та лабораторіях

Найменування виміру	Нормативна величина видимості
Горизонтальний кут видимості класної дошки від краю дошки завдовжки 3 м до середини крайнього місця учня за переднім столом:	
- в класах закладів загальної середньої освіти;	Не менше ніж 40 град.
- в кабінетах та лабораторіях закладів загальної середньої освіти;	Не менше ніж 35 град.
- в кабінетах та лабораторіях профтехучилищ та закладів вищої освіти	30-35 град.
Висота нижнього краю класної дошки над підлогою:	
- для перших класів;	60-70 см
- для других-четвертих класів;	75-80 см
- для п'ятих-дванадцятих класів;	80-90 см
- для профтехучилищ та закладів вищої освіти	90 см
Найбільша віддаленість від класної дошки крайнього місця в останньому ряду (для закладів загальної середньої освіти та профтехучилищ), не більше	860 см

3. The design of sanitary and hygienic facilities and the entrance area to such facilities shall be carried out in accordance with DBN V.2.2.40:2018, Amendment 2, and DSTU B ISO 21542:2013.

A universal sanitary and hygiene room must have the following minimum dimensions: width 1.7 m, depth 2.2 m (clause 11.6, Fig. 77 of DBN V.2.2.40:2018, Rev. 2)

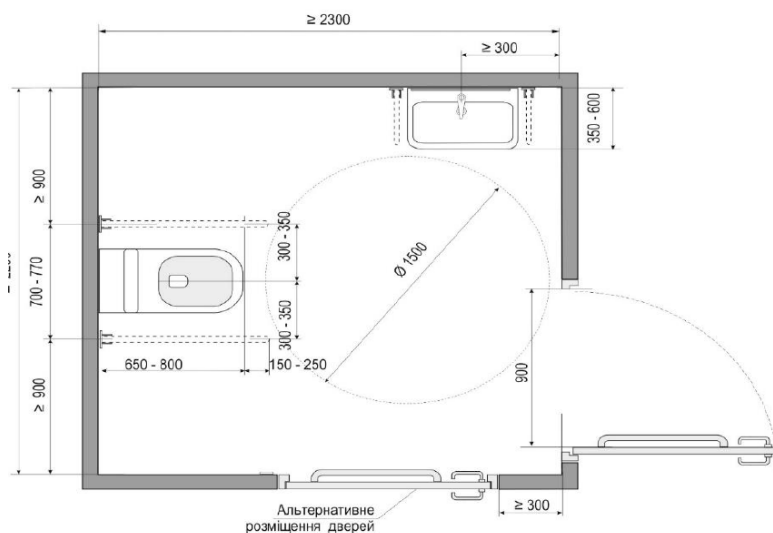
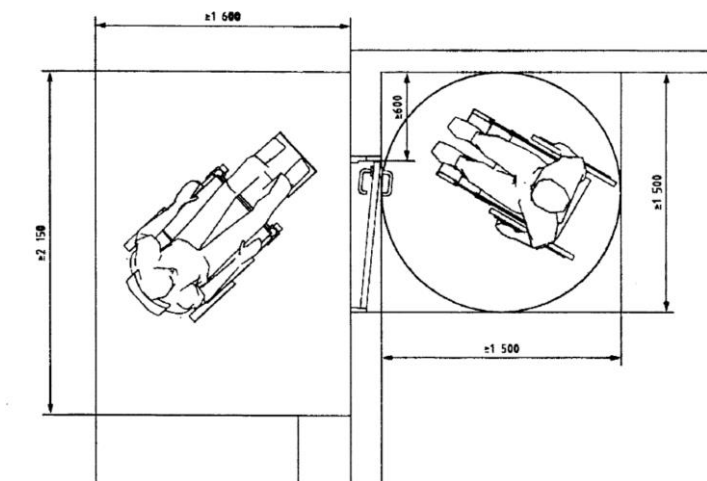


Fig. 77 DBN v.2.2.40:2018 rev. 2

Note that the distance from the door leaf (at the door handle location) to the wall is more than 300 mm; sanitary fixtures are installed correctly, and there is space near the toilet for a wheelchair.

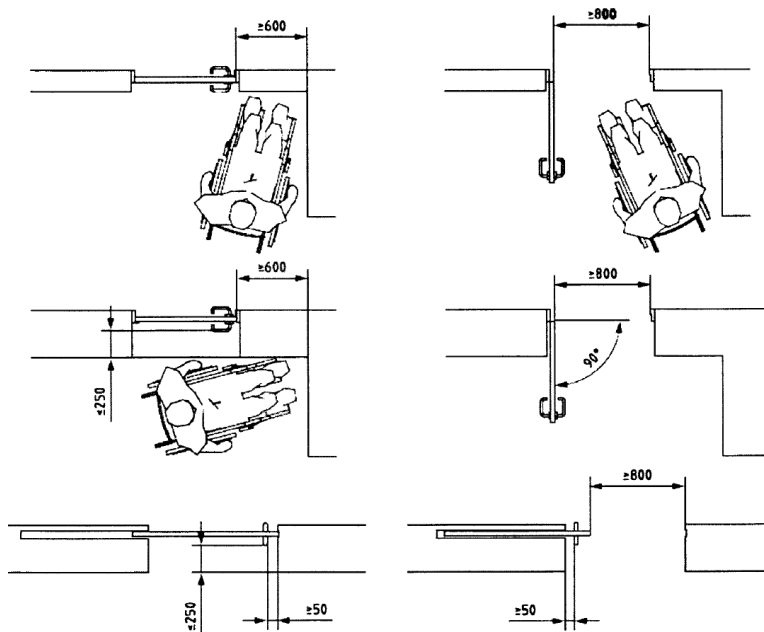


Розміри в міліметрах

Dimensions in millimetres

DSTU B ISO 21542:2013

From the corridor side, the distance is 600 mm; there is a 1.5 x 1.5 m space for maneuvering in a wheelchair in front of the door.



Розміри в міліметрах

Dimensions in millimetres

Рисунок 26 – Безперешкодна ширина повороту і розсувні двері  
Figure 26 – Unobstructed width of swinging and sliding doors

DSTU B ISO 21542:2013

According to the above-mentioned standards, spatial planning solutions must provide for a “Universal sanitary and hygiene room with a shower area.” Therefore, a shower area must also be included. The dimensions of the shower area are specified only in Section 11.11 of DBN V.2.2.40:2018 (Amendment 2), but it is noted that this applies to public showers.

**11.11** У приміщеннях громадських душових слід передбачати щонайменше одну зону для душу, обладнану для особи з інвалідністю в кріслі колісному.

Розмір kabіни (зони для душу) 1,5 м х 1,8 м із урахуванням простору для маневрування крісла колісного. Піддон (трап) для зливу води повинен бути в одному рівні з підлогою (не допускається обладнувати kabіни піддонами на підвищенні або бортиками).

Душову kabіну (зону для душу) слід обладнувати відкидним сидінням заввишки 400 мм—480 мм від підлоги та комбінованими горизонтально-вертикальними допоміжними поручнями, розміщеними на висоті 0,8 м від підлоги. Кран змішувача та полички повинні бути в зоні досяжності з відкидного сидіння. Зону для душу слід обладнувати занавіскою (шторкою).

**(Пункт 11.11 змінено, Зміна № 2)**

The geometric parameters of areas used by persons with disabilities,

including those in wheelchairs, in sanitary and utility rooms of public and industrial buildings, should be taken from Table 11.1 (Section 11.15 of DBN V.2.2.40:2018 (Amendment 2))

**11.15** Геометричні параметри зон, які використовуються особами з інвалідністю, у тому

числі на кріслах колісних, у санітарно-побутових приміщеннях громадських і виробничих будівель слід приймати за таблицею 11.1.

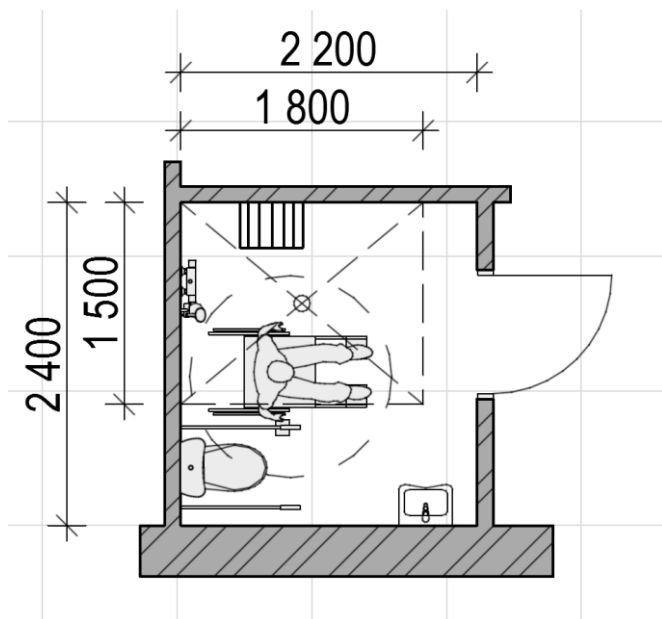
**(Пункт 11.15 змінено, Зміна № 1, Зміна № 2)**

**Таблиця 11.1**

Найменування санітарно-побутових приміщень громадських і виробничих будинків	Розміри в плані (у чистоті) не менше ніж, м
Кабіни душових: - закриті;	1,8 × 1,8
- відкриті і з наскрізним проходом; kabіни напівдушів	1,2 × 0,9
Кабіни особистої гігієни жінок	1,8 × 2,6

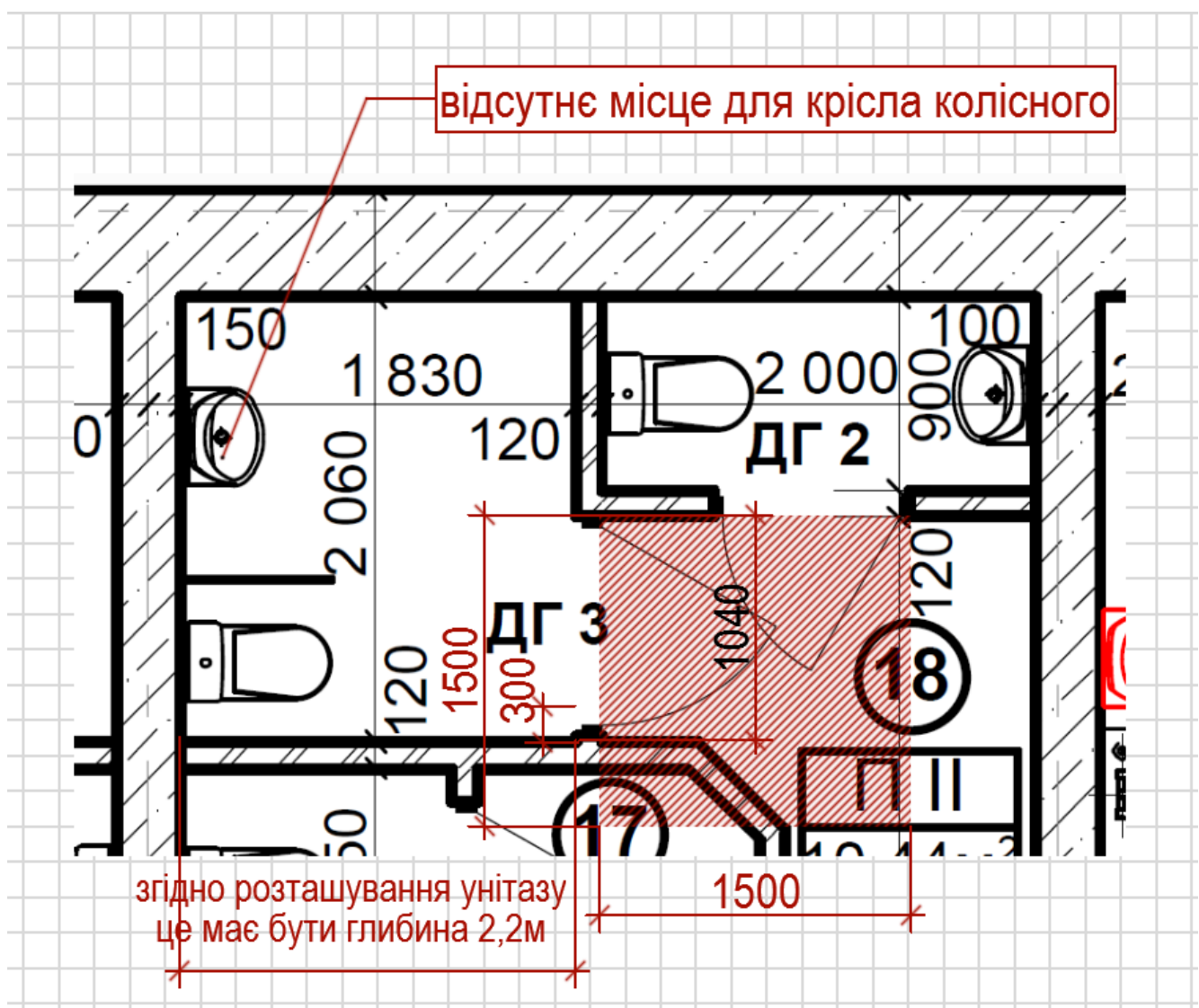
Therefore, this standard (1.5 x 1.8 m) may be applied, or the dimensions in Table 11.1 may be used. Alternatively, by referring to specialized publications or design guidelines, a shower area of different dimensions may be provided.

Equipment shall be installed in accordance with Section 11.11 of DBN V.2.2.40:2018 (Amendment 2).

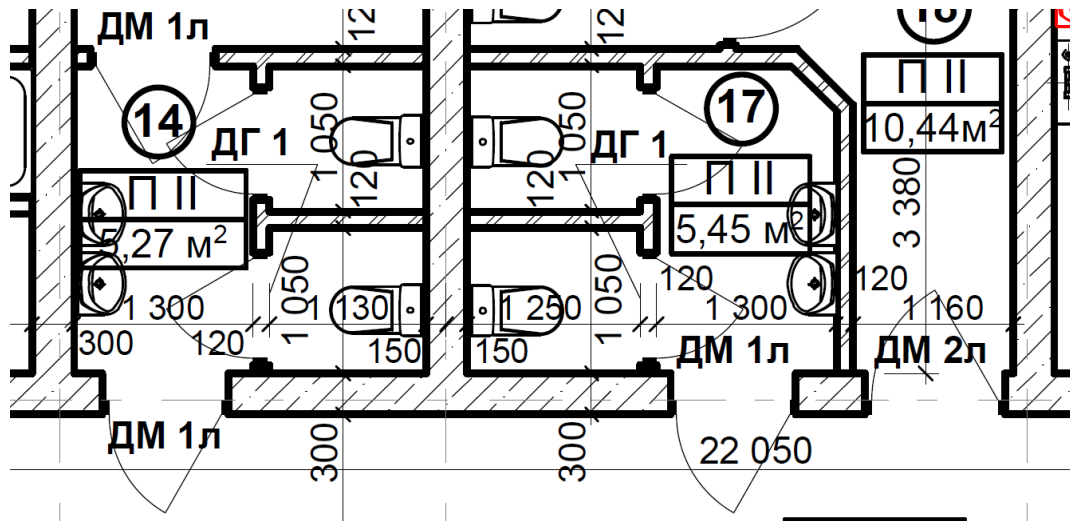


### Example of a combination with a shower area

Identification of major violations (highlighted in red)



4. Design of public restrooms (rooms 14 and 17) in accordance with Note 2.9.



According to Section 7.4.2 of DBN V.2.2-5:2023, sanitary and hygienic facilities shall be designed in accordance with state sanitary norms and rules, DBN V.2.2-9, and DBN V.2.2-40.

According to ANNEX E of DBN V.2.2-9:2018

- The dimensions of the stalls in plan view, if the doors open, are 0.85 x 1.2 m. In the design, the depth of the stall is 1130 mm.
- The standard distance between sinks is 650 mm—this is not specified in the design.
- The width of the passage between the wall and the row of cubicles is 1.3 m. **In the design, washbasins are placed along the wall, so the distance must be determined based on other parameters.**

According to Note 1 of the specified APPENDIX: “The dimensions of toilet and shower stalls, passageways to them and to washbasins, as well as the distance between sanitary fixtures (appliances) in buildings of preschool education institutions, general secondary education institutions, boarding schools, and hospitals shall be determined in accordance with the design standards for these buildings. Therefore, the parameters are also determined in accordance with DBN V.2.2-3:2018 Educational Institutions, as set forth in Section 6.63.

According to Section 6.63 of DBN V.2.2-3:2018 Educational Institutions, only the following parameters are specified:

- Toilets in restrooms for students in grades 1–4 must be separated by partitions or screens at least 1.75 m high (from the floor), which do not reach the floor by 0.1 m. The size of the stalls (for students in grades 1–4) is set at 0.8 x 1 m. The stalls must have doors.  
**The draft decision regarding the design of restrooms for students in grades 1–4 does not include these requirements.**
- The passage between toilet stalls and the opposite wall should be at least 1.1 m in the absence of urinals and at least 1.8 m in the presence of urinals. The passage between sinks and the wall and between two rows of sinks should be at least 1.6 m.



No other specifications are provided. According to the layout plan for restrooms, the distance between the toilet partition (stall) and the sinks must be correctly determined. Taking the last point into account, this distance should be 1.6–1.8 m.

We determine the spatial and layout solutions for general sanitary and hygiene facilities in accordance with DBN V.2.2.40:2018, Amendment 2. We take into account that the project provides for the accommodation of people with limited mobility, including individuals (children) in wheelchairs (in accordance with the design specifications, sheet 24, item 1.8)—a total of 15 people.

#### 1.8 ДОСТУПНІСТЬ ОБ'ЄКТА БУДІВНИЦТВА ДЛЯ МАЛОМОБІЛЬНИХ ГРУП НАСЕЛЕННЯ

При новому будівництві захисної споруди цивільного захисту – споруди подвійного призначення із захисними властивостями протирадіаційного укриття передбачено забезпечення для інвалідів і громадян інших мало мобільних груп населення (МГН) умов життєдіяльності, однакових з рештою категорій населення.

Проектним рішенням прийнято характеристики людей груп мобільності:

- М2 Немічні люди, мобільність яких знижена через старіння організму (особи з інвалідністю по старості); особи з інвалідністю на протезах; особи з інвалідністю з порушенням зору, що користуються білою тростиною; люди з психічними відхиленнями - 6 осіб;

- М3 Особи з інвалідністю, що використовують під час руху додаткові опори (милиці, ципки) – 6 осіб;

- М4 Особи з інвалідністю, що пересуваються на кріслах колісних, що приводяться в рух вручну - 3 особи.

У проекті передбачені умови безперешкодного і зручного пересування МГН по території до будівлі.

- Paragraph 11.5 of DBN V.2.2.40:2018, Amendment 2, specifies that public restrooms must include a universal stall and a stall for people with limited mobility who do not use wheelchairs. This is schematically shown in Figs. 41a and 41b.

11.5 Санітарно-гігієнічні приміщення повинні бути розраховані на широке коло відвідувачів, зокрема для маломобільних груп населення.

Санітарно-гігієнічні приміщення для маломобільних груп населення передбачають у туалетах загального користування.

У туалетах загального користування (окремо для чоловіків і жінок) слід передбачити:

— універсальну кабінку з можливістю заїзду і маневрування в ній осіб з інвалідністю, які пересуваються кріслом колісним;

— кабінку для МГН, які не користуються кріслом колісним, проте потребують підтримки у вигляді поручнів з обов'язковим відкриванням дверей назовні (рисунок 41б);

— один з пісуарів потрібно розміщувати на висоті 0,4 м від підлоги;

— один з умивальників потрібно розміщувати на висоті 0,55 м від підлоги.

Рекомендується в туалетах загального користування передбачити:

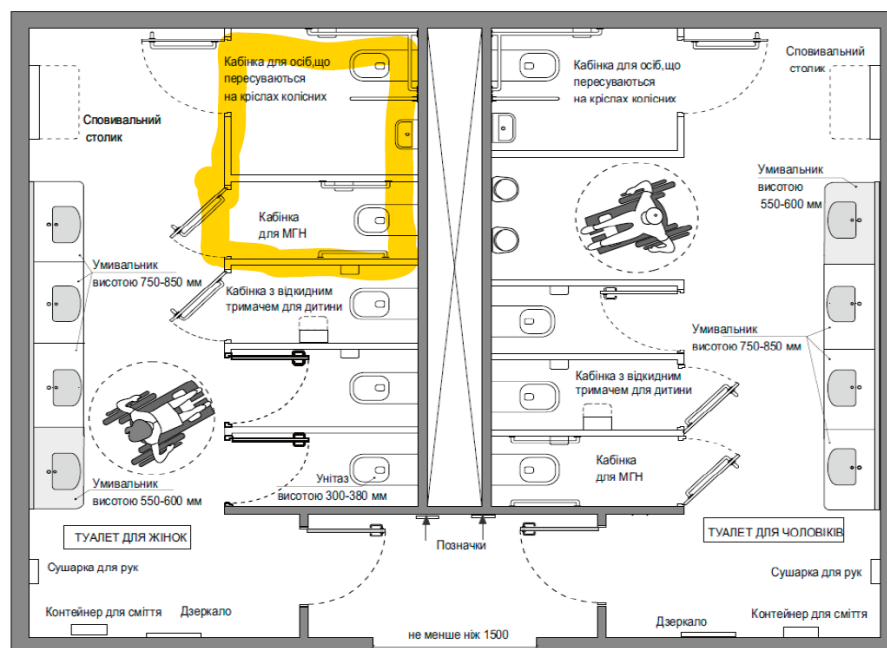
— кабінку для осіб з маленькими дітьми, обладнану тримачем для дитини;

— кабінку для дітей та осіб невеликого зросту, обладнану дитячим унітазом висотою не більше ніж 0,34 м.

(Пункт 11.5 змінено, Зміна № 1, Зміна № 2)

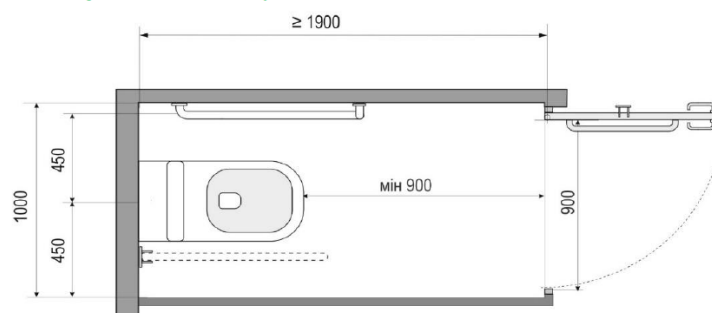
Рисунок 41

(Рисунок 41 вилучено, Зміна № 2)



**Рисунок 41а** – Приклад облаштування універсальної кабіни в туалеті загального користування

(Рисунок 41а долучено, Зміна № 2)



**Рисунок 41б** — Приклад облаштування кабіни для МГН

(Рисунок 41б долучено, Зміна № 2)

Therefore, public restrooms do not include stalls for people with limited mobility (who do not use a wheelchair)—as shown in Fig. 41b.

Therefore, I believe that in accordance with the specified clause and the specified mobility groups of people, all stalls in public restrooms should be designed as shown in Fig. 41b. A universal sanitary facility with a shower area should be designed with a separate entrance.

- Please note the arrangement of washbasins in accordance with Fig. 41a and the standards set forth in Section 11.5 of DBN V.2.2.40:2018, Amendment 2; Section 6.63 of DBN V.2.2-3:2018.

#### 4.15 Section: Analysis of Design Documentation

Based on the results of the analysis of the cost estimate documentation included in the technical design, the following has been established:



## 1. Compliance of the cost estimate documentation with design solutions

Overall, the cost estimate documentation **does not fully comply with the design solutions, drawings, specifications, and scope of work.**

Specifically:

- equipment has not been listed in separate cost estimates (in some cases, it is accounted for as material with code “C”);
- costs for commissioning work are missing.

## 2. Accuracy of the determination of the scope of work

It has been determined that **some of the construction work specified in the cost estimate documentation does not comply with the design specifications.**

Detailed information is provided in the corresponding table (see “List of comments on the cost estimate section of the project documentation presented in tabular form”).

## 3. Compliance with Regulatory Framework

The cost estimates, rates, coefficients, and indices applied **comply with the current regulatory documents of Ukraine in the field of construction pricing.**

## 4. Justification of resource costs

- The cost of materials, products, and structures at the time of preparing the cost estimate **generally corresponds to market levels.**
- At the same time, **the cost of technological equipment is generally overstated.**
- The budget includes provisions for risks and inflation, which is reasonable given the project timeline (6 months).

## 5. Identified discrepancies and deficiencies

The audit revealed the following:

- **a complete absence of commissioning work**, despite the presence of equipment;
- discrepancies between the scope of work and design solutions;
- isolated instances of potential cost overestimation.

The aforementioned deficiencies must be addressed and corrected.

## 6. Consistency of the cost estimate documentation

- The consolidated cost estimate **has been prepared in accordance with current Ukrainian standards and legislation.**
- The project-specific estimate **requires revision and reformatting**

Нове будівництво захисної споруди цивільного захисту - споруди подвійного									
ОБ'ЄКТНИЙ КОШТОРИС № 02-01									
на будівництво : нове будівництво захисної споруди цивільного захисту - споруди подвійного призначення із захисними властивостями протирадіаційного									
Кошторисна вартість об'єкта						22543,147 тис.грн.			
Кошторисна трудомісткість						22,21581 тис.люд.год.			
Кошторисна заробітна плата						1883,294 тис.грн.			
Вимірник одиничної вартості									
Будівельні обсяги									
Складений за поточними цінами станом на 27 травня 2024 р.									
№ ч.	Номери кошторисів	Найменування робіт і витрат	Кошторисна вартість, тис.грн.			Кошторисна трудомісткість.	Кошторисна заробітна плата,	Показники одиничної вартості	
			будівельних робіт	устаткування, меблів	всього				
1	02-01-01.*	на внутрішні мережі водовостачання та каналізації	353,406	-	353,406	0,52458	44,07	-	
2	02-01-04	на диспетчеризація систем протипожежного захисту	81,393	-	81,393	0,53157	47,836	-	
3	02-01-05	на придбання устаткування	-	20,427	20,427	-	-	-	
4	02-01-06	на загальнобудівельні роботи	12730,462	-	12730,462	15,24121	1303,781	-	1
5	02-01-07.*	на архітектурна частина	899,296	-	899,296	1,65280	135,483	-	
6	02-01-08	на топкова	1170,449	-	1170,449	0,35779	29,717	-	2
7	02-01-09.*	на вентиляція	4201,873	-	4201,873	1,01755	82,154	-	3
8	02-01-010.*	на опалення	598,74	-	598,74	0,68379	57,766	-	4
9	02-01-011.*	на електротехнічні роботи	843,598	-	843,598	1,66327	137,531	-	5
10	02-01-014.*	на Тепломеханічні рішення	777,379	-	777,379	0,34036	28,525	-	6
11	02-01-015	на структурована кабельна мережа (СКС)	63,599	-	63,599	0,19018	15,372	-	
12	02-01-016	на придбання устаткування	-	70,301	70,301	-	-	-	
13	02-01-017	на придбання устаткування (СКС)	-	730,468	730,468	-	-	-	
14	02-01-018	на придбання устаткування	-	-	-	-	-	-	
		на придбання обладнання та на монтаж обладнання	1,756	-	1,756	0,01271	1,059	-	
		Всього:	21721,951	821,196	22543,147	22,21581	1883,294	-	

- Consistency between the local, project, and consolidated cost estimates requires clarification.

## General Conclusion

The cost estimate documentation has generally been prepared in compliance with the regulatory framework; however, it contains **significant discrepancies with the design solutions, errors in the scope of work, and deficiencies in the cost structure**, which require further refinement prior to approval.

**A detailed list of comments on the cost estimate section of the project documentation is provided in tabular form.**

	Project stage P - general	in the estimate	in the project	note	recommendations
		SS2	task not provided		
		salary=13707.89			
		assignment			
		distance of transportation of materials 60km			
ch1.	estimate 01-01-01 preparatory				
	land reclamation	bulldozer used to move soil 300m		effective up to 100m, requires a grader	change
Chapter 2	primary purpose facilities			the numbering of estimates is broken	correct
	estimate 02-01-01 internal VC	B1		project section not specified 02 - 2024 - VK	to indicate
p.1	KV-1.5 meter	item 4		price 1800 with VAT is overpriced in 2 years	correct
	mesh filter	d.20	d.25	item 8	correct
p.2	crane kit	B2		p.43. price 19968 UAH including VAT, specify the requirements for the configuration (price 8150-8800 UAH)	clarify
p.4 -K1	cleaning d.100	not taken into account	1pc	sheet 3 spec. of the project	to take into account
	plug d.100	1 piece included	0		clarify
	estimate 02-01-02,-03 fire protection, equipment	completed according to the project	14-2024 SDR	turned off (frozen)?	clarify
	estimate 02-01-04,-05 dispatching fire protection, equipment			does not comply with 14-2024 SDR, there is no other section	clarify
	estimate 02-01-06 general construction			02 - 2024 KB, code not specified in estimate	
p.1	soil for plants	372.84m3, 35m3 compacted		paragraphs 1-5	correct
	soil removal	30km away		p8	clarify
	slab waterproofing	KB11-4-5 takes into account 2mm waterproofing.	-Ceresit CP 43 bitumen-polymer waterproofing -4mm;	sheet 6, sections, not all work is taken into account, the number of materials is recalculated	correct
		only 429.1 kg of material was taken into account for 536.33 m2;		paragraphs 13,14	correct
	plate reinforcement	20.8t, cost coefficient 1.04 applied as for metal structures	approximately 20.0 t	p.21, 45.82 approximately -1.5%	correct

	waterproofing under ceramic tiles	primers for CL 51 are not included		paragraphs 34-36	to take into account
	self-leveling floor with polymer coating	only self-leveling screed CN 69 t.20mm is taken into account	-Self-leveling floor with polymer coating - 20mm;	sheet 12, missing polymer layer	to take into account
	roofing:	SR43 taken into account: 387.95 gk per 484.95 m2	Ceresit CP43 waterproofing -4mm;	pp. 92-95, expenses to be corrected	correct
	geotextile	not included, film included	-Geotextile;	p.96,97	correct
	estimate 02-01-07 AR			02 - 2024 - AP is not included in the budget	to indicate
	door	do not match the project	specification of exterior and interior doors	sheet 9, see table below.	clarify

	двері, шт		м2	у кошторисі		
	2	EI60	2,1*1,3	5,46	2	
	3	EI 30	2,1*0,9	5,67	3	
	2		2,1*0,9	3,78	2	1,3*2,1
	2	EI60	2,1*0,9	3,78	2	
	1	метал	2,1*0,9	1,89	6	
	5		2,1*0,9	9,45		
	2		2,1*1	4,2	18	2
	5	м/пласт	2,1*0,8	8,4	схоже 7шт	12,52
	1		2,1*0,9	1,89		
	1		2,1*1	2,1		
	1	EI 45	2,1*0,9	1,89	1	
	0	утеплений з замком	0		1	2,5*3
	Всього	25		48,51	26	
	Всього м/пласт.			36,12		

	tactile tables, tapes, tiles -	not taken into account	acre.14		to take into account
	estimate 02-01-08 furnace			02-2024 AR sheet 11,12,13; KB sheet 13-18	to indicate
p.1	size along axis 1-2		sheet 11 = 4.6 m, sheet 13 = 9.2 m		clarify
	plate reinforcement	20.8t per 7.3 m3 of concrete - error, cost coefficient 1.04 is used as for metal structures	approximately 20.0 t	p.5, the amount to correct is an error, the costs are approximately -1.5%	correct
	layer of floor film	KB27-29-1 - price for reinforcing a/b coating with geotextiles;; price 45.96/m2 including VAT	AR film, sheet 13	p.7 avk; 24/m2- epicenter, correct price	correct

	concrete screed with reinforcement d.8mm	0.5 tons of "periodic profile" reinforcement per 1.2 m3	Concrete preparation, concrete class C12/15 reinforced with mesh Ø8A240S (200x200mm) - 100mm;	§ 9,10 - number of arms. Correct, indicate "smooth"	correct
p.3	ceiling panels	KB7-45-5	All open voids in the ends of the panels to the depth of support should be carefully filled with cement mortar of the M150 brand before laying the panels in the design position. All joints between the panels and the walls should be cleaned of debris and after anchoring the floor panels between themselves and the walls, install the formwork and fill with concrete.	p.25, works not taken into account	to take into account
p.2	plastering of parapets	not taken into account	Brick parapet plastered with cement mortar M200 over metal mesh	KB sheet 18	to take into account
p.4	additional layers of adjacency	not taken into account	Additional layers of roofing material: Technoelast EPP, EK	KB sheet 18	to take into account
	edge strip, sealant, stainless steel apron	not taken into account	Sealant for exterior work Edge rail. Fasten with roofing screws at 200 mm intervals Galvanized steel apron with a width of at least 70 mm	KB sheet 18	to take into account
	estimate 02-01-09 ventilation	equipment is not allocated in a separate budget		02-2024-OV.S	to indicate
p1	system VEshch:	Small protective section of the Ministry of Foreign Affairs - price 156282 UAH including VAT		p.4. price 20,000 UAH including VAT	clarify
	PRU fans	9pcs	sheet 7, specification - 6 pcs.	item 2,26,50,74,103,108,141,168(2pcs) estimate	clarify
	systema VEp- valve	Fire valve with electric drive and TEP KPV-1.0-200x200E	not specified	p.99	clarify
	filter	FPS filter 300x300mm + box of 4352 with VAT	absent	p.101	correct
	system W: air ducts, shaped parts.	price for the perimeter 1100-1600, 900,	250*250, 150*150	pp129,130, .sizes in the mat. write down correctly, prices correct	correct
	filter	FyaR filter 250x250mm	absent	p.135	
	valve	Fire valve KPV-1.0-250x250E	not specified	p.138	clarify
	system Vz: valve	DKP throttle valve 400x300	DCP400x35	p.150	correct
	fan system VZ	ERV-2-L.0-MSG-4	ERV-2-L.0-MSG-5 or ERV-2-L.0-MSG-4	item 141, sheet 2, sheet 7 or sheet 5. Spec.	clarify

	valve	Fire valve with electric drive and TEP KPV-1.0-700x400E	absent	p.212	correct
	Small section of protective SZS	price 278682 UAH including VAT		p.4. price ~167,546 UAH including VAT	clarify
	commissioning	absent			to take into account
	furnace ventilation	-	OV1_PZ-1_furnace		to take into account
	estimate 02-01-10 heating			02-2024-OV.S, sheet 9	to indicate
	pipe insulation 50	0.5m	25m	p.47 estimate	correct
	estimate 02-01-11 ETR			02-2024-ETR1.	to indicate
	shzss	switch SEZ-PR61-C10- 12 pcs.	10pcs	item 8	clarify
	DES	only installation is taken into account	Three-phase diesel generator, ~380 V, 50 Hz, 17 kVA/13.6 kW, APD17A	p.14; the estimate was ? excluded from the ZKR	to take into account
		Socket ViKO Palmiye 90555508- 1pc	3pcs	p.41	clarify
		Fire-resistant junction box (P30) KVK 1.30-3-1 -12 pcs.	6pcs	p.46	clarify
		pipe D=20 mm - 857m	876m	p.49	clarify
		pipe D=25 mm - 183m (9m outside the network)	191m, no external networks specified	p.50	clarify
		m/sleeve d.20 --- 232m	149m	p.54	clarify
		m/sleeve d.25 --- 23m	62m	p.55	clarify
	cable	2x1.5 mm² 91m	136m	p.58	clarify
		3x1.5 526m	500m	p.59	clarify
		4x1.5 97m	105m	p.60	clarify
		7x 1.5 KVVGngd-660 7m (23m outside the networks)	30m, not specified external mayor.	p.69	clarify
		5x6 14m (92m in external networks)	106m, external networks not specified	p.76	clarify
		2x1.5mm2 RE (E30) FLAME-X 950(N) HXH FE180/E30 --- 53m	-	p.62	clarify
		3x1.5mm2 RE (E30) FLAME-X 950(N) HXH FE180/E30 - 179m	149m	p.63	clarify
		4x1.5mm2 RE (E30) FLAME-X 950(N) HXH FE180/E30 - 8m	-	p.64	clarify
		3x1.5mm2 RE (E30) FLAME-X 950(N) HXH FE180/E90 - 15m	62m	p.65	clarify
		-	2x1 PVSngd-380 -----44m		clarify
		-	4x1 KVVGEngd-660 --81m		clarify
		-	earthworks grounding		to take into account

	commissioning	absent			to take into account
	ETR furnace	-	02-2024-ETR.2		to take into account
	Appliance products	absent	Gas sensor control panel, Methane gas detector, Sound and light detector, Sound and light gas detector,	sheet 1 02-2024-ETR1.S	to take into account
	estimate 02-01-12, -13 equipment, commissioningdiesel generator			turned off (frozen)?	clarify
	estimate 02-01-14 thermal engineering solution - furnace			02-2024-TM	to indicate
	boiler	counted as material		p.3, to be taken into account as equipment.	correct
		-	Control automation unit	judging by the price of the boiler - it is not taken into account	clarify
	heat and heating circuit pumps	2pcs	2pcs on reserve +1-in stock +1-in stock	p.10,11, reserve not taken into account	to take into account
	estimate 02-01-15,-16 SCS, equipment			code 24-2024SPZ not specified, no commissioning	to take into account
	estimate 02-01-117- TX			02 - 2024 - TX	to indicate
note 1	Writing desk	4 pcs	3		correct
	Chair with folding base	44pcs	40		correct
note 2	Writing desk	12pcs	11pcs		correct
note 18		kitchen - 1 pc	Lower kitchen cabinet 1 pc Upper wall-mounted kitchen cabinet 1 pc		correct
note 20	Office table	2pcs	1pc		correct
	Office chair	6pcs	5pcs		correct
	estimate 04-01-01 external electrical networks			02-2024-ЭТП1. not allocated to the district section	correct
		-	d.63	sheet 8 cut, in special case absent	to take into account
	estimate07-02-01 landscaping	lawn 653.2m2	623.6m2/653.2	02-24-GP, sheets 6,7	clarify
	estimate07-02-01improvement	Polyurethane binder TETRAPUR 144-2 layers	-		clarify
		metal canopy	-		clarify