

ВЕРНОВАТИ ЗВІТ ЗА ПРОЕКТАМИ:

КАНАЛІВ ПЕМОТІ ВІД НАЗВАННЯ
КІЛЬКІСТЬ ПОПОВНЕННЯ

КАНАЛІВ ПЕМОТІ ВІД НАЗВАННЯ
М. КИЇВ: БУД. АРМА-АТЛАНТИКА БІЛІ БУДІВЛИ
НАЗВА "КО" БУД. ПІДПИСАНО

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LIST OF ABBREVIATIONS AND TERMS

CoST (Infrastructure Transparency Initiative) – a voluntary initiative involving a wide range of stakeholders, designed to ensure transparency and accountability in construction projects funded by public money.

CMU – Cabinet of Ministers of Ukraine.

KMDA – Kyiv City State Administration.

Kyivavtodor Municipal Corporation – Kyivavtodor Municipal Corporation is the successor to the Kyiv Municipal Association for the Operation of Motorways and Structures.

DBN – State Building Standards of Ukraine.

DSTU – State Standard of Ukraine.

General Conditions – general conditions for the conclusion and execution of contracts in capital construction, approved by Resolution of the CMU No. 668 dated 01.08.2005.

Roadbed – the soil structure of a motorway.

Longitudinal profile of the road – a cross-section of the roadbed by a vertical plane passing through the axis of the road.

Transport and operational properties of the road – a set of indicators that ensure compliance with applicable building codes and standards.

TU – technical conditions.

SMA – stone mastic asphalt.

PKD – design and estimate documentation

VERIFIERS

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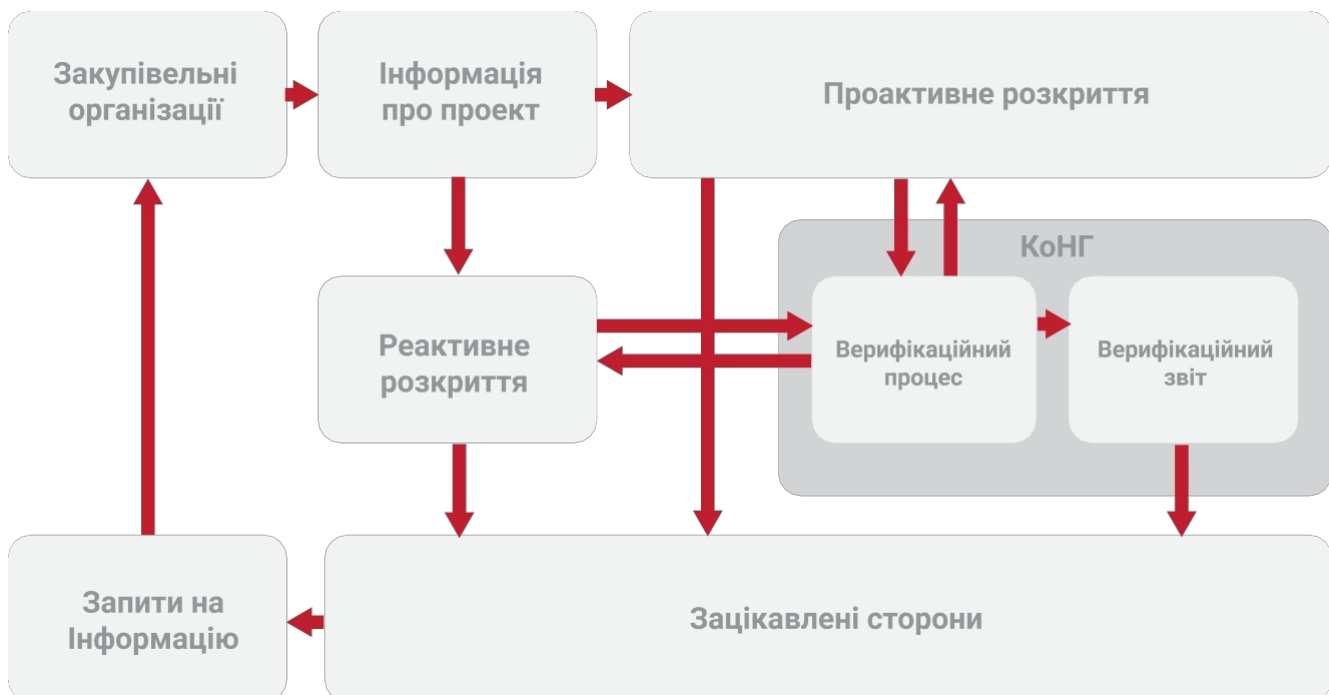
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COST

The goal of CoST is to create an effective platform for cooperation between the government, business and civil society, which will enjoy a high degree of public trust and open up practical opportunities for transparent and clear information disclosure, public control and data verification in the construction sector. The functioning of CoST should ensure:

- the creation of conditions for the long-term functioning of the platform;
- strengthening of equal partnership between the government, business and the public sector for effective monitoring and oversight of public spending and technical standards in the construction sector;
- the identification and support of independent expertise necessary for the ongoing implementation of monitoring and verification procedures in Ukraine;
- using best international practices in data publication and verification through the integration of CoST principles and approaches, and using the support and advice of experts from the CoST International Secretariat.

“Data disclosure” within the framework of CoST projects (Fig. 1.1) refers to the publication of objective, disclosed data provided by purchasing organisations that are customers of construction/renovation works.



Proactive disclosure refers to data that procurement organisations are required to disclose about projects and contracts at specified stages during the relevant project cycle. The information is presented in a clear and accessible format, publicly disseminated, and open and accessible to a wide range of stakeholders.

1. Project stage	Project information	2. Contract stage	Contract information
Project identification	Project owner Site, part of site Project name Project location Project objective Project description	Procurement	Procurement organisation Contact details of the procurement organisation Procurement process Contract type Contract status (current) Number of tender participants Cost according to estimate Contract management organisation Contract name Contractor Contract price Scope of work under the contract Start date and deadline for completion of work under the contract
Project preparation	Project content (main conclusion) Environmental impact Resettlement plan Contact details Sources of funding Project budget Date of approval of the project budget		
Project completion	Project status (current) Cost of work (according to the project) Date of completion of work (according to the project) Scope of work (according to the project) Reasons for project changes Links to financial audit reports Project review	Implementation	Contract price changes Contract price escalation Changes in the terms of work performance Changes in the scope of work Reasons for price changes Reasons for changes in the scope and deadlines for work

Reactive disclosure involves providing additional information in a form accessible to the requesting party and posting this information on public resources.

Project

Identification and preparation

Multi-year programme and budget
Project description or feasibility study
Environmental and social impact assessment
Resettlement and compensation plan
Project managers and their functions
Financial agreement
Procurement plan
Project approval decision

Completion

Project progress reports
Decision on budget changes
Project completion report
Project evaluation report
Technical audit reports
Financial audit reports

Contract

Procurement

Persons responsible for the contract and their functions
Procurement method
Tender documents
Results of tender evaluation
Project preparation report

Contract

Contract agreement and terms
Registration and ownership of companies
Specifications and drawings
Implementation
List of variations, changes, amendments
List of price increase approvals
Quality assurance reports
Sampling records or payment certificates
Contract amendments

Reactive disclosure

In preparing the verification report, we reviewed documents available in the public domain on the Internet, data provided in response to verifiers' requests and individual requests sent by email, as well as information provided by Kyivavtodor.

The results of the verification of the data received for the projects are summarised in the tables provided in Appendices 1 and 2 of the electronic version of the report.

VERIFICATION REPORT

for the project
"Major repair of the
road surface of the
Ring Road "

SUMMARY OF THE PROJECT

The Ring Road in Kyiv is one of the busiest arterial roads with high traffic intensity, which as of 2013 required repair of the road surface, bringing the strength of the road structure up to modern standards, and restoration of drainage.

The project for the major repair of the Ring Road was developed in accordance with the decision of the Kyiv City State Administration No. 982 dated 17 June 2013.

As part of the major repair of 6.071 km of road surface, the following is planned:

- 1) widening of the carriageway in certain sections;
- 2) replacement of concrete kerbstones on the building side with natural stone kerbstones;
- 3) installation of kerb profiles at traffic turning points;
- 4) overhaul of pavement along the roadway;
- 5) overhaul of outdoor lighting with replacement of reinforced concrete supports with metal ones;
- 6) replacement of outdoor lighting control cabinets and power cables;
- 7) overhaul of storm drains and rearrangement of storm drain pipes in places where the roadway widens;
- 8) organization of traffic with the installation of metal barrier fences along the road;
- 9) replacement of existing reinforced concrete barrier fences with metal ones;
- 10) installation of new road markings;
- 11) dismantling existing metal arches for information boards, whose supports were affected by the widening of the carriageway;
- 12) landscaping and greening of the area adjacent to the pavements and the dividing strip.

The service life of individual elements is 10 years. The implementation of the project made it possible to improve transport services, increase the traffic capacity of the street, renovate the storm sewer system, and improve and landscape the adjacent area.

Final cost of the project: UAH 332,209,976.26

Completion date: 30 November 2017. Status: Completed

Design and author supervision: Kyivproekt Design Bureau LLC 1,074,021.13 UAH General contractor: Onur Construction International LLC 396,504,096.00 UAH

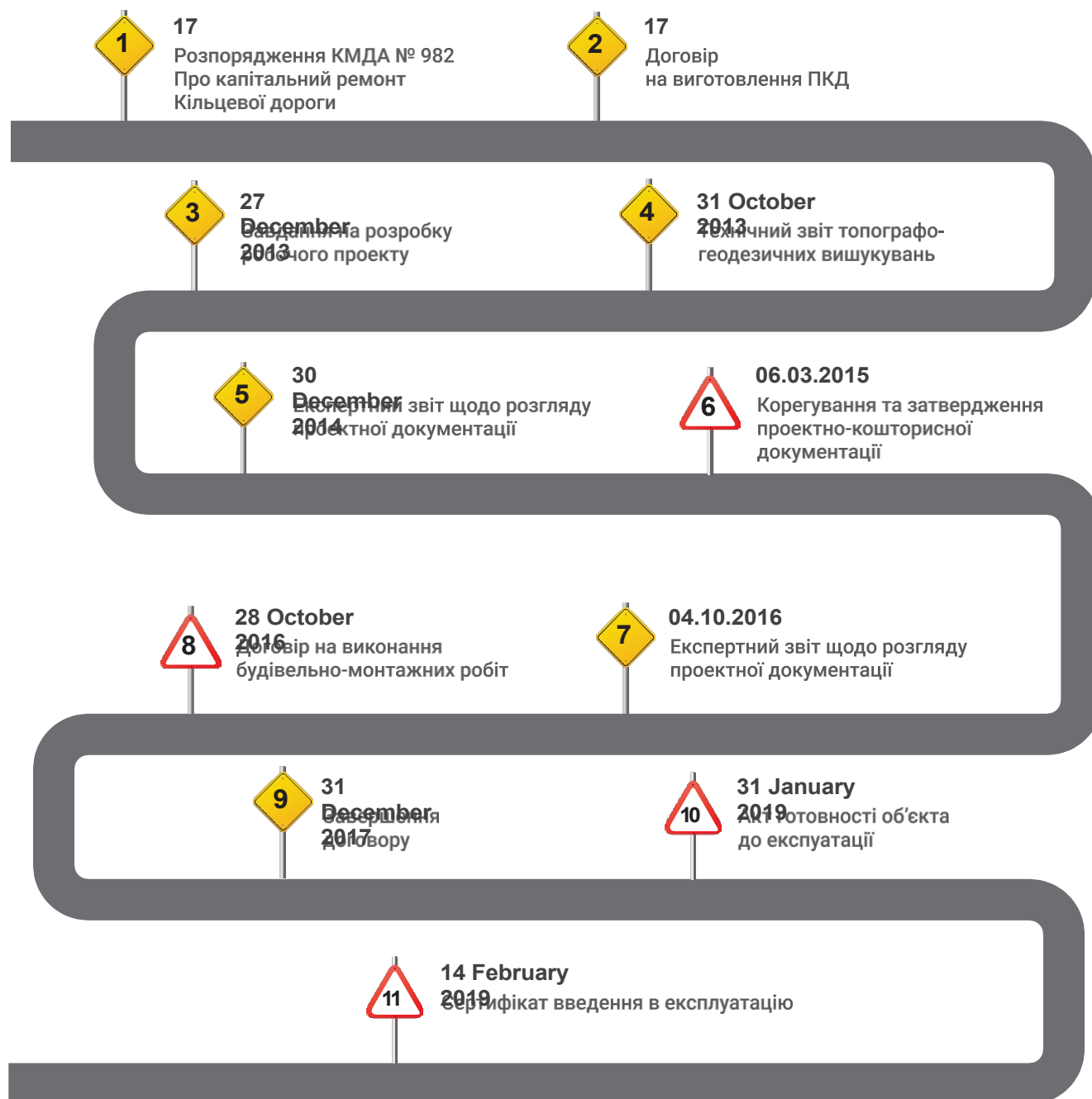
Final cost of construction and installation works: UAH 330,931,435.16

Expert review of cost estimate documentation: State Enterprise "Ukrderzhbudekspertiza" 204,519.97 UAH

The project was implemented with funds from the Kyiv City State Administration, with Kyivavtodor acting as the customer.

PROJECT LIFE CYCLE:

Overhaul of the road surface of the Ring Road



Technical characteristics of the facility

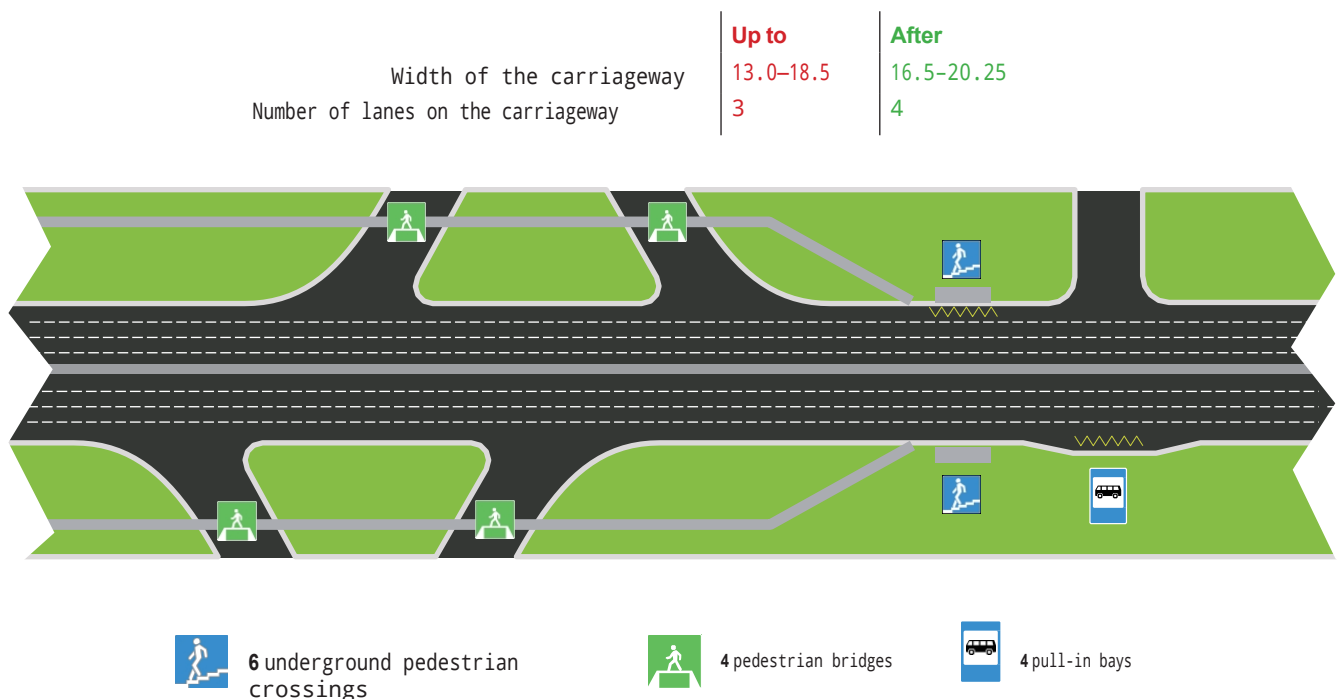
NAME OF INDICATORS	RING ROAD	
	BEFORE REPAIR	AFTER CAPREMONT
Type of construction	major repairs	
Street category	Main street of citywide importance with continuous traffic	
Length	6.070 km	6.070 km
Width of carriageway (including emergency lanes)	13.0–18.50 m	16.50–20.25 m
Number of lanes on the carriageway	3–4 lanes	4–5 lanes
Lane width	3.75 m	3.75 m
Safety lane width	0.75 m	0.75 m
Area of the carriageway (including safety lanes)	201,413 m ²	226,137 m ²
Total road surface area	249,135 m ²	
Sidewalk area	29,581 m ²	33,517 m ²

The Ring Road is classified as a major thoroughfare of citywide importance with continuous traffic. The land plot on which the Ring Road is to be overhauled is located entirely within the red lines and belongs to the city's engineering and transport infrastructure.

According to calculations, the traffic intensity of various types of transport on the Ring Road prior to the repair was 105.1 thousand equivalent units in both directions per average day on the section of maximum load (from Peremohy Avenue to Zhmerynska Street), according to forecasts of the comprehensive transport scheme, by 2020 it will be 115.3 thousand equivalent units per average day in both directions.

The length of the Ring Road undergoing major repairs is 6.071 km. The width of the carriageway before the repair ranged from 13 to 18.5 m, after the repair it is 16.50 m – 20.25 m with 4 lanes (lane width 3.75 m) and 0.75 m safety lanes on both sides of the carriageway. In addition, the median strip in the field profile sections will have a reinforced shoulder with grass planting 1.0 m wide. The design of the Ring Road pavement takes into account the major repair of the existing pavement and new pavement on the carriageway extensions.

A major city street with continuous traffic



A one-sided barrier fence has been installed along the entire dividing strip. The existing fence, which was unsuitable, has been replaced.

Due to the rapid deterioration of reinforced concrete barriers on city streets, a decision was made to replace the barriers along the carriageway on the section from Peremohy Avenue to the beginning of the median strip with double-sided metal barriers.



To create a barrier-free living environment for people with limited physical abilities and other low-mobility groups, the kerbs at organised pedestrian crossings have been lowered to 2.5 cm.

As part of the project, the pavement covering was restored, with a total area of 33,517 m².

One new turning pocket has been constructed, two existing ones have been expanded, and one existing one has been preserved. A total of four turning pockets have been constructed.

There are six underground pedestrian crossings on the site at the junction of Sim'i Sosninykh, Litvinenko-Volgemut, Zhmerynska, Yantarna, Verkhovynna streets and in the area of the Elektronmash plant.

Four pedestrian bridges have been built over the road junctions at the intersection with Peremohy Avenue.

A brief overview of the main stages of the project

Design

The project documentation for the "Capital repair of the road surface of the Ring Road" was developed on the basis of the order of the Kyiv City State Administration dated 17 June 2013 No. 982.

The design organisation was selected without a tender procedure, the designer was Kyivproekt Design Bureau LLC, agreement No. PBK-1317 dated 17 October 2013.

The term of performance of works under the contract: October 2013 - January 2014, the cost of performance of works is UAH 944,241.13.

Four additional agreements were concluded, including additional agreement No. 2 to extend the term of performance. The contract was fully performed and paid for, the actual term of performance was December 2014, which is 11 months longer than the planned term (January 2014).

Based on the results of the design and estimate documentation, the State Enterprise "Ukrderzhbud-ekspertiza" provided a **positive expert report** No. 00-0914-14/PB dated 30 December 2014.

The design and estimate documentation was approved on the basis of the order of the Kyiv City State Administration dated 06.03.2015 No. 203. In 2016, the project was revised, and the final version of the design and estimate documentation received a positive expert report from the State Enterprise "Ukrderzhbudekspertiza" dated 4 October 2016 No. 28-0444-16-A.

Construction and installation works

The procurement of major repairs to the road surface of the Ring Road was announced

05.09.2016

Procurement code in Prozorro: UA-2016-09-05-000106-a.

Expected cost: UAH 399,100,000.00.

Three bids were submitted for participation in the tender, one of which was submitted by a non-resident (Az-Inshaat LLC) and was rejected at the pre-qualification stage. There were no complaints about this procurement.

Two companies participated in the auction on 13 October 2016:

Participants	Expected cost	Initial bid,	Price reduction, %	Final offer, UAH including VAT
ONUR Construction International	399,100,000.00	398,499,600.00	0.65	396,504,096.00
LLC Rostdorstroy	399,100,000	399,000,000.00	0.025	399,000,000.00

ONUR Construction International LLC reduced its price by UAH 1,995,504.00 in the first round. Thus, the difference between the expected cost and the winning bid was 0.65%.

On 28 October 2016, Kyivavtodor and ONUR Construction International LLC signed a contract for UAH 396,504,096.00.

The minutes of the review of the results of the electronic auction were signed and published on 14 August 2017 (No. 21/118-2).

Term of work completion: 14.5 months after signing the Agreement During the

term of the agreement, 5 amendments were made to it, including:

- Supplementary Agreement No. 4 amended the schedule, reducing the deadline for completion of the work by one month to November 2017;
- Supplementary Agreement No. 5 reduced the contract price – the contract value was reduced by UAH 65,572,660.84.

The final cost of the work is UAH 330,931,435.16.

Below is a table showing statistics on the Contractor's participation in procurement by Kyivavtodor.

Year	Participants	Number of wins	% wins	Amount of winning bids	Average % difference between expected value and contract amount
2016	ONUR CONSTRUCTION INTERNATIONAL LLC	3	100	601,774,496.40	0.96
2017	ONUR CONSTRUCTION INTERNATIONAL LLC	4	50	265,468,504.00	1.98
2018	ONUR CONSTRUCTION INTERNATIONAL LLC	1	25	418,500,000	0.45

Conclusions

The project is of great social importance for Kyiv: increasing the capacity of the Ring Road; increasing the average speed of traffic on one of the city's busiest thoroughfares.

Improvements to the structural strength and drainage system should ensure the effective operation of the road during the warranty period, which is 5 years for the asphalt concrete pavement and road base.

The CoST verification team provided a number of comments regarding inaccuracies and missing data in the design and estimate documentation, such as:

- the statement of intent and the environmental impact statement were not approved by the customer;
- there were no materials taking into account public interests (publications in the media, minutes of hearings, written and other documents regarding citizens' appeals);
- there are no calculations of the expected equivalent and maximum noise levels at the boundary of the nearest residential development from the construction and subsequent operation processes.

Despite this, the project can be considered successful.

During the preparation of the verification report, the Client established a new structural unit responsible for the qualitative analysis and acceptance of project documentation from the project organisation, which should resolve some of the comments that arose during the preparation of the report.

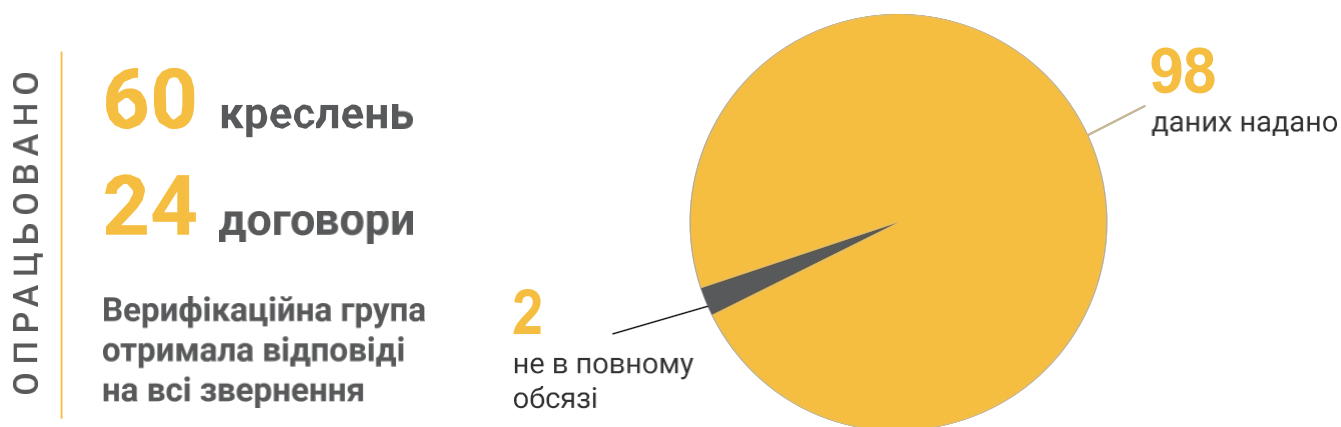
The CoST verification team drew the Client's attention to the time required for the State Architectural and Construction Inspection to process the permits.

Recommendations:

- conduct an analysis of delays in the approval of permits and the nature of the comments made by the permitting authorities;
- draw attention to the complexity of the process of obtaining permits, consider simplifying the approval process for important social projects.

% РОЗКРИТТЯ

Замовником самостійно розкрито **98%** інформаційних показників за проектом



As part of the reactive disclosure of information on the report "Capital repair of the road surface of the Ring Road," the verifiers reviewed the following documents:

- project documentation;
- cost estimate documentation;
- the buyer's tender documentation;
- tender proposals from participants;
- contracts with annexes;
- acts of completed works, customer service orders, etc.

The total number of contracts processed within the project is 24.

ANALYSIS OF PROJECT

To prepare the verification report, the design and estimate documentation for the project "Capital repair of the road surface of the Ring Road" was analysed, which was developed at the request of Kyivavtodor in 2013.

The project documentation is presented in volumes:

- Volume 1. General plan, relief organisation. Storm drainage. Landscaping and greening.
- Volume 2. Organisation of road traffic: permanent position and for the construction period.
- Volume 3. Outdoor lighting and power supply networks. Trolleybus contact network.
- Volume 4. Environmental impact assessment.
- Volume 5. Report on engineering and geological surveys.
- Volume 6. Technical report on topographic and geodetic surveys.
- Volume 7. Construction organisation.
- Volume 8. Local and object cost estimates.
- Volume 9. Consolidated cost estimate.

During the analysis of the design and estimate documentation, the following were:

- considered fundamental technological solutions;
- an analysis of the completeness of the documentation in accordance with the requirements of current legislation was performed;
- conclusions were drawn;
- recommendations were made.

The working draft of the "Capital Repair of the Ring Road Pavement" was prepared by Kyivproekt Design Bureau LLC on the basis of Order No. 982 of the Kyiv City State Administration dated 17 June 2013, the design task of Kyivavtodor approved by the first deputy head of the Kyiv City State Administration.

This project covers a section of the Ring Road between Peremohy Avenue and the entrance to Vyshneve, with a total length of more than 6 km, with two lanes and a dividing strip.

The ~~work~~ project provides for the major repair of the road surface of the Ring Road on the section from Peremohy Avenue to the entrance to Vyshneve, namely:

- major repairs to the road surface with the widening of the carriageway in certain sections, replacing the concrete kerbstones on the building side with natural stone kerbstones and installing kerb profiles at turning points;
- major repairs to the pavement along the carriageway;
- overhaul of outdoor lighting with replacement of reinforced concrete supports with metal ones, replacement of outdoor lighting control cabinets and ABVG power cables from TP to PV;

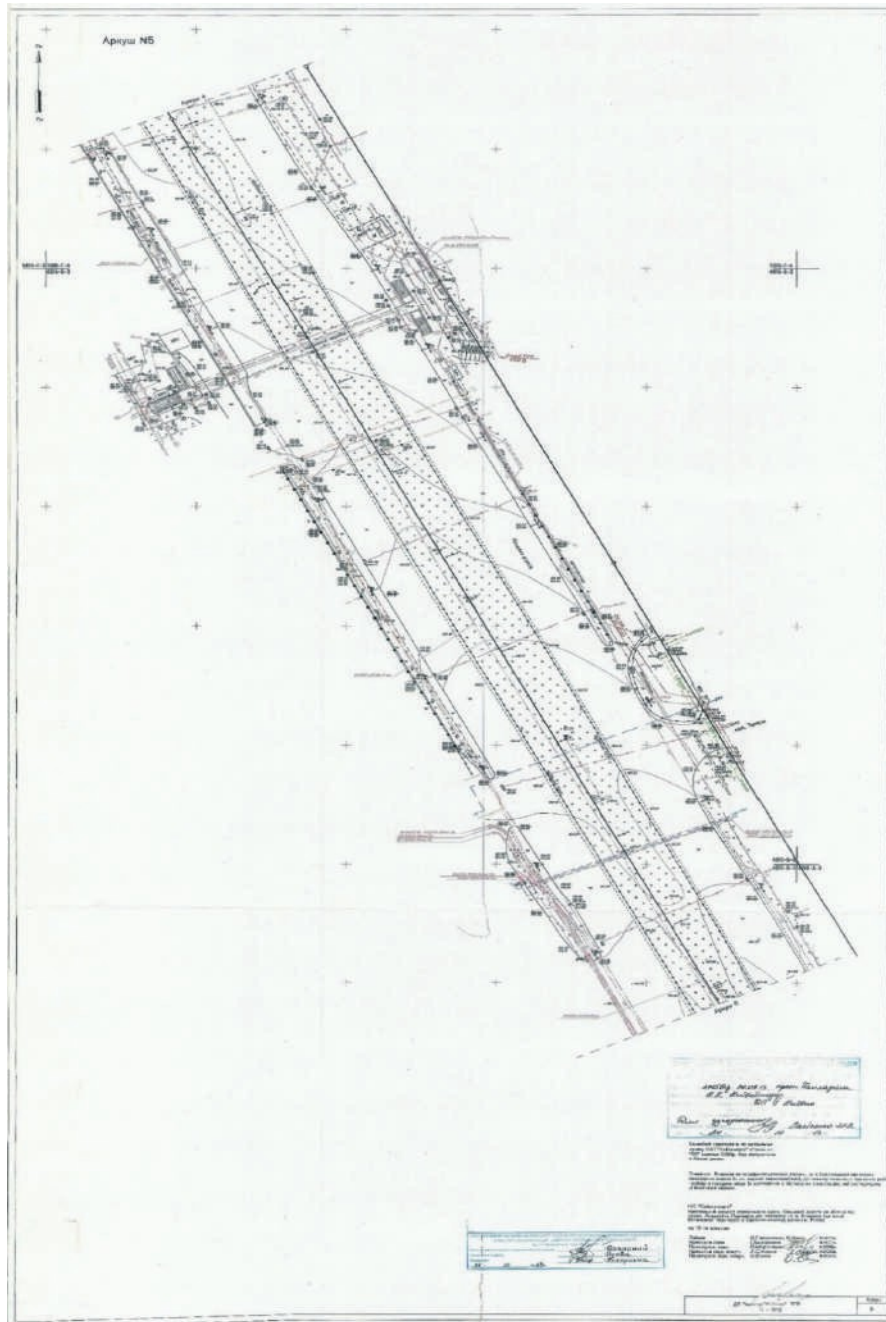
- overhaul of storm drains and rearrangement of storm drain pipes in places where the roadway is widened;
- organization of traffic with the installation of metal barrier fences along the road and replacement of existing reinforced concrete barrier fences with metal ones, installation of new markings, dismantling of existing metal arches for information boards, the supports of which fall under the widening of the carriageway;
- landscaping and greening of the area adjacent to the pavements and the dividing strip.

The project documentation for the "Capital repair of the road surface of the Ring Road" project was developed on the basis of:

- Order of the Kyiv City State Administration No. 982 dated 17 June 2013
- design assignment from Kyivavtodor;
- ~~Technical~~ Specifications No. 10/3899 dated 5 December 2013 of the State Traffic Police Department of the Main Directorate of the Ministry of Internal Affairs of Ukraine in Kyiv;
- Technical specifications No. 297-8-13 dated 12 December 2013 from Kyivavtodor for connection to the storm sewer system and construction of a vehicle access road;
- TU No. 15-2 dated 07.01.2014. Kyivmiskvitlo Municipal Enterprise for outdoor lighting electrical networks in Kyiv for the design of outdoor lighting electrical networks.

Engineering surveys

Technical and design solutions for the development of a project for the major repair of the road surface of the Ring Road were determined on the basis of a technical report on topographic surveys developed by Kyivgeo Institute LLC and approved by the Department of Urban Development and Architecture of the Kyiv City State Administration on 31 October 2013.



Topographic and geodetic surveys for dismantling and relocating utility networks on the section from Peremohy Avenue to the entrance to Vyshneve in the Sviatoshynskyi district of Kyiv

Existing provisions

This project covers the section of the Ring Road between Peremohy Avenue and the entrance to Vyshneve, with a total length of more than 6 km, with two lanes and a dividing strip.

There are six underground pedestrian crossings on the section of the Ring Road under consideration, located at the junctions with Sim'i Sosninykh, Litvinenko-Volgemut, Zhmerynska, Yantarna, Verkhovynna streets and in the area of the Elektronmash plant.



On the section from the start of the design (PC 0+8.90) to PC 5+58.00, the width of the carriageway varies from 17.0 to 17.5 m and has a 2.0 m wide dividing strip with a barrier fence made of reinforced concrete blocks. The side along the carriageway on the side of the buildings for a length of 400 m is made of natural stone.

On the section from PK 5+58.00 to PK 7+29.35, the width of the carriageway varies from 13.75 to 17.0 m with a dividing strip of variable width from 3.0 to 8.40 m. On the dividing strip on the even side of the Ring Road, there is a one-sided metal barrier fence and trolleybus contact network supports.

On the section from PC 7+29.35 to PC 37+30.80, the width of the carriageway varies from 13.50 to 18.0 m with a dividing strip, the width of which increases from 8.40 to 26.0 m and then decreases to 4.0 m. At the same time, starting from PK 19+12.25 to PK 33+78.00 on the odd side, and from PK 20+18.15 to PK 36+34.00 on the even side, a one-sided metal barrier fence is installed along the dividing strip. Within the limits of PC 16+50.00 - PC 19+17.55 and PC 25+00 - PC 28+00, traffic turns have been installed across the dividing strip. The turning radii are 8 m, and the width of the carriageway is 14.0-18.0 m. The carriageway of the turning lanes, traffic accumulation lanes, and the run-off and braking wedge are bordered by reinforced concrete kerbstones.

On the section from PK 37+30.80 to PK 60+62.00 (work boundary), the width of the carriageway varies from 13.50 to 17.50 m with a dividing strip from 4.0 to 25.50 m. A one-sided metal barrier fence is installed on the dividing strip. Within PK 42+24.55 - PK 48+31.80, PK 49+60.10 - PK 51+17.60 and PK 55+53.65 - PK 56+76.05, there are turning lanes across the dividing strip. The turning radii are 8 m, and the width of the carriageway is 9.0-14.0 m. The carriageway of the turning lanes, traffic accumulation lanes and the run-off and braking wedge are edged with reinforced concrete kerbstones.

Numerous junctions and exits/entrances to/from adjacent areas are located along the Ring Road. Some exits/entrances have transition-speed or accumulation gates. Some public transport stops also have stop "pockets". The width of the "pockets" is 1.5-2.0 m.

A trolleybus line operates on the section of the Ring Road from Peremohy Avenue (PK 0) to 50-Richchia Zhovtnia Avenue (GTK 39+50). On this section, the outdoor lighting poles have been replaced with metal ones and a trolleybus contact network has been installed. The trolleybus contact network poles are also located on the dividing strip, but without lamps. The outdoor lighting poles from 50-Richchia Zhovtnia Avenue (PK 39+50) to the end of the works (entrance to Vyshneve) are reinforced concrete. The outdoor lighting is powered by an underground cable. There are six underground pedestrian crossings on the section of the Ring Road under consideration. This project does not address the issue of major repairs to underground pedestrian crossings.

The median strip of the Ring Road is planted with trees and has a lawn, but due to vehicles driving on the median strip, the lawn has been completely destroyed in some areas.

Due to the relative flatness of the territory along which the Ring Road runs, the existing longitudinal profile complies with the standards for this category of street. However, the transverse profile of the road, where non-standard slopes occur (there are sections where there is no transverse slope at all, in places with small radii there are no turns, etc.), needs to be corrected.

e solutions

The ring road is classified as a city-wide arterial street with continuous traffic.

The calculated speed of a single passenger car according to DBN V.2.3-5-2001, Table 1.2, for main streets of citywide importance with continuous traffic is 100 km/h, and the calculated traffic intensity is 1,200 equivalent units per hour per lane. The traffic intensity on the Ring Road in the section of maximum load (from Peremohy Avenue to Zhmerynska Street) will be 9.2 equivalent units during the morning rush hour in both directions. Taking into account the average speed of traffic on the Ring Road - 60 km/h, the capacity is estimated at 9.6 thousand equivalent units per hour in both directions.

The length of the Ring Road in the section undergoing major repairs is 6.071 km. The width of the carriageway is planned to be 16.50 m - 4 lanes in each direction (lane width 3.75 m) and 0.75 m safety lanes on both sides of the carriageway. Taking into account the numerous junctions of side streets with the Ring Road, entrances/exits from the adjacent territory, their close location, the absence of local passages, etc., in order to organise an additional lane (transition-speed lane) on certain sections, a carriageway width of 20.25 m has been adopted, consisting of 5 lanes of 3.75 m each and lanes without

on both sides of the carriageway by 0.75 m. In addition, a 1.0 m wide roadside reinforced with grass sowing is provided on the dividing strip in sections of the field profile.

To improve traffic flow conditions at turning points and increase transition lanes, some existing turning points have been relocated. The turning radii are set at 8.0 m. However, taking into account the turning of large vehicles, the width of the carriageway at new turning points is set at 10.50 m, while the width of the carriageway at existing turning points is retained.

In order to prevent vehicles from driving onto the median strip, destroying the grass and creating dangerous situations, a one-sided barrier fence will be installed along the entire median strip, replacing the existing unsuitable fence.

Due to the rapid deterioration of the reinforced concrete barrier fences used on city streets, it has been decided to install a barrier fence with a width of more than 2.0 m (GPS 6+50) on the section from Peremohy Avenue (PK 2+50) to the beginning of the dividing strip (PK 6+50) to replace the existing reinforced concrete fence. Peremohy Avenue (PK 2+50) to the beginning of the dividing strip with a width of more than 2.0 m (GPS 6+50), the existing reinforced concrete fence along the axis of the carriageway will be replaced with a double-sided metal barrier fence (11DD-280-0.8-2-1.1, 11AD-280-0.8-2-1.5, 11AD-128-0.8-2-1.5, 11AD-460-1.16(0.8)-2-1.5, 11MD280 (N16, 2m), 11MO-280).

To create a barrier-free living environment for persons with physical disabilities and other low-mobility groups, the kerbs at organised pedestrian crossings have been lowered to 2.5 cm.

Along the Ring Road, in the section undergoing major repairs, the pavement covering will be restored directly adjacent to the carriageway without changing its geometric parameters. The length of the 3.0 m wide pavements is 10,649 m, the length of the 2.25 m wide pavements is 360 m, and the length of the 1.0 m wide pavements is 760 m. The total area of the pavements is 33,517 m².

The start of route PK 0 is located 210.50 m from the edge of the overpass on Peremohy Avenue towards Akademika Palladina Avenue. The boundary of the works is located 8.92 m from PK0 to the north along Akademika Palladina Avenue. The beginning (PK0) of the design route does not coincide with the boundary of the works due to the clarification of the boundaries of the works for another project (the Peremohy Avenue reconstruction project). The end of the route - PK60+61.99 is located at the junction of Kyivska Street (entrance/exit to Vyshneve) taking into account the construction of a transition-speed lane and an acceleration wedge at the exit from Vyshneve.

At public transport stops, it is planned to construct "pockets" - one new entry pocket will be constructed, two existing entry pockets will be expanded, and one existing entry pocket will be retained. The remaining public transport stops are located on additional lanes, which are being constructed before the entrances/exits to side streets.

The longitudinal profile of the Ring Road is designed separately for each of the two carriageways along the edge of the carriageway along the dividing strip. When designing the longitudinal profile, the existing longitudinal slopes and vertical curves are preserved. The horizontal curves at the two turning corners in the plan, into which horizontal curves with a radius of 600-800 m are inscribed, have also been preserved.

curves with a radius of 600-800 m. However, the transverse slopes of the carriageway have been corrected, and turns with small radii have been incorporated.

The cross-section of the street is gabled with a cross slope of 20 ‰. The sidewalk part of the street is designed with a slope of 20 ‰ towards the carriageway.

The planned section of the Ring Road has a closed system for draining rainwater and meltwater from the carriageway. The major repair project involves rebuilding the rainwater drainage pipes in places where the carriageway is widened and installing rainwater collectors in accordance with the new relief layout.

The design of the Ring Road pavement takes into account the major repair of the existing pavement and the new pavement on the widened carriageway.

The road surface design for the major repair of the existing road surface is planned to consist of three layers with preliminary milling of the existing pavement to an average depth of 10 cm. The milling of the pavement is carried out in order to correct the transverse profile of the carriageway, eliminate rutting and repair cracks in the lower layers of the pavement.

The road surface design in areas where the carriageway is widened (new design) provides for a three-layer coating based on crushed stone and sand mixtures.

To level the existing road surface structure and the new one, a crushed stone "tooth" is to be installed, for which the existing road surface in places where the carriageway is widened is to be dismantled to a width of 1.0 m.

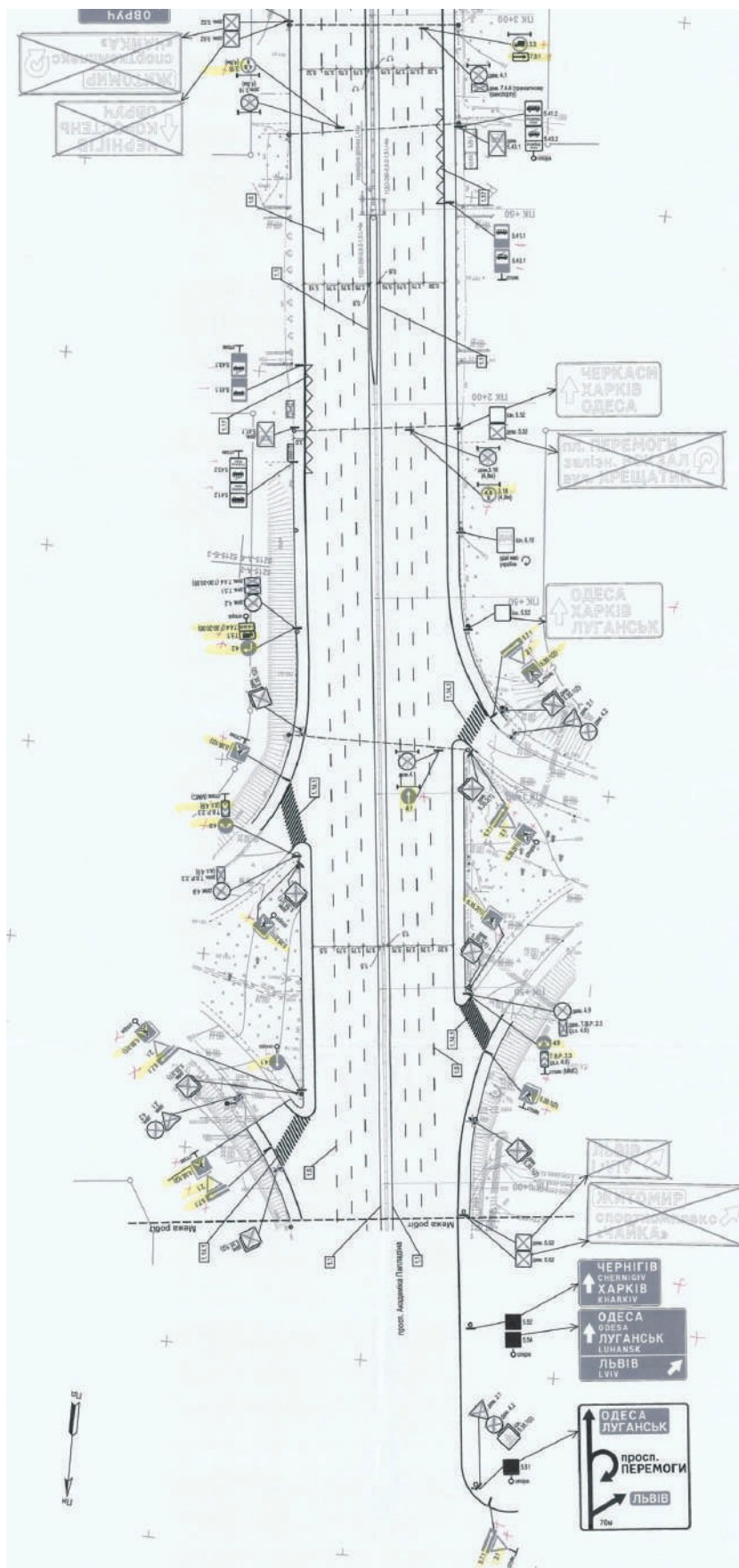
The structure of the reinforcement strips is similar to that of the road surface.

In areas where the carriageway is widened (construction of a new road surface), earthworks are planned for the construction of the roadbed.

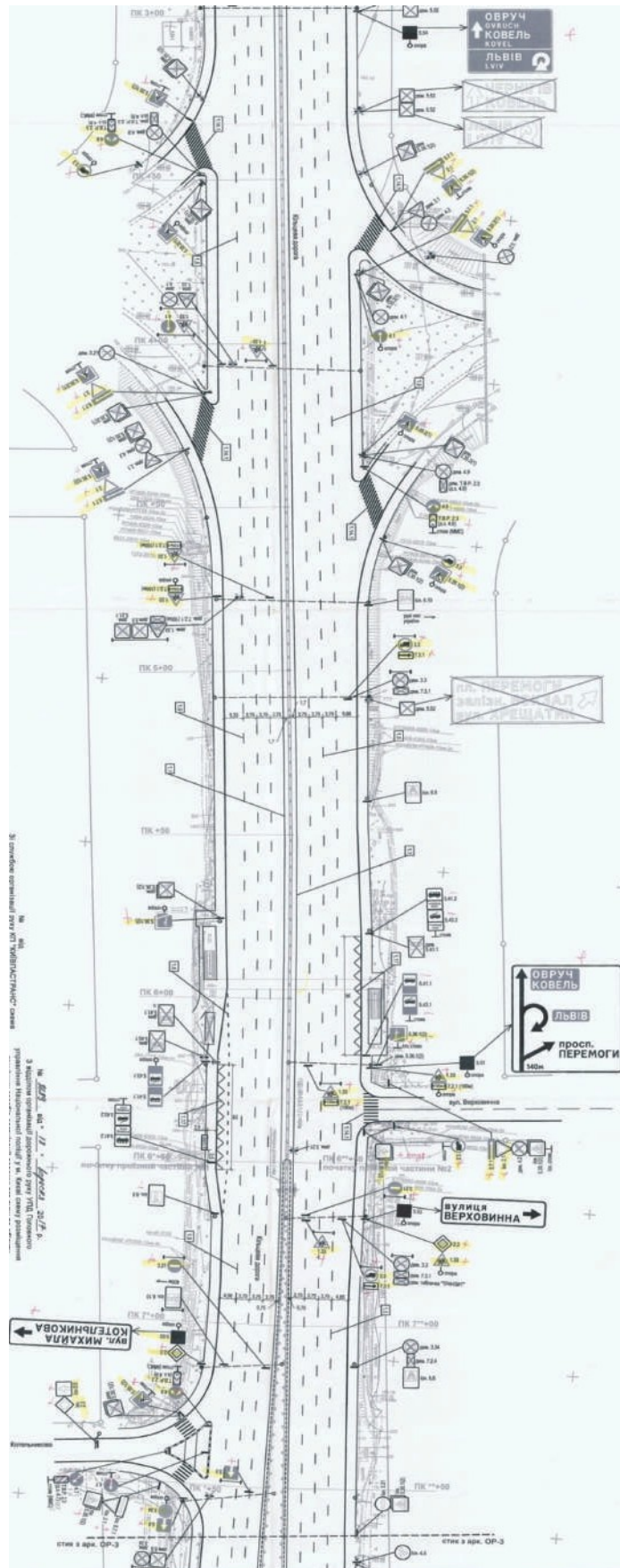
The roadside and embankment slopes are reinforced by sowing lawn grasses on a plant base. The pavement structure on the sidewalks is made of sandy asphalt concrete with a layer thickness of 4 cm on a base of granite crushed stone with a layer thickness of 12 cm.

The carriageway on the sections of the curb profile is edged with granite curb stone GP-1.

Due to the saturation of the area adjacent to the access road with underground utilities and taking into account the existing plantings along the street, planting trees along the road is not planned. For the greening of the access road, it is proposed to plant groups of decorative shrubs, coniferous and deciduous shrubs of the third size, and to decorate the supports by planting wild grapes. The lawn will be created by preparing the areas: adding a 20 cm layer of vegetable soil and sowing a lawn mixture. Climbing plants and shrubs should be planted with 50% replacement with fertile soil.



Design solution for the organisation of traffic on the Ring Road within PK0 to PK3+00



Project solution for traffic management on the Ring Road within the limits of PK3+00 to PK7+50

Technical and economic indicators for the project "Overhaul of the road surface of the Ring Road".

No.	Name of indicators	Unit	Ring Road (right carriageway "**")		Ring road (left carriageway "**")	
			Before major repairs	after major repairs	before major repairs	after major repairs
1.	Type of construction		overhaul		overhaul	
2.	Street category		main line on the street general-city meaning of continuous traffic	main line street general city continuous traffic	main line-on the street general city continuous traffic	main line-on the street general city continuous traffic
3.	Length	km	6.070	6.070	6.055	6.055
4	Width of the carriageway (including emergency lanes)	m	13.0	16.50	14.0-18.50	16.50
5	Number of lanes on the carriageway	lane	3	4-5	3	4-5
6	Lane width	m	3.75	3.75	3.75	3.75
7	Width of safety strip	m	0.75	0.75	0.75	0.75
8	Roadway area (including safety lanes)	m ²	100379	116506.0	101034.0	109,631.0
9	Total road surface area	m ²		126,870		122,265
	Inddly -area of major repairs to road surface	m ²		98425.0		100,470
	- area of new road surface	m ²		28445.0		21795
10.	Width of the central dividing strip	m	20.00	16.00-25.00	20.00	16.00-25.00
11	Sidewalk area	m ²	15561	17717	14,020	15,800
12	Lawn area (including the dividing strip)	m ²	65993	48,076	53,994	40159.0
13	Minimum radius in plan	m	600	600	900.0	900.0
14	Minimum radius of vertical curve: - convex	m		6000.0	6000.0	6000.0
	- concave	m		1500.0	3000.0	3000.0
15	Maximum longitudinal slope	‰	26.89	26.89	23.25	23.25

List of individual works volumes provided for in the working draft

Name of work	Unit of measurement	Quantity	Note
Transfer of the route to the site	km	11.47	
Cutting of vegetation layer	m ³	325.92	
Milling of asphalt pavement (10 cm) with removal for recycling to an asphalt plant	m ²	198,894.98	
Dismantling of concrete pavement 4 cm thick	m ²	295	
Dismantling of crushed stone base, thickness 0.30 m	m ²	4702.23	
Demolition of crushed stone base with a thickness of 0.12 m	m ²	4574.99	
Demolition of kerbstones (90% return)	m	15449.70	
Soil development	m ³	21686.6	V excavatio n
Embankment construction	m ³	11045.86	V embankmen t
Slope reinforcement by sowing grass	m ²	3793.20	
Lawn installation	m ²	45000	
<i>New coating (extension + "tooth")</i>			
Installation of the upper layer of a two-layer base 20 cm thick with a crushed stone and sand mixture C 7.	m ²	44693.43	
Installation of the bottom layer of a two-layer base with a thickness of 26 cm made of crushed stone and sand mixture C 5.	m ²	44693.43	
Spreading of bitumen emulsion 0.6 l/m ² (SPS-asphalt)	m ²	50	
Spreading bitumen emulsion 0.4 l/m ² (asphalt-asphalt)	m ²	100	
Installation of the bottom layer of a two-layer coating made of asphalt concrete mixture: porous, coarse-grained, grade I type A-B, 8 cm thick	m ²	50	
Installation of the middle layer: coarse-grained, dense asphalt concrete, type B, with continuous granulometry, grade 1, 8 cm thick.	m ²	50	
Upper layer construction: crushed stone-mastic asphalt concrete (CSMA-20) - 6 cm.	m ²	50240.5	
<i>Capital repair of existing pavement: (-"tooth")</i>			
Spreading of bitumen emulsion 0.4 l/m ² (asphalt-asphalt)	m ²	397789.9	
Installation of a reinforcement and levelling layer made of asphalt concrete mixture: porous, coarse-grained, grade I, continuous granulometry, thickness 0-8 cm (average 4 cm)	m ³ /t	6251.25 14377.88	
<i>New coating with hot asphalt concrete mixtures:</i>			
Installation of the bottom layer: coarse-grained, dense, type B asphalt concrete, non-interrupted granulometry, grade 1 - 8 cm.	m ²	198894.98	
Upper layer construction: crushed stone-mastic asphalt concrete (CSMA-20) - 6 cm	m ²	198,894.98	

Name of work	Unit of measurement	Quantity	Note
<i>Installation of "tooth"</i>			
Dismantling of concrete pavement: H = 28 cm, W = 1.00 m	m ²	14623.24	
Dismantling of crushed stone base, thickness 30 cm.	m ²	14623.24	
Excavation of Group II soil with a bulldozer with movement of 50 m, H = (21+80)-28-30=43 cm	m ³	6287.99	
Construction of base and covering from crushed stone materials: H=80 cm	m ³	11698.59	
Laying of HaTelit type mesh (W=1+1=2 m)	m ²	29246.48	
<i>Repair of cracks (10% of the area of major repairs to the coating - "tooth"):</i>			
Milling of layers with a milling cutter - 6 cm (additionally to 10 cm milling of the entire coating)	m ²	19889.50	
Laying of HaTelit type mesh	m ²	19889.50	
Bitumen emulsion pouring 0.9 l/m ² (SPS - asphalt)	m ²	19889.50	
Coarse-grained, porous asphalt concrete, type A-B, continuous granulometry, grade 1 - 6 cm.	m ²	19889.5	
Natural kerbstones on concrete/crushed stone base	per metre	17735.80	
Curb on a crushed stone base, size with reinforcement consumption.	per metre	11605.52	
Construction of a 12 cm thick base for pavements from granite rubble, 20-40 mm	m ²	33517.09	
Covering paths and pavements with hot fine-grained/cast/asphalt concrete mixture, thickness	m ²	33517.09	
Renovation of FEM pavement	m ²	471.46	

During the preparation of the verification report, an explanatory note and drawings (21 pieces) of the 1st volume of the working draft, section "General plan, relief organisation scheme. Rainwater drainage. Landscaping and greening" and drawings from section 2 of the volume "Traffic organisation" (9 drawings, explanatory note not provided).

During proactive and reactive data disclosure, the following information indicators were processed: 30 sheets of drawings, a list of road works volumes and an explanatory note.

Due to the fact that the section "Master plan, relief organisation scheme. Rainwater drainage. Landscaping and greening" was developed and approved in 2014, the analysis was performed based on the rules and regulations in force at the time of approval of the documentation (2014).

It should be noted that it was not possible to verify the project documentation in full (the main scope of work and the feasibility of construction), as the materials presented were not prepared in accordance with DSTU B A.2.4-4:2009; DSTU B A.2.4-6:2009; DSTU B A.2.4-29:2008; SOU 45.2-00018112-048:2010; DSTU B A.2.4-2:2009, DSTU 2587-2010, DSTU 4100-2014; DSTU 4241-2003.

For example, the drawings of the plans do not contain sufficient dimensions and references for all the elements being designed, the drainage from the adjacent territory is not shown, and the drawings of the ODR do not indicate the length of the road markings and the picketage of the installed road signs.

Due to the fact that the submitted materials do not include an engineering-geological report (including reports on the excavation of the existing road surface), calculations and design options for the road surface (there is no comparative analysis of the cost of the road surface options, which would allow the most rational and economically advantageous option to be selected), it is not possible to perform a thorough analysis of the decisions made regarding the structural elements of the road surface.

Based on the analysis of the above data on the design of the road pavement, the following discrepancies and inconsistencies in the design documentation were identified:

Incorrect

AB.Psh.Sh.G.NP.I

AB.NSh.Kr.Sh.B.NP.I

AB.NS.Kr.P.A-B.NP.I

DBN V.2.3-218-002-95

VBN V.2.3-218-002-95

DSTU V. 2.7-119:2006

The top layer is a mixture of C-7 of optimal composition, reinforced with M400 cement, II strength class, M40 according to DBN V.2.3-218-002-95, arranged in accordance with VBN V.2.3-218-002-95 (E = 400 MPa) with a thickness of 20.0 cm.

The bottom layer is a mixture of C-5 of optimal composition, unfortified, in accordance with DSTU B.2.7-30-95 (E=180 MPa) with a thickness of 26.0 cm.

Correct

ASG. Psh.Sh.G.NP.I

ASG.Kr.Sh.B.NSh

ASG.Kr.P.A-B.NP.I

GBN V.2.3-37641918-554:2013

DSTU V. 2.7-127:2006

In a mixture of crushed stone SSh-20 of optimal composition, reinforced with cement, the thickness of which is calculated for a modulus E=400 MPa, the material grade according to GBN B.2.3-37641918-554:2013 should be M20 (M-40 – for modulus E=700 MPa).

The bottom layer is a mixture of C5 of optimal composition according to DSTU B V.2.7-30.2013 with a modulus of E=260 MPa. (E=180 MPa – for sand-gravel mixtures)

In the information on the volume of road works (Section IV), it is necessary to indicate "spreading of bitumen emulsion" rather than "spreading of bitumen".

The reinforcement of road shoulders and embankment slopes by sowing lawn grass on 20 cm thick topsoil (15 cm thick is required) is unjustified.

The road works volume report does not include the volumes for the installation of road signs and markings.

External lighting and power supply networks. Trolleybus contact network.

The project involves the reconstruction of the external lighting network of the Ring Road and the relocation of the KL-10 kV power line. The reconstruction of outdoor lighting is carried out in accordance with the technical conditions of Kyivmiskosvitlo Municipal Enterprise No. 356-2 dated 09.12.2016 (No. 15-2 dated 30.01.2014).

The Ring Road is classified as a road with a calculated brightness of 2.0 cd/m² and an average pavement illumination of 20 lx.

The project involves replacing nine existing outdoor lighting control cabinets and replacing the control cabinet power cables. Electricity is metered using three-phase multi-rate Mercury 230ART-02PQRSIN meters. For outdoor lighting, two Ambar-3 luminaires with DNAT-250 sodium lamps are to be installed on 12 m high OKM-12 metal supports with double-arm brackets. The type of supports was chosen taking into account the prospect of constructing a trolleybus line.

The lighting network is made of self-supporting AsXSn wire.

Due to the reconstruction of the roadway, the project provides for the relocation of 10 kV cables.

The absence of technical conditions for the relocation of 10 kV cables makes it impossible to estimate the sufficient scope of work.

The local estimate for outdoor lighting does not correspond to the scope of work and materials specified in the specifications and drawings. In the local estimate, the lighting network is made with underground cable, while in the documentation, the network is made with self-supporting AsXSn type wire.

External water supply, drainage and rainwater sewerage networks.

The capital repair project provides for the replacement of existing storm drains and inspection wells, the reconstruction of existing pipelines, and the flushing of certain sections of existing storm sewer pipelines.

The section "Rainwater drainage" has been completed in full in accordance with Technical Specifications No. 297-8-13 dated 12 December 2013 of Kyivavtodor.

The section "Water supply and drainage networks" has not been completed; it is necessary to obtain technical specifications from PJSC "AK "Kyivvodokanal" to determine the need to develop this section.

The section "Heat Supply" has not been completed; it is necessary to obtain technical specifications from PJSC "Kyivenergo" to determine the need to develop this section.

The section "Gas Networks" has not been completed; it is necessary to obtain technical specifications from PJSC "Kyivgaz" to determine the need to develop this section.

Environmental impact assessment

The EIA materials were developed in accordance with 1.13 DBN A.2.2-1-2003 on the basis of engineering and environmental, sanitary and hygienic, engineering and technical surveys and studies using modern methods and technical means. The initial data for the EIA were the available background data characterising the state of the environment in the study area, monitoring data, the results of engineering and technical and other surveys conducted in previous years, cartographic materials and other available information.

Based on the analysis of the section, the following comments were made:

- 1) The materials provided include a Statement of Intent and a Statement of Environmental Impact that have not been approved by the customer.
- 2) There is no evidence of public interest being taken into account (media publications, minutes of hearings, written and other documents relating to citizens' appeals).
- 3) The calculation of harmful emissions does not include emissions of benz(a)pyrene, soot, nitrogen oxide (N₂O) and sulphur dioxide;
- 4) There is no confirmation from the State Emergency Service of Ukraine or the Central Geophysical Observatory (CGO) of the information provided in section 2.14.4 of the EIA, on the background concentrations in the city;
- 5) There are no calculations of the expected equivalent and maximum noise levels at the boundary of the nearby residential area from construction processes and subsequent operation (vehicle traffic), therefore it is not possible to draw conclusions regarding compliance with noise impact requirements in the nearest residential area;
- 6) There is no data on the sanitary and living conditions of workers at the construction site;
- 7) There are references to tables showing the volumes of solid waste generated during construction and operation (section 3.2.2 of the EIA), but these tables are missing from the subsection "Requirements for the removal or disposal of construction waste".

Estimated cost documentation

The analysis was carried out based on the following cost estimate documents:

- Installation of the contact network
- Road works
- Rainwater drainage
- Outdoor lighting
- Organisation of road traffic during the construction period
- Traffic management – permanent arrangement

The analysis revealed that the estimated wage level is within the range of UAH 3,200, which complies with Order No. 281 of the Ministry of Regional Development, Construction, Housing and Communal Services of Ukraine dated 20 October 2016, which allows local authorities to independently approve the estimated wage for projects financed from local budgets based on their calculations. For the public sector, this indicator will be calculated annually by the Ministry and communicated to local authorities. In 2016, the estimated wage was 3,590-5,500 hryvnia.

The main price-forming materials correspond to the 2016 level and do not exceed the maximum prices set by the Ministry of Regional Development.

It is not possible to analyse general production costs, averaged by the Ministry of Regional Development, which correspond to the conditions and types of work, estimated profit and administrative expenses due to the lack of data (there is no consolidated cost estimate). The approximate calculation based on the expert report corresponds to the level of estimated profit and administrative expenses proposed by the Ministry of Regional Development for these types of work: $K_{pr} = 2.71$, $K_{adm} = 1.23$, under the conditions of work in motion and in limited conditions. However, it is not specified, i.e. it is not clear which items of expenditure are included in the section "Other expenses".

Conclusion: the main indicators of the cost estimate documentation correspond to the scope and requirements of the project, comply with the requirements of DSTU B D.1:1-1:2013, and can be implemented in the construction of the facility.

No.	Name	Quantity	Price, UAH	Total, UAH
1	2	3	4	5
Road works				
1	The salary level is within the range of 3,350 UAH/month, which is acceptable for 2016; the maximum level was 5,100 UAH/month.			
2	Prices for materials			
	Estimated price of a heavy cast iron manhole cover – 3,245.42 UAH (excluding VAT)	177	3,245.42	574439.34
	Market price of heavy cast iron manhole cover – 2310.83 UAH (excluding VAT)	177	2310.83	409016.91
	overpriced, but does not exceed the maximum price			165422.43
	estimated price Sand and gravel mixture C-5	133	478	6396333.58
	Market price Sand and crushed stone mixture C-5	13363	490	6547870
	understatement			-151536.42
	volume matches the project			
	all other prices are at the level established for 2016			
Rainwater drainage				
1	Salary level within 3350 UAH/month, which is acceptable for 2016, the maximum level was 5100 UAH/month			
	The estimated price of a heavy cast iron manhole cover is 3,245.42 UAH (excluding VAT)	99	3245.42	321,296.58
	Market price of a heavy cast iron manhole cover – 2,310.83 UAH (excluding VAT)	99	2310.83	228772.17
	overpriced, but does not exceed the maximum price			92524.41
	Estimated price for corrugated pipes 630 mm "KORSIS" – 1616.83 UAH (excluding VAT)	145	1616	234
	Market price for corrugated pipes 630 mm KORSIS – 2,171.83 UAH (excluding VAT)	145	2171.83	314915.35
	understatement			-80475
	all other prices at the level established for 2016			
Traffic management – permanent position				
1	Salary level within 3350 UAH/month, which is acceptable for 2016, the maximum level was 5100 UAH/month			
	the volume coincides with the project			
	Estimated price	3400	745.92	2536128
	market price	3400	610	2074000
	road markings are slightly overpriced			462,128
	all other prices are at the level established for 2016			

VERIFICATION REPORT

for the project
"Major repair of the road
network of Kyiv: Alma-Atynska
Street
from Prazka Street
to Litinska Street"

PROJECT SUMMARY

Alma-Atynska Street connects the DVRZ district with other districts of Kyiv.

At the time of the project's implementation, it required: replacement of the foundation and restoration of the road surface, reconstruction of the tram tracks, installation of drainage and outdoor lighting, and repair of the overpass, which had not undergone major repairs since the 1960s.

According to the decision of the Kyiv City Council dated 28 January 2015 No. 60/925 "On the budget of the city of Kyiv for 2015" and dated 28 January 2015 No. 59/924 "On the Programme of economic and social development of the city of Kyiv for 2015", the master plan of Kyiv envisages the reconstruction of Pryvokzalna Square near the Darnytsia railway station with the construction of two road tunnels and one tram tunnel, which will connect Alma-Atynska Street with Boryspilska Street and the Darnytsia road and railway bridge across the Dnipro River. This reconstruction will create an additional sustainable connection between the DVRZ district and the city's main street and road network, radically change the distribution of traffic flows, and free the district's street and road network from heavy freight traffic.



The project is being implemented in accordance with the order of the Kyiv City State Administration dated 02.03.2015 No. 200, Customer: Kyivavtodor.

Technical characteristics of the facility

Alma-Atynska Street is classified as a main street of district significance – pedestrian and transport connection, which connects territorial units and provides transport connection in areas with enterprises and facilities of local significance.

The **average daily traffic intensity** on the section of Alma-Atynska Street ranges from 9.5 to 6.5 thousand units per average day on separate sections. The estimated traffic intensity on Alma-Atynska Street after major repairs (as of 2027):

- from Prazka Street to O. Dovbush Street, the total in both directions is 11.6-14.1 thousand units;
- from O. Dovbush Street to Litinska Street, a total of 7.9-9.6 thousand units in both directions.

The **length of the major repair project** on Alma-Atynska Street is 3.572 km.

The **width of the carriageway** is planned to be 2x7.0 m and 14.0 m, with two lanes in each direction.

The **total area of the carriageway** of Alma-Atynska Street after major repairs is 53,020 m².

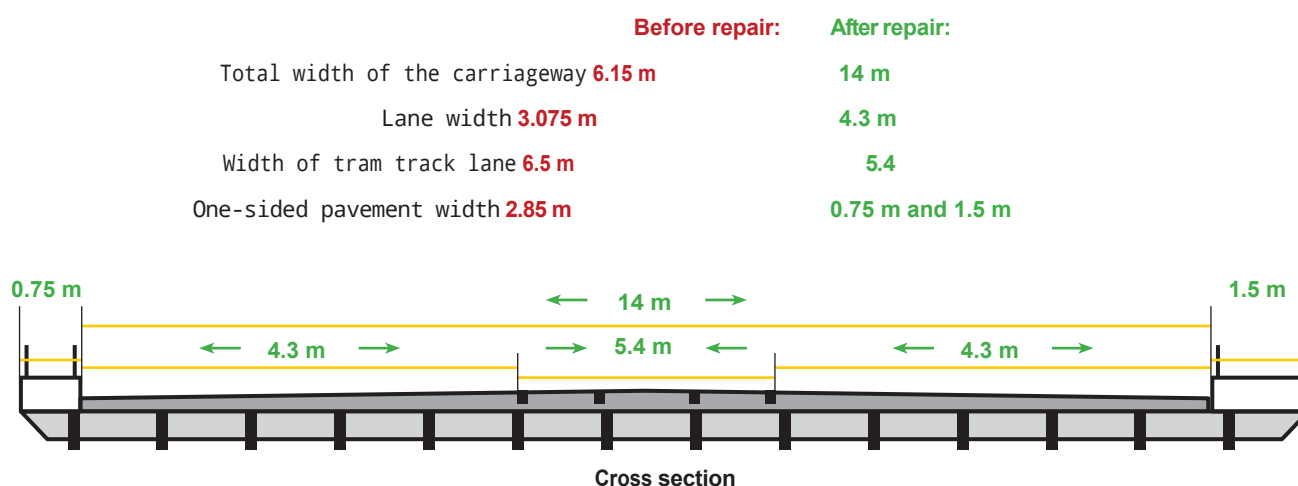
The **width of each lane** is 3.5 m, with a total of 4 lanes.

The **road surface** is designed with a three-layer asphalt concrete pavement based on sand and crushed stone mixtures.

New metal supports for outdoor lighting have been installed in the repair area.

After completion of the major repairs, the service life of individual elements is 30 years.

A significant part of the work is focused on **the overpass** on Alma-Atynska Street for motor vehicles, trams and pedestrians to cross the railway tracks.



Main geometric characteristics:

Overpass characteristics	Before major repairs	After major repairs
Total length	61.42 m	61.42 m
Geometric diagram	3 x 14.06 m	3 x 14.06 m
Total width of the carriageway	12.64 m	14.00 m
Width of the traffic lane	6.15 m	8.6
Width of tram track lane	6.5	5.4
Sidewalk width	one-sided – 2.85 m	0.75 and 1.5 m double-sided

The following work has been carried out on **the overpass**:

- widening of the carriageway to remove restrictions on motor vehicle traffic;
- overhaul of the bridge deck, installation of a monolithic reinforced concrete slab for the carriageway and monolithic reinforced concrete pavements;
- installation of barrier fencing, handrails, expansion joints, lighting supports and contact network;
- overhaul of supports (disassembly, cleaning, restoration of concrete surface);
- construction of monolithic reinforced concrete cabinet walls;
- installation of monolithic reinforced concrete transition slabs;
- replacement of road surface, installation of grounding circuit structures;
- reconstruction of lighting with the installation of additional new lighting poles

Tram track



In the areas of tram track reconstruction, the track width is 1524 mm, and the track spacing is 3200 mm. The tram track is given a dominant elevation in the cross-section for effective surface drainage from the tramway.

The project envisages the reconstruction of tram tracks in areas where the tram tracks change their position, namely in areas where the tram tracks are combined with the motorway, i.e. in areas where the tracks intersect with the motorway.

The tram track structure (on combined tracks) is of the block type with 35 cm thick reinforced concrete slabs manufactured by PBK Kovalskaya with embedded 60R2 and 62R1 rails using Sika Icosit KC polyurethane material.



This reduces noise from trams and improves comfort for local residents.

The design solution allows the use of special reinforced concrete slabs with "channels" instead of sleepers, into which the rails are inserted and fixed, and then filled with Sika Icosit KC polyurethane material. After rapid polymerisation, it securely holds the rail in the design position and distributes the load. Sika Icosit KC is durable, chemically resistant, elastic and at the same time strong enough to withstand heavy loads.

This material significantly reduces noise and vibration during train movement and reduces wear on tracks and rolling stock.

This technology is widely used in the construction and reconstruction of rail transport tracks in Germany, Switzerland, France, Great Britain, Poland and Hungary.

The above-mentioned structure is laid as a jointed slab and can withstand a nominal static load of 115 kN per axle. In places where motor vehicles cross tram tracks on the sides of the slab structure, a granite edge on a concrete base (concrete class B15) is installed to prevent the slabs from shifting. The joints between the slabs and between the slabs and the kerb are first filled with granulated granite (crushed and sieved granite rock with a fraction not exceeding 5 mm) and then filled with epoxy resin mastic. In areas with a longitudinal slope of more than 50‰, a concrete stop is installed to prevent the tram slabs from shifting.

Water drainage

Surface drainage is designed using the longitudinal and transverse profile slope. During the major repair, a new storm sewer system was installed in areas where the roadway was widened, storm drains were installed, and existing storm sewer pipes were rebuilt.

Main stages of project implementation

Design

Designer – Kyivproekt Design Bureau LLC, agreement No. 1523 dated 17 November 2015. The term of work under the agreement is November 2015 – June 2016. The contract amount is UAH 1,142,000.

In accordance with agreement No. 28-0052-17/26-10 dated 10 March 2017 concluded between the Specialised State Expert Organisation – Central Service of Ukrainian State Construction Expertise and Kyivavtodor, an expert review of the project documentation (including the cost estimate) was carried out. Based on the results of the examination, a positive Expert Report No. 28-0311-16-A dated 14 December 2016 was received.

The working draft was approved by Order No. 722 of the Kyiv City State Administration dated 16 June 2017.

The design organisation is conducting **author supervision** on the basis of agreement No. PBK-1523-A/N/1152-10.

Construction and installation works

The procurement was announced on 26 June 2017.

The expected cost is UAH 249,946,900.00.

Three bids were submitted for

participation in the tender:

- Kyivshlyakhbud – winner
- Avtomagistral-Pivden LLC – rejected
- Onur Construction International LLC

The bid submitted by Avtomagistral-Pivden LLC was rejected at the prequalification stage due to the bank guarantee not meeting the requirements of the tender documentation.

There were no complaints about this procurement. There were also no questions or clarifications from potential contractors regarding the technical specifications.

Two companies participated in the auction on 8 August 2017. The expected value is 249,946,900.00

Participants	Expected value	Initial bid,	Price reduction, %	Final offer, UAH with VAT
ONUR Construction International	249,946,900	249,115,590.00	0	249,115,590.00
PP Kyivshlyakhbud	249,946,900.00	248,439,597	0	248,439,597

Neither participant lowered their price during the bidding. As a result, the company PP "KYIVSHLYAKHBUD" won, with a difference of 0.6% between the expected purchase price and the contract price.

The minutes of the electronic auction were signed and published on 14 August 2017 (No. 21/118-2), and the intention to sign the contract was published on the same day.

Progress of work

On 29 August 2017, under No. 612-10, a contract was signed between Kyivavtodor and KYIV-SHLYAKHBUD. The cost of the work under the contract is 248,439,597.00.

Term of work: September 2017 – December 2018. Amendments were made to

the contract:

- Additional agreement No. 4, according to which the term of performance was extended until May 2019;
- Additional agreement No. 8 regarding changes to the contract price. **According to the agreement, the price of the contract is reduced to the actual volume of work performed and amounts to: UAH 234,589,212.62.**

On 15 February 2019, due to the need for additional construction work not specified in the initial project, pursuant to Article 35 of the Law of Ukraine "On Public Procurement", the Contracting Authority concluded a contract for the performance of **additional construction work** with the previous Contractor without conducting an open tender.

By additional agreement No. 4 dated 12 July 2019, the cost of additional works was reduced to UAH 66,479,300.00.

The deadline for completion of the works under the contract is 31 December 2020 (however, in a letter dated 25 April 2019, the Customer informed the CoST verification team that the actual performance of the main types of works would continue until the end of May 2019).

Year	Participants	Number of wins	% of wins	Amount of winning bids	% difference between expected value and contract amount
2016	PP "KYIVSHLYAKHBUD"	26	10	7,250,908.19	0
2017	PP "KYIVSHLYAKHBUD"	52	78	172,955,546	1.44
2018	PP "KYIVSHLYAKHBUD"	1	25	86,207,220.00	0.41

As of 01.06.2019, 100% of the funds were paid – 234,589,212.62 UAH under the main contract; no payments were made under the contract for additional works.



The plot on Almatynska Street is located entirely within the red lines and belongs to the city's engineering and transport infrastructure.



Cost of works

Initial cost
(as of 29 August 2017)
UAH **248.44** million

Increase
by **66.48** million (27%)

Final cost
(as of 25 March 2019)
UAH **314.92** million



Initial completion date

487 days



Final completion date

Under the main contract **852**
days Deferral for **365** days (75%)



Work not completed



Additional work

66.48 million UAH



Final deadline

under the Agreement – **1,217** days
(3 years 122 days)

Conclusions and recommendations

The project is of significant social importance for the residents of the DVRZ district. thanks to the implementation of the project, high-quality transport links between the district and other parts of the city have been restored, road capacity has been increased, noise from tram tracks has been reduced, more comfortable and safer traffic on Almatynska Street has been ensured, the operational condition of the overpass has been improved, and storm drains and lighting have been restored.

A positive aspect is the use of modern technology in the reconstruction of the tram tracks – a slab construction widely used in Europe, which reduces the load on the tracks, lowers noise levels and ensures level crossing at intersections with motorways.

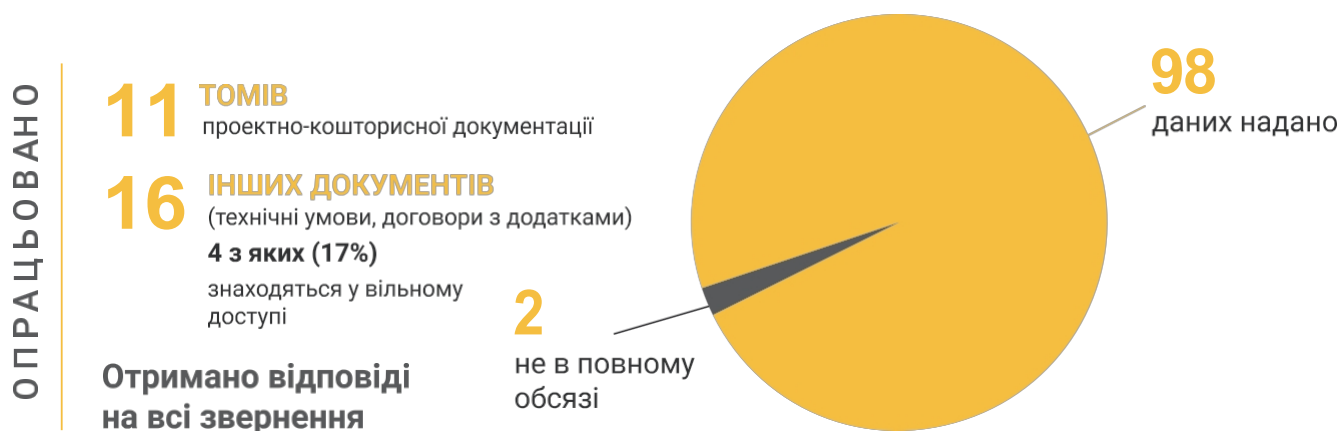
Due to unforeseen circumstances not taken into account in the initial design, additional construction and installation work was required, extending the completion date by at least five months and increasing the cost of the project by more than 66 million hryvnia.

Based on the results of the verification report, the CoST team recommended that the Client consider engaging an independent consulting engineer and a testing laboratory with a broader scope of accreditation, or establishing its own laboratory.

REACTIVE DISCLOSURE OF INFORMATION

% РОЗКРИТТЯ

Замовником самостійно розкрито **98%** інформаційних показників за проектом



As part of the reactive disclosure of information on the report "Capital repair of the road network of Kyiv: Alma-Atynska Street from Prazka Street to Litinska Street," the verifiers reviewed the following documents:

- project documentation;
- the buyer's tender documentation;
- tender proposals from participants;
- contracts with annexes;
- acts of work performed, orders of the customer's service, etc.

INTRODUCTION

Alma-Atynska Street appeared in the 1940s-1950s under the name Shose DVRZ Street, and since 1961 – Darnytske Shose. Its current name has been in use since 1973 in honour of the city of Alma-Ata, the capital of Kazakhstan at that time. The main thoroughfare of Alma-Atynska Street is formed from the old districts of Kyiv (Stara Darnytsia, Liski, DVRZ), which additionally has an overpass (built in 1960) at the intersection with the access tracks of the Darnytsia railway station (Liski Park). According to field surveys, the condition of Alma-Ata Street and the overpass is assessed as unsuitable for normal operation.

The length of Alma-Atynska Street in the section undergoing major repairs is 3.572 km. The width of the carriageway is planned to be 2x7.0 m and 14.0 m – 2 lanes in each direction (lane width 3.50 m). The total area of the carriageway of Alma-Atynska Street after major repairs is 53,020 m².

The major repair of Alma-Atynska Street between Prazka Street and Litinska Street will achieve the following social objectives:

- improvement of the transport scheme;
- improving transport services in the transport hub area;
- improvement and greening of the surrounding area.

Between 12 February 2018 and 2 April 2018, the design and cost documentation for the project "Major repair of the road network in Kyiv: Alma-Atynska Street from Prazka Street to Litinska Street," which was developed by order of Kyivavtodor in 2016.

The design documentation for the above-mentioned project is presented in the following volumes:

- Volume 1. General plan, relief organisation. Storm sewerage. Landscaping and greening.
- Volume 2. Power supply networks and outdoor lighting. Power supply during construction.
- Volume 3. Tram line.
- Volume 4. Overpass across the railway tracks near the Liski station on Alma-Atynska Street.
- Volume 5. Traffic management: permanent arrangements and arrangements for the construction period.
- Volume 6. Environmental impact assessment.
- Volume 7. Construction organisation.
- Volume 8. Topographic and geodetic survey report.
- Volume 9. Report on engineering and geological surveys.
- Volume 10. Local and object cost estimates.
- Volume 11. Consolidated cost estimate.

During the analysis of the design and estimate documentation, the following were considered:

- considered fundamental technological solutions;
- an analysis of the completeness of the documentation in accordance with the requirements of current legislation was performed;
- conclusions were drawn;
- recommendations were made.

ANALYSIS OF DESIGN DOCUMENTATION

The project documentation for the project "Overhaul of the road network of Kyiv: Alma-Atynska Street from Prazka Street to Litinska Street" was developed on the basis of:

- Order of the Kyiv City State Administration No. 200 dated 02.03.2015.
- The initial data for the design are presented in the table

Table: Initial data for design

Available in the project documentation

- Order of the Kyiv City State Administration No. 200 dated 02.03.2015.
- Design assignment from Kyivavtodor Kyivavtodor dated 20.11.2015;
- TU No. 91698 dated 30.12.2015
- Preventive Activities Order of the Main Directorate of the National Police of Ukraine in Kyiv;
- TU No. 43-4-16 dated 28.04.2016
- Kyivavtodor for connection to the storm sewer network and construction of a driveway;
- TU No. 01-5 dated 14 January 2016
- Kyivmiskosvitlo, Kyiv's public lighting utility, for the design of public lighting electrical networks;
- TU dated 14 December 2015 Kyivpastrans Track Service for the design of tram tracks;
- Technical specifications dated 20 May 2016 of the Traffic Organisation Service of Kyivpastrans Municipal Enterprise;
- Technical specifications dated 12 May 2016 of the Energy Supply and Communications Service of Kyivpastrans Municipal Enterprise;
- TC No. NT-296-16 dated 16 March 2016 of the structural separate subdivision Kyiv Electric Networks of PJSC Kyivenergo;
- TU dated 22 June 2016 No. 11 Kyiv City Branch of PJSC Ukrtelecom
- Act No. 124 on the inspection of green spaces subject to removal dated 5 April 2016;
- Act of the commission on determining the conditions for repairing the road overpass on
- Alma-Atynska Street, which crosses the railway tracks of Darnytsia Station dated 23 May 2016;

Not included in the project documentation

- Technical specifications for the maintenance of rolling stock and transport infrastructure of the municipal enterprise "KYIVTRANSPORT";
- Technical conditions of KP "KYIVDORSERVICE";
- Register of land plots. Current cadastral plan;
- Urban planning conditions and restrictions;
- Technical conditions of the Regional Branch South-Western Railway of PJSC "Ukrzaliznytsia";
- Technical conditions of PJSC "AK Kyivvodokanal";
- Technical conditions of PJSC "Kyivenergo";
- Technical conditions of PJSC Kyivgaz.

Available in the project documentation

- Act of excavation of the road surface of the carriageway and crushed stone ballast of the overpass across the railway tracks at the facility dated 20 February 2016;
- Act of inspection of topsoil dated 26 September 2016;
- Act of excavation of the road surface of the carriageway dated 03.08.2016;
- Act of inspection of the technical condition of the existing kerbstone dated 18 August 2016.

Not included in the project documentation

Table: Key project events

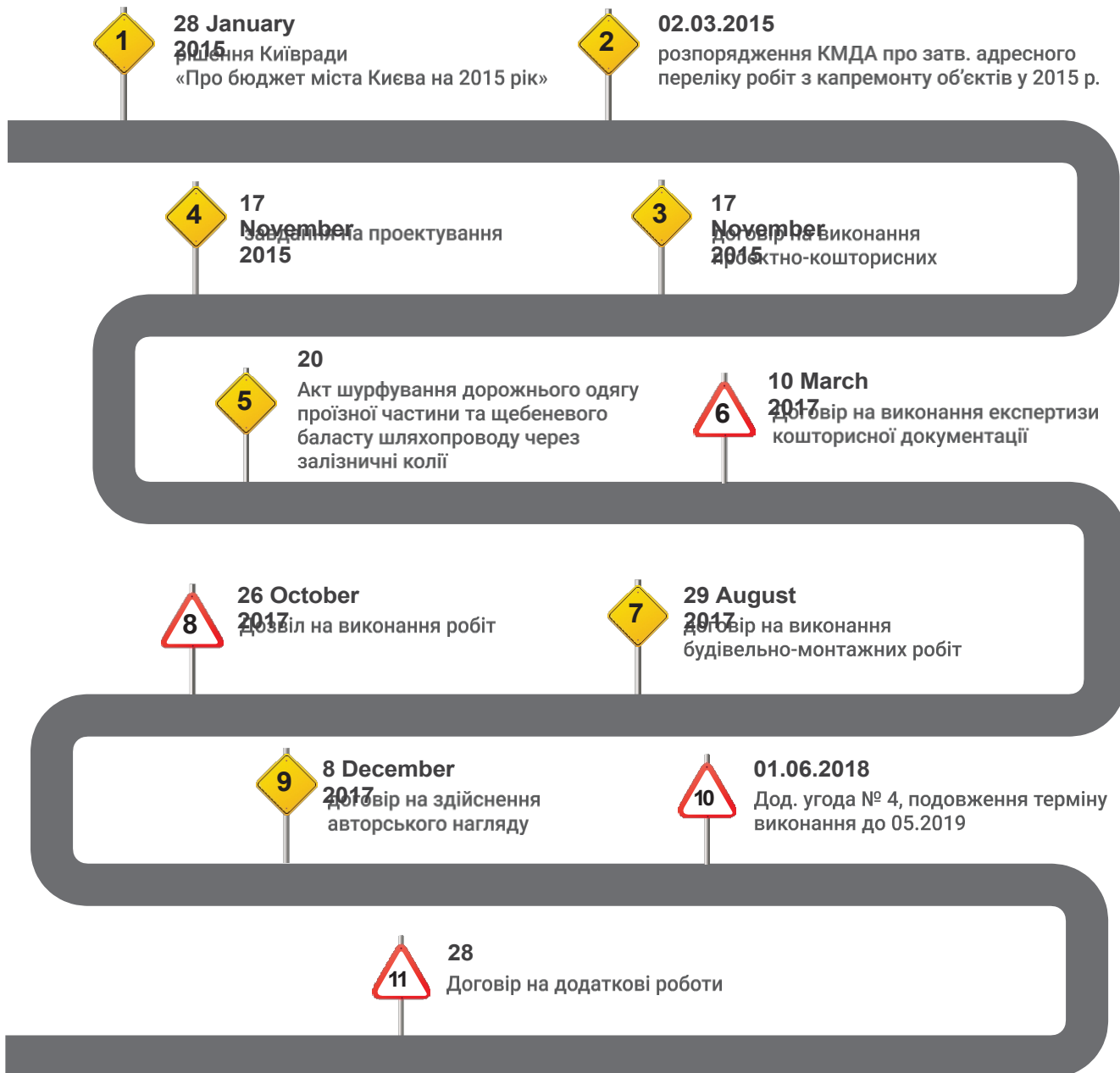
Main key project events	Date of event
Signing of Kyiv City Council Decision No. 60/925 of 28 January 2015 "On the budget of the city of Kyiv for 2015".	28 January 2015
Signing of Kyiv City Council Decision No. 59/924 of 28 January 2015 "On the Programme of Economic and Social Development of Kyiv for 2015".	28 January 2015
Signing of Order No. 200 of the Kyiv City State Administration dated 02.03.2015 approving the targeted list of works for the major repair of facilities in 2015 by the main administrator of budget funds, the Department of Transport Infrastructure of the executive body of the Kyiv City Council.	02.03.2015
Signing of the agreement for the performance of design and estimate works No. 1523 dated 17.11.2015.	17.11.2015
Signing of the design assignment for the project "Major repairs to the road network of Kyiv: Alma-Atynska Street from Prazka Street to Litinska Street".	20 November 2015
Technical specifications dated 14 December 2015. Track services of Kyivpastrans for the design of tram tracks.	14 December 2015
Signing of Technical Specifications No. 91698 dated 30 December 2015. Preventive Activities Department of the Main Directorate of the National Police of Ukraine in Kyiv.	30 December 2015
Signing of Technical Specifications No. 01-5 dated 14 January 2016. Kyivmiskvosvitlo, a municipal enterprise providing outdoor lighting in Kyiv, for the design of outdoor lighting electrical networks.	14 January 2016

Key project milestones	Date of event
Signing of the Act of excavation of the road surface of the carriageway and crushed stone ballast of the overpass across the railway tracks at the facility dated 20 February 2016.	20 February
Signing of Technical Contract No. NT-296-16 dated 16 March 2016 by the structural separate division "Kyiv Electric Networks" of PJSC Kyivenergo	16 March 2016
Signing of Act No. 124 on the inspection of green spaces subject to removal dated 5 April 2016.	05.04.2016
Signing of Technical Specifications No. 43-4-16 dated 28 April 2016 by Kyivavtodor for connection to the storm sewer system and construction of a driveway.	28.04.2016
Signing of Technical Specifications dated 12 May 2016 by the Energy Supply and Communications Service of Kyivpastrans Municipal Enterprise.	12 May
Signing of technical specifications dated 20 May 2016 by the Traffic Organisation Service of Kyivpastrans Municipal Enterprise.	20 May 2016
Signing of the Commission Act on determining the conditions for repair work on the road overpass on Al-Ma-Atynska Street, which crosses the railway tracks at Darnytsia Station, dated 23 May 2016.	23 May 2016
Signing of Technical Specifications dated 22 June 2016 No. 11 Kyiv City Branch of PJSC Ukrtelecom.	22 June
Signing of the Act of excavation of the road surface of the carriageway dated 3 August 2016.	03.08.2016
Signing of the Act of inspection of the technical condition of the existing kerbstone dated 18 August 2016.	18 August 2016
Signing of the Act of Inspection of Plant Soil dated 26 September 2016.	26
Signing of the agreement for the examination of cost estimate documentation No. 28-0052-17/26-10 dated 10 March 2017.	10 March 2017
Signing of a contract for the performance of construction and installation works No. 612-10 dated 29 August 2017.	29 August 2017
Signing of supplementary agreement No. 1 dated 12 September 2017 to contract No. 612-10 dated 29 August 2017.	12 September
Permit for construction works No. KV 112172991428 dated 16 October 2017, Department for State Architectural and Construction Control of the City of Kyiv, Kyiv City State Administration	26 October
Signing of the contract for author supervision No. PBK-1523-A/N/1152-10 dated 08.12.2017.	08.12.2017

Key project milestones	Date of event
Signing of the contract for design work No. 641-10 dated 20.12.2016 for the section "Automated systems for early detection of emergencies" at the facility "Overhaul of the road network of Kyiv: Alma-Atynska Street from Prazka Street to Litinska Street"	20 December 2016
Signing of supplementary agreement No. 2 dated 22 December 2017 to contract No. 612-10 dated 29 August 2017.	22 December
Signing of contract No. 402 dated 26 December 2017 for the performance of work on cleaning the storm sewer system at the site "Major repair of the road network of Kyiv: Alma-Atynska Street from Prazka Street to Litinska Street"	26 December 2017
Signing of Supplementary Agreement No. 4 dated 1 June 2018 to the contract, extending the deadline for completion of work until May 2019 at the site "Major repair of the road network in Kyiv: Alma-Atynska Street from Prazka Street to Lytynska Street"	01.06.2018
Signing of supplementary agreement No. 5 dated 11 December 2018 to contract No. 612-10 dated 29 August 2017.	11 December 2018
Signing of supplementary agreement No. 6 dated 22 December 2018 to contract No. 612-10 dated 29 August 2017	22
Signing of supplementary agreement No. 7 dated 28 December 2018 to contract No. 612-10 dated 29 August 2017.	28 December
Expert report No. 30/e/18 dated 22 January 2019 on the review of the cost estimate section of the project documentation for the project "Overhaul of the road network of Kyiv: Alma-Atynska Street from Prazka Street to Litinska Street" (adjustment)	22 January 2019
Signing of contract No. 11-10 for additional construction work on the project "Major repair of the road network in Kyiv: Alma-Atynska Street from Praska Street to Lytynska Street"	15 February
Signing of supplementary agreement No. 8 dated 2 April 2019 to contract No. 612-10 dated 29 August 2017.	02.04.2019

PROJECT LIFE CYCLE:

Major repairs to the road network in Kyiv:
Alma-Atynska Street from Prazka Street to Litinska Street



CONTRACTUAL CIRCUMSTANCES

The development of project documentation for the project "Major repair of the road network in Kyiv: Alma-Atynska Street from Prazka Street to Litinska Street" was carried out in accordance with Agreement No. 1523 for the performance of design and estimate works dated 17 November 2015 between Kyivproekt Design Bureau LLC and Kyivavtodor CC. There is no information on the selection of contractors for the design work, and no tender was held in the unified electronic public procurement system of the State Enterprise "PROZORRO" (the "PRO-ZORRO" system began operating on 31 July 2016).

The project documentation (including the cost estimate) was ~~reviewed~~ in accordance with Agreement No. 28-0052-17/26-10 dated 10 March 2017 between the Specialised State Expert Organisation - Central Service of Ukrainian State Construction Expertise and Kyivavtodor.

Based on the results of the examination, a positive Expert Report No. 28-0311-16-A dated 14 December 2016 was received.

In accordance with Order No. 722 of the Executive Body of the Kyiv City Council (KSCA) dated 16 June 2017, the working draft was approved.

Construction and installation works are being carried out in accordance with the Contract No. 612-10 dated 29 August 2017 by Kyivshlyakhbud, commissioned by Kyivavtodor. The contract was concluded for the amount of UAH 248,439,597.00, including VAT of UAH 41,406,599.50. In accordance with Additional Agreement

No. 1 to Contract No. 612-10 dated 18 August 2017 and Additional Agreement No. 2 to Contract No. 612-10 dated 29 August 2017, the redistribution of funding for 2017 and 2018 was agreed upon.

Author supervision is carried out on the basis of Agreement No. PBK-1523-A/N/1152-10, performed by Kyivproekt Design Bureau LLC, commissioned by Kyivavtodor.

A complete list of agreements is provided in the table below

Table: List of contracts provided

No.	Contract number	Customer	Contractor	Notes
1	Contract No. 1523 for the performance of design and estimate works dated 17 November 2015.	Kyivavtodor	Kyivproekt Design Bureau LLC	
2	Contract No. 25-0052-17/26-10 dated 10 March 2017 for the performance of an expert review of the cost estimate documentation	Kyivavtodor	SE "Specialised State Expert Organisation - Central Service of Ukrainian State Construction Expertise"	
3	Contract No. 612-10 dated 29 August 2017	Kyivavtodor	Kyivshlyakhbud	
4	Supplementary Agreement No. 1 dated 12 September 2017 to Contract No. 612-10 dated 29 August 2017	Kyivavtodor	Kyivshlyakhbud	

No.	Contract number	Customer	Contractor	Notes
5	Supplementary agreement No. 2 dated 22 December 2017 to Contract No. 612-10 dated 29 August 2017.	Kyivavtodor	Kyivshlyakhbud	
6	Contract No. PBK-1523-A/N/1152-10 dated 8 December 2017 for author supervision	Kyivavtodor	LLC "Design Bureau "Kyivproekt"	
7	Contract for the performance of design works No. 641-10 dated 20.12.2016	Kyivavtodor	Security Systems of the Future LLC	
8	Contract No. 402 dated 26 December 2017	KP SHEU Dnipro District	Technologies of Hydrocleaning LLC	
9	Contract for the preparation of technical documentation No. 635/1185-10 dated 21 December 2017.	Kyivavtodor	Kyiv Institute of Land Relations	Not relevant to the project under consideration

Conclusion

The existing subcontracting agreements generally indicate a fairly high level of transparency in the design, examination, and construction and installation works.

Recommendations

Ensure the disclosure of data throughout the entire life cycle of the project for all contracts concluded within the framework of the project and at all stages of project implementation. The data should be published on the Transparent Infrastructure portal portal.costukraine.org.

ENGINEERING SURVEYS

Technical and design solutions in the development of the project on Alma Atynska Street were determined on the basis of a topographic and geodetic plan developed by Kyivgeo Institute LLC

Kyivgeo LLC and approved by the Department of Urban Development and Architecture of the executive body of the Kyiv City Council on 29 February 2016.

GENERAL PLAN

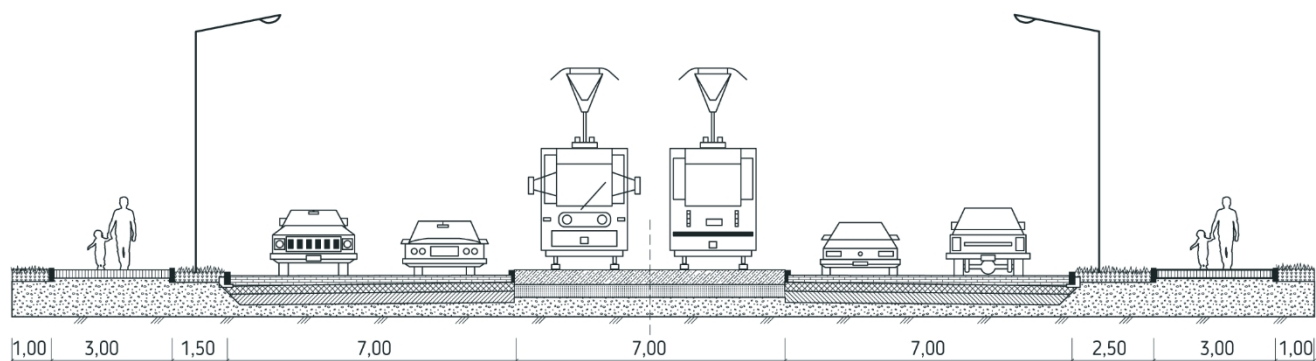
The working draft "Capital repair of the road network of Kyiv: Alma-Atynska Street from Prazka Street to Litinska Street" was prepared by Kyivproekt Design Bureau LLC on the basis of Order No. 200 of the Kyiv City State Administration dated 2 March 2015 design task dated 20.11.2015, approved by the Director General of Kyivavtodor.

The section of Alma-Atynska Street undergoing major repairs has a total length of almost 3.6 km. On the section from Prazka Street to Traktoristov Street, there are two carriageways of Alma-Atynska Street with two lanes in each direction (the width of the carriageway on the even side of the street varies from 6.35 to 7.0 m, and 7.0 m on the odd side) with a separate tram line along the axis with a width of 7.0 m.

At the junction of Alma-Atynska Street and Praska Street (PK 0+00 - PK 0+44.0), a tram track is planned to be built at the same level as the carriageway.

On the section from Prazka Street to Traktoristov Street (PK 0+44.0 - PK 6+79.04), major repairs will be carried out on the carriageway, maintaining a width of 2x7.0 m and shifting it towards the pavements (creating a so-called "fish") in certain sections due to the widening of the tram tracks to 9.1 m for the installation of tram stop platforms. The width of the carriageway in these sections will also be 2x7.0 m. The tram will run on a separate track 7.0 m wide, and 9.1 m wide in the months when the platforms are being constructed.

Ділянки трамвайних колій на відокремленому полотні від проїздної частини
(ПК 0+44,00 - ПК 6+79,04)
(Проектний переріз)



(Існуючий переріз)

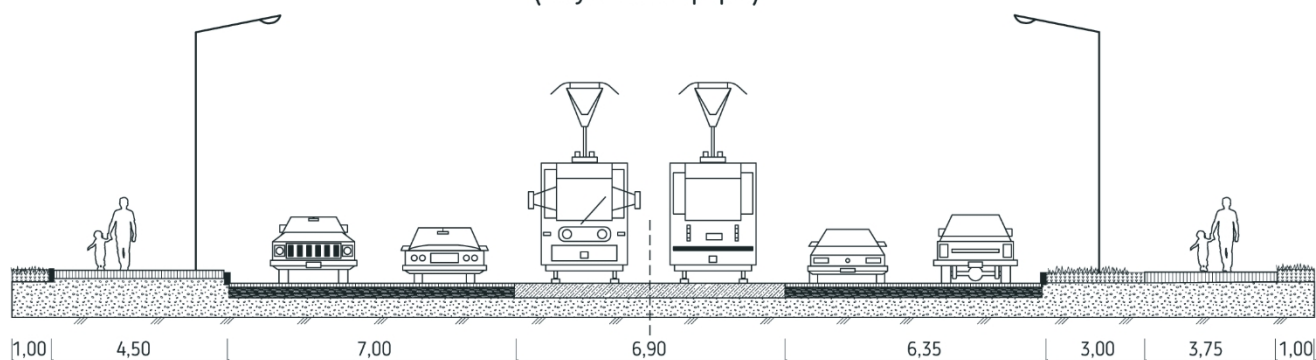


Figure – Cross-section of the planned and existing carriageway from Prazka Street to Traktoristov Street.

On the section from PK 6+79.04 (Tractorist Street) to PK 13+60.89, major repairs of the carriageway with widening to 14.0 m and transfer of the tram tracks to the carriageway axis, including the overpass, with the organisation of 4 lanes taking into account traffic on the tram tracks. The transition from a separate tram track to one combined with the carriageway is carried out on the section PK 6+79.04 - PK 7+40.50 and on the section PK 12+10.40 - PK 13+60.89.

Ділянки трамвайних колій в рівні з проїзною частиною
(ПК 0-35,40 - ПК 0+44,00); (ПК 6+79,04 - ПК 13+60,89);
(ПК 21+23,15 - ПК 21+53,15); (ПК 24+70,20 - ПК 25+90,60)

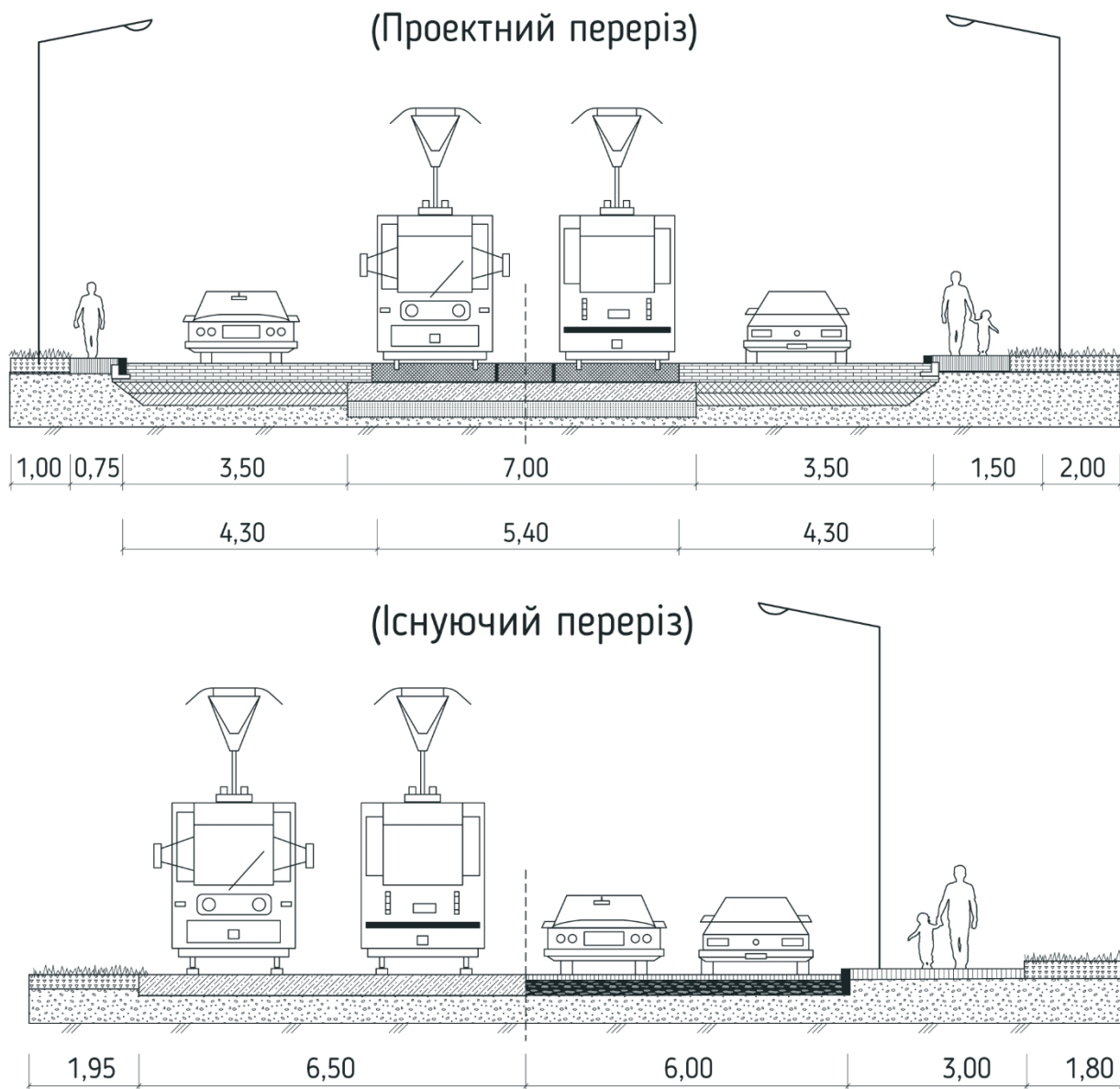


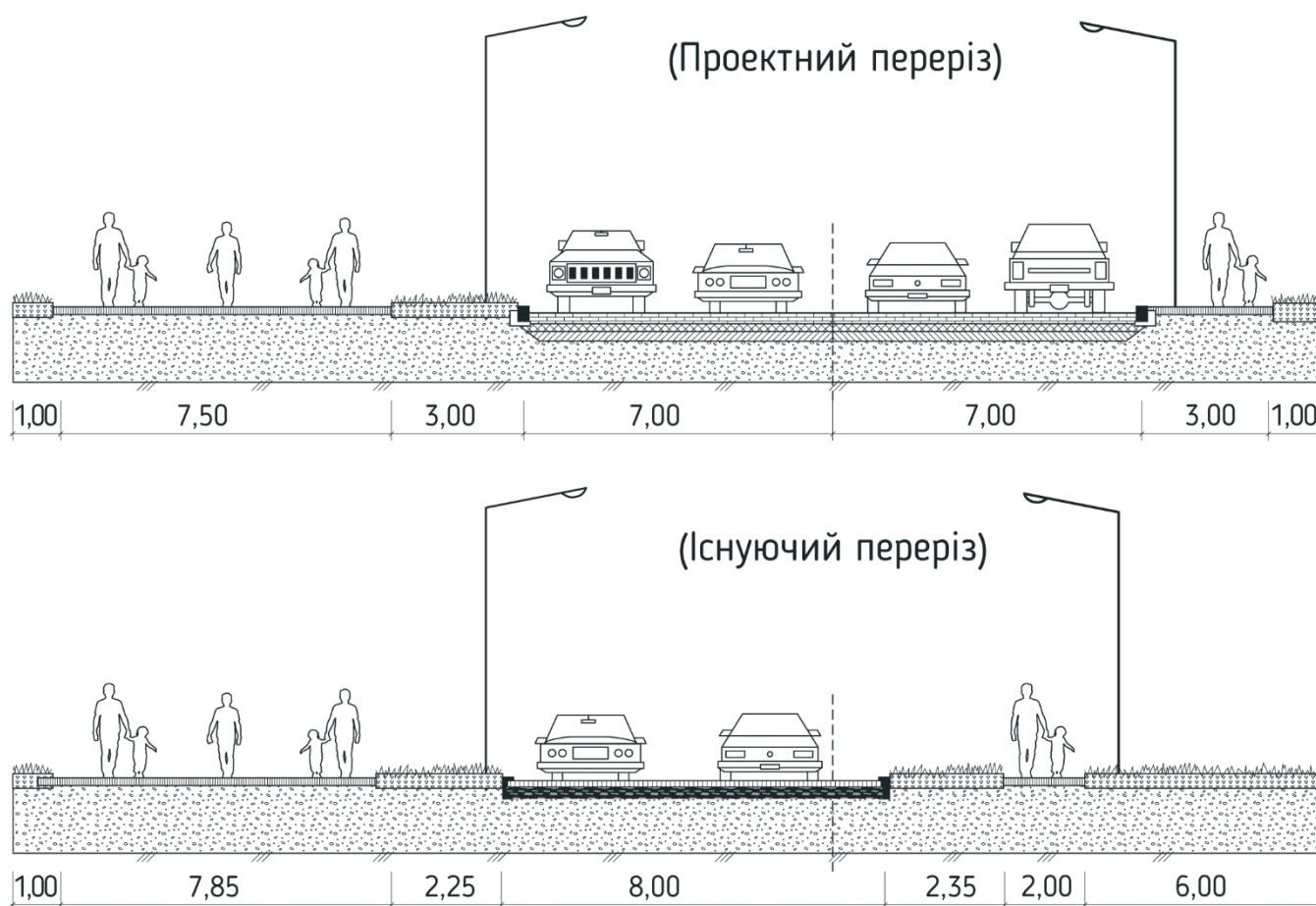
Figure – Cross-section of the planned and existing position of tram tracks at the level of the carriageway from Traktoristiv Street to O. Dovbush Street.

On the section from PK 13+60.89 to PK 24+70.20, major repairs of the carriageway with their expansion to 7.0 m and the installation of a separate 7.0 m tram track, with the exception of the intersection at PK 21+23.15 - PK 21+53.15, where the tram track is being laid at the level of the carriageway (to organise traffic at the intersection). At the same time, a new carriageway is being built on the right side of the tram track along the picket line on the section from PK 13+17.90 to PK 21+24.00.

On the section from PK 24+70.20 to the junction with Alma-Atynska Street at PK 25+90.60 towards the roundabout, the tram tracks are arranged in conjunction with the carriageway. The transition from a separate track to a combined track is carried out on the section from PK 24+70.20 to PK 25+46.00 with a corresponding narrowing of the carriageway width to 14.0 m.

On the section from PK 25+90.60 to PK 31+59.25, the width of the carriageway is widened to 14.0 m with the organisation of 4 lanes of traffic.

Ділянка розширення проїзної частини до 14м (ПК 25+90,60 - ПК 31+59,25)



Cross-section of the planned and existing carriageway on the section where it is widened to 14 m.

On the section from PK 31+59.25 to Litinska Street (PK 35+71.36), the width of the carriageway, separated by a boulevard strip of variable width from 5.0 to 8.0 m, is widened to 7.0 m. A roundabout for public transport will be built at the junction with Litinska Street.

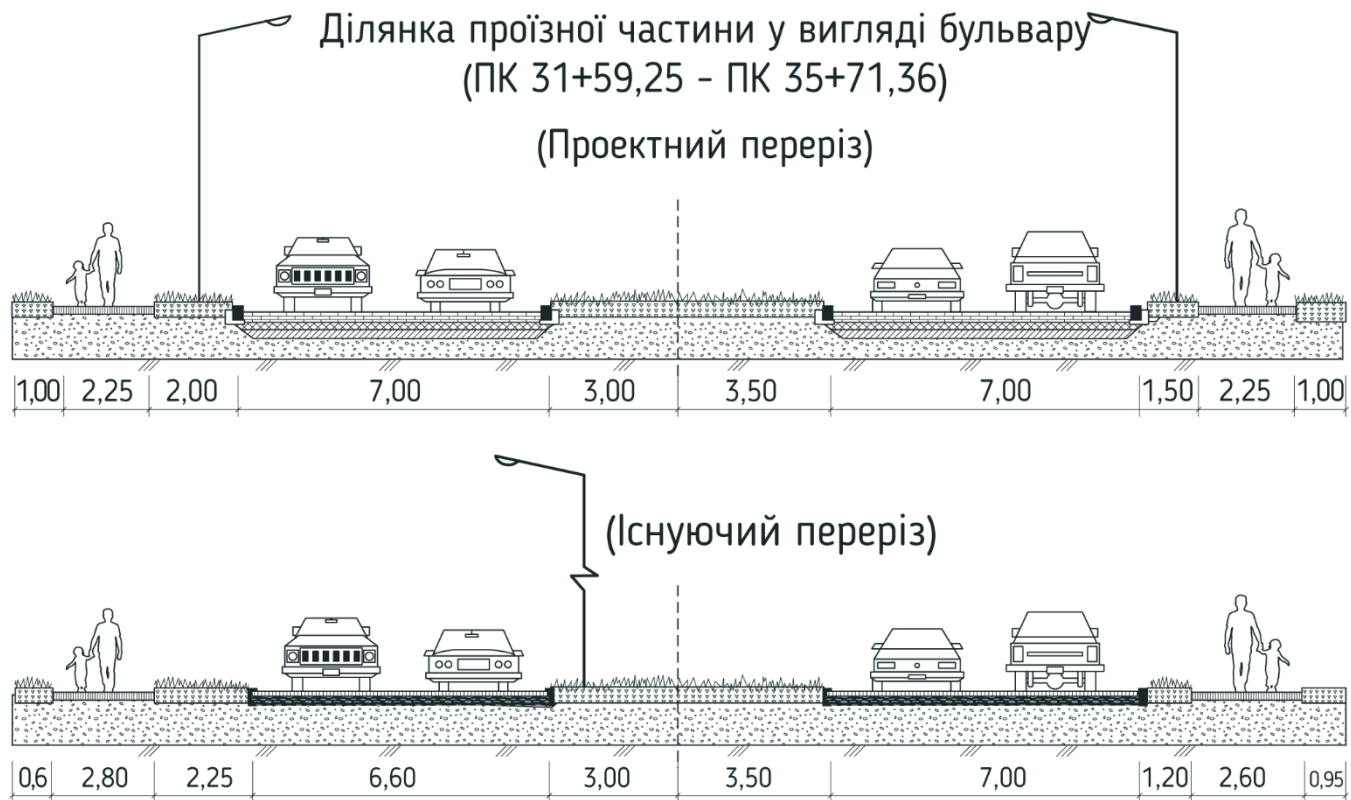


Figure – Cross-section of the planned and existing layout of the carriageway in the form of a boulevard.

The carriageway of Alma-Atynska Street and the pavements are covered with asphalt concrete. Along Alma-Atynska Street, there are numerous junctions and intersections of streets and entrances/exits to/from adjacent areas.

On the section of the street with a tram line, the supports for outdoor lighting and the contact network are combined, and on sections without a tram line, there is outdoor lighting with metal and partially reinforced concrete supports.

Engineering networks are laid along Alma-Atynska Street, namely: 10 kV power lines, water supply and sewerage, storm sewerage, medium and low pressure gas pipelines, etc. There are green spaces along the street, consisting mainly of deciduous trees. The removal of green spaces is carried out on the basis of a green space removal act, drawn up and agreed upon in the appropriate manner.

During the development of the working draft, traffic intensity surveys were conducted and an analysis of surveys conducted in previous years by PJSC Kyivproekt and other city organisations was carried out.

The average daily traffic intensity on the planned section of Alma-Atynska Street ranges from 9.5 to 6.5 thousand units per average day on individual sections.

The estimated traffic intensity on Alma-Atynska Street and the end of its service life (item 14 of the design task – 10 years) after major repairs (2027):

- from Prazka Street to O. Dovbush Street, the total in both directions is 11,600/14,100 units;
- from O. Dovbush Street to Litinska Street, a total of 7,900/9,600 units in both directions.

The working project provides for the major repair of Alma-Atynska Street on the section from Praska Street to Litinska Street. The design solution for the major repair of Alma-Atynska Street provides for the complete dismantling of the existing road surface and pavements (except for the intersection of Alma-Atynska Street and Praska Street Prague Street, where the top layer of asphalt concrete with a thickness of 5 cm will be milled) with the asphalt concrete being taken away for recycling and the base material being taken to a landfill as construction waste. This decision was made in connection with a complete change in the longitudinal profile of the street in order to organise a closed drainage system, the incompatibility of the existing road surface structure with the load on it from the existing traffic intensity, 30% of which is heavy goods vehicles, in accordance with the technical conditions of Kyivavtodor regarding the need to construct a new road surface for category II roads and the significant damage to the existing road surface. On the planned Alma-Atynska Street, on the section from Prazka Street to Traktoristiv Street (PK 0 – PK 7+00), a closed system for draining rainwater and meltwater from the carriageway will be installed, with rainwater collectors installed in accordance with the new relief organisation scheme.

Major repairs to the road network for the drainage of rainwater and meltwater from the carriageway include:

- rearrangement of existing storm sewer pipelines;
- installation of rainwater drainage pipes in areas where there is no rainwater drainage system.

The route in question runs along the left bank of the first floodplain terrace of the Dnieper River and belongs to the Darnytskyi Meliorative Canal catchment basin. The geological structure to a depth of 6.0 m consists of alluvial soils – sand, fine and silty with layers and lenses of sandy loam. Loose soils lie on the surface. Groundwater is encountered at a depth of 2.4-4.5 m. Seasonal fluctuations in the groundwater level are possible within 1.5 m of the recorded levels.

According to the current master plan for Kyiv for the period up to 2020, Alma-Atynska Street is classified as a main street of district significance (a main street of district significance is a pedestrian and transport link within a territorial unit that connects territorial units and provides transport links in planning areas with enterprises and facilities of local significance).

The start of the PK 0 route is located at the intersection of Prazka and Alma-Atynska streets. The scope of work includes the area of the intersection of Prazka Street and Alma-Atynska Street. The end of the route - PK35+7I.36 is located at the junction of Litinska Street, taking into account the construction of a turning circle for public passenger transport.

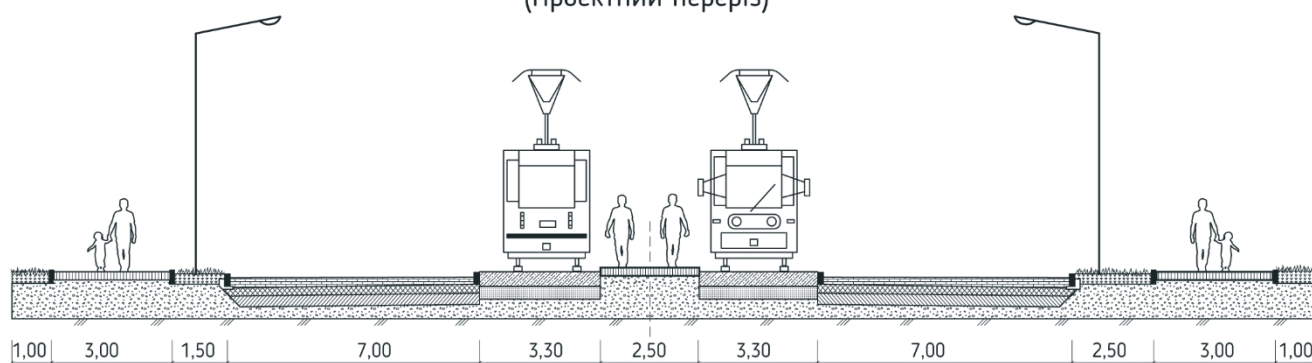


Figure – Road network plan for Alma-Atynska Street from Prazka Street to Litinska Street

At public transport stops (trams), the tram tracks will be widened to 9.10 m to accommodate an island platform with a corresponding widening of the carriageway in the form of a so-called "fish". The stops for other public passenger transport, buses, are arranged on the carriageway without the construction of stop "pockets" due to the saturation of the territory along the carriageway with engineering communications and cramped conditions.

Трамвайні колії на відокремленому полотні від проїзної частини
в місцях зупинок громадського транспорту

(Проектний переріз)



(Існуючий переріз)

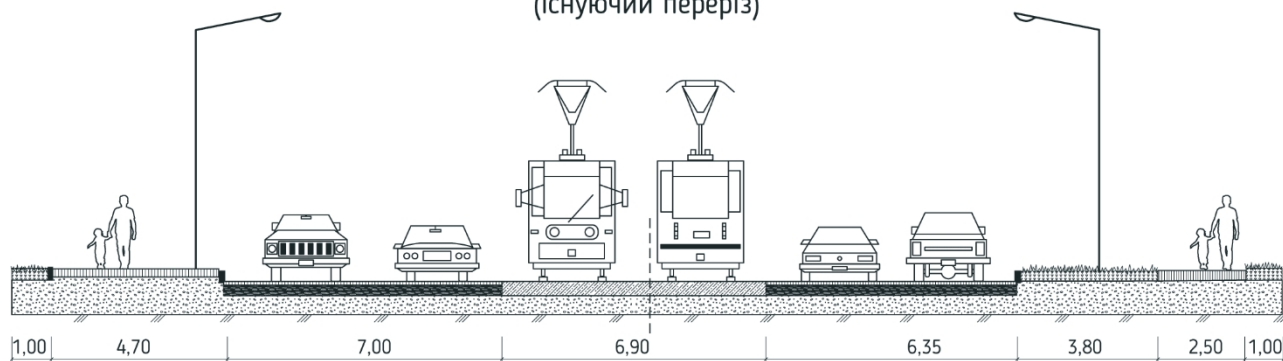


Figure – Cross-section of the planned and existing position of the tram track carriageway at public transport stops.

The longitudinal profile of Alma-Atynska Street is made along the axis of the tram track. When designing the longitudinal profile, the existing longitudinal slopes and vertical curves were changed to make it possible to install a closed drainage system.

Конструкція з/б обойми посилення ОУБ-4 з охопитом труби на 360°

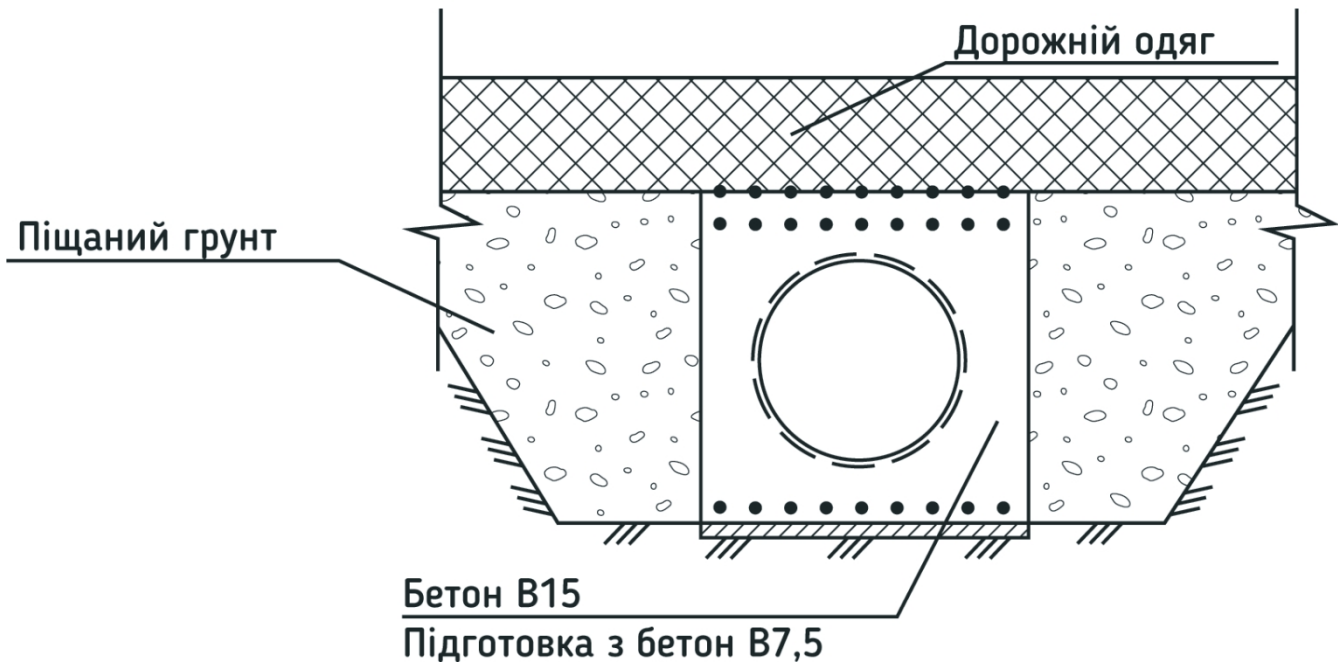


Figure – Design solution for the organisation of a frame for water drainage.

The cross-section of the street is gabled with a transverse slope of 20 ‰. The cross-section of the carriageway takes into account the transverse slopes of the tram tracks - 7 ‰ on sections of the separate track and on sections combined with the carriageway. The pavement part of the street is designed with a slope of 20‰ towards the carriageway.

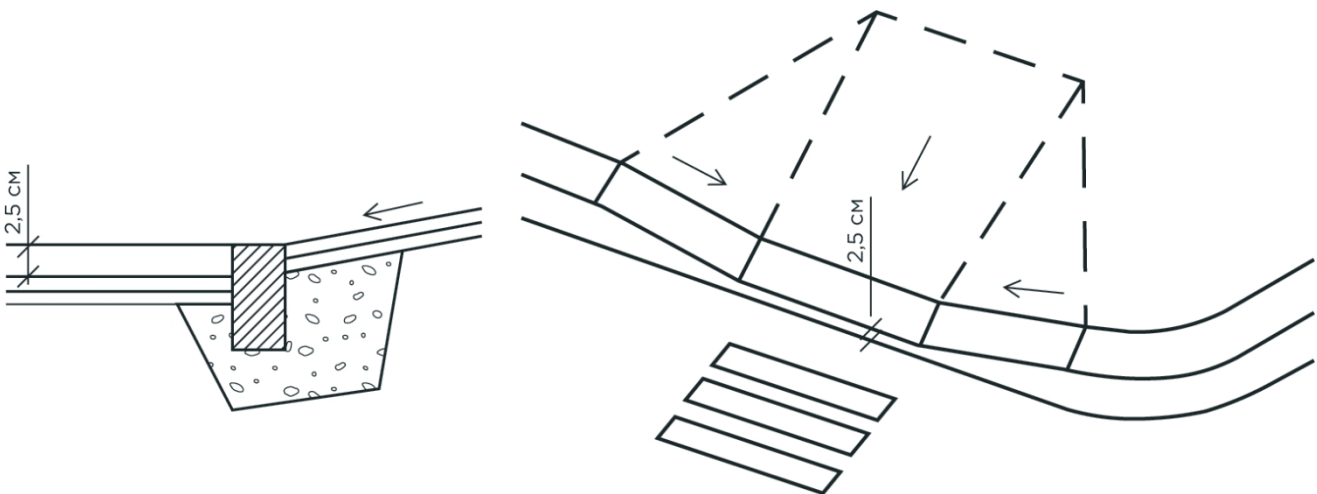


Figure – Diagram of the curb lowering at a pedestrian crossing.

Based on calculations, the road surface is designed with a three-layer asphalt concrete pavement on a sand-crushed stone mixture base.

Road surface design on the carriageway		
1	Fine-grained asphalt concrete with a maximum mineral grain size of up to 20 mm, dense, type B, continuous granulometry, grade 1 (Asphalt concrete AB. Dr. Shch.B.20.NP.I DSTU B.V. 2.7-119:2011), on polymer-bitumen binder grade BMP 60/90-52	5.0 cm
2	Spreading of bitumen emulsion 0.4 l/m ² , according to DBN V.2.3-4:2015	
3	Coarse-grained asphalt concrete with a maximum mineral grain size of up to 40 mm, dense, type B, with a crushed stone content of 45%, continuous granulometry, grade 1 (Asphalt concrete AB. NSh. Kr. Sh.B.NP.I.DSTU B.V. 2.7-119:2011), on bitumen BND 60/90	8.0 cm
4	Spreading of bitumen emulsion 0.4 l/m ² , according to DBN V.2.3-4:2015	
5	Coarse-grained, porous asphalt concrete, type A-B, continuous grain size, grade 1 (Asphalt concrete AB. NSh. Kr. P.NP.I. DSTU B.V. 2.7-119:2011), on bitumen BND 60/90	8.0 cm
6	Spreading of bitumen emulsion 0.6 l/m ² , according to DBN V.2.3-1:2015	
7	Shchebnevo - sand mixture C 7, optimal composition, reinforced with cement M400, strength class II, M40 according to GBN B.2.3.-37641918-554:2013	20.0 cm
8	Crushed stone - sand mixture C 5, optimal composition, unfortified, according to DSTU B V.2.7 - 30:2013	20.0
9	Woven biaxial polyester geogrid covered with PVC with a tensile strength of 55 kN/m	67

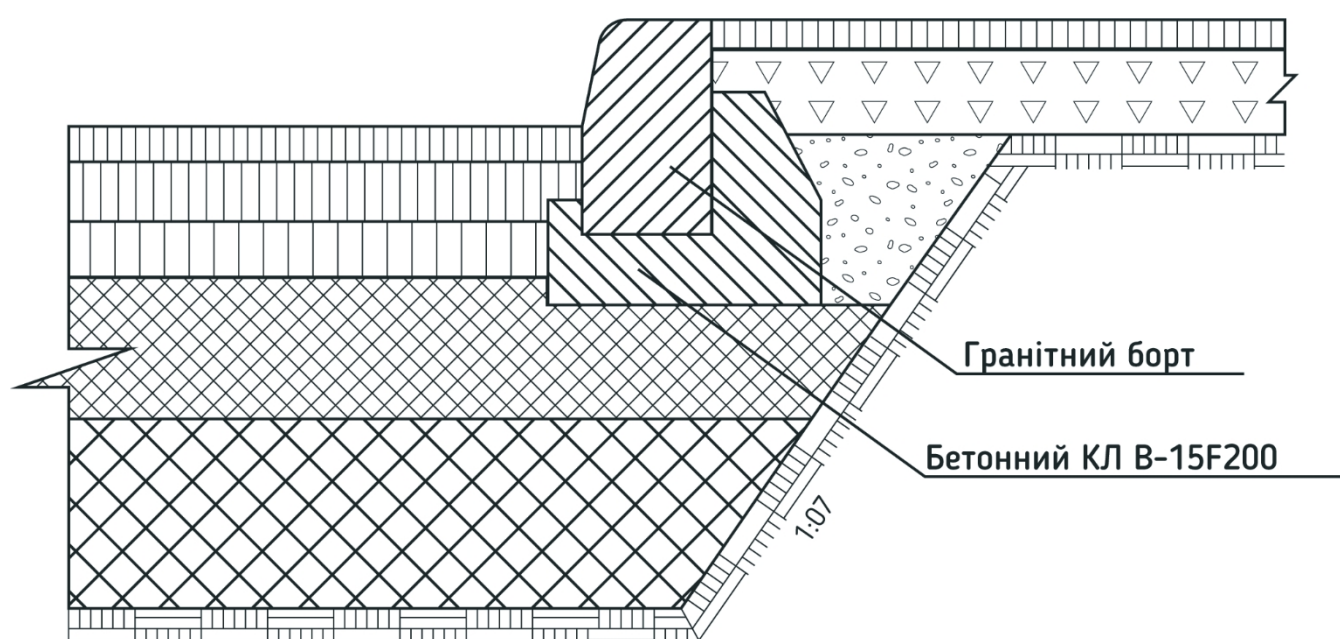


Figure – Road surface structure on the carriageway.

Pavement structure		
1	Sand asphalt concrete type G, grade I	4.0
2	Granite crushed stone, fraction 20-40 mm	12

Бетонний борт БР 100.20.8

Посів трав по шару
рослинного ґрунту 20 см

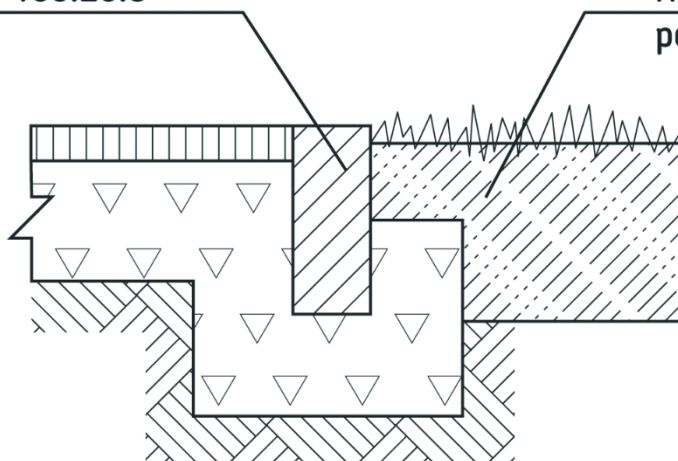


Figure – Road surface design on the carriageway.

The transport and pedestrian scheme provides for the organisation of two-way traffic on Alma-Atynska Street. Pedestrian traffic is provided for on pavements on both sides of the street.

At the intersections of Alma-Atynska Street with intersecting and adjacent streets, traffic is planned in all directions, with exits/entrances to/from internal block passages organised by right turns. There are no traffic lights at intersections and junctions at the same level.

For the greening of Alma-Atynska Street, it is proposed to plant groups of decorative shrubs, coniferous and deciduous shrubs of the third size, and to decorate the supports with wild grapevines.

Table: Technical and economic indicators for the project "Capital repair of the road network of Kyiv: Alma-Atynska Street from Prazka Street to Litinska Street"

Indicators	Unit of measurement	Quantity
Type of construction	Major repairs	
Road category	main street of regional importance	
Length of section	km	3.571
Width of carriageway	m	2x7.0; 14.0
Lane width	m	3.5
Number of traffic lanes on the carriageway	lane	4

Indicators	Unit of measurement	Quantity
Width of central dividing strip	m	7.0 - 9.10: 5.0 - 8.0
Minimum radius in plan		120
Minimum radii of vertical curves:		
- convex	m	2200
- concave	m	1200
Maximum longitudinal slope	‰	55.7
Duration of major repairs	months	15
Total estimated cost of construction at current prices as of 14 December 2016, including:	thousand UAH	235401.164
- construction works;	thousand	189,319.107
- equipment;	UAH	466,051
- other expenses	thousand	45616.006
	UAH	
	thousand	
	UAH	
Refundable amounts	thousand UAH	180,524

Table: List of individual works volumes provided for in the working draft

Name of work	Unit of measurement	Number of units of measurement
Transfer of the route to the site	km	3.57
Cutting of vegetation layer	m ³	320
Milling of asphalt pavement with removal for processing at an asphalt plant	m ²	414
Dismantling of concrete pavement with a thickness of 4 cm	m ²	17
Dismantling of crushed stone base:	m ²	3345
Demolition of cobblestone base	m	34705
Dismantling the side stone:/	m	6791
Dismantling of reinforced concrete slab covering	m ²	990
Soil excavation	m ³	211
Embankment construction	m ³	447
Slope reinforcement by sowing grass	m ²	50
Lawn installation	m ²	80
Installation of a layer of woven biaxial polyester geogrid covered with PVC 55/55	m ²	2923
Installation of a lower/middle base layer made of crushed stone and sand mixture C 5, uncompacted, thickness 14/12 cm	m ²	51
Construction of the upper layer of the base with a thickness of 20 cm from crushed stone and sand mixture C 7, optimal composition, reinforced with cement M400, strength class II, M40	m ²	52908
Bitumen emulsion flow rate 0.6 l/m ²	m ²	50503
Installation of lower layers of two-layer coating from asphalt concrete mixture) porous, coarse-grained, grade I type A-B, thickness 8/8 cm	m ²	50503

Name of work	Unit Measure	Quantity Unit of measurement
Spreading of bitumen emulsion 0.4 l/m ²	m ²	51719
Construction of the upper layer of asphalt concrete mixture: dense, fine-grained with a maximum mineral grain size of up to 20 mm, type B, thickness 5 cm	m ²	51719
Construction of pavements from sandy asphalt concrete type G, grade II, thickness 4 cm on a crushed stone base	m ²	21360
Kerbstones:		
a) granite type	m	11760
b) concrete kerbstones on a concrete base, h = 45 cm BR 100.60.20 c) kerbstone BR 100.20.8	m	46
Construction of a temporary road made of dense, coarse-grained asphalt concrete with a maximum mineral grain size of up to 40 mm, type B, thickness 5 cm, length 0.64 km and width 3.5 m for public transport during the construction period	m	9050
Dismantling of asphalt concrete pavement Road signs	m ²	2240
	m ²	2240
	pcs	303

1. During the preparation of the verification report, the explanatory note and drawings of the first volume of the working draft, the approval section, the section "General plan, relief organisation scheme. Landscaping and greening" and the drawings of the fifth volume "Traffic organisation" were reviewed.

2. It should be noted that the materials presented are not in compliance with DSTU B A.2.4-4:2009; DSTU B A.2.4-6:2009; DSTU B A.2.4-29:2008; SOU 45.2- 00018112-048:2010; DSTU B A.2.4-2:2009, DSTU 2587-2010, DSTU 4100-2014; DSTU 4241-2003.

For example, the drawings do not contain sufficient dimensions and references for all elements, drainage from the adjacent territory is not shown, and the length of road markings and the picketage of installed road signs are not provided.

3. Based on the analysis of the road pavement structure, the following discrepancies and inconsistencies in the project documentation were identified:

- According to the test pit report (determination of the existing pavement), the thickness of the pavement and base layers to be removed has been determined. In addition to the specified layers, the road works volume report also includes a 5 cm thick layer of milled asphalt concrete pavement, which is not taken into account in the scope of work and calculations, and therefore the costs of its restoration are not included;
- There is no explanation as to why point 28 of the "Design Task" has not been fulfilled, which requires the provision of patch repairs to the lower layer of the asphalt concrete pavement after milling.
- there is no comparative analysis of the cost of road pavement options, which would allow for the selection of a more rational and economical option;

- In sections 6 and 7 of the explanatory note and in the drawing "Road pavement design", the names of materials and DSTU, VBN, etc. are incorrectly indicated, namely:

Incorrect

AB.Dr.Shch.B20.NP.I

AB.NSh.Kr.Sh.B.NP.I

AB.NS.Kr.P.A-B.NP.I

DBN V.2.3-218-002-95 VBN V.2.3-218-002-95

DBN V.2.3-4:2007

bitumen emulsion application 0.4 l/m²

Top layer – mixture C-7 of optimal composition, reinforced with cement M400, II strength class, M40 according to DBN V.2.3-218-002-95 arranged in accordance with VBN V.2.3-218-002-95 (E=400 MPa) with a thickness of 20.0 cm

The bottom layer is a mixture of C-5 of optimal composition, reinforced in accordance with DSTU B.2.7-30-95 (E=180 MPa). E=260 with a thickness of 26.0 cm

spreading bitumen emulsion 0.6 l/m²

Correct

ASG.Dr.Sh.B.NP.I

ASG.Kr.Sh.B.NSh

ASG.Kr.P.A-B.NP.I

GBN V.2.3-37641918-554:2013

DBN V.2.3-4:2015

spreading of bitumen emulsion EKSH60 0.66 l/m² (spreading 0.4 l/m² – for pure bitumen)

In a mixture of crushed stone SSh-20 of optimal composition, reinforced with cement, the thickness of which is calculated for a modulus E=400 MPa, the material grade according to GBN B.2.3-37641918-554:2013 must be M20 (M-40 – for modulus E=700 MPa)

according to DSTU B V.2.7-30:2013 has a modulus MPa. (E=180 MPa - for sand-gravel mixture)

bitumen emulsion pouring 1.0 l/m² (pouring 0.6 l/m² – for pure bitumen)

- The dimensions of the granite stone are not specified in the road pavement design drawing.

ARTIFICIAL STRUCTURES

The overpass was built in 1960 by Bridge Construction Unit No. 2 based on a design by the Kyivproekt Institute.

Kyivproekt. The overpass is located in the Dnipropetrovsk district of Kyiv on Alma-Atynska Street, a major district road.

ШЛЯХОПРОВІД, ПРОЕКТ

Збудований в 1960 році Мостозагоном №2 за проектом інституту «Київпроект», за весь час експлуатації капітальний ремонт не проводився.



The overpass on Alma-Atynska Street in Kyiv is designed to allow motor vehicles, trams and pedestrians to cross the railway tracks. The main geometric characteristics of the existing structure are as follows:

- total length - 61.42 m;
- geometric layout - 3 x 14.06 m;
- total width of the carriageway - 12.64 m;
- width of the motorway lane - 6.15 m;
- width of the tram track lane - 6.5 m;
- A one-sided pavement with a width of 2.85 m.

The design and construction solutions for the major repair of the overpass were adopted based on the results of the survey conducted by Mistproekt LLC in February 2016 and the design specifications.

The working design provides for the major repair of the overpass. After the major repair, the overpass will have the following main characteristics:

- total length - 61.42 m;
- geometric scheme - 3x14.06 m;
- width of the carriageway - 14 m;
- sidewalk width - 0.75 and 1.5 m;
- load on the structure: A-11, NG-60, load from trams, crowd on pavements 400 kg/m² .

The project provides for:

- widening of the carriageway to remove restrictions on motor vehicle traffic;
- overhaul of the bridge deck, supports, installation of a monolithic reinforced concrete slab for the carriageway and monolithic reinforced concrete pavements;
- installation of barrier fencing, handrails, expansion joints, lighting supports and contact network;
- installation of monolithic reinforced concrete cabinet walls;
- installation of monolithic reinforced concrete transition slabs;
- replacement of road surface, installation of grounding circuit structures.

Existing lighting poles (contact network) are replaced, and additional new lighting poles are installed.

After the repair, restrictions on motor vehicle traffic will be lifted.

The major repair of the overpass supports involves the following technological operations:

- demolition of damaged concrete;
- sandblasting of concrete and reinforcement;
- application of Sika 910 N bonding compound or a compound with similar characteristics to the concrete surface;

- application of Silka 910 N anti-corrosion compound or a compound with similar characteristics to the reinforcement;
- restoration of the concrete surface using the "dry" shotcrete method;
- application of the Welesgard protective system to the concrete surface.

Overhaul of the overpass structures involves the following technological operations:

- demolition of damaged concrete;
- sandblasting of concrete and reinforcement;
- application of Sika 910 N bonding compound or a compound with similar characteristics to the concrete surface;
- application of Sika 910 N anti-corrosion compound or a compound with similar characteristics to the reinforcement;
- restoration of the concrete surface using the "dry" shotcrete method;
- applying the Welesgard protective system to the concrete surface.

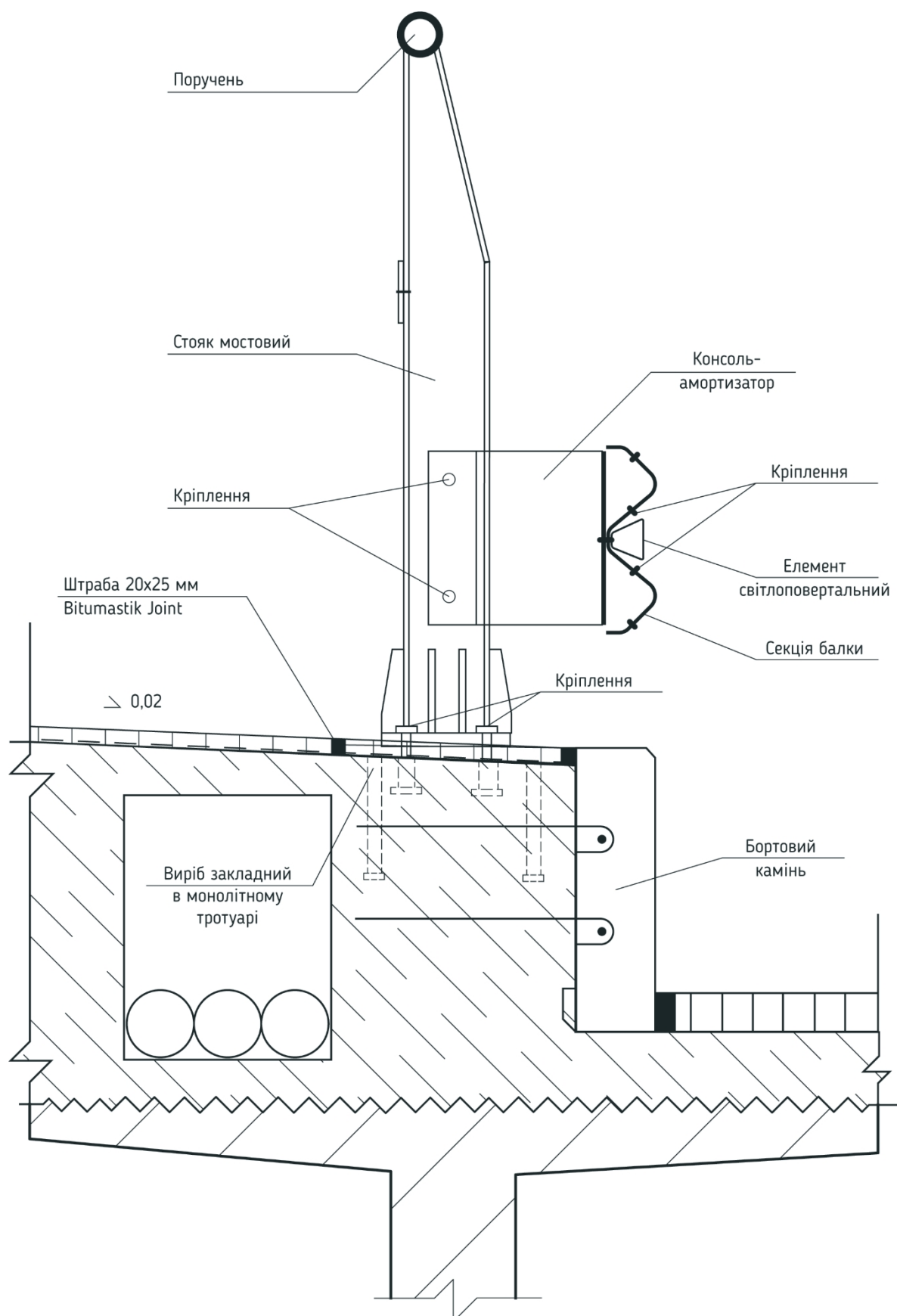


Figure – Barrier fence construction

The bridge deck involves dismantling the asphalt pavement on the roadway and sidewalks, dismantling the metal fence and reinforced concrete railing. Dismantling of expansion joints and drainage devices. Sandblasting and washing of the existing surface of the superstructure.

The major repair of the bridge deck involves the following technological works:

- application of a bonding compound (Sika Mono Top 910 N, or a compound with similar characteristics);
- dismantling of the reinforced monolithic slab and protective layer of beams (to a depth of 2 cm);
- dismantling of prefabricated structures of pavements and cornice blocks;
- installation of monolithic reinforced concrete slabs for the carriageway and monolithic reinforced concrete pavements (B30 W8 F300 concrete tested in a saline environment);
- installation of barrier fencing, handrails, D80 expansion joints, lighting poles and contact network;
- installation of the Eliminator waterproofing system on the roadway and pavements;
- installation of D80 expansion joints, galvanised barrier fencing and lighting poles (contact network);
- installation of galvanised handrails;
- installation of concrete kerbs;
- installation of a two-layer hot mix asphalt pavement on the roadway:
 - a) lower layer h=40 mm made of GA-15 hot mix asphalt;
 - b) bottom layer h=30 mm made of GA-10 bituminous asphalt.

Installation of a 25 mm thick asphalt concrete pavement on sidewalks made of GA-10 bituminous asphalt.

The combination involves the following repair work:

- dismantling of existing cornice blocks;
- dismantling of existing cabinet walls and partial dismantling of existing nozzles;
- installation of monolithic reinforced concrete cabinet walls;
- installation of monolithic reinforced concrete transition slabs on a crushed stone cushion, made using the wedging method;
- replacement of road pavement on approaches and asphalt concrete pavements;
- installation of grounding circuit structures.

External lighting involves replacing existing lighting poles with new ones and installing additional new lighting poles.

Surface water flows along transverse and longitudinal slopes into the city's storm sewer system and is then treated at municipal treatment facilities.

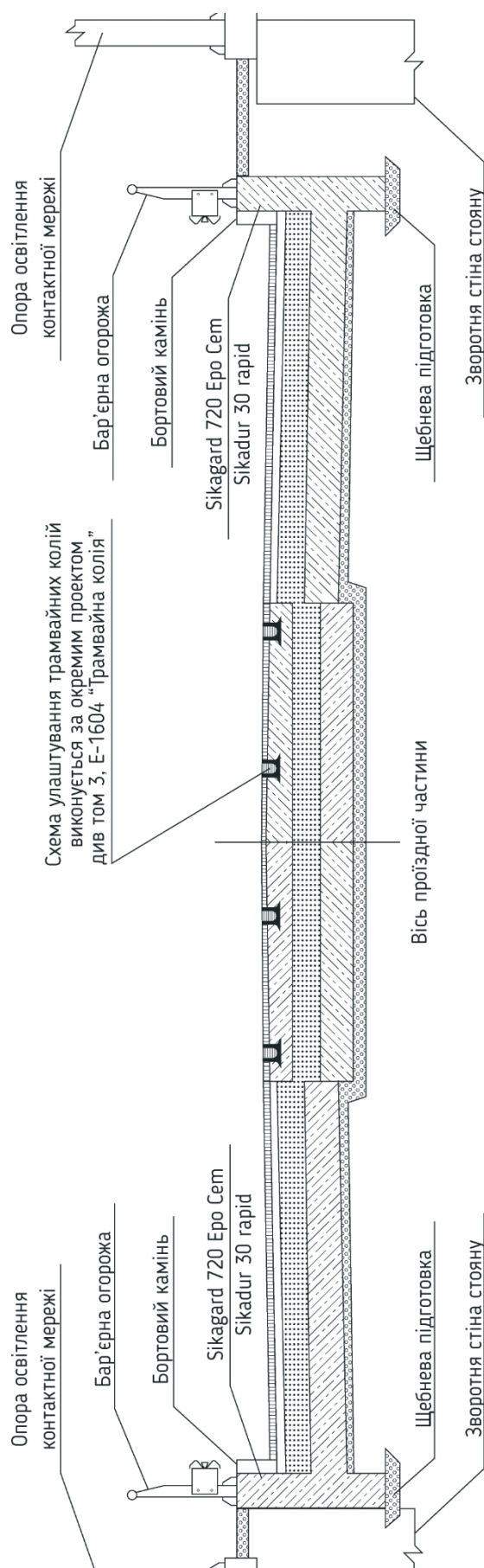


Figure – Cross-section of the overpass at the end of the transition slab. Layout of elements

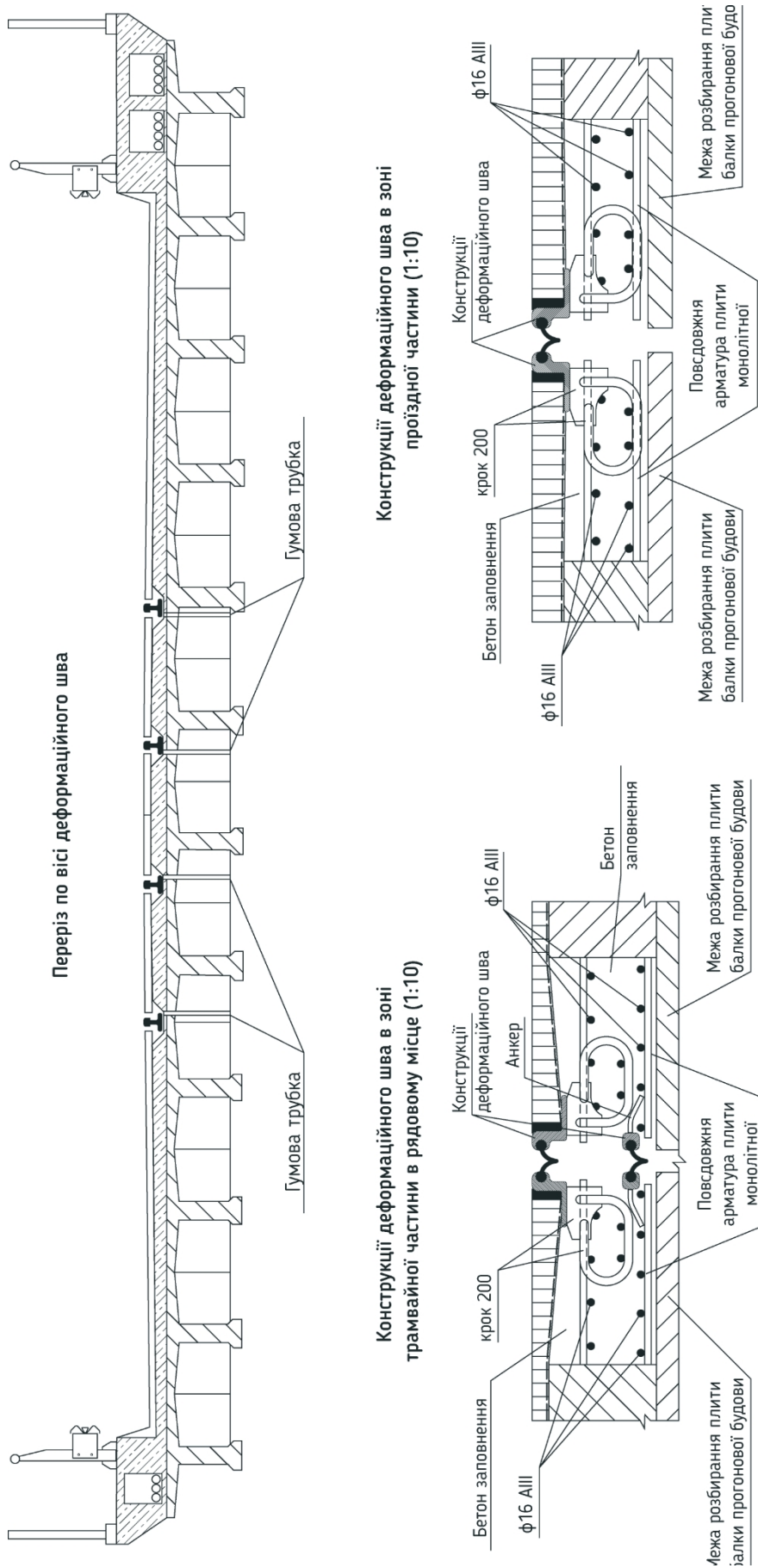


Figure – Cross-section of the overpass along the axis of the expansion joint

In section 161/15 "Overpass across railway tracks near Liski station on Al-Ma-Atynska Street," the following comments on the project documentation were identified:

- according to Table 7.1 of DBN 360-92** "Urban Planning. Planning and Development of Urban and Rural Settlements," the width of the traffic lane has been reduced from 3.75 m to 3.5 m, and the dimensions of the carriageway do not meet the requirements;
- the overpass across the railway tracks lacks safety lanes in accordance with DBN V.2.3-14:2006 "Transport structures. Bridges and pipes. Design rules";
- According to Table 7.1 of DBN 360-92** "Urban Planning. Planning and development of urban and rural settlements," the minimum width of the sidewalk should be 2.25 m. In the project, the width of the right sidewalk is 1.5 m, and the width of the left sidewalk is 0.75 m. However, due to the fact that major repairs were carried out rather than reconstruction, it is impossible to increase the width of the bridge;
- there is no data (type of load, amount of transverse deflection of the beam, etc.) on the road barrier fence used, which makes it impossible to assess the correctness of the decisions made;
- The thickness of the asphalt concrete pavement of the carriageway is underestimated (70 mm in the project instead of 110 mm in accordance with DBN V.2.3-22:2009 "Bridges and pipes. Basic design requirements"), but the project uses lightweight asphalt - gus-aas-falt;
- there is no information on the installation of drainage to remove water that has penetrated the asphalt concrete pavement (requirement of clause 7.2.6 of DBN V.2.3-22:2009);
- the thickness of the monolithic reinforced concrete slab of the bridge deck does not meet the requirements of clause 7.2.4 of DBN V.2.3-22:2009 (at least 140 mm is required, but the design specifies 125 mm), no justification is provided for the concrete class of the slab, which makes it impossible to assess the correctness of the decisions made;
- there is no connection between the new monolithic reinforced concrete slab and the old span structure. Most often, the connection is made by anchoring the monolithic slab. The justification for the adequacy of the strength of the connection made in the project is unclear;
- The design of the tram track on the overpass does not comply with the requirements of clauses 6.10.6, 6.10.8 DBN V.2.3-18:2007 "Tram and trolleybus lines. General design requirements";
- the requirement of clause 2.6 of the technical conditions of Kyivpastrans No. 31/1/137 dated 20 January 2016 on the installation of safety rails on the overpass has not been fulfilled;
- the necessary decisions have not been taken to ensure the movement of people with reduced mobility in accordance with the requirements of DBN V.2.2-9-2009 "Buildings and structures. Public buildings and structures. Basic provisions".

Recommendations:

Considering the above, we recommend considering the possibility of revising this section in accordance with the requirements of the current regulatory documentation, obtaining technical conditions and agreeing on the project documentation with the Regional Branch "South-Western Railway" of PJSC "Ukrzaliznytsia".

TRAMWAY TRACKS

The project "Major repair of the road network of Kyiv: Alma-Atynska Street from Prazka Street to Latynska Street" provides for the reconstruction of tram tracks in areas where the tram tracks change their position, namely, in areas of combined tracks at PK1+07.66 - PK1+72.00, PK8+08.00 - PK14+89.85, PK22+52.74

- PK22+82.74, PK26+02.00 - PK27+22.40 along the tram track alignment. Sections that do not fall within the specified limits are carried out on the order of KP "Kyivpastrans" E 0824 "Reconstruction of tram tracks on Alma-Atynska Street".

In the sections of tram track reconstruction, the track width is 1524 mm, and the track spacing is 3200 mm. The tram track is given a dominant elevation in the cross-section for effective surface drainage from the tramway.

The tram track structure (on a combined track bed) is of the block type with 35 cm thick VRZ reinforced concrete slabs manufactured by PREFA (Poland) with embedded NT1 grooved rails (Poland) or 60R2 equivalent using polyurethane resin.

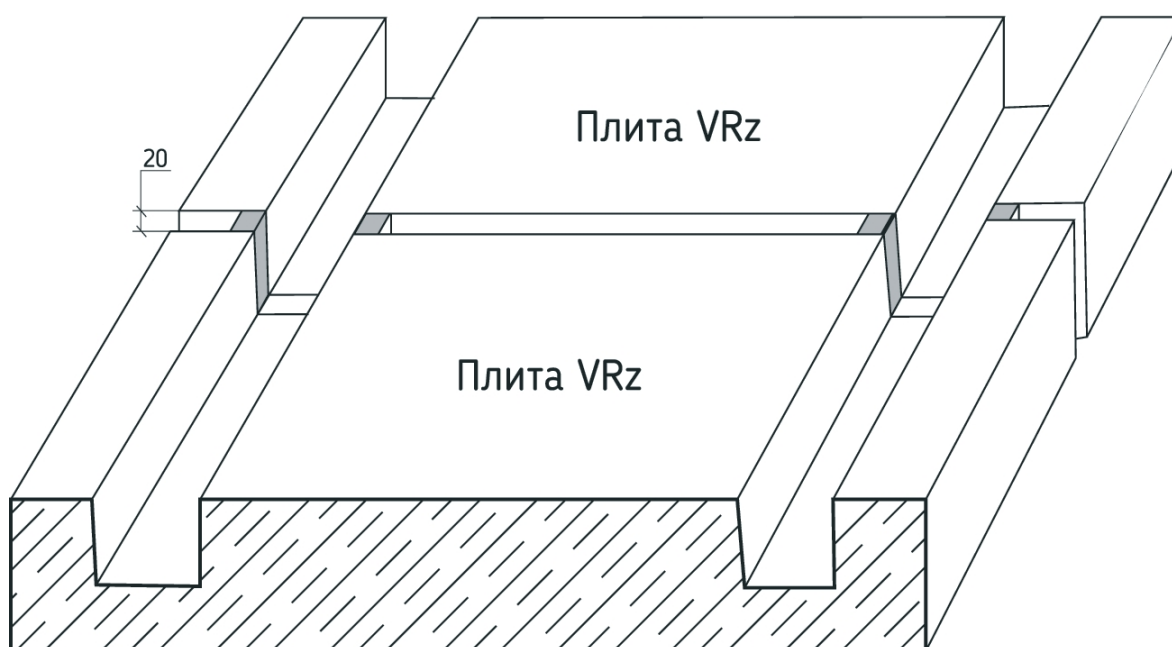


Figure – Block-type tram track design with VRZ reinforced concrete slabs manufactured by PREFA (Poland)

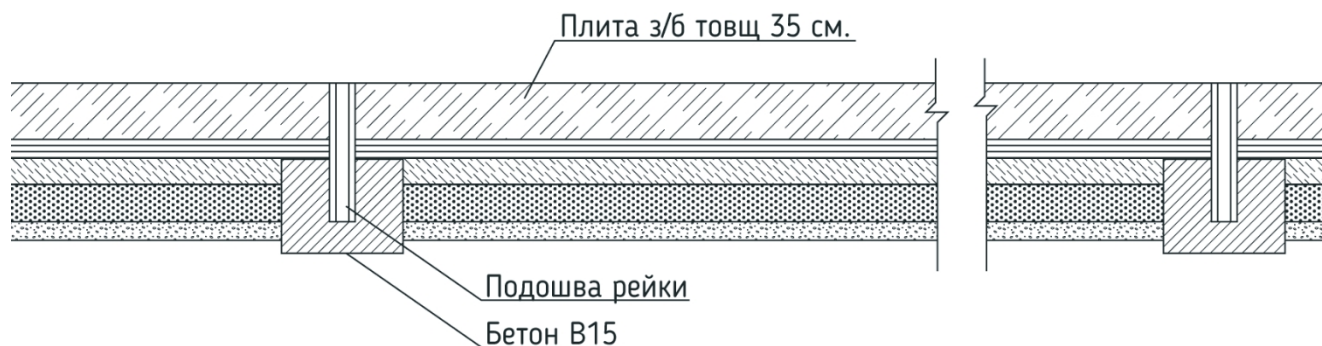


Figure – Installation of a concrete stop along the entire tram track (top view)

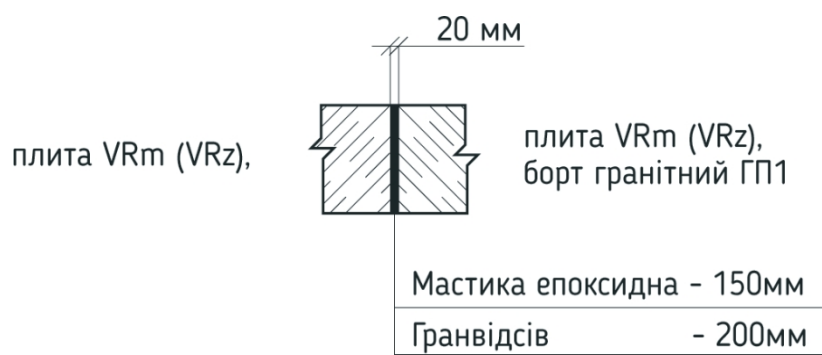


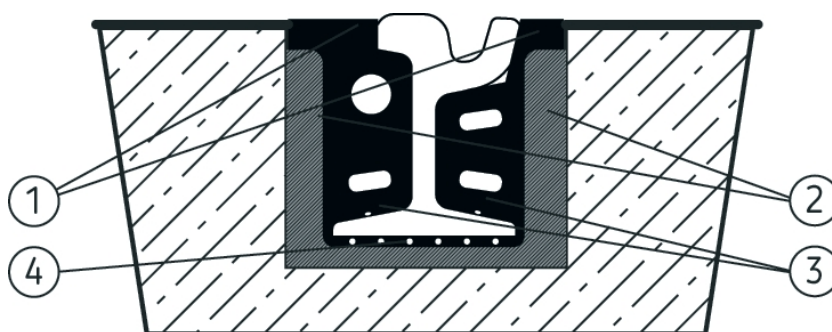
Figure – Construction of the joint between slabs and slabs and the side

This structure is laid as a single slab and can withstand a nominal static load of 115 kN per axle. Two layers of asphalt concrete, a concrete layer, two fractions of crushed stone and sand are laid under the reinforced concrete slabs. Geosynthetic materials are also used in the structure. In places where motor vehicles cross tram tracks on the sides of the slab structure, a granite curb on a concrete base (concrete class B15) is installed to prevent the slabs from shifting. The joints between the slabs and between the slabs and the kerb are first filled with granulated granite (crushed and sieved granite rock with a fraction not exceeding 5 mm) and then filled with epoxy resin mastic. In areas with a longitudinal slope of more than 50‰, a concrete stop is installed to prevent the tram slabs from shifting.

The tram track design used prevents uneven track subsidence, meets modern requirements for integrated tram tracks, and reduces noise pollution in the surrounding environment.

Table: List of main works (tram tracks)

Name of work	Quantity of units measured
Dismantling of prefabricated reinforced concrete slabs with a thickness of 100 mm, 120 mm	2245.03 m ²
Dismantling of tram tracks from tram and railway profile rails on wooden sleepers, 1680 pcs/km	1.67 km
Dismantling (cutting) of crushed stone (ballast materials and crushed stone base)	1518.28 m
Development of soils of the 2nd group	483.67 m
Installation of geosynthetic filter fabric	6860.57 m
Installation of reinforcing geogrid	2847.2 m
Installation of sand layer	522.11 m
Installation of a base made of crushed stone, size 20-40 mm, size 40-70 mm	1044.12 m
Installation of a layer of B10 concrete	1044.15 m ³
Installation of tram tracks made of NT1 rails in reinforced concrete slabs	1.794 km
Installation of GP-1 type side walls	328



1. Штроба Bitmastic Joint
2. Компаунд
3. Гумові вкладиші
4. Рейка типу 60R2 (аналог NT-1)
5. Монтажна підкладка

Figure – Installation of 60 R2 rails in the concrete part of the stop

At intersections and crossings of tram tracks with motor vehicles, on the sides of the slab structure, a granite kerb on a concrete base (concrete class B15) is installed to prevent the slabs from shifting. The joints between the reinforced concrete slabs and between the slab and the kerb are first filled with 20 cm thick gravel, then 15 cm thick epoxy mastic is poured in.

Drainage is designed to be surface drainage due to the longitudinal and transverse profile slope.

Thanks to the integrated rail and road surface, the track is an effective solution to the problem of uneven settlement of the carriageway and eliminates its unevenness.

The project provides for the re-equipment of the tram contact network on the overpass and approaches to it with the replacement of contact wires, suspension and power supply elements using modern equipment in accordance with the technical conditions of SEZ "Kyivpas-trans".

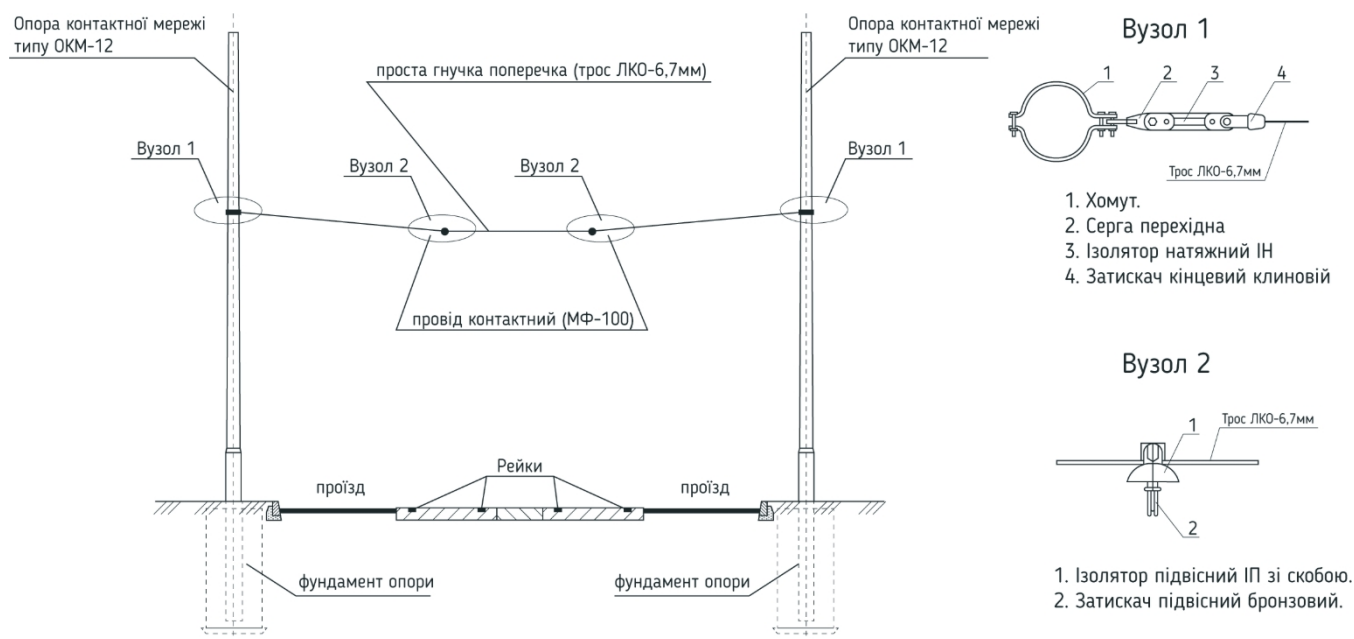


Figure – Design diagram of the contact suspension on a straight section of track

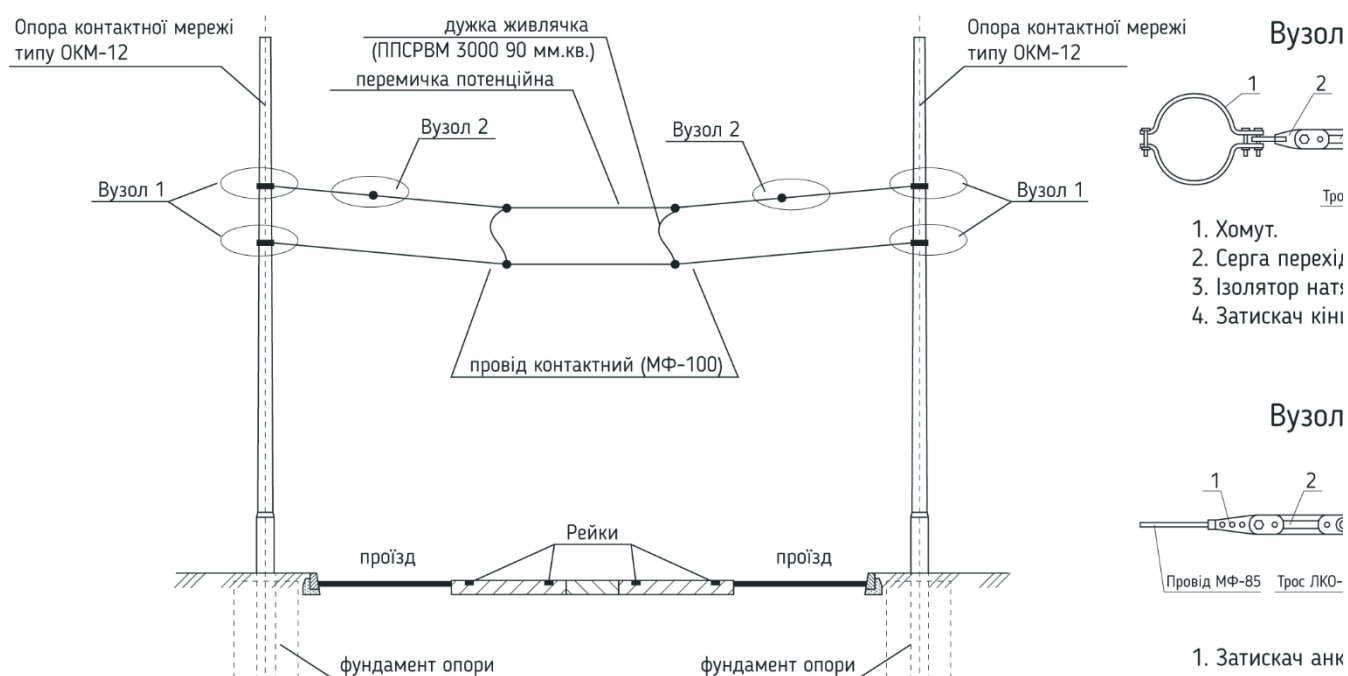


Figure – Design diagram of the contact suspension potential bridge (+600 V)

The project documentation for the tram tracks complies with the requirements of current regulatory documentation and modern needs. The project uses modern materials and technologies that help reduce noise and vibration and increase the service life of the facility.

Based on the analysis of this section, the following comments have been made:

- 1) The project documentation uses 35 cm thick VRZ reinforced concrete slabs from PREFA (Poland), but no certificates or commercial offers for the supply of reinforced concrete slabs are provided. Also, the use of imported materials significantly increases the cost of construction and installation works. It may be possible to consider using reinforced concrete slabs from domestic suppliers, for example, 350 mm thick PTS-E reinforced concrete slabs.
- 2) Technical conditions No. 965 dated 12 May 2016 from KP "KYIVTRANS":
 - p.1 There are no packages of asbestos cement pipes with a diameter of 110 mm at the intersections of the KL-10kV and KL-600V cable routes with the roadway. This circumstance will lead to an increase in the cost of the facility, since these materials and works are not included in the design and estimate documentation;
 - Item 2: OKM type supports are used instead of SK-120-17 type supports.
- 3) The "Tram Line" section includes four reconstruction sites where the track axis is to be shifted, and the contact network has been designed for one of the four. This circumstance will subsequently affect the timely completion of the contact network installation work, but is not critical, as the Contractor's construction and installation work will be followed by the implementation of the installation plans.

POWER SUPPLY NETWORKS AND OUTDOOR LIGHTING. POWER SUPPLY DURING THE CONSTRUCTION PERIOD

The project "Overhaul of the road network of Kyiv: Alma-Atynska Street from Prazka Street to Latynska Street" in terms of the power supply network and outdoor lighting provides for:

- Reconstruction of outdoor lighting along Alma-Atynska Street with the installation of OKM-12 metal lighting poles with double-arm brackets. Ampera MIDI energy-saving LED lamps are used as light sources. The type of poles was chosen taking into account the construction of the contact network and distribution network.
- in accordance with the technical specifications of Kyivmiskosvitlo, the replacement of outdoor lighting control cabinets PV5671, PV5876, PV5321, PV5357 with new cabinets of the I-710N (100A) -3/2 type is provided for;
- replacement of power cables from TP to PV with new four-core VVG-1, 4x50mm² cables;
- reconstruction of KL-10 kV RP205-TP1089 in the section of the roadway under reconstruction;
- power supply to construction machinery during the construction period with VVG-1 cable, 4x95mm² from RU-0.4 kV TP5730;

- Laying of reserve channels at points where cable lines cross the carriageway.



Figure – OKM-12 metal lighting pole with double-arm head

Table: List of individual works volumes provided for in the working design

Name of work	Unit Measurement	Quantity unit Measurement
Dismantling of outdoor lighting networks		
ZhKU-150 type luminaire	pcs	84
DnaT lamps – 150	pcs	84
Brackets 2-horned	pcs	35
1-horn brackets	pcs	14
SOK-5 supports	pcs	49
Self-supporting wire AsXSn 4x25	km	0.25
A-35 cable	km	3.2
Crossarm with 2 insulators	pcs	90
Relaying 10 kV cables		
Digging and backfilling trenches for laying:		
- 1st cable	m	75
- 6 PEV pipes d=160 mm	m	24
Laying of PEV pipes d=160 mm	m	1380

Name of work	Units	Quantity
	Measurement unit	Measurement
Laying of APvEgaPu cable - 8.7/15 1U1202/35		
- in a trench	m	3x85
- in PEV pipe d=160 mm	m	3x25
Building bricks	thousand pieces	0.6
Connecting sleeve for three-core cables TRAS-24/1x120-240-346	pcs	2
Laying of 1 kV power supply cables for construction		
Digging and filling trenches for laying:		
- 1st cable;	m	370
- 2 PEV pipes d=160 mm	m	10
Laying of PEV pipes d=160 mm	m	20
Laying of AVVG cable, 4x95:		
- in a trench	m	39
- in PEV pipe d=160 mm		1
Building bricks	thousand pieces	3.12
Installation of outdoor lighting network		
Digging and filling trenches for laying:		
- 1 cable	m	5
- 2 cables	m	450
- 1st PEV pipe d=63 mm	m	685
Laying of PEV pipe d=110 mm with two KKS-2 wells under motorways		
L=8 m;		
L=9 m;	pcs.	9
L=10 m;	pcs.	7
L=12 m;	pcs.	6
L=15 m;	pcs.	10
L=18 m;	pcs.	2
L=22 m;	pcs	2
L=40 m	pcs.	4
	pcs	1
Laying of PEV pipes d=110 mm with two KKS-2 wells under tram tracks		
L=25m	pcs	5
Laying of VVG-1 cable, cross-section 4x50 mm ² (PV5671, PV5876, PV5311, PV5357):		
- trenches	m	1060
- on structures		40

Name of work	Units Measurement unit	QuantityUnit Measurement
laying of AVVG-1 cable, 4x35 mm ² :		
- in PEV pipe d=110 mm	m	560
- in PEV pipe d=63 mm	m	7200
- in a support	m	705
- along the support	m	75
- along the support in a PEV pipe	m	25
Laying flexible GDP3 wire, 2x2.5 mm ² :		
- in a support	km	7.1
Cabinet with 2 inputs И-710H(100A)-3/2-Y1 with executive type terminal	pcs	4
Building bricks	thousand pcs.	6

Laying of reserve pipes across Alma-Atynska Street

Digging and filling trenches for laying:

- 6 PEV pipes d=160 mm

m 160

Laying PEV pipes d=110 mm with two KKS-2 wells under motorways

L=18 m

pcs 4

L=24 m

pcs 1

L=25 m

pcs 4

L=28 m

pcs 1

L=30 m

pcs 1



Figure – Ampera energy-saving LED luminaire

The design documentation for power supply and outdoor lighting complies with the requirements of current regulatory documentation, and the design solutions adopted ensure energy efficiency and reliability.

Based on the analysis of this section, the following comments have been made:

- there is no plan for laying for a temporary power supply from TP5730 to the construction cabinet;
- no consideration has been given to the improvement of the TP5730 cable line route to the construction cabinet;
- the following items are missing from the specifications: construction inventory cabinet, YARP, construction inventory cabinet for distribution;
- no work on improving the cable line route outside the design area;
- There is no plan for laying cable lines from the transformer substation to the power distribution station.
- no consideration has been given to the improvement of cable lines from the transformer substation to the power distribution substation;
- deviation from clause 3.4 of the technical specifications of Kyivmiskosvitlo No. 01-5 dated 14 January 2016; cable lines from the transformer substation are planned to be four-core instead of five-core.

EXTERNAL WATER SUPPLY, WATER DISPOSAL AND STORM SEWERAGE NETWORKS

The project documentation for the project "Overhaul of the road network of Kyiv: Alma-Atynska Street from Prazka Street to Litinska Street" was developed by Kyivproekt Design Bureau LLC on the basis of:

- Order No. 200 of the Kyiv City State Administration dated 02.03.2015;
- design assignment from Kyivavtodor dated 20 November 2015;
- ~~Technical~~ specifications No. 91698 dated 30 December 2015 from the Preventive Activities Department of the Main Directorate of the National Police of Ukraine in Kyiv;
- Technical specifications No. 43-3-16 dated 28 April 2016 from Kyivavtodor for connection to storm sewer networks and installation of a motor train;
- TU No. 01-5 dated 14 January 2016. Kyiv Public Utility Company for Outdoor Lighting
- Kyivmiskosvitlo for the design of outdoor lighting power grids;
- TU dated 14 December 2015 from the Track Service of Kyivpastrans for the design of tram tracks;
- TU dated 20 May 2016 Kyivpastrans Municipal Enterprise Traffic Organisation Service;
- Technical specifications dated 12 May 2016 Energy supply and Communications of Kyivpas-Trans Municipal Enterprise;
- TU No. NT-296-16 dated 16 March 2016 of the structural separate subdivision Kyiv Electric Networks of PJSC Kyivenergo;
- Act of inspection of green spaces subject to removal dated 5 April 2016;

- Act of the commission on determining the conditions for repairing the road overpass on Alma-Atynska Street, which crosses the railway tracks of Darnytsia Station dated 23 May 2016.

The capital repair project provides for the reconstruction of storm sewer pipes in places where the roadway is widened, the installation of storm drains, and the reconstruction of existing storm sewer pipes.

The presented project does not contain complete initial data.

The technical conditions of PJSC "AK "Kyivvodokanal" for water supply and sewerage of the facility, PJSC "Kyivenergo" and PJSC "Kyivgaz" are missing.

The absence of technical conditions affects the completeness of the design decisions made.

The section "Rainwater drainage" has been completed in full in accordance with Technical Specifications No. 43-3-16 dated 28 April 2016 of Kyivavtodor.

The section "Water supply and drainage networks" has not been completed and needs to be completed due to the fact that the section from PK 13+60 to PK 24+70 is undergoing major repairs of the carriageway with an expansion to 14 m. The new carriageway will cover water supply and sewerage networks, chambers and wells that were previously in the "green" zone (an area that performs protective, sanitary and hygienic functions).

The section "Heat Supply" has not been completed; it is necessary to obtain technical specifications from PJSC "Kyivenergo" to determine the need to develop this section.

The section "Gas Networks" has not been completed; it is necessary to obtain technical specifications from PJSC Kyivgaz to determine the need to develop this section.

CONSTRUCTION ORGANISATION PROJECT

To create a continuous, rhythmic flow of construction and installation work at a construction site, the site is divided into sections, work areas and stages.

A section is a part of the allocated volume of work assigned to one contractor (work unit).

A work area is a part of the facility under construction with a set of identical completed construction, installation and specialised works, within which the work of individual teams of contractors is carried out and coordinated.

A stage is a part of the object's work area completed by construction, which includes completed parts and units of structures, communications and individual structural elements.

The construction organisation plan provides for the division of the design area into seven sections:

Section I of works PK 0+00÷PK 0+41.3.

The carriageway is being widened at the turn from Grodnenskaya Street to Pražskaya Street with the relocation of the support.

II The section of work is from Prazka Street to Traktoristov Street (PK 0+41.30 - PK 6+79.60). A major repair of the carriageway is being carried out with an expansion in certain sections (at tram stop platforms) to 7.0 m. The tramway is being built on a separate 7.0 m wide track, with 9.1 m wide tracks where the platforms are located. At the junction of Alma-Atynska Street and Praska Street, the tramway is being built at the level of the carriageway intersection.

III Work section – PC 6+79.60 (Tractorist Street) to PC 13+58.90 (Margaretska Street) major repair of the carriageway with widening to 14.0 m and transfer of the tram tracks to the carriageway axis, including the overpass at , with the organisation of 4 lanes taking into account traffic on the tram tracks. The transition from a separate tram track to one combined with the carriageway is carried out on the section PK 6+79.6 - PK 7+40.50 and on the section PK 12+10.40 - PK 13+58.90.

IV Work section – from PK 13+58.90 to PK 24+71.00: major repair of the carriageway with its widening to 7.0 m and the installation of a separate tram track 7.0 m wide. At the same time, on the section from PK 13+17.90 to PK 21+24.00, a new carriageway is being built on the right side of the tram track along the picket line;

V the section of work is being carried out on the section from PK 24+71.00 to the exit from Alma-Atynska Street at PK 25+70.50 towards the roundabout, where the tram track is being constructed together with the carriageway. The transition from a separate track to a combined track is carried out on the section from PK 24+71.00 to PK 25+46.00 with a corresponding narrowing of the carriageway width to 14.0 m;

VI the section from PK 25+70.50 to PK 31+58.90, the width of the carriageway is widened to 14.0 m with the organisation of 4 lanes of traffic;

VII the section from PK 31+58.90 to Litinska Street (PK 35+72.001) will be widened by 7.0 m, with the carriageway divided by a boulevard strip of variable width from 5.0 to 8.0 m. A turning circle for public passenger transport will be constructed at the junction with Lytynska Street.

Table – Distribution of work volumes by sections, stages and phases for the organisation of construction

No	Numbering of work sections	Breakdown of the section by picket points	Construction and installation work sections	Stages of construction and installation works	List of works to be performed
1	I section of works	PK 0+00 ÷ PK 0+41.3	Section I	Stage 1.1	Dismantling of tram tracks and asphalt pavement, installation of tram tracks and asphalt pavement on the roadway.
				Stage 1.2	Dismantling of tram tracks and asphalt pavement, installation of tram tracks and asphalt pavement on the carriageway, reconstruction of the tram power supply and contact network (with replacement of supports), major repair of pavements.
				Stage 1.3	Dismantling of asphalt pavement, installation of asphalt pavement on the carriageway, reconstruction of the tram's power supply and contact network, major repair of pavements.
2	II section of works	PK 0+41.3 ÷ PC 6+79.60	I grabber from PC 0+41.3 to Profsoyuznaya Street	Stage 2.1	Dismantling of tram tracks and asphalt pavement, installation of tram tracks and asphalt pavement on the roadway, reconstruction of the tram power supply and contact network (with replacement of supports), major repair of pavements.
				Stage 2.2	Dismantling of asphalt pavement, installation of asphalt pavement on the carriageway, reconstruction of the tram's power supply and contact network (with replacement of supports), major repair of pavements.
			Section II from Profsoyuznaya Street to Traktoristov Street	Stage 2.1a	Dismantling of tram tracks and asphalt pavement, installation of tram tracks and asphalt pavement on the carriageway, reconstruction of the tram power supply and contact network (with replacement of supports), major repair of pavements.
				Stage 2.2b	Dismantling of asphalt pavement, installation of asphalt pavement on the carriageway, reconstruction of the tram's power supply and contact network (with replacement of supports), major repair of pavements.

No	Numbering of work sections	Breakdown of the section by picket points	Construction and installation work sections	Stages of construction and installation works	List of works to be performed
3	III section of works	PC 6+79.60 ÷ PC 13+58.90	I grabber from PC 6+79.60 (Streets Tractors-Stiv) to PK 11+50	Stage 3.1	Dismantling of asphalt pavement, installation of tram tracks, reconstruction of the power supply network and tram contact network (with replacement of supports). Repair work is carried out on the overpass before the start of tram track installation.
				Stage 3.2	Dismantling of the existing asphalt pavement and installation of new asphalt pavement on the outer lanes of the street, reconstruction of the drainage system and tram contact network (with replacement of supports), major repair of pavements.
			Section II from PK 11+50 to Marganetska Street (PK 13+58.9)	Stage 3.1a	Demolition of the existing roadway, construction of a new one (with expansion), removal of trees, reconstruction of the overhead line and tram contact network (with replacement of supports), major repair of pavements. Reconstruction of the overhead line and contact network.
				Stage 3.2b	Demolition of existing tram tracks and asphalt pavement, construction of tram tracks and new asphalt pavement, reconstruction of the tram network (with replacement of supports), major repair of pavements.
4	IV section of works	PK 13+58.90 ÷ PK 24+71.00	I section from PK 13+58.9 to 0. Dovbush Street	Stage 4.1	Dismantling of existing tram tracks, removal of existing trees, reconstruction of the tram contact network (with replacement of supports), construction of a new roadway, major repair of pavements.
				Stage 4.2	Dismantling of the existing asphalt pavement, reconstruction of the tram contact network (with replacement of supports), construction of a new roadway, major repair of pavements. Relocation of storm sewer No. 4 is carried out with slopes. At the intersection with existing power lines, the soil is dismantled manually. Installation work is carried out using a 16-tonne mobile crane.
			II section From 0. Dovbush Street 0. Dovbush to PK 24+71.0	Stage 4.1a	Dismantling of existing tram tracks, demolition of existing trees, construction of a new roadway, reconstruction of the tram network and contact network (with replacement of supports), major repair of pavements.
				Stage 4.2b	Dismantling of existing asphalt pavement, construction of a new roadway, reconstruction of the sewerage and tram contact network (with replacement of supports), major repair of pavements.

No	Numbering of work sections	Breakdown of the section by picket points	Construction and installation work sections	Phasing of construction and installation works	List of works to be performed
5	V section of works	PK 24+71.00 ÷ PK 25+70.50	I section	Stage 5.1	Demolition of existing asphalt pavement, construction of temporary bypass road.
				Stage 5.2	Demolition of asphalt pavement, construction of tram tracks and new asphalt pavement.
				Stage 5.3	Demolition of existing asphalt pavement and construction of new asphalt pavement on the outer lanes of the street, reconstruction of the tram power supply and contact network (with replacement of supports), major repair of pavements.
6			I section from PK 25+70.50 to Rogozovskaya Street	Stage 6.1	Dismantling of the existing tram tracks, removal of existing trees, construction of a new roadway, reconstruction of the overhead contact line, major repairs to pavements.
				Stage 6.2	Demolition of existing asphalt pavement, construction of new roadway, reconstruction of sidewalks, major repair of sidewalks.
			II section from Rogozovskaya Street to Rogozovskaya Street to Vynahidnykiv Street Vynikhativska	Stage 6.1a	Dismantling of existing tram tracks, removal of existing trees, construction of a new roadway, reconstruction of the tram tracks, major repair of pavements.
				Stage 6.2b	Dismantling of existing asphalt pavement, construction of a new roadway, reconstruction of the tram tracks, major repair of sidewalks.
7	Section VII	PK 31+58.90 ÷ PK 35+72.00 (Lytynska Street)	I section	Stage 7.1	Demolition of existing asphalt pavement, major repair of pavements, installation of new asphalt pavement.
				Stage 7.2	Demolition of existing asphalt pavement, major repair of sidewalks, installation of new asphalt pavement.

Based on the analysis of the section, the following comments were made:

- 1) Explanatory note PBK-1523-POB Volume 7 was developed in accordance with DBN A.3.1-5-2009 "Organisation of Construction Production" - the project documentation was developed in 2016, therefore it is necessary to correct Volume 7 in accordance with the current standard DBN A.3.1-5:2016 "Organisation of Construction Production", and to correct section 1 "General Provisions";
- 2) The explanatory note in accordance with Appendix G of DBN A.3.1-5:2016 "Organisation of Construction Production" does not include a construction schedule with a breakdown of capital investments and construction work volumes by construction periods; this must be added.
- 3) Information on the scope of major construction works by type of work is provided in separate reports (Appendix No. 5 to the explanatory note) and must be brought into line with Appendix G of DBN A.3.1-5:2016 "Organisation of Construction Production". At the same time, the volumes of road works (milling, dismantling of asphalt concrete pavement, crushed stone base, installation of asphalt concrete pavement, etc.) have not been taken into account.
- 4) The section on occupational health and safety does not provide a "List of requirements for building structures, products, materials and equipment" in accordance with Appendix G of DBN A.3.1-5:2016 "Organisation of construction production";
- 5) Section 11, "Duration of Construction," states that the duration of construction is determined by the construction organisation project in accordance with DSTU B A.3.1-22:2013, "Determination of the Duration of Construction of Objects." However, no definition of the duration of the facility as a whole is provided, in accordance with DSTU B A.3.1-22:2013, clause 4.1.3.
"As part of the project (the approved part of the working draft), the duration of construction of facilities is determined by the construction organisation plan (COP) according to the schedule, based on the volume of construction work, costs, labour, material and technical resources, and construction conditions..." The explanatory note does not provide a calendar plan. To confirm the duration of construction, a calendar plan must be provided.
- 6) Section 2, "Characteristics of Construction Conditions," states that the project involves: reconstruction of the overpass (separate project), road works, installation of drainage systems, reconstruction of the sewerage network, reconstruction of tram tracks (partially) and the contact network.

Section 3, "Organisational and technological scheme for the execution of works" II, "Main period," provides for: reconstruction of the overpass, laying and relocation of engineering networks, road works, landscaping and improvement. At the same time, the beginning of the section states that the reconstruction of the tram line is being carried out as a separate project.

It is necessary to correct and bring into line;
- 7) The information on the need for construction workers (Appendix No. 2) shows a total number of 96 employees, and it is stated that the number is calculated based on the estimated labour intensity and duration of the work, but the labour intensity of the work is not given either in Appendix No. 2 (with the calculation formula) or in section 12 "Technical and economic indicators". Therefore, it is not possible to verify the accuracy of the calculation of the number of workers;

- 8) Page 33 shows the electricity demand for the construction site. It is stated that the calculation is based on the power of the construction machinery and mechanisms accepted, but no calculation taking into account the lighting of the site is provided. A calculation must be provided to confirm the accepted maximum electricity demand of 50 kW.
- 9) Section 3, "Organisational and Technological Plan for the Execution of Works," states that the major repairs to the road section of Alma-Atynska Street must be carried out in conjunction with the reconstruction of the tram line (the "Reconstruction of the Tram Line on Alma-Atynska Street" project, currently being developed in accordance with the order of the Kyiv City State Administration dated 9 January 2008). of the tram line on Alma-Atynska Street, currently being developed in accordance with Order No. 18 of the Kyiv City State Administration dated 09.01.2008 (designer: MPP "Eltrans").

At the same time, the following is stated: on section PK0+00 - PK 0+41 (stages 1.1 - 1.3), work is being carried out on the dismantling and installation of tram tracks with the reconstruction of the contact network. The same applies to other sections.

The introductory part of section 3 states that all reconstruction work (title of the object "Capital repair") is being carried out without closure (with restrictions on motor vehicle traffic).

Project No. E-1604 takes into account that tram tracks on sections of combined lanes, where the axes of tram tracks change their position, are constructed using block technology, which involves the construction of a monolithic concrete slab for the subsequent laying of reinforced concrete slabs with the installation of track rails in them. Taking this into account, the schedule must provide for a technological break for the concrete to reach its design strength in sections where motor vehicles are expected to travel on the combined tram track during the period of major repairs to the carriageway, while providing for the complete closure of tram traffic for the period of the works.

- 10) According to the project composition for "Capital repair of the road network of Kyiv: Alma-Atynska Street from Prazka Street to Litinska Street," the project documentation for the overpass is being prepared by Mistproekt LLC (No. 161/15), the design documentation for the tram track reconstruction section is being prepared by MPP Eltrans (No. E-1604), and "Construction Organisation" Volume 7 No. PBK-1523-POB is being prepared by PB Kyivproekt LLC.

ENVIRONMENTAL IMPACT ASSESSMENT

The EIA materials were developed in accordance with 1.13 DBN A.2.2-1-2003 on the basis of engineering and environmental, sanitary and hygienic, engineering and technical surveys and studies using modern methods and technical means. The initial data for the EIA were the available background data characterising the state of the environment in the study area, monitoring data, the results of engineering and technical and other surveys conducted in previous years, cartographic materials and other available information.

Based on the analysis of the section, the following comments were made:

- 1) The materials provided include a Statement of Intent and a Statement on the Environmental Impact of Activities that have not been approved by the customer.
- 2) The Statement on the Environmental Impact of Activities, in compliance with Order No. 200 of the Kyiv City State Administration dated 02.03.2015, states that public opinion has been taken into account, which contradicts the requirements of DBN A.2.2-1-2003;
- 3) The materials provided do not include acts on the destruction of green spaces with an indication of their replacement value. There is conflicting information regarding compensation measures for the destruction of green spaces;
- 4) The calculation of harmful emissions does not include emissions of benzopyrene and nitrogen oxide (N₂O);
- 5) There is no confirmation from the State Emergency Service of Ukraine or the Central Geophysical Observatory (CGO) of the information provided in section 2.14.4 ONS, on the significance of background concentrations in the city;
- 6) There are no results of calculations of expected maximum noise levels at the boundary of nearby residential buildings from construction processes and subsequent operation (vehicle traffic) of the reconstruction site;
- 7) The materials provided do not contain data on issues related to ensuring sanitary and living conditions for workers at the construction site;
- 8) There are no materials on the public hearings (publication in the media, minutes of the hearings, information on the consideration of appeals or their absence);
- 9) The materials provided contain references to tables showing the volumes of solid waste generated during construction and operation (section 2.5.4 of the EIA), but these tables are missing from the subsection "Requirements for the removal or disposal of construction waste";
- 10) There are references to inactive regulatory and methodological materials.

COST ESTIMATE DOCUMENTATION

The cost estimate documentation has not been submitted for review, therefore an objective report cannot be provided.

REPORT ON THE VISIT TO THE CONSTRUCTION SITE

As part of the Memorandum of Cooperation signed between the CoST Construction Transparency Initiative, the Kyiv City State Administration, the Kyivavtodor municipal corporation, and Transparency International Ukraine, and the implementation of international standards of transparency and accountability in the capital's road sector, on 16 May 2018, a visit was made to the capital repair site "Capital repair of the road network of Kyiv: Alma-Atynska Street from Prazka Street to Litinska Street".

Representatives of CoST, Kyivavtodor, Transparency International Ukraine, Kyivproekt Design Bureau LLC, Mistproekt LLC and Kyivshlyakhbud PP were present at the capital repair site.

The purpose of monitoring the capital construction project "Capital repair of the road network of Kyiv: Alma-Atynska Street from Prazka Street to Litinska Street" is to verify the performance of repair works in accordance with the developed project documentation, discuss problematic issues in the implementation of the road project and ways to resolve them, and verify the maintenance of general construction documentation for all types of works performed and special journals. Monitoring is necessary to identify the presence/absence of risks of ineffective management, determine the effectiveness of the use of public funds, and identify design errors to prevent their recurrence in subsequent projects.

Alma-Atynska Street appeared in the 1940s-1950s under the name Shose DVRZ Street, and since 1961 it has been called Darnytske Shose. Its current name has been in use since 1973 in honour of the city of Alma-Ata, which was the capital of Kazakhstan at the time. The main thoroughfare of Alma-Atynska Street is formed from the old districts of Kyiv (Stara Darnytsia, Liski, DVRZ), which additionally has an overpass (built in 1960) at the intersection with the access tracks of the Darnytsia railway station (Liski Park). According to field surveys, the condition of Alma-Atynska Street and the overpass is assessed as unsuitable for normal operation.

The implementation of the capital repair project involves the following objectives:

- capital repair of the motorway with the widening of the carriageway of Alma-Atynska Street with a length of 3.572 km;
- installation of asphalt concrete pavement on Alma-Atynska Street;
- overhaul of the tram tracks;
- reconstruction of the tram contact network;
- overhaul of the existing overpass above the railway tracks at Darnytsia station, Liski Park;
- construction of a storm sewer system;
- replacement of road signs and installation of new road markings;
- reconstruction of the outdoor lighting network.

The project documentation for the facility was developed on the basis of "Order of the Kyiv City State Administration No. 200 of 02.03.2015".

The project documentation for the project "Capital repair of the road network of Kyiv: Alma-Atynska Street from Prazka Street to Lytynska Street" was developed in accordance with Agreement No. 1523 for the performance of design and estimate works dated 17.11.2015 - PB Kyivproekt LLC (General Contractor).

Construction and installation works are being performed in accordance with Contract No. 612-10 dated 29 August 2017 by Kyivshlyakhbud (General Contractor).

Author supervision is performed by Kyivproekt LLC on the basis of Agreement No. PBK- 1523-A/N/1152-10.

Technical supervision is carried out by Kyivavtodor using its own resources from the technical control department of capital construction management, with O.O. Konontsov, the engineer responsible for technical supervision, present at the construction site. During the analysis of the information received, the website <http://www.minregion.gov.ua/> was checked for the presence of the specified person's certificate, and it was found that O.O. Konontsov is a certified engineer for technical supervision(category "leading") specialising in "Technical supervision of motorway construction", which entitles him to carry out technical supervision at facilities of consequence classes CC1, CC2 and CC3.

The verification team checked the following types of work:

- major repairs to the motorway;
- overhaul of tram tracks;
- overhaul of an existing overpass;
- construction of storm drains.

Overhaul of the road surface and pavements on Alma-Tynska Street.

The design solution for the major repair of Alma-Atynska Street involves the complete dismantling of the existing road surface and pavements (except for the intersection of Alma-Atynska Street and Praska Street, where the upper layer of asphalt concrete with a thickness of 5 cm will be milled) with the removal of asphalt concrete for recycling. Prague Street, where the top layer of asphalt concrete with a thickness of 5 cm will be milled) with the asphalt concrete being taken away for recycling and the base material being taken to a landfill as construction waste. This decision was made in connection with a complete change in the longitudinal profile of the street in order to organise a closed drainage system, the incompatibility of the existing road surface structure with the load on it from the existing traffic intensity, 30% of which is heavy goods vehicles.

Thanks to the presence at the site of major repairs of a representative of Kyivproekt LLC, Chief Project Engineer R.I. Khalilov, answers to questions and explanations regarding the design decisions made were provided.

Question

1. To determine the existing road surface covering (thickness of the covering and base layers) to be dismantled, milling of the asphalt concrete covering is carried out in accordance with the trenching report. Have the volumes of work and materials for its restoration been taken into account during the major repair of the carriageway of Alma-Atynska Street?

2. Are the improvement works after the relocation of the cable line routes included in the project documentation?

3. The project documentation for the tram tracks specifies the use of 35 cm thick VRZ reinforced concrete slabs manufactured by PREFAB (Poland). Is it possible to consider using reinforced concrete slabs from domestic suppliers, for example, 350 mm thick PTS-E reinforced concrete slabs?

4. The section "Tram Line" includes four reconstruction sites where the track axis is to be shifted, and the contact network has been designed for one of the four. Will this circumstance affect the timely completion of the contact network installation work in the future?

5. Why does the project provide for the installation of road pavement layers made of coarse-grained asphalt concrete with a thickness of 8 cm, which contradicts the current DBN V.2.3-4, which regulates the minimum thickness for such material as 10 cm?

6. When driving along a street undergoing major repairs, we noticed that in one direction, the manhole covers were installed flush with the base layer (they will have to be raised before the top layer is laid), while in the opposite direction, they were installed directly on top of the top layer. Why is this?

Answer

1. The design and estimate documentation provides for materials and expenses related to the restoration of the carriageway on Alma-Ata Street.

2. The costs of improving the planned cable line routes are included in the design and estimate documentation.

3. Together with the Customer, we looked at and agreed on using domestically produced reinforced concrete slabs, specifically those made by the Industrial and Construction Group Kovalska.

At present, the author's supervision has made the appropriate adjustments to the design and estimate documentation, and the relevant quality certificates for the slabs are available.

4. After the contractor has completed the installation work on one section, the others will be similar in design. Upon completion of the tram contact network installation work, the contractor will provide the Customer with the final installation diagrams, and all changes will be made to the design documentation as part of the author's supervision.

5. The design thicknesses have been confirmed by calculations, and the design has been reviewed by experts.

6. This is due to the fact that in one direction, the base layer was laid back in 2017 and the manholes were left flush with the constructed layer in order to ensure the possibility of winter maintenance of the area where traffic is carried out. Before the construction of the top layer, the manholes will be set to the design marks.

Question

7. What are the functions of geotextile material in the construction of road pavement (it is planned to be laid on the soil surface under the lower layer of the base)?

Answer

7. Geotextile material will serve to separate the layers.

During the inspection of the facility, work was carried out on the repair of the overpass, dismantling of the existing road surface, installation of a base layer of crushed stone and sand mixture, reconstruction of underground utilities and construction of tram tracks.

During the inspection of the facility, a number of questions were asked to the representative of the customer, Kyivavtodor, P.O. Monastyrny, and the representative of the general contractor for construction and installation works, Kyivshlyakhbud, I.P. Tonchev, and reasonable answers were received.

Question

1. Are operational and acceptance inspections carried out at the site, and do the customer and the general contractor for construction and installation works have their own laboratories?

Answer

1. The general contractor for construction and installation works carries out operational and incoming control using its own laboratory, while the customer uses the laboratory of Kyivblagoustriy.

2. Is core sampling carried out, and for what purpose? At first glance, it appeared that 2 to 3 cores were sampled from the base layer of coarse-grained asphalt concrete mixture at one point, which is insufficient to determine all the necessary indicators.

2. The customer assured that a sufficient number of cores were selected, but more attention was paid to the selection and testing of mixtures, since it is possible to determine a greater number of indicators for a mixture, and individual indicators with greater accuracy.

3. Where is the asphalt concrete mixture transported from?

3. The representative of the general contractor for construction and installation works replied that the asphalt concrete mixture is transported from its own asphalt concrete plant located in Obukhiv (distance - 50 km).

4. Is a general work log kept and can its timely completion be verified?

4. A general work log was provided at the overpass repair site. The log is bound, the pages are numbered, and entries are made daily, starting from the date of its inception. There are also entries regarding comments from technical supervision. According to the Customer's information, the comments were addressed immediately during the course of the work.

5. Why was it decided to use a fine-grained asphalt concrete mixture for the pavement rather than SMA? Was an alternative design of the road surface structure carried out?

5. This decision was made based on the results of variant design, taking into account the fact that over time, the composition of transport flow is expected to change towards a decrease in the share of heavy transport. In addition, the use of asphalt concrete mixture on bitumen modified with polymer is envisaged, which will improve the properties of the material.

Question

6. What material is planned to be used for horizontal road markings, and what warranty will be provided?

7. Is it economically feasible to use cold-applied plastic with a 1-year warranty compared to paint, for which the state standard warranty is at least 6 months, taking into account the cost of materials?

8. Have there been any cases of poor-quality materials being detected as a result of laboratory tests?

9. What material will be used for the overpass pavement and why was this material chosen?

10. In a straight line on the coarse-grained asphalt concrete layer, there are isolated localised areas of damage in the form of potholes and cracks. What is the cause of the damage?

Answer

6. The markings will be made of cold plastic with a warranty of at least 1 year.

7. Experience in operating the city's street and road network shows that, given the current intensity of traffic, it is difficult to achieve a service life of 6 months for paint markings, while cold plastic markings in some cases last up to 2 years (for example, on Bazhana Avenue).

8. The Customer's representative replied that there had been no such cases.

9. The road surface on the overpass will be made of Gusasfalt moulded asphalt concrete, as it is the most suitable material for use on artificial structures. When using this material, there is no need to install waterproofing. The contractor provides a guarantee of at least 15 years, and there is already evidence of the successful use of this material at sites in Kyiv.

10. There are about 300 manholes in the area undergoing major repairs within the carriageway. Damage has occurred in places where the manholes are covered by a layer of road surface. All manhole locations are known, so the manholes will be raised to the design level before the top layer is laid.



Figure – Section of the motorway after major repairs from PK 6+79.60 (Tractorist Street) to PK 13+58.9 (Manganese Street)



Figure – Section of the motorway at the entrance to the overpass from PK 6+79.60 (Tractoristiv Street) after major repairs



Figure – Section of the motorway after major repairs from PK 13+58.90 (Margaretska Street) to PK 24+71.00 (O. Dovbush Street)

Major repairs to the existing overpass

Design and construction solutions for the major repair of the overpass were developed by Mistproekt LLC in February 2016 based on the results of the survey and design specifications.

The working project provides for the major repair of the overpass. After the major repair, the overpass will have the following main characteristics:

- total length – 61.42 m;
- geometric layout – 3 x 14.06 m;
- width of the carriageway – 14 m;
- load on the structure: A-11, NG-60, load from trams, crowd on pavements 400 kg/m² .

The project provides for:

- an increase in the carriageway to remove restrictions on motor vehicle traffic;
- overhaul of the bridge deck, supports, installation of a monolithic reinforced concrete slab for the carriageway and monolithic reinforced concrete pavements;
- installation of barrier fencing, handrails, expansion joints, lighting supports and contact network;

- installation of monolithic reinforced concrete cabinet walls;
- installation of monolithic reinforced concrete transition slabs;
- Replacement of road surfaces, installation of grounding structures.

Existing lighting poles (contact network) are being replaced, and additional new lighting poles are being installed.

Thanks to the presence at the site of the major repair of a representative of Mistproekt LLC, Chief Project Engineer D.Y. Tarnopolsky, answers to questions and explanations regarding the design decisions made were provided.

Question

Answer

1. Will there be a pedestrian sidewalk after the major repair of the existing overpass?

1. After major repairs, the road bridge will have a 1.5 m wide pedestrian pavement and a 0.75 m wide service passage on the other side.

2. The thickness of the monolithic reinforced concrete slab of the bridge deck, according to clause 7.2.4 of DBN V.2.3-22:2009, must be at least 140 mm, in the project 125 mm?

2. Considering that the design and estimate documentation does not provide for the construction of a new overpass, but only for major repairs to ensure the necessary strength of the monolithic reinforced concrete slab, a thickness of 125 mm filled with B30 F300 W8 concrete is sufficient.

3. The section "Artificial structure" does not specify the technical conditions of the Regional Branch "South-Western Railway" of PJSC "Ukrzaliznytsia"; could their absence lead to a delay in the implementation of the project at the stage of commissioning?

3. ~~And~~ specifications from the Regional Branch "South-Western Railway" of PJSC "Ukrzaliznytsia" are available and will be provided upon request.



Figure – Section of the motorway after major repairs from PK 13+58.90 (Margaretska Street) to PK 24+71.00 (O. Dovbush Street)



Figure – Installation of a monolithic reinforced concrete slab for the bridge deck of the overpass

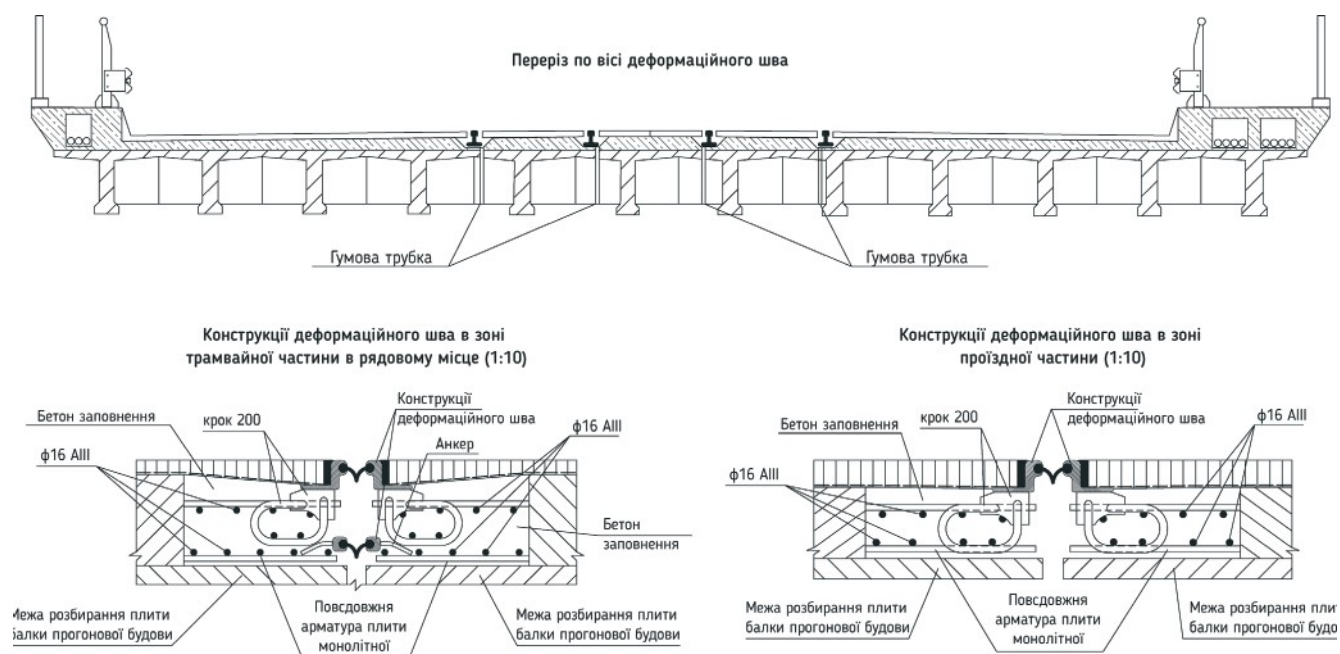


Figure – Design solution for the construction of an expansion joint in the carriageway area of the bridge deck



Figure – Completed construction of the expansion joint in the roadway area of the bridge deck (as of 16 May 2018)



Figure – Strength of concrete in the monolithic reinforced concrete slab of the overpass bridge deck (technological break).

Overhaul of tram tracks

The project "Major repair of the road network of Kyiv: Alma-Atynska Street from Prazka Street to Latynska Street" provides for the reconstruction of tram tracks in areas where the axes of tram tracks change their position, namely, in areas of overlapping tracks at PK1+07.66 – PK1+72.00, PK8+08.00 – PK14+89.85, PK22+52.74 – PK22+82.74, PK26+02.00 – PK27+22.40 along the tram track alignment.

In the areas of tram track reconstruction, the track width is 1524 mm, and the track spacing is 3200 mm. The tram track is given a dominant elevation in the cross-section for effective surface drainage from the tram track.

The tram track structure (on a combined track) is of the block type with 35 cm thick reinforced concrete slabs manufactured by PBK Kovalskaya with 60R2 rails embedded using Sika Icosit KC polyurethane material.

The adopted design solution allows the use of special reinforced concrete slabs with "channels" instead of sleepers, into which the rails are inserted and fixed, and then filled with Sika Icosit KC polyurethane material, which, after rapid polymerisation, will reliably hold the rail in the design position and distribute the load. Sika Icosit KC is durable, chemically resistant, elastic and at the same time strong enough to withstand heavy loads.

This material significantly reduces noise and vibration during train movement and reduces wear on tracks and rolling stock. This technology is widely used in the construction and reconstruction of rail transport tracks in Germany, Switzerland, France, Great Britain, Poland and Hungary.

This structure is laid as a single slab and can withstand a nominal static load of 115 kN per axle. Two layers of asphalt concrete, a concrete layer, two fractions of crushed stone and sand are laid under the reinforced concrete slabs. Geosynthetic materials are also used in the structure. In places where motor vehicles cross tram tracks on the sides of the slab structure, a granite curb on a concrete base (concrete class B15) is installed to prevent the slabs from shifting. The joints between the slabs and between the slabs and the kerb are first filled with granulated granite (crushed and sieved granite rock with a fraction not exceeding 5 mm) and then filled with epoxy resin mastic. In areas with a longitudinal slope of more than 50%, a concrete stop is installed to prevent the tram slabs from shifting.

Surface drainage is designed using the longitudinal and transverse profile slopes.

Thanks to the integrated rail and road surface, the track is an effective solution to the problem of uneven settlement of the carriageway and eliminates its unevenness.



Figure – Installation of Typar SF-49 geotextile and crushed stone layer in the design of the tram track



Figure – Installation of a concrete layer in the design of a tram track



Figure – Reinforced concrete block slabs manufactured by PBK Kovalskaya



Figure – 60R2 tram rails



Figure – Installation of block-type tram track with reinforced concrete slabs on Alma-Atynska Street



Figure – Installation of block-type tram track with reinforced concrete slabs



Figure – Construction of block-type tram tracks with 350 mm thick PTS-E reinforced concrete slabs manufactured by PBK Kovalskaya, replaced under the contract for author supervision

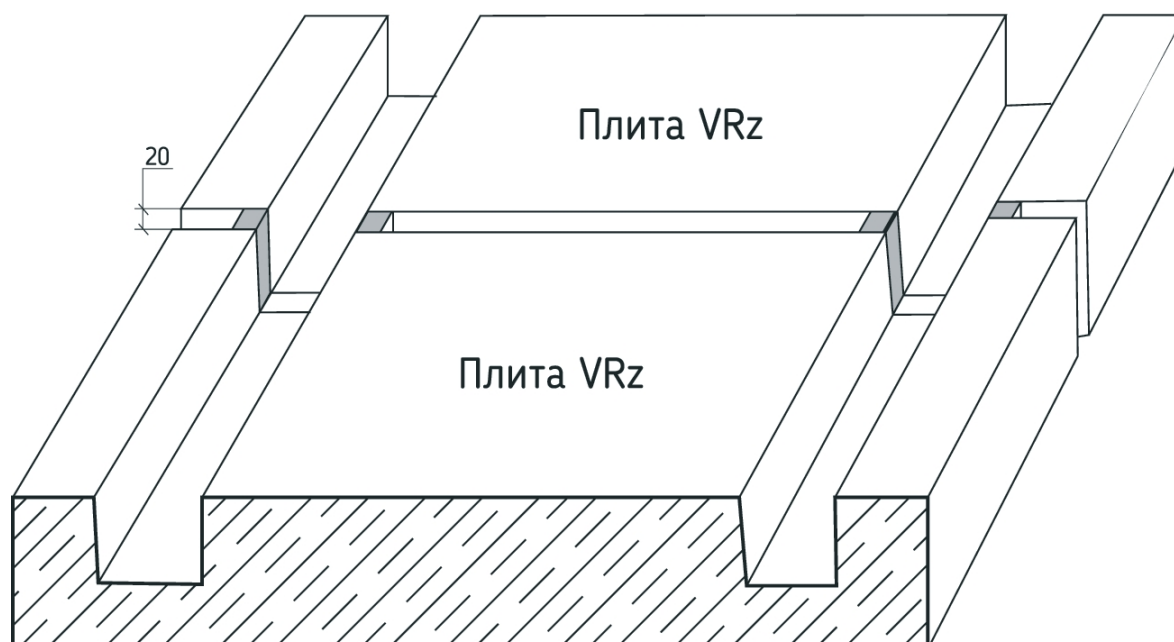


Figure – The design of a block-type tram track with VRZ reinforced concrete slabs from PREFA (Poland) is approved in the project documentation in the section "Tram line".



Figure - After laying the geogrid and gradually filling and compacting the crushed stone with a thickness of 120 mm, fraction 40-70 and 80 mm, fraction 20-40 mm, the surface crushed stone cushion is poured with bitumen emulsion (consumption 2.5 l/m²) for better adhesion of fine-grained asphalt concrete with a fraction of 10 mm (layer 3 cm), which acts as a levelling layer and is the base. Installation of a 200 mm thick concrete layer

made of concrete class C8/10 (B10). After the concrete has set, two layers of fine-grained asphalt concrete 40 mm thick are laid on it, namely, a levelling and installation layer. After that, reinforced concrete slabs are installed. The rails are cleaned of rust and dirt, polished and degreased, and then primed with a primer. The rails are welded together, the rail channels are primed, and pads are placed at the bottom of the channel at 1 m intervals. The rails are lowered into the rail channels of the reinforced concrete slabs, hung and set to the design vertical marks. Concrete ballasts are attached to the 60R2 rails, which are used to reduce costs when pouring polyurethane material. The channel slabs and rails are cleaned again. After that, the channels with rails are filled with Sika Icosit KC polyurethane material.



Figure – Welding of 60R2 tram rails together using automated electric arc welding



Figure – Repeated cleaning of channel plates and rails, then the rails are cleaned of rust and dirt, degreased, and then primed with a primer

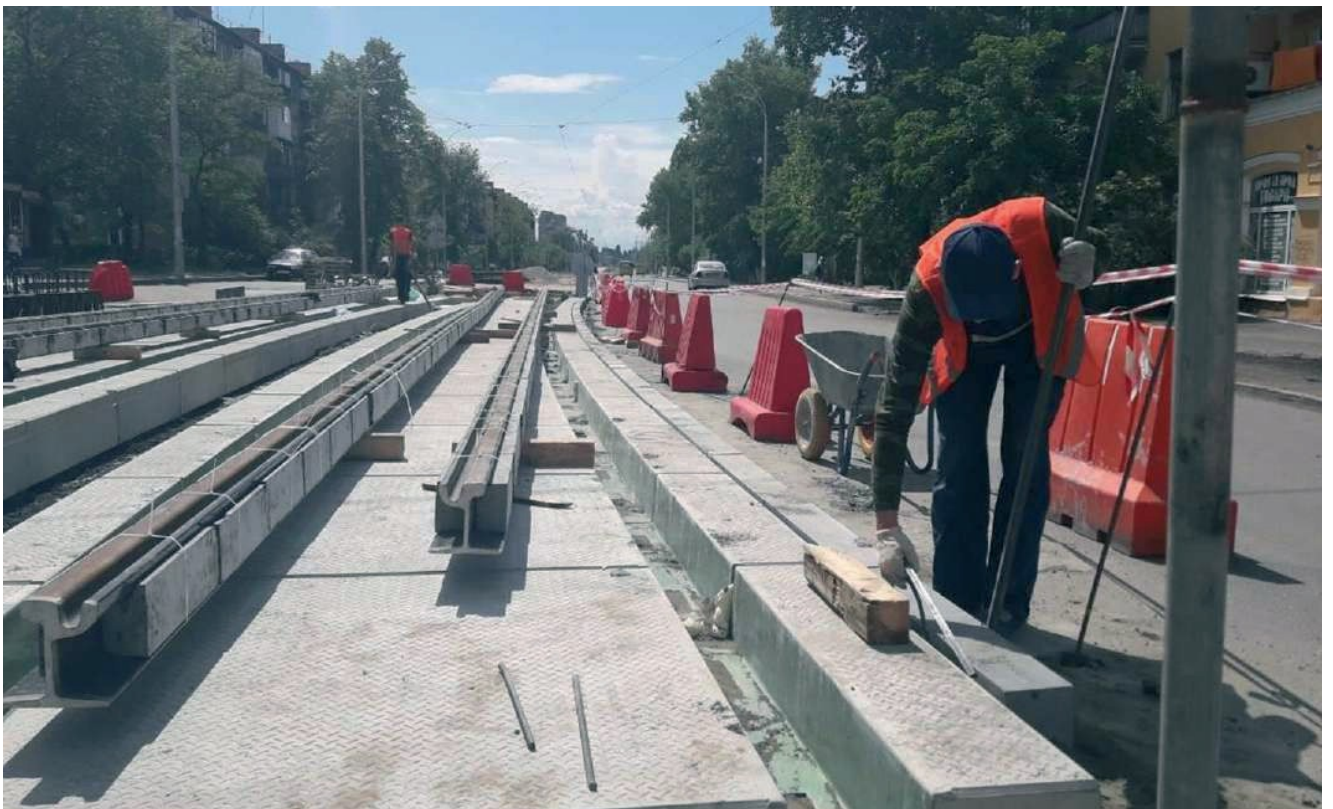


Figure – Attaching 60R2 concrete ballasts to the rails



Figure – Installation of block-type tram tracks with reinforced concrete slabs



Figure – Construction of a block-type tram track with 350 mm thick PTS-E reinforced concrete slabs manufactured by PBK Kovalskaya, replaced under the contract for author's supervision



Figure – 60R2 rails are hung and set to the design vertical marks

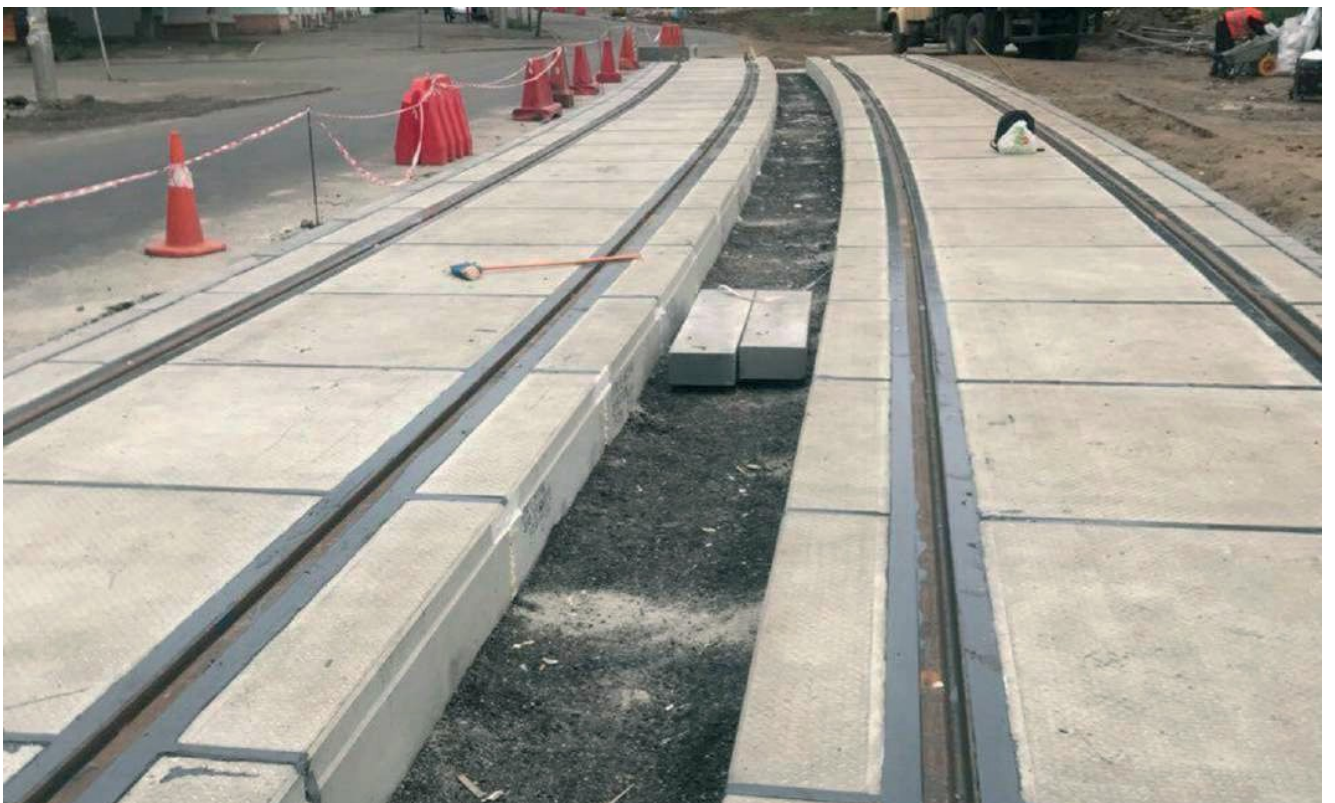


Figure – 60R2 rails are filled with Sika Icosit KC polyurethane material



Figure – Sample of Sika Icosit KC polyurethane material used to fix rails in special channels in reinforced concrete slabs

Construction of storm drains

Overhaul of the storm sewer system includes:

- rearrangement of storm sewer pipes in places where the roadway widens;
- installation of storm drains;
- rearrangement of existing storm sewer pipelines;
- installation of storm sewer pipelines in areas where there is no storm sewer system.

The route under consideration runs along the left bank of the first floodplain terrace of the Dnieper River and belongs to the Darnytskyi Meliorative Canal catchment basin. The geological structure to a depth of 6.0 m consists of alluvial soils – sand, fine and dusty with layers and lenses of sandy loam. Loose soils lie on the surface. Groundwater is encountered at a depth of 2.4-4.5 m. Seasonal fluctuations in the groundwater level are possible within 1.5 m of the recorded levels.

Surface water flows along transverse and longitudinal slopes into the city's storm sewer system and is then treated at municipal treatment facilities.



Figure – Preparation before installing KKS-2 type wells

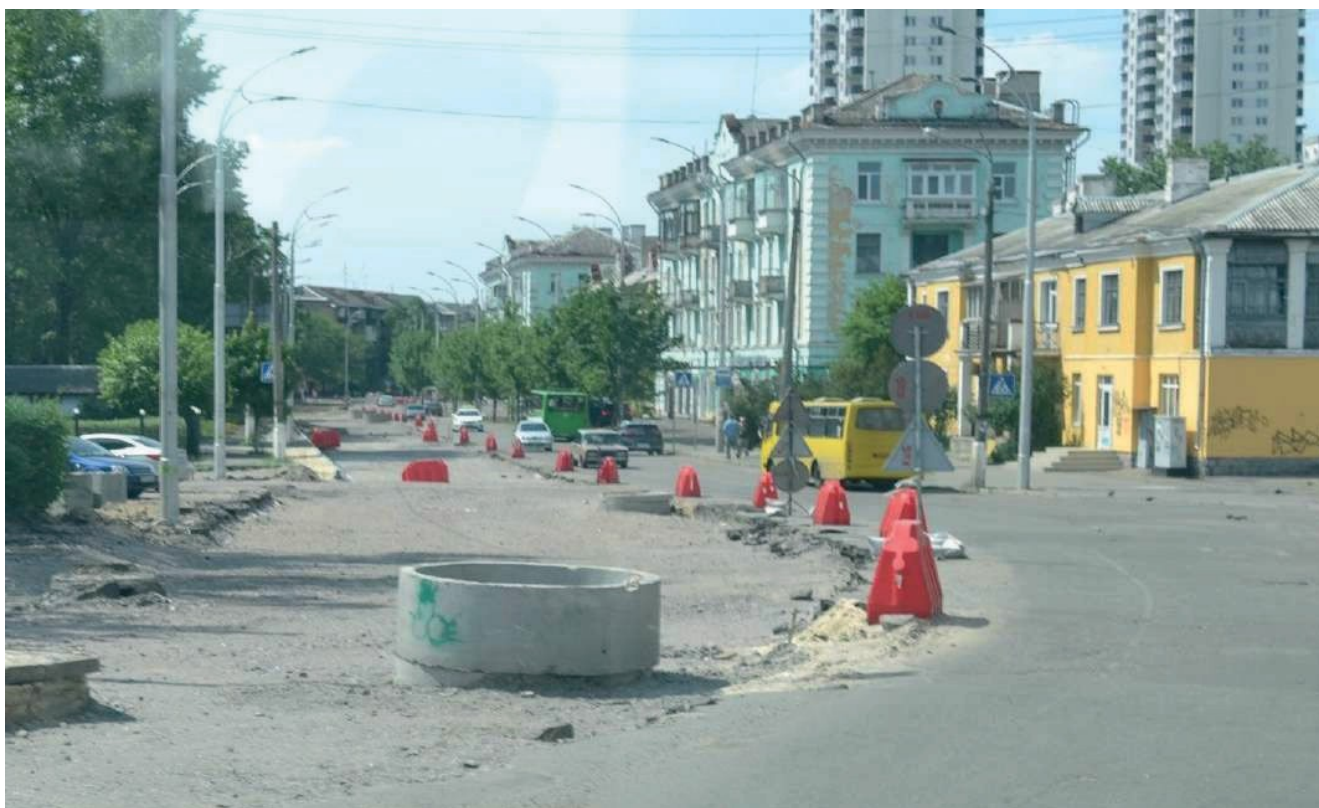


Figure – Installation of storm drains on Alma-Atynska Street.

The full report with appendices is available on the official CoST website: costukraine.org

CONCLUSIONS

The analysis of the documentation revealed the following observations:

MAJOR REPAIRS OF THE ROAD SURFACE OF THE RING ROAD

Design

- 1) There are a sufficient number of comments regarding the construction and compliance of the project with the requirements of current regulatory documents (the drawings of the plans do not contain sufficient dimensions and references for all the elements being designed, the drainage from the adjacent territory is not shown, the ODR drawings do not show the length of road markings and the picketage of installed road signs, there are a sufficient number of incorrectly provided names of materials, and there are no volumes for the installation of road signs and markings).
- 2) The scope of work on outdoor lighting does not correspond to the scope of work and materials in the specifications and drawings.
- 3) The lengthy process of obtaining permits and approvals; the permit for construction work was obtained in 2018, although the work was completed by the end of 2017.

Environmental impact assessment. Some EIA documents, namely the Statement of Intent and the Statement of Environmental Impact, have not been approved by the customer. Materials reflecting public interests (media publications, minutes of hearings, written and other documents of citizens' appeals) are also missing (or have not been provided).

The calculation of harmful emissions does not include calculations for four types of emissions and calculations of noise levels for nearby residential buildings. At the same time, there is no confirmation from the State Emergency Service of Ukraine or the Central Geophysical Observatory of information on background concentrations in the city.

MAJOR REPAIRS TO THE ROAD NETWORK IN THE DISTRICT OF KYIV: ALMA-ATYNSKA STREET FROM PRAZKA STREET TO LITINSKA STREET

Most of the comments made by the CoST verification team concern the details of the project documentation.

Design

- 1) There are a sufficient number of comments regarding the construction and compliance of the project with the requirements of current regulatory documents (the drawings do not contain sufficient dimensions and references for all designed elements, drainage from the adjacent territory is not shown, and the length of road markings and the picketage of installed road signs are not provided).
- 2) The costs of restoring the existing road surface of the carriageway have not been taken into account in the scope of work and calculations.

- 3) The customer's wishes, which were specified in the Design Assignment, were not taken into account in the project, and the repair of potholes in the lower layer of the asphalt concrete pavement after milling was not included.
- 4) There is no comparative analysis of the cost of road pavement options, which would allow for a more rational and economical choice.
- 5) The dimensions of the roadway of the overpass do not meet modern regulatory requirements (however, due to the fact that major repairs were carried out rather than reconstruction, it is objectively impossible to increase the width of the bridge).
- 6) The design of the overpass railing does not meet the requirements of regulatory documents.
- 7) The thickness of the monolithic reinforced concrete bridge deck slab is underestimated (125 mm in the design instead of 140 mm in accordance with regulatory requirements).
- 8) The design provides for a layer of coarse-grained asphalt concrete 8 cm thick, which contradicts the standards in force at the time of implementation (10 cm). At the same time, the customer informed that the thickness of the layer had been verified by calculations and approved by experts.
- 9) Outdoor lighting. The following are missing from the project:
 - a plan for laying certain cables;
 - work on improving the cable route;
 - other cables were used, unlike those approved by Kyivmiskosvitlo.
- 10) Environmental impact assessment. Some EIA documents, namely the Statement of Intent and the Statement on the Environmental Impact of Activities, have not been approved by the customer. There is also a lack of materials taking into account public interests (publication in the media, minutes of hearings, written and other documents of citizens' appeals). The calculation of harmful emissions does not include calculations for four types of emissions and calculations of noise levels for nearby residential areas. At the same time, there is no confirmation from the State Emergency Service of Ukraine or the Central Geophysical Observatory of information on background concentrations in the city.

Verification team visit to the construction site

- 1) A large number of asphalted sewer manholes were found. (According to the Customer's explanation, this is due to the fact that the base layer was laid in 2017 and the manholes were left flush with the laid layer in order to ensure winter maintenance of the site.
- 2) There are no records of the acceptance of concealed works in the work log.
- 3) The customer did not provide a single example of the discovery of poor-quality materials.
- 4) A contract for additional work on the facility was published, but Prozorro did not post a detailed list of the work to be performed, as required by the Law of Ukraine "On Public Procurement."

GENERAL CONCLUSIONS

The verification report was carried out as part of a pilot project by CoST Ukraine, Kyivavtodor and the Kyiv City State Administration in accordance with the Memorandum of Cooperation dated 08.09.2017.

As part of the pilot project, data was disclosed for the following projects:

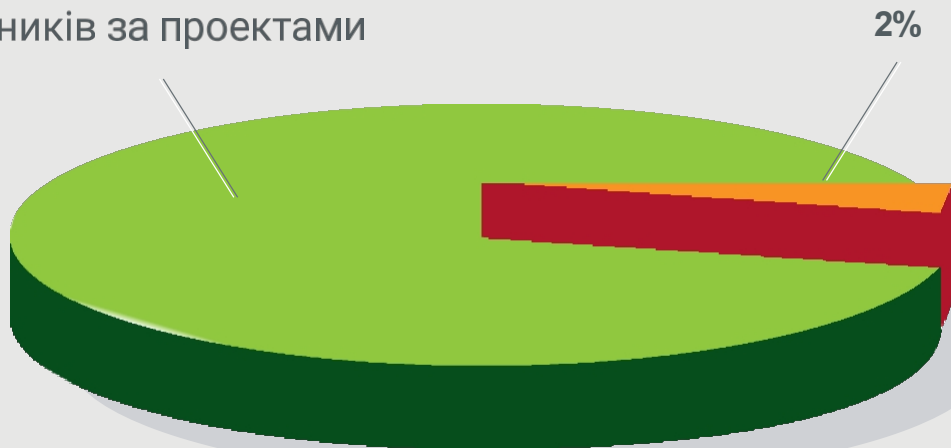
- Overhaul of the road surface of the Ring Road;
- Major repairs to the road network in Kyiv: Alma-Atynska Street from Prazka Street to Litinska Street.

Project data is available on the CoST portal: portal.costukraine.org.

It is worth noting the unprecedented level of transparency and openness on the part of the client – all requests from the verification team were answered, and all copies of primary documents were provided as part of proactive disclosure. The client not only provided the necessary information, but also ensured effective communication between the CoST verification team and all project participants, from the designer to the technical supervision engineer, representatives of the general contractor and even subcontractors.

Рівень розкриття даних:

Розкрито **98 %** інформаційних показників за проектами



Отримано відповіді на всі звернення



Опрацьовано 60 креслень за проектом Кільцева дорога



11 томів проектної документації за проектом Алма-Атинська



45 договорів та інших документів за проектами

The verification group recommended that the Customer pay attention to the acceptance of project documentation after the designer, since some of the project documents processed within the framework of the report were incomplete (some of the points from the design assignment were not taken into account). At the same time, the Customer is responding to the identified issues and, at the time of completion of the report, a design department has been created at Kyivavtodor.

RECOMMENDATIONS

- 1) Publish data on the implementation of all stages of road repair works on the Transparent Infrastructure portal: portal.costukraine.org.
- 2) When accepting work from design organisations, pay special attention to the completeness of the information in the project, its compliance with the design assignment, and the use of the necessary materials and structures.
- 3) When carrying out the design, pay attention to the social component (holding public hearings, discussions) in accordance with the current legislation at all facilities.
- 4) Pay attention to the insufficient scope of accreditation of the testing laboratory involved, KP "Kyivblagoustriy". Consider the possibility of involving a laboratory with a broader scope of accreditation or creating your own laboratory.
- 5) Consider engaging an independent consulting engineer.

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