

MOSPROEKT-3

GROUP OF COMPANIES

TRANSFORMATION OF THE CONSTRUCTION INDUSTRY IN RUSSIA: BIM FOR TRANSPORTATION INFRASTRUCTURE

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THE GROUP OF COMPANIES MOSPROEKT-3

THE LEADING RUSSIAN CENTRE OF THE ENGINEERING STRUCTURES, WHICH PROVIDES HIGHLY TECHNOLOGICAL SOLUTIONS IN THE TRANSPORT CONSTRUCTION AND COMPLEX TERRITORY DEVELOPMENT



CONSTRUCTED OBJECTS



>800 KM ROADS



83 KM METRO LINES



30 TRANSPORT HUBS



THE TEAM OF THE GROUP OF COMPANIES MOSPROEKT-3 HAS HUGE EXPERTISE IN TRANSPORT CONSTRUCTION AND IS READY FOR THE ACCELERATED INFRUSTRUCTURE **DEVELOPMENT OF CITIES AND FEDERAL PROJECTS**



OUR KEY INSTRUMENT IS BIM-TECHNOLOGIES AND OTHER DIGITAL PRODUCTS

"The construction of new objects should be performed at the entirely new level. All-around widespread application of digital design and engineering, production and implementation of the most advanced energy-saving

> Marat Khusnullin, Deputy Prime Minister of the **Russian Federation**

MAJOR INFRASTRUCTURE PROJECTS OF THE RUSSIAN FEDERATION



TRANSCONTINENTAL ROUTE "EUROPE – WESTERN CHINA"

THE LARGEST ROAD INFRASTRUCTURE PROJECT OF RUSSIA WITH MASSIVE MACROECONOMIC EFFECT

There has been developed a digital information model, unique for Russian transport infrastructure, which has been efficiently integrated with the data of engineering-geological model, digital aerial photography survey and interferometric analysis of the satellite images as well as the design and engineering solutions.

Complex geological model contains the complete range of the basic data:

geological columns

digital terrain model

geophysical investigation data (electrothermography, seismic exploration data, vertical electrical sounding)

hydrological research data

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"We continue to work proactively. Regardless of COVID, we are closely engaged in the dynamic infrastructure construction. For the decades ahead we tend to form the new transport network, new chord highways, new road network, new kilometres of the Metro lines. They are incorporated into the unified system"

OUR KEY INSTRUMENT IS BIM-TECHNOLOGIES AND OTHER DIGITAL PRODUCTS

Sergei Sobyanin, Mayor of Moscow

MOSCOW MEGAPROJECT OF ROAD CONSTRUCTION DEVELOPMENT

DURING 2011-2023 THE STREET-ROAD NETWORK HAS INCREASED BY 18%

UNIQUE TECHNOLOGICAL SOLUTIONS OF THE GC MOSPROEKT-3 TO THE ROAD INFRASTRUCTURE DEVELOPMENT:

Construction works in the densely built-up megapolis without traffic interruption

Design and engineering of multi-level transport interchanges for highways with intensive traffic

Application of BIM-technologies in road construction

NORTERN ALTERNATE ROUTE OF KUTUZOVSKY PROSPEKT IN MOSCOW

THE LARGEST CONCESSION IN MOSCOW WITH PRIVATE INVESTMENT OVER 705M USD

The first large-scale project of the Group of companies on the application of information modelling technologies in road construction. For the efficient implementation of the project, the GC Mosproekt-3 received the status of "BIM-leader of Russia in infrastructure construction", the project won the competition "BIM-technologies 2020/21".

Implemented by means of BIM:

Modelling of the following project documentation:

- Highway (routing, vertical land levelling, volume of earthwork operations' calculation)
- General plan (vertical planning of the territory)
- Engineering structures
- Buildings and structures
- External utilities networks
- Facilities of road construction

Modelling of geophysical basis over the territory of 320 hectares, including terrain, existing utility networks and structures, earth bores

Modelling of different interconnected projects in the construction industry in search for collision

MOSCOW MEGAPROJECT OF RAPID TRANSPORT SYSTEM DEVELOPMENT

DURING 2011-2023 THE SYSTEM IS GOING TO INCREASE TO 2,5 TIMES ITS CURRENT LEVEL

UNIQUE TECHNOLOGICAL SOLUTIONS OF THE GC MOSPROEKT-3 FOR RAPID TRANSPORT SYSTEM DEVELOPMENT:

deep level stations in unstable soil
construction of the innovative ground metro line in New Moscow
construction of double-track tunnels by applying tunnel-boring complex
integration of stations into operating sections without train traffic interruption as well as the application of "top-down" method section of a metro line, created entirely by BIM

SOKOLNICHESKAYA MOSCOW METRO LINE

UNIQUE GROUND METRO SECTION WITH 12 KM COVERING, THAT IS CONSOLIDATED INTO THE UNIFIED NETWORK WITH THE HIGHWAY

The first experience of digital information model development of a metro line in Russia.

Implemented by means of BIM:

Architectural solutions

Construction solutions

Complete range of utility networks (heating, ventilation, water supply, sewage system and electricity supply)

TROITSKAYA MOSCOW METRO LINE

THE 13 KM SECTION OF THE LINE IS THE FIRST **PROJECT OF METRO IN RUSSIA DEVELOPED ENTIRELY IN BIM-ENVIRONMENT**

The expansion of the functionality of the information model by immersing analytical and calculated methods into the unified digital sphere.

Implemented by BIM:

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The number of the applied instruments of information modelling has been extended

The digital model for the automatic generation of all the drawings' types, specifications and documentation issues for the key disciplines directly from the information model, leaving out the classical packages, has been developed

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Special components of information models have been developed – the prototypes of the future sites with engineering networks going through the constructive elements

The corporate regulations documents have been developed and applied

The modelling of the fire and evacuation development

Geotechnical modelling

TROITSKAYA MOSCOW METRO LINE

THE LINE ROUTE CONNECTS MOSCOW WITH THE HISTORICAL TERRITORIES OF NEW

13 km section of the line

5 station complexes and running tunnels between them

The metro line is being designed and engineered in the tunnels of shallow and deep laying in the technical area. The external tunnel diameter takes approximately 6,0 metres. The tunnel construction is being done by deep bore tunnelling, applying the earth pressure balance tunnel boring machine that provides non-subsidence tunnelling in the complicated hydrogeological conditions within New Moscow territory. Highly accurate waterproof assembled reinforced concrete tunnel casing is applied as the basic structures of the running tunnels.

INFORMATION MODEL OF THE SURROUNDING AREA

"Tyutchevskaya" station:

- is located from the outer side 39th km of the Moscow Circle Automobile Road at the intersection with Proyezd # 976 under design. It has one ground hall and one evacuation exit.
- Type: three-spanned, five-level with two rows of columns, made from in-situ reinforced concrete, the platform is of island type.

'Mamyri" station:

- is located along Kaluzhskoye shosse at the intersection with Ulitsa Admirala Kornilova. It has one ground and one underground halls.
- Type: three-spanned, with the platform of island type with two rows of columns.

"Ulitsa Generala Tyuleneva" station:

- is located at the intersection of Ulitsa Tyoply stan and Ulitsa Generala Tyuleneva. It has one underground hall and one evacuation exit.
- Type: three-spanned, five-level with two rows of columns, made from in-situ reinforced concrete, the platform is of island type.

"Novatorskaya" station:

- is the interchange with the station of the Big circle line that is under construction. It is located at the intersection between Ulitsa Udaltsova and Leninsky Prospekt. It has two halls.
- Type: three-spanned, with two rows of columns made from in-situ reinforced concrete, it is also a multi-level station with the platform of island type.

"Ulitsa Akademika Oparina" station:

- is located at the intersection between Ulitsa Akademika Oparina and Ulitsa Miklukho-Maklaya. It has the underground hall and one evacuation exit.
- Type: three-spanned, six-level with two rows of columns from in-situ reinforced concrete, the platform is of island type.

ARCHITECTURAL MODEL

The architectural information model is the first to be developed, it is used as a task or the basis for the development of all other chapters.

At present the complete range of the processes that relate to the development of architectural solutions, is performed entirely by means of information modelling technology.

Digital Information Model enables to conduct the joint operations, to develop space-planning decisions and to enter the data thoroughly. That also enables to calculate all the necessary specifications, as well as to issue the documentation directly from the information model.

ARCHITECTURAL MODEL

VENTILATION SYSTEMS

MPP_OB_O_Вентиляционная установка (верх-верх, бок-бок, верх-бок, бок-верх)_v.01

Оборудование (1)		\sim	ß	Изм	енит	ь тип
Размеры						*
=== Размеры вент. установк	=== Размерь	і ве	нт. у	стан	ювк	
ADSK_Размер_Длина	2245.000					
ADSK_Размер_Ширина	1300.000					
ADSK_Размер_Высота	800.000					
=== Рама ===	=== Рама ==	=				
Рама						
Высота рамы	150.000					
=== Характеристики вент. у	=== Характер	рис	тики	вен	п. ус.	
Коэффициент расхода	0.500000					
Расход воздуха расчётный L	6500.0000 м³/	ч				
ВУ_Номинальный расход Lн	7150 м³/ч					
ВУ_Напор ∆Р	150 Па					
ВУ_Мощность установки N	2.2 кВт					
ВУ_Напряжение установки U	380 B					
ВУ_Число оборотов двигате	1388					
=== Комплектующие устан	=== Комплек	стун	ощи	ie yo	тано.	
Сторона обслуживания	справа					
Воздушный клапан	\checkmark					
Тип электропривода	LF-230S					
Фильтр	\checkmark					
Тип фильтра	G3, M5					
Электрокалорифер						
Мощность электрокалориф	16,5 кВт					
Напряжение электрокалори	380 B					
Воздухонагреватель водяной						
Мощность водяного воздух	15,7 кВт					
tr_to	130/70 °C					
Воздухоохладитель фреоно						
Мощность воздухохладител	17,5 кВт					
Промежуточная секция	\checkmark					
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Ventilation equipment, air terminal units and air tube carcasses contain the information for the necessary calculations and the formation of specifications.

HEATING AND VENTILATION

Applying information modelling technology when creating the heating and ventilation model is one of the most effective ways of design and engineering. The possibility to connect the joint units in the unified information space in real time enables to identify adverse intersections with the pipelines and cable management systems, such sections as Ventilation and Electric Equipment.

> The ventilation and smoke extraction systems are located due to their type and are classified due to their purpose of use, that enables to control their completeness and consistency as well as identify the unattached equipment.

SYSTEMS OF ELECTRIC SUPPLY AND ELECTRIC EQUIPMENT

The benefits of the cable management structures created in the information model include the visibility of the development through the object with the ability at the stage of design and engineering to work out the intersections with the Ventilation, Water supply and Sewage system, as well as to construct the route in the right way, on the basis of architectural and constructive features of the object, which is complicated to be

ENGINEERING SYSTEMS OF VENTILATION AND SEWAGE

ENGINEERING SYSTEMS OF VENTILATION AND SEWAGE

The systems of pipelines and plumbing fixtures require individual control and monitoring that can be achieved by allocating the systems of ventilation and sewage onto working sets which simplify the joint work in the future when forming the consolidated information model.

The systems under development comply with all the necessary standard and requirements, enabling to perform internal calculations immediately in Revit environment.

ELECTRIC SUPPLY

Apart from the basic information the cases contain the operating range (shown in green area) that is regulated by the operation rules of the electricity generating equipment. Moreover, when switched on, it can be visually detected if the case is located in the premises in the right way, as well as how the access to it is ensured.

PJ-20KB	07- Marana			
Электрооборудование (1)	С Изменить	ПИП		
МРР_ЭОМ_Инженерная система	АСОП	^		
Macca	I			
Электросети		*		
Назначение шкафа	Трансформатор АСОП, связи №1			
Наличие разъединяющего заз	24/31/5 кА			
Прибор щитовой	ЩМ-120			
Тип МБРЗ	Сириус-2ММ- 5А-220В-И4-ТХ			
Тип счетчика э/э	CЭT-4TM.03M.01			
Тип TT	ТОЛ-20-0.5s/0/5s/10P-5/5/10-15			
Тит TT нулевой последователь	CSH-120 470/1-1шт.			
Тип TH	-			
Устройство дуговой защиты	Орион-ЗДЗ			
Силовой выключатель	Силовой выключатель			
Тип	ISM25_LD_1(210_S)			
Номинальный ток отключения	16000.00 A			
Тип модуля управления	TER_CM_16_1			
Ток номинальный	800.00 A			
Прочее	Прочее			
Примечания в заголовке спец	1			
Примечания в нижнем колонт				

There are also lighting fittings in the model with realistic laying out. Their fixture on the walls, ceilings, in the counter ceilings and on the stalls is demonstrated.

CONSOLIDATED INTERSECTIONAL MODEL

CONSOLIDATED INTERSECTIONAL MODEL

All models have the unified coordinate system, as a result, the effective intersectional cooperation is provided, which enables at the stage of project development to find and eliminate the collisions, improving the efficiency and accelerating the coordination between the sections.

MODELLING OF METRO LINE ROUTE

The route is the network for the entire information model, it reflects the precise geometry of the lines with the picketage on the basis of the defined sections and the profile with vertical marks.

Each object in this tunnel is a separate element of the information model which is copied on the defined route and includes such retated elements as tubings, rails, ties, etc.

GEO-TECHNICAL MODEL

MODELLING OF THE EXCAVATION PIT

Deformation forecast

GEO-TECHNICAL MODEL

CONSTRUCTION WITHOUT URBAN TRAFFIC

The choice of the method of construction works was made with respect to:

choice of the method of construction works was made with respect to the possibility of no urban traffic interruption (including the passenger traffic),

provision of the section line for the re-laying of the underground engineering systems, which was carried out within the vacation of the construction site and reconstruction of the street-road network,

maintaining the position of the existing utilities underneath Ulitsa Akademika Pilyughina and ultimately the economic feasibility

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