

Expert Review of Project Documentation for Projects in Chernihiv Region

Scope of documentation review:

1. Verification of compliance with regulatory requirements.

During the analysis of each project, primary attention was paid to those design solutions that may contradict the applicable building codes, standards, and fire safety requirements.

2. Identification of logical inconsistencies and risks of increased scope of works.

All key issues in the documentation that may lead to additional works or necessitate adjustments during the project implementation process were обязательно identified and highlighted.

3. Assessment of weak or low-quality solutions.

Particular attention was paid to solutions that may potentially require changes during construction and could complicate the implementation of the project at various stages.

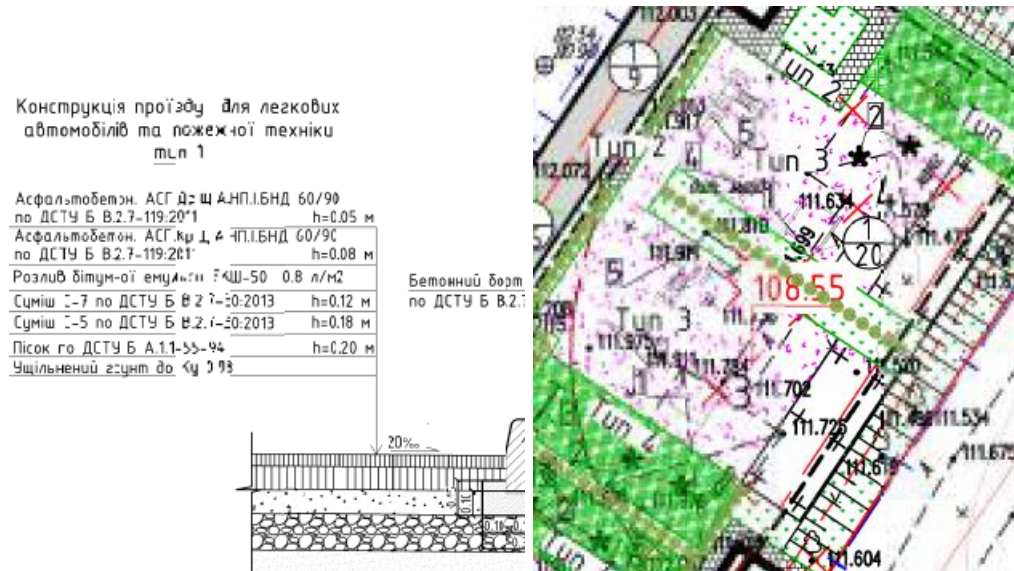
“New Construction of a Civil Protection Facility (Radiation Shelter) at the address: Chernihiv Region, Chernihiv District, city of Oster, B. Khmelnytskoho Street, 76-A”

General

1. The project has been developed with a sufficient number of project documentation sections to undergo expert review.
2. The project documentation is compiled in accordance with DBN A.2.2-3:2014 “*Composition and Content of Project Documentation for Construction.*”
3. The drawings are prepared in accordance with DSTU 9243.4:2023, DSTU 9243.7:2023, DSTU B A.2.4-13:2009, DSTU B A.2.4-11:2009.
4. The project corresponds to the RP stage.
5. The project has been correctly calculated in accordance with the applicable regulatory documents. The level of detailing of the design solutions meets the requirements for execution of works. The project documentation is properly and qualitatively prepared. The drawings contain detailed instructions for the execution of works, specifications, and sections that clarify the project details. The reinforcement of structures in the RC

section is developed in great detail. Overall, out of the four projects submitted, the expert considers this project to be the most successful in terms of implementation.

6. Very low quality of drawings in the electronic version of the sets of working documentation (GP albums).



7. The GP album refers to an invalid standard DSTU B V.2.7-30:2013 (mixture C-7).
8. In the design assignment dated 18.12.2023, clause 9 specifies data on engineering surveys — topographic and geodetic survey. However, this survey is not included in the project.
9. In the design assignment dated 18.12.2023, clauses 11 and 14 state “in accordance with DBN,” but the title and number of the DBN are not specified.
10. In the design assignment dated 18.12.2023, clause 14 specifies the number of persons subject to sheltering as 47 persons. However, the number of children (166 persons) is not specified.
11. Technical conditions (TU) for connecting the facility to the water supply networks are missing.
12. The report on engineering and geodetic surveys is missing in accordance with Clause 2.3.10 of DBN A.2.1-1-2008: “The result of desk work is a report with appendices.”
13. There is no information on the additional electrical capacity for the PRU agreed with the regional electricity provider (Oblenergo).

14. The section on an alternative power supply source has not been developed. Diesel generator.
15. The project sections indicated in the project have not been provided for review: SPS.SO; SSDKG; ZVK; POB; Cost estimates; RCE.
16. AR sheet 3.2 contains an error in the name of room 45.
17. According to DSTU 9243.4:2023, the title block on each sheet does not indicate the person who checked this sheet.
18. AR sheet 3. Section 3-3. The box for enclosing VK utilities is covered with gypsum boards. Boards of 480 mm size do not exist; 500 mm boards are available. In addition, the choice of material for the box is questionable, since the board material is gypsum, the use of which is not recommended in a humid environment. Replace with red brick with moisture-resistant gypsum board cladding.
19. AR sheet 7. In the foundation slab structure, waterproofing over the 100 mm concrete blinding layer is missing, which will significantly reduce the water-resistance performance of the foundation structure.
20. AR sheet 7. Plaster CT-24 is used as the plaster layer. CERESIT® CT 24 is a mixture for leveling surfaces made of cellular concrete (aerated and foam concrete, shell rock, expanded clay concrete, etc.) before interior and exterior finishing. It is effective for filling joints, repairing cracks, cavities, and other defects. It is recommended for leveling brick masonry and cement-sand blocks. According to its characteristics, it is not suitable for concrete surfaces. At the same time, it is recommended to use polypropylene mesh with 5×5 mm cells.
21. AR sheet 7. On vertical underground walls, bitumen-rubber mastic is used as the waterproofing layer. Taking into account data from geological surveys, it is proposed to use roofing felt in two layers. In addition, in order to meet energy efficiency requirements, it is proposed to insulate the external walls of the shelter with extruded insulation with a thickness of 100 mm.
22. AR 8.1. To access the platform of the lift for persons with limited mobility (PLM), it is necessary to open two inward-opening intersecting doors with a width of 1 m. At the same time, the room dimensions are 1.5 × 1.5 m. This creates extremely inconvenient logistics for the operation of this room. There is a possible danger during operation in emergency situations.
23. AR 10. A water drainage pipe is not installed in the roof of the superstructure of the PRU exit. The same applies to the canopy. DBN V.2.2-40:2018.
24. According to DBN clause 10.9, evacuation exits/routes are allowed to be arranged through vestibules, air-lock vestibules, hermetic-protective, hermetic doors, and protective doors. According to the description in the AR explanatory note, sheet 3, all three exits are considered by the project as evacuation exits. However, none of them is equipped with an air-lock vestibule. In addition, in AR 17.2, the door type is incorrectly specified in the door schedule as D1 — protective metal door leaves. According to the same DBN clause, the doors must be protective-hermetic doors.
25. KB sheets 18–21. The detail of embedding the landing platforms of stair flights 1, 2, and 3 into monolithic walls is missing, which violates the stability of the bearing support node.
26. HVAC. A 3D model of the supply and exhaust ventilation systems shall be developed.

27. A project section for persons with limited mobility (PLM) shall be developed (plans, specifications).

28. A critical non-compliance of air exchange parameters has been identified.

In the project, the calculated air flow rate is assumed to be 3,148 m³/h, whereas the explanatory note directly states that with a minimum air exchange rate of 6 h⁻¹ for a shelter volume of 1,367 m³, a supply of at least 8,205 m³/h is required. Thus, the adopted ventilation solutions do not ensure compliance with the requirements of Mode I (clean ventilation) in accordance with DBN V.2.2-5:2023.

It is recommended to recalculate the air exchange and bring the design air flow rates, selection of ventilation equipment, air ducts, grilles, and noise silencers into compliance with regulatory requirements, or to provide a justified explanation for the use of another mode or zoning.

29. There is a methodological inconsistency in the calculation of outdoor air in the explanatory note.

It is stated that the amount of outdoor air is adopted by calculation (with reference to an appendix); however, in the text itself, different approaches are simultaneously applied — by number of people and by air exchange rate, which leads to contradictory results and violates the requirements of DBN V.2.2-5:2023.

It is necessary to adopt a single coordinated calculation methodology: either clearly define modes and zones with different air flow rates, or perform a full recalculation based on the minimum regulatory air exchange rate.

30. The solutions regarding blast-protection devices are not confirmed considering the actual air flow rates.

The project adopts blast valves of types ABV5000X/ABV5000Z; however, their capacity, aerodynamic, and noise characteristics have not been verified taking into account a possible increase in air flow up to 8,205 m³/h. This creates a risk of non-compliance with the requirements of DBN V.2.2-5:2023.

After adjusting the air flow rates, it is necessary to re-verify the compliance of the valves and filters and to add equipment passports and certificates to the project.

31. The ventilation (airing) mode is described formally and is not linked to the operational modes of the shelter.

Airing “2–3 times a day by personnel” is specified without a clear algorithm of actions in peacetime and wartime, without linkage to the shelter operation modes, which does not comply with the requirements of DBN V.2.2-5:2023.

It is recommended to develop and include in the documentation an operation regulation describing Modes I and II, the procedure for system switching, responsible persons, and control parameters.

32. Accessibility solutions are not confirmed by verification of accessibility routes.

The project declares a universal sanitary and hygienic facility with a shower for persons with limited mobility; however, there is no verification of route accessibility to it, taking into account slopes, thresholds, door widths, and turning zones, which contradicts the requirements of DBN V.2.2-40:2018 and DBN V.2.2-5:2023.

It is necessary to provide in the architectural drawings the widths of passages and doors, threshold heights, turning diagrams with a diameter of 1.5 m, as well as specifications for handrails, ramps, and contrast markings.

33. The number and placement of evacuation exits require confirmation by calculation.

The text part states the presence of three dispersed evacuation exits; however, their compliance with the calculated evacuation time and architectural plans has not been confirmed, which does not comply with the requirements of DBN V.1.1-7:2016.

It is recommended to prepare a consolidated list of evacuation exits indicating numbers, widths, door opening directions, distances, and capacity, and to coordinate it with the evacuation time calculation.

34. Door parameters require cross-checking between sections.

The project specifies a minimum door height of 2.0 m and a leaf width of 0.9 m with opening in the direction of evacuation; however, there is a risk of discrepancies between the text part, AR drawings, and the door schedule, which may lead to violations of DBN V.1.1-7:2016.

It is necessary to verify all door openings and blocks, including hermetic and fire-resistant doors, and bring them to unified coordinated parameters.

35. Fire resistance requirements are not linked to structural solutions.

The technical characteristics specify fire resistance limits (REI 120, EI 15, EI 45, etc.); however, they are not linked to materials, structural thicknesses, and reinforcement in the KB section or to door specifications, which contradicts DBN V.1.1-7:2016.

It is recommended to add a consolidated compliance table: element — fire resistance limit — structural solution — documentary confirmation.

36. Power supply solutions for Category I and special Category I consumers require full coordination.

Redundancy is declared for pumps, ventilation, guaranteed sockets, fire protection systems, communication, and emergency lighting; however, it is necessary to confirm that all these systems are actually connected in the electrical section and accounted for in single-line diagrams in accordance with DBN V.2.5-23:2010.

It is recommended to prepare a consolidated load table for all engineering systems and to cross-check it with the power supply diagrams.

37. The diesel generator capacity is adopted with minimal reserve.

With an adopted generator capacity of 20 kW and Category I load of 17.6 kW, starting currents of ventilation units and pumps are not taken into account, which creates a risk of unstable system operation.

It is necessary to verify starting coefficients, power factor, load simultaneity, and, if necessary, increase the generator capacity or apply soft starters or frequency converters.

38. An inconsistency in electricity metering solutions has been identified.

The explanatory note specifies a meter with a PLC module with direct connection, whereas the electrical section предусматривает indirect

connection, which violates the principle of unity of design solutions.

It is recommended to adopt one coordinated solution regarding the metering type and update the diagrams and specifications accordingly.

39. The configuration of fire hose cabinets is not coordinated between sections.

In the explanatory note of the VK section, a Ø50 fire hose cabinet is adopted, whereas a different configuration is shown on the axonometric diagrams, which contradicts DBN V.2.5-64:2012.

It is necessary to unify the fire hose cabinet configuration in all documentation sections and add marking and explanatory notes.

40. Insufficient level of detail in the working drawings.

Lengths of routes, clear references, complete specifications, and symbols are missing, which does not comply with the requirements of the RP stage.

It is recommended to supplement the drawings with linear references, elevations, details, and a complete set of specifications, particularly for the VK section.

41. Project sections are not systematically coordinated with each other.

It has been recorded that the level of elaboration of the documentation is closer to the P stage than to RP, in violation of the requirements of DBN A.2.2-3:2014.

It is necessary to perform comprehensive inter-section coordination (openings, embedded parts, inputs, shafts, power supply, automation) and issue a separate inter-section coordination sheet.

42. Door solutions are not fully identified.

The technical characteristics specify fire-resistant and hermetic doors of the second type; however, they are not fully identified in the specifications and are not coordinated with evacuation and shelter sealing requirements.

It is recommended to add a consolidated door table indicating type, class, opening direction, and seals.

43. Air flow rates for sanitary facilities require confirmation.

The adopted flow rates of 100 m³/h per toilet and 75 m³/h per shower are not confirmed by the number of sanitary fixtures and may disrupt system balance after bringing ventilation to regulatory values.

It is necessary to clarify the number of fixtures according to architectural and technological solutions and perform an updated balance of ventilation systems.

Conclusion Based on the Results of the Expert Review of the Project Documentation

for the facility:

“New Construction of a Civil Protection Facility (Radiation Shelter)

at the address: Chernihiv Region, Chernihiv District, city of Oster,

B. Khmelnytskoho Street, 76-A”

Based on the results of the comprehensive analysis of the project documentation, the following has been established.

The project as a whole has been developed with the required set of sections and complies with the requirements of DBN A.2.2-3:2014 regarding completeness and the design stage (RP). The architectural, structural, and engineering solutions generally demonstrate a sufficient level of development, correctness of calculations, and a high level of detailing, in particular with regard to reinforcement of structures in the KB section. Among the four projects submitted for review, this facility can be considered the most prepared for practical implementation.

At the same time, a significant number of comments have been identified in the project documentation, some of which are of a critical nature and directly affect the safety, functionality, and compliance of the shelter with the requirements of current regulatory documents.

In particular, the following has been identified:

- inconsistencies and gaps in the input data (absence of engineering and geodetic survey materials, technical conditions for connection to engineering networks, approvals from electricity supply organizations);
- a formal or incomplete nature of certain sections and solutions (absence of an alternative power supply section, a section for persons with limited mobility, and an operational regulation for the shelter);
- significant inter-sectional inconsistencies between AR, KB, HVAC, VK, and EP, indicating insufficient comprehensive coordination of design solutions;
- critical violations in the ventilation and air exchange systems, which do not ensure compliance with the requirements of Mode I (clean ventilation) in accordance with DBN V.2.2-5:2023, as well as the absence of confirmation of the operability of blast-protection and filtration elements at regulatory air flow rates;
- uncoordinated and potentially hazardous solutions related to evacuation, sealing, inclusivity, and movement logistics for persons with limited mobility;
- lack of confirmation of compliance of the declared fire resistance limits with actual structural solutions;

- insufficient quality of part of the working drawings, in particular the electronic versions of the GP albums, as well as certain violations of documentation formatting requirements in accordance with current DSTU standards.

The identified comments indicate that, in its current form, the project cannot be recommended for implementation without prior revision. Some of the deficiencies may lead to:

- failure to perform the functions of a protective facility under regulatory modes;
- risks to human safety during operation;
- the need for significant adjustments and additional works already at the construction stage, which will have financial and organizational consequences.

General conclusion:

The project documentation as a whole has good basic quality and potential for successful implementation; however, it requires mandatory comprehensive revision taking into account the above comments, completion of full inter-sectional coordination, updating of calculations (especially for ventilation, power supply, and evacuation), as well as bringing all solutions into compliance with the requirements of current DBN, DSTU, and civil protection regulations.