ISSN 2518-170X (Online),
ISSN 2224-5278 (Print)

ҚАЗАҚСТАН РЕСПУБЛИКАСЫ
ҰЛТТЫҚ ҒЫЛЫМ АКАДЕМИЯСЫНЫҢ

Х А Б А Р Л А Р Ы

ИЗВЕСТИЯ

НАЦИОНАЛЬНОЙ АКАДЕМИИ НАУК
РЕСПУБЛИКИ КАЗАХСТАН

N E W S

OF THE ACADEMY OF SCIENCES
OF THE REPUBLIC OF KAZAKHSTAN

ГЕОЛОГИЯ ЖӘНЕ ТЕХНИКАЛЫҚ ҒЫЛЫМДАР СЕРИЯСЫ

♦

СЕРИЯ ГЕОЛОГИИ И ТЕХНИЧЕСКИХ НАУК

♦

SERIES OF GEOLOGY AND TECHNICAL SCIENCES

5 (425)

ҚЫРҚҮЙЕК – ҚАЗАН 2017 ж.
СЕНТЯБРЬ – ОКТЯБРЬ 2017 г.
SEPTEMBER – OCTOBER 2017

ЖУРНАЛ 1940 ЖЫЛДАН ШЫҒА БАСТАҒАН
ЖУРНАЛ ИЗДАЕТСЯ С 1940 г.
THE JOURNAL WAS FOUNDED IN 1940.

ЖЫЛЫНА 6 РЕТ ШЫҒАДЫ
ВЫХОДИТ 6 РАЗ В ГОД
PUBLISHED 6 TIMES A YEAR

АЛМАТЫ, ҚР ҰҒА
АЛМАТЫ, НАН РК
ALMATY, NAS RK

«ҚР ҰҒА Хабарлары. Геология мен техникалық ғылымдар сериясы».
ISSN 2518-170X (Online),
ISSN 2224-5278 (Print)
Меншіктенуші: «Қазақстан Республикасының Ұлттық ғылым академиясы» РҚБ (Алматы қ.).
Қазақстан республикасының Мәдениет пен ақпарат министрлігінің Ақпарат және мұрағат комитетінде 30.04.2010 ж. берілген **№10892-Ж** мерзімдік басылым тіркеуіне қойылу туралы куәлік.

Мерзімділігі: жылына 6 рет.
Тиражы: 300 дана.

Редакцияның мекенжайы: 050010, Алматы қ., Шевченко көш., 28, 219 бөл., 220, тел.: 272-13-19, 272-13-18, http://nauka-nanrk.kz /geology-technical.kz

---

Редакцияның мекенжайы: Қазақстан, 050010, Алматы қ., Қабанбай батыра көш., 69а.
Қ. И. Сәтбаев атындағы геология ғылымдар институты, 334 бөлме. Тел.: 291-59-38.

Типографияның мекенжайы: «Аруна» ЖК, Алматы қ., Муратбаева көш., 75.

«Известия НАН РК. Серия геологии и технических наук».
ISSN 2518-170X (Online),
ISSN 2224-5278 (Print)
Собственник: Республиканское общественное объединение «Национальная академия наук Республики Казахстан (г. Алматы)
Свидетельство о постановке на учет периодического печатного издания в Комитете информации и архивов Министерства культуры и информации Республики Казахстан **№10892-Ж,** выданное 30.04.2010 г.

Периодичность: 6 раз в год
Тираж: 300 экземпляров

Адрес редакции: 050010, г. Алматы, ул. Шевченко, 28, ком. 219, 220, тел.: 272-13-19, 272-13-18,
http://nauka-nanrk.kz /geology-technical.kz

Адрес редакции: Казахстан, 050010, г. Алматы, ул. Кабанбай батыра, 69а.
Институт геологических наук им. К. И. Сатпаева, комната 334. Тел.: 291-59-38.

Адрес типографии: ИП «Аруна», г. Алматы, ул. Муратбаева, 75

News of the National Academy of Sciences of the Republic of Kazakhstan. Series of geology and technology sciences.
ISSN 2518-170X (Online),
ISSN 2224-5278 (Print)
Owner: RPA "National Academy of Sciences of the Republic of Kazakhstan" (Almaty)
The certificate of registration of a periodic printed publication in the Committee of information and archives of the Ministry of culture and information of the Republic of Kazakhstan N 10892-Ж, issued 30.04.2010

Periodicity: 6 times a year
Circulation: 300 copies

Editorial address: 28, Shevchenko str., of. 219, 220, Almaty, 050010, tel. 272-13-19, 272-13-18,
http://nauka-nanrk.kz/geology-technical.kz

Editorial address: Institute of Geological Sciences named after K.I. Satpayev
69a, Kabanbai batyr str., of. 334, Almaty, 050010, Kazakhstan, tel.: 291-59-38.

Address of printing house: ST "Aruna", 75, Muratbayev str, Almaty

N E W S
OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
SERIES OF GEOLOGY AND TECHNICAL SCIENCES
ISSN 2224-5278
Volume 5, Number 425 (2017), 238 – 243

UDC 625. 861; 666.973.2.00.2

K. T. Zhantasov, K. S. Dosaliev, V. N. Bosak, Sh. Shapalov, K. S. Baybolov, Zh. A. Usenkulov, Y. B. Kunanbayeva, A. S. Naukenova, A. Tulenov

M. Auezov South Kazakhstan state university, Shymkent, Kazakhstan.
E-mail: dosaliev_k@mail.ru

MATERIALS OF BOX-TYPEPAVEMENT

Abstract. The development of the automotive industry require modern approaches to construction of pavements and highways coatings.

The data for use as the raw building materials are not scarce and cheap phosphorus waste production and coal production that preserve the landscape surrounding environment and improve the environmental situation of industrial enterprises and some of the regions as a whole. A part of the raw materials for the manufacture of pavement box type, used in the construction of highway coverage, with the aim of improving the properties of the roadway and stabilize the moisture balance in it.Given a brief description of waste facilities used in the laying of the pavement. Experimental studies using as ingredients pavement box-type, consisting of a thin-walled lean concrete with slag phosphorus production ground to a class of less than 2 mm, as well as in the manufacture of underlayment internal overburden coal mining industry and phosphogypsum forming in the preparation of the extraction of phosphoric acid from phosphate materials.In pavement placement technologythe mixture ispreparedin advance from the raw materials, which is thoroughly mixed, and then laid on the roadbed of the future highway. This design of box-type pavement ismade of lean concrete laid, which is subjected to hardening and drying under natural climatic conditions.

Calculations revealed that the total savings in material and labor costs for the construction of the pavement over the existing types of pavements may be up to 30%.

Keywords: construction, civil engineering, highway engineering**,** pavement, pavement, building, highway, road construction machinery, road surface, charge.

Introduction. Nowadays, in the age of technological progress, increased cargo volume and road transport vehicles, which often leads to the destruction of the roadway. Therefore, pavement modern highways needs to be durable and safe in operation and safe for human activity.

The basic condition for reliable operation of the roadbed and pavement is the stability of the soil, depending on its density, so the saturation of the subgrade moisture - an extremely dangerous phenomenon, which leads to a decrease in the stability and the bearing capacity of the ground elements of the road [1].

The degree of strength and stability of the roadbed and pavement elements in different climatic zones under various environmental conditions, it can characterize the water-temperature conditions and changes in temperature and humidity of time at different points of the road subgrade [2]. If these changes are within the limits for which the subgrade loses its strength and stability necessary to construct buildings that protect it from waterlogging and sudden temperature changes.

In the following periods can be characterized by the annual cycle of changes in the water regime of the subgrade:

- The initial accumulation of moisture in the fall, as a result of infiltration of atmospheric precipitation;
- Freezing of the roadbed and winter moisture redistribution;
- Thawing of the subgrade soil waterlogging and spring;
- Saving moisture removal and drying of the roadbed.

On roadbed humidity also affect terrain, vegetation, wind and other natural factors and features of climatic regions.

The methods and techniques that will improve the bearing capacity of subgrade soil, is widely known throughout the world and in the Republic of Kazakhstan [3-8].

Analysis of thermal sources shows that the most dangerous type of deformation of subgrade is a loss of stability of all parts of the road structure due to moisture, since moisture leads to the loss of stability and their implementation is fast enough, resulting in failure of the entire distillation section.

For example, when the road device strengthen weak soils binders, such as cement, lime, bitumen and others., Using industrial wastes as the ash and slag, oil sludge, secondarily processed construction materials as concrete, limestone and waste etc. [9-13].

There are a number of technological solutions [3-4], which require their improvement and use of cheaper materials that do not violate the surrounding landscape of the environment and ecological situation in the areas of production: Ingredients used in the construction of the foundations of the roadway.

For example, the known pavement with prefabricated flat reinforced concrete plates with a thickness of 18 to 24 cm [12]. Due to collecting, not require expensive facilities for their construction, and because of their small size, thermal deformations occur to a small extent. However, the shortcomings of the road construction can be attributed to their weak pairing underlying layers, thereby possibly uneven deformation in the longitudinal and transverse directions.

In addition, proposed pavements consisting of coatings with the use of concrete plates and the underlying layers comprising a bottom and side walls defining a box of thin layer of concrete-filled layers of sandy loam or silt and sand, with plates coated with a lower surface of the pointed cone-shaped elements [12]. Disadvantages include increased consumption of special cement binder and the availability of soil moisture, which leads him to a longitudinal shift of the underlying layer, and the complexity of the complexity of the lay-up of sandy loam and loam, and the absence at the base cracks interrupt layers of granular materials.

The purpose of research is to develop a more reliable, durable and safe in operation pavement structure.

Methods. To solve this problem the pavement of roads consisting of a coating with the use of reinforced concrete plates that form the box side walls and a bottom, as well as the underlying layer, regulating water and thermal regime. The side walls and the bottom are made of thin-walled lean concrete, containing a certain amount of finely ground slag phosphorus production ground to a class of less than 2 mm, whose chemical composition is shown in Table 1. Underlying layer of sandy loam or loam contains minor amounts of domestic coal mining overburden (GDP) and phosphogypsum waste-phosphate production. The chemical composition of GDP and phosphogypsum used in experimental research is shown in Tables 2 and 3, respectively.

Table 1 – Chemical composition of phosphorus slag production

#	Content	Indicators, mass %
1	$P_2 O_5$	1,5
2	SiO_2	38,0
3	$Fe_2 O_3$	1,0
4	$Al_2 O_3$	2,3
5	CaO+MgO	43,0
6	CaF_2	2,7
9	Moisture	5,2
10	Other	6,3

Table 2 – Chemical composition of internal overburden

Field	The content of components, %									
	Na_2O	K_2O	Cr_2O_3	Fe_2O_3	Al_2O_3	SiO_2	CaO	MgO	C_{CB}	MnO
Lenger	0,5	0,5	0,1	9,3	8,3	49,9	1,8	1,8	28	0,1-0,6

Table 3 – Composition phosphogypsum plant fertilizer LLP "Kazphosphate"

#	Thecontentofcomponents	indicators, mass %
1	$P_2 O_5$	0,7
2	MgO	absent
3	N_2O	0,4
4	Al_2O_3	0,1
5	F	0,1
6	Insolubleresidue	19,7
7	Fe_2O_3	0,1
8	CaO	31,8
9	SO_4^{2}	47,1

The optimal values of the content of ingredients of the raw materials used to create base layers, due to the fact that when the content of domestic waste rock and phosphogypsum less than the minimum or more than the optimum value is not observed a significant increase in its reliability and the increased moisture content of the material, which could lead to a shift in the underlying layer in the longitudinal and transverse directions, leading to the formation of potholes and grooves of the roadway.

When the content of lean concrete, used to create the side walls of the box and pavement bottom ingredients less than 10 %, a significant effect of reducing the flow of material resources is not observed, and when exceeding 20% by weight of phosphorus slag composed lean concrete reduces the strength of the walls characteristics flash design box of lean concrete, due to the possible presence of phosphorus in the slag and molten rounded particle size of less than 2 mm.

The figure 1 shows a cross-sectional view of the pavement of the proposed box type, and figure 2 - reinforced concrete plate with the bottom surface of the pointed elements.

The proposed pavement box type, below in figures 1 and 2 comprises a bottom 1 and side walls 2 of the box, made of lean concrete thin-layer, composed of ground phosphorous slag is introduced.

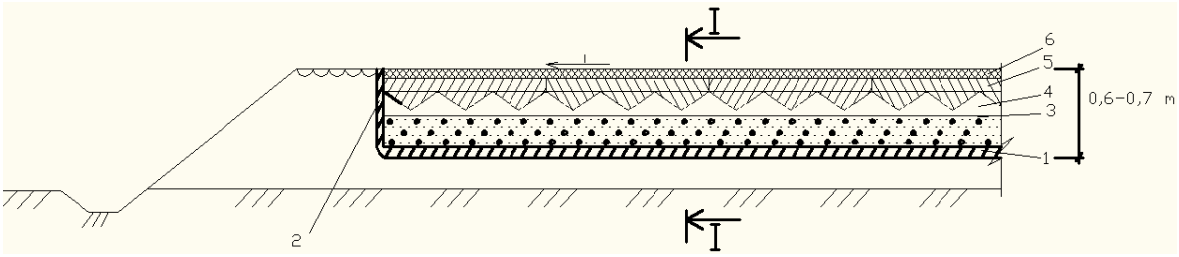

Figure 1 – Pavement box type

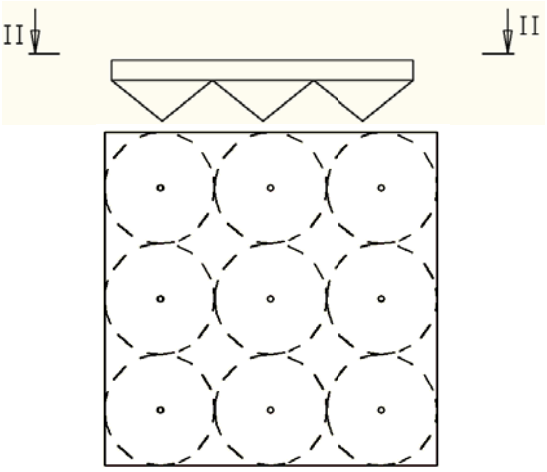

Figure 2 – Reinforced concrete plate with a bottom surface of the pointed cone-shaped elements

On the bottom are stacked two layers of soil - sandy loam or loam mixed with internal overburden and phosphogypsum 3 and 4 sand, and then laid concrete plates 5, the lower surface of which is made in the form of a pointed cone-shaped elements. The upper surface is covered with plates cushioning layer of asphalt concrete 6.

Introduction of finely ground slag phosphorus production is carried out at the mixing stage, the raw materials for the preparation of lean concrete and laying pavement box configuration. After the implementation of these works fit underlayment mixture and loam, containing in its composition of waste coal (internal overburden) and phosphorus production (electro thermal phosphoric slag) in predetermined amounts.

In practice electro thermal phosphoric slag is obtained in two ways, depending on the process design of production:

- granulation fiery molten slag into the water stream in the liquid-solid ratio 20:1;
- cooling flaming molten slag into the pits to obtain the solid material, it requires crushing to a particle size less than 10-15 mm when receiving flitnstone and which can serve as an element of a pointed lower pavement layer.

Used in the manufacture of pavement phosphorous slag technology must be crushed, and comply with the requirements of ST RK 935-92 "granulated slag" and contain SiO2 - not less than 38 and CaO + MgO at least 43%. Milling electro thermal phosphoric granulated slag due to the fact that they are spliced rounded shape, which reduces the effect of coupling binder cement material. This reduces the load bearing capacity of the box walls pavement thin layer of lean concrete, which should correspond to the thickness of 15-20 mm.

Results and discussion. When creating a pavement design box type box made of lean concrete laid, which is subjected to hardening and drying under natural climatic conditions.

On the pavement laying technology previously preparing a mixture of raw material containing a certain amount of coal waste phosphogypsum - the cost of production of phosphorus, sandy loam and loam, which is thoroughly mixed, and then laid on the roadbed of the future highway.

The optimum composition of lean concrete, 100 kg of mixture introduced in the specified amounts: cement, ground slag electro thermal phosphoric (phosphorus slag production) based filler sand and gravel, which was stirred in the presence of water.

As may be used crushed gravel phosphorus slag obtained by cooling sumps. The resulting mixture is thoroughly mixed and put into the formwork of the side walls of the pavement. On top of the concrete plate is laid a base layer of asphalt concrete.

Compared with known pavement with prefabricated flat reinforced concrete slabs with a thickness of 18 to 24 cm, this construction of the road reduces the cost of the current, average and major repairs of roads, increasing its reliability, durability and safety are improved traffic conditions and livelihoods of people.

Conclusions.

1. It is proposed to use in the optimum composition of the underlying layer of loam, sandy loam, internal overburden, crushed slag, phosphorus, gravel and phosphogypsum.
2. The proposed pavement design prevents the occurrence of local deformations of the pavement of the road in the vertical and horizontal directions from the action of loads, since together with the upper layer of shock-absorbing asphalt turns into a single massive structure rigid.
3. Due to the absorption of atmospheric precipitation decreases the cost of the current, average and major repairs of roads, at the same time increases its reliability, durability, conditions for road safety and livelihoods of people.
4. Calculations revealed that the total saving sinmaterial and laborcosts compared to existing types of pavements may be up to 30%.
5. The introduction of the pavement of phosphogypsumandslag phosphorus production, and coal was tepermit releasel and sand reduce the consumption of natural gravel, maintaining the landscape.

REFERENCES

[1] Kruchinin I.N., Dedyukhin A.Y. Improved deformation characteristics of asphalt concrete pavement of roads. Upgrade and research in the transport sector: Materials of the international scientific-practical conference. Perm: Publishing house PNRPU, 2016. P. 280-282.

[2] Buldakov S.I. Highway. Pat. Number 163782, Russian Federation, IPC E01C 7/00.the applicant and the patentee F.S.E.I. of Higher Education, Moscow State University of Technology and Management. №201603993; published .09.09.2016.

[3] Buldakov S.I., Murzich S.A. Assessment of the stability of asphalt concrete pavement for rut formation. Scientific creativity of youth - Russian forestry complex: mater //XII All-Russian Scientific – Technical Conference. Yekaterinburg: Ural. state. Forestry Engineering. University Press, 2016. P. 128-131.

[4] Chudinov S.A., Kukarskikh D.N. Modern additives for the production of cement-concrete mixtures Road. Scientific creativity of youth – Russian forestry complex: mater // XII All-Russian Scientific – Technical Conference. Yekaterinburg: Ural. state. Forestry Engineering. University Press, 2016. P. 114-117.

[5] Yushkov V.S. diagnosis and assessment of the state of roads // Young scientist. 2011. Vol. 1, N 12. P. 67-69.

[6] Grinevich N.A., Plotnikova A.V., Kochergin Ya.A. Fiber concrete modifiers // Proceedings of the VII All-Russian scientific and engineering. Conf. undergraduate and graduate students and "Egghead" contest on the program / 1 piece / USFEU, Ykaterinburg, 2011. P. 51-54.

[7] Sharov A.Yu., Chigorin S.M. Foreign experience in the construction of asphalt concrete pavement. Scientific creativity of youth - Russian forestry complex: mater. //XII All-Russian Scientific – Technical Conference. Ykaterinburg: Ural.sta. Forestry Engineering. University Press, 2016. P. 153-155.

[8] Geosynthetics. Moscow. 2014 (http://geosynt.ru/requirements-for-subgrade-soils/)

[9] Alinova M.Sh., Prokopenko N.V. // PSU Bulletin Series Physical – mathematical account of the experience physical requirements of the roadbed. Pavlodar State University PSU. 2010. N 4. P. 93-115.

[10] Innovative patent of RK №20083, Pavement box type, publ. 27.06.2008.

[11] E.A. Lando. Highways and Road Safety.Bulletin Dnieper State Academy of Construction and Architecture. 2013. N 11(188). P.15-22.

[12] Nesvetaev G.V. For the construction of roads with cement concrete of use.InternetmagazineNaukovedenie. 2013. N 5(18). P. 1-5. (http://cyberleninka.ru/article/n/k-voprosu-stroitelstva-avtomobilnyh-dorog-s-primeneniem-tsementnyh-betonov)

[13] Serikov D.L., Kravchenko S.E., Makarevich A. Determination of the influence of the main parameters of structural pavement layers on reflection cracking of asphalt concrete coatings. Journal "Roads and bridges" Belarusian National Technical University. 2013. N 1(11). (http://www.bntu.by/news/24-ftk-news/929--q-q-.html).

[14] Sirotyuk V.V. Standardization and perspectives of using ash-and-slag of energy for road construction in Russia V.V.Sirotyuk // Materials of III International scientific and practical workshop "ashes from TPPs: removal, transport, processing and warehousing. M.: MPEI Publishing house, 2010. P. 58-59. [In Russian].

[15] Ivanov E.V. Overview of normative-methodical documents, concerning the use of ash and slag waste TPP in road construction // The Development of road-transport complex and construction infrastructure on the basis of environmental management: Materials of the IV all-Russian scientific-practical conference of students, postgraduates and young scientists, 20-21 may 2009. SibADI. Omsk, 2009. Book 1. P. 176-180. [In Russian].

[16] Kritsky M.J., Start I.V., Skorkin V.F., Lanis A.L. Treatment of diseases of the subgrade with the use of modern technology. Tr. Intern. scientificparkt. Conf.On problems of soil mechanics, Foundation engineering and transp. str-vu. – Perm.: PGTU publishing house, 2004. Vol. Second. P. 47-53. [In Russian].

[17] The roadbed of roads: defects, damage and destruction, their causes, methods of prevention and recovery: study guide / M. J. Kritsky, V. N. Shestakov.-Omsk: Publishing house SibADI, 2008. 56 p. [In Russian].

[18] Bogomolov A.N. Evaluation of stress-strain state, the values of the stability coefficient and landslide pressure forces in a homogeneous isotropic slope for the management of landslide processes / A. N. Bogomolov [and others] // Vestnik Volg GASU. Ser.: Building and architecture. Volgograd, 2008. Vol. 10(29). P. 74-80. [In Russian].

[19] Pochinkov V.A., Myaskov A.V. Analysis of existing methods of utilization and processing of waste coal. Proceedings of the XIII international scientific-practical conference "Energy safety of Russia. New approaches to developing coal industry". The side, 2011. [In Russian].

[20] Tupa N., Palmeira E.M. Geosynthetic reinforcement to reduce the effects of explosions under the influence of internal pressure buried pipe // Geotextiles and Geomembranes. 2007. N 25. P. 109-127.

[21] Long P.V., Bergado D.T., Abuel-Naga H.M. The use of geosynthetics for reinforcement of tsunami reconstruction: evaluation of interface parameters with silty sand and weathered clay // Geotextiles and Geomembranes. 2007. N 25. P. 311-323.

К. Т. Жантасов, К. С. Досалиев, В. Н. Босак, Ш. К. Шапалов, К. С. Байболов, Ж. А. Усенкулов, Я. Б. Кунанбаева, А. С. Наукенова, А. Туленов

Южно Казахстанский государственный университет им. М. Ауэзова, Шымкент, Казахстан

МАТЕРИАЛЫ ДОРОЖНОЙ ОДЕЖДЫ КОРОБЧАТОГО ТИПА

Аннотация. В работе приведены сведения по применению в качестве шихтовых строительных материалов отходов фосфорного производства и угледобычи, которые позволяют улучшить экологическую обстановку регионов, где расположены промышленные предприятия. Предложен состав шихтовых материалов для изготовления дорожной одежды коробчатого типа, применяемого при строительстве покрытия автомобильной трассы, который позволяет улучшить свойства дорожного полотна и стабилизировать влажностной баланс. Даны краткие характеристики отходов производств применяемых при укладке дорожной одежды.

Проведены исследования по применению шлака фосфорного производства измельченного до класса менее 2 мм в качестве ингредиентов дорожной одежды коробчатого типа, состоящих из тонкостенного тощего бетона. При технологии укладки дорожного покрытия предварительно готовится смесь из исходных материалов, которая тщательно перемешивается, а затем укладывается на земляное полотно будущей автомобильной дороги. Расчетами установлено, что общая экономия материальных и трудовых затрат по возведению данной дорожной одежды по сравнению с существующими типами дорожных одежд может составлять до 30%.

Ключевые слова: строительство, гражданское строительство, дорожное строительство, дорожная одежда, строительство, шоссе, дорожно-строительная техника, дорожное полотно, шихта

К. Т. Жантасов, К. С. Досалиев, В. Н. Босак, Ш. К. Шапалов, К. С. Байболов, Ж. А. Усенкулов, Я. Б. Кунанбаева, А. С. Наукенова, А. Туленов

М. Әуэзов атындағыОңтүстікҚазақстан мемлекеттік университеты Шымкент, Қазақстан

ҚОРАПША ТҮРІНДЕГІ ЖОЛ ТӨСЕНІШІНІҢ МАТЕРИАЛДАРЫ

Аннотация. Жұмыста шихталықұрылыс материалдары ретінде, фосфорөндірісінің қалдықтары және өнеркәсіп орындары орналасқанаймақтарда экологиялық ахуалды жақсартуға мүмкіндік беретін көмір олжасын қолдану жөніндегі мәліметтер келтірілген. Жол төсемінің қасиеттерін жақсартатын және ылғалдылықты реттеп тұратынавтомобиль жолын салу кезінде қолданылатынқорапша түріндегі жол төсенішін дайындаудағы шихталы материалдардың құрамы келтірілген.Мақалада, жол төсеміне қолданылатын өндіріс қалдықтарына қысқаша сипаттама берілді.Жұқа қабырғалы бетоннан тұратын қорапша түріндегіжол төсемінің ингредиенттері ретінде, 2 мм дейін майдаланған фосфор өндірісінің шлагыназерттеулер жүргізілді. Жол төсемін төсеу технологиясында, бастапқыматериалдардан жақсылап араластырылған, топырақ үстіне төсеу үшін, келешек автомобиль жолына төселетін қоспа дайындалады. Типтік жол төсенішімен салыстырғанда берілген жол төсеніші, материалдық және еңбек шығындарын 30% үнемдейді.

Түйін сөздер: құрылыс, азаматтық құрылыс, жол құрылысы, жол төсеніші, тас жолы, жол- құрылыстық техника, жол төсемі, шихта.

Publication Ethics and Publication Malpractice
in the journals of the National Academy of Sciences of the Republic of Kazakhstan

For information on Ethics in publishing and Ethical guidelines for journal publication see http://www.elsevier.com/publishingethics and http://www.elsevier.com/journal-authors/ethics.

Submission of an article to the National Academy of Sciences of the Republic of Kazakhstan implies that the described work has not been published previously (except in the form of an abstract or as part of a published lecture or academic thesis or as an electronic preprint, see http://www.elsevier.com/postingpolicy), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. In particular, translations into English of papers already published in another language are not accepted.

No other forms of scientific misconduct are allowed, such as plagiarism, falsification, fraudulent data, incorrect interpretation of other works, incorrect citations, etc. The National Academy of Sciences of the Republic of Kazakhstan follows the Code of Conduct of the Committee on Publication Ethics (COPE), and follows the COPE Flowcharts for Resolving Cases of Suspected Misconduct (http://publicationethics.org/files/u2/New_Code.pdf). To verify originality, your article may be checked by the Cross Check originality detection service http://www.elsevier.com/editors/plagdetect.

The authors are obliged to participate in peer review process and be ready to provide corrections, clarifications, retractions and apologies when needed. All authors of a paper should have significantly contributed to the research.

The reviewers should provide objective judgments and should point out relevant published works which are not yet cited. Reviewed articles should be treated confidentially. The reviewers will be chosen in such a way that there is no conflict of interests with respect to the research, the authors and/or the research funders.

The editors have complete responsibility and authority to reject or accept a paper, and they will only accept a paper when reasonably certain. They will preserve anonymity of reviewers and promote publication of corrections, clarifications, retractions and apologies when needed. The acceptance of a paper automatically implies the copyright transfer to the National Academy of Sciences of the Republic of Kazakhstan.

The Editorial Board of the National Academy of Sciences of the Republic of Kazakhstan will monitor and safeguard publishing ethics.

Правила оформления статьи для публикации в журнале смотреть на сайте:

www:nauka-nanrk.kz

ISSN 2518-170X (Online), ISSN 2224-5278 (Print)

http://geolog-technical.kz/index.php/kz/

Верстка *Д. Н. Калкабековой*

Подписано в печать 16.10.2017.
Формат 70x881/8. Бумага офсетная. Печать – ризограф.
18,9 п.л. Тираж 300. Заказ 5.

Национальная академия наук РК
050010, Алматы, ул. Шевченко 28, т. 272-13-19, 272-13-18