

INITIATIVE 3 TRANSPARENCY IN CONSTRUCTION  
COST UKRAINE

# VERIFICATION REPORT ON THE "ROADS KPAD"

June 2017



## CONTENTS

|                                                                     |           |
|---------------------------------------------------------------------|-----------|
| <b>1. INTRODUCTION:</b>                                             | <b>3</b>  |
| 1.1. List of abbreviations and terms                                | 3         |
| 1.2. Verifiers                                                      | 4         |
| 1.3. About CoST                                                     | 4         |
| 1.4. Disclosure                                                     | 4         |
| <b>2. SOURCES OF INFORMATION</b>                                    | <b>6</b>  |
| <b>3. ABOUT THE PROJECT "ROADS OF THE CARPATHIAN REGION"</b>        | <b>7</b>  |
| 3.1. General information                                            | 7         |
| 3.2. Project financing and procurement                              | 8         |
| 3.3. Results of procurement procedures                              | 12        |
| 3.4. Project implementation period                                  | 15        |
| <b>4. Proactive disclosure of information</b>                       | <b>15</b> |
| 4.1. Transcarpathian region                                         | 15        |
| 4.2. Ivano-Frankivsk region                                         | 15        |
| 4.3. Chernivtsi region                                              | 15        |
| 4.4. Lviv region                                                    | 15        |
| <b>5. Reactive disclosure of information</b>                        | <b>16</b> |
| 5.1. Chernivtsi region                                              | 16        |
| 5.1.1. Analysis of tender procedures                                | 16        |
| 5.1.2. Deficiencies identified during the visit                     | 17        |
| 5.1.3. Recommendations regarding identified shortcomings            | 18        |
| 5.2. Ivano-Frankivsk region                                         | 18        |
| 5.2.1. Analysis of tender procedures                                | 20        |
| 5.2.2. Requirements of the customer's technical service             | 24        |
| 5.2.3. Deficiencies identified during the visit                     | 25        |
| 5.2.4. Recommendations regarding identified deficiencies            | 26        |
| 5.3. Road repair technology in Ivano-Frankivsk region               | 26        |
| 5.4. Project documentation                                          | 28        |
| 5.5. Subcontractors                                                 | 29        |
| 5.6. Additional work and cost of 1 km of routine medium repair work | 30        |
| <b>6. CONCLUSIONS</b>                                               | <b>36</b> |
| <b>7. RECOMMENDATIONS</b>                                           | <b>38</b> |
| <b>APPENDICES</b>                                                   | <b>39</b> |

## 1. INTRODUCTION:

### 1.1. List of abbreviations and terms

**CoST** (Construction Sector Transparency Initiative) – a voluntary initiative involving a wide range of stakeholders, designed to ensure transparency and accountability in construction projects financed by public funds.

**CoNG** – Consultative and Supervisory Group, established to coordinate and monitor the implementation of CoST in Ukraine.

**CMU** – Cabinet of Ministers of Ukraine

**Ministry of Infrastructure** – Ministry of Infrastructure of Ukraine

**Ministry of Finance** – Ministry of Finance of Ukraine

**Ministry of Economic Development** – Ministry of Economic Development and Trade of Ukraine

**Ukravtodor** – State Agency of Motor Roads of Ukraine

**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 Cabinet of Ministers of Ukraine No. 668 dated 01.08.2005.

**Roadbed** – soil structure of a motorway

**PORD** – traffic management plan

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

**PSHS** – transition-speed lane. A traffic lane designed for accelerating or braking road vehicles when exiting or entering the general traffic flow.

**Remix technology** pavement repair is designed to restore worn asphalt concrete pavement by hot recycling with improved structure and physical and mechanical properties. The method consists of heating the pavement to a temperature of (150-180)°C and loosening the asphalt concrete pavement, mixing the resulting mixture with additives (new asphalt concrete mixture, black crushed stone, mineral fillers, organic binders), laying, distributing and pre-compacting the homogeneous regenerated mixture with a remixer tamping bar, ensuring the required evenness and design marks of the pavement in one pass of the remixer.

**SAD** – Regional Road Service

**Thin-layer coating** – road surface coating made of a cast emulsion-mineral mixture of the Slarisil (**Multimac**) type to increase the roughness and water resistance of the coating, as well as to prevent damage to the base layer of the coating.

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

**TTK** – typical technological map

**Cold recycling** – works on the regeneration of structural layers of motorway road surfaces using a cement-water suspension.

**SMA** – stone mastic asphalt

## 1.2. Verifiers

Report prepared by:

team leader – Oleg Ostroverkhyi;

Verification team consultant – Victor Lyadets; Verification team consultant –

Vadim Kozhushko; Verification team consultant – Yuri Pilyugin;

Verification team consultant – Elena Gavrish.

## 1.3. About CoST

The goal of CoST is to create an effective platform for cooperation between the government, business and civil society that 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.

CoST's operations should ensure:

- the creation of conditions for the long-term functioning of the platform;
- strengthening 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;
- the use of best international practices in data publication and verification through the integration of CoST principles and approaches, and the use of support and advice from experts at the CoST International Secretariat.

## 1.4. Disclosure

"Disclosure" in the context of CoST projects (Fig. 1.1) refers to the publication of objective, disclosed data provided by procurement organisations that are customers of construction/repair works.

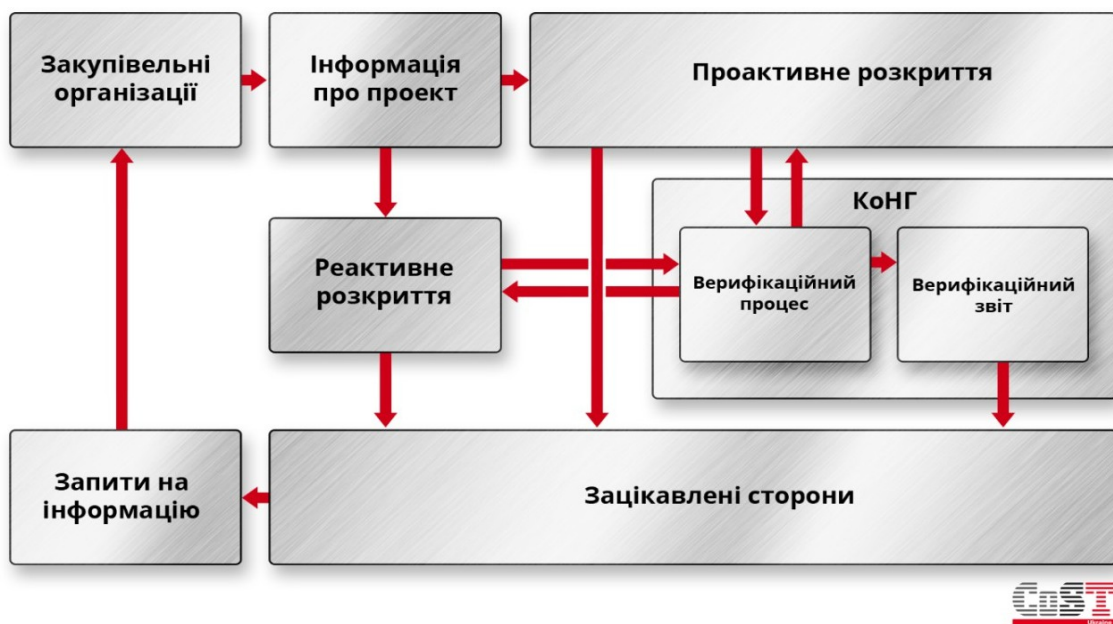


Figure 1.1 – CoST disclosure and related verification

**Proactive disclosure** (Table 1.1) refers to the information that procuring entities 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.

**Table 1.1 – Proactive disclosure of information**

| 1. Project stage              | Project information                                        | 2. Contract stage     | Contract information                            |
|-------------------------------|------------------------------------------------------------|-----------------------|-------------------------------------------------|
| <b>Project identification</b> | Project owner                                              | <b>Procurement</b>    | Procurement organisation                        |
|                               | Plot, part of a plot                                       |                       | Contact details of the procurement organisation |
|                               | Project name                                               |                       | Procurement process                             |
|                               | Location<br>Project                                        |                       | Contract type                                   |
|                               | Project objective                                          |                       | Contract status (current)                       |
|                               | Project description                                        |                       | Number of participants<br>Tender                |
| <b>Project preparation</b>    | Project content (main conclusion)                          |                       | Cost according to cost estimate                 |
|                               | Impact on the environment<br>environment                   |                       | Organisation of management contract             |
|                               | Resettlement plan                                          |                       | Contract name                                   |
|                               | Contact details                                            |                       | Contractor                                      |
|                               | Sources<br>Funding                                         |                       | Contract price                                  |
|                               | Project budget                                             |                       | Scope of work under contract                    |
|                               | Date of project budget approval                            |                       | Start date and deadline for work under contract |
| <b>Project completion</b>     | Project status (current)                                   | <b>Implementation</b> | Contract price changes                          |
|                               | Cost of implementation of works (according to the project) |                       | Contract price escalation                       |
|                               | Date of completion of work (according to the project)      |                       | Changes in the terms of work performance        |
|                               | Scope of work (according to the project)                   |                       | Changes in the scope of work                    |
|                               | Reasons for changes the project                            |                       | Reasons for price changes                       |

|  |                                                    |  |                                                                |
|--|----------------------------------------------------|--|----------------------------------------------------------------|
|  | Links to financial audit reports<br>Project review |  | Reasons for changes in scope and deadlines of work performance |
|--|----------------------------------------------------|--|----------------------------------------------------------------|

**Reactive disclosure** (Table 1.2) involves providing additional information in a form accessible to the requesting party and posting this information on public resources.

**Table 1.2** – Reactive disclosure of information

| Project                                           | Contract                                                 |
|---------------------------------------------------|----------------------------------------------------------|
| <b>Identification and preparation</b>             | <b>Procurement</b>                                       |
| Multi-year programme and budget                   | Persons responsible for the contract and their functions |
| Project description or feasibility study          | Procurement method                                       |
| Environmental and social impact assessment impact | Tender documents                                         |
| Resettlement and compensation plan                | Results of tender evaluation proposals                   |
| Project managers and their functions              | Project preparation report                               |
| Financial agreement                               | <b>Contract</b>                                          |
| Procurement plan                                  | Contract agreement and terms and conditions              |
| Project approval decision                         | Company registration and ownership                       |
| <b>Completion</b>                                 | Specifications and drawings                              |
| Project progress reports                          | Implementation                                           |
| Decisions on budget changes                       | List of variations, changes, amendments                  |
| Project completion report                         | List of price increase approvals                         |
| Project evaluation report                         | Quality assurance reports                                |
| Technical audit reports                           | Sampling records or payment certificates                 |
| Financial audit reports                           | Contract amendments                                      |

## 2. SOURCES OF INFORMATION

As part of the preparation of the verification report, documents available in the public domain on the Internet were reviewed, as well as data provided in response to requests from verifiers by the Road Services in Chernivtsi, Ivano-Frankivsk, Lviv and Zakarpattia regions (letters dated 15 July 2016 No. 04/07/2016 (Lviv Road Service), No. 05/07/2016 (Transcarpathian Road Service), 06/07/2016 (Chernivtsi Road Administration) and 07/07/2016 (Ivano-Frankivsk Road Administration) and individual requests sent by email, as well as information provided by Ukravtodor.

### 3. ABOUT THE PROJECT "ROADS OF THE CARPATHIAN REGION"

#### 3.1. General information.

The aim of the project is to ensure the sustainable functioning of motorways in the Ukrainian part of the Carpathian Euroregion, transport links between settlements in the Carpathian Euroregion and the development of cross-border cooperation with European Union countries, developing the tourism and recreational potential of the regions of the Ukrainian part of the Carpathian Euroregion and carrying out investment activities; ensuring the socio-economic development of settlements that have been granted mountain status. Current medium repairs of motorways of national importance are planned on the following motorways:

- **H-09 Mukachevo – Rakhiv – Bohorodchany – Ivano-Frankivsk – Rohatyn – Bibrka – Lviv** – a national motorway passing through three regions: Zakarpattia, Ivano-Frankivsk and Lviv. It starts in Mukachevo, passes through Khust, Tyachiv, Rakhiv, Yasinya, Yablunytsky Pass, Yaremcha, Nadvirna, Ivano-Frankivsk, Galich, Burshtyn, Rohatyn, Bibrka and ends in Lviv. The total length of H-09 is 423.6 km;
- **The H-10 Stryi – Ivano-Frankivsk – Chernivtsi – Mamalyga (to Chisinau)** is the shortest route between Poland on one side and Romania and Moldova on the other, with further access to Ukraine's Black Sea ports. This road connects to the international transport corridor No. 5 (Trieste – Ljubljana – Budapest (Bratislava) – Kosyni – Chop – Stryi – Lviv) in the city of Stryi. Improving the condition of the H-10 road is strategically important for the development of good neighbourliness and the integration of Ukraine's economic potential with the economies of Poland, Slovakia, Hungary and Romania. International and intra-regional passenger transport is of considerable social importance.
- **The R-24 Tatariv – Kosiv – Kolomyia – Borshchiv – Kamianets-Podilskyi** road is important for the development of the tourist infrastructure of the Carpathian region, connecting the tourist centres of Ternopil with the recreation and leisure areas in the Carpathians. It adjoins the H-09 Mukachevo – Lviv motorway in the central part of the Carpathians. The road connects five districts of the region: Nadvirna, Verkhovyna, Kosiv, Kolomyia and Horodenka.

### 3.2. Project financing and procurement

The project is financed from the state budget in accordance with Resolution No. 323 of the Cabinet of Ministers of Ukraine dated 25 May 2015 (as amended by Resolution of the Cabinet of Ministers of Ukraine No. 1126 of 30 December 2015) in accordance with the budget programme "Development of the road network in the regions of the Ukrainian part of the Carpathian Euroregion", under which the funds are allocated as follows:

**Table 1.3 - Distribution of funds**

| Name of the object and its location                                                                                                                                                      | Planned amount of funding, thousand UAH | Planned commissioning date, km |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------------------------|
| 1                                                                                                                                                                                        | 2                                       | 3                              |
| <b>Transcarpathian region</b>                                                                                                                                                            |                                         |                                |
| H-09 Mukachevo - Rakhiv - Bohorodchany - Ivano-Frankivsk - Rohatyn - Bibrka - Lviv on the section km 4+000 - km 5+230                                                                    | 4                                       | 1                              |
| H-09 Mukachevo - Rakhiv - Bohorodchany - Ivano-Frankivsk - Rohatyn - Bibrka - Lviv on the section km 16+000 - km 17+000                                                                  | 2,763.5                                 | 1                              |
| H-09 Mukacheve – Rakhiv – Bohorodchany – Ivano-Frankivsk - Rohatyn - Bibrka - Lviv on the section km 22+120 - km 23+700                                                                  | 5,024.5                                 | 1                              |
| H-09 Mukachevo - Rakhiv - Bohorodchany - Ivano-Frankivsk - Rohatyn - Bibrka - Lviv on the section km 37+500 - km 38+200                                                                  | 1,836                                   | 0                              |
| H-09 Mukachevo - Rakhiv - Bohorodchany - Ivano-Frankivsk - Rohatyn - Bibrka - Lviv on the section km 60+900 - km 62+400                                                                  | 4,210.2                                 | 1.5                            |
| H-09 Mukachevo - Rakhiv - Bohorodchany - Ivano-Frankivsk - Rohatyn - Bibrka - Lviv on the section km 71+300 - km 73+080                                                                  | 6,095.2                                 | 1                              |
| H-09 Mukacheve – Rakhiv – Bohorodchany – Ivano-Frankivsk – Rohatyn – Bibrka – Lviv on the section km 97+800 - km 98+700                                                                  | 4 126.1                                 | 0                              |
| H-09 Mukachevo - Rakhiv - Bohorodchany - Ivano-Frankivsk - Rohatyn - Bibrka - Lviv on the section km 109+050- km 110+400                                                                 | 4,866.0                                 | 1                              |
| H-09 Mukachevo - Rakhiv - Bohorodchany - Ivano-Frankivsk - Rohatyn - Bibrka - Lviv on the section km 167+400 - km 169+000                                                                | 2,755.9                                 | 1                              |
| H-09 Mukachevo - Rakhiv - Bohorodchany - Ivano-Frankivsk - Rohatyn - Bibrka - Lviv on km 90+227 (repair of the bridge deck)                                                              | 377.6                                   |                                |
| H-09 Mukachevo - Rakhiv - Bohorodchany - Ivano-Frankivsk - Rohatyn - Bibrka - Lviv on sections km 29+000-km 32+200; km 61+400-km 62+400; km 150+000 - km 151+000; km 162+200- km 162+700 | 117.4                                   |                                |

|                                                                                                                                              |           |           |
|----------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|
| H-09 Mukacheve - Rakhiv - Bohorodchany - Ivano-Frankivsk - Rohatyn - Bibrka - Lviv on the section km 16+942 (repair of junction)             | 2         |           |
| H-09 Mukacheve – Rakhiv – Bohorodchany – Ivano-Frankivsk – Rohatyn – Bibrka – Lviv on the section km 22+080 - km 22+240 (repair of fencing)  | 204       |           |
| H-09 Mukachevo - Rakhiv - Bohorodchany - Ivano-Frankivsk - Rohatyn - Bibrka - Lviv on the section km 37+411 - km 37+500 (thin-layer coating) | 203.9     |           |
| H-09 Mukachevo - Rakhiv - Bohorodchany - Ivano-Frankivsk - Rohatyn - Bibrka - Lviv on the section km 39+473 - km 39+605 (fencing)            | 115       |           |
| H-09 Mukachevo - Rakhiv - Bohorodchany - Ivano-Frankivsk - Rohatyn - Bibrka - Lviv on the section km 64+310 - km 64+530 (fencing)            | 204       |           |
| H-09 Mukachevo - Rakhiv - Bohorodchany - Ivano-Frankivsk - Rohatyn - Bibrka - Lviv on the section km 90+050 - km 90+145 (thin-layer coating) | 132.1     |           |
| <b>Total for the section "Zakarpattia Region"</b>                                                                                            | <b>37</b> | <b>11</b> |
| <b>Ivano-Frankivsk Region</b>                                                                                                                |           |           |
| H-09 Mukachevo – Lviv on the section km 318+925 – km 332+650                                                                                 | 56,278.0  | 11        |
| H-09 Mukachevo - Lviv on the section km 332+650 - km 341+700                                                                                 | 44,859.1  | 9         |
| H-09 Mukachevo - Lviv on the section km 346+123 - km 349+123                                                                                 | 16,368.3  | 3         |
| H-09 Mukachevo - Lviv on the section km 349+123 - km 359+000                                                                                 | 41,535.5  | 8         |
| H-09 Mukachevo - Lviv on the section km 359+000 - km 375+850                                                                                 | 90,925.8  | 15        |
| H-09 Mukachevo - Lviv on the section km 375+850 - km 376+650                                                                                 | 8         |           |
| H-09 Mukachevo – Lviv on the section km 376+650 – km 393+660                                                                                 | 69,431.0  | 14        |
| H-09 Mukachevo - Lviv on the section km 393+660 - km 395+660                                                                                 | 10,179.4  | 2         |
| H-10 Stryi - Mamalyga on the section km 27+292 - km 34+892                                                                                   | 8,030     | 1         |
| H-10 Stryi - Mamalyga on the section km 34+892 - km 41+123                                                                                   | 14,020    | 3         |
| H-10 Stryi - Mamalyga on the section km 49+050 - km 53+824                                                                                   | 12,670    | 1         |
| H-10 Stryi - Mamalyga on the section km 57+650 - km 64+300                                                                                   | 5,280     | 0         |
| R-24 Tatariv – Kamianets-Podilskyi on the section between km 5+050 and km 10+450                                                             | 4,286.2   | 1         |

|                                                                                                                   |                  |                |
|-------------------------------------------------------------------------------------------------------------------|------------------|----------------|
| R-24 Tatariv - Kamianets-Podilskyi on the section km 19+420 - km 41+000                                           | 7,890.6          | 2              |
| R-24 Tatariv - Kamianets-Podilskyi on the section km 48+000 - km 58+933                                           | 565.4            |                |
| R-24 Tatariv - Kamianets-Podilskyi on the section km 58+933 - km 69+629                                           | 7,403.5          | 3              |
| R-24 Tatariv - Kamianets-Podilskyi on the section km 78+200 - km 94+450                                           | 26,424.2         |                |
| <b>Total for the section "Ivano-Frankivsk region"</b>                                                             | <b>425,000</b>   | <b>78</b>      |
| <b>Lviv Region</b>                                                                                                |                  |                |
| N-09 Mukachevo-Rakhiv-Bohorodchany-Ivano-Frankivsk-Rohatyn-Bibrka-Lviv, km 436+433-km 439+433 (Carpathian region) | 20               | 3              |
| H-09 Mukachevo-Rakhiv-Bohorodchany-Ivano-Frankivsk-Rohatyn-Bibrka-Lviv, km 395+660-km 436+433 (Carpathian region) | 179              | 19             |
| <b>Total for the section "Lviv Region"</b>                                                                        | <b>200,000.0</b> | <b>22.3</b>    |
| <b>Chernivtsi region</b>                                                                                          |                  |                |
| H-10 Stryi – Ivano-Frankivsk – Chernivtsi – Mamalyga on the section km 206 + 402 – km 208 +635                    | 7,587.7          | 2              |
| H-10 Stryi – Ivano-Frankivsk – Chernivtsi – Mamalyga on the section km 208 + 635 – km 216 + 258                   | 29,813.1         | 7              |
| H-10 Stryi – Ivano-Frankivsk – Chernivtsi – Mamalyga (separate sections)                                          | 99               |                |
| <b>Total for the section "Chernivtsi Region"</b>                                                                  | <b>37,500</b>    | <b>9</b>       |
| <b>Total</b>                                                                                                      | <b>700,000</b>   | <b>121,913</b> |

Additional funding for the project was provided through customs payments (customs duties, excise tax on excisable goods (products) imported into the customs territory of Ukraine, value added tax on goods (products) imported into the customs territory of Ukraine in accordance with the Law of Ukraine No. 666-VIII of 3 September 2015 "On Amendments to Section VI "Final and Transitional Provisions" of the Budget Code of Ukraine (financed by the H-10 Stryi – Ivano-Frankivsk – Chernivtsi – Mamalyga (to Chisinau) within the Chernivtsi region) and other local budget funds.

**Table 1.4** – Average planned cost per 1 km for current medium repair of motorways in the Carpathian Euroregion

| Region          | Planned funding,<br>thousand UAH | Planned<br>commissioning, km | Average cost per<br>1 km, thousand<br>UAH |
|-----------------|----------------------------------|------------------------------|-------------------------------------------|
| 1               | 2                                | 3                            | 4                                         |
| Transcarpathian | 37,500.0                         | 11.6                         | 3,232.8                                   |
| Ivano-Frankivsk | 425,000.0                        | 78                           | 5,441.7                                   |
| Lviv            | 200,000                          | 22                           | 8,968.6                                   |
| Chernivtsi      | 37,500                           | 9                            | 3,787.9                                   |

The average cost per kilometre by region clearly shows the difference in technologies used in the repair of motorways in the Carpathian Euroregion. Thus, in Chernivtsi and Zakarpattia regions, thin-layer coatings were applied using the "Hot Remix" technology (to a depth of 0.06 m) and a "Multimac" type top layer, In Ivano-Frankivsk and Lviv regions, road surface regeneration was carried out using the "cold resurfacing" technology (to a depth of 18-22 cm), followed by the installation of a levelling layer of asphalt concrete and a top layer of SMA. Therefore, we have almost identical figures for the Zakarpattia and Chernivtsi regions. The same comparative data should have been available for the Ivano-Frankivsk and Lviv regions, but there is a significant difference, which may indicate different approaches to determining the cost using identical technologies.

A more detailed analysis with actual indicators is presented in Tables 1.8 and 1.10 with accompanying diagrams.

### 3.3. Results of procurement procedures

As part of the verification, the results of procurement procedures carried out under the Carpathian Region Roads project in 2015 were reviewed:

| Indicator                                          | Quantity  | %<br>Quantity | Total procurement budget<br>purchases, UAH | %<br>Amount |
|----------------------------------------------------|-----------|---------------|--------------------------------------------|-------------|
| <b>1. Project "Roads of the Carpathian Region"</b> | <b>38</b> | <b>100%</b>   | <b>2,264,384,530.80</b>                    | <b>100</b>  |
| <b>Ivano-Frankivsk region</b>                      | <b>23</b> | <b>61</b>     | <b>1,523,596,256.00<sup>1</sup></b>        | <b>67</b>   |
| Of which                                           |           |               |                                            |             |
| Contracts concluded with winners                   | 12        | --            | 747,935,975.13                             |             |
| Open tenders                                       | 7         | --            | 588,279,933.13                             |             |
| Negotiation procedure                              | 5         | --            | 159,656,042.00                             |             |
| Tender cancelled                                   | 11        | --            | --                                         |             |
| <b>Zakarpattia region</b>                          | <b>11</b> | <b>29</b>     | <b>224,033,000</b>                         | <b>10%</b>  |
| Of which:                                          |           |               |                                            |             |
| Contracts concluded with winners                   | 6         | --            | 51,091,777.64                              |             |
| Open tenders                                       | 6         | --            | 51,091,777.64                              |             |
| Negotiation procedure                              | 0         | --            | --                                         |             |
| Tender cancelled                                   | 5         | --            | --                                         |             |
| <b>Lviv region</b>                                 | <b>2</b>  | <b>5</b>      | <b>407,206,336.80</b>                      | <b>18</b>   |
| Of which                                           |           |               |                                            |             |
| Contracts concluded with winners                   | 2         | --            | 271,162,706.40                             |             |
| Open tenders                                       | 2         | --            | 271,162,706.40                             |             |
| Negotiation procedure                              | 0         | --            | --                                         |             |
| Tender cancelled                                   | 0         | --            | --                                         |             |
| <b>5. Chernivtsi</b>                               | <b>2</b>  | <b>5</b>      | <b>109,548,938.00</b>                      | <b>5</b>    |
| Of which                                           |           |               |                                            |             |
| Contracts concluded with winners                   | 2         | --            | 109,438,571.46                             |             |
| Open tenders                                       | 2         | --            | 109,438,571.46                             |             |
| Negotiation procedure                              | 0         | --            | --                                         |             |
| Tender cancelled                                   | 0         | --            | --                                         |             |

<sup>1</sup> During the analysis of procurements conducted by the State Agency of Motorways in the Ivano-Frankivsk region, 11 procurement procedures were reviewed, divided into 29 lots, of which 6 lots are not included in the Carpathian Region Roads project. Since the expected cost of the procurement by the Customer is indicated without a breakdown by lots, but only as the total cost of the procurement, the value of the total procurement budget for the region is overstated, but overall does not significantly affect the distribution of the budget for the "Roads of the Carpathian Region" project between the Road Administration of the specified regions.

Percentage of cancelled tenders: 42% of procedures (16 out of 38) were cancelled for the following reasons:

| Reasons for cancellation of tenders                                                                                                                                                                                                                                   |                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| <b>Less than two bids were accepted for evaluation participants were admitted to the evaluation:</b>                                                                                                                                                                  | <b>4 procurements</b> |
| lot 2 - routine repair of the H-09 Mukachevo-Lviv on the section km 346+123 - km 349+123                                                                                                                                                                              |                       |
| Lot 3 - Current repair of the H-09 Mukachevo-Lviv state motorway Lviv on the section km 393+660 - km 395+660                                                                                                                                                          |                       |
| Lot 4 - routine maintenance of the R-24 Tatariv-Kamianets-Podilskyi national highway Kamianets-Podilskyi on the section km 5+050 - km 10+450                                                                                                                          |                       |
| Lot 4 - routine maintenance of the R-24 Tatariv-Kamianets-Podilskyi national highway Kamianets-Podilskyi on the section km 5+050 - km 10+450                                                                                                                          |                       |
| <b>No further need for procurement:</b>                                                                                                                                                                                                                               | <b>9 procurements</b> |
| Rules for determining the cost of construction DSTU B.D.1.1-1:2013 (current average repair of the H-09 Mukachevo-Rakhiv-Bohorodchany state highway Ivano-Frankivsk-Rohatyn-Bibrka-Lviv, km 16+000 – km 87+000) – 7.95 km (2 lots)                                     |                       |
| Rules for determining the cost of construction DSTU B.D.1.1-1:2013 (current average repair of the H-09 Mukachevo-Rakhiv-Bohorodchany-Ivano-Frankivsk-Rohatyn-Bibrka-Lviv state highway, km 16+000 – km 87+000) – 7.95 km (2 lots)                                     |                       |
| lot 1 - current repair of the H-09 Mukachevo-Lviv on the section km 318+925 - km 332+650                                                                                                                                                                              |                       |
| Lot 2 - routine maintenance of the H-09 Mukachevo-Lviv national highway between km 349+123 and km 359+000                                                                                                                                                             |                       |
| Lot 3 - routine maintenance of the H-09 Mukachevo-Lviv on the section km 359+000 - km 375+850                                                                                                                                                                         |                       |
| Lot 4 - Current repair of the H-09 Mukachevo-Lviv state motorway Lviv on the section km 376+650 - km 393+660                                                                                                                                                          |                       |
| Lot 1 - routine maintenance of the H-09 Mukachevo-Lviv on the section km 332+650 - km 341+700                                                                                                                                                                         |                       |
| Lot 2 - routine maintenance of the H-09 Mukachevo-Lviv on the section km 375+850 - km 376+650                                                                                                                                                                         |                       |
| lot 3 - routine maintenance of the R-24 Tatariv-Kamianets-Podilskyi national highway between km 58+933 and km 94+510 (separate sections between km 58+933 - km 69+629)                                                                                                |                       |
| <b>Reduction of expenditure on procurement:</b>                                                                                                                                                                                                                       | <b>3 purchases</b>    |
| current medium repair of the H-09 Mukachevo-Rakhiv-Bohorodchany-Iv.Frankivsk-Rohatyn-Bibrka-Lviv, km 37+300 – km 39+500, km 47+100 – km 50+100, km 51+700 – km 52+600, km 61+000 – km 62+200 (installation of thin-layer asphalt concrete pavement)                   |                       |
| ongoing medium repair of the H-09 Mukachevo-Rakhiv-Bohorodchany-Iv.Frankivsk-Rohatyn-Bibrka-Lviv, km 109+000 – km 112+000, km 115+000 – km 117+000, km 167+6675 – 169+000 (restoration of asphalt concrete using the Remix method)                                    |                       |
| current medium repair of the H-09 Mukachevo-Rakhiv-Bohorodchany-Iv.Frankivsk-Rohatyn-Bibrka-Lviv state highway, km 62+200 – km 69+700, km 73+000 – km 73+170, km 105+500 – km 107+000, km 131+400 – km 132+500 (installation of thin-layer asphalt concrete pavement) |                       |

Rating of participants by total cost of winning bids:

| Participant                                                              | Total cost of contracts,<br>UAH                           | Number<br>of wins    |
|--------------------------------------------------------------------------|-----------------------------------------------------------|----------------------|
| <b>1. PBS LLC</b><br>Ivano-Frankivsk Lviv                                | <b>764,470,650.20</b><br>419,345,768.60<br>345,124,881.60 | <b>4</b><br>2<br>2   |
| <b>2. Avtomagistral-Pivden LLC</b><br>Ivano-Frankivsk                    | <b>138,588,948.53</b><br>138,588,948.53                   | <b>4</b><br><b>4</b> |
| <b>3. Shlyakhbud-LIM LLC</b><br>Ivano-Frankivsk                          | <b>134,184,298.00</b><br>134,184,298.00                   | <b>2</b><br>2        |
| <b>4. SAT Ukraine LLC</b><br>Zakarpattia Chernivtsi                      | <b>81,543,577.68</b><br>30,597,148.08<br>50,946,429.60    | <b>3</b><br>2<br>1   |
| <b>5. Eurodor Company LLC</b><br>Chernivtsi                              | <b>58,492,141.86</b><br>58,492,141.86                     | <b>1</b><br>1        |
| <b>6. Trade-Invest IF</b><br>Ivano-Frankivsk                             | <b>29,115,048.00</b><br>29,115,048.00                     | <b>1</b><br>1        |
| <b>7. Onur Construction International</b><br>Lviv                        | <b>27,921,810.00</b><br>27,921,810.00                     | <b>2</b><br>2        |
| <b>8. Ivano-Frankivsk Oblavtodor State Enterprise</b><br>Ivano-Frankivsk | <b>26,701,912.00</b><br>26,701,912.00                     | <b>2</b><br>2        |
| <b>9. PrJSC "UKRATOMENERGOBUD"</b><br>Zakarpattia                        | <b>15,584,450.40</b><br>15,584,450.40                     | <b>1</b><br>1        |
| <b>10. LLC "SHBU-58"</b><br>Zakarpattia                                  | <b>4,537,478.16</b><br>4,537,478.16                       | <b>1</b><br>1        |
| <b>11. State Enterprise "Zakarpattia Oblavtodor"</b><br>Zakarpattia      | <b>372,701</b><br>372,701.00                              | <b>1</b><br>1        |

### 3.4. Project completion date

According to the project documentation, the work will be carried out during 2015–2016.

## 4. Proactive disclosure of information

When comparing the data and information about the project disclosed to CoST by the procuring entities with the data publicly available on official websites, the following facts were revealed (by region).

### 4.1. Zakarpattia region

The procurement organisation's reports lack information on a number of repair projects; the available information on completed procurements is incomplete (there is no data on the procurement announcement, the qualification criteria for selecting the winner, the evaluation of bids, or the contractor); contracts have been partially uploaded to the Ministry of Finance's web portal e-data.gov.ua.

The following purchases made *without competitive selection of participants*, i.e. under direct contracts, should be highlighted separately:

- installation of fencing on the H-09 motorway between km 64+310 and km 64+530 – contractor SDT LLC, cost **199,929 thousand UAH**;
- repair of the junction of the H-09 motorway on the section km 16+942 – contractor: "ShBU-58", cost: **199,329 thousand UAH**;
- installation of fencing on the H-09 motorway, on the section between km 22+080 and km 22+240 – contractor: STD LLC, cost: **UAH 199,917 thousand**;
- installation of fencing on the H-09 motorway on the section between km 39+473 and km 39+605 – contractor: SDT LLC, cost: **112,909 thousand UAH**;
- current medium repair of the H-09 motorway on the section km 64+310 - km 64+530 – contractor SDT LLC, cost: **UAH 199,929 thousand**;
- installation of a thin-layer asphalt concrete pavement on the H-09 motorway between km 90+050 and km 90+145 – contractor: Zakarpattia Oblavtodor State Enterprise, cost: **UAH 129,468 thousand**.

All of the above contracts, with a total value of UAH 1,041,481 thousand (four of them with one contractor), were concluded on 17 December 2015 with a deadline for completion of works by 31 December 2015, which may indicate, firstly, earlier actual deadlines for completion of works and, secondly, that the procurement was divided into parts in order to avoid a tender.

### 4.2. Ivano-Frankivsk region

The purchaser's report contains information on only one object, which is partially completed.

### 4.3. Chernivtsi region

The report lacks information about subcontracts (number, date, subject matter and cost of such contracts).

### 4.4. Lviv region

The report lacks information about subcontracting agreements (contractor's EDRPOU, number, date, subject and cost of the agreement). The report also lacks information on the object of the current medium repair of the H-09 Mukachevo – Rakhiv – Bohorodchany – Ivano-Frankivsk – Rohatyn – Bibrka – Lviv motorway on the section km 395+660 – km 436+433 (main scope of work), only additional work has been included. Only one contract dated 16 June 2015 No. 70-06/15 has been posted on the Ministry of Finance portal, with a reported payment of UAH 175,675.0 thousand, while according to the information on the Ministry of Finance portal

Ministry of Finance portal, it is UAH 83,683.078 thousand. At the same time, acts of completed works have been registered for the amount of UAH 190,230.863 thousand.

## 5. Reactive disclosure of information

As part of the reactive disclosure of information on the report "Roads of the Carpathian Region", the verifiers processed the following documents:

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

A total of 25 contracts were reviewed within the framework of the Carpathian Region Roads project.

The verification group also visited **the following repair sites:**

- 14 September 2016, motorway H-10 Stryi – Ivano-Frankivsk – Chernivtsi – Mamalyga (to Chisinau) within the Chernivtsi region at km 206+402 – km 208+635 (field trip report in Appendix No. 1 to this report) – work on the site has been completed;
- 14 September 2016, motorway H-10 Stryi – Ivano-Frankivsk – Chernivtsi – Mamalyga (to Chisinau) within the Chernivtsi region at km 208+635 – km 216+495 (trip report in Appendix No. 1 to this report) – work on the site has been completed;
- 15 September 2016, motorway H-09 Mukacheve – Rakhiv – Bohorodchany – Ivano-Frankivsk – Rohatyn – Bibrka – Lviv km 318+925 – km 341+700, km 349+123 – km 393+660 (trip report in Appendix No. 1 to this report) – work on the site completed.

### 5.1. Chernivtsi region

#### 5.1.1. Analysis of tender procedures

In total, as part of the project implementation, the procurement organisation conducted one procurement procedure for services related to the current medium repair of the H-10 Stryi – Ivano-Frankivsk – Chernivtsi – Mamalyga motorway, divided into two lots with a total cost of UAH 109,548.9 thousand. The winners of the tender were: for lot 1 – SAT Ukraine LLC, for lot 2 – Eurodor Company LLC. As of the date of this report, the repair work on the sites has been completed.

In the procurement for lot 1, the bid with the lowest price was rejected.

|   | Project name                                                                                                                                                                                                                                                                                                                    | Participants who submitted proposals                                                                                                                                                      | Cost of participants' proposals, UAH                                      |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| 1 | Current medium repair of the H-10 Stryi – Ivano-Frankivsk – Chernivtsi – Mamalyga (to Chisinau) state motorway (separate sections): Repair of the road surface using thin-layer coating technology on the following sections: km 216+258 - km 222+509 km 225+830 - km 226+053 km 239+574 - km 243+807 km 243+807 - km 245+727 ) | <ol style="list-style-type: none"> <li>1. <b>DORLIDER Construction Company LLC (rejected)</b></li> <li>2. <b>SAT Ukraine LLC (winner)</b></li> <li>3. Avtomagistral-Pivden LLC</li> </ol> | <p><b>31,993,440</b></p> <p><b>53,946,429.60</b></p> <p>55,575,652.00</p> |

More detailed information is provided in Appendix No. 2 to this report.

### 5.1.2. Deficiencies identified during the visit

During the visit to the repair site on the H-10 Stryi – Ivano-Frankivsk – Chernivtsi – Mamalyga (to Chisinau) within the Chernivtsi region at km 206+402 – km 216+495, the following shortcomings, defects and violations of the requirements of DBN V.2.3-4:2007 and DSTU 3587-97 were identified:

- During the repair work, the longitudinal and transverse profiles of the motorway were not levelled, which violated the standards for correcting the transverse profile to the norm. Thus, in accordance with clause 5.1.4 of DBN V.2.3-4:2007, the transverse slope of the carriageway, except for sections where bends are to be constructed, must be determined depending on the material of the road surface. On roads with asphalt concrete and cement concrete pavement, the transverse slope of the carriageway must be 25 ‰. In turn, the design documentation does not contain the necessary set of works due to their absence in the customer's design assignment.
- Practically all junctions and junctions of secondary roads with roads of national importance within the radius of curvature do not have a surface, which causes gravel and dirt to be carried onto roads of national importance and premature wear of road markings, which is a shortcoming of the contractors during the development of the design documentation (violation of clause 9.2.2.5 of DBN V.2.3-4:2007).



- In areas where schools and preschools are located, there are no "Pedestrian Crossing" road signs with a "Distance to Object" sign near pedestrian crossings.
- There are no traffic lights at right- and left-hand curves.
- There are no pavements or street lighting in built-up areas at night.
- On virtually all sections of roads where routine repairs have already been carried out, drainage issues have not been adequately addressed at the project level (private houses and gardens are located below the road surface).

- At intersections of motorways with power lines, there are no road signs limiting the height of vehicles.
- At km 214+150 in the village of Revakivtsi, at the site of the bus shelter, no transition-speed lane has been installed (clause 9.2.4.1 of DBN V.2.3-4:2007 has not been complied with).
- At km 245 – km 254, new kerbstones are being installed on the right-hand side after the road surface wear layer has been restored. This leads to the destruction of the asphalt pavement within the limits of the dismantling of the old kerbstones and unjustified additional costs for the installation of asphalt concrete pavement already near the new kerbstone.

### **5.1.3. Recommendations regarding the identified shortcomings**

1. In future projects for routine medium repairs, provide for an increased thickness of the asphalt concrete levelling layer, which in turn will make it possible to level the transverse and longitudinal profiles of the road in accordance with the requirements of DBN V.2.3-4:2007.

2. When developing future projects, it is essential to take into account the installation of pavement on exits within the radius of curvature with a design similar to the pavement of the main road.

3. In areas where schools and preschools are located, provide for the installation of road signs with yellow reflective film when approaching pedestrian crossings with a sign and directly at pedestrian crossings with duplication on both sides of the carriageway in order to ensure road safety, pedestrian safety and accident prevention; and where they are located within right- or left-hand curves, install flashing yellow traffic lights or call-action traffic lights.

4. In the village of Revakivka, a transition-speed lane should be constructed near the bus station, which is currently absent. Since it is located within the settlement, it should have the following parameters: braking distance – 15 m, acceleration distance – 45 m.

5. When developing the design task, involve local authorities (for co-financing the work) and the public in order to make timely changes to the project documentation in terms of improvement and road safety within populated areas.

### **5.2. Ivano-Frankivsk region**

In total, as part of the project implementation, the procurement organisation purchased services for 23 lots for the current medium repair of motorways H-09 Mukachevo – Lviv, H-10 Stryi – Ivano-Frankivsk – Chernivtsi – Mamalyga, R-24 Tatariv – Kamianets-Podilskyi for a total cost of UAH 1,514,178.0 thousand. At the same time, the customer cancelled the tenders for three of the announced procedures. As a result of the procurement, 12 contracts were concluded for a total cost of UAH 747,936,000 with the following contractors: Avtomagistral-Pivden LLC, Trade-Invest IF PE, PBS LLC, Shlyakhbud-LIM LLC, and Ivano-Frankivsk Oblavtodor State Enterprise. As of the date of this report, the repair work has been completed.

In two cases of procurement procedures, the bids of the participants offering the lowest price were rejected.

|   | Project name                                                                                                                                                             | Participants who submitted proposals                                                                                                                                                                                                                                                                                                     | Cost of participants' proposals, UAH                                                                                                 |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Lot 2 - current Medium repair of a motorway of national importance H-10 Stryi – Mamalyga on sections km 27+292 - km 34+892, km 49+050 - km 53+824, km 57+650 - km 64+300 | <ol style="list-style-type: none"> <li>1. PP "Dorleader" (rejected)</li> <li>2. Shlyakhbud-LIM LLC (rejected)</li> <li>3. Vita Construction LLC (rejected)</li> <li>4. Avtomagistral-Pivden LLC (winner)</li> <li>5. Ivano-Frankivsk Oblavtodor</li> <li>6. Mercury-1 LLC</li> <li>7. Garilit LLC</li> </ol>                             | <p>79,739,570.00</p> <p>87,239,394</p> <p>87,787,142.00</p> <p>92,976,012.00</p> <p>94,699,944.00</p> <p>96,336,972.00</p> <p>--</p> |
| 2 | lot 2 - current repair of motorways of the state H-09 Mukachevo – Lviv section km 393+660 - km 395+660                                                                   | <ol style="list-style-type: none"> <li>1. Ivano-Frankivskavtodor LLC (rejected)</li> <li>2. Trade-Invest IF (winner)</li> <li>3. PP VPKP "UKREVROBUD 2013</li> <li>4. PMK-22 LLC</li> <li>5. LLC Road Construction Altkom</li> <li>6. Avtomagistral-Pivden LLC</li> <li>7. Techno-Bud-Centre LLC</li> <li>8. Rostdorstroy LLC</li> </ol> | <p>11,934,343.20</p> <p>12,037,200.00</p> <p>12,063,832.60</p> <p>12,905,744.00</p> <p>--</p> <p>--</p> <p>--</p> <p>--</p>          |

**9% (2 out of 23)** proposals from participants offering the lowest price were rejected.

More details on the tender procedures and shortcomings identified during verification are provided below.

### 5.2.1. Analysis of tender procedures

Procurement of repairs on the H-09 Mukachevo – Lviv motorway, km 318+925 – km 393+660. On 4 June 2015 and 9 June 2015, the customer announced two procurement procedures for repairs of separate sections, and on 17 June 2015, cancelled both due to the absence of further need for procurement. However, on 1 July 2015, the need arose again. In our opinion, the tenders in this case were cancelled illegally, as the need still existed. The results are presented in the table below.

**Table 1.5 – Cancellation of tenders**

| No | Project name                                                                                                                                                                                                                                                 | Date of announcement of the procedure | Announcement number | Date of selection of winner/cancellation | Reason for cancellation / Name Contractor                                                       |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|---------------------|------------------------------------------|-------------------------------------------------------------------------------------------------|
| 1  | Current repair of the H-09 Mukachevo – Lviv state highway on the section between km 332+650 and km 341+700, km 375+850 and km 376+650, R-24 Tatariv – Kamianets-Podilskyi on the section km 58+933 - km 94+510, (separate sections at km 58+933 – km 69+629) | 04.06.2015                            | 142018              | 17                                       | Cancellation of tender due to lack of further need for procurement of goods, works and services |
| 2  | Current repair of the H-09 Mukachevo – Lviv state motorway on the section km 318+925 – km 332+650, km 349+123 – km 359+000, km 359+000 - km 375+850, km 376+650 - km 393+660                                                                                 | 09.06.2015                            | 144524              | 17.06.2015                               | Cancellation of tender due to lack of further need for procurement of goods, works and services |
| 3  | Ongoing medium repair of the H-09 Mukachevo-Lviv state motorway on sections km 318+925 - km 341+700, km 349+123 - km 393+660                                                                                                                                 | 01                                    | 15628               | 17.08.2015                               | PBS LLC                                                                                         |

The expected cost of purchasing road repairs according to the announcement on the web portal of the Ministry of Economic Development No. 156282 dated 01.07.2015, according to the calculations of the State Agency of Motorways, amounted to UAH 733,847.97 thousand. At the same time, the winners of the tender for three lots (listed in Appendix No. 2) agreed to perform the customer's tasks for a total amount of UAH 524,130.65 thousand. Economy and efficiency are the basic principles of procurement carried out with budget funds, but it is worth noting that when compiling and approving the investor's estimate documentation, on the basis of which the expected cost of the purchase is determined, the lowest prices for material resources are taken into account, and when

when compiling the price of the tender offer, the prices for materials are set according to the results of monitoring as the lowest in the region (determined by DSTU B D.1.1.1:2013, SOU 42.1-37641918-050:2012 and Order No. 270 of Ukravtodor dated 10 July 2012). In other words, either the customer miscalculated the expected purchase price by UAH 210 million, or the bidders' prices are somehow much lower than the minimum prices in the region.

**Table 1.6 – Savings on purchases**

| No | Project name                                                                                                                                                   | Procurement procedure | Expected cost, thousand UAH | Name Contractor          | Contract value, thousand UAH |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------------|--------------------------|------------------------------|
| 1  | Current average repair of the H-09 Mukachevo-Lviv state motorway on sections km 318+925 - km 341+700, km 349+123 - km 393+660                                  | Open tenders          | 733,847.97                  | PBS LLC                  | 325,966.47                   |
| 2  | Current medium repair of the H-10 Stryi-Mamalyga state motorway on sections km 27+292 - km 34+892, km 49+050 - km 53+824, km 57+650 - km 64+300                |                       |                             | LLC Avtomagistral-Pivden | 92,976.01                    |
| 3  | Current medium repair of the R-24 Tatariv - Kamianets-Podilskyi state motorway on sections km 19+420 - km 41+000, km 48+000 - km 69+629, km 78+200 - km 94+450 |                       |                             | LLC Shlyakhbud-LIM       | 105,188.17                   |
|    |                                                                                                                                                                |                       |                             |                          | 524,130.65                   |

Significant savings were also achieved in the tender for the procurement of services for the current medium repair of the H-09 motorway, km 395+660 - km 436+433, within the Lviv region, in the amount of UAH 134 million (detailed information is provided in Appendix No. 2 to this report).

Considering the above, there is a need to examine the specified procurement in more detail: Lot 1 – H-09 on sections km 318+925 - km 341+700, km 349+123 - km 393+660, lot 2 – H-10 on sections km 27+292 - km 34+892, km 49+050 - km 53+824, km 57+650 - km 64+300 and lot 3 – P-24 on the sections km 19+420 - km 41+000, km 48+000 - km 69+629, km 78+200 - km 94+450.

The participants in the competitive bidding are listed below:

|    | <b>Lot 1</b>                 | <b>Price offer<br/>(thousand UAH)</b> |                                                                                        |
|----|------------------------------|---------------------------------------|----------------------------------------------------------------------------------------|
| 1  | Road Construction<br>Altikom | 254943                                | Rejected. Calculations do not meet the requirements of the tender documentation        |
| 2  | PP "Dorleader"               | 261107.6                              | Rejected. Calculations do not meet the requirements of the tender documentation        |
| 3  | Vita<br>Construction         | 294,997.2                             | Rejected. Calculations do not comply with the requirements of the tender documentation |
| 4  | Shlyakhbud-<br>LIM           | 300,630.6                             | Rejected. Calculations do not comply with the requirements of the tender documentation |
| 5  | PBS LLC                      | 325966.5                              | Winner                                                                                 |
| 6  | Mercury-<br>1                | 326665.2                              | Rejected due to non-compliance with the qualification criteria                         |
| 7  | PJSC<br>Umanavtodor          | 328,606.0                             | Rejected. Calculations do not meet the requirements of the tender documentation        |
| 8  | Techno-Bud-<br>Centre        | 345,188.4                             | Rejected. The calculations do not meet the requirements of the tender documentation    |
| 9  | Garalit LLC                  | 356,792.1                             | Rejected. Calculations of general production and administrative costs                  |
| 10 | Transstroy-<br>Mechanisation | 369,823.6                             | Admitted for evaluation                                                                |

|   | <b>Lot 2</b>                                         | <b>Price<br/>proposal<br/>(thousand UAH)</b> |                                                                                        |
|---|------------------------------------------------------|----------------------------------------------|----------------------------------------------------------------------------------------|
| 1 | PP "Dorleader"                                       | 79,739.6                                     | Rejected. Calculations do not meet the requirements of the tender documentation        |
| 2 | Shlyakhbud-<br>LIM                                   | 87,239.4                                     | Rejected. Calculations do not comply with the requirements of the tender documentation |
| 3 | Vita<br>Construction                                 | 87787.1                                      | Rejected. Calculations do not comply with the requirements of the tender documentation |
| 4 | LLC<br>Avtomagistral-Pivden                          | 92,976                                       | Winner                                                                                 |
| 5 | State Enterprise "Ivano-<br>Frankivsk<br>Oblavtodor" | 94699.9                                      | Admitted to evaluation                                                                 |
| 6 | Mercury-<br>1                                        | 96337.0                                      | Rejected due to non-compliance with the qualification criteria                         |
| 7 | Techno-Bud-<br>Centre                                | 110273.1                                     | Rejected. The calculations do not meet the requirements of the tender documentation    |
| 8 | Garalit LLC                                          | 111,532.8                                    | Rejected. Calculations of general production and administrative costs                  |

|    | Lot 3                                                        | Price proposal (thousand UAH) |                                                                                        |
|----|--------------------------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------|
| 1  | Shlyakhbud-LIM                                               | 105,188.2                     | Winner                                                                                 |
| 2  | Vita Construction                                            | 105390.4                      | Rejected. Calculations do not meet the requirements of the tender documentation        |
| 3  | State Enterprise "Ivano-Frankivsk Oblast Road Administration | 113061.4                      | Admitted for evaluation                                                                |
| 4  | PBS LLC                                                      | 116545.8                      | Rejected. No calculation of business trips                                             |
| 5  | PP "Dorleader"                                               | 124,278.3                     | Rejected. Calculations do not comply with the requirements of the tender documentation |
| 6  | Techno-Bud-Centre                                            | 130,595.9                     | Admitted for evaluation                                                                |
| 7  | Avalon Budinvest                                             | 133511.0                      | Rejected. Calculations do not meet the requirements of the tender documentation        |
| 8  | Mercury-1                                                    | 143249.1                      | Rejected due to non-compliance with the qualification criteria                         |
| 9  | Garalit LLC                                                  | 166010                        | Rejected. No calculations of general production and administrative expenses            |
| 10 | Eurodor Company Eurodor                                      | 180060.5                      | Rejected. No calculations of general production and administrative costs               |

Thus, the lowest bids for lots 1 and 2 were submitted by LLC "ShB Altcom LLC and Dorleader PE with a total value of UAH 334,683.4 thousand, which the customer rejected due to a violation of the procedure for calculating the contract price specified in the tender documentation. Instead, the customer concluded contracts for two lots worth UAH 418,942.5 thousand, which is **UAH 84 million more than the possible result of the tender.**

It should also be noted that only two participants out of 8-10 who took part in the procurement were admitted to the evaluation for the first two lots, and that the customer behaved quite consistently in rejecting the lowest bids.

For further information, we provide an extract from the ruling of the Ivano-Frankivsk City Court dated 03.11.2015 in criminal case No. 344/15905/15-k (reyestr.court.gov.ua): *"Throughout 2015, PBS LLC, on the basis of won tenders, on its own and with the involvement of the contractor Avtomagistral-Pivden LLC, carried out repairs on sections of the public highway of national importance H-09 (Mukachevo – Rakhiv – Bohorodchany – Ivano-Frankivsk – Rohatyn – Bibrka – Lviv), for which it received UAH 90,450,652 from the state budget.*

*An investigation of the tax invoices registered by LLC PBS and LLC Avtomagistral-Pivden revealed that these companies purchased construction materials from LLC Vita Construction for a total amount of UAH 61,309,595 to perform the above-mentioned work.*

*In turn, Vita Construction LLC purchased the construction materials sold by PBS LLC and Avtomagistral-Pivden LLC through a chain of purchases from Skorzonera LLC*

*Skorzonera LLC and Driada Real Estate LLC, which in turn purchases the above-mentioned materials from manufacturers at significantly lower prices.*

*From the information provided it appears that the price of the materials purchased by LLC "PBS" and LLC*

*The cost of construction materials for Avtomagistral-Pivden, which is included in the cost of repairing the H-09 motorway, is significantly higher than the actual purchase price of these construction materials from manufacturers and increased after their purchase was formalised through a chain of companies, including Vita Konstruktsion, Skorzonera LLC and Dryada Real Estate LLC, for a total amount of UAH 22,119,000.*

*Vita Construction, Skorzonera LLC and Dryada Real Estate LLC, for a total amount of UAH 22,119,000.*

*At the same time, the criminal case materials contain information that gives reason to believe that the winner of the tender for the performance of works, LLC*

*PBS and the companies from which the latter purchased materials, namely Vita Construction LLC, Skorzonera LLC and Dryada Real Estate LLC, are related business entities, since some of them are located at the same address, some of them have the same founders and employees, and the reports of all companies are submitted from the same IP addresses.*

*Therefore, there are currently grounds to believe that officials of PBS LLC, abusing their official position, inflated the prices of construction materials used to repair the H-09 motorway by purchasing them through a chain of related business entities, as a result of which they misappropriated state budget funds allocated for the repair of the motorway in particularly large amounts totalling UAH 22,119,000.*

**The court ruled** to grant representatives of the State Financial Inspection access to the bank accounts of PBS LLC. There is currently no information on the further consideration of the case and the court's decision.

In the above table with the results of the tender, all three parties to the case: PBS LLC, Vita Construction LLC and Avtomagistral-Pivden LLC participate in each of the lots, which may indicate concerted behaviour. Also noteworthy is the appeal to the Antimonopoly Committee against the customer's decisions by the participant Vita Construction LLC. On 28 August 2015, a complaint was filed with the AMCU regarding the illegal rejection of Vita Construction LLC's bid for lot 3, while the participant is not interested in the rejection of the first two lots, despite the fact that the reasons for the rejection are identical. However, on 1 September 2015, the complaint was withdrawn from consideration.

Detailed information on the tender is provided in Appendix No. 2 to this report.

### **5.2.2. Instructions from the customer's technical service:**

- No. 7 dated 20 November 2015 to Dorleader Construction Company LLC: suspend the regeneration of structural layers on the H-09 motorway between km 359+900 and km 375+850, complete the filling of the roadside by 1 December 2015;
- No. 14 dated 11 December 2015 (repeated) to Avtomagistral-Pivden LLC: km 318+925 – km 341+700, complete the filling of the roadside by 28 December 2015;
- No. 12 dated 11 December 2015 (repeated) to Dorleader Construction Company LLC: km 359+700 – km 374+000, complete filling of the roadside with sand and gravel mixture by 28 December 2015.

*The road administration's orders do not contain any notes regarding their implementation.*

### 5.2.3. Deficiencies identified during the visit

During the inspection of the repair site on the H-09 Mukachevo – Rakhiv – Bohorodchany – Ivano-Frankivsk – Rohatyn – Bibrka – Lviv motorway, km 318+925 – km 341+700, km 349+123 – km 393+660, the following deficiencies, defects and violations of the requirements of DBN V.2.3-4:2007 and DSTU 3587-97 were identified:

- The roadsides on all sections are reinforced with pebbles from the banks of local rivers, have a different fractional composition, and in the event of a forced stop of a vehicle on the roadside and its braking, an emergency situation may be provoked (in accordance with clause 9.2.3.10 DBN V.2.3-4:2007: the entire width of the roadside must be constructed of dense crushed stone or gravel mixtures, and, if justified, of stone materials treated with binders, asphalt concrete or concrete slabs. According to clause 3.26: a shoulder is a strip of roadbed located between the edge of the carriageway and the edge of the roadbed on each side of the road, which can be used for emergency stopping of vehicles);



- Practically everywhere on bends, there is no slope towards the inner radius of the curve in plan (clause 3.3 of DBN V.2.3-4:2007).
- At km 364 - km 366, there is no reinforced roadside, which will lead to the destruction of the edge of the carriageway.
- Within the settlement of Potik at km 378, there are no horizontal road markings, including centre line markings.
- Within the village of Pidkamin, on the inner radius of the right-hand curve, there are two exits with a gap in the barrier fence, while the curve has a radius of less than 600 m (according to clause 9.2.2.9 of DBN V.2.3-4:2007, there should be no exits with such parameters).
- In the village of Babukhiv (km 368+500), road signs are installed on the roadside (clause 10.2.4.: Road signs shall be installed on the right side of the road **outside** the carriageway

and shoulder (it is permissible to install them on the embankment), on the pavement, dividing strip, lawn, etc. and above the road, except in cases specifically stipulated by standard DSTU 4100-2002).

#### 5.2.4. Recommendations regarding identified deficiencies

1. a) Add another fraction of crushed stone material to the existing material on the shoulders (pebbles) for wedging, compaction and, as a result, increasing the coefficient of friction.  
b) To prevent the stone material of the reinforced roadside from shifting, impregnate it with coarse-grained materials, followed by wedging (e.g. 5x10) and layer-by-layer compaction.
2. Within the settlement of Potik at km 378, before the onset of the autumn-winter period of road operation, it is necessary to apply road markings in accordance with the Road Design and Construction Regulations.
3. Within the village of Pidkamin, eliminate existing exits and arrange them in another place, and install road signs 1.4.1 and 1.4.2 "Direction of turn" on this radius.

#### 5.3. Road repair technology in the Ivano-Frankivsk region

On 9 June 2015, the Tender Committee of the Road Service in Ivano-Frankivsk region held an open tender for the procurement of works for the current medium repair of the H-09 Mukachevo-Lviv state road for the following lots:

- 1) lot 1 – routine medium repair of the H-09 Mukachevo-Lviv national highway on the section between km 346+123 and km 349+123 (near the village of Bilshivtsi, Galytskyi district, Ivano-Frankivsk region);
- 2) lot 2 – current medium repair of the H-09 Mukachevo – Lviv national highway on the section km 393+660 – km 395+660 (near the village of Frag, Rohatyn district, Ivano-Frankivsk region).

According to the technical specifications, participants are offered the following technology:

- ✓ regeneration to a depth of 18 cm with the addition of new stone material, 3.0% bitumen emulsion and 1.5% cement;
- ✓ lower layer – porous asphalt concrete 4 cm thick;
- ✓ top layer – fine-grained asphalt concrete with a thickness of 6 cm;
- ✓ surface treatment – 1 cm.

For clarity, we provide a technological diagram of cold recycling works (Appendix No. 4) in accordance with TK 218-03449261-026-2003, which the customer used when drawing up the technical specifications for the above-mentioned tender.

On 11 June 2015, Lviv Polytechnic National University, commissioned by PBS LLC (contract No. 223 dated 1 April 2015), provided a conclusion (Appendix No. 5) on the review of the tender documentation of the Ivano-Frankivsk Regional Road Administration for the purchase of current medium repairs of the H-09 Mukachevo – Lviv motorway, km 346+123 – km 349+123 and km 393+660 – km 395+660, and on the shortcomings of the road surface design chosen by the customer, and provides relevant proposals. It should be noted that the tender for the current medium repair of the H-09 Mukachevo – Lviv motorway, km 346+123 – km 349+123 and km 393+660 – km 395+660 within the Ivano-Frankivsk region was launched by the Road Service on 7 May 2015, and the bids were opened on 9 June 2015. PBS LLC did not participate in the tender.

People's Deputy of Ukraine O. L. Shevchenko sent a deputy's appeal dated 15 June 2015 No. 530 (Appendix No. 3) to the management of the Road Service

of Ivano-Frankivsk Region, attaching the conclusions of Lviv Polytechnic (Appendix No. 4) and the M. P. Shulgin State Road Research Institute (Appendix No. 6). According to the conclusions of the scientists, it is recommended to change the technology of work on the specified sections of the motorway, namely:

- ✓ regeneration to a depth of 22 cm with the addition of new stone material, 2% bitumen emulsion and 3.5% cement;
- ✓ bottom layer – dense coarse-grained asphalt concrete type B (A) – 6 cm;
- ✓ top layer – SMA-15 – 4 cm.

These recommendations by scientists were applied by the Road Service in Lviv Oblast during the repair of the same road on sections within Lviv Oblast.

On 20 July 2015, the State Agency of Motorways signed contracts with the winner of the tender for the current medium repair of the H-09 Mukachevo – Lviv motorway, km 346+123 – km 349+123 and km 393+660 – km 395+660 – PP Trade-Invest IF.

On 21 July 2015, the State Road Research Institute sends a letter to Ukrainian MP O. L. Shevchenko dated 21 July 2015 No. 22.2-2/1-730 (Appendix No. 7) (in response to the letter from the People's Deputy dated 21 July 2015 No. 623) regarding the violation by the contractor Trade-Invest IF of the technology for performing cold recycling works on the section of the H-09 motorway between km 346+123 and km 349+123.

The Road Service of Ivano-Frankivsk Region provided a response No. 04-10/869 dated 7 August 2015 (Appendix No. 8) to the aforementioned parliamentary inquiry from People's Deputy O. L. Shevchenko, in which it explained the reasons for the selection of materials and road pavement layers when performing work on the regeneration of structural layers of road pavement using the cold recycling method.

On 17.08.2015, based on the results of the tender, the Road Administration concluded a contract with PBS LLC for the repair of the H-09 motorway between km 318+925 and km 341+700, and between km 349+123 and km 393+660.

Additionally, we provide an extract from the results of research conducted by the M.P. Shulgin State Road Research Institute, set out in the official document "Proposals for the repair of public roads in the Carpathian Euroregion within the Ivano-Frankivsk region" (Appendix No. 9).

**"For road H-09:**

**Option 1.**

1. The base is made of a milled organo-mineral mixture reinforced with a combined binder (cement and bitumen emulsion) M-20 in accordance with the requirements of VBN V.2.3-218-545:2009 – 22 cm. It is recommended to mill the existing road surface to a depth of 10-12 cm. Add new stone material in an amount of up to 50%. The composition of the combined binder should be on average: cement 3.2-3.6% by weight and bitumen emulsion 2.0-1.8% by weight.

2. Dense fine-grained asphalt concrete type A – 6 cm.

3. SMA-15 in accordance with DSTU B V.2.7-127:2006 – 4 cm.

**Option 2.**

1. The base is made of a milled organo-mineral mixture reinforced with a combined binder (cement and bitumen emulsion) M-20 in accordance with the requirements of VBN V.2.3-218-545:2009 – 20 cm. It is recommended to mill the existing road surface to a depth of 10-12 cm. Add new stone material in an amount of up to 50%. The composition of the combined binder should be on average: cement 3.2-3.6% by weight and bitumen emulsion 2.0-1.8% by weight.

2. Dense coarse-grained asphalt concrete type A – 8 cm.
3. SMA-15 in accordance with DSTU B V.2.7-127:2006 – 4 cm.

The above options must also be applied to the sections described at the beginning, namely km 346+123 - km 349+123 (near the village of Bilshivtsi, Galytskyi district, Ivano-Frankivsk region) and km 393+660 - km 395+660 (near the village of Fraga, Rohatyn district, Ivano-Frankivsk region). And on the section km 347+660 - km 347+160, where the asphalt concrete pavement is completely destroyed, a 22 cm thick layer of crushed stone and sand mixture (taking into account the compaction coefficient) with a complex binder consisting of 3-3.6% cement by weight and 2.2% bitumen emulsion by weight must be laid to ensure a structural base layer.

**For road H-10:**

1. The base is made of a milled organo-mineral mixture reinforced with a combined binder (cement and bitumen emulsion) M-20 in accordance with the requirements of VBN V.2.3-218-545:2009 – 22 cm. It is recommended to mill the existing road surface to a depth of 10-12 cm. Add new stone material in an amount of up to 50%. The composition of the combined binder should be on average: cement 3.2-3.6% by weight and bitumen emulsion 2.0-1.8% by weight.
2. Dense fine-grained asphalt concrete type A - 6 cm.
3. SMA-15 in accordance with DSTU B V.2.7-127:2006 - 4 cm.

**For road P-24:**

1. The base is made of a milled organo-mineral mixture reinforced with a combined binder (cement and bitumen emulsion) M-20 in accordance with the requirements of VBN V.2.3-218-545:2009 – 20 cm. It is recommended to mill the existing road surface to a depth of 10-12 cm. Add new stone material in an amount of up to 50%. The composition of the combined binder should be on average: cement 3.2-3.6% by weight and bitumen emulsion 2.0-1.8% by weight.

2. Dense fine-grained asphalt concrete type B – 5 cm.

In the case of phased construction of the road surface of the R-24 motorway (1st stage base, 2nd stage asphalt concrete), the layer constructed using cold recycling technology must be covered with a thin-layer coating: double surface treatment, Slarysil, Multimac.

These technologies must be used along the entire length of the relevant motorways without exception, except for sections that are still under warranty.

## 5.4. Project documentation

In total, within the documents reviewed by verifiers for 16 road repair projects in the Carpathian region, project documentation is available for 14 projects (in all regions, except Lviv). According to clause 6.1. GBN G.1-218-182:2011

"Organisational, methodological, economic and technical standards. Repair of public roads. Types and list of works" states that routine medium repairs are carried out in accordance with the design and estimate or estimate documentation, which is compiled on the basis of a defect report or engineering survey or inspection materials and approved by the customer.

In accordance with Resolution No. 1221 of the Cabinet of Ministers of Ukraine dated 06.08.2003 "Some issues of road complex management," the decision to prepare design and estimate or estimate documentation is made by the customer depending on the complexity of the object. **The Lviv Regional Road Administration did not develop the design documentation,**

but defect reports and cost estimate documentation (not properly executed) were drawn up. Additional work volumes that arose during the construction process can be found in Tables 1.8 and 1.10 of Section 5.6 of this report.

As for the developed projects for the current medium repair of motorways in the Carpathian Euroregion, these projects are only cost indicators for the repair project with an indication of the physical scope of work. A project is a document that contains quantitative and qualitative indicators of the repair project for the purpose of further control. The quantitative indicators for the object of current medium repair are evenness and skid resistance, as well as the thickness of the top layer of the pavement. The latter indicator is regulated by repair projects and can serve as an indicator of quality control and project compliance, while evenness and skid resistance are measured and checked for compliance with DSTU. It is impossible to predict changes in these parameters at the design stage. Accordingly, **the main criterion for this type of repair is not designed in principle**, since there are no appropriate methods and criteria for their assessment depending on the "levelling" of one or another structure of road pavement layers.

Thus, by deciding to carry out routine medium repairs instead of major repairs, customers avoid a lengthy (years instead of months) procedure of preparing design and permit documentation and performing a full range of works to restore the consumer qualities of the road — a set of indicators that directly reflect the interest of road users in the quality of services, namely: safety, speed, continuity, and comfort of road traffic; road capacity, in particular the ability to pass cars and road trains with permitted axle loads, total weight, and dimensions; the ecological and aesthetic condition of the road; the level of service and information provision. In turn, such a substitution of concepts regarding types of repairs is possible due to **the absence of requirements for repair criteria in GBN G.1-218-182:2011** "Repair of public roads. Types of repairs and list of works", where the list and types of works for routine medium repairs practically coincide with the list and types of works for major repairs.

## 5.5. Subcontractors

To clarify the issue of the cost of work performed under the project by subcontractors, verifiers sent emails to the responsible persons at the State Agency of Motorways on 17 and 20 October requesting information. The Transcarpathian SAD replied that no subcontractors were involved, while the Chernivtsi SAD informed by telephone that it had no information about subcontractors under the contract agreements, although the specified information about the presence of subcontractors was included in the report of the procurement organisation and clause 6.3.4. of the contract stipulates that the contractor is obliged to inform the customer about the conclusion of contracts with subcontractors. The Ivano-Frankivsk Regional State Administration also did not respond to the request.

For reference: Part 3 of the General Conditions for the Conclusion and Performance of Contract Agreements in Capital Construction stipulates that *a subcontractor is a contractor who, in accordance with the procedure specified in the contract agreement and on the basis of a subcontract agreement concluded with the general contractor, is involved in the performance of work*. Part 30 provides that *the contractor has the right to engage third parties (subcontractors) to perform the contract with the consent of the customer*. Part 2 of Article 319 of the Commercial Code of Ukraine provides as follows: *The contractor has the right, with the consent of the customer, to involve third parties (subcontractors) in the performance of the contract, on the terms of subcontracts concluded with them, being responsible to the customer for the results of their work*.

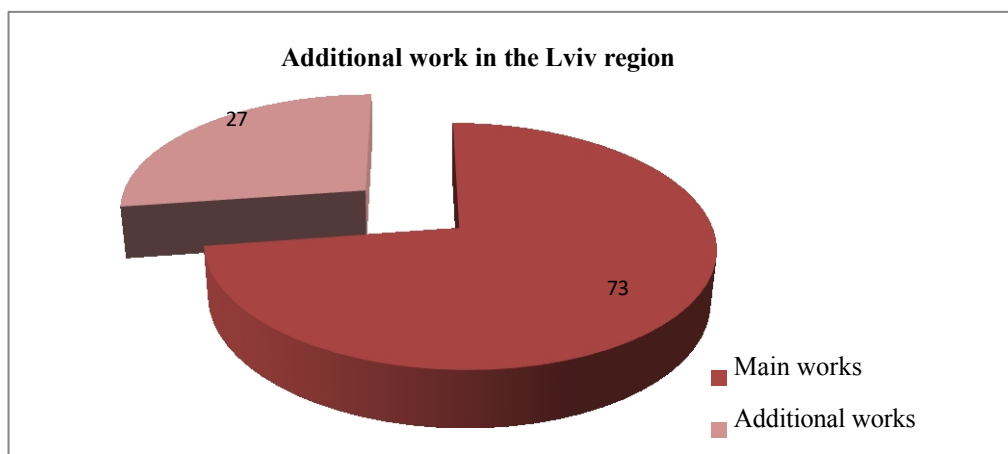
According to the verifiers, during the performance of works on the current medium repair of the public motorway of national importance H-09 Mukachevo – Rakhiv – Bohorodchany – Ivano-Frankivsk – Rohatyn – Bibrka – Lviv on the section km 395+600 – km 436+433 in 2015, out of the total amount of work performed in the amount of UAH 169,639,948.40 (as of 10 November 2015), the following was performed:

- PBS LLC (general contractor) – 36,169,171.20 hryvnias;
- Avtomagistral-Pivden LLC (subcontractor) – 93,724,544.00 hryvnias;
- Technobud LLC (subcontractor) – UAH 39,746,233.20.

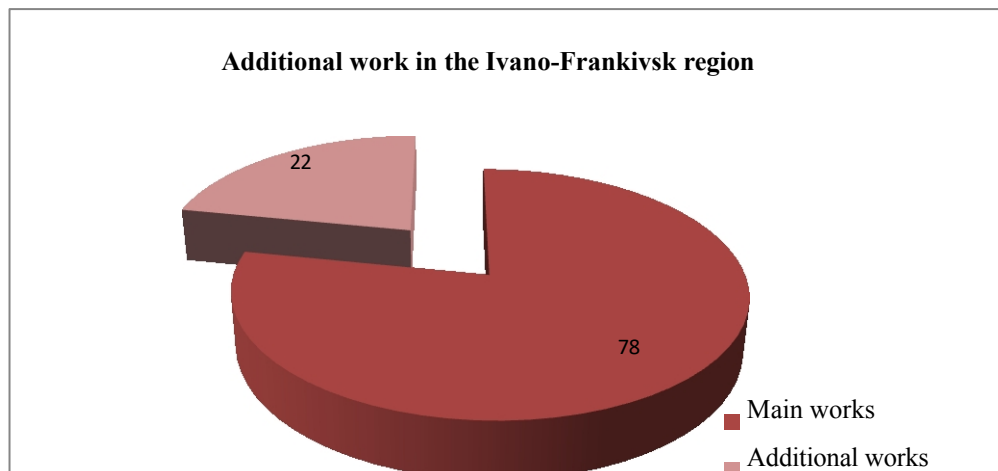
Thus, **the general contractor actually performed only 21% of the total volume of work**, which can be considered a distortion of the tender results.

#### 5.6. Additional work and the cost of 1 km of current average repair work

The Lviv and Ivano-Frankivsk regions are indicative of the occurrence of additional work. Thus, in June, the Lviv Regional Road Administration concludes contracts for the repair of the H-09 motorway between km 395+660 and km 436+433, km 436+433 - km 439+433, and already in September there is a need to perform additional volumes not provided for in the main contracts. The share of additional volumes averaged 27%.



In the Ivano-Frankivsk region, the average share of additional works in the cost of main works was 22%.



For certain procurement procedures, the share of additional works exceeded 40% (Tables 1.8 and 1.10 below):

- in Lviv region, repair of the H-09 motorway, km 395+660 - km 436+433, using cold recycling technology – 41%;
- in Ivano-Frankivsk region, repair of the H-10 motorway between km 34+892 and km 41+123 – 47%.

Unlike the Lviv Regional Road Administration, the Ivano-Frankivsk Regional Road Administration procured additional works through a negotiated (non-competitive) procedure, citing a clause in the law on procurement that applies to the procurement of works, whereas routine maintenance is a service within the meaning of the law on procurement. In other words, the clause of the law was applied incorrectly.

's justification for the negotiated procedure cites letters from the State Road Research Institute

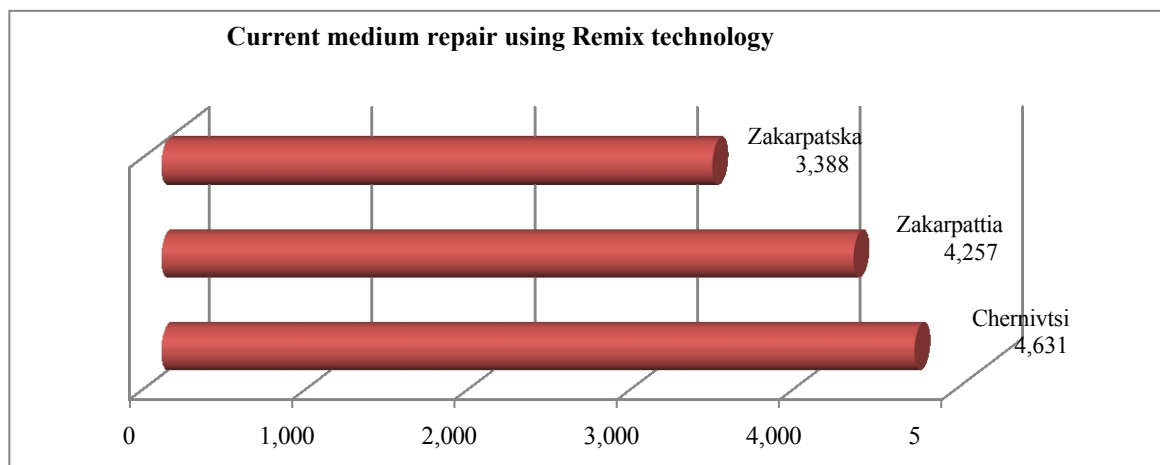
"DerzhdorNDI" and design organisations with the following conclusions: *"survey work was carried out in April 2015, and the condition of the road surface at the time of the work differed significantly from that at the time of preparation of the documentation. Heavy traffic, hot summer weather and heavy rainfall led to damage to the road surface, erosion and unevenness on the roadside, and erosion of the roadbed embankment. The contractor additionally inspected the road base and found that it did not meet the regulatory physical and technical parameters for ensuring the quality, durability and relevant transport and operational performance of the road surface. These types of additional work could not have been foreseen at the stage of preparing the working design."* These conclusions are identical for all five objects of the current medium repair of motorways:

- H-10 Stryi – Chernivtsi – Mamalyga km 34+892 – km 41+123;
- H-09 Mukachevo – Lviv on sections km 318+925 – km 341+700, km 349+123 – km 393+660;
- H-10 Stryi – Mamalyga on sections km 27+292 – km 34+892, km 49+050 – km 53+824, km 57+650 – km 64+300;
- R-24 Tatariv – Kamianets-Podilskyi on sections km 19+420 – km 41+000, km 48+000 – km 69+629, km 78+200 – km 94+450;
- R-24 Tatariv – Kamianets-Podilskyi on the section km 5+050 – km 10+450.

The cost of routine medium repairs **per kilometre of road** (for the same carriageway width) is shown below, broken down by region, highlighting the specific technologies used and taking into account **additional work**.

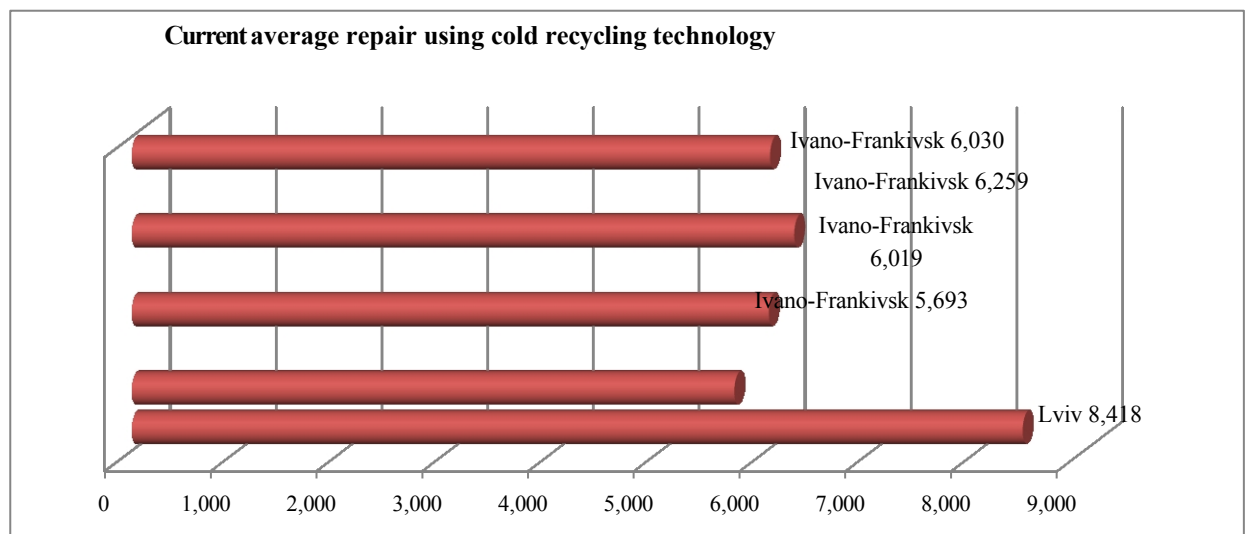
**Table 1.7 – Current medium repair using Remix technology**

| Region                                                                                                                           | Contract cost, thousand UAH | km | Cost per 1 km, thousand UAH |
|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------|----|-----------------------------|
| <b>Chernivtsi</b>                                                                                                                |                             |    |                             |
| H-10 km 206+402 – km 208+635, km 222+509 – km 225+830, km 226+053 – km 231+177                                                   | 50,946                      | 11 | 4,631                       |
| <b>Transcarpathian</b>                                                                                                           |                             |    |                             |
| Highway H-09 km 4+000 – km 5+000, km 22+200 – km 23+700, km 97+700 – km 98+700, km 109+000 – km 109+500, km 168+200 – km 169+000 | 20,432                      | 4  | 4                           |
| Highway H-09 km 60+900 – km 62+400 and km 71+300 – km 73+080                                                                     | 10,165                      | 3  | 3                           |



*Table 1.8 – Current average repair using cold recycling technology*

| Region                                                                           | Contract price, thousand UAH | Additional work, thousand UAH | Road construction | km | Cost per 1 km initial, thousand UAH | Cost per 1 km additional work, thousand UAH |
|----------------------------------------------------------------------------------|------------------------------|-------------------------------|-------------------|----|-------------------------------------|---------------------------------------------|
| <b>Lviv</b>                                                                      |                              |                               |                   |    |                                     |                                             |
| H-09 km 395+660 - km 436+433                                                     | 244                          | 100                           | 41                | 41 | 5,970                               | 8,418                                       |
| <b>Ivano-Frankivsk</b>                                                           |                              |                               |                   |    |                                     |                                             |
| H-09 motorway km 346+123 - km 349+123                                            | 17                           |                               |                   | 3  | 5,693                               | 5,693                                       |
| Highway H-09 km 393+660 - km 395+660                                             | 12,037                       |                               |                   | 2  | 6,019                               | 6                                           |
| Highway H-09 km 318+925 - km 341+700, km 349+123 - km 393+660                    | 325,966                      | 93,379                        | 29                | 67 | 4,865                               | 6,259                                       |
| Highway H-10 km 27+292 - km 34+892, km 49+050 - km 53+824, km 57+650 - km 64+300 | 92,976                       | 21,602                        | 23                | 19 | 4,893                               | 6,030                                       |



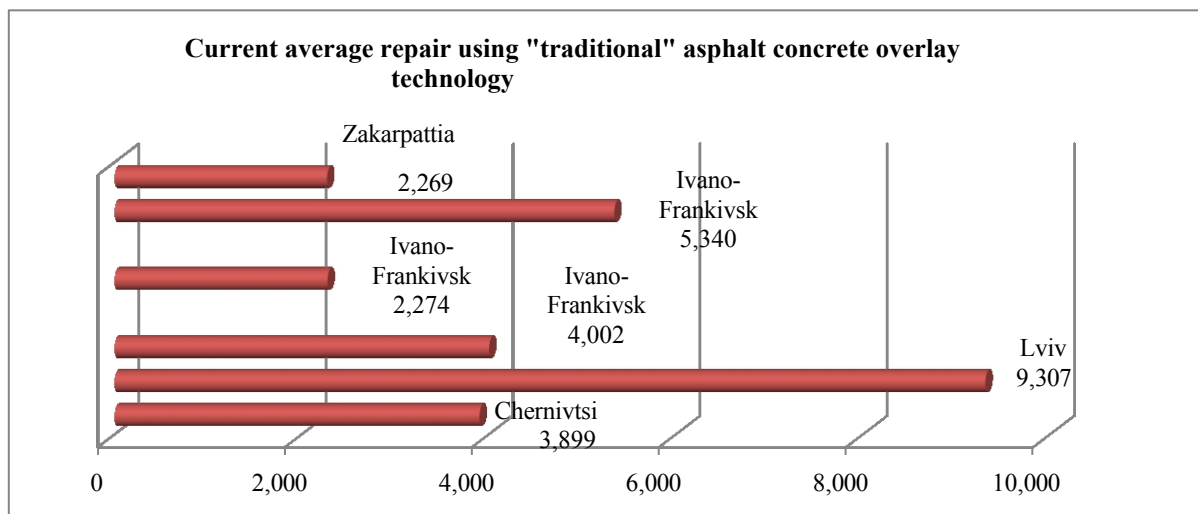
The diagram clearly shows a difference of almost 40% in the cost of 1 km of current average repairs in the Lviv region compared to the cost of work in the Ivano-Frankivsk region, despite the fact that the same technologies were used in both regions and the work was performed by the same contractor, PBS LLC. In other words, the price indicators (costs) of the contractor for both repair sites on the H-09 motorway at km 318+925 - km 341+700, km 349+123 - km 393+660 (Ivano-Frankivsk region) and at km 395+660 - km 436+433 (Lviv region) should be the same. The difference in cost can be partly explained by the thickness of the regeneration layer: 18 cm in Ivano-Frankivsk region and 22 cm in Lviv region; the percentage of combined binder used (described in section 5.3 of this report); also, not the entire area of the H-09 motorway km 318+925 - km 341+700, km 349+123 - km 393+660 within the Ivano-Frankivsk region was repaired using the "cold recycling" technology. Thus, the cost of repairing 1 m<sup>2</sup> of pavement in the Ivano-Frankivsk and Lviv regions was as follows (see below):

**Table 1.9 – Cost of repairing 1 m<sup>2</sup> of pavement**

| Region          | Section of motorway                                           | Cost of work under contracts, thousand UAH | Repair work performed, m <sup>2</sup> | Including cold recycling technology, m <sup>2</sup> | Cost of repair of 1 m <sup>(2)</sup> of pavement, thousand UAH |
|-----------------|---------------------------------------------------------------|--------------------------------------------|---------------------------------------|-----------------------------------------------------|----------------------------------------------------------------|
| Ivano-Frankivsk | Highway H-09 km 318+925 - km 341+700, km 349+123 - km 393+660 | 419345                                     | 640 524                               | 334,238                                             | 0.655                                                          |
| Lviv            | Highway H-09 km 395+660 - km 436+433                          | 345125                                     | 304,800                               | 304,800                                             | 1                                                              |

**Table 1.10** – Cost of routine medium repair of pavement using "traditional" asphalt concrete overlay technology

| Region                                                                           | Cost under the contract, thousand UAH | Additional work, thousand UAH | Cost increase | km | Initial cost per 1 km, thousand UAH | Cost per 1 km, including additional work, thousand UAH |
|----------------------------------------------------------------------------------|---------------------------------------|-------------------------------|---------------|----|-------------------------------------|--------------------------------------------------------|
| <b>Chernivtsi</b>                                                                |                                       |                               |               |    |                                     |                                                        |
| Highway H-10 km 208+635 – km 222+509, km 225+830 – km 226+053                    | 58,492                                |                               |               | 15 | 3,899                               | 3,899                                                  |
| <b>Lviv</b>                                                                      |                                       |                               |               |    |                                     |                                                        |
| H-09 motorway km km 436+433 - km 439+433                                         | 26                                    | 1,549                         | 6             | 3  | 8,791                               | 9,307                                                  |
| <b>Ivano-Frankivsk</b>                                                           |                                       |                               |               |    |                                     |                                                        |
| H-10 motorway km 34+892 – km 41+123                                              | 16,310                                | 7,702                         | 47            | 6  | 2,718                               | 4,002                                                  |
| Highway R-24 km 19+420 - km 41+000, km 48+000 - km 69+629, km 78+200 - km 94+450 | 105,188                               | 28,996                        | 28            | 59 | 1,783                               | 2,274                                                  |
| R-24 motorway km 5+050 - km 10+450                                               | 18,725                                | 7,977                         | 43            | 5  | 3,745                               | 5,340                                                  |
| <b>Transcarpathian</b>                                                           |                                       |                               |               |    |                                     |                                                        |
| Highway H-09 km 16+000 – km 17+000 and km 37+500 – km 38+200                     | 4,537                                 |                               |               | 2  | 2,269                               | 2,269                                                  |



As we can see from the diagram, even with traditional technology, the cost of work is highest in the Lviv region. It is almost twice as high as the cost of projects in

neighbouring regions. Therefore, Ukravtodor should pay special attention to this discrepancy and take all possible measures to prevent similar incidents in the future.

## 6. CONCLUSIONS

**6.1.** The Law "On the State Budget of Ukraine for 2015" was adopted on 28 December 2014. Resolution No. 323 of the Cabinet of Ministers of Ukraine on the distribution of funds by area was adopted on 25 May 2015. The work actually began in July-August. This means that six months are currently needed to coordinate and approve financial programmes and plans, which means that most of the warm construction season is lost. This situation repeats itself every year, when construction work is carried out in autumn and winter under unfavourable weather conditions, which increases the risk of reducing the durability, reliability of repair measures and the effectiveness of financial investments.

**6.2.** The main criterion for the implementation of budgetary road repair programmes, in particular the budgetary programme "Development of the road network in the regions of the Ukrainian part of the Carpathian Euroregion", is the amount of funds used, rather than the maximum amount of road network sections repaired with an optimal budget. Since there is no procedure for assessing the effectiveness of the use of public funds for current medium-term road repairs and no relevant methodologies have been developed, it is impossible to assess whether the repair budget is optimal or not. Only time will tell whether the costs listed in this report were justified, based on how long the repaired road sections will last. In any case, the type of repair used in this budget programme (current medium repair) is practically identical in composition and content to major road repairs. At the same time, the durability (inter-repair service life) of such repairs, depending on the technical category of the roads and the intensity of traffic, should be from 4 to 6 years, while with major repairs it should be twice as long.

**6.3.** Additional work usually arises due to numerous errors in the development of project documentation, survey and geodetic work, which, in turn, are closely related to insufficient funding for these works. We believe that with a different approach and careful planning, the volume of these unforeseen works should not exceed 10% of the cost of the main works. In fact, they reach up to 30-40 %, which is unacceptable. An additional factor contributing to such work is the duration of the tender process, which is two months. In our opinion, the deadlines should be reviewed and shortened as much as possible (the deadline for preparing tender proposals, which is 30 calendar days, is unreasonably long).

**6.4.** The projects implemented under this programme focus heavily on repairing road surfaces and foundations, with very little attention and funding devoted to measures to ensure traffic comfort and safety. Roadside reinforcement, markings, intersections and junctions leave much to be desired. This situation is also a consequence of the use of a simplified repair procedure, where, due to the complexity and duration of major road repairs, the most important reasons for building and repairing roads – comfort and safety in the transport of passengers and goods – are "simplified".

### **6.5. The feasibility of remixing.**

The cost of the 0.06 m thick "hot remix" pavement in the Chernivtsi region was 240 UAH/m<sup>2</sup>. The pavement laid using this technology was covered with a cast emulsion-mineral mixture, which costs an additional 110 UAH per 1 m<sup>2</sup>. As a result, we get 350 UAH/m<sup>2</sup>. It should be added that in the Chernivtsi region, the amount of new material added to the regenerated material was 50-75 kg/m<sup>2</sup>, and in the Zakarpattia region – 75 kg/m<sup>2</sup>, which is more than 50% of the total amount of

material used (6 cm of coating = 145 kg of asphalt concrete mixture). According to the requirements of TTK 37641918/03450778-174:2014, the selection and quantity of materials added to the regenerated mixture are determined on the basis of laboratory tests of cores. This information was not provided to the verifiers, nor was any justification for the use of this technology provided. This technology has one significant advantage: it is resource-saving and has a relatively low cost, as the material is reused and there are no associated transport costs, etc. However, judging by the above, there is no economic effect. According to scientists, adding 15-20% of new material to the regenerated mixture is quite sufficient.

This may indicate an inadequate choice of technology used in the repair, insufficiently detailed economic analysis when selecting the technology and approving the decision by the customer's technical services and, as a result, a significant overspending of budget funds in the absence of an appropriate technical and economic justification for the use of this technology.

In addition, it should be noted that in both regions where this pavement construction technology was used, the contracts were awarded to SAT Ukraine LLC, whose only competitor in the tender was Avtomagistral-Pivden LLC, all of whose equipment is leased, with only one Wirtgen HM 4500 asphalt concrete paver available (clause 6.2 of TTK 37641918/03450778-174:2014 provides for the need to perform work using two such installations – Appendix No. 9 to this report, information on the availability of equipment and material and technical resources of Avtomagistral-Pivden LLC – Appendix No. 10). Therefore, it can be concluded that there is no real alternative on the market for Remix paving works, as only one construction company performs such works. At the same time, open tenders are, unfortunately, not a realistic process for competitive selection of participants.

## 7. RECOMMENDATIONS

**7.1.** Review the legislation in terms of simplifying the permitting documentation for the design, construction and commissioning of roads after major repairs, which will allow for measures to improve the consumer qualities of the road to be carried out comprehensively, rather than partially. In particular, review the classification of works for the repair and maintenance of public roads, taking into account European experience. We propose that the future version of the classification of road repair works provide for a clear distinction between routine and major repairs and introduce restrictions on the types and scope of works to prevent the assignment of routine repair works when there is a real need for major repairs.

**7.2.** Improve standards for the design of routine medium road repairs by developing standard designs for pavement and base repairs that would make it impossible to manipulate costs. In projects for routine medium repairs, it is mandatory to ensure, by all possible means, the implementation of priority measures to ensure traffic safety.

**7.3.** When deciding on the use of a particular technology (design), take into account the opinions and analytical data of scientists and experts. Recommend that Ukravtodor, in the event of appeals from members of the Ukrainian parliament regarding violations of work execution technology, if this data is confirmed by scientists and leading institutes (DerzhdorNDI), as in this case, submit final decisions on the use of a particular technology to the Technical Council of Ukravtodor for consideration.

**7.4.** Introduce restrictions on the involvement of subcontractors in the amount of 20% of the total volume of contract works or, if there is a corresponding justification for the need to purchase complex works, up to 30% (in the Lviv region, subcontracted works reach about 80%).

**7.5.** Personal responsibility of the top managers of the project organisation and the customer's service should be provided for in the event of additional work, the cost of which exceeds 30% of the total.

**7.6.** In order to ensure the timely commencement of road construction works within the construction season and the timely preparation of project documentation for repair projects, we propose to significantly shorten the Government's decision-making procedure (no later than October of the year preceding the year in which the repair measures are planned to be carried out) on the distribution of funds by object or to restore Ukravtodor's right to approve lists of objects and the amounts of their financing from the budget programme and to introduce responsibility for the late adoption of such decisions.

## APPENDICES

### Appendix No. 1

Report on visit to construction site  
(provided in electronic form, [www.costukraine.org](http://www.costukraine.org)).

### Appendix No. 2

Summary information on procurement procedures carried out (provided in  
electronic form, [www.costukraine.org](http://www.costukraine.org)).



PEOPLE'S DEPUTY OF UKRAINE SHEVCHENKO  
OLEKSANDR LEONIDOVYCH  
01008, Kyiv, 5 Hrushevsky Street

15 June 2015  
No.

Head of the Road Service in Ivano-Frankivsk Region  
Mr. Protsiv M.M.  
Ivano-Frankivsk, 1 Petrushevycha Street 76018

**DEPUTY'S APPEAL**  
**in accordance with Article 16 of the Law of Ukraine "On the Status of People's Deputies of Ukraine"**

**Dear Mykola Mykolayovych!**

The Tender Committee of the Road Service in Ivano-Frankivsk Region recently held an open tender for the procurement of works for the current repair of the H-09 Mukachevo-Lviv state highway for the following lots:

- 1) lot 1 - routine maintenance of the H-09 Mukachevo-Lviv national highway between km 346+123 and km 349+123
- 2) lot 2 - routine maintenance of the H-09 Mukachevo-Lviv national highway between km 393+660 and km 395+660.

Due to the great importance of road construction and repair projects carried out with public funds and the attention of the Ivano-Frankivsk community to such projects, the documentation for these tenders was analysed with the involvement of scientists

. After studying the documentation, reasonable doubts arose regarding the existence of shortcomings in the technology used to repair the above-mentioned road, to which I would like to draw your attention, namely:

1. The tender documentation does not specify the amount of bitumen in the bitumen emulsion for regeneration. Accordingly, tender participants may have formed their tender proposals based on bitumen emulsions of varying composition. The bitumen content in bitumen emulsion can range from 50% to 70%. To perform the type of work specified in the tender, the bitumen content must be at least 65%. Since the tender conditions do not specify the bitumen content in the bitumen emulsion, participants may offer bitumen emulsion of varying quality and, accordingly, price. Accordingly, participants offering higher quality and more expensive bitumen emulsion will be at a disadvantage compared to other participants in the procurement. In addition, the use of cheap bitumen emulsion will weaken the road base and worsen its performance characteristics.

2. The tender documentation provides for a recycling depth of 18 cm, which will cause a problem with the drainage of water released after the decomposition of the bitumen emulsion, since 1.5% by mass of cement will not be sufficient to bind this water, which in turn may lead to poor quality of the work. Recycling of road pavement with the predominant use of bitumen emulsion to obtain a mixture of the required quality and create conditions for the drainage of water released after the emulsion breaks down is carried out to a depth of no more than 12 (15) cm.

3. The installation of a 4 cm thick levelling layer of **porous** asphalt concrete will inevitably lead to rutting after 1-3 years of operation of the pavement. It would be advisable to construct the bottom layer from coarse-grained, necessarily dense asphalt concrete with a thickness of at least 6 cm. Accordingly, the top layer of the pavement should be constructed from fine-grained dense asphalt concrete or SMA.

4. It is not advisable to install a wear layer with surface treatment at the time of construction, since new asphalt concrete has the required coefficient of friction and roughness. It is advisable to apply surface treatment after 3-5 years of pavement operation to increase roughness and cover minor defects (cracks, flaking and spalling of the asphalt concrete pavement).

Similar conclusions to the above were provided by scientific institutions, in particular Lviv Polytechnic National University

Lviv Polytechnic National University in its conclusion based on the analysis of tender documentation for the procurement of works for the current repair of the H-09 Mukachevo-Lviv state motorway on the section km 346+123 - km 349+123 and the section km 393+660 - km 395+660 in the context of road pavement construction, which is attached.

In addition, I would like to note that the H-09 Mukachevo-Lviv motorway on the Ivano-Frankivsk-Lviv section was examined by specialists from the State Road Research Institute to determine the optimal option for current medium repairs. This conclusion was taken into account by the Road Service in the Lviv region, and based on this conclusion, technical specifications for a tender in the Lviv region were formed. The tender was successfully conducted, and on 16 June 2015, work began on repairing the motorway.

In view of the above, given the limited funding for this section of the road and the need for significant reinforcement of the foundation and ensuring durability, it would be most appropriate to apply the following option for carrying out the work:

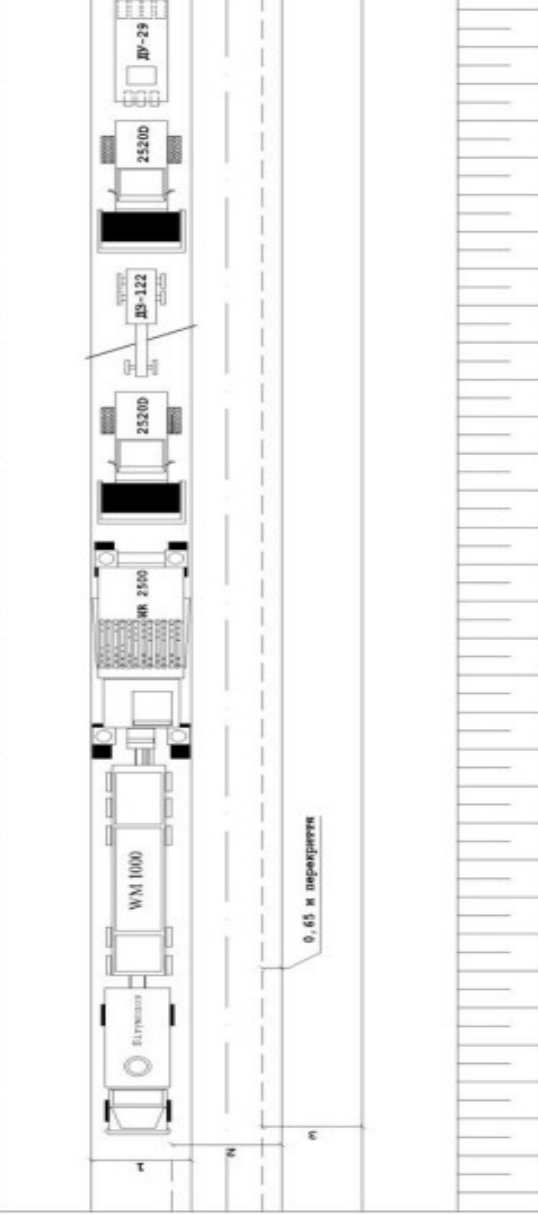
- regeneration to a depth of 22 cm with the addition of new stone material, bitumen emulsion 2% by mass and cement 3.5% by mass;
- lower layer – dense coarse-grained asphalt concrete type B (A) – 6 cm;
- upper layer SMA-15 – 4 cm.

Appendix:

1. Conclusion of Lviv Polytechnic National University based on the results of analysis of tender documentation for the procurement of works for the current repair of the H-09 Mukachevo-Lviv state motorway on the section km 346+123 - km 349+123 and the section km 393+660 - km 395+660 in the context of road pavement construction.
2. "Proposals for the repair of the road surface on the H-09 Mukachevo-Lviv motorway" by the State Enterprise "M.P. Shulgin State Road Research Institute"

Yours sincerely,  
People's Deputy of Ukraine

O. L. Shevchenko

|                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Довжина захватки, м                                                                                              | 520 - 540                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Напрямок потоку                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Номери процесів                                                                                                  | 1 - 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <p>Найменування процесів</p>  | <ol style="list-style-type: none"> <li>1. Приготування та подача цементно-водної суспензії з установки WM 1000 та бітумної емульсії з бітумовоза у ресайклер WR 2500 ;</li> <li>2. Ресайклінг матеріалів машиню WR 2500 ;</li> <li>3. Попереднє уціплення шару фрезерованого матеріалу обробленого цементно-водною суспензією та бітумною емульсією, самохідним вібраційним котком комбінованої дії типу HAMM, масою 9,3 т за два проходи по одному сліду;</li> <li>4. Планування конструктивного шару суміші (на ширину робочого проходу WR 2500) автогрейдером типу ДБ-122 після попереднього уціплення;</li> <li>5. Уціплення самохідним вібраційним котком типу HAMM, масою 10,6 т за чотири проходи по одному сліду;</li> <li>6. Профілювання поперечного профілю проїжджої частини (на повну ширину) автогрейдером типу ДБ-122 під наступне уціплення;</li> <li>7. Остаточне уціплення суміші самохідним котком на пневматичних шинах типу ДВ-29, масою 15-30 т за шість проходів по одному сліду.</li> </ol> |
| Рисунок 1.                                                                                                       | <p>Технологічна схема на регенерацію шару дорожнього одягу товщиною 18 см з застосуванням бітумної емульсії (міст емульсії 3% від маси) та цементно-водної суспензії (міст цементу 1,5% від маси) за технологією "холодний ресайклінг", машиню ресайклер WR 2500 у складі із знішувальною установкою WM 1000 та бітумовозом.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |



**ЗАТВЕРДЖУЮ:**  
Проректор з наукової роботи  
НУ «Львівська політехніка»  
Чухрай Н.І.

11 червня 2015р.

Замовник: ТОВ «ЛБС»

Договір: №223 від 01-04.2015.

### **ЗАКЛЮЧЕННЯ №2**

за результатами аналізу тендерної документації  
по закупівлі робіт з поточного ремонту автомобільної дороги державного  
значення Н-09 Мукачеве-Львів на ділянці км 346+123 - км 349+123 і ділянці  
км 393+660 - км 395+660 в контексті конструкції дорожнього одягу

1. В документації конкурсних торгів не вказана кількість бітуму в бітумній емульсії для реалізації технології холодного ресайклінгу. Вміст бітуму в бітумних емульсіях дорожнього призначення становить 50-70 мас.%. Для вказаного в тендері виду робіт вміст бітуму згідно з вимогами ДСТУ Б В.2.7.-129:2013 повинен бути не менше 60-65 мас.% (ЕКП-60, ЕКП-65, ЕКПМ-60, ЕКПМ-65). Для унеможливлення використання бітумної емульсії ненормативної концентрації, а відтак зниження її ціни, необхідно однозначно обумовити вимоги до бітумної емульсії за критерієм вмісту бітуму.

2. Ресайклінг дорожнього одягу із переважним використанням бітумної емульсії для отримання суміші потрібної якості і створення умов для відведення води, яка вивільниться після розпаду емульсії, здійснюється на глибину не більше 12 (15) см; цементу в кількості 1,5 мас.% буде недостатньо, щоб зв'язати цю воду. Натомість в тендерній документації передбачена глибина ресайклінгу 18 см.

3. Витрата цементу в кількості 1,5 мас.% практично не вплине на підвищення несучої здатності шару, який піддається регенерації, тому рецепт, що передбачає введення 3 мас.% бітумної емульсії і 1,5 мас.% цементу, не є коректним. Для досягнення марки М40 регенованого матеріалу необхідно збільшити кількість цементу.

4. Влаштування вирівнювального шару із пористого асфальтобетону середньою товщиною 4 см обов'язково призведе внаслідок доущільнення в процесі експлуатації до пластичних деформацій в даному шарі, а підтак появи колійності через 1-3 роки експлуатації дороги. Доцільно влаштувати нижній шар із крупнозернистого обов'язково щільного асфальтобетону типу Б(А) товщиною не менше 6 см. Відповідно верхній шар покриття влаштувати із дрібнозернистого щільного асфальтобетону або ЩМА-15.

5. Влаштування шару зносу поверхневою обробкою в момент будівництва є недоцільним, оскільки новий асфальтобетон має необхідну шорсткість і коефіцієнт зчеплення. Влаштування поверхневої обробки доцільно зробити через 3-5 років експлуатації покриття для підвищення шорсткості і, закриття дрібних дефектів (тріщин, шолушіння, викришування).

**Висновок:** виходячи із обмеженого фінансування на дану ділянку дороги, необхідності значного підсилення конструктиву і забезпечення довговічності дорожнього одягу загалом, найбільш доцільним буде наступний варіант дорожнього одягу:

- холодний ресайклінг на глибину 22 см із додаванням нового кам'яного матеріалу, бітумної емульсії 1,8-2,2 мас.% і цементу 3,4-3,8 мас.% (значення конкретних витрат повинні бути встановлені в результаті лабораторного підбору згідно з вимогами тендерної документації);
- нижній шар покриття: щільний крупнозернистий асфальтобетон типу Б (А) товщиною 6-8 см;
- верхній шар ЩМА-15 товщиною 4см.

Завідувач кафедри «Автомобільні шляхи»,  
д.т.н., проф.



Солодкий С.Й.

**Пропозиції щодо ремонту дорожнього одягу на автомобільній дорозі Н-09  
«Львів – Мукачево» на відрізку Львів - Івано-Франківськ .**

Згідно з даними узятими з паспорту автомобільної дороги Н-09 «Львів - Мукачево» , існуюча конструкція дорожнього одягу така :

5 см щільний асфальтобетон,  
8/10 см щебінь з просоченням,  
14-20 см гравійний матеріал,  
20 см – пісок.

Грунт земляного полотна - суглинок.

В 1997 році виконана подвійна поверхнева обробка.

Інструментальне обстеження.

З метою уточнення паспортних даних відібрані керни з дорожнього одягу.

Таблиця 1 - Загальна товщина монолітних матеріалів

| км  | Загальна товщина монолітних матеріалів (керну), см | Товщини шарів монолітних матеріалів                                                                              |
|-----|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| 400 | 9,0                                                | 2,0 см – поверхнева обробка;<br>3,0 см – дрібнозернистий асфальтобетон<br>4,0 см – крупнозернистий асфальтобетон |
| 405 | 10,5                                               | 2,0 см – поверхнева обробка;<br>8,5 см – дрібнозернистий асфальтобетон                                           |
| 410 | 7,0                                                | 1,0 см – поверхнева обробка;<br>6,0 см – дрібнозернистий асфальтобетон ( частина керну не відібралась)           |
| 415 | 8,7                                                | 3,0 см – поверхнева обробка;<br>5,7 см – дрібнозернистий асфальтобетон                                           |
| 420 | 9,5                                                | 3,0 см – поверхнева обробка;<br>6,5 см – дрібнозернистий асфальтобетон                                           |
| 424 | 8,5                                                | 3,0 см – поверхнева обробка;<br>5,5 см – дрібнозернистий асфальтобетон                                           |

Відбір та аналіз кернів показав, що верхній шар асфальтобетону влаштований з кам'яних матеріалу марки не нижче 800, які оброблені в'язким бітумом. З урахуванням результатів обстеження встановлено, що органомісткі шари становлять до 11 см.

Склад потоку та його добова інтенсивність руху у 2014 р. наведені в таблиці 2.

Таблиця 2 - Розрахункова добова інтенсивність руху

| Легкові<br>авт. | Вантажні<br>легкі | Вантажні<br>середні | Вантажні<br>важкі | Автобуси<br>середні | Автобуси<br>важкі | Автопоїзди                |                      |
|-----------------|-------------------|---------------------|-------------------|---------------------|-------------------|---------------------------|----------------------|
|                 |                   |                     |                   |                     |                   | Тягачі з<br>напівпричепом | Тягачі з<br>причепом |
| 14542           | 1724              | 160                 | 411               | 577                 | 28                | 374                       | 50                   |
| <b>Всього</b>   |                   |                     |                   |                     |                   |                           | <b>17866</b>         |

Аналіз складу потоку показав, що ваговий транспорт становить в середньому 3324 авт./добу. Встановлено, що потрібний модуль пружності на поверхні дорожнього одягу повинен становити не нижче 336 МПа.

На даний час модуль пружності на поверхні покриття показав значення 240 – 260 МПа, що не відповідає вимогам до потрібного модуля пружності. Також встановлено, що модуль пружності на шарі основи в середньому становить 150 МПа, що також не відповідає вимогам до потрібного модуля пружності основи.

Також виконаний аналіз коефіцієнту якості ущільнення  $T_f$ , який визначається як відношення середнього модуля пружності  $E_k$  до значення модуля пружності після другого удару:  $T_f = E_k/E_2$ .

В більшості випадків при проведенні вимірювань значення коефіцієнта якості ущільнення  $T_f$  завжди більше 1(одиниці). І чим ближче це значення до 1 (одиниці) 1,01-1,02-1,03 -тим краще. Чим більше значення(1,2-1,3-1,5) - це означає, що матеріал під п'ятою погано ущільнений. Необхідно зважити на те, що при значеннях коефіцієнту якості ущільнення  $T_f$  менше 1 (одиниці) є ознаки, що в 99% випадків в даній точці існує серйозна проблема земляного полотна або дорожнього одягу (наприклад, перезволоження).

Таблиця 3 - Величини коефіцієнту якості ущільнення

| Номер серії | Величина коефіцієнту $T_f$ |
|-------------|----------------------------|
| 65          | 1,00                       |
| 66          | 0,75                       |
| 67          | 1,09                       |
| 68          | 1,19                       |
| 69          | 0,72                       |
| 70          | 0,79                       |
| 71          | 1,29                       |
| 72          | 1,06                       |
| 73          | 0,93                       |
| 74          | 0,76                       |
| 75          | 1,03                       |
| 76          | 1,53                       |
| 77          | 0,78                       |
| 78          | 1,14                       |
| 79          | 1,00                       |

Результати визначення коефіцієнту якості ущільнення ( $T_f$ ) показують, що тільки чотири ділянки з п'ятнадцяти відповідають вимогам до якості ущільнення, що свідчить про надмірні деформації (переміщення) на основі існуючого дорожнього одягу на більшості ділянок автомобільної дороги Н-09 на відрізку Львів – Івано-Франківськ.

Візуальне обстеження показало, що за час експлуатації асфальтобетонне покриття на багатьох ділянках підверглося тріщино

утворенню, в основному зафіксовані тріщини або мережа тріщин від механічної втоми вздовж колієруху важкого транспорту. Це можна пояснити тим, що існуюча основа не витримує фактичного рівня напружень, що передається від вагових транспортних засобів і відповідно цьому, в асфальтобетонному покритті утворюються надмірний рівень напружень, який викликає руйнування у вигляді тріщин та колії.

Враховуючи результати візуального та інструментального обстеження, можна зробити висновок, що в існуючій конструкції відбулась втрата працездатності як покриття, так і основи. Пропонується відновлення міцності основи виконувати за ресурсозберігаючою технологією - холодний ресайклінг.

Досвід показує, що на дорогах державного значення доцільно покриття влаштовувати з двох шарів, де перший шар забезпечує зчеплення колеса із дорожнім одягом, а також повинен бути коліс стійким. Тому, пропонується верхній шар покриття влаштовувати з щебенево-мастикового асфальтобетону згідно з ДСТУ Б В.2.7-127:2006 «Будівельні матеріали. Суміші асфальтобетонні і асфальтобетон щебенево-мастикові. Технічні умови».

Нижній шар покриття забезпечує рівність і міцність. Пропонується влаштовувати з щільного асфальтобетону типу А, згідно з ДСТУ Б В.2.7-119:2011 «Суміші асфальтобетонні і асфальтобетон дорожній та аеродромний. Технічні умови».

Шар основи пропонується влаштовувати за технологією холодного ресайклінгу ВЕН В.2.3.-218-545:2009 «Споруди транспорту. Укріплення та стабілізація шарів дорожнього одягу за методом холодного ресайклінгу».

Враховуючи, що може бути поєднаний ремонт дорожнього одягу, коли поверх основи буде влаштований тільки один шар з асфальтобетону, а відповідно будуть суттєві температурні коливання, що може викликати температурне тріщино утворення. Тому для укріплення органічно-мінеральної

суміші рекомендується використати комбіноване в'язуче (цемент та бітумну емульсію). Відповідно до вимог ВБН В.2.3-218-545:2009 марка матеріалу має бути М-20 з фактичною міцністю у водонасиченому стані близько 3 МПа. Рекомендується фрезерувати існуючий дорожній одяг на глибину 10-12 см. Додавати новий кам'яний матеріал в кількості до 50 %. Склад комбінованого в'язучого повинен становити в середньому:

- цемент 3,2 - 3,6 % за масою,
- бітумна емульсія 2,0 - 1,8 % за масою.

Маса компонентів комбінованого в'язучого уточняється, при виконанні робіт, в залежності від стану і вмісту органічного в'язучого у фрезерованій крихті.

За результатами розрахунку нежорсткого дорожнього одягу згідно з ВБН В.2.3.-218-186-2004. Споруди транспорту . Дорожній одяг нежорсткого типу визначені такі варіанти дорожнього одягу :

#### Варіант 1

- 1 ЩМА- 15 згідно з ДСТУ Б В.2.7-127:2006 - 4 см;
- 2 Щільний дрібнозернистий асфальтобетон типу А - 6 см;
- 3 Основа влаштована з фрезерованої органо – мінеральної суміші укріпленої комбінованим в'язучим (цемент та бітумну емульсію) М-20 відповідно до вимог ВБН В.2.3-218-545:2009 - 22 см.

#### Варіант 2

- 1 ЩМА- 15 згідно з ДСТУ Б В.2.7-127:2006 - 4 см;
- 2 Щільний крупнозернистий асфальтобетон типу А - 8 см;
- 3 Основа влаштована з фрезерованої органо – мінеральної суміші укріпленої комбінованим в'язучим (цемент та бітумну емульсію) М-20 відповідно до вимог ВБН В.2.3-218-545:2009 - 20 см.

*Примітка. На ділянках де висота земляного полотна становить до 1,0 метра, особливу увагу необхідно приділяти водовідводу з існуючої конструкції дорожнього одягу - влаштування поперечного та поздовжнього дренажу.*

Завідувач відділу  
конструкцій дорожнього одягу  
ДП «ДерждорНДІ»

СТ 1

Головко С.К.



ДЕРЖАВНЕ АГЕНТСТВО АВТОМОБІЛЬНИХ ДОРІГ УКРАЇНИ  
(УКРАВТОДОР)  
Державне підприємство  
«Державний дорожній науково-дослідний інститут імені М.П. Шульгіна»  
ДП «ДерждорНДІ»

03113, м. Київ,  
проспект Перемоги, 57  
код ЄДРПОУ 03450778

тел/факс 456-34-15  
e-mail: domauka@post.com.ua  
www.domdi.org.ua

21.07.2015р. № 22.2-2/1-730  
на № 623 від 21.07.2015р.

Народному депутату України  
Шевченко О.Л.

*Шановний Олександрє Леонідовичу!*

На Ваше звернення № 623 від 21.07.2015р., надаю інформацію щодо об'єкту  
«Автомобільна дорога державного значення Н-09 Мукачеве-Львів на ділянці км 346+123 –  
км 349+123».

Під час візуального обстеження 21.07.2015р. на цьому об'єкті було виявлено  
порушення технології холодного ресайклінгу на ділянці в кількисот метрів. Під час  
фрезерування було не дотримано глибини фрезерування, що призвело до перемішування  
перезвоженого глинистого ґрунту з щебеневу-гравійним шаром. Такий матеріал, в якості  
основи, не дає можливість влаштування якісного і стабільного покриття на ньому.

Перший заступник директора  
з наукової роботи  
ДП «ДерждорНДІ»

  
Вирожемський В.К.



Державна служба автомобільних доріг України  
(УКРАВТОДОР)

Служба автомобільних доріг в Івано-Франківській області

76004, м. Івано-Франківськ, вул. Петрушевича, 1

тел. (0342) 72-22-00  
факс (0342) 72-22-28  
e-mail: sadif@com.if.ua

07.08.15р № 04-10/869

на №530 від 15 червня 2015 р.

Народному депутату України  
Шевченку О.Л.

Служба автомобільних доріг в Івано-Франківській області розглянула  
Ваше звернення і надає відповідь.

1. Стосовно вмісту бітуму у емульсії для регенерації.

Згідно використаної в документації конкурсних торгів на послуги з поточного ремонту автомобільної дороги державного значення Н-09 Мукачеве – Львів на ділянці км 346+123 – км 349+123 та на ділянці км 393+660 – км 349+123 кошторисній нормі ДА 2-33-3 "Регенерація конструктивних шарів дорожнього одягу на глибину 18 см з застосуванням бітумної емульсії (вміст емульсії 3 % від маси) та цементно-водяної суспензії (вміст цементу 1,2 % від маси) за допомогою машини Ресайклер WR 2500 у складі зі змішувальною установкою WM 1000 та бітумовозом" враховані вимоги до матеріалів, у тому числі до бітумної емульсії. Згідно технологічної карти ТК 218-03449261-026-2003 WR2500(8) , яка розроблена для вищезгаданої розцінки ДА 2-33-3 , використовується емульсія марки ЕБК з вмістом бітуму 60-62 %.

2. Щодо води, яка вивільниться після розпаду бітумної емульсії. Регламент робіт за технологією «холодний ресайклінг», згідно технологічної карти ТК 218-03449261-026-2003 WR2500(8) передбачає пункт про обов'язковий регулярний операційний контроль, зокрема «взяття проб для визначення вологості». Крім того, у тому ж джерелі вказано, що для попереднього та остаточного ущільнення товщі регенованого шару повинна бути зволожена та залишатися такою до моменту закінчення ущільнення.

3. Відносно використання пористого асфальтобетону у конструкції дорожнього одягу.

В документації конкурсних торгів на послуги з поточного ремонту автомобільної дороги державного значення Н-09 Мукачеве – Львів на ділянці км 346+123 – км 349+123 та на ділянці км 393+660 – км 349+123 враховані

роботи, що відповідають ГБН Г.1-218-182:2011 "Ремонт автомобільних доріг загального користування. Види ремонтів та перелік робіт". Технологія ремонту дорожнього одягу обговорювалась з провідними спеціалістами Івано-Франківського ВКП інституту ДП "Укрдінпродор". Кошторисна норма ДА 2-33-3 "Регенерація конструктивних шарів дорожнього одягу на глибину 18 см з застосуванням бітумної емульсії (вміст емульсії 3 % від маси) та цементно-водяної суспензії (вміст цементу 1,5 % від маси) за допомогою машини Ресайклер WR 2500 у складі зі змішувальною установкою WM 1000 та бітумовозом" затверджена у складі СОУ 45.2-00018112-035:2010 "Ресурсні елементні кошторисні норми на ремонтно-будівельні роботи. Автомобільні дороги та мости) Укравтодором, наказ № 482 від 23 грудня 2010 р., та погоджена Мінрегіонбудом, лист № 21-10/3334/0/6-10 від 14 грудня 2010р". Дана технологія ремонту дорожнього одягу була узгоджена на Технічній раді Укравтодору для застосування на автомобільній дорозі Мукачеве – Львів на ділянці Івано-Франківськ – границя Івано-Франківської області.

#### 4. Стосовно доцільності влаштування поверхневої обробки.

У ДБН В.2.3-4:2007 «Автомобільні дороги» вказано, що «шари зносу та захисні шари дорожнього одягу потрібно влаштовувати на дорогах усіх категорій з метою підвищення шорсткості поверхні покриття та його водонепроникнення, а також для попередження руйнування основного шару покриття». Крім того, при умові влаштування поверхневої обробки по свіжовкладеному покриттю відпадає необхідність у підґрунтовці рідким бітумом у кількості 0,3-0,5 л/м<sup>2</sup>, чим здешевлюється вартість дорожніх робіт.

Щодо запропонованого Вами варіанту конструкції дорожнього одягу. В «Рекомендації з проектування та влаштування шарів з сумішей холодних дорожніх ... за методом холодного ресайклінгу» (РВ.2.3-218-03450778-768:2010) зазначено, що «додавання більшої кількості мінерального в'язучого (цементу) для підвищення міцності може негативно вплинути на характеристики шару. Матеріал, оброблений мінеральним в'язучим, стає відносно крихким. Це незмінно веде до швидкого зростання тріщин від дії транспортних засобів і до температурних тріщин, що завжди небажані.»

З повагою  
Перший заступник начальника



Л. Семанів

## Appendix No. 9:

Proposals of the State Road Research Institute regarding the repair of public roads in the Kaprat Euro-region within the Ivano-Frankivsk region (provided in electronic form, [www.costukraine.org](http://www.costukraine.org)).

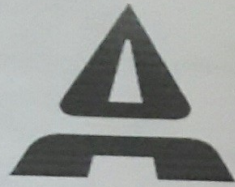
## Appendix No. 10

Extract from the TYPICAL TECHNOLOGICAL CARD for the performance of work on restoration worn layers asphalt concrete covering using using "hot recycling" on the road using the "Remix" method TTK 37641918/03450778-174:2014:

"6. NEED FOR MATERIAL AND TECHNICAL RESOURCES

6.2 Need for machines is determined from the optimal load when performing work by a complex mechanised brigade:

- Wirtgen RP\RC 4500 remixer for hot recycling of structural layers of road pavement - 1 unit;
- **Wirtgen HM 4500 thermal plant for heating asphalt concrete pavement - 2 units;**
- BOMAG 164 AC-2 self-propelled vibratory road roller with combined action, weight 9.7 t - 1 unit;
- HAMM HD 90 self-propelled smooth roller, weight 9.3 t - 1 unit;
- watering and washing machine, capacity 6000 l - 1 pc.;
- autohydrogenerator, capacity 3500 l - 1 pc.



**ТОВАРИСТВО З ОБМЕЖЕНОЮ ВІДПОВІДАЛЬНІСТЮ  
„АВТОМАГІСТРАЛЬ-ПІВДЕНЬ”**

65058, Україна, м. Одеса, вул. Романа Кармена, 21  
тел.: + 38 (048) 728-95-84; факс: + 38 (048) 728-95-83  
www. automagistral.com.ua; 7289583@mail.ru

р/р 26002312237001 в АБ «Південний»  
МФО 328209; ЄДРПОУ 34252469

Вих. № 1806/15-03 від « 18 » червня 2015р.

м.Одеса

Комітету з конкурсних торгів  
Служби автомобільних доріг у Чернівецькій області  
Державного агентства автомобільних доріг України

**НАЯВНІСТЬ ОБЛАДНАННЯ ТА МАТЕРІАЛЬНО-ТЕХНІЧНОЇ БАЗИ**

| № п/п | Найменування обладнання (інструментів, устаткування, приладів) та матеріально-технічної бази (машин, механізмів, техніки) | Країна виробник, марка та строк експлуатації (роки) | Стан (нове (а), справне (а), несправне (а) обладнання (інструменти, устаткування, прилади) та матеріально-технічної бази (машин, механізмів, техніки), а також наявна кількість (шт.) | Власне (власна), орендується чи лізинг (фінансовий/оперативний) обладнання (інструменти, устаткування, прилади) та матеріально-технічна база (машини, механізми, техніка) | Місце дислокації                                                                                                |
|-------|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| 1     | 2                                                                                                                         | 3                                                   | 4                                                                                                                                                                                     | 5                                                                                                                                                                         | 6                                                                                                               |
| 1.    | Автогрейдери середні                                                                                                      | Китай, PY 190 Zoomlion, 5р.; США, NH -106.6, 7 р.   | Справна, 2 шт.                                                                                                                                                                        | Орендовані (ТОВ «Белогві»), Орендовані (ТОВ «Шляховик97»)                                                                                                                 | 65058, г. Одеса вул. Романа Кармена, 21 67661, Одеська обл. Біляївський район с. Нерубайське, вул. Пастера 29-Б |
| 2.    | Автогудронатори на базі Scania, місткість 15м3                                                                            | Туреччина, Tekfalt Makina, 10р., 11р.               | Справна, 3 шт.                                                                                                                                                                        | Орендовані (ТОВ «Белогві»)                                                                                                                                                | 65058, г. Одеса вул. Романа Кармена, 21                                                                         |
| 3.    | Котки дорожні самохідні з гладкими вальцями, масою 10,6 т                                                                 | Німеччина, Намм 110, 7 р., 8р.                      | Справна, 1 шт. Справна, 1 шт.                                                                                                                                                         | Орендовані (ТОВ «Белогві»)                                                                                                                                                | 65058, г. Одеса вул. Романа Кармена, 21                                                                         |
| 4.    | Котки дорожні самохідні з гладкими вальцями, масою 9,2 т                                                                  | Німеччина, Намм 90, 7 р., 9р.                       | Справна, 2 шт. Справна, 1 шт.                                                                                                                                                         | Орендовані (ТОВ «Белогві»), Орендовані (ТОВ «Шляховик97»)                                                                                                                 | 65058, г. Одеса вул. Романа Кармена, 21 67661, Одеська обл. Біляївський район с. Нерубайське, вул. Пастера 29-Б |

ДИРЕКТОР

М.С. ТИМОФЕЄВ



| 1   | 2                                                                                                | 3                                      |                                  |                                                                  |                                                                                         |
|-----|--------------------------------------------------------------------------------------------------|----------------------------------------|----------------------------------|------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 5.  | Коток самохідний, маса 2,2 т                                                                     | Німеччина, Bomag, BW 20AD, 9 р.        | Справна, 1 шт.                   | Орендовані (ТОВ «Белогві»)                                       | 65058, г. Одеса, вул. Романа Кармена, 21                                                |
| 6.  | Машина поливально-мийна, місткість 6000 л                                                        | Росія, ЗИЛ, 24 р;<br>Росія, ЗИЛ, 11 р; | Справна, 1 шт.<br>Справна, 1 шт. | Орендовані (ТОВ «Автомагістраль»),<br>Орендовані (ТОВ «Белогві») | 54001, м. Миколаїв, вул. Карла Лібкнехта, 7<br>65058, г. Одеса, вул. Романа Кармена, 21 |
| 7.  | Навантажувач однокіштовий універсальний                                                          | США, Case, 5р.                         | Справна, 1 шт.                   | Орендовані (ТОВ «Автомагістраль»)                                | 54001, м. Миколаїв, вул. Карла Лібкнехта, 7                                             |
| 8.  | Автобуси                                                                                         | Росія, ПАЗ, 4р.<br>ПАЗ, 7р.            | Справна, 2 шт.                   | Орендовані (ТОВ «Белогві»)                                       | 65058, г. Одеса, вул. Романа Кармена, 21                                                |
| 9.  | Тягач                                                                                            | Швеція, Volvo FM6, 8р.                 | Справна, 1 шт.                   | Орендовані (ТОВ «Белогві»)                                       | 65058, г. Одеса, вул. Романа Кармена, 21                                                |
| 10. | Напівпричіп                                                                                      | Німеччина, Fliegl, 9р.                 | Справна, 1 шт.                   | Орендовані (ТОВ «Белогві»)                                       | 65058, г. Одеса, вул. Романа Кармена, 21                                                |
| 11. | Машина для улаштування тонкошарових покриттів<br>Мультимак на базі автомобіля MAN TGA 18.400     | Німеччина, MAN TGA, 3 роки             | Справна, 1 шт.                   | Орендовані (ТОВ «Автомагістраль»)                                | 54001, м. Миколаїв, вул. Карла Лібкнехта, 7                                             |
| 12. | Термічна установка для розігріву асфальтобетонного покриття Wirtgen HM 4500                      | Німеччина, Wirtgen, 2 роки             | Справна, 1 шт.                   | Орендовані (ТОВ «Автомагістраль»)                                | 54001, м. Миколаїв, вул. Карла Лібкнехта, 7                                             |
| 13. | Машина для гарячої регенерації конструктивних шарів дорожнього одягу, реміксер Wirtgen RP/RC4500 | Німеччина, Wirtgen, 2 роки             | Справна, 1 шт.                   | Орендовані (ТОВ «Автомагістраль»)                                | 54001, м. Миколаїв, вул. Карла Лібкнехта, 7                                             |

Директор  
ТОВ „Автомагістраль-Південь”



М.С.Тимофесв

## **Construction Sector Transparency Initiative**

The verification report is published in Ukrainian in printed and electronic formats. The electronic version will be published on the website of the Construction Sector Transparency Initiative CoST Ukraine ([www.costukraine.org](http://www.costukraine.org)).

The printed version of the report is distributed free of charge. Texts from the report may be distributed with reference to the source.



Construction Sector Transparency  
Initiative

М.КПІБ, С'хpaї a

Ten.: +380 44 351 4180

e-mail: [info@costukraine.org](mailto:info@costukraine.org)

web: [costukraine.org](http://costukraine.org)