Unique Objects of Industrial and Transport Architecture of Khabarovsk (Early 20th Century)

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Abstract. Studied were the drawings of the students of the Architecture Department of Pacific National University, which depict the appearance of historical objects in the city of Khabarovsk. This article concerns itself with drawings depicting unique objects: the refrigerator of Count Ressegye and the old "tsar’s" bridge across the Amur River near the city of Khabarovsk, the history of which is little known outside the Far Eastern region. The article reveals new visual information about these objects of architecture.

1. Introduction

Very few objects of industrial and transport architecture were built at the beginning of the 20th century in Khabarovsk. Among them, there are unique buildings, interesting from both an architectural and historical standpoint. They are undoubtedly of great interest to the upcoming generation of architects, who also treat these buildings as objects for the purposes of academic drawing. The methodical collection of the Department of Architecture and Urbanism of The Institute of Architecture and Design at Pacific National University (PNU) includes a number of student drawings of industrial and transport structures of Khabarovsk in them. Over the years, these drawings have become a valuable record which captures the state of architectural objects during the execution of the drawings. It was this methodical collection of drawings that served as the basis of our study. The article is illustrated with student drawings from this collection.

2. Literature review

This study is related to the collection and preservation of the methodical collection of student drawings of the Architecture Department of PNU. Many years of work, which made it possible to track changes in the architectural environment of the city of Khabarovsk based on collected materials, are reflected in the monograph and textbook of the teaching staff of the Department of Fine Arts of PNU [1, 2]. Information about the unique object of the industrial architecture of the city of Khabarovsk described in the article - the refrigerator of Count Ressegye - is contained in the Catalog of Cultural Heritage of the Khabarovsk Territory [3], the monograph of the architectural historian N. P. Kradin [4] and in some online publications [5, 6]. The bridge over the Amur River near the city of Khabarovsk is a much more famous object of transport architecture. The history of its design, construction, and reconstruction is reflected in a number of publications: a collection of documentary materials compiled by V.F. Burkov and V.F. Zuev [7], the book Trans-Siberian and Baikal-Amur Railways - a bridge between the past and future of Russia [8], in the publication of the Russian news...
agency History of the Trans-Siberian Railway [9], in numerous online publications [10, 11, 12, 13 and others]. A number of materials in print and online sources are devoted to little-known details and newly discovered facts from the history of this unique object [14, 15, 16, 17, 18, 19, 20]. Biographical information about the engineers who created the unique bridge is contained in the monograph by the researchers N. P. Kradin and M. E. Bazilevich [21].

3. Materials and methods of research
The main material of the study was the drawings by students collected over four decades by the methodical fund of the Department of Architecture and Urbanism of the Institute of Architecture and Design. The main research methods were the selection of drawings depicting unique architectural objects of the city of Khabarovsk and their study in the context of the history of the development of the Russian Far East by Russians. In the course of the investigation, archival materials and local history literature were studied. The method of studying Internet resources was used to obtain the necessary information. The method of describing the research results with the purpose of publication in scientific journals with the goal of popularizing among specialists the knowledge about the little-known objects of architecture and pages of history of the Far East, was also used.

4. Results
The article describes two unique constructions in the city of Khabarovsk. One of them is the bridge over the Amur, which is better known in its reconstructed form, but it is important to carry its former history. Another object is a refrigerator known only to local architectural historians. Student drawings will help to give a visual representation of these objects.

4.1. The Refrigerator
The building of the refrigerator is depicted in Figure 1. It is unusual both in the place of construction and in shape. Located on the edge of a steep slope of the Amur coast, the construction is quite an original example of a small industrial building built in the Neo-Russian (Pseudo-Russian) style. Squat volume does not give reason to call it an architectural dominant, but the specific style of the facades distinguishes the building from the background of the surrounding buildings and turns it into an accentuated artistic element of the environment. In its technical solution and technique, the refrigerator was a unique industrial object of its time. The implementation of advanced technologies in the food storage industry at the beginning of the 20th century in the Far East was carried out by “the Association of Refrigerators for Khabarovsk, Nikolaevsk and Harbin.” The company was founded in 1912 by an Austrian subject Count F. O. Ressegge with the financial support of German funds. It should be noted that a general feature of the Far East at the beginning of the 20th century was the emergence of a significant number of companies created with the help of foreign funds (for example, the Kunst and Albers trading house, a branch of the Singer company, etc.) [4, p. 39]. The building of the refrigerator in Khabarovsk was built in 1913 and fitted out with German equipment. Four freezers with 13 to 20 tons capacity were installed in the workshop. In addition, there was a storage capacity for products weighing 40 thousand poods (Russian measure of weight) capacity. Unfortunately, the operation of the refrigerator turned out to be unprofitable. Due to the high cost of fish, it was not possible to buy enough of it to fill all the storage areas. Therefore, trade affairs of F. O. Ressegese’s company in Khabarovsk were not particularly successful. The obtaining of Russian citizenship by Count Ressegge in 1914 and his obtaining the rank of merchant of the second guild did not change things for the better. The same year the building was sold to a new owner, an Austrian citizen, Charles Reginand Berkil [3, p. 53, 5, 6]. C.R. Berkil owned the refrigerator for less than ten years. Before the municipalization in 1922, the building was shortly rented by a private entrepreneur E. Kh. Elenev [6].

After municipalization in December 1922, an inventory of the building was made: “... Stone, one storey, under an iron roof, equipped with refrigerators and cameras, in good working order. An extension (stable) to the refrigerator is made of boards, on pillars, under a roof of galvanized corrugated iron, with a hayloft. It is designed for the storage of state products” [4, p. 39 - 40]. Until
1925, the building was owned by the military department, then by municipal administration. In 1928, a sausage factory was opened in the refrigerator’s place, while refrigeration equipment was modernized. A new one was delivered from Leningrad. In 1930, the steam installation was replaced by an electric one. Eventually, the capacity of the factory was no longer enough for the growing city, and the sausage production was transferred to a meat factory built at a new site. In 1939, a fish-smoking factory was opened on the site of the former refrigerator. At the end of the Soviet era, the purpose of production facilities and warehouses changed several times. Then, in the early 1990s they were passed on to Amur-Trading, a Russian-Japanese company. This resulted in the modernization of the complex [6].

From an architectural standpoint, the refrigerator is a fairly rare example of a stylish industrial building (Fig. 1). This is a nearly square 34 x 32 meter case. With such a configuration and one storey height, it is impossible to achieve good illumination of internal spaces through regular windows. Under these circumstances, the builders of the refrigerator resorted to the structure of a skylight, the volume of which rises along the comb of the gable roof and appears to be a very expressive part of the architectural composition. The two-slope roof of the lantern is cut through four ventilation columns of a pyramidal shape with holes on all four faces. The same columns are located at the bottom of the roof slopes.

Figure 1. Refrigerator. View from the north.  Figure 2. Refrigerator. Fragments.

It can be clearly seen in Figure 1 that the ends of the building are divided by flat blades. Their location emphasizes the division of the inner space of the building with walls and piers. A narrow gallery adjoins the building from the northeast side. It leads to the entrances to cameras. The street facade of the gallery is also clearly visible in the picture and presents itself as the most attractive part of the entire building. The facade is divided into four parts, each of which has its own compositional solution, subject to a unified style. The nature of divisions, forms and details of decoration fits in with the Neo-Russian style, which was one of the leading styles in the Russian architecture of the late XIX and early XX centuries. Details that were typical for the Neo-Russian style can be seen in Figure 2: the pyramidal completion of some volumes (for example, the southeastern part of the building), the keel-like frames of window and doorways, bellied columns serving as window racks. The different composition of each part allows us to overcome the monotony of the elongated facade of the low building, the integrity of the composition of which is ensured by the presence of connecting elements that give the building a special appeal and expressiveness.

The drawings of students A. Lobkov (Fig. 1) and V. Danchenko (Fig. 2) were made, respectively, in 2015 and 2013 and represent the current state of the refrigerator building, which has almost completely preserved its original architectural appearance.
4.2. The Amur bridge

Figure 3, a drawing made by I. Znamenok in 2003, depicts a fragment of the truss of the old “royal” Amur bridge. This amazingly beautiful work of transport architecture was preserved during the reconstruction of the bridge from 1992 to 2009 and is currently located as the main exhibit in Museum of the History of the Amur Bridge, which opened in 2010. The span is 127 meters long, which rises to 60 meters above the surface of the Amur, and now makes a grand impression, which the drawing conveys quite well. Eighteen such bridge spans lasted three decades longer than estimated and withstood the load of modern railway trains, three times higher than the one they were initially designed for. The exact drawing of the bridge conveys the grace of its design, which made it a true work of architecture, comparable to the most famous architectural symbol of Paris, the Eiffel Tower. The Amur bridge is a grandiose embodiment of Russian technical genius. The practical significance of the bridge was, and remains, of great importance. In 1900, Professor L. D. Proskuryakov’s project of the truss of the Amur bridge was awarded a gold medal at the World Exhibition in Paris [19]. At the time of its construction, it was the largest bridge crossing in Eurasia.

Figure 3. The girder of Amur’s bridge.

The history of the design, construction and operation of the bridge is fairly interesting and little known outside the Khabarovsk Territory. The first surveys on the construction of a railway bridge in the Khabarovsk region began in 1895, but soon ceased due to the construction of the Chinese Eastern Railway. The question of building the Amur Railway and, accordingly, the bridge over the Amur River was raised once again in connection with the defeat of the Russian Empire in the Russo-Japanese war [9, 10]. In 1906, survey work for the construction of the bridge was resumed and was not interrupted until the final place of construction was chosen. A competition for the best design of the Amur bridge was announced, and leading bridge engineers took part in it. At the same time, the option of building a tunnel under the Amur was also considered. Finally, the design linked to Osipovka village (located 8 km from Khabarovsk) was recognised as the best.

Lavr Dmitrievich Proskuryakov and Grigory Petrovich Perederiy’s project won the competition. Proskuryakov designed the main part of the bridge, Perederiy designed a reinforced concrete arched overpass (western passage to the bridge). The project was largely innovative. It provided for an unusual combination of reinforced concrete and steel: the Amur was blocked by a chain of metal trusses, that were supposed to be followed with a reinforced concrete arched overpass over Amur’s binnacle.
L. D. Proskuryakov was an outstanding Russian engineer, scientist and professor (1896). He was one of the largest bridge builders in Russia, a graduate of Saint Petersburg Institute of Railway Engineering. In addition to the Amur bridge, the bridges across Narva, Volkhov, Oka, Yenisei and other rivers were built upon the projects of Proskuryakov [21, p. 164].

G.P. Peredriy also graduated from Saint Petersburg Institute of Railway Engineering (1897), where he first worked as a teacher, and then as the head of the Bridges department, and rector. He was a prominent Russian scientist in the field of bridge building, a corresponding member of the USSR Academy of Sciences, a laureate of the Stalin Prize (1943). He was a co-creator of many bridges and overpasses. Along with the arched overpass, he designed concrete supports for the Amur Bridge [21, p. 156-157], which are still in operation after the reconstruction of the Amur bridge.

The construction of the bridge was led by railway engineers B. I. Khlebnikov, V. A. Pinus, M. I. Malyshev [7, 12]. A civil engineer A.A. Lushnikov worked on the erection of the supports. A big contribution to organization of work was made by A.B. Liverovskiy, who was the head of the eastern part of Amur Railway.

The construction of the bridge took place on July 30 (August 12), 1913 in a festive atmosphere [11]. The governor general N.L. Gondatti and other officials of Priamurskiy territory were present at the event. In accordance with the project, the bridge was supposed to be commissioned on October 1, 1915. Only 26 months were allocated for construction, but a number of circumstances delayed the construction for a whole year. Metal trusses for the bridge were made in Warsaw at K. Rudzsky and Co. engineering and iron foundry plant, then, in dis-assembled state, they were delivered to Odessa, from there by sea to Vladivostok, where they were loaded onto railway platforms and transported to Khabarovsk. The build-up of eighteen trusses took place on the building site. Miners, caissons, masons, riveters were involved in the process [12]. All of them were housed in a town located on both sides of the Amur river and near the constructed bridge.

Granodiorite stone for bridge piers was delivered from Korfovsky and Zabelevsky quarries located near Khabarovsk, as well as from a basalt quarry on the Tunguska River [13]. There are student drawings of the basalt quarry on the Tunguska River in PNU’s methodical collection (Fig. 4). The quarry was developed on a slope of an ancient extinct volcano located in swamped lowlands of Amur River region. The structure of the quarry with its ingrained ball-shaped volcanic bombs can be seen on the said figure.

The First World War caused significant difficulties in the construction of the bridge. Until recently, it was believed that in the fall of 1914, the German cruiser Emden sank the Korteyk steamer with the last two trusses in the Indian Ocean. According to another version, which appeared a hundred years later based on the study of archival materials, the Perm ship, which transported these trusses, was sunk in the port of Colombo on July 25 (August 7), 1914 as a result of a fire [14]. It was one way or another, but the lost trusses had to be ordered again in Canada, which did not take part in the war, and from there transported to Vladivostok [12].

Another circumstance that slowed down the construction was that experienced workers were mobilized for the war and were replaced by random people and convicts. In total, about 5,000 people were involved in the construction of the bridge. The work was carried out day and night with 10 hour shifts [13].

Despite the difficulties, the construction of the bridge was completed in record time: in 3 years and 3 months [13]. Such pace could not be achieved in later times with the very modern technology. To put this into perspective, the 1,500-meter bridge across the Amur on the BAM by Komsomolsk-on-Amur, was built from 1969 to 1975, that is six years [8].

The 2600-meter railway bridge over the Amur River was opened for traffic on October 5 (October 18 in a new style) in 1916. It cost 13.5 million rubles, an amount comparable to all military expenditures in 1916 (15.3 million rubles) [13].

Neither the whole country nor the Far East managed to feel the immediate economic effect of putting the bridge into operation. The revolution and the Civil War interfered. On April 5, 1920 [13] (according to other sources, on the night of April 20) [15, 16] two spans (Nos. 12 and 13) of the Amur
bridge were blown up by partisan units [13] retreating from Khabarovsk in order to cut off the path to the left bank for the advancing Japanese interventions. The Trans-Siberian Railway turned out to be torn for five years. Restoration works began when the Soviet power consolidated in the Far East. The through traffic on the highway was reopened on March 22, 1925. The costs of restoring the bridge (a total of 750,000 rubles, according to the estimates of winter works in 1923–1924 and 1924–1925) are still covered under the “damage caused by the intervention” clause [18].

5. Conclusion
The Tsar’s bridge served the country for almost a century. In the 1980s, the single-track was no longer meeting the requirements of railway’s capacity and in 1991 reconstruction works began. In the 1999-2000s, when rail and road traffic opened along the new part of the bridge, the dismantling of the trusses of the royal bridge began. They were replaced by new ones, and on November 7, 2009 the second part of the railway bridge was put into operation. The last dismantled truss was sent to a museum, and the reconstructed bridge continues its work to this day. The refrigerator is used for its intended purpose after a hundred years. Let us hope that many more future architects will master the experience of their predecessors, who created their remarkable creations on the Far East, through educational drawing.

6. References
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