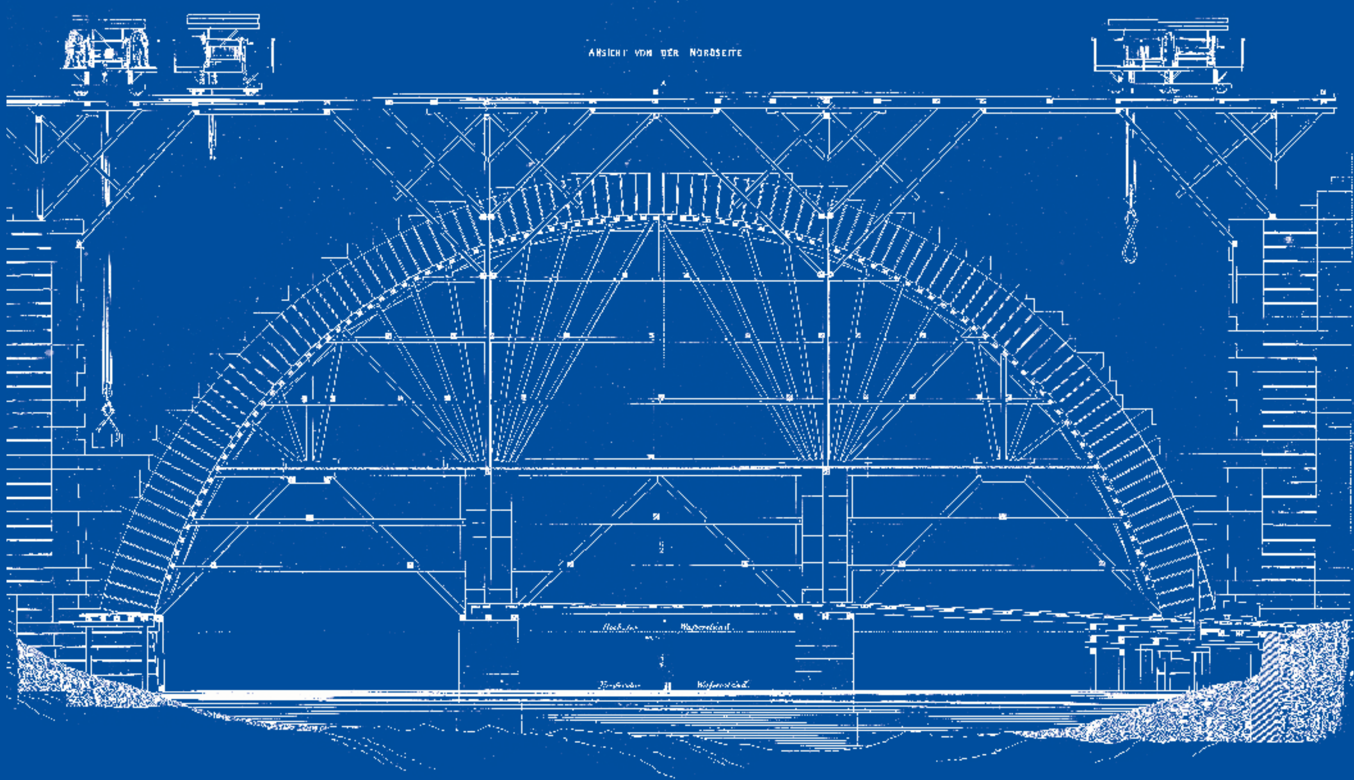
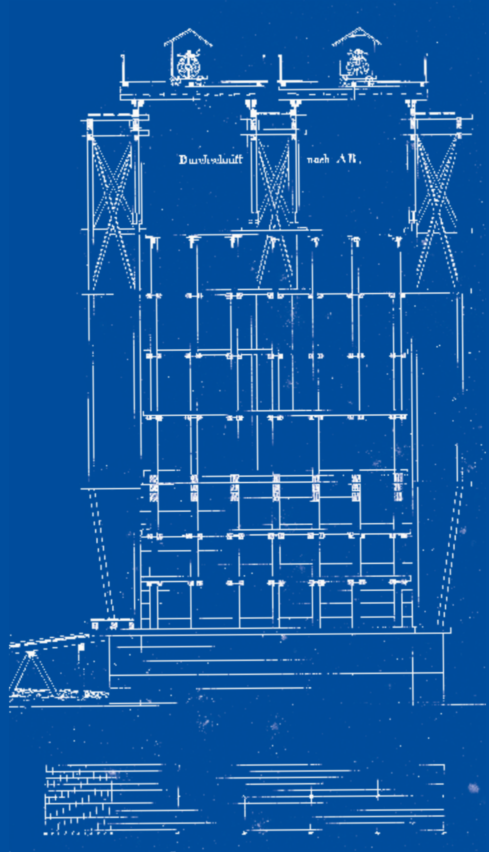
Proceedings of the 8th International Congress on Construction History
Stefan Holzer, Silke Langenberg, Clemens Knobling, Orkun Kasap (Eds.)



Construction Matters



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Exploring the Gulag as built heritage: Construction techniques and architecture of the Chtchoutchi camp in Siberia

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Abstract: In the early 1950s, Joseph Stalin ordered the construction of a railway line in the Far North known as the Polar Mainline or Project 501–503. Its purpose was to connect Tchum to Igarka, spanning 1400 km of tundra and crossing the Ural Mountains. The construction of the railway also required the establishment of camps to house the inmates and guards responsible for their custody. Over 200 camps were planned along the railway track. In 2019, a Russo-Swiss expedition set out to study one of these camps in the Yamal Province, the Lagpounkt 93, known as Chtchoutchi.
This article discusses the historic and geographic context of the Chtchoutchi camp before describing its architectural features. Based on the preserved remains, the construction technique of the buildings is presented in detail. The characteristic use of modular and partially prefabricated elements allowed the mass production of the main components (walls, doors, windows) off-site and accelerated the on-site construction, which was mainly limited to the assemblage of normed pieces. Nevertheless, a close comparison of archaeological remains and archival documents suggests that despite the numerous similarities, every camp was unique.

Introduction

The built heritage of the Gulag, which is a large, heterogeneous collection of constructions, infrastructure, and built landscapes, has rarely been studied within the framework of its construction history. The difficult access to the sites, their large number, the diversity of their shape and nature (Jurgenson 2017) as well as the political and commemorative sensitivity of this chapter of recent Russian history (Ulturgasheva 2015; Flige 2021) have hindered an in-depth analysis of the remains.

The so-called Chtchoutchi camp in the Siberian Yamal region is part of this vast heritage and will be the subject of a detailed analysis in the present article. This prison camp, erected in 1950, is number 93 of the 140 camps of Construction site 501, dedicated to the installation of a polar railway track connecting the city of Salekhard to the river Yenisey (Gritsenko and Kalinine 2010). (Fig. 1) It housed around 300 inmates in charge of laying a section of the track.

In the summer of 2019, this camp was the focus of a Swiss-Russian scientific expedition.

Its aim was to study the camp in its entirety from a multitude of angles, including a focus on construction techniques. For this purpose, an archaeological approach based on the documentation of the preserved remains was chosen (Myers and Moshenka 2011; Blin 2016).

The camp and its environment were subjected to an intensive survey. The building remains have been systematically described, photographed, and localized on the application iDig, with an additional photogrammetric coverage of select structures. The results obtained have been compared to the available archival documents, including the written account of an inmate detained in the camp.

The results of this research have been partially published online (Changing Arctic Team. n.d.) and in a collective book (Verdan 2021).

Figure 1. Map of the Yamal region and Construction sites 501/503 (J. André).

1. Chtchoutchi camp in context

1.1. Historic context: Construction sites 501–503

At the end of the Second World War, the Soviet government was convinced of the necessity to reinforce territorial defenses in the North, secure the northern maritime route, and facilitate the transport of resources from the large Siberian mining complexes, such as the mine in Norilsk (Mildenberger 2000, 408–10; Mote 2003, 52–53). In order to do so, they planned a railway track in the Siberian North to complement the Trans-Siberian railway. On December 26, 1946, Joseph Stalin convened a ministerial council during which it was decided to build a railway between Vorkuta and a deepwater port in the Ob estuary (Gritsenko and Kalinine 2010, 22). On January 29, 1949, the project was modified to comprise a new port on the Yenisey. The undertaking required the construction of a 1,250 km long railway track through the tundra (Gritsenko and Kalinine 2010, 39). (Fig. 1) The line was expected to be operational in 1955.

The construction sites or ITL (*Ispravitelno-Troudovoï Lagueria,* Corrective labour camps) no. 501 and 503 were placed under the Chief Directorate of Railroad Construction Camps (GULZhDS). As a priority, they absorbed important resources and a large labour force: in 1949, the project occupied more than 48,000 inmates, while almost 300,000 convicts participated in the construction throughout its entire duration.

However, at the end of the year 1950, the delays, immense costs, and technical difficulties raised doubts about the feasibility of the railway. Therefore, the means allocated to Construction sites 501 and 503 were progressively decreased. After the death of Stalin on March 5, 1953, the project was stopped and definitely abandoned in November of the same year (Mildenberger 2000, 415–16). By that time, 800 km of the railway had already been constructed, yet approximately 600 km was still pending. The abandoned track was quickly dubbed “Dead Road”.

1.2. Geographic context

The Construction site was established in the Yamalo-Nenets Autonomous Okrug, a region in Northern Siberia, located around the Arctic Circle. The railway was supposed to connect the Ob estuary on the Kara Sea to the Yenisey estuary. To cross the river Ob, the train needed to be transported by ferry in summer, while the tracks were laid directly on the ice in winter. Between the two rivers, the railway line crossed a landscape alternating taiga and tundra.

The climatic conditions were disadvantageous for the construction and maintenance of the infrastructure along the track. Although the vegetation yielded birches and larches, they were not suitable as building material. Due to the low temperatures, fluctuating between -29 °F in winter and 50° F in summer (Amos and Logeais 2021), the trees grew at a slow rate and maintained a small stature over decades. The construction materials therefore needed to be imported from warmer regions over long distances. Furthermore, the discontinuous permafrost underground threatened the stability of all buildings, as they needed to withstand important shifts of the ground twice a year (Bond 1983, 121).

Chtchoutchi camp itself was set in a swampy territory, shaped by alluvial sand. It was surrounded by small lakes and ponds. The exact location of the camp was carefully chosen: it was constructed on a slight elevation of the landscape (with a slope of 1 m), protecting it from the overall humidity of the region. (Fig. 2)

1.3. Sources and testimonies

In addition to the building remains documented during the fieldwork campaign in 2019, several other sources provide information about the camp’s history. Various regional and federal archives contain documents concerning the Construction sites 501/503, which have been used in several analyses of the overall building project. While they do not mention Chtchoutchi, life within this specific camp was described in detail by one of its occupants, Ivan D. Marmanov (1931–2020), one of the many Gulag prisoners who wrote their memoires (Marmanov 2008; French translation of the chapter about Chtchoutchi in Marmanov 2021).

2. The camp and its buildings

2.1. Layout and general organization

The *lagpounkt* 93 was constructed at the place traditionally called Chtchoutchi (Щучий, pike fish), where a siding needed to be installed in order to allow trains to cross on the track section Salekhard–Nadym (N 65.697292, E 71.765636). It was located 11 km west and 2,5 km east of the neighboring camps (Verdan, André 2021, 59–61).

Chtchoutchi camp was built in 1950, when Construction Site 501 moved from Salekhard towards Nadym. It was definitely operational in April 1951, as a celebration of the completion of the bridges was organized on the site (Marmanov 2021, 75). As confirmed by two archival documents from March and July 1952, the camp was already abandoned less than one year later (Verdan, André 2021, 60; Samuilov 1952).

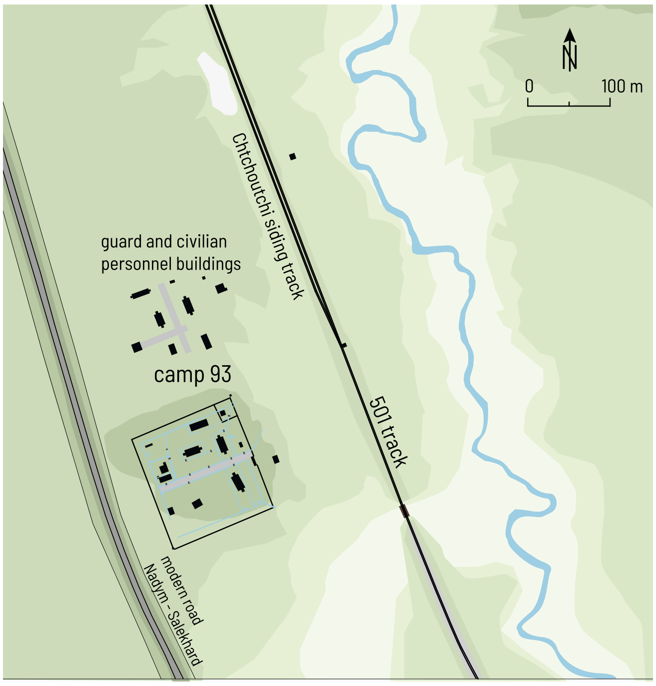

Figure 2. General plan of Chtchoutchi camp (J. André).

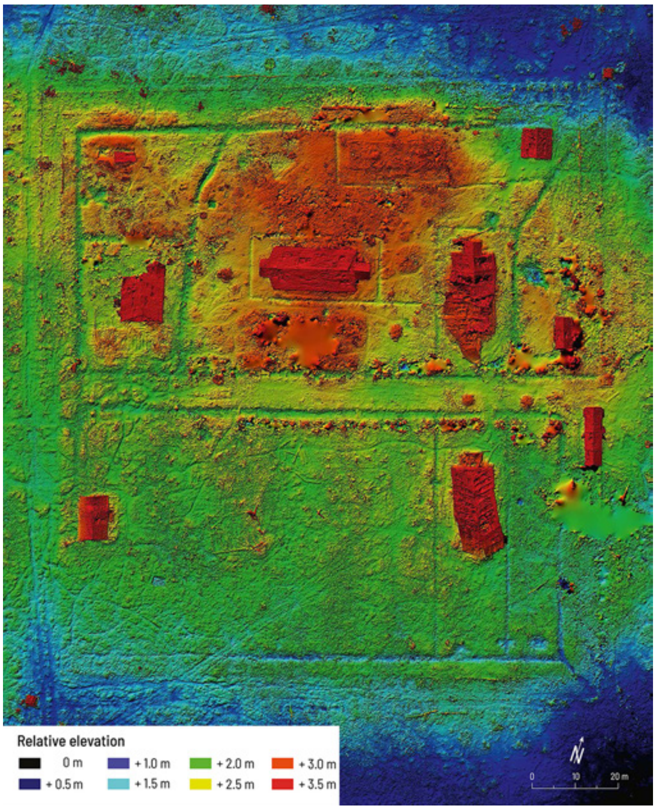

Figure 3. Digital elevation model (DEM) of camp 93 (June 2019). The picture helps to identify the elements hidden by the vegetation, such as the drains (J. André).

The camp was composed of two separate buildings groups. (Fig. 2) The dormitories as well as the buildings for the guards and staff were located in the north. They were built with the same techniques as the barracks for the inmates described below, but their interior provided more privacy.

The actual camp, "the zone" in the Gulag vocabulary, was an enclosure delimited by barbed wire further south. The following description concerns this second building block.

The enclosure of barbed wire, which in itself constituted the camp, was the first built structure on the site. It was composed of wooden posts with a height of 3.5 m, planted at a regular distance of 3 m, which supported a barbed wire fence. At a distance of 5 m on either side of this enclosure, a simple wooden rail defined the "forbidden zone". This area was monitored by two watchtowers located at opposing outer angles of the enclosure.

The entire zone was structured around a large central alley, which led to a gate opening onto the railway construction site. Like most of the buildings, this alley was flanked by two hollow drains to evacuate water. (Figures 3–4) Small wooden footbridges were built by the prisoners to facilitate circulation within the camp (Marmanov 2021, 76).

2.2. *The buildings of the "zone"*

Most buildings were located in the northern half of the camp. They fulfilled the fundamental needs of the residents. The prisoners were accommodated in dormitories with two large rooms, built for a total of approximately 100 people; three such buildings were discovered in Chtchoutchi. (Fig. 4, B4, B5, B15) The kitchen (B6), the refectory (B14?) and the latrines (B9) as well as a kiosk (*lariok*) (B2), where the inmates could buy consumption goods or store their property (B2), were also destined for use by the prisoners. Several administrative buildings served for work and to assure a smooth running of the camp. (Fig. 4, B7, B8, B10)

The guardhouse next to the entry gate, accessible from outside the camp, was destined for the guards. The narrow corridor within the building enabled them to search the inmates one by one as they left or entered the camp. (Fig. 4, B1) The disciplinary isolation unit (*shtrafnoy izolyator or SHIZO*), separated by an internal enclosure, was located in the North-eastern corner of the camp and was used to confine inmates who did not meet the requirements or had committed an infraction. (Fig. 4, B3) It can be considered a prison within the prison, composed of a guard room, two individual lockups, and a larger cell.

3. The architecture of the buildings

Except for the disciplinary isolation unit, all buildings were constructed from the same materials and with similar techniques (Muschietti 2021). The central barracks are among the best-preserved buildings of the camp and will therefore serve as an example in the following description. (Fig. 4, B4, B5)

3.1. *Foundations and walls*

The buildings sat on wooden posts with a roughly carved point, embedded deeply into the ground (diameter of 30 cm, more than 50 cm depth). Such posts were used to support the angles and the central colonnade, and were also placed in regular intervals below the external walls.

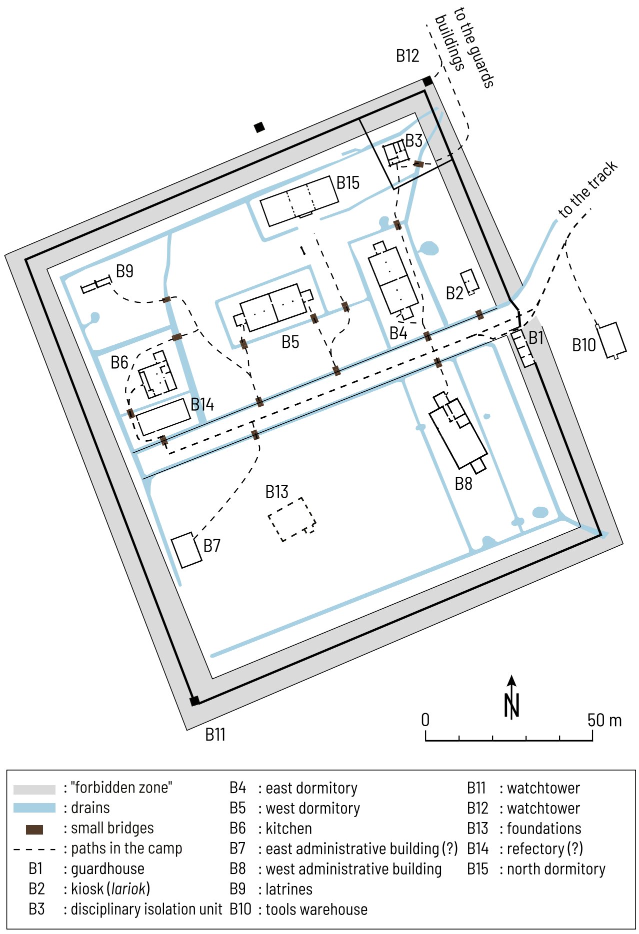

Figure 4. Detailed plan of Chtchoutchi camp (J. André).

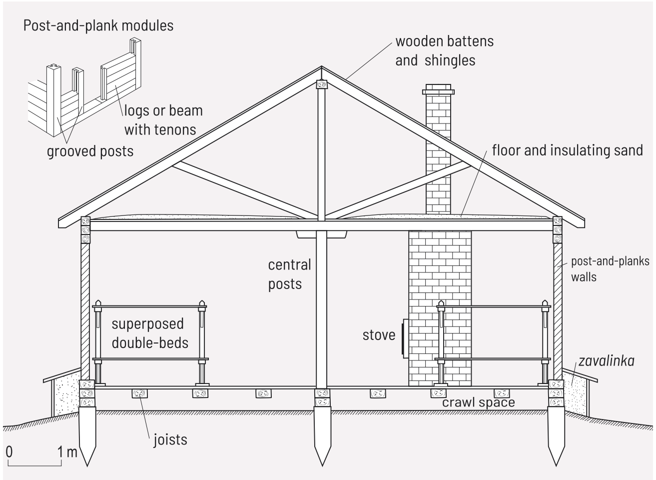

Figure 5. Schematic cross-section of a barracks (J. André).

Figure 7. The entrance door to the eastern airlock of barracks B5. On the right, the insulation box. Remains of lime plaster are visible above the door (J. André).

The upper free part had a squared section (15 x 15 cm) with a vertical groove on two sides, into which the joints of the roughly shaped logs or beams of the walls were fitted. The length of the logs between the posts, or between the posts and an opening, usually measured 90 or 180 cm. (Figures 6–7)

Although the general dimensions of the buildings varied according to their type, they were all composed of the same regular modules, which were used for both the external walls and internal partitions. The upper end of the vertical posts was carved into a tenon, which was then inserted into the mortise of the wall plate. The top of the walls was marked by triple top plates, connected by half lap splice or cross lap joints.

The floors were installed on joists, ensuring the presence of a crawl space between the building and the ground. This air cushion protected the building from humidity and the frozen ground from melting due to the warmth inside the rooms (Bond 1983, 122–23).

3.2. *Ceilings and roof structures*

The rooms were closed off by a ceiling made of planks, held in place by a series of joists that were connected to the top wall plate. The ceiling of this floor was covered with a layer of clayey sand (5 to 10 cm), serving as thermal insulation.

The buildings were covered by gable roofs. The roof structure was composed of rafters, made of simple logs, fixed on the top plate with birdsmouth joints. Only the outer rafters were reinforced by struts. In some cases, the joints between the struts and rafters of the wall and roof structures, as well as the connections between the posts and wall plates, were reinforced by large metal clamps. The ridge beam was simply supported by vertical posts with a squared section (15 x 15 cm), bolted to the central beam. This beam was in turn held in place by posts of the same section. (Fig. 8) The rafters were covered by wooden battens, onto which a cover of shingles was nailed.

3.3. *Openings*

Both barracks B4 and B5 were lit by 16 large, double-glazed windows (dimensions of the frame 145 x 85 cm), which were equally distributed among the dormitories. (Fig. 6) On both sides of the barracks, a door (190 x 85 cm) opened onto an airlock, a room of 3 on 3 m with a small window, destined to minimize temperature loss. (Fig. 7) Except for the features of the solitary confinement unit, all doors and windows in the camp had the same dimensions. The door- and windowpanes were endowed with an interior groove, into which the planks of the wall were fitted.

3.4. *Insulation and heating*

Due to the glacial climate and the harsh environment, thermic insulation was a serious issue. The walls and ceiling comprised internal and external layers of wooden latticework. They served as tack coat for an insulating clay layer of 2 to 3 cm, while a thick layer of sand strewn onto the intermediate floor

Figure 6. External wall of barracks B5 (J. André).

Figure 8. Interior of the eastern dormitory of barracks B5 (J. André).

Figure 9. Disciplinary isolation unit B3 (J. André).

above the ceiling provided additional thermic insulation. The lower walls were reinforced by sand boxes made of wooden planks called *zavalinka* in Russian, which improved the thermic insulation and protected the building from damages due to rising water levels. (Fig. 7) Furthermore, the walls were whitened with lime against the humidity.

Each dormitory was heated by two massive stoves located in the center of the room. Although most of them caved in over the years and could not be documented in full, it is clear that the entire chimney and the fireplace chambers were constructed using red bricks, a building material which has not been identified in any other structures within the camp. The small fireplace chambers, closed by cast-iron doors, did not enable the lighting of large fires.

3.5. The disciplinary isolation unit

The disciplinary isolation unit is the only building of the camp that was not constructed with a post-and-plank system. (Fig. 9) Its outer and inner walls were constructed from logs with the so-called Swedish Cope profile, squared off on the outer side in order to provide a flat surface. They were connected by saddle-notch joints at the angles. This particularly easy and very robust construction technique, often used to build Russian Isbas, required longer logs than a post-and-plank system and was therefore not widely applied in the Chtchoutchi camp. It was nevertheless preferred for the construction of the solitary confinement unit since this building needed to be particularly solid. Apart from this particularity and the bars in front of the small windows, the disciplinary isolation unit was constructed with the same techniques as the other buildings. A single stove, located in the guard room, was used to heat the entire building.

3.6. The materials and techniques

The construction of the buildings at Chtchoutchi camp required the use of the following building materials:

- Wood (foundations, walls, roof structure, covers)
- Bricks (stoves)
- Glass (windows)
- Lime (inner and outer wall plaster)
- Iron (nails and metallic clamps, tools)
- Clay (thermic insulation of the walls)
- Sand (insulation of the roofs)

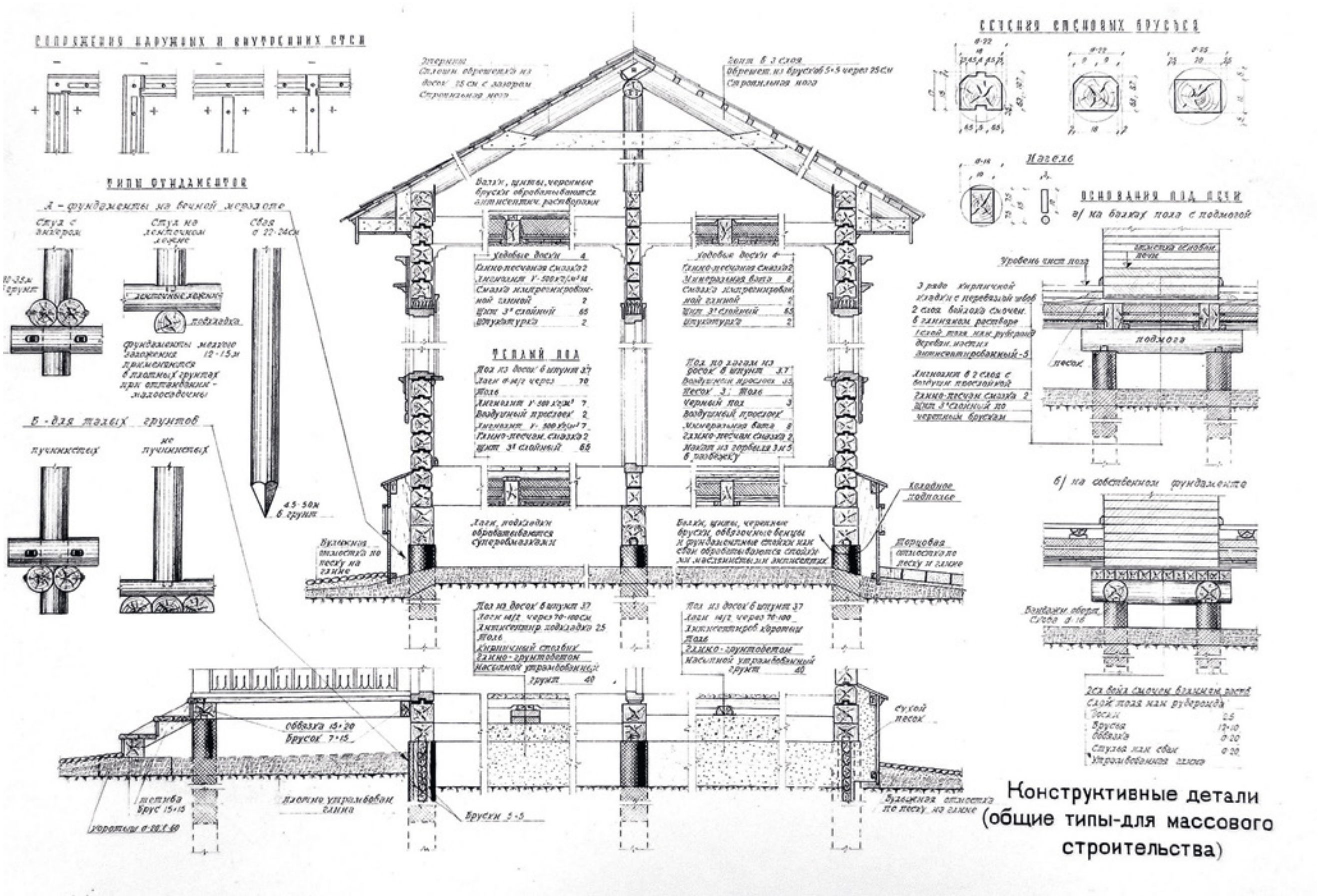

Figure 10. Plate entitled "Structural details (generic types for mass construction)" from the Chum-Salekhard-Igarka Line Technical Project, 1951 (State Archive of the Yamalo-Nenets Autonomous Okrug, picture Vadim Gritsenko).

Only two of these materials were available on-site: the alluvial plain on which the camp was built provided sand and clay. All other resources needed to be transported to the camp.

The volume of wood required for the construction surpassed by far the quantities of all other imported materials. Lime, glass, and iron were only needed in small amounts. The wooden components of the walls and roofs were mostly connected through mortises and tenons, or splines and grooves. These building techniques minimized the need for nails, as they were only used to fix the battens, shingles, and floors.

As mentioned above, the regional trees were too small to serve as construction wood. The use of the modular post-and-plank system reduced the required number of large logs and thick beams, as they were reserved for vertical posts, purlins, and rafters. The rest of the walls was built from logs with a small diameter or roughly shaped planks with an average length of 90 cm, or 270 cm for those above the windows. The smaller dimensions of these pieces facilitated their transport immensely.

The construction techniques were adapted to the practical and organizational restrictions imposed by the difficult geographic environment. As the number of camps and consequently the number of buildings to be erected along the railway line was very high (more than 140 alone for the Construction site 501, see Samuilov 1952), it was necessary to keep the material usage and building costs as low as possible.

The use of standardized modules for the wall segments, windows, doors, and stoves led to a mass fabrication of the necessary elements for the camp in factories or specialized camps. The construction itself was therefore mostly restricted to the assemblage of prefabricated elements, with only an occasional manufacture of new pieces. As it did not require much know-how, the specialized craftsmen could work on the railway track in the meantime. Additionally, this procedure reduced the construction time of the camps considerably. In the prevailing climatic conditions, it was crucial to provide the inmates with a roof over their head as quickly as possible.

4. From the ideal project to the realities of the construction site

4.1. The plans and norms

Two archival documents illustrate the planification of the constructions in great detail. The first document is the “Technical project of the line Chum-Salekhard-Igarka” (Tatarintsev 1951). This document provides detailed plans of the infrastructure, railway track, bridges, civil buildings, and the train stations of the line. It is both a compilation of the engineers’ plans and a promotional booklet destined for the government, as it is illustrated with drawings and idealized views of the technical works and train stations to be constructed.

One of the technical plates indicates the structural details of the general constructions, namely all civil and administrative buildings of the project. (Fig. 10) These indications are very specific and describe for example the different types of foundations on wooden posts to be used according to the environmental premises. They also contain dimensions for the section of the wall logs and planks, as well as the thickness of the different insulating layers of the roof (6 layers). They even specify certain work processes during the construction, such as the coating of joists and joints.

Some of the described construction techniques are traditionally used in the Russian vernacular architecture adapted to the arctic climate, such as the log house walls, the use of the insulating boxes around the lower walls (*zavalinka*) or the choice of clay and sand for the thermic insulations.

When comparing these instructions with the architectural remains of the Chtchoutchi camp, it becomes clear that the latter are just “cheap” versions of the civil buildings. They contain the same elements, yet they have been constructed reducing cost and material input (only 2 insulating layers, post-and-plank system instead of log construction). Most camps were of course temporary facilities, designed to be dismantled or simply abandoned as soon as the track was finished.

Nevertheless, all buildings along the line present a certain homogeneity in layout and construction. The layout of the stations is notably a larger and more developed copy of the barracks for the prisoners: a symmetric structure with a two-parted main building and entry airlocks on both sides. Furthermore, the same building material, roughly squared planks, was used for all buildings.

A second archival document provides the floor plan of the inmates’ barracks from Khandyga in Yakoutia (Kradin 2014; Kradin 2021), designed for 60 occupants. (Fig. 11) Although this document was not drawn up for the Construction sites 501/503, it probably resembles the type of plans the construction supervisors of these sites had at their disposal.

The layout of the dormitory is the same as in Chtchoutchi camp: two rows of superposed double-beds along the sides and two stoves in the center of the room. The plans indicate the dimensions of the wall, door, and window modules, the surface allocated to every inmate, and especially the insulation features of the ceilings (2,5–3 cm thick floors made of slabs cut from the outside of the log, covered with a 2 cm layer of clay). The thermic insulation of the buildings was generally the most precisely defined element on the construction plans, (Figures 10–11) yet this is hardly surprising considering its crucial role for survival in Siberian climatic conditions.

4.2. Constraints and adaptations

In comparison to the other camps of Construction sites 501/503, the one at Chtchoutchi is both similar and unique. A study of the camps belonging to Construction site 503, conducted in the early 1950s, has shown that all of them comprised the same limited number of construction types (barracks, latrines, administrative buildings…), but none of them were completely similar. Every camp was built according to the requirements of the construction site. Their structure and size were adapted to the number and type of inmates (political or common law prisoners), the work to be done on the tracks, and the climatic conditions.

This adaptation to the constraints of the site and to the environment can be seen in the architecture, notably by comparing the construction details of the buildings in different camps. While the walls of the buildings in Chtchoutchi camp were only insulated with clay, those in Iaroudeï camp, located a few dozen kilometers further west, were equipped with boxes full of sawdust, made from wooden planks and installed between the vertical posts. In the latter camp, the

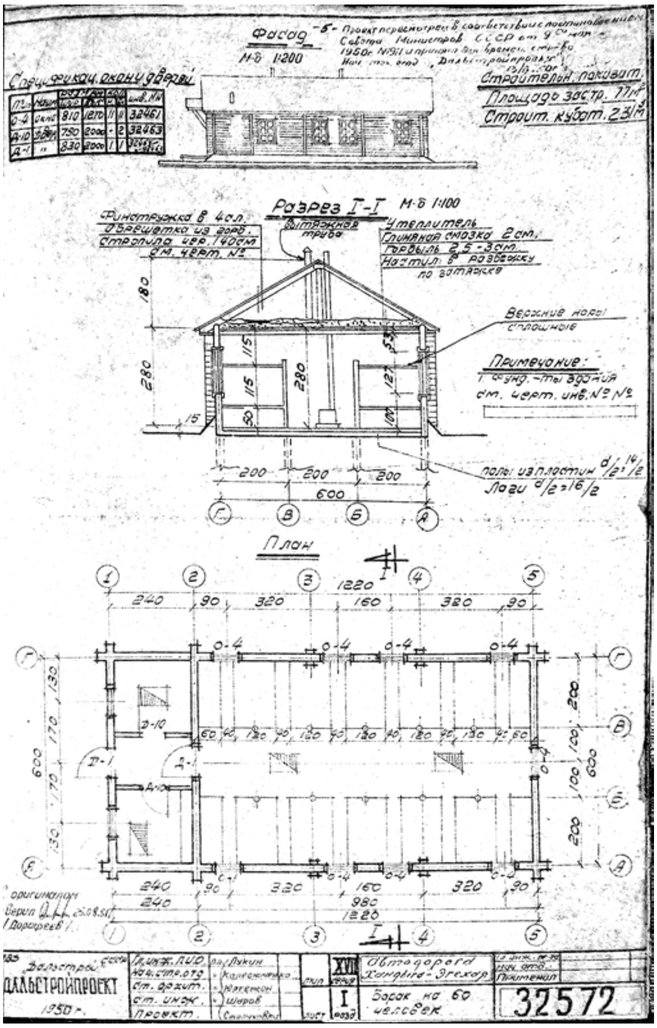

Figure 11. Outer view, cross-section and floor plan of a barracks for 60 prisoners on the construction site of the highway Khandyga-Ege-Khay in Yakutia (picture Vadim Gritsenko).

roof substructure on which the shingles were nailed was not made of wooden planks, but was composed of small logs. These two examples show that the prisoners adapted the construction techniques to the available materials during the building process. Construction materials were allocated first of all to the installation of the railway track and associated infrastructure, which had priority over the construction of the camps.

4.3. A prison built and developed by its occupants

These small variations to the ideal norms defined in the project plans were not only a consequence of the material and environmental restrictions, but were also choices made by the inmates. They usually built the camps they were going to inhabit: they put up the enclosure, dug the drains, and assembled the barracks (Gritsenko and Kalinine 2010, 72).

The camps were first and foremost a place of imprisonment and forced labor, but it was de facto also the home of the detainees. There are several accounts of installations made by the prisoners in an attempt to improve their living conditions.

The report by Marmanov shows that the prisoners in Chtchoutchi were privileged people, including engineers and bridge constructors (Marmanov 2021, 73–74). This may explain some of the visible installations in the camp, such as the decoration on the roof ridge of the guardhouse. (Fig. 12)

One of the detained engineers at Chtchoutchi also asked for the authorization to plant conifers along the central alley and to install small bridges to cross the drains within the camp, which was granted by the camp direction (Marmanov 2021, 75–76). In his utopian vision, these installations were going to be at the center of a small town which was supposed to replace the camp. The result of this personal initiative is still visible today, since a range of high conifers flanks the alley of the camp, and several bridges are still preserved.

5. Conclusion

The analysis of the remains of Chtchoutchi camp offers an overview of the architecture and construction techniques used on the numerous construction sites managed by the Gulag. As a simple *lagpounkt* among others, it is of course not representative of the extremely varied heritage. However, its analysis illustrates the numerous challenges the builders had to tackle due to the Siberian climate and environment. This article has shed light on some of their solutions to these problems, such as the standardization and rationalization of traditional Siberian construction techniques in order to use them at the scale of the Gulag. The detailed study of the architecture and the comparison of the floor plans reveal the singularities of each building as well as the small differences between them. They were provoked by the premises of the construction site, the climate, and the preferences of the inmates. Even though the thousands of camps forming the “archipelago” of the Gulag were largely built out of the same prefabricated modules, there were no two identical camps.

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Figure 12. Guard house next to the camp’s entrance (J. André).

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Construction History is still a fairly new and small but quickly evolving field. The current trends in Construction History are well reflected in the papers of the present conference. Construction History has strong roots in the historiography of the 19th century and the evolution of industrialization, but the focus of our research field has meanwhile shifted notably to include more recent and also more distant histories as well. This is reflected in these conference proceedings, where 65 out of 148 contributed papers deal with the built heritage or building actors of the 20th or 21st century. The conference also mirrors the wide spectrum of documentary and analytical approaches comprised within the discipline of Construction History. Papers dealing with the technical and functional analysis of specific buildings or building types are complemented by other studies focusing on the lives and formation of building actors, from laborers to architects and engineers, from economical aspects to social and political implications, on legal aspects and the strong ties between the history of construction and the history of engineering sciences.

The conference integrates perfectly into the daily work at the Institute for Preservation and Construction History at ETH Zurich. Its two chairs – the Chair for Building Archaeology and Construction History and the Chair for Construction Heritage and Preservation – endeavor to cover the entire field and to bridge the gaps between the different approaches, methodologies and disciplines, between various centuries as well as technologies – learning together and from each other. The proceedings of 8ICCH give a representative picture of the state of the art in the field, and will serve as a reference point for future studies.

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