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Construction of the Great Siberian Route

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ABSTRACT

The construction of the Great Siberian Route is a heroic page of Russia. The article examines the main milestones of epoch-making construction. In 1837, there were no railways in Russia yet, and proposals for construction of the Trans-Siberian Railway had already begun to be heard. The government has discussed this issue on several occasions. The opinion of the Minister of Finance A. I. Vyshnegradsky is indicative: «The Siberian railway is needed, but the country has more important issues». The situation changed dramatically in 1892 with appointment of S. Yu. Witte as Minister of Finance. He found necessary funding, supervised the construction site and resettled people to Siberia. The article, illustrated by several photos of the time, shows the unprecedented scale of railway construction in difficult natural conditions and under tight deadlines.

Keywords: *Trans-Siberian Railway, history of transport, Committee of the Siberian Railway, surveys, design, construction, resettlement to Siberia, artificial structures, field development.*

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Topic of construction of Siberian railway (this is how the modern Trans-Siberian Railway was modestly called at first) is so significant that every year, especially on anniversary dates, numerous publications are devoted to this event. The Trans-Siberian Railway is included in the famous Guinness Book in several nominations at once. Until now, the Trans-Siberian Railway is the longest double-track and fully electrified railway in the world.

The first design proposals for construction of the Trans-Siberian Railway began to arrive back in 1837. In 1857, surveys began in various regions of Siberia and the Far East. From 1869 the directions of the lines began to be chosen.

In 1872–1874 government surveys were carried out, which identified three main directions:

1. Kineshma–Vyatka–Perm–Yekaterinburg (933 versts).

2. Nizhny Novgorod–Kazan–Krasnoufimsk–Yekaterinburg (1172 versts).

3. Alatyr–Ufa–Chelyabinsk (1173 versts).

Since 1875, the directions of the Siberian railway have been regularly discussed at the meetings of the Committee of Ministers. In 1877, the railway network of the European part of Russia reached the Urals. Alexander II and then Alexander III approved the decisions of the Committee of Ministers [1].

In 1886, Alexander III wrote a resolution: «*How many reports of the governors-general of Siberia I have read and I must confess with sadness and shame that the Government has so far done almost nothing to meet the needs of this rich but neglected region! And it's time, very time*» [2].

On March 17, 1891, Alexander III handed over to the heir-tsarevich (future Emperor Nicholas II) a rescript: «*I command now to begin construction of a continuous railway across all Siberia, which has to connect Siberian regions, abundant gifts of nature, with a network of internal railway communications, I instruct you to announce also My will upon your entry into the Russian land again after observing the foreign countries of the East. At the same time, I am entrusting you with commissioning in Vladivostok of laying of the permitted for construction at the expense of the treasury and the direct order of the Government of Ussuriysk section of the great Siberian railway route*» [2].

The command of this rescript was executed on May 19, 1891, when, having landed in Vladivostok, the heir-Tsarevich laid the

Pic. 1. An engraving from a photograph of the Tsarevich carrying the first wheelbarrow of land to the place where Ussuriysk railway was laid. Photo: portal «Old Vladivostok». Source: https://primamedia.ru/news/493214 [3].

Pic. 2. Scheme of Siberian railways: 1 – roads built before 1900; 2 – roads built from 1900 to 1916; 3 – ferry and ice crossings; 4 – state border [4].

Pic. 3. Scheme of Ussuriysk railway [3].

Pic. 4. Sergey Yulievich Witte (1849–1915) [6].

foundation stone there (Pic. 1) of the future Siberian railway (Pic. 2). This was the beginning of Ussuriysk railway, which runs from Vladivostok to Khabarovsk (Pic. 3).

In the spring of 1891, work began on Ussuriysk line under the leadership of O. P. Vyazemsky, but due to a lack of funds released, construction proceeded slowly.

In July 1891, a note was prepared at the Ministry of Railways, which determined time and procedure for construction of Siberian railway, as well as the required loans. The note

Pic. 5. Terminal of the station Chelyabinsk [4].

was forwarded to the Minister of Finance I. A. Vyshnegradskiy, who gave evasive answers and did not show initiative in finding the necessary funds. I. A. Vyshnegradskiy believed that Siberian railway was needed, but the country had more important issues.

The situation changed dramatically when S. Yu. Witte was appointed to the post of Minister of Finance on August 30, 1892 (Pic. 4). He showed energy and initiative in finding sources of financing for construction of Siberian railway, and proposed to divide all work into three stages. First of all, to build West Siberian section from Chelyabinsk (Pic. 5) to the Ob (1328 versts) and Central Siberian section from the Ob to Irkutsk (1754 versts), to complete construction of Vladivostok–Grafskaya section and to build a connecting branch between Ural Gornozavodskaya and Siberian railways [5].

Establishment of wine monopoly and introduction of a gold-backed ruble allowed the state, thanks to the resulting budget surplus, not to resort to emergency financing methods. At the beginning of construction, the treasury had an amount of 1 million rubles, while the preliminary estimate included 350 million rubles. The seemingly grandiose amount was eventually exceeded three times and amounted to almost 915 million rubles.

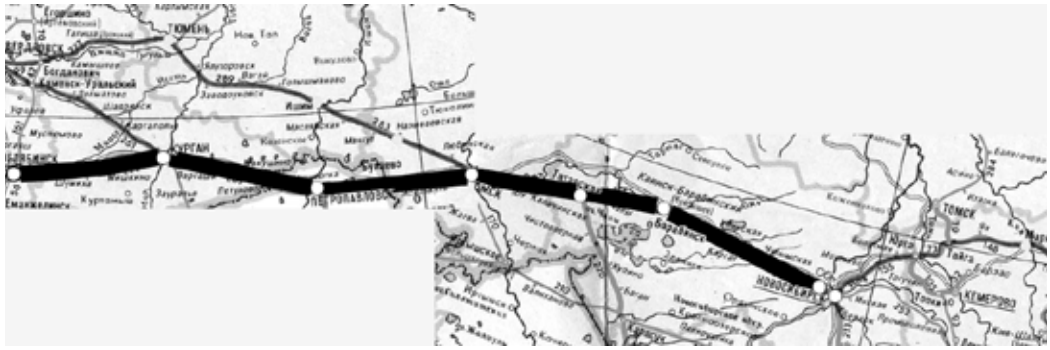
Sergey Witte proposed to establish a special supreme body – the Committee of Siberian Railway – from the ministers of the interior, state property, finance and communications and the state controller. Later, the Committee included the Minister of War, the head of the Naval Ministry and the actual privy councilor, Academician N. Kh. Bunge.

On January 14, 1893, by the rescript of Alexander III, the heir-Tsarevich was appointed chairman of the Committee of Siberian railway.

The committee met regularly and considered the issues of establishing the Office for construction of railway, timing of surveys and construction, the progress of work. At one of the Committee's meetings, the question of resettlement of peasants from European Russia to Siberia was raised in principle (Pic. 6). Emperor Alexander III approved the journal of Siberian Committee, which expressed the idea of usefulness of resettlement for national interests and the idea of the harm of artificially hindering this resettlement [2].

The Transsib had a tremendous impact on the fate of Russia. It is officially known that the annual number of immigrants to Siberia, until the 1880s did not exceed two thousand people. At the beginning of the last decade of 19th century, the number of immigrants reached 50 thousand, and since 1896, thanks to Siberian

Pic. 6. Resettlement settlement near the station Kansk [4].



Pic. 7. Scheme of West Siberian railway [6].

railway, it increased to 200 thousand, and in two and a half years (from 1907 to June 1909) about 2 million immigrants arrived in Siberia [7]. All this movement came mainly from the central chernozem provinces of European Russia. From 1897 to 1914, the population of Siberia increased from 4,6 to 7,6 million people, the population of the Far East – from 0,9 to 1,6 million. The settlement scheme has changed. Instead of the coast of rivers and highways, the predominant settlement of the area began along the highway and branches from it [2].

The project of the first section of West Siberian railway (Pic. 7) from Chelyabinsk to Omsk was considered by the Committee at the beginning of 1892. On May 8, 1892, it was approved by Alexander III, and on July 7, 1892, construction began.

At the beginning of 1893, the project of the second part of West Siberian railway was presented, and in the same spring, work began on the second part. Already on August 30, 1894, temporary traffic was opened to Omsk (Pic. 8), and laying of the track was brought to the Ob (Pic. 9) on August 19, 1895. Already on

Pic. 8. Omsk station [6].

Pic. 9. Great Siberian Route. Ob station [6].

October 15, 1895, temporary traffic was opened throughout West Siberian railway.

On West Siberian railway, under the leadership of the chief of works, K. Ya. Mikhailovsky (Pic. 10), 274 artificial structures were erected, ten depots and 38 water supply points were built. A telegraph line was built along the railway on poles, set at 20 per mile, i.e. 9–10 per kilometer, with a steel wire with a cross section of 5 mm stretched in two rows. This standard was subsequently adopted throughout the Trans-Siberian Railway [8].

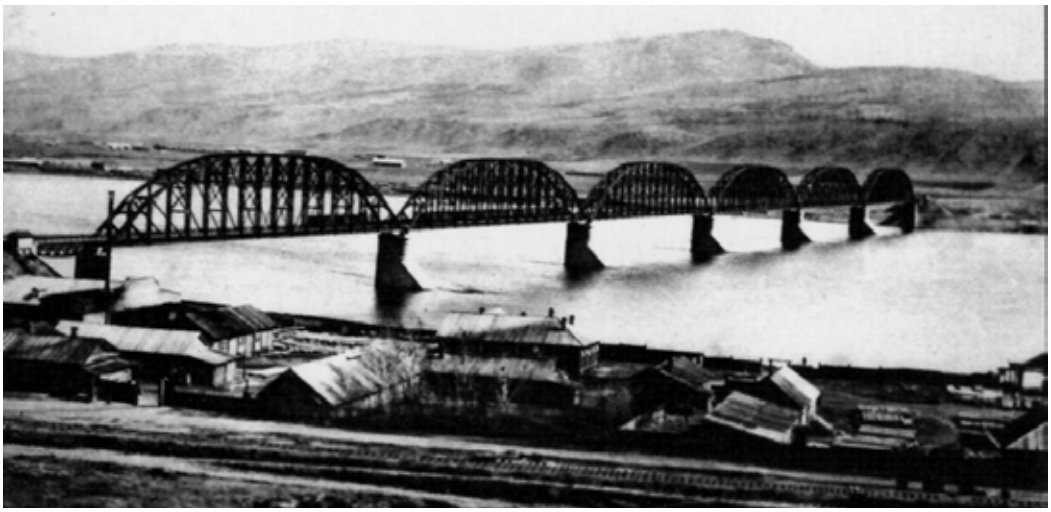
After the death of Alexander III, Nicholas II, who ascended the throne, retained the title of

Pic. 10. Konstantin Yakovlevich Mikhailovsky (1834–1909) [6].

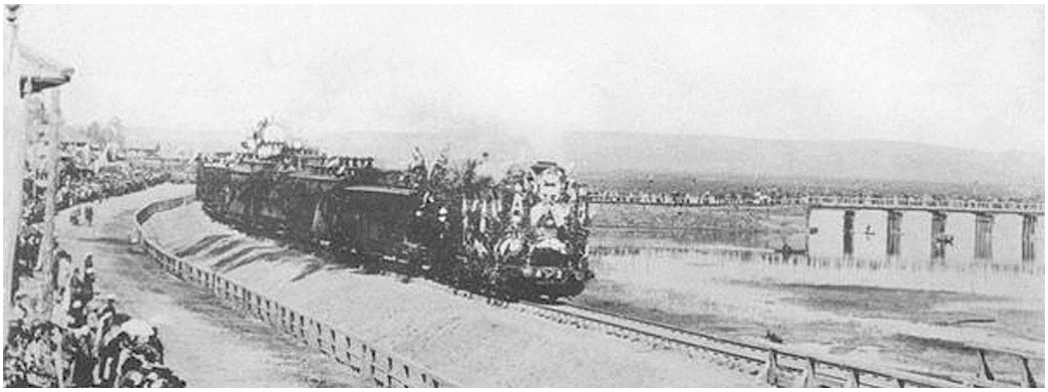
chairman of Siberian Railway Committee. 11 meetings of the Committee until December 1897 were held under the personal chairmanship of Nicholas II.

The construction of Central Siberian railway on the section from the Ob to Krasnoyarsk (711 versts) was started in May 1893 and on January 1, 1898 this section was put into operation. The bridge across the Yenisei (Pic. 11) was called the bridge of the century, because it was the first in Russia and the second on the Eurasian continent in terms of spans – 145 m. Work on remaining sections of Central Siberian Railway began in summer of 1894 and was commissioned in 1899 (Pic. 12).

Compared to Western Siberia, it was more difficult to work here because of the harsher climate. Working period, i.e. warm season, when construction could be carried out on a wide front, was here only a hundred days a year



Pic. 11. The bridge across the Yenisei [6].



Pic. 12. Arrival of the first train to Irkutsk [3].

Pic. 13. Construction of the Trans-Siberian railway [6].

(Pic. 13). Construction became more difficult and more expensive due to low population density and taiga thickets. S. Yu. Witte emphasized that the work was especially difficult in the taiga, impassable over a vast area, with the exception of rare hunting trails, and consisting of a dense mixed forest with a marshy topsoil, an average thickness of about one arshin, covered with powerful herbaceous vegetation. Work in the taiga could only be started after construction of roads consisting of a row of logs laid side by side; then it was necessary to drain the upper layers of the soil using a network of drainage channels and clear the upper layer of dead wood, needles and foliage, entangled by the roots of trees and plants [2].

It was difficult to find persons in this area who would undertake execution of contracts and supplies. The work supervisor, N. P. Mezheninov (Pic. 14), was very demanding about selection of contractors for complex work and preferred to conclude contracts only with those who had already proven themselves on the positive side [9].

Pic. 14. Nikolay Pavlovich Mezheninov (1838–1915) [6].

During construction of Central Siberian Railway, Tomsk remained on the sidelines. On July 29, 1895, it was allowed to build a branch to Tomsk. Work began immediately, and on July 22, 1896, the first train followed the branch, and temporary traffic was opened. On January 1, 1898, Taiga–Tomsk branch (82 versts) (Pic. 15) was put into operation.

In the summer of 1896, headed by A. N. Pushechnikov (Pic. 16), work began on the section from Irkutsk to Lake Baikal. It was

Pic. 15. Taiga station [6].

Pic. 16. Alexander Nikolaevich Pushechnikov (1850–1916) [3].

difficult to work in difficult environmental conditions. Floods from storm water, permafrost, mountainous terrain – all this made it necessary to quickly change the position of the route, the marks of embankments, the number and location of openings of culverts. This part of the Transsib was accepted into permanent operation in 1901 [10].

After the Russo-Japanese War of 1904–1905 the connection of Ussuriysk line with the Trans-Baikal railway along Chinese-Eastern Railway became unreliable due to transfer of South Manchuria to Japan. Therefore, the Chairman of the Council of Ministers S. Yu. Witte proposed to return to the project of Amur railway again.

Amur main line was divided into three sections: western, middle and eastern. In 1907, work began on the western section from Kuenga to Ugryum (636 km). The construction management of this section was based in Nerchinsk, which was headed by E. Yu. Podrutsky. Construction of the western section was completed in 1913. A train with a church-car was the first to travel along the railway (Pic. 17). Prayers were held at all stations.

Construction of a middle section 675 km long – from st. Kerak to st. Robin by the Bureya River – led by V. V. Tregubov. Deaf taiga and vast swamps seriously impeded work in this part of the Transsib. The labor of convicts was used here. When passing the swamps, a temporary railway was first built on a wooden base,

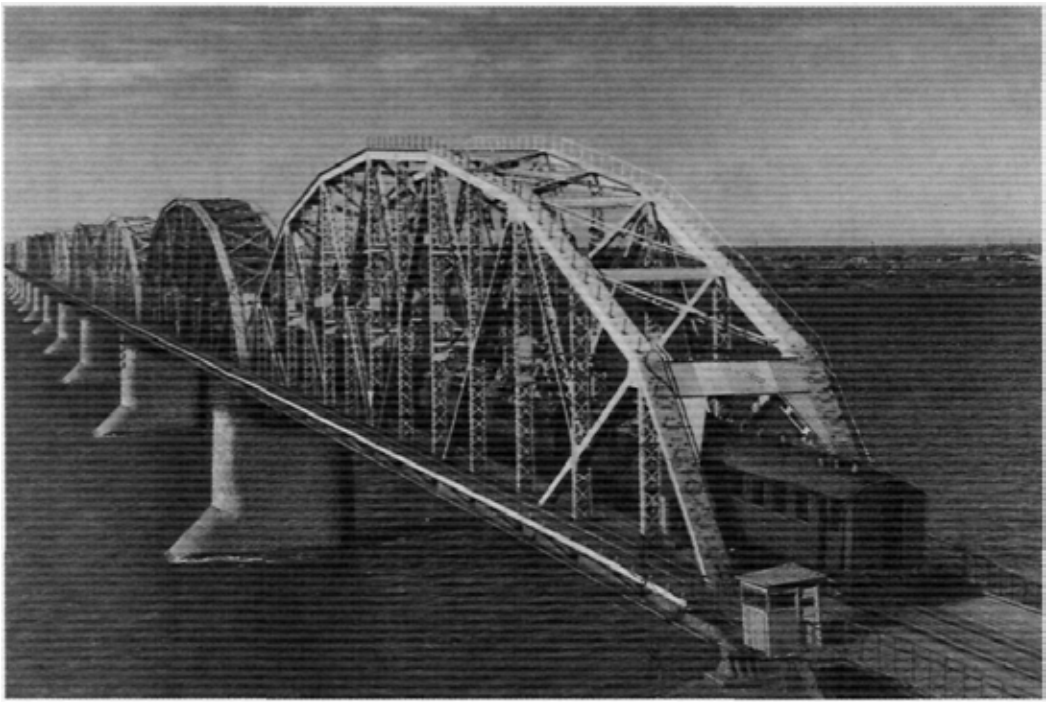
Pic. 17. Church-car on the section Bochkarevo–Blagoveshchensk, 1913 [3].

representing a system of longitudinal and transverse slopes. The soil was tumbling along it, which was poured onto the log floors. Often, whole links of the finished road disappeared without a trace in the marshes, and work was resumed again. In these conditions, it was necessary to create a complex network of ditches and canals. The plans for construction of the section included construction of a 108 km branch to Blagoveshchensk. In 1914, the entire middle section of Amur railway was commissioned.

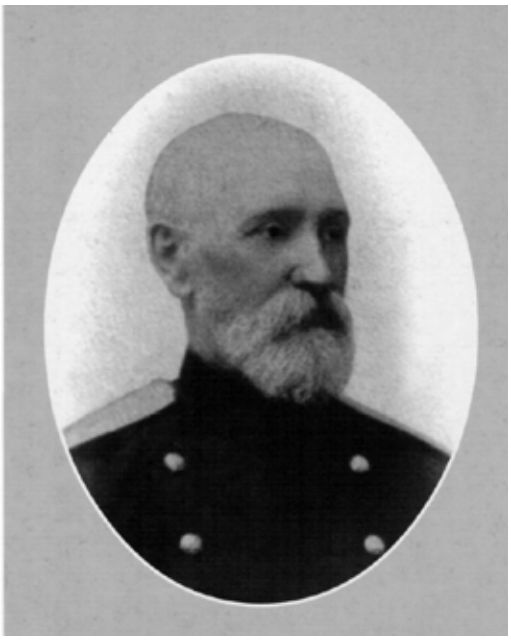
The last part of the railway was the eastern section with a length of 497 km – from Malinovka to Khabarovsk. The construction of the line in 1912 was started by M. S. Navrotsky, but a few months later he was replaced by A.V. Liverovsky, who headed construction for four years. The eastern section, unlike others, was built using the economic method. The entrepreneurs were given the responsibility of building a bridge across the Amur (Pic. 18). A. V. Liverovsky succeeded in mechanizing earthworks on a large scale. In this case, three single-bucket and seven multi-bucket excavators were used, manufactured at Putilov plant. For transportation of soil and other materials, trucks were used for the first time. On many kilometers of shallow bogs, roadbed was erected in an original way. In winter, rails were laid here on the ice, and then sandy soil was poured along this winter road. In spring, after settling, a rail track was laid on it and multi-bucket excavators were launched, which excavated excavations on both sides of the track, laying suitable clay soil into the body of embankment to design marks.

On the section, eight tunnels had to be built for two tracks. One of them, 1,5 km long, was pierced through the rocks of Khingan; the other, 820 m long, turned out to be watery; the third, 420 meters high, passed through the strata of rocks with permafrost; the fourth – in soils with aggressive sulfuric acid waters. The manufacturers of works on construction of tunnels were A. N. Passek and V. N. Pisarev, who widely used new devices and mechanisms in construction: compressors, pneumatic perforators, rock crushers, etc. In 1915, the last section of Amur railway was commissioned.

In the names of many stations and sidings of the Trans-Siberian Railway, the names of the Minister of Railways, Prince M. I. Khilkov (station of Khilkov), Amur general-governirs A. N. Korf (station Korfovskaya) and N. I. Grodekov (station Grodekovo) etc. Stations Kurdyumovka, Rozengartovka, Sviyagino, Dermidotontovka, etc., passing



Pic. 18. Bridge across the Amur near Khabarovsk [6].



Pic. 19. Nikolay Pavlovich Petrov (1836–1920) [8].

points Knorring, Drozdov, Kraevsky, Ryzhev, Eberhard, Snarskaya, Kruglikovo, etc. named after railway engineers [11].

A significant drawback of Siberian railway was one track, which is why it could not pass more than eight pairs of trains per day. In 1903 professor N. P. Petrov (Pic. 19) surveyed Siberian railway and identified the mountainous sections Achinsk–Nizhneudinsk and Zima–Polovina, which limited the carrying capacity. He substantiated the need to reduce slopes by bypassing difficult places. However, these reconstruction measures were not enough. In October 1904, a decision was made to build a second main track on Siberian railway. The technical conditions for reconstruction of the railway were developed by N. P. Petrov [12]. The works began in October 1904.

And ten years after construction of the railway in Siberia, construction of second tracks on the Trans-Siberian (1907–1910) began, which turned into a radical reconstruction of the existing line and made it possible to dramatically increase the capacity of the main line. The direction has completely become double-track. The construction of the Trans-Siberian Railway was completed in 1916 (Pic. 20).

About seven thousand artificial structures (tunnels, bridges, viaducts, pipes and retaining walls) were built on the Transsib, including West Siberian – 1184, Central Siberian – 1480,

Pic. 20. Scheme of the Trans-Siberian main line [8].

Circum-Baikal – 582, Transbaikal – 1183, Ussuriisk – 359.

During construction of the Trans-Siberian Railway, the Committee for Siberian Railway did a great job of exploring Siberia and the Far East. Geological expeditions went along with the builders. They discovered deposits of coal, iron ore, graphite, jade. S. Yu. Witte, who introduced the gold standard during this period, especially insisted on large-scale prospecting for gold deposits. Expeditions discovered and mapped gold deposits in North-East Siberia. Eastern Siberia, primarily Vitim and Olekma mines, yielded up to 75 % of the gold mined in Russia.

The construction of the main line contributed to rapid development of the once backward regions of Siberia and the Far East. Industry and agriculture received a powerful incentive to increase production and expand the sales market. The towns and villages through which the highway passed were transformed [13].

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