



Bridges in Ukraine: Crisis, Problems, Solutions

Policy Paper

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Analytical report “Bridges in Ukraine: Crisis, Problems, Solutions” (Policy Paper) – Viktor Zagreba, 2025.

This analytical report was prepared in 2024-2025 with the support of the European Climate Foundation (<https://europeanclimate.org/>). The responsibility for the information and views expressed in this report lies with the author and the persons quoted. The European Climate Foundation cannot be held responsible for any use that may be made of the information contained in this study and does not necessarily share the opinions, assessments and conclusions expressed in this report.

Architect and publicist Oleg Grechukh played a major role in the research, whose research work served as the basis for further analysis. The author also expresses his gratitude to the engineers who agreed to be interviewed and whose thoughts and quotes became an important part of this analytical report (in alphabetical order): Anna Gontarenko, Anna Minyukova, Volodymyr Semko (Poland), Dmytro Bepalov, Kostyantyn Shcherbachenko, Krzysztof Wachalski (Poland), Michael Bornmann (Germany), Serhiy Rud, Yuriy Lototsky.

Special thanks for the comments, suggestions and corrections that made this analytical report more accurate: Anna Gontarenko - Association "Ukrainian Center of Steel Construction", Artem Bezugliy and the staff of the State Enterprise "National Institute for Infrastructure Development" (NIRI), Kostyantyn Shcherbachenko - Ukrainian Association of Road Safety Auditors, Oleksandr Kordun - Ukrainian Institute of Steel Structures named after V.M. Shymanovsky.

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Introduction

According to the Constitution of Ukraine and public sources, the area of the territory of Ukraine is 603,628 square kilometers. This is 93% larger than the territory of Poland, which is considered in this publication as the main country for comparison. Ukraine has a developed network of roads and railways. According to the Ministry of Infrastructure, there are about 160 thousand kilometers of roads (of which 52 are state roads) thousand km) and 19,772 km of operating railways. These transport networks also include bridges. For According to the State Enterprise "National Institute for Infrastructure Development" (NIRI), in Ukraine there are about 28 thousand 500 bridges. Among them, as of the beginning of 2025 on the balance sheet State Reconstruction (Ukravtodor until 2023) accounted for 5,770 bridges, on the balance sheet regional military administrations – 10,013 bridges, 3 were in municipal ownership 663 bridges, and on the balance sheet of JSC "Ukrzaliznytsia" – 6,186 bridges¹.

Total length of all bridges and overpasses in Ukraine at the end of 2020 was 746.8 km. This is approximately is equal to the distance from the border of Ukraine to the city of Berlin.

Almost all bridges in Ukraine are state or municipal property. In Private property may include bridges within closed facilities such as ports, industrial enterprises or housing estates, but these are rather the exceptions. Possible From the point of view of Ukrainian legislation, there is a scenario of public-private partnership regarding construction and operation of bridges in Ukraine, however, in practice there have been no such examples yet.

Table 1. Number of bridges on the balance sheet of Ukrainian organizations as of the beginning of 2025

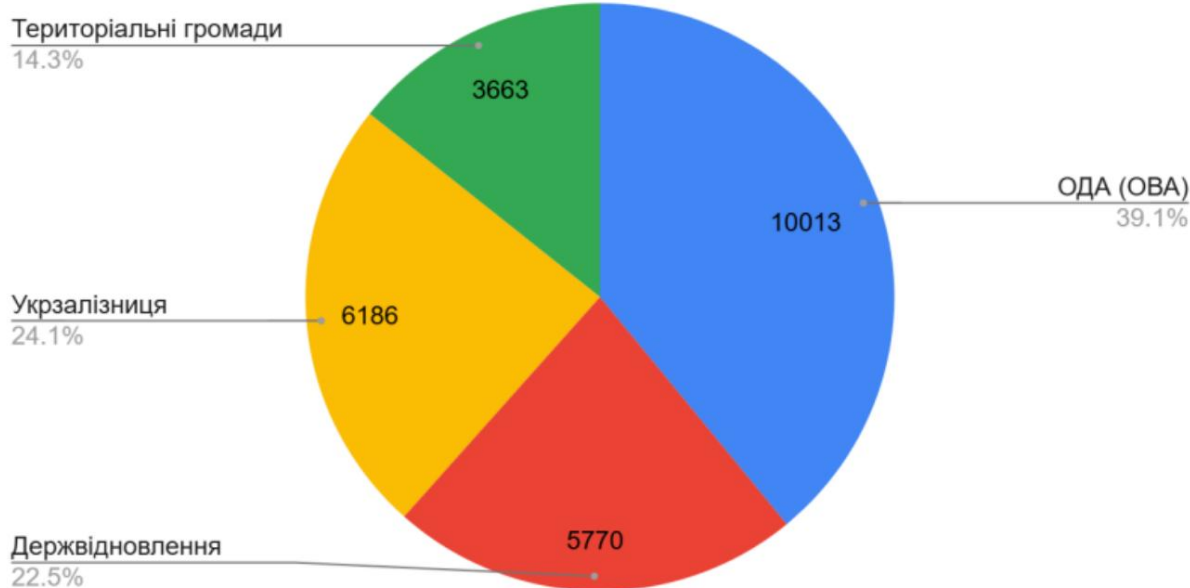
Owner		Arrangement	Number	Fraction
State	Regional state (military) administrations	Local roads value (C, O)	10,013	39%
State	Recovery services in the regions (subdivisions "State Restoration")	Roads of state importance (T, R, N, M)	5770	23%
State JSC "Ukrzaliznytsia"		Railway bridges and	6186	24%

¹ Data on the number of objects is based on NIRI letter No. 19.4-18-130-09/151-75 dated 05.03.2025

		overpasses		
Communal	Territorial communities	Streets of settlements	3663	14%

Fig. 1. Distribution of bridges by balance holders

Мости в Україні за балансоутримувачами



Description of the current state

Technical wear and tear

A large proportion of bridges in Ukraine are worn out. Technical wear or deterioration of a structure is the degradation of elements during operation, which consists in the deterioration of the initial design indicators, such as bearing capacity and load-bearing capacity². This is directly related to the conditions and number of years in which the bridge is operated.

60 years is considered by experts to be the period after which wear and tear usually becomes critical and the condition of the object requires preparation for reconstruction, as the objects are approaching the end of their life cycle. This "life span" is relatively short, compared, for example, to residential or non-residential buildings, due to the nature of the loads and influences to which bridges are exposed: precipitation, freezing water,

² Precise technical definitions and assessment criteria are contained in DSTU 9181:2022 "Guidelines for assessing and predicting the technical condition of road bridges"

temperature changes, traffic loads, etc. Half of all bridges in Ukraine are already crossed this 60-year mark.

Table 3. Number of bridges with an operating life of more than 60 years

Arrangement	Total bridges	Bridges over 60 years old	
		Number	Fraction
Local roads	10013	2958	30%
Roads of national importance	5770	2129	37%
Railway	6186	5115	83%
Streets and roads of settlements	3663	1825	50%
Together	25632	12027	47%

As follows from the above data, as of 2025, 47% of all bridges in Ukraine have been built until 1964. In the context of the service life, it is also advisable to examine the number relative to new bridges built after 1991, or which have undergone reconstruction. Such bridges, as it turned out, average 15%.

Table 4. Number of bridges built and reconstructed since 1991

Arrangement	Total bridges	After 1991	
		Number	Fraction
Local roads	10013	738	7%
Roads of national importance	5770	1175	20%
Railway	6186	1036	17%
Streets and roads of settlements	3663	832	23%
Together	25632	3781	15%

The time factor is not the only factor that affects the wear of bridge elements. Other High-quality performance (or failure to perform) of timely routine and repair work is important , i.e. operational maintenance. In Ukraine there are regulatory requirements for these works, however, as practicing engineers say that customers often do not carry out such work at all, carry it out late or not in full, or impose obligations on operating organization (utility or holding company), but not provide these obligations with financial, human and technical resources. For example, current preventive repairs of the road surface are not carried out on time parts, regulatory replacement of waterproofing, routine repairs of drainage systems,

anti-corrosion treatment of metal parts, repairs and replacement of expansion joints, etc. This leads to much faster and irreversible destruction of structures under the influence of corrosion, dynamic loads and material fatigue.

According to NIRI experts, the current technical condition of bridges was significantly affected by their improper maintenance and operation during economically difficult periods of Ukraine's modern history, i.e. in the 1990s and 2000s. As a result, a significant part of the structures now requires major repairs or reconstruction, since existing significant defects and damage can no longer be eliminated by operational maintenance methods. In financial and organizational terms, this poses a serious challenge for Ukraine, especially given the current war situation and limited state resources.

(For more details on this aspect, see the "Operational Maintenance" section).

The severity and scale of the problems

The severity of the problems of a particular facility is described by its operational state. According to Ukrainian standards, 5 such states are defined³ :

Number	Title and explanation
1	Serviceable condition – the bridge or element meets all design requirements and current operating standards.
2	Limited serviceability – the bridge or element partially does not meet the design requirements, but the requirements of the first and second limit state groups are not violated. (Has certain defects or damage that may require current or medium repair.)
3	Operational condition – partially does not meet the requirements of the project. Partial violation of the requirements (damage or wear of structures) is possible, which does not limit the normal functioning of the structure.
4	Limited serviceability – limit state requirements are violated. The structure is operated in a limited mode and requires special monitoring of the condition of its elements. The bridge has serious damage or defects that pose a threat.
5	Unserviceable condition – non-compliance with the requirements of the limit states and the established impossibility of satisfying them. The need to stop operating the structure and requires an urgent solution to the issue of reconstruction of the structure or its closure.

These categories are determined by the results of periodic inspections and technical inspections carried out by specialized organizations. In communication, these conditions are called "third,

³ According to DSTU 9181:2022 "Guidelines for assessing and forecasting the technical condition "road bridges"

fourth, fifth". In the norms of Ukraine there are no such concepts as "critical" or "emergency" states, although these evaluative characteristics are often used in articles, stories, and other media publications. In this publication, the term "emergency bridge" is applied to objects of the 4th and 5th states.

According to NIRI data as of the beginning of 2025, about 25% of all bridges for which there is data information, are in these states – in the 4th or 5th. Regarding 35% of all bridges information about the technical condition is completely absent, so what proportion of them is in an emergency situation is unknown. It can be reasonably assumed that it is also significant.

Table 5. Number of bridges in limited and inoperable condition

Arrangement	Total bridges	Operational condition			Information absent
		4 (limited functionality)	5 (incapable of working)	Total 4 and 5	
Local roads value	10013	2144	122	2266	6048
State roads value	5770	1233	320	1553	1388
Railway	6186	128	1576	1704	0
Streets and roads settlements	3663	496	193	689	1666
Together	25632	4001	2211	6212	9102
<i>Share, %</i>	<i>100%</i>	<i>15.61%</i>	<i>8.63%</i>	<i>24.24%</i>	<i>35.51%</i>

Dynamics of deterioration

The transition of bridges from one state to another is a unidirectional and nonlinear process. At the beginning degradation occurs slowly but accelerates over time. The further the bridge is on the in its life cycle, the steeper the curve of deterioration of its condition. Influence this capable of timely maintenance and repair work, but the general pattern

This pattern is well illustrated by the Ukrainian scientific article "Operational " State of Bridges of Ukraine" from 2019⁴. Its authors used data on 5,620 bridges, which were included in the Analytical and Expert Bridge Management System (AESUM), developed and has been filling since 2004. At the time of writing the article in 2019, the situation was as follows:

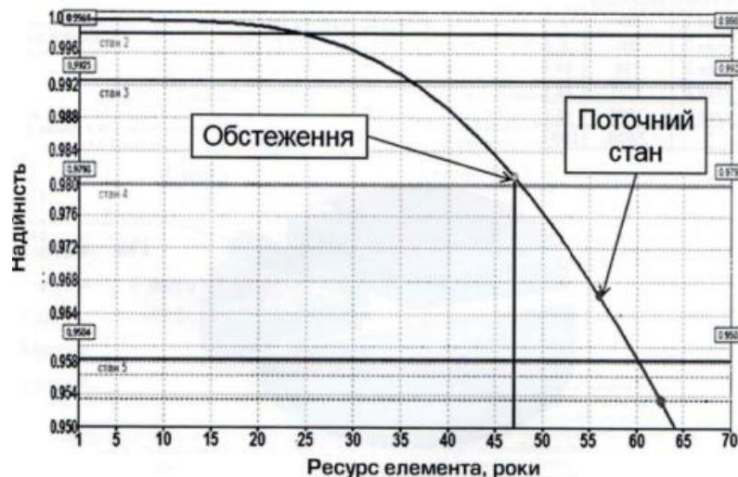
⁴ "Operational condition of bridges in Ukraine", L.P. Bodnar, P.M. Koval, S.M. Stepanov, L.G. Panibratets, "Avtoshlyahovyk Ukrainy", 2019, No. 2

Table 6. Condition of bridges in Ukraine as of 2019

State	Number of bridges, pcs.	Share, % Total, %	
Condition 1 (working)	109	2%	13%
Condition 2 (limited serviceability)	620	11%	
State 3 (operational)	3314	59%	77%
Condition 4 (limited functionality)	1484	26%	
State 5 (inoperable)	93	2%	
Together:	5620	100	

The government published updated generalized information on the condition of bridges in Ukraine in the summer of 2023 year, after a surge in political attention to the problem of bridge condition⁵. The share of disabled bridges (in the 5th state) in Ukraine has increased 4.5 times (+450%) in just 4 years. In 2019, such was 2%, in 2023 - 9%. This sharp deterioration in the situation between 2019 and 2023 is explained by scientists theoretically on the graph of bridge degradation.

Fig. 2. Bridge condition degradation curve (L.P. Bodnar, P.M. Koval, S.M. Stepanov, L.G. Panibratets, 2019)



The illustration shows that the reliability coefficient of the bridge elements (vertical axis) sharply decreases starting from about 35 years of operation, and the further, the steeper the curve goes towards the vertical line. The critical level (state 5) is theoretically reached by the structure after 60 years of operation. The vertical scale shows reliability. This means that for older bridges, the probability of failure (i.e. collapse) increases in a nonlinear progression.

⁵ "Commission to inspect the condition of bridges: preliminary conclusions presented", Ministry of Infrastructure website, 07/27/2023 <https://mtu.gov.ua/news/34560.html>

It is worth noting the changes in the assessment methodology that occurred in 2023. Since the beginning of 2023 The new standard DSTU 9181:2022 (replacing DSTU-N B V.2.3-23:2012) came into force, which has slightly changed the approach to assessing the technical condition of bridges. According to the updated DSTU, if at least one defining element (span structure, supports or foundations) receives the 5th state, the entire structure is automatically classified as unserviceable (5th state). At the same time, the previous standard allowed assigning the structure the 4th or even 3rd state for similar circumstances. Be that as it may, buildings are rapidly losing their residual resource, especially those built before 1964. All this indicates a high degree of the severity of the problem, and that in the future the number and frequency of destruction cases of bridge elements will increase.

“Bridge collapse” – sudden collapse of bridge structures

Journalists have dubbed the phenomenon of bridges collapsing and falling with the word “bridge collapse.” spans or other parts directly during operation⁶ . It is generally accepted that modern The “bridge collapse” began approximately in 2017:

1. February 2017: Part of the Shulyavskiy overpass in Kyiv collapsed⁷ .
2. February 2019: A bridge on the state highway R-24 in Ternopil collapsed⁸ .
3. August 2019: near Kharkiv, on the international highway M-12 at the railway
The span of the overpass collapsed on the track⁹ .
4. May 2020: near Nikopol, Dnipropetrovsk region, on the H-23 highway, a bridge over the Chortomyk River collapsed while a truck was passing by¹⁰;
5. May 2021: on the state highway H-17 between Lviv and Lutsk
The travelers saw a gap in the road because the bridge had collapsed during the night¹¹ .
6. July 2023: A bridge in Transcarpathia collapsed under an overloaded truck, on
on the state highway N-09. Several people were injured. The bridge was
declared emergency since 2018¹². It is noteworthy that the bridge collapsed during operation

government commission established by decision of the National Security and Defense Council.

⁶ For example, a publication in the newspaper “The Day” entitled “Stop the “bridge collapse” on July 1, 2020: <https://day.kyiv.ua/article/den-ukrayiny/zupynyty-mostopad>

⁷ Shulyavsky overpass partially collapsed in Kyiv, <https://www.bbc.com/ukrainian/news-39110128>

⁸ Emergency bridge collapses in Ternopil region – road workers blame drivers, <https://tsn.ua/ukrayina/na-ternopilschini-obvalivsya-avariyniy-mist-dorozhniki-zvinuvachuyut-vodiyiv-1297404.html>

⁹ A road bridge collapsed near Kharkiv, <https://kh.depo.ua/ukr/kh/pid-kharkovom-obvalivsya-avtomobilniy-mist-201908251017631>

¹⁰ In Dnipropetrovsk region, a bridge collapsed into a river while a truck was driving across it, https://lb.ua/society/2020/05/20/457946_dnepropetrovskoy_oblasti_reku.html

¹¹ A bridge over the Western Bug collapsed on the highway near Kamyanka-Buzskaya - Zakhid.net, 03.05.2021, <https://zaxid.net/na-trasi-bilya-kamyanki-buzkoyi-provalivsya-mist-cherez-zahidniy-bug-n1518376>

¹² A bridge with cars collapsed in Transcarpathia: the cause of the tragedy was named - UNIAN, 07/25/2023, <https://www.unian.ua/economics/transport/na-zakarpatti-obvalivsya-mist-shcho-vidomo-12339744.html>

7. June 2024: Elements of Povitroflotsky collapsed in the capital overpass, blocking traffic on one of the main avenues of the capital¹³ .
8. November 2024: In the Dzhanhoy district of occupied Crimea, an overpass collapsed onto the railway tracks along with cars¹⁴ .

Fig. 3. Collapsed bridges in the Lviv region (2021) and in Transcarpathia (2023).



This list only mentions major “bridge collapse” episodes that made national news. However, in Ukraine there are many more small bridges on local roads and streets of settlements that are also collapsing due to their condition and age, but these “bridge collapse” cases are covered only in local media. This indicates a wide, national scale of the problem of the condition of bridges. In some “bridge collapse” episodes, such as item 4 or item 6, the direct cause of the collapse was determined to be a truck that was moving on the bridge with a significant violation of weight restrictions. However, this does not negate the circumstances that the bridges are in a worn-out condition and require urgent construction work.

Bridge inspection and testing

Engineering inspection of a bridge is a regulated, laborious and lengthy process that requires a decision and funding from the customer and the services of a qualified contractor. Inspecting all 28 thousand bridges in Ukraine is a task in itself a huge task.

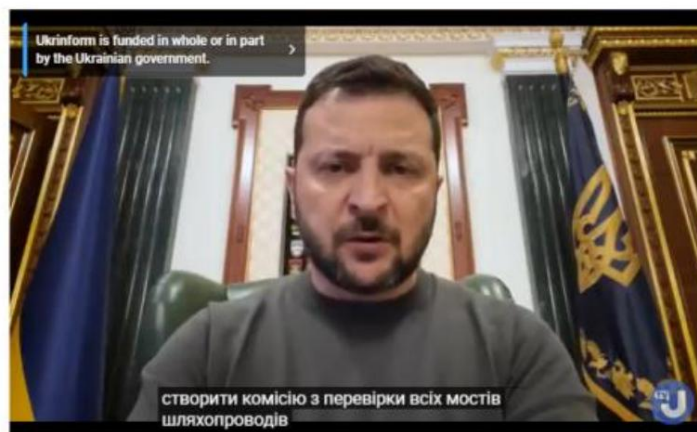
¹³ “Part of the Povitroflotsky overpass collapsed in Kyiv”: <https://www.rbc.ua/rus/news/kievi-obvalilas-ya-chastina-povitroflotskogo-1718814273.html> "A

¹⁴ bridge over a railway collapsed in the Dzhanhoy district of Crimea: there is information about victims": https://24tv.ua/obval-mosta-krimu-dzhanhoy-skomu-rayoni-vpav-mist-cherez-perenavantazheniya_n2685426

The previously mentioned scientific article from 2019 provides the following data: in recent years before the Covid-19 epidemic, 130 bridges were inspected per year in Ukraine in 2018, 263 bridges in 2017, and 333 bridges in 2016. In subsequent years, according to NIRI, the volume of inspections increased significantly. For example, on state roads alone, 455 bridges were inspected in 2021 (approximately 8.5% of the total number of such bridges), and in 2023 – 673 bridges (12.5%).

In the summer of 2023, by the decision of the National Security and Defense Council of 23.06.2023, a commission to inspect bridge structures was created, headed by Deputy Prime Minister and Head of the Ministry of Infrastructure Oleksandr Kubrakov¹⁵. At that time, no direct reason for the creation of the commission was mentioned, for example, the sudden destruction of a specific bridge¹⁶, however, on June 23, 2023, the leaders of the state devoted their attention to the problem of emergency bridges throughout the country. The President of Ukraine held a meeting of the National Security and Defense Council, where among the three agenda items was one on the condition of bridge structures. The President announced the creation of a “commission to inspect bridges”¹⁷

“Prime Minister Shmyhal also reported on the difficult situation with the condition of bridges and overpasses in the largest cities, in particular, in Kyiv. The condition is frankly dangerous. There is a decision by the National Security and Defense Council to create a commission to inspect all bridges and overpasses throughout the country. Vice Prime Minister Kubrakov is responsible for the inspection,” the President announced in a video address¹⁸.



As the President's statement, the commission's attention was largely focused on Kyiv and other large cities, that is, on municipal, rather than state-owned, properties. And the official decisions on the creation of the commission used the phrase “inspection of bridges” rather than “survey.” The procedure and scope of such an “inspection” were not enshrined in either the legislation or other regulatory acts, so it could be carried out using the methodology determined by the commission itself, in a limited time and without financial resources. Therefore, the preliminary conclusions of the government commission were published a month after its creation¹⁹, and the press release about

¹⁵ Order of the Cabinet of Ministers of Ukraine dated June 27, 2023 No. 578-r “On the establishment of a commission on inspection of the condition of bridge structures”, <https://www.kmu.gov.ua/npas/pro-utvorennia-komisii-z-perevirky-stanu-mostovykh-sporud-i270623-578> ¹⁶ The only significant

episode of “bridge collapse” in 2023 occurred in Transcarpathia after the creation of the commission.

¹⁷ “Zelensky announced the creation of a commission to inspect bridges” - Correspondent, 06/23/2023, <https://ua.korrespondent.net/ukraine/4601190-zelenskyi-povidomyv-pro-stvorennia-komisii-dlia-obstezhennia-mostiv>

¹⁸ “Special commission to check condition of bridges and overpasses across Ukraine - President”, Ukrinform, 06/23/2023, <https://www.ukrinform.ua/rubric-vidbudova/3726869-specialna-komisija-perevirat-stan-mostiv-i-slahoprovodiv-po-ukraini-prezident.html>

The final report of the commission was published two months later.²⁰ The experts in the commission visited and visually inspected bridges in Kyiv, Zhytomyr and Rivne, which were reported by the media, as well as facilities in other cities (not covered by the media). The commission also worked with information about the facilities entered into the AESUM digital system. Additional requests were sent to local governments, and their responses were received and processed.

Fig. 4. The condition of bridges in Ukraine, which were inspected by the commission. Photo *by the State Reconstruction Agency*, 2023.



Data on the number of bridges, information about which was processed by the commission, was not published either in the preliminary or in the final press release. It is clear that the commission did not have the opportunity to inspect or even visit 9 thousand bridges, information about the condition of which is missing, in a short time. Therefore, the commission worked with information not about “all bridges across the country”, but only about those about which information was available in the AESUM or which local balance holders were able to promptly provide. This is told by a member of the commission, engineer Dmytro Beshpalov. During the work of the commission, he was once again convinced that many balance holder organizations in Ukraine simply do not have a system for managing bridges as assets.

“It’s a big problem that we don’t have an asset management system. Bridges are assets. If there were such a system, it would be a kind of fuse against the destruction of bridges. It’s like a service book for a car,” says transport engineer Dmitry Beshpalov. “As a result, we don’t know how many we have

¹⁹ Ministry of Infrastructure, 07/27/2023, <https://mtu.gov.ua/news/34560.html>

²⁰ Ministry of Infrastructure, 08/21/2023, <https://mtu.gov.ua/news/34627.html>

bridges, what condition they are in, we don't understand in what order to restore them."

Bridge inspection is an important diagnostic procedure that is needed for every facility, especially those for which there is no information and whose service life exceeds 60 years. However, it should be remembered that commission inspections and engineering surveys, although they serve as a source of up-to-date information, are not able to solve the large-scale crisis of the worn-out condition of bridges. *"If a bridge is in the 5th condition, no matter how much you inspect it, its condition will not improve. Inspection, commission inspection, inspection are often just a way to once again document what is already known,"* comments Anna Minyukova, a railway engineer who works in the field of bridge design and engineering surveys.

In conclusion, political attention to the problem of the condition of bridges at the highest level - the President, the National Security and Defense Council, the Prime Minister, the Minister of Infrastructure - is certainly a positive phenomenon, because without political attention at the highest level, it will not be possible to stop the crisis and move on to systematic asset management. However, in 2023, the focus of this attention was limited to a quick "bridge inspection" and its media coverage, and not to the search for deep problems and possible solutions from the point of view of state policy. The surge in political and media attention, the intensive work of the members of the temporary commission did not result in changes in state policy or the policy of local governments regarding the reconstruction of emergency bridges, prioritization of facilities and spending of funds, and operational maintenance. There was also no systemic change in the amount of available information about the condition of bridge facilities or improvement of the organizational or financial capacity of balance sheet holders in the field of bridge management. In the next escalation of political and media attention, for example, after the next high-profile "bridge collapse" incident, which will certainly happen, it is advisable to direct the momentum of action not towards finding the guilty or quick commission inspections, but towards systemic and strategic improvement of state policy based on successful EU practices. An overview of the deep-seated problems of state policy and directions for its improvement are described later in this study.

Critical infrastructure facilities

In the legal field of Ukraine, there is a concept of "critical infrastructure facilities". According to the law of 2021²¹, *"critical infrastructure facilities are infrastructure facilities, systems, their parts and their aggregates that are important for the economy, national security and defense, the disruption of which may harm vital national interests"*. According to this definition, strategic bridges should belong to such facilities, and probably do (it is impossible to know for sure, since this information is classified). An indirect sign that a bridge is included in this list is the presence of armed security of the facility and/or foot patrols in the military

21 Law of Ukraine 1882-IX of 16.11.2021 "On Critical Infrastructure": <https://zakon.rada.gov.ua/laws/show/1882-20#Text>

uniform. According to eyewitness accounts, such patrols can be observed on some bridges over the Dnieper in Kyiv, or on railway bridges throughout the country.

However, the problem is that the status of “critical” does not directly result in priority attention for the allocation of funds. According to the law, the goal of state policy in relation to critical infrastructure facilities is ... *“ensuring the security of critical infrastructure facilities, preventing unauthorized interference in their functioning, predicting and preventing crisis situations at critical infrastructure facilities”*.

Preservation of bridges of critical infrastructure from destruction or decommissioning WITHOUT unauthorized interference (enemies, saboteurs) is not listed among the goals in the Law. Perhaps this is why at the state level strategic bridges are not separated from others, and when making decisions on the preparation and financing of projects (capital repairs, reconstructions, new construction), bridges of strategic importance do not become a priority. Rather, on the contrary - such large and problematic bridges do not receive priority due to the great complexity, scale of work and the corresponding need for funds.

Engineer Dmytro Bespalov, who often comments on bridge issues for the media and previously served as an advisor to the Minister of Infrastructure of Ukraine, confirms this situation. *“Ukraine lacks prioritization. Some bridges are more important, and some are less important. It is obvious that we need to prioritize the more important ones. The constructions that have been carried out recently – I am not sure that such prioritization was done, and that Ukraine has really repaired or rebuilt the bridges that are the most important,”* says Bespalov.

As an illustrative example, the engineer cites the capital, Kyiv, which for many years had no problems with filling the local budget, and therefore had all the resources to establish an effective system of managing bridges as assets. However, Kyiv, despite favorable circumstances, is an example of a critical situation with the condition of strategic bridges and a lack of prioritization.

In 2023, Kyiv Mayor V. Klitschko reported that the capital has 175 bridges and overpasses (not counting pedestrian ones), and all the capital's bridges are *“...taken care of by the municipal enterprise “Kyivavtoshlyakhmist”, which is engaged in the maintenance of artificial structures and regularly inspects them.* 22 ” There is no official information about the condition of these structures in the public domain. Therefore, in 2023-2024, the public organization “Passengers of Kyiv” sent official requests to various balance sheet holders in the capital, and from the responses collected and summarized information about the operational condition of the capital's bridges. This monitoring showed the following:

²² Paton Bridge, Metro Bridge and Podilsky Bridge: Klitschko spoke about the prospects of crossings across Dnipro, Kyiv Vechirniy, <https://vechirniy.kyiv.ua/news/85420/>

“ There are 31 inoperable bridges in Kyiv , including 28 transport and 3 pedestrian bridges, and 53 bridges with limited operability, including 44 transport bridges and 9 pedestrian bridges. In total , 75 bridges are in critical or emergency condition, ” Oleksandr Rak, head of the NGO “Passengers of Kyiv,” reported for this study.

According to official data collected by the organization, four bridge crossings across the Dnieper have emergency structures.

“These bridges can actually collapse at any moment, especially if they receive overloaded trucks or an explosion somewhere nearby. This is a really huge problem,” comments Dmitry Besspalov on the condition of the bridges across the Dnipro.

Meanwhile, while the most important bridges of Kyiv and Ukraine can collapse with catastrophic consequences at any day, the capital spends billions of hryvnias on the construction of new overpasses without any strategic significance. Only in 2024 did the capital put into operation two new two-level interchanges in the Obolon residential area, and also completed the reconstruction of a similar interchange on Degtyarevskaya Street . All three objects do not pass over railways or rivers, so traffic at these intersections of city streets could well be organized by traffic light regulation, as is customary in EU cities. This is exactly what was proposed by transport planners and public organizations, but these rational ideas did not find support in the decisions of city leaders. ²³

Fig. 5. New road junction in Obolon, opened by V. Klitschko in 2024²⁴





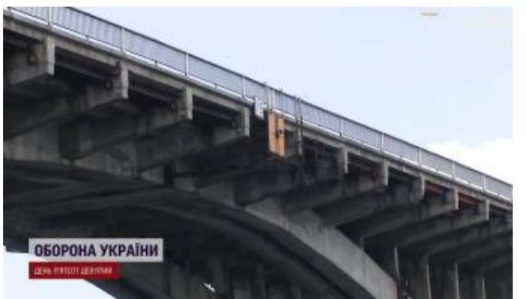

The problem of the emergency condition of truly strategically important bridges is not only present in Kyiv. The Kryukivskyi bridge across the Dnieper in Kremenchuk (1948) and the Varvarivskyi bridge across the Southern Bug in Mykolaiv, which is recognized as

²³ Another bridge is “tired” in Kyiv. This is a reason to reconsider the approach of the Kyiv City State Administration to overpasses and interchanges, The Village, 03.10.2023, <https://www.village.com.ua/village/city/transport/344075-cherhoviy-mist-utomivsyia-v-kievi-tse-prichina-pereglyanuti-pidhid-kmda-do-shlyahoprovodiv-i-rozv-yazok>

²⁴ Vitali Klitschko opened the exits and entrances to the new overpass in Obolon, official Kyiv city website, 30.08.2024, https://kyivcity.gov.ua/news/vitaliy_klichko_vidkriv_rukh_zzdami_ta_zazdami_na_noviy_shlyahoprovodiv_na_oboloni/

emergency in 2008²⁵, 44 years after it was put into operation in 1964. In October 2023, the Government agreed to accept this bridge and another bridge in Mykolaiv for balance of the state.²⁶

Table 7. Examples of strategic bridges in Ukraine and their condition

	<p>Southern (cable-stayed) bridge across the Dnieper. Opened in 1990 (34 years of operation). It is in the fourth state (limited able-bodied).</p>
	<p>Northern bridge crossing over the Dnieper. The bridge crossing was opened in 1976 (48 years old). The cable-stayed bridge is in limited use. operational (fourth) state, bridge over the Desenka River – in inoperable (fifth) state.</p>
	<p>Metro Bridge - a bridge crossing the Dnieper River. Opened in 1965 (59 years old). Main bridge across the Dnieper is in the fifth (inoperable) condition, bridge over Rusanivska duct – in the fourth state (limited able-bodied).</p>
	<p>Paton Bridge over the Dnieper. Opened in 1953 (72 years old). A welded metal bridge, has the status of an architectural monument. It is located in fifth (inoperable) state.</p>

²⁵ Pivdennobuzka bridge crossing. 57 years ago, the Varvarivskyi bridge was opened in Mykolaiv - Suspilne, 07/18/2021, <https://suspilne.media/mykolaiv/148417-pivdennobuzka-mostova-pereprava-57-the-year-old-in-mykolaiv-the-barbarian-mist/>

²⁶ The government transferred important bridges in Mykolaiv to the management of the Recovery Agency, — Denis Shmyhal, Government Portal, 13.10.2023, <https://www.kmu.gov.ua/news/uriad-peredav-vazhlyvi-mosty-v-mykolaievi-v-upravlinnia-ahentstva-vidnovlennia-denys-shmyhal>



Kryukiv Bridge in Kremenchuk. Opened (restored) in 1948. In 2019, citizens petitioned the President of Ukraine, claiming that the bridge “has been in a state of disrepair for 30 years” and that the balancer - Ukrzaliznytsia - does not carry out its repairs. ²⁷

"Dovgobud" and unfinished objects

A common problem in Ukraine is the situation when bridge facilities are built much longer than stipulated in the design and estimate documentation. Such facilities are commonly referred to in the media as “long-term construction projects”. Sometimes construction work is suspended for several years or even decades. It is impossible to estimate the number of such long-term construction projects on a national scale, but every industry specialist or interested citizen can recall at least one such bridge that has either been under construction for decades (receiving “new impulses” with the advent of new presidents or mayors), or has not been built at all for a long time, or has been built and opened only partially, not completely. Examples of such projects are strategic large crossings across the Dnieper, as well as many local (non-strategic) bridges that are simple in terms of design solutions and project management.

The Podilsko-Voskresensky bridge crossing is a complex and extremely expensive facility, with serious questions about its planning and design decisions. a typical example of errors in ²⁸The bridge is strategic and transport planning, as well as questionable design and management decisions. According to publications from 2017, the German government had the desire and financial resources to help Kyiv complete this facility. As part of the preparation and research, numerous visits were made by the German Minister of Transport and Digital Infrastructure, Alexander Dobrindt, visits to the facility, and negotiations with the newly elected Kyiv Mayor Vitaliy Klitschko. However, all these negotiations and visits ended in nothing - in the same 2017, the completion of the bridge was given to the laying company of Denys Komarnytsky , a man close to the city leadership ,²⁹ who was later officially named by the NABU as the organizer of the criminal group. The Germans, based on their research and experience, included this capital's "long-term construction" in an academic publication as an example of how bridges should not be built.

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²⁷ Electronic petitions, No. 22/068662-yy, <https://petition.president.gov.ua/petition/68662>

28 “From nowhere to nowhere. Where will the Podilskyi Bridge begin and end”, Economic Truth, 19.08.2019: <https://epravda.com.ua/publications/2019/08/19/650111/>

²⁹ Komarnitsky, Klitschko and Tishchenko embezzled UAH 6 billion allocated for the Podilsko-Voskresensky bridge, 06/30/2020: <https://www.rbc.ua/ukr/news/komarnitskiy-klitchko-tishchenko-prisvoili-1593508134.html> 30 "Bridge to Troveshchyna" will be included

in the German guide - Deutsche Welle, 05.04.2017: <https://www.dw.com/uk/%D1%8F%D0%BA-%D0%BD%D0%B5-%D1%82%D1%80%D0%B5%D0%B1%D0%B0->

%D0%B1%D1%83%D0%B4%D1%83%D0%B2%D0%B0%D1%82%D0%B8-

Regarding the history of the issue, the bridge was included in the General Plan of Kyiv in 1986, the design documentation was developed in 1993, and later it was repeatedly updated and adjusted. The facility was supposed to consist of a complex of bridges and overpasses and connect Voskresenka with the center of Kyiv. Construction work began in 1993, and was carried out with long delays. In the end, part of the crossing was opened to automobile traffic in 2024, while the design solutions did not provide for infrastructure for cycling, despite the fact that in 2017 the Kyiv City Council recognized the bridge as part of a first-category cycle route. Only in 2025 were attempts recorded to equip the bridge with bicycle lanes marked with markings.

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The Darnytsia railway and road bridge, unlike the Podilsko-Voskresensky crossing, was built relatively quickly. Work began in 2004, rail traffic was launched in 2010, and road traffic in 2011. The high speed of construction is explained by the fact that the project was implemented by JSC “Ukrzaliznytsia”. However, in 2011, the facility was opened in an unfinished state, not all of the designed sections of the bridge were built. Part of it was completed in 2012-2023, but one of the exits on the left bank has not yet been built, so the entire facility is not completed³².

“New Bridge” in Zaporizhia. Construction began in 2004, progressed slowly over the next 10 years, after which it was stopped. In 2016-2017, work resumed and was stopped again. The bridge structures towered over the Dnieper for more than 15 years, under the influence of weather phenomena and without anti-corrosion measures. The project received a new impetus in 2019 under President Zelensky, and in 2022 the bridge was partially opened - car traffic was allowed on some of the passages according to a temporary scheme. With the outbreak of a full-scale war in 2022, construction work stopped, the bridge crossing is incomplete.

“New Bridge” in Kremenchuk. The decision to build this bridge was made back in 1989, and design documentation was ordered at the same time. 1993-2022 – numerous attempts to organizationally ensure the construction of the bridge, the creation of working groups and a separate legal entity. 2002 – President of Ukraine L. Kuchma gave instructions to the Cabinet of Ministers regarding design and construction. 2012 – Prime Minister V. Yanukovich, during a visit to Kremenchuk, stated that they plan to start building the bridge in 2013. Then it really

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[%D0%BF%D0%BE%D1%81%D1%96%D0%B1%D0%BD%D0%B8%D0%BA/a-38309919 31 PODILSKY](#)

PODILSK: A NEW TRAFFIC SCHEME WITH CYCLE LANES AND WITHOUT SEPARATE TRAM LINES WAS PRESENTED - <https://kiev.vgorode.ua/ukr/news/>

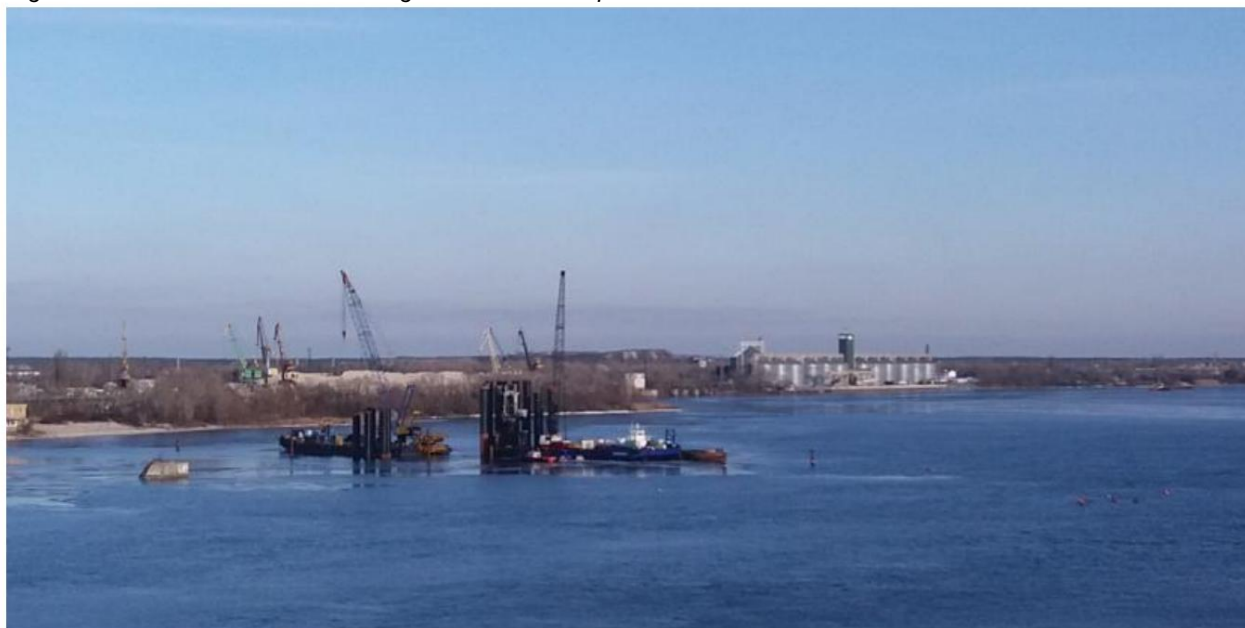
[transport_y_infrastruktura/a1273881-podilskij-mist-prezentovali-novu-skhemu-rukhu-z-velosmuhami-ta-bez-vidokremlenikh-tramvajnikh-kolij](#)

³² “Two halves of the Darnitsky Bridge live separate lives” - The Village, 11/16/2024: <https://www.village.com.ua/>

[village/city/infrastructure/356929-dvi-polovini-darnitskogo-mosta-zhivut-okremim-zhittiam-e-horosha-novina-vin-mayzhe-spravniy-nbsp](#)

construction work has begun on the construction of one of the towers, although this is the point stopped.

Fig. 6. Construction site of a new bridge across the Dnieper in Kremenchuk in 2013



The next steps towards the implementation of the bridge were taken in January 2021, under President Zelensky: a tender was held, in which a Turkish company won. *"The approximate deadline*
"The start of construction work is in the spring of 2021. Construction, according to plans, will last three
years." - reported "Ukravtodor" headed by O. Kubrakov³³. These statements
were not implemented, and work on the facility was not resumed in 2021-2024.

Overpass over the railway in Kherson. Decision on the need for an overpass between Tavriyskyi microdistrict and the KhBK enterprise were enshrined in the general plan of Kherson in 1986 1989 Design work began at the Mosdorproekt Research Institute. After a long pause, the design The documentation was completed and construction was solemnly launched under the flags of the "Party of Regions" in 2012, but it stopped. In 2017, the construction of the bridge was resumed, burying another capsule for posterity, but this attempt did not last long. In 2019, the head of the KhODA Yuriy Gusev said that the facility is now planned to be completed using a 25 million euro EBRD loan and announced a technical audit of the structure. This did not happen. In 2020 financing and construction continued within the framework of the so-called "Great Construction" program, despite the fact that the bridge is not of strategic importance for the state. In the summer of 2021, the facility "partially opened", namely - one half and without sidewalks. The second part and sidewalks promised to open by the end of 2021³⁴. This was not fulfilled. In the winter of 2022 Kherson was occupied, and deoccupied in 2023.

³³ <https://hmarochos.kiev.ua/2021/01/22/turetska-kompaniya-buduvatyme-kremenchutskyj-mist-cherez-dnipro-proyekt/>

³⁴ "Connected the city: the first part of a large-scale overpass was opened in Kherson", 04/25/2021: <https://kanal.dim.tv/soedinil-dve-chasti-goroda-pervuyu-chast-masshtabnogo-puteprovoda-otkryli-v-herson-video/>

Fig. 7. Unfinished overpass in Kherson – a project from 1989



As of 2025, the overpass is still only partially built (one half) and not has sidewalks. Instead, the project provides for as many as four lanes for cars. The project budget has been growing all the time: in 2012 - 197 million, in 2017 - 357 million UAH, in 2021 already over 1.5 billion UAH. There have been corruption scandals and criminal proceedings. 37 years after the start of design, the bridge is still unfinished.

Bridge in Ivano-Frankivsk across the Bystrytsia-Nadvirnianska River. The first stone of the bridge was solemnly laid by the city mayor Ruslan Marcinkiv in the spring of 2016. The project immediately has come under criticism from the townspeople due to questionable planning decisions: location next to existing bridge, two lanes, narrow sidewalks that rest against stairs, no provision trolleybus traffic and bicycle infrastructure, unclear to drivers and dangerous traffic interchange at the end of the bridge. In addition, the flow of cars towards the center will be to run into the already congested Halytska Street, which will mean an increase congestion. Meanwhile, work on the site continued, and its price increased over the first 2 years from 120 million UAH. to 426 million. Due to problems with financing, work was stopped. In 2020 In 2018, the city hall managed to lobby for funds from the state budget as part of the "Great construction", although this local bridge is not of strategic importance for the state. The work has resumed, and its cost has increased again. As of the beginning of 2025, the object is still unfinished.

Construction has been going on for 9 years instead of one year, and the expected cost is approaching 1 billion UAH. ³⁵, and the exposed steel elements of the bridge are damaged by corrosion. Anti-corrosion treatment and painting have not been carried out for the past 9 years.

³⁵ <https://suspihne.media/ivano-frankivsk/952791-mer-marcinkiv-rozpoviv-koli-u-frankivsku-planuut-vidkriti-new-bridge-on-pasichnu/>

Fig. 8. The newest "long-term construction" - a bridge across the Bystrytsia-Solotvinska River in Ivano-Frankivsk



Strengths of Ukraine's bridge sector

The Ukrainian bridge sector has not only problems and challenges, but certainly also significant positive aspects that are worth highlighting and taking into account by those interested in this sector 1. **Strong engineering school and**

engineering personnel. After 1991, thanks to higher education institutions in Ukraine, a new generation of bridge engineers has been formed, who are successful, knowledgeable and productive. This human capital has significant potential for further effective work in the next 15-25 years both in Ukraine and in the single market of Europe. At the same time, there is a shortage of students and young specialists in Ukraine who would like to study civil engineering and become high-quality engineers. However, the engineering school of Ukraine lacks international integration, exchange of the Ukrainian academic, student and engineering environment with foreign colleagues. Previously, international exchange of knowledge and practice was carried out in the directions of Russia and Belarus, but after 2015, and especially after 2022, this direction, of course, ceased.

2. **Rich practice of bridge design and construction in 2017-2024.** During these years, hundreds of bridge projects of various levels of complexity and scale were implemented by customers and contractors in Ukraine. In Ukraine, there is an ecosystem of engineers, suppliers, manufacturers, contractors, researchers and other specialists and organizations who have been actively working and increasing their personal and organizational capabilities in recent years. That is, Ukraine has fresh experience, fresh technologies and a large number of fresh projects. All this creates a solid foundation for

large-scale reconstruction of Ukraine's bridges in significant volumes and in a relatively short time.

3. **Adaptability and ability to learn.** Ukrainian engineers and companies quickly adapt to changes in the regulatory environment. While the Eurocodes have remained unchanged for over 15 years, the Ukrainian DBN have already undergone dozens of changes and updated editions. The Ukrainian engineering environment not only takes into account changes in standards, but also constantly masters new technologies, methods and software. Active learning and professional development takes place already in the workplace.

4. **High competence and significant experience in surveying and "digitization"**

bridges. Ukrainian standards for the inspection and assessment of the operational condition of bridges are well developed and proven in practice. The key expert center for bridge inspection is the State Enterprise "National Institute for Infrastructure Development", other research and engineering institutions also have significant experience in conducting inspections, creating digital passports of bridges, digital models, etc.

5. **High capacity of the construction sector.** Thanks to sufficient financing of the road industry in 2017-2023, Ukrainian road construction companies have developed, created bridge and engineering divisions, built networks of partners, suppliers and contractors, and gained valuable experience in implementing complex projects in a short time, effectively cooperating and finding optimal solutions. The Ukrainian construction sector has modern equipment, human and financial capital at its disposal. However, this situation is not sustainable, because after 2024 the situation on the market has become significantly more complicated. 6. **Approximation of Ukrainian DBN and DSTU**

to European standards. As

As mentioned in other parts of this study, Ukrainian DBNs are already close to European standards (Eurocodes) in terms of loads, and many old state standards for materials and components have already been replaced by European EN standards. This proximity will facilitate Ukraine's future transition to Eurocodes, which should, of course, be accompanied by national annexes.

Destruction in 2022 and rapid reconstruction

The full-scale invasion of the Russian Federation into Ukraine began on February 24, 2022, and active hostilities were ongoing at the time of writing this publication. During the tragic events of the war, bridges often became victims of the situation. Some of them were blown up by the Ukrainian defense forces to stop the movement of the aggressor columns, some were destroyed by Russian air strikes or during the retreat of the occupier. Particularly significant losses of bridges were in the Kyiv, Chernihiv, Kharkiv, Kherson and Mykolaiv regions (of course, not counting the Donetsk region, the situation in which will become clear after the end of the war).

The extent of destruction from the war

According to the State Reconstruction Service of June 2023³⁶, as a result of the Russian military aggression, 346 bridges and overpasses were damaged and destroyed, of which 157 were on roads of state importance. Information on the number of damaged and destroyed facilities after June 2023 was not published in open sources. Active military operations continued throughout 2023 and 2024, and the front line changed. Final calculations of destruction should be carried out after the end of military operations. Among the bridge facilities destroyed during military operations are several strategic bridge crossings across the Dnieper - Antonivskyi bridge near Kherson and a bridge crossing over the dam of the Kakhovka hydroelectric power station.



Fig. 9. Antonivskyi Bridge over the Dnieper River near Kherson, destroyed by military operations



How large are these losses? Given the concentration of destruction in several regions, these are undoubtedly huge losses for the transport system, society and the state. However, if we consider the number of objects in the state, then 346 is about 1.2% of all 28,500 bridges registered in Ukraine. And for comparison, the number of bridges that are themselves in an inoperable (5th) operational state is 2,211 units, that is, 6 times more.

Without intending to downplay the significance of Ukraine's infrastructure losses as a result of the criminal armed aggression of the Russian Federation, it can still be said that without the direct impact of military actions – under the influence of wear and tear, time, and lack of operational maintenance – Ukraine is gradually losing a significantly larger number of bridges. If in

³⁶ <https://gmk.center/ua/opinion/u-vidbudovi-mostiv-vikoristovuietsya-lishe-ukrainskij-metal/>

In the first case, the culprit is clear, in the second case, a specific culprit no.

Rapid reconstruction 2022-2023

The state leadership made a strategic decision in the spring of 2022 to rebuild bridges, without waiting for the end of the war. And this reconstruction was to take place under the slogan speed. The President of Ukraine has already been in full swing for a month and a half since the start of the invasion declared a course for rapid reconstruction:

"I am sure we will be able to quickly rebuild our state. No matter what losses... This will be a historic reconstruction. A project that will inspire the world just like our fight for freedom. Just like our fight for Ukraine," he noted President Zelenskyy April 11, 2022³⁷.

³⁷ Destroyed houses and bridges: Zelenskyy showed the consequences of the Russian invasion - State Ukrinform Agency, 11.04.2022, <https://www.ukrinform.ua/rubric-ato/3454875-zrujnovani-budinki-i-mosti-zelenskij-pokazav-naslidki-rosijskogo-vtorgnenna.html>

Fig. 10. Infographics published on the State Reconstruction website on 05/30/2023



In May 2023, a year after the President's declaration of rapid reconstruction, the Reconstruction Agency reported that it had already rebuilt 12 war-damaged bridges, and work was underway on 25 more sites in Zhytomyr, Kyiv, Chernihiv, Kharkiv, Kherson, and Mykolaiv regions. 38 In total, 37 bridges were in "rapid reconstruction" work .

Rapid recovery monitoring

According to researcher Oleg Hrechukh, in 2022-2023, speed prevailed over procedures, building codes, and legal requirements. *"Contracts for the reconstruction of bridges were concluded without complying with the requirements of the legislation on public procurement, without conducting tenders, and without complying with the requirements for the design stages. The so-called "design-build" model, which is absent from the legislation of Ukraine and which was interpreted as a wartime necessity, became widespread in state orders"* - these are the conclusions made by Oleg Hrechukh from his own careful monitoring of rapid reconstruction projects.

To assess the economic dimension of this rapid reconstruction, researchers Oleg Grechukh and Viktor Zagreba collected and analyzed information on bridge facilities in the two regions where reconstruction work began the earliest – Kyiv and Chernihiv. The monitoring included only bridges on roads of state importance. The state websites *DREAM.gov.ua*, *Prozorro.gov.ua* and *e-Construction.gov.ua* were used as the main sources of information , and as

38 "The Restoration Agency continues to actively rebuild bridges in Ukraine" - State Restoration Website, 05/20/2023, <https://restoration.gov.ua/press/news/55516.html>

additional sources - publications in the media and responses from the Recovery Services in Kyiv and Chernihiv regions for information requests. Despite the limited availability of information about rapid reconstruction, the authors were able to collect the most important information. Access to It was not possible to obtain design and estimate documentation, so we collected and estimated the volumes of the materials used was impossible, but valuable information was collected about the expected (estimated) cost of all objects and the final (actual) cost of part objects.

Table 8. Scope of monitoring of "rapid reconstruction" of bridges in two regions

Region	Number of objects	Total length, meters	Total expected cost, UAH
Kyivska	14	2008	4,458,668,577.00
Chernihiv	12	3105	8,064,816,472.00
Together	26	5113	12,523,485,049.00

The data from this monitoring exceed the figures in the State Recovery publication from May 2023: then 10 bridges were indicated for Kyiv region and Chernihiv region, i.e. 20 objects in total. According to monitoring data, regional restoration services worked on 26 bridges in these two regions. Such a discrepancy in information from the state was discovered repeatedly during the study.

Monitoring of rapid bridge rehabilitation facilities in Kyiv and Chernihiv regions allowed to make the following generalizations:

1) Inaccessibility of data on objects. Monitoring revealed that there is no public It is impossible to obtain comprehensive data about objects in large spaces. The lack of data has more characteristic of the Chernihiv region than of the Kyiv region.

Table 9. Public availability of data on "rapid reconstruction" bridges

Region	Kyiv (14)	Chernihiv (12)
Procurement pages on the government portal procurement Prozorro.gov.ua	3 of 14	6 of 12
Object pages and documents on the state construction portal e-construction.gov.ua	0 out of 14	7 of 12
Bridge length data	14 of 14	12 of 12
Bridge width data	13 of 14	7 of 12

In general, avoiding publishing information about government construction projects, such as bridges and roads, is not a new phenomenon. It was observed regularly until 2022, despite political statements about accountability and transparency as tools for prevention corruption. Typical methods of concealing information about projects include refusing to publication on Prozorro of estimates for construction work, or publication of such a form consolidated estimates, which cannot be analyzed and verified³⁹.

2) Cost of bridges per square meter. The monitoring results allowed us to calculate the relative cost per square meter of a significant portion of newly constructed bridges meter. This turned out to be possible for 13 bridges in the Kyiv region and 2 bridges in the Chernihiv region (for others there was not enough data). The calculation did not include bridges (a) for which there was no it was possible to obtain data on the width of the bridge; (b) which had a partial nature of destruction and restoration works, for example, when one or more spans were destroyed. The cost of bridges per square meter was calculated in hryvnias based on the estimated value (obtained from expert reports), and for ease of international comparison converted at the current exchange rate in euros and US dollars. Full table with collected data on all objects is contained in the Appendix (.xls), below is a shortened table with main results.

Table 10. Conditional cost of "rapid reconstruction" bridges per square meter

	Name	Length, meters	Width, meters	Area, sq. meters	Price* for 1 sq. meter, euro
1	Bridge crossing over the Irpin River at km 5+621 of the state public road R-30 value	114.97	21.6	2,483.35	6,872.13
2	Bridge crossing over the Irpin River at km 23+470 of the general highway use of state importance M-07 Kyiv – Kovel – Yagodyn	138.4	21.6	2989.44	2,044.62
3	Bridge crossing over the Irpin River at km 36 + 490 public highway state importance R-02 Kyiv — Ivankiv — Ovruch	155.95	12.75	1988.36	5,598.97
4	Overhaul of the bridge crossing over Irpin at km 50+380 of the highway public use of state importance R-04 Kyiv-Fastiv – Bila Tserkva-Tarasha – Zvenyhorodka	58.14	11.55	671.00	5,163.93
5	Bridge crossing over the Trubizh River at km 28+780 of the general highway use of state-important T-10-18 "Boryspil-Berezan-Yagodyn"	60.2	8.5	671.00	2,953.96
6	Bridge crossing over the Irpin River at km 21+140 public highway M-06 Kyiv-Chop	83.25	32.6	2713.95	3,345.12

³⁹ Top tenders of the week: road workers gave 479 million for bridge repairs - prices of building materials were NOT shown either violated Kubrakova's methodology - Our Money, 04/09/2023, <https://nashigroshi.org/2023/04/09/top-tendery-tyzhnia-shliakhovyky-za-479-mln-vidremontuiut-mist-po-novym-neprozyrom-pravylam-tsinoutvorennia-kubrakova/>

7	Bridge crossing over the Zdvizh River at km 60+635 of the general highway use of state importance R-02 Kyiv-Ivankiv-Ovruch	132.35	11	1455.85	2,982.16
8	Bridge over the Tal River at km 72+540 of the main highway use of state importance R-02 Kyiv-Ivankiv-Ovruch	36.8	9.5	349.6	2,970.16
9	Bridge over the Teteriv River at km 79+110 of the main highway use of state importance R-02 Kyiv-Ivankiv-Ovruch	334.32	13.25	4429.74	2,010.79
10	Bridge crossing over the Teteriv River at km 78+850 of the general highway use of state importance M-07 Kyiv – Kovel – Yagodyn	289.63	11	3185.93	5,509.47
11	Overhaul of the bridge crossing over Zdvizh River at km 51+910 of the highway public roads M-07 Kyiv – Kovel – Yagodyn	102	11	1,122.00	5,730.53
12	Overhaul of the overpass per km 54+863 of the general highway use of state importance T-10-19 Fenevichi-Borodyanka-Makariv-Byshiv	84.11	11	925.21	12,344.78
13	Overhaul of the bridge crossing over Teteriv River at km 37+210 of the highway public use of the state value T-10-05 Ivankiv – /M-07/	310	11	3,410.00	3,372.68
14	Overhaul of the bridge crossing over canal at km 29+110 of the highway public use of the state value of R-69 Kyiv-Vyshgorod-Desna-Chernihiv	108.87	16	1741.92	2,912.87
15	Construction of a bridge across the Desna River on national highway M-01 Kyiv - Chernihiv - Novi Yarylovichi (to Gomel). Southern entrance to Chernihiv , km 11+414	631.61	23	14527.03	10,276.56
	Average score				4939.25

* Note: the cost for objects 1-14 was obtained from expert opinions on the review of project documentation, for object 15 - from Recovery Service responses. The cost may change after receiving information about the actual cost of the objects

Cost of rapid reconstruction facilities

As can be seen from the table, the average cost for the 15 investigated bridge facilities that were included to the plans for rapid recovery, in 2022-23, amounted to 4939 euros per 1 sq.m. For 13 objects, the cost lies in the range from 2000 to 7000 euros per 1 sq.m. Two objects sharply differ in a larger direction, having indicators of 10,276 and 12,344 euros per 1 sq. meter.

In addition, the study revealed significant discrepancies between the stated expected cost facilities and cost in the project documentation. According to the interviewed experts, this is expected and it is clear when the predicted values of objects differ less from the values that were later specified in the design and estimate documentation. This can be explained by objective circumstances: the customers did not have full information about the consequences of the destruction

and future volumes of work, and the cost of materials, fuel, and work in 2023 became significantly higher than in the pre-war year 2021.

The study revealed a significant fact of a significant increase in cost already at the construction stage, after the development and examination of the design and estimate documentation. This applies to the largest object in the monitoring conducted – the so-called “Chernihiv Bridge”⁴⁰, which cost taxpayers 10,276.56 euros per square meter, twice the average figure. According to data from public sources and the response of the Restoration Service in Chernihiv region, the cost of this object already at the construction stage increased from 4.854 billion to 5.806 billion hryvnias, i.e. by approximately 1 billion hryvnias. This is +20% to the cost in the design and estimate documentation. A significant increase in the cost of an object already during construction is not a new phenomenon for Ukraine. It is quite likely to occur for other objects of rapid reconstruction, remaining unknown to the public.

Comparison with Poland

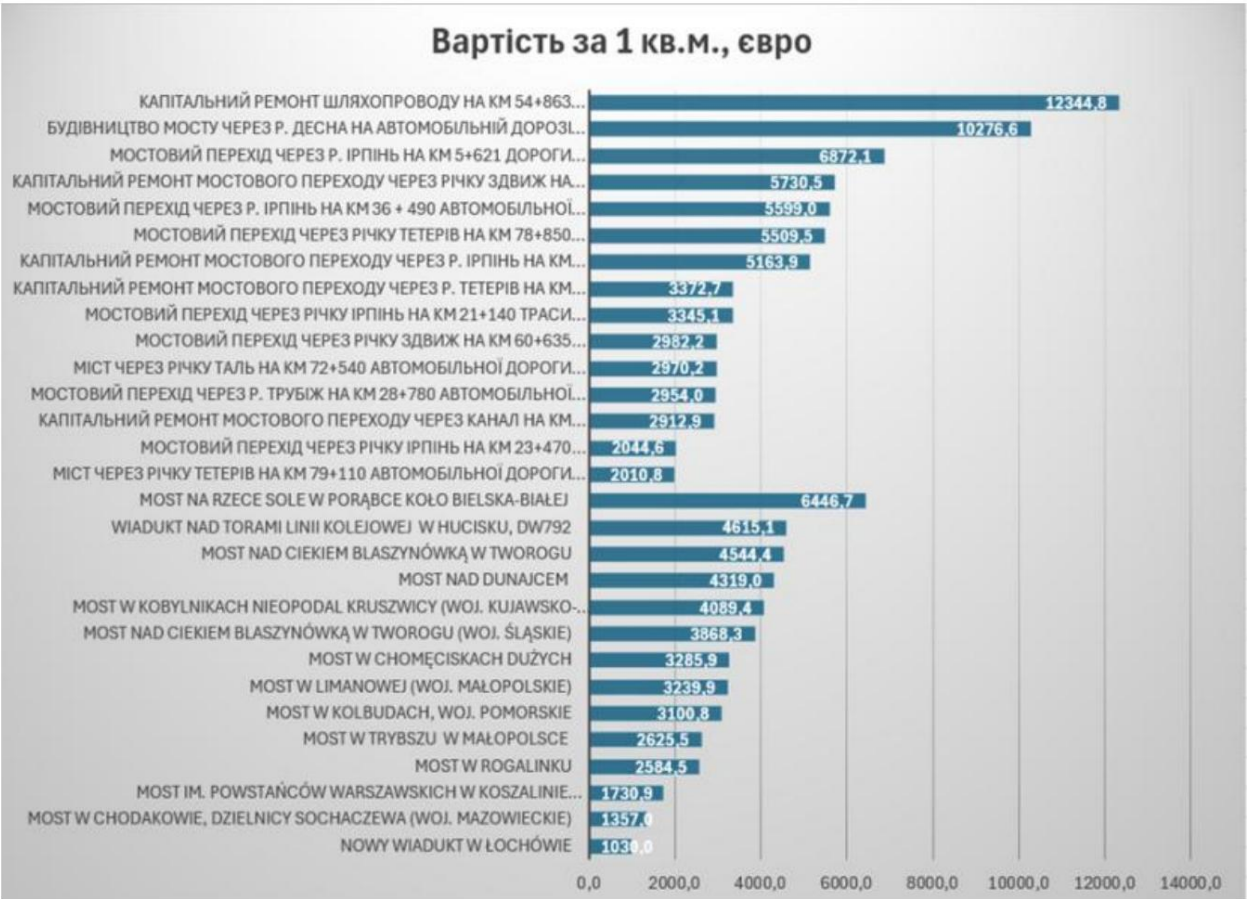
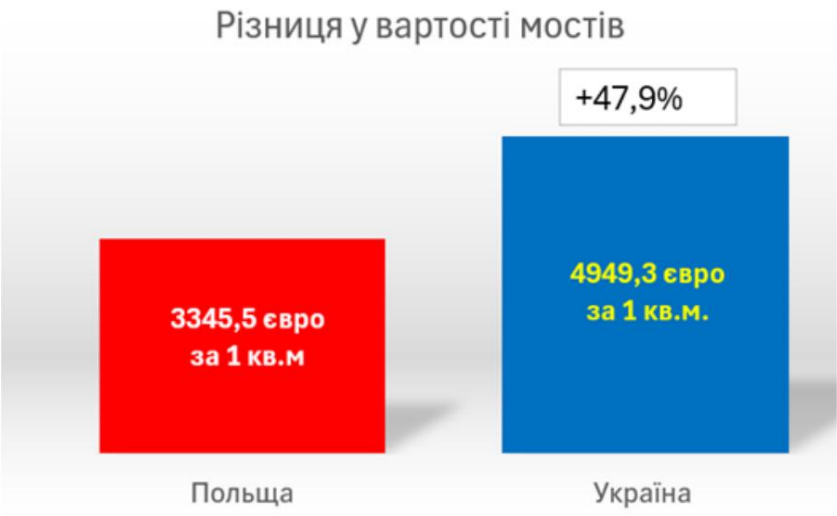
As part of the study, the authors collected from open sources a sample of 14 bridge projects in Poland that were commissioned around the same time that Ukraine was implementing the “rapid reconstruction” announced by the President. The sample of Polish bridges, like in Ukraine, is diverse: the length varies from 16 to 815 meters, and the width from 12 to 25 m. As in Ukraine, some projects included the dismantling of old structures and site preparation, some involved the construction or reconstruction of access roads, artificial lighting, and some used existing foundations of supports. Each bridge project is unique, and therefore it is impossible to take into account all the differences between them, especially without access to design documentation. Nevertheless, the random and diverse sample of objects in Poland, the different types of bridges in size and design included in it, allow for informative generalizations and comparisons with a high degree of reliability, while adhering to methodological consistency.

Similar to monitoring facilities in Ukraine, the authors collected information from open sources about the length, width, and cost of each bridge facility in Poland and calculated the cost per square meter in different currencies at the exchange rate current for the year of the facility's completion.

The results of the comparative study showed that bridges in Ukraine in 2022-2024 were significantly more expensive than bridges in Poland, namely by 47.9%.

Fig. 5. The difference in the cost of bridges in Ukraine and Poland was revealed

⁴⁰ Construction of a bridge across the Desna River on the national highway M-01 Kyiv - Chernihiv - Novi Yarylovychi (on Gomel city). Southern entrance to Chernihiv city, km 11+414.





Cost indicators of bridges in Ukraine and Poland built in 2021-2024:

- 1. The average cost of bridges in Ukraine is 47.9% higher than in Poland (4949.4 euros per 1 sq. meter in Ukraine versus 3345.5 euros in Poland);

2. **All bridges in Poland**, except one, have a cost significantly lower than the average Ukraine's figure is 4,949.4 euros;
3. **The most expensive bridge in Ukraine is 368% more expensive** than the average cost of bridges in Poland per 1 sq. meter;
4. **In Ukraine, not a single bridge was found with a cost of less than 2 thousand euros** per 1 sq. meter, while in Poland there were **three such bridges**;
5. **In Ukraine, 7 bridges cost more than 5 thousand euros per 1 sq. meter**, in Poland
There was only one such bridge .

Regarding point 5, the high cost of one bridge in Poland is probably due to the chosen architectural and engineering solutions that have not been seen in Ukraine. This is a modern arch bridge with a 120-meter span, without supports in the riverbed. It cost the taxpayers taxes of 6446 euros per 1 sq. meter.

Table 11. New bridges over the Sola River (Poland) and the Irpin River (Ukraine)

	
Length 129 m, width 12 m, area 1548 sq.m.	Length 114 m, width 21.6 m, area 2437 sq.m.
Arched steel	Reinforced concrete beam
Span: 120 meters	Spans: 24 and 33 meters
Cost: 10.05 million euros (43 million zlotys)	Cost: 17.06 million euros (663.77 million UAH)
Price per 1 sq.m.: 6497 euros	Price per 1 sq.m.: 6872 euros

Description of the problems from a public policy perspective

The condition of bridges in Ukraine is difficult, the dynamics of the situation are negative. The number of objects that need attention is huge, the cost of projects is prohibitively high, planning and Design decisions often raise questions. Some bridges fall, while others remain unfinished for decades. All these discovered and described facts and trends are

consequences of systemic and long-standing problems in public policy and public asset management practices. These problems are described in the following sections.

What are the reasons for these consequences? This section takes a deeper look: it formulates and describes less obvious but more fundamental problems from the perspective of public policy and public administration.

Improper operational maintenance

Bridge maintenance is a painstaking and well-regulated process. It involves a set of routine works that should be performed on schedule, as well as minor repairs that should be performed as needed. Bridge maintenance can be compared to owning a car. Regular replacement of fluids, filters, and belts, as well as timely diagnostics and minor repairs, are the key to reliable and long-term operation of a car. Regulatory documents for bridge elements, as well as for cars, specify routine works and repair and replacement periods. For bridge expansion joints, for example, the repair interval is 15 years, and waterproofing must be replaced every 10-15 years. Other bridge elements also require maintenance, anti-corrosion treatment, and other work. If the work is not carried out on time, defects form that accumulate over a long period of time until the repair is no longer of any use. However, unlike taking care of your private cars, bridge maintenance has not been on the agenda of decision-makers in recent decades.

"Funds for bridge maintenance are practically not allocated, all maintenance is reduced to snow removal, salting, and pothole repair of the pavement. Because of this, bridges serve much less than they should," says Serhiy Rud, a bridge engineer who participated in the design of over a hundred facilities.

Engineer Anna Minyukova gives a similar assessment: *"For the past 30 years, the strategy for operating bridges in Ukraine has been and remains to do nothing until a critical moment when it becomes easier and cheaper to build a new structure than to repair an existing one."*

These assessments are confirmed by both statistical data on the condition of bridges in Ukraine (see Section 1) and specific examples of rapid transition of bridges to an emergency state. The Northern Bridge in Kyiv has less than 50 years of service, and it is already emergency. The Southern Bridge in the capital – almost the same age as Independence – has been in operation for only 35 years, and has been problematic for a long time and is in the fourth operational state.

It is important that even unfinished or "frozen" objects require operational maintenance, because the elements installed on them are already beginning their service life and are already exposed to static loads, precipitation, temperatures, etc. Unfinished elements stand open for years or decades, are subject to corrosion, and of course, make further successful maintenance much less likely. This can be compared to buying

A car with zero mileage that has been parked in an open parking lot for 10 years with the windows open can no longer be called new.

There is no division into strategic and ordinary bridges.

Not all bridges are equally important for the state and society. Some bridge structures can easily pass their planned service life of 60-80 years and be replaced with similar ones by closing traffic and reconstruction. For example, bridges over a small river, railway or other road from the point of view of transport communication can often have non-strategic importance, regardless of the road of what importance they are located, if nearby it is possible to quickly and cheaply organize a bypass or a level crossing. A cheap and simple temporary bridge is sometimes built across small rivers in Ukraine (which often serves for years or decades), and a level crossing can be organized across railways or roads.

An example of a bridge that turned out to be non-strategic, although it is located on a road of national importance, is the overpass over the railway in the village of Delyatyn in the Carpathians near Yaremche, on the H-09 highway. This emergency bridge underwent major repairs in 2021 with a complete closure of traffic. At that time, a temporary detour was arranged for cars and small trucks near the overpass, and larger trucks were sent to bypass through other settlements⁴¹.



Despite the large tourist flows on this road, the decommissioning of the facility for a long time did not lead to negative consequences at the strategic level. It turned out that the temporary closure of this facility is not strategically important for the state, the region, or local communities.

At the same time, there are bridges that, on the contrary, have strategic transport importance for the state. Their decommissioning, even temporary, is extremely expensive for society, for the economy, for the country's connectivity. This is not about sabotage risks, but about the transport function of the bridge and what will happen if it is decommissioned. The absence or remoteness of alternative connections due to an obstacle, the complexity or impossibility of building a temporary crossing - this makes the bridge critical, which cannot be bypassed. Necessary.

The division into strategic and non-strategic bridges, depending on these circumstances, exists and is used in Germany, the expert says. *"A bridge over a large river or sea*

⁴¹ A new bridge was laid in Delyatyny - a structure with a bend, 2021: <https://kurs.if.ua/society/u-delyatyni-nastelyly-mist-konstrukciya-iz-virazhem/>

bay are usually strategic objects. Their planned and actual service life should exceed 100 years. Because closing these objects and building new ones to replace them is extremely expensive and difficult,” says Michael Bornmann, a German bridge engineer and head of a design company, in an expert interview. He notes that bridges are not considered strategic if a temporary crossing can be quickly and cheaply arranged or traffic can be detoured. These bridges are bypasses, with an emphasis on the “i”: they can be bypassed or even done without, at least

temporarily.

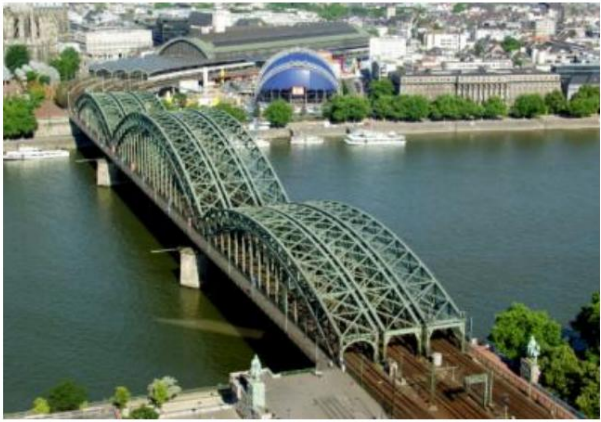


In Ukraine, there is no division into strategic and non-strategic bridges from the point of view of transport importance and non-necessity (impossibility of bypassing). This follows from the analysis of the legislative and technical norms of Ukraine. In an expert interview, design engineer Serhiy Rud confirms this. *“Officially, there is no such division in Ukraine. The customer himself can determine which bridge is strategic, for example, for reasons of defense capability. Bridges on international roads are generally considered priority, because there is usually a significant flow of transport and logistical routes there,”* says Serhiy Rud, who has been working with bridges for over 20 years.

The lack of a division of bridges by strategic importance at the state level is also evidenced by the National Transport Strategy of Ukraine until 2040, approved by the Cabinet of Ministers of Ukraine in December 2024⁴². The text of the strategy did not find a place to describe the problem of the condition of the country's main bridges, to define goals and measures aimed at preservation and reconstruction. The State Building Code of Ukraine also does not separate the requirements for the planned service life, operational maintenance for ordinary bridges and strategic, important bridges. The division is based on the material from which the bridge is made. For reinforced concrete section bridges, the planned service life is 80 years, for reinforced concrete non-section bridges and for steel bridges - 100 years.

The lack of a differentiated approach to bridges depending on their importance is a stark contrast between Ukraine and EU practices, such as Germany. *“From an economic point of view, it makes no sense to make ordinary, local bridges too durable. It is wiser to plan their renewal after 60-80 years. Strategic bridges, on the other hand, are usually designed and maintained in such a way that they last for more than 100 years, and ideally forever, and that repair work on them can be carried out without completely blocking traffic,”* says engineer Michael Bornmann about the German bridge sector.

⁴² <https://zakon.rada.gov.ua/laws/show/430-2018-%D1%80#Text>

Table 12. Examples of strategic bridges in the world

	<p>Hohenzollern Bridge (Hohenzollernbrücke) across the Rhine in Cologne, Germany. Built in 1911 as a railway and road bridge. Partially blown up in 1945 year, restored in 1948. In modern The bridge serves rail traffic, pedestrians, and cyclists.</p>
	<p>Havana Bridge in Sydney (Sydney Harbour Bridge) opened in 1932 and still serves without problems (93 years). Operational maintenance work bridges are maintained daily – a separate team specialists constantly work only on this bridge.</p>
	<p>Golden Gate City Bridge) over the San Francisco Strait opened in 1937. Thanks to the constant maintenance, routine repairs and anti-corrosion measures , the bridge has been successfully serving in difficult conditions for almost 90 years conditions – fog, winds and salt water Pacific Ocean.</p>

Lack of or insufficient planning

A common phenomenon for Ukraine is suboptimal solutions in planning bridge projects. or even not using planning tools at all. In Ukraine, it is often accepted a political decision that a bridge or overpass is needed, and it should be right here. And the technical decisions, for example about the number of lanes, geometric parameters, etc., are made on based on prescriptive building codes that are not based on transportation planning, comparison of options, and economic analysis.

Transport engineer Dmitry Bepalov says that bridge planning should have two levels: 1) prioritization of objects: which objects are taken into work first, and why; 2) volume planning: what bridge should be, how wide, what cross-section profile, what loads, and so on. Bepalov observed and studied hundreds of transport objects over the past 20 years, both state and local, and reached conclusion: *"We as Ukraine are failing in both of these areas – both prioritization and calculations . We don't make the objects we need, and we don't make them in the right places. parameters, which are required. This is terrible in terms of efficiency of use funds, very limited funds."*

There are many examples of imperfect planning. The three local ones mentioned above (non-strategic) transport interchanges, put into operation in Kyiv in 2024, built without the use of planning, simply a "political decision" by the Kyiv leadership.

Feasibility study for formality

A typical project planning stage for the Western world is the Feasibility Study, which has a shortened (simplified) version – Pre-Feasibility Study. In Ukraine, this stage is not classified as planning (research), and before design, and this stage of design is called Ukraine and Russia feasibility study (FES) ⁴³. In Poland Feasibility Study called "road feasibility study" or "road feasibility study" (road feasibility study) feasibility), and it is carried out at the planning or "investment preparation" stage, and not designing.

Feasibility Study in the theory and practice of successful countries is a stage of formal technical planning, where the initial information is collected (geodetic and geological exploration, land use analysis, environmental research), development and comparing different project implementation options from transport, technical, economic, environmental and social perspectives. The goal is for politicians and managers to have the most complete information to choose the most optimal option that meets the needs and budget. At this stage, the project concept and basic parameters are formed , stakeholder consultations, presentations and discussions.

Engineer Dmytro Bepalov has worked with the feasibility study stage in Ukraine and with the Feasibility Study abroad many times and talks about his experience: *"In my experience, in Ukraine, feasibility study is usually low-quality documents, with little engineering, few facts and sources data. Many general phrases, often there is "pulling by the ears" when there is "the favorite option, and fake rival options are made for it."*

Bepalov adds that customers and designers in Ukraine are often aware of serious shortcomings in the feasibility study and take a condescending position, saying, "it's nothing, we're on to the next one." "We'll fix everything at the next stage." However, these errors are usually not corrected at later stages.

⁴³ According to DBN A.2.2-3:2014 "Composition and content of design documentation for construction".

and move on to the working design. Bespalov has also seen cases where frankly simulated feasibility studies of bridges or overpasses were performed, which were not at all related to reality, did not have true input data, but on which the contractor could receive millions of hryvnias from the budget customer, and the customer could fulfill the requirement for the justification of the bridge and put the document on the shelf with the word "feasibility study".

Excessive number of traffic

lanes The road before and after the bridge has only two traffic lanes, and on the bridge itself there are already four (2+2). This is exactly what Ukrainians saw on the most expensive "rapid reconstruction" bridge ever built on the approach to Chernihiv. This naturally raised questions even among people far from transport planning and engineering. The fact is that Ukrainian standards are built this way

The first problem: DBN V.2.3-4:2015 directly indicates that "when designing and building bridges and overpasses on public roads of categories II and III, which will be expanded to category I parameters in the future, it is necessary to provide for the appropriate expansion of bridges and overpasses in order to avoid their further rearrangement." In someone's plans, the entrance to Chernihiv will someday have a "highway profile", and therefore the bridge on this road during the war was designed and built for 6 billion hryvnias already in the parameters of the highway.

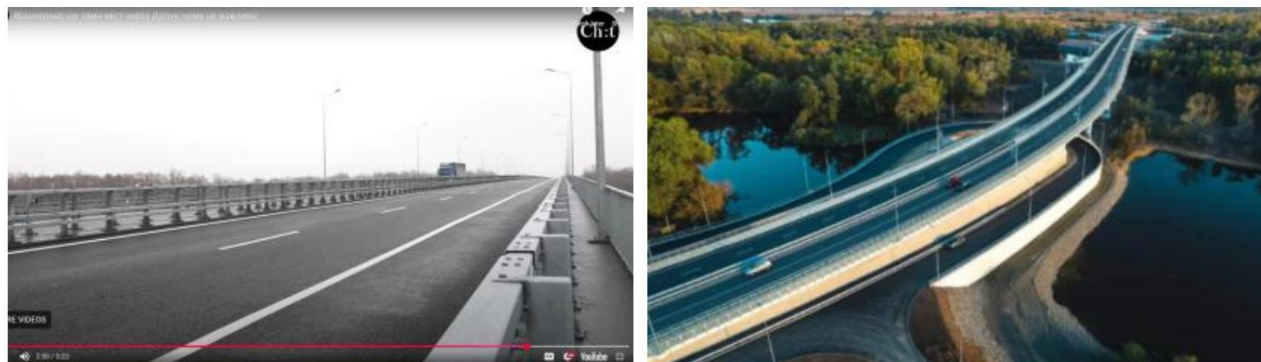
The second problem: Linear approach to forecasting traffic flows. In Ukraine, there is an established practice, regulated by norms and standards, which encourages engineers to count on a constant and stable growth in the prospective intensity of automobile traffic. As a rule, the growth rate is taken at 4% per year. Therefore, it is expected that on the road, where 1000 cars (given units) currently travel per day, in 10 years there will be 1480 cars, and in 20 years - 2229.

"As an engineer, I am forced to use this method, although I consider it fundamentally wrong. Where these 4% per year come from is incomprehensible," says chief engineer Konstantin Shcherbachenko, who has been working in road projects for over 25 years. Transport engineer Dmitry Bespalov agrees with him. He says that when he first learned about these 4%, he simply did not believe it: *"I still do not believe that such a primitive and illogical norm exists in our country. Even schoolchildren can calculate this, and in our country engineers calculate it. In the real world, transport planning does not work like this. The demand for movement is much more complex and, in general, it is not constant. There are four steps that must be taken to predict the demand for a road or bridge. And at all stages, you can influence the indicators and change this final demand."*

This practice of using the expectation of a fixed annual increase in traffic flow is not supported by reality. This can be seen if you take documents from 2000-2025 and look at the forecast intensity of traffic flows towards Belarus and Russia, which was expected in 2025, and compare it with today's traffic flows on these roads, for example, in the same Chernihiv region. In addition, this

a straightforward approach contradicts the principles and practices in official EU documents. In the EU Commonly recognized and officially established goals in the field of transport are to reduce road traffic: avoiding unnecessary trips, shifting freight transport to railways, and urban and local mobility – public transport and bicycles.⁴⁴ The number of car lanes is often not increased, but reduced.

Fig. 11. Two “rapid reconstruction” bridges in Ukraine, each with 4 lanes.



Both quickly rebuilt bridges near Chernihiv have 2+2 lanes, although traffic intensity of over 21 thousand cars per day (DBN standards) there is never was and will not be in the next 20 years. This is evidenced by photo and video reports from newly opened facilities, where from 1 to 3 cars travel on the bridge at the same time.

Fig. 12. The new Pelješac Bridge in Croatia, with 1 lane in each direction



The *Pelješac* Bridge across the sea strait in Croatia (Dubrovnik direction), opened in 2022, has only one lane in each direction. At the same time, Croatia receives 20.6 million tourists per year, and the city of Dubrovnik - 4.5 million tourist overnight stays per year. With From a financial point of view (per square meter), this object was also cheaper than some Ukrainian bridges: 7400 euros per 1 sq. meter, while the bridge near Chernihiv – 10276 euros.

Cycling infrastructure

⁴⁴ "Strategy for sustainable and smart mobility - European transport on the path to the future", Brussels, 2020, translated into Ukrainian by the NGO "Vision Zero": https://visionzero.org.ua/wp-content/uploads/2023/03/EU_SSMS_Ukrainian-Translation.pdf

Bridges in Ukraine often ignore cycling, even when cycling routes are included in local planning and strategic documents. The new bridge over the Irpin River in the village of Romanivka in the Kyiv region, built in 2023, has no cycle paths – cyclists ride on the carriageway, putting themselves at risk of death on this new and expensive bridge.

“The city bike path of Irpin ends right in front of the bridge on one bank of the river, and the other one, in the direction of Kyiv, built in 2020 by order of the Regional Reconstruction Agency, begins on the opposite bank and leads to the nearest metro station. The customer did not include the bike path in the technical specifications of the bridge, and it was not built,” comments Oleg Hrechukh, an architect and researcher of bridge construction, author of the monograph “Bridges of Ukraine.”

The example of the bridge in Romanivka is not unique. The unfinished and partially open Podilsko-Voskresenskyi bridge crossing in Kyiv also does not provide for bicycle infrastructure, although in the Kyiv City Concept for the Development of Bicycle Infrastructure, approved by the Kyiv City Council in 2018, this bridge is one of the important routes⁴⁵.

Management and financial planning

The above-mentioned phenomenon of construction freezes (“long-term construction”) is usually explained by customers and politicians as problems with financing. However, financing is one of the means of project implementation, and financial planning is part of project planning. In EU countries, if an official does not have confirmed sources of financing to complete the project according to plan, then the decision to start bridge construction is simply not made. Sometimes delays in project implementation are caused by unexpected problems, for example, at the excavation stage, but much more often the reasons and problems lie in planning and management. And these mistakes, including with financial planning, have very serious consequences for society, ultimately making projects much more expensive.

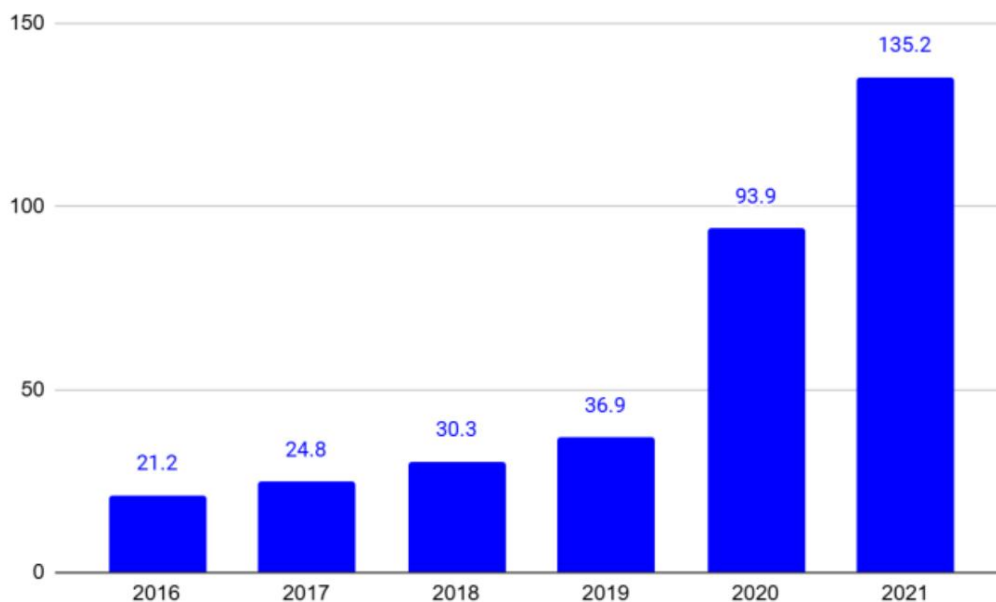
“Stopping bridge construction is very bad. This means that much more money is needed later. Setting up the site, returning equipment and people to this site is already a lot of money. And then there is the detection and elimination of defects, changes to the design and estimate documentation, the increasing cost of materials,” explains engineer Serhiy Rud, who has had to work on “long-term construction” projects many times. He says that according to the construction plans, which are part of the design and estimate documentation, a bridge 50-70 meters long should usually be built in 6 to 12 months, and large strategic bridges across the Dnieper - in 3-4 years. If this does not happen, the reasons should be sought in management and financial planning.

⁴⁵ On approval of the Concept for the development of bicycle infrastructure in the city of Kyiv, https://kyivcity.gov.ua/npa/pro_zatverdzhennya_kontseptsi_rozvitku_velosipedno_infrostrukturi_v_misti_ki_yevi/

Financing problem

Among politicians and in expert comments, there is sometimes an opinion that the main problem of the bridge sector is the lack of funding. They say, if there were enough funds, there would be no problems. However, the facts do not confirm this opinion. In the years before 2022, the amount of available funding for balance sheet holders was sufficient or even more than sufficient, thanks to the reforms successfully implemented in 2015-2018, which are worth briefly recalling. In 2016, amendments to the laws began, which ultimately created the State Road Fund as a special fund of the state budget. This fund began to function on January 1, 2018, during the term of President Petro Poroshenko, Prime Minister Volodymyr Groysman and Minister of Infrastructure Volodymyr Omelyan. The state began to collect and use earmarked funds exclusively for road infrastructure, and the source of these funds was parts of the excise tax on fuel, tires, cars and spare parts. As a result, the annual funding of state roads (the managing agency is Ukravtodor) increased from 24.8 billion in 2017 to 135 billion in 2021 – that is, 5.5 times – in just 4 years⁴⁶.

Fig. 13. Amounts of financing of roads of national importance from the state budget, billions of hryvnias.



According to the World Bank's 2018 estimate, Ukraine needed 30 billion hryvnias per year to finance capital and current repairs during 2018-2022 (excluding inflation), and the amount at the disposal of Ukravtodor already met the Bank's ⁴⁷ As can be seen from the graph, in 2018-2019 the amount of funds in estimate, and since 2020 has exceeded this estimate many times over. How many bridges have undergone reconstruction or

⁴⁶ Data for 2016-2020 from the VoxUkraine portal: <https://voxukraine.org/velike-budivnistvo-shho-road-is-being-repaired>, for 2021 from the Ukravtodor report (see below) ⁴⁷ Ibid.

The exact number of major repairs is unknown, as Ukravtodor reports mix these types of work with current repairs. In 2021, Ukravtodor reported on 307 man-made structures undergoing repair work⁴⁸.

At the local level, the decentralization reform began several years before the creation of the State Road Fund. It had positive financial consequences for local budget holders starting in 2015. According to the amendments to the Budget Code, local budgets now received 60% of the personal income tax (PIT), 100% of the single tax, part of the excise tax on retail trade (until 2020), including on automotive fuel, as well as land tax and real estate tax. As a result, the total annual revenues of local budgets increased from 68.6 billion hryvnias in 2014 to 304.0 billion in 2020, i.e. 4.5 times.

Specific examples of the impact of decentralization reform on the financial capabilities of cities:

- **Kyiv:** the revenue part of the local budget gradually increased between 2014 and 2021 from 24 to 60.6 billion hryvnias (by 252%)⁴⁹,
- **Ivano-Frankivsk:** growth from 832 million to 2.945 billion (by 354%), • **Kherson:** growth from 1.2 to 2.712 billion UAH (by 226%).

At the same time, all three cities in 2015-2021 were unable to cope with both the proper maintenance of existing bridges and the completion of "long-term construction" or new buildings (as in Frankivsk). This situation is characteristic not only of the mentioned cities. All this confirms the statement that the real problems were not a lack of funds. Although the lack of funds became a growing and acute problem starting from 2023-2024.

Conflict of interest due to corruption

The objectives of this study do not include delving into the topic of corruption, but it is also impossible to completely avoid these "realities of life". Kickbacks, bribery, rigged tenders – these aspects of corruption were mentioned by foreign experts, whom the author interviewed as part of the study. In order to briefly record the problem of corruption, the author did not conduct his own research, but instead cites information from open sources that confirms the presence of corruption in the road industry and gives an idea of its scale and level. At the same time, the author believes that corruption in the bridge and road sector is not widespread, it is not the main or only cause of the consequences and trends described in this analytical report. The presence and scale of corruption depend on the customers and the rules of the game prevailing in their organizations.

Corruption at the local level: NABU's long-term and large-scale "Clean City" investigation into corruption in the city of Kyiv ended in the spring of 2025 with public publicity and suspicions against numerous individuals. According to NABU's conclusions, the key person - "the head of

⁴⁸ Report of the State Road Agency of Ukraine for 2021, <https://restoration.gov.ua/4489/zvity/49385/49386.pdf> <https://www.slovoidilo.ua/2020/12/24/novyna/suspilstvo/kyivrada-uxvalyla-byudzheth-stolytzi-2021-rik>

⁴⁹ www.slovoidilo.ua/2020/12/24/novyna/suspilstvo/kyivrada-uxvalyla-byudzheth-stolytzi-2021-rik

criminal organization” – Dmytro Komarnytskyi, an activist close to the President’s office and the Kyiv mayor, turned out to be . Four years earlier, in 2021, a journalistic investigation provided irrefutable evidence of billion-dollar corruption organized by Komarnytskyi at Kyiv’s infrastructure facilities⁵¹ and one of the large and long-term schemes for embezzling taxpayers’ funds was the “long-term construction” – the Podilsko-Voskresenskyi bridge crossing.

Corruption in national road projects. In 2018, the SBU exposed Oleksandr Kharchenko⁵² , the then deputy head of Ukravtodor, Slavomir Novak , in embezzling 30 million hryvnias.⁵³ In 2019, a group of 15 public organizations publicly drew the attention of state leaders and asked them to remove the appointment of a corrupt figure from the Ternopil Highway Service (Ukravtodor) to the position of Novak’s deputy.⁵⁴ Also in 2019, the head of the Mykolaiv Region Highway Service was exposed in corruption, and the publications revealed a bribe of 90 thousand US dollars and 300 thousand UAH.⁵⁵ Already in 2020, after leaving his post and Ukraine, Novak himself was arrested in Poland on charges of corruption, which he committed on projects in Ukraine.⁵⁶ At that time, about 50 searches were carried out simultaneously in the two countries. After 9 months in custody, Novak has been under other preventive measures since 2021, and the trial of the charges against him and other alleged participants in the corruption schemes began in 2024. The court is considering charges for 17 episodes of corruption crimes on Ukrainian roads.

Already during the full-scale invasion, there were also several corruption scandals involving large sums. In 2023, NABU published information about several uncovered corruption schemes involving MPs and other high-ranking officials with bribes amounting to hundreds of millions of hryvnias.⁵⁷ At that time , the Minister of Infrastructure Oleksandr Kubrakov and the head of “State Restoration” Mustafa Nayem secretly cooperated with the investigation, who essentially handed over the bribe-takers to law enforcement and helped collect irrefutable evidence. Both leaders lost the favor of President Zelensky’s office and were removed from their positions. In 2024, another corruption scandal occurred in the road sector, this time involving the entire management team of the Dnipropetrovsk Regional State (Military) Administration. The NABU press release mentioned the amount of the episode as 286 million hryvnias and the presentation of suspicions to 5 leaders.⁵⁸

⁵⁰ https://www.youtube.com/watch?v=iv3TmQSgNWY&ab_channel=NABU

⁵¹ https://www.youtube.com/watch?v=4wEOgKStvmE&ab_channel=BIHUSInfo

⁵² <https://www.rbc.ua/ukr/news/korruptsiya-ukravtodore-ulichennyi-prisvoenii-1537883109.html>

⁵³ Nowak is the former Minister of Transport of Poland, who headed Ukravtodor in 2016-2019.

⁵⁴ https://ti-ukraine.org/news/zayava-zaklykayemo-kabmin-ne-stoyaty-ostoron-skandalu-v-ukravtodoru/?fbclid=IwY2xjawKFxQhleHRuA2FlbQlXMQABHvVgY6w_jj9zSwR8sigOUPeGKAqf6_SBW_L_XwXu7J3BUeNTGalaBw6W8eZWx_aem_4vUXRAntkM_IHGjdMOJf3A

⁵⁵ <https://nabu.gov.ua/news/novyny-spravu-kerivnyka-sluzhby-avtodorig-mykolayivskoyi-oblasti-skerovano-do-sudu/>

⁵⁶ <https://www.bbc.com/ukrainian/news-53469906>

⁵⁷ <https://nabu.gov.ua/news/koruptci-ia-u-sfer-v-dnovlennia-p-dozriuiut-sia-chinn-nardepi-b-znesmen-ker-vniki-kompan-i/>

It should be understood that only a tiny fraction of all corruption schemes and events that take place in Ukraine are reported in the media, and even more so in official NABU press releases . Almost always, these processes occur quietly and remain unknown to the general public.

Summing up the part on corruption, it can be stated that a corrupt element is often present in road (including bridge) projects in Ukraine, although there is no evidence that it is always present in every project. It can also be assumed that the scale of corruption in large projects can also be large, and the political level of the organizers and beneficiaries is high.

Corruption as a phenomenon can have a direct impact on the emergence and severity of some of the systemic problems described in this report. Corruption creates a distorted system of interests (or conflict of interests): the real interests of decision-makers conflict with their nominal interests as officials, as well as with the interests of society, the state and users of transport systems.

Here are examples of a distorted system of interests and motivations that hypothetically exist in Ukraine: - Certain

- officials may be interested in project and planning
 - decisions that involve excessive amounts of work and materials, as this leads to a higher estimated cost of projects and increases the amount of undue profit;
- Certain officials may be interested in “long-term” construction as much as possible
 - have not been completed for a long time, as delayed projects with increasing budgets are a long-term and large source of illicit profit;
- Certain officials may be interested in bringing bridges to an emergency level state, in order to then “absorb funds” on major repairs and reconstructions, which have significantly higher estimated cost indicators and opportunities for illegal profit than routine maintenance work.

Transparency (publication of tender documents) is a useful and necessary element for changing this defective system of interests, but it is not sufficient. Corruption as a practice and as part of the “status quo” should be taken into account in changes to public policy, and of course, future changes should be aimed at eradicating corruption and creating conditions and rules so that the system of interests and motivations of decision-makers is not in conflict with the interests of the state, society, economic feasibility and sustainability.

Distributive method instead of parametric or target One of the causes of the problem of excessive parameters and material consumption is the distributive method of rationing. Ukraine has politically decided to move away from it, but has not yet implemented this decision. Analytical document of state policy (green paper) “Parametric

⁵⁸ <https://nabu.gov.ua/news/dorozhnia-koruptciia-v-dnipropetrovs-kiyi-oda-vykryto-skhemu-na-286-mln-grn-under-wartime/>

"Rationing in Construction" (2020)⁵⁹, is entirely dedicated to this topic, defines these methods so:

- *Parametric method of standardization in construction* - a way of establishing requirements to the object of standardization in construction, which involves the definition of goals and/or safety, functionality and quality parameters of the object of standardization in construction (criteria, requirements for operational characteristics and/or its indicators); •
- Regulatory method of standardization in construction* - a way of establishing requirements for object of standardization in construction, which provides for an element-by-element description of the object standardization in construction (solutions, designs, materials that do not provide for alternatives);
- *Target method* - involves defining goals and specific evaluation criteria technical characteristics of the facility⁶⁰.

In other words, in **the parametric method**, norms describe functions and parameters of the future object and its components (city, street, school or hospital) and based on these functions and parameters, as well as other input data, architects and engineers, together with customers and future users of the building are looking for and finding the optimal solution. Of course, the future project must also meet the general requirements for reliability, durability and durability of structures, fire safety and, for example, energy efficiency. However, how this compliance will be achieved is decided not by directives, and the authors of the project based on their education, experience and application modern software. The parametric method encourages creative and innovative solutions, while striving to achieve a high cost- benefit ratio. That is why in EU countries you can often see bridges, schools or kindergartens Individually designed gardens that cannot be seen in Ukraine.

In the administrative method inherent in the USSR, Russia and Ukraine, norms do not explain functions, criteria and decision-making logic, but only state dry requirements, limitations and specific numerical prescriptions: width, length, height, distance, area, radius, quantity. The role for the creative realization of architects in such a directive normative environment is reduced to almost zero. Architectural and aesthetic component, experience and needs future users, as well as economic efficiency, play no role. The only requirement is that there should be no contradictions with the indicators contained in the standards.

“

The role of engineers in Ukraine is to ensure that projects include compliance with all directive requirements of the norms, even if they are illogical. The role of the engineer, at least in the road sector, has been reduced to almost zero,” says Kostyantyn Shcherbachenko, a road engineer and head of the Ukrainian Association of Road Safety Auditors.

⁵⁹ “Parametric standardization in construction”: D. Barzylovych, I. Lagunova, I. Bardasova, S. Buravchenko , A. Necheporuk , O. Medvedchuk , O. Marusheva, V. Kolesnyk, BRDO: <https://brdo.com.ua/wp-content/uploads/2024/06/14-ZK-Parametrychne-normuvannya-v-budivnytstvi.pdf>

⁶⁰ There is also a target method, which involves defining goals and specific evaluation criteria. technical characteristics of the object of standardization in construction

Ukraine has taken several steps towards the transition from the Soviet regulatory to the European parametric method of standardization. In 2019, the parametric method was enshrined in Ukrainian legislation, as were the regulatory and target methods.⁶¹ The law also clearly stated that the regulatory method should no longer be a priority in construction: *“Preference shall be given to parametric and target methods of standardization in construction,”* declares Article 7-1 of the Law of Ukraine *“On Building Standards.”*

Certain steps have been taken to implement these visionary provisions of the law: the DSTU “Guidelines for the Application of the Parametric Method of Standardization in Construction”⁶² was adopted, which entered into force in the summer of 2023. However, in practice, the parametric method is not used in the bridge and road industries, where the regulatory method still prevails. Instead of terminating the (regulatory) DBN and transitioning to guidelines, in accordance with global practices, Ukraine is developing and approving new editions of DBN, without changing the approach⁶³.

What does this lead to? Suboptimal design decisions, and as a result, excessive amounts of materials and funds required by projects.

Typical consequences of applying directive standards for bridges in Ukraine:

- Wider bridge dimensions than necessary – and therefore higher material costs, inappropriately high project costs and excessive greenhouse gas emissions;
- Failure to take into account pedestrian and cyclist traffic in bridge projects: customers and designers are limited to the minimum requirements of the DBN;
- Negative impact on road safety, as a result – accidents, injuries, mortality and economic losses for society. Example: in the absence of a bicycle lane, cyclists, in accordance with the Road Traffic Regulations, move in the right lane with cars and become victims of car collisions.

The described consequences of suboptimal design decisions are supported by real examples and a comparison of bridges in Ukraine and neighboring countries.

Example 1. Lane width. In Ukraine, lane width is prescribed by the Road Traffic Act without any connection to the function or speed limit on the road or street. In Ukraine, if a state-owned road belongs to international or national roads, the lane width on it (including bridges) should be 3.75. Even on those sections where the route of this road passes through city streets and the speed limit is 50 km/h.

⁶¹ Law of Ukraine “On Building Standards”, <https://zakon.rada.gov.ua/laws/show/1704-17#Text>

⁶² DSTU 9193:2022 Standardization system in construction. Guidelines for application parametric method of standardization in construction

⁶³ For example, DBN V.2.3-26:2024 "Bridges and pipes. Design of steel structures", DBN V.2.3-27:2023 "Tunnels. Design standards".

Reference: lane width in international practice

The official European Commission guide to road infrastructure safety assessment "Network Wide Road Safety Assessment – Methodology and Implementation Handbook" 64 clearly notes that wide lanes increase speed and encourage dangerous driving. The typical width of traffic lanes in EU cities is 2.80-3.25 meters, while in Ukraine – 3.75 meters. In Germany, 3.75 m is the width of the lane on federal highways, autobahns (index A), where there is often no speed limit. In the areas where During repair work on German autobahns, the right lane is narrowed to 3.0 m and the left lane to 2.10 m. On federal state roads (index B), which have profile scheme 1+1 or 1+2, the typical lane width is 3.5 m, sometimes 3.25 m or 3.00 m. When such a road passes through populated areas, the norms for populated areas apply. points: from 2.75 to 3.50 meters depending on the function of the street and the planned speed of traffic.⁶⁵

So, thanks to the directive norms of the DBN, the width of each lane on the bridge in a settlement in Ukraine can be up to 1 meter higher than in Germany (3.75 instead of 2.75). If there are 4 lanes on a bridge, this means 4 “extra” meters of width. Excessive width has a direct impact on the cost of objects and the volume of materials consumed.

Fig. 14. Widths of traffic lanes on bridges: 3.75 m in Ukraine and 3.00 m in Poland



In the photo on the left: a bridge opened in 2024 in the city of Terebovlya, Ternopil region, along which the route of the M-19 national road passes. On the right: similar to cities in Poland. Due to the difference in regulatory requirements, the overall width of the Ukrainian bridge is 12.8 meters⁶⁶, and the bridge in Poland is about 10 meters.

Example 2. Barrier fencing. In Ukraine, barrier fencing is required at all without exception on bridges, regardless of their function, speed or type of obstacle they are crossing crosses the bridge. These circumstances only affect the type of barrier fence (deterrence capacity). This means, firstly, the impact on the width – each barrier

⁶⁴ European Commission, Road infrastructure guidelines: https://road-safety.transport.ec.europa.eu/eu-road-safety-policy/priorities/infrastructure/road-infrastructure-guidelines_en?utm_source=chatgpt.com

⁶⁵ The width of a typical passenger car is approximately 1.80 m, and that of a heavy-duty vehicle is approximately 3.0 m.

⁶⁶ In addition to the difference in width, at a nominal cost per unit area, the Polish bridge cost 1,357 euros per 1 square meter, and the Ukrainian one cost 5,897 euros per 1 square meter (+434%).

requires about 0.5 meters, adding at least 1 meter to the total width of the bridge. Secondly, it entails costs for the installation and subsequent maintenance of this element of infrastructure. The third consequence is the use of hundreds or thousands of tons of steel and the corresponding greenhouse gas emissions that could have been avoided. The fourth consequence is the risks to the health and safety of those on the other side of the fence (pedestrians and cyclists), because the rear side of the fences often has unprotected parts of the metal structures. Options when the fence is not installed at all or is installed along the outer edge of the sidewalk are not allowed in Ukrainian standards. What is allowed in Poland or Germany is prohibited in Ukraine.

Fig. 15. Parametric application of barrier fencing in Poland



In EU countries, parametric standards usually recommend the installation of barrier fencing depending on the circumstances and based on risk management principles. On bridges within settlements, barrier fencing is often absent in principle. Sometimes a decision is made to place the barrier fencing together with the guardrail along the edge of the bridge, rather than between the sidewalk and the bridge.

Fig. 16. Bridge width and barrier fencing in Germany and France



Also, barrier fencing may be absent on bridges outside populated areas, for example at "blind intersections" that allow local roads to pass over transit (autobahns). On the left in the photo: a bridge over the A7 autobahn in Germany, on the right - over the A4 highway in France.

Excessive design decisions

Ukrainian bridges are often characterized by excess, resulting in overspending of materials and funds. International experts who have studied long-term bridges in Ukraine have been struck by the “wastefulness” and, as a result, the huge budgets.

“The bridges in Kyiv and Ivano-Frankivsk are very different, but both are very massive. In Poland, we would definitely not choose such constructive solutions. We would design much lighter and cheaper bridges that fully fulfill their functions and have the appropriate safety margin in accordance with Eurocodes,” says Krzysztof Wachalski, a bridge engineer and head of a design firm in Gdansk.

This overconsumption of materials may explain the trend identified in the study, where newly built bridges in Ukraine are on average 48% more expensive than bridges in Poland. For large-scale strategic bridges, such as those in Kyiv or Zaporizhia, the difference in material volumes and final cost may not be tens, but hundreds of percent.

One of the reasons was discovered and described by researcher Oleg Grechukh. In Ukraine, there is a directive requirement of the norms: if a bridge has a consequence class of SS3 (and these are all bridges on international and national roads of state importance), then even a simple bridge with low traffic must receive an additional safety margin. Scientists published an article in 2023, which stated that such excessive requirements of the norms lead to an additional consumption of materials by approximately 20% without changing the functionality. Quote: *“The requirements put forward in the DBN regarding an additional reliability coefficient for responsibility of 1.25 for bridges are unacceptable, as they will change the existing balance between bridge calculations according to DBN V.1.2-15 and EN 1991-2 and may cause unjustified overconsumption of materials by up to 20%”*

Incomplete transition to European standards

At the beginning of the 21st century, Ukraine took a political course towards global and European integration, towards joining the Western world, in particular the European Union. The state has undertaken a wide range of international commitments regarding reforms, in particular in the field of technical regulation (which includes the bridge industry). These commitments are stipulated in the Association Agreement between Ukraine, on the one hand, and the European Union, the European Atomic Energy Community and their Member States, on the other hand, and the World Trade Organization Agreement, and include, among others⁶⁷:

- approximation of technical regulation systems, standards and conformity assessment; • implementation of the relevant provisions of the EU *acquis communautaire* into its legislation;
- implementation of administrative and institutional reforms necessary for the implementation of the Association Agreement in accordance with the Agreement on Conformity Assessment and Acceptance of Industrial Goods (ACAA Agreement);

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- introduction of an effective and transparent administrative system, which is necessary to approximate technical regulation systems; • creating conditions for the free movement of products and services on the market⁶⁸ .

One consequence of these reforms is expected to be the transition to European standards for structural design, known as Eurocodes . Over the following years, ten major Eurocodes were officially translated and approved. However, their practical application remains limited. As of 2025, for example, bridge structures, like most other structures, are largely not designed according to Eurocodes, although the regulatory framework already exists.

Despite this, **there are successful examples of the application of European standards in Ukraine.**

In particular, according to Anna Gontarenko, acting executive director of the Association "Ukrainian Center for Steel Construction" (UCSC), the design of Terminal D of Boryspil Airport was carried out according to Eurocodes - Japanese and Turkish specialists worked on it, and Ukrainian engineers adapted technical solutions to local conditions. There are also a number of industrial steel facilities designed according to European standards, owned by international corporations.

The legal mechanism for the implementation of Eurocodes in Ukraine is determined **by the Resolution of the Cabinet of Ministers of Ukraine dated May 23, 2011 No. 547**. According to this document:-

- **Eurocodes can be used** for the design of new facilities and renovations.
- **During the transition period**, the simultaneous existence of national building codes (NBC) and harmonized European standards.
- **The customer has the right to choose** under which regulatory system the design, however, mixed use of DBN and Eurocodes standards within the same facility is not allowed - to avoid technical and legal inconsistencies.

Anna Gontarenko explains how Russia's full-scale invasion in 2022 has catalyzed an accelerated transition to European standards, especially in the steel construction sector. According to her, the loss of industrial facilities in Mariupol and other occupied territories, where products were manufactured according to Ukrainian standards (e.g., steel of certain strength classes, hardware), has effectively made it impossible to continue using many of the DSTU. At the same time, such products are not manufactured in EU countries, and their import from Russia is unacceptable for political and security reasons.

In this regard, at the end of 2022, the national standardization body of Ukraine adopted more than 20 thousand European standards, and from January 1, 2023, **the Law of Ukraine "On the Provision of Construction Products on the Market" came into force**, which implements the requirements

⁶⁸Green Paper "Parametric Standardization in Construction", Office of Effective Regulation BRDO, 2020, <https://brdo.com.ua/wp-content/uploads/2024/06/14-ZK-Parametrychne-normuvannya-v-budivnytstvi.pdf>

EU Technical Regulation No. 305/2011. This means that from 2026, after the repeal of the 2006 technical regulation, the requirements for construction products in Ukraine will be fully aligned with European ones.

On July 9, 2024, a Colloquium on the topic "Implementation of the Second Generation of Eurocodes in Ukraine" was held in Ukraine, which brought together representatives of the Ministry of Infrastructure, technical committees, specialized research institutions, universities, as well as design and self-regulatory organizations. The participants discussed the experience of applying the first generation of Eurocodes and came to a common conclusion: **at the stage of implementing the second generation, the use of DBN should be finally terminated and the design should be switched to exclusive Eurocodes.** The transition period is expected to last 2–3 years.

However, as of June 2025, the Ministry of Infrastructure has not yet prepared a draft amendment to the Cabinet of Ministers' Resolution No. 547, which would legally establish a two-year deadline for such a transition. *"This slows down the introduction of a single regulatory system and creates uncertainty for the market," explains Anna Gontarenko. She adds that the mass application of Eurocodes, in particular in the design of infrastructure facilities, is still ahead. "It requires the completion of the development of national annexes to the Eurocodes, the coordination of regulatory and technical documentation, and the introduction of relevant amendments to the current legislation."*

An interesting example of the transition to Eurocodes can be Kazakhstan, which, by political decision, switched from Soviet-Russian SNIPs to Eurocodes from 2021⁶⁹. Professor, Doctor of Technical Sciences Volodymyr Semko is well versed in Eurocodes, because he has been teaching them to students at the Poznan Polytechnic University (Poland) for many years. He says that at one time he prepared manuals for the Eurocodes for Kazakhstan. And he adds that even Russia at one time planned to switch to the Eurocodes, and Belarus even switched: *"The Belarusians stopped the operation of SNIPs, switched to the Eurocodes, worked like that for several years, but then, due to political circumstances, they refused. The first time I got acquainted with the Eurocodes in the form of translations for Belarus, under the TPK EN index. Somewhere in 2009, I read these Belarusian versions," says V. Semko.*

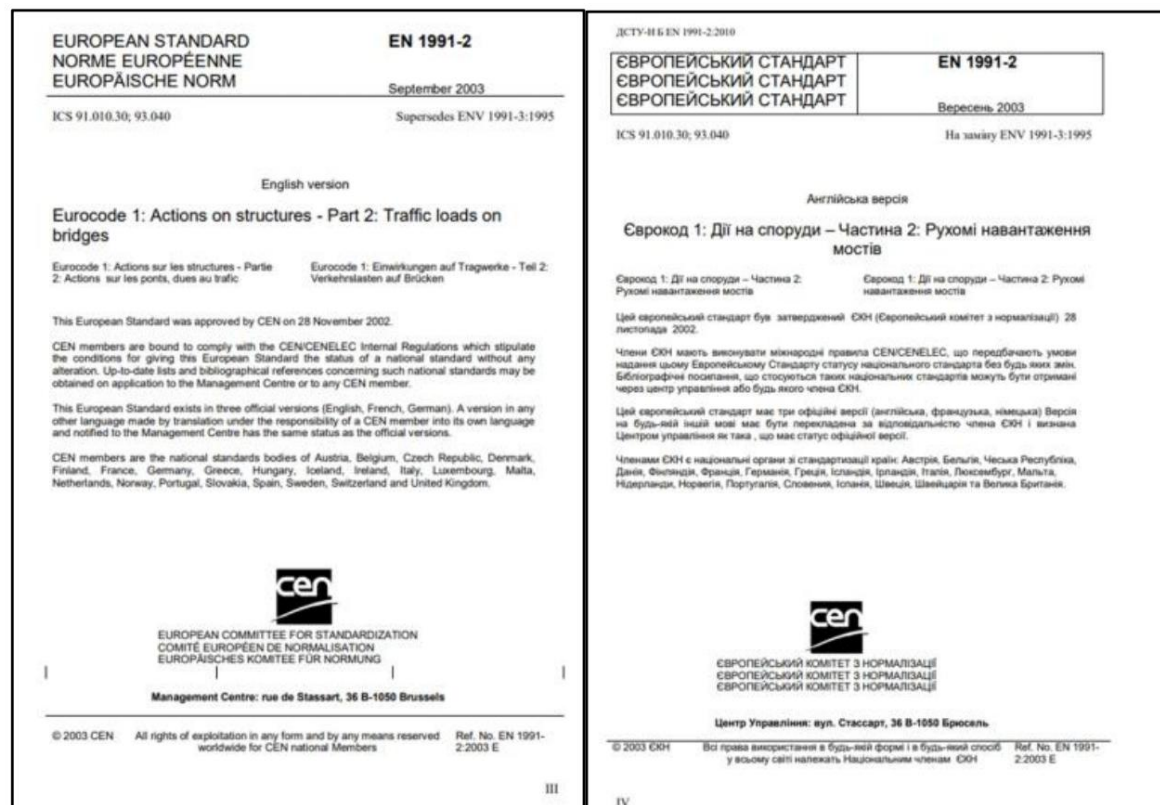
Engineers say that modern DBN requirements are generally close to Eurocodes, one might say harmonized. Yuriy Lototsky, who has been designing bridges since 2011, says that when it comes to the level of loads, DBN and Eurocodes are on the same level, and in some cases even our design loads are higher. That is, there is no such problem that our recently built bridges will not meet Eurocodes in terms of stability and strength. *"Ukraine once took a very important step in 2006 in the updated DBN. In Russia, SNiPs were changed at that time, they went to the load A-14 and NK-100. In our country, thanks to people like Petro Koval, Albert Lyashchenko and*

69 "In 2020, Kazakhstan fully switched to Eurocodes": <https://okna-kz.com/news/20210129/v-2020-hodu-kazakhstan-polnostyu>

"Otherwise, even then the A-15 load was accepted, close to the Eurocodes, and not from SNIP," says bridge engineer Yuriy Lototsky.

The interlocutor concludes that bridges built according to modern DBN, with A-15 and NK-100 loading, will comply with the Eurocodes in terms of load level. And older bridges that were built before 2006, before the adoption of DBN, still do not comply with either our DBN or the Eurocodes.

Fig. 17. One of the Eurocodes translated and approved in Ukraine, which is not used for bridge design



Experts agree that Ukraine's transition to Eurocodes is necessary, and the sooner the better. Yuriy Lototsky: *"I consider Ukraine's transition to Eurocodes mandatory. This does not cancel all DBNs, because, for example, the requirements for road design, territorial planning - they are not in the Eurocodes, they will be Ukrainian. The transition is undeniable, it is only a matter of time. Maybe we just need to take it and "break it at the knee". By the way, our neighbor, Belarus, did this at one time. They once had one fine day, and from the first day only Eurocode70 was valid for them. And they learned very quickly."*

⁷⁰ Note: this is 2015, Eurocode 2.

Professor Volodymyr Semko expresses a similar assessment in an interview: *“I believe that we must definitely switch to Eurocodes. Because the national branch has already outlived itself. The transition to Eurocodes, I believe, should not be evolutionary, but revolutionary. A political decision was made, that's all. The transition period is a maximum of a year, and after a year - that's it, that's all,”* says Mr. Semko.

Experts consider fears that Ukrainian design organizations will not be able to adapt and learn to calculate in a new way to be unfounded. Volodymyr Semko answers the question of whether it is difficult for a Ukrainian engineer to master the Eurocodes: “I do not see any problems in learning something new. Engineers, in general, are lifelong learners. In this field, it is impossible to stand still and not learn, to relearn. Because progress does not stand still, not only technologies but also norms change. On the contrary, in Ukraine, the variability of norms is much higher than in the European Union.”

He makes a comparison: in the EU, Eurocode-2 has been in effect for over 20 years, and the second generation will only be in effect from September 1, 2027. And in Ukraine, there have already been many changes during this time. “In 18 years, only the main standards have changed at least 5 times, and there are also dozens of other DBN that must be adhered to,” V. Semko says .

Negative impact on climate and environment

Carbon dioxide (CO₂) emissions are one of the key drivers of climate change, and their reduction is a priority task of the global community, enshrined in the Paris Agreement. Ukraine, as a party to it, has also undertaken commitments to reduce greenhouse gas emissions.

The construction sector is one of the largest sources of CO₂ emissions, responsible for around 25% of global emissions. The main reason is the use of energy-intensive materials, in particular cement and steel. These materials have a huge carbon footprint. Cement production accounts for around 8% of global CO₂ emissions , while steel accounts for around 7%. This high level of emissions is due to the significant energy consumption and chemical processes involved in their production. According to international studies, the production of 1 tonne of steel emits around 1.8 tonnes of CO₂. Some modern technologies can reduce this figure to 1.41 tonnes of CO₂ per tonne of steel, but this is still a significant amount of emissions. The production of 1 tonne of cement emits between 0.85 and 1.0 tonnes of CO₂ . The main contributor to emissions is the calcination of limestone, which releases CO₂ during the clinker formation process.

Bridges can have a negative impact on wildlife, and there are some recommendations for minimizing this. One important aspect is ensuring ecological continuity in wildlife habitats. For example, if a river valley contains natural migration routes for animals, the bridge design may include additional spans to ensure that not only the riverbed but also a strip of dry land (floodplain) remains under the bridge for the unhindered movement of animals. Although the assessment of the impact on

The environment is a mandatory part of project documentation in Ukraine, the real impact on wildlife is subject to separate study and analysis.

Bridges can also affect the quality of water in rivers and lakes, which is especially relevant for Ukraine, where a significant part of old bridges does not have a drainage system. In such cases, rainwater flows directly into the water body, carrying with it pollutants: road dust, solid particles, oil products and heavy metals that accumulate on the roadway. To reduce this impact, modern bridges are equipped with wastewater collection and treatment systems that allow filtering pollution before discharge into water bodies. In recent years, requirements for these solutions have also appeared in Ukraine, but their real and long-term functioning requires operational maintenance - maintaining the integrity of pipes, cleaning filters. As described above, there are big problems with the operational maintenance of bridges in Ukraine.

An example of structures that have a positive impact on the environment are ecoducts (or green bridges) - special crossings designed to connect the natural habitats of animals separated by transport routes. Ecoducts help restore migration routes, reduce the risk of road accidents involving wild animals and contribute to the preservation of biodiversity. In Germany, France and the Netherlands, ecoducts are actively introduced into road construction, while they are absent in Ukraine. In recent years, the first such facility has been planned and designed as part of the future northern bypass of Lviv.

The closure of the Ukrainian market for players from the EU

Both Polish and German engineering firms, whose managers were interviewed as part of the study, are interested in working in Ukraine, are ready to invest and open design offices. However, all note the isolation and incomprehensibility of the Ukrainian market, and of course, mention stories about the high penetration of corruption.

Representatives of progressive Ukrainian engineers also see value in joining the single European market. *"Ukraine is politically moving towards the EU, and the EU means one market, one standards. We sell our products there, and they sell theirs to us. We cannot keep our market isolated. The design market should also be open and competitive,"* says Yuriy Lototsky. *"Now no one from Europe will be able to design here according to our DBNs, and why is that? This is unfair competition. There should be more competition, because it means progress, development. Who lives better - Europe or us? Everyone can intuitively say that in Europe the quality of goods and infrastructure is generally better than in ours, including bridges."*

He notes that he and other familiar engineers would be interested in entering the EU market themselves: *"I personally would be interested in designing abroad, for the EU market. We have talked with various colleagues, for example in Poland, their earnings are an order of magnitude higher than ours. Therefore, the transition to Eurocodes will open up such opportunities for our engineers, our companies."*

Practicing engineers note that the transition to Eurocodes is a necessary condition for European integration, but not a sufficient one. *"I consider it mandatory for Ukraine to transition not only to Eurocodes, but also to standard contracts, such as Fidic,"* says Polish engineer Krzysztof Wachalski. He argues that it is thanks to standard contracts that engineering, consulting, and construction companies from the EU can confidently work in other countries, avoiding the risks associated with the peculiarities of local legislation, complex systems of related norms, as well as corruption risks. The fact that tenders should be international and fair is also a mandatory expectation.

Conclusions and recommendations

Conclusion 1. Operational maintenance and preservation of existing bridges should prevail over the construction of new ones

The situation with the technical condition of bridges in Ukraine has become catastrophic due to the lack of proper maintenance. As a result, the life cycle is sharply reduced even in relatively new structures, and in older bridges, defects become destructive. Inadequate operational maintenance is manifested in failure to meet the deadlines for scheduled work or in general ignoring these works, financing these works on a residual basis, and insufficient human and material and technical resources in organizations and units responsible for these works. In order for the bridge crisis to be resolved in a sustainable manner, priority in public administration and financing should be given to the preservation and proper management of existing assets before creating new ones. Otherwise, Ukraine faces a scenario where even "fresh" bridges built in 2018-2025 will reach the 4th state after 20-30 years of operation instead of the estimated 80-100 years.

- **Recommendation 1.1. Introduce asset management, starting with inventory and survey of bridges.** At the level of state decisions, supported by funding, it is necessary to collect and enter into the database "Analytical and Expert System of Bridge Management (AESUM)" up-to-date information on all bridges on the balance of all balance holders as soon as possible. Reasonable exceptions are temporarily occupied territories and combat zones.

- **Recommendation 1.2.**

Provide targeted funding from the state budget or international sources to cover the costs necessary to create an effective asset management system, including collecting and updating information about objects, surveys, maintaining the database, connecting balance holders of all levels to it, and strengthening organizational capacity (training, education).

- **Recommendation 1.3. Introduce a state-level moratorium on the implementation of new projects for the construction of bridges, overpasses, and overpasses and underground pedestrian crossings if the balance sheet holder has bridges in the 4th and 5th operational states or bridges whose current state is unknown (with rare exceptions).**

Conclusion 2. It is necessary to identify strategically important bridges from a transport point of view and prioritize them over other objects

As this study describes, not all bridges are equally important. In Ukraine, at the level of the regulatory framework and political practice, there is no grouping of bridges according to strategic importance. First, this makes it impossible to truly prioritize management attention and limited funding. Second, it shifts the focus of attention from the preservation and restoration of the most important bridges to the construction of new, more “simple” facilities. Third, it leads to excessive design decisions and overspending on secondary (non-strategic) bridges, since they have the same parameters and estimated service lives as strategic bridges. As a result of the lack of division into strategic and all other, limited resources of the state and local balance-keeping organizations are dispersed over numerous low-importance facilities, while the condition of strategically important facilities deteriorates in a non-linear progression.

• **Recommendation 2.1.**

Introduce criteria and practices for determining strategically priority bridges. The criteria should include the current volume of traffic load, the predicted transport and economic consequences of decommissioning the bridge (determined and calculated mathematically, including through modeling), the possibility and expected cost of organizing an alternative connection (e.g., a temporary structure or an overpass).

• **Recommendation 2.2.** Ensure prioritization of expenditures on bridges and overpasses from budgets of all levels and international programs: first of all, for operational maintenance of existing facilities, secondly, for restoration work on strategically priority existing bridges (overhaul and reconstruction), and thirdly, for the construction of strategically priority new facilities (for example, bridges across the Dnieper and Southern Bug).

• **Recommendation 2.3.** Introduce a moratorium on design and construction road overpasses, road junctions at different levels, overpasses and underpasses in places where traffic can be efficiently and safely organized at one level (traffic light regulation, roundabouts). If such existing facilities are in the 5th operational state, they should be dismantled and replaced with a single-level solution instead of reconstruction or major repairs.

Conclusion 3. Planning and research should be a separate pre-project stage of investment preparation before the development of design and estimate documentation.

Ukraine should introduce a separate stage of project planning (feasibility study) and carry out this planning qualitatively, in accordance with modern world practices. This stage should precede the stage of development of project documentation. The current absence, insufficiency or formality of technical and transport planning at the feasibility study design stage leads to erroneous strategic decisions that are costly to society and the state. For example, new bridges are sometimes built where there is no objective need, or they provide for suboptimal transport solutions. The planning stage should be carried out with broad involvement of stakeholders, and the results of the research are published and discussed. Based on the results of the Feasibility Study, authorized persons make a political decision on which solution option is appropriate to approve for advancement to the next stage, and the study forms a technical task for the detailed design, which is implemented by architects and engineers.

- **Recommendation 3.1.** Abandon the feasibility study (FE) and the feasibility calculation (TER) as design stages in the DBN. Instead, introduce norms that allow the customer to conduct various types of preliminary feasibility studies of infrastructure projects (Feasibility Study and others), taking as a model the experience of IFOs and international development programs, as well as successful practices of EU member states.

- **Recommendation 3.2.** When regulating the planning stages of project preparation, apply parametric and target-based methods of regulation, rather than the regulatory method. Take international guidelines and practices as a basis, in particular, typical requirements and criteria for similar studies in projects of the World Bank, EIB, EBRD, GIZ , etc.

- **Recommendation 3.3.** Abolish outdated regulations and discontinue the practice of settlements forecast traffic load, based on the hypothesis of constant and lifelong growth of automobile traffic flows on all streets and roads of Ukraine without exception. Switch to practices and methods for calculating traffic flows, coefficients of reduced units, tools for forecasting and modeling traffic flows, assessing the impact on road safety, etc., common in the EU and at the local level in Ukraine .

Conclusion 4. Ukraine should complete European integration in the bridge industry by switching to European approaches and regulatory regulation Despite

the declared political intentions of integration into the European space and the steps taken since 2005, as well as the status of a candidate for accession to the European Union (since 2022), Ukraine's transition to EU approaches and technical standards remains incomplete. Bridges are still designed not according to European standards, but according to the standards of the Ukrainian branch of national technological traditions. The priority of the parametric method of standardization over the regulatory method, enshrined in the Law of Ukraine "On Construction Standards", is not implemented in practice - bridges are designed according to regulatory standards. Ukraine should make a political decision to switch to Eurocodes (EN) for the calculation of structures, as the post-socialist countries of Europe and recently even Kazakhstan did at one time. The engineering and construction industries are quite capable of coping with this transition, and it will open up opportunities for them to start working in a single coordinate system with colleagues in Europe.

- **Recommendation 4.1.** Establish the mandatory use of Eurocodes as the only possible standards for structural calculations in bridge design for all projects starting from a specific date, for example, January 1, 2027. Require customers to include this requirement in the technical specifications, and the Ministry of Development and Infrastructure to update and approve the necessary technical documents.

- **Recommendation 4.2.** Move from the prescriptive (directive) method of standardization in bridge construction to a parametric method that will encourage the use of innovative architectural and engineering solutions based on world practice. Develop guidelines for selecting design solutions based on an assessment of effectiveness, and not only compliance with formal requirements.

- **Recommendation 4.3.** In the absence of regulatory regulation in Ukraine of a certain aspect of preparatory, survey or design work, legally allow

application of national standards of one of the EU Member States listed as best practices (Examples: Poland, Germany, Czech Republic , Lithuania, France, Spain, Italy, Sweden, Denmark).

Conclusion 5. Ukraine should integrate into the single European market for bridge planning, design and construction The

national branch of standardization of the Ukrainian bridge industry leads to the isolation of the Ukrainian market for bridge planning, design and construction and contradicts Ukraine's political and economic course towards joining the EU and the European single market. The current regulatory framework is a barrier to the participation of EU companies in the provision of services and performance of works in Ukraine, even in partnership with local companies. This "regulatory wall" also makes it difficult for Ukrainian engineers and companies to work on foreign projects, since Ukrainian specialists and companies, with few exceptions, do not have a track record of designing according to Eurocodes.

- **Recommendation 5.1.** Initiate an annual international conference on the Ukrainian bridge industry with the participation and funding of international partners. To invite to the conference heads of balance-keeping organizations of all levels from Ukraine and the EU, research, design, expert and consulting organizations, engineering and construction companies from Ukraine and the EU, media and civil society organizations. To publish openly the materials of the conference, including video recordings of the speeches.
- **Recommendation 5.2.** Under the political leadership of the Minister of Community and Territorial Development of Ukraine and with the support of international partners, plan and implement a separate "track" of bridge projects that will be planned and implemented according to European standards and approaches. Invite consortia with companies from EU countries and Ukraine to participate. The first projects, free from corruption and implemented in a public manner with high-level political support, will allow to verify and increase the interest of EU business in bridge projects in Ukraine, create the necessary experience and understanding of the processes and content of services and works, and help to update Ukrainian standards based on the principles of European integration and the parametric method of standardization.
- **Recommendation 5.3.** Secure international funding from partner governments and funds and support (reconstruction) programs for Ukraine to conduct the first international tenders and implement the resulting projects, which can be implemented either by Ukrainian construction companies or international consortiums.

Terms and abbreviations

This publication is aimed at a wide interested audience, which is not necessarily familiar with industry terminology in detail. For a better understanding of the content of the publication, the meaning and explanation of the terms and abbreviations used in the analytical report are given. These formulations do not necessarily correspond literally to the definitions in the norms and standards of Ukraine, but their content is preserved.

Bridge - a transport structure designed to pass over obstacles for rail, road transport, pedestrians and communications of various purposes;

Bridge crossing - a complex of structures consisting of a bridge (several bridges), approaches and other transport and hydraulic structures;

Overpass - a transport structure (bridge) over a railway, road or street;

Viaduct - a transport structure that crosses a gorge or other natural depression;

Span - a part of a bridge structure that covers the space between two adjacent supports;

Overpass – a multi-span structure built instead of an embankment or to use the underpass space for various purposes;

Roads of state importance – highways that provide interregional, international and national transport connections. They are divided into international (M), national (N), regional (R), territorial (T).

Roads of local importance – highways that provide transport connections within the same region or between individual settlements. They are divided into regional (O) and district (S).

Streets and roads of settlements – a street and road network of cities, towns and villages that ensures the movement of transport and pedestrians within the settlement;

State Reconstruction – the State Agency for the Restoration and Development of Infrastructure of Ukraine, established in 2023 on the basis of the State Agency of Roads of Ukraine (“Ukravtodor”);

Ministry of Infrastructure – the central executive body responsible for transport infrastructure in Ukraine (the Cabinet of Ministers of Ukraine changed the name and scope of powers of this body several times in 2021-2024);

NIRI – State Enterprise “National Institute for Infrastructure Development” (until 2023 - State Enterprise “Shulgin State Research and Development Institute”);

DBN – State Construction Standards of Ukraine;

DSTU – State Standards of Ukraine;

SDR – Road Traffic Rules of Ukraine

EN – European standards.
