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Virtual Reconstruction of the Synagogue in Rijeka/Croatia

carried out for the purpose of obtaining the degree of

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Dedication

I dedicate this work to my family and my mentor, who had enough patient and kindness to support me along the way.

Abstract

This master these is a part of the study that addresses destroyed and ruined synagogues all over Europe. BIM Modelling techniques are used for modelling and archiving the current knowledge about the building. 3D data contain all information about color, materials, light and the real geographical position in one file.

The goal of this work is to demonstrate the Synagogue in Rijeka in the most realistic way and to show the sources and the validity of the information.

The synagogue in Rijeka was built in 1903 and it was unscathed until 1944. In the year 1944 National German Reich damaged, robbed and burned it. The fire was of short duration due to the weather, and the synagogue was preserved. In 1948 After World War II, for the Socialist authority, there was no interest in reconstructing or saving the Synagogue, so they gave a command for a complete demolition of the object. Therefore, after 45 years, on the same location an apartment building was built.

The architect of the synagogue was the famous Hungarian architect – Lipót Baumhorn. He planned over 15 synagogues in Europe (Hungary, Serbia, Croatia, etc.) and was one of the most famous architects of the synagogues in the Austro-Hungarian Empire. Different approaches of investigation are used in order to set the broader portrait of the building. The investigation about the history of the Jewish community will show the conditions in which the synagogue was built. The description and classification of Baumhorn's architecture and his buildings will be helpful in presenting and modelling the architecture elements of the synagogue in Rijeka. Beside the investigation on Baumhorn's buildings, there will be a summary of his biography and the influences which have shaped his style. The modeling process will rely on a combination of information gathered in the investigation process. The most reliable source are the plans, supported by the information from photos and similar examples of the building. As the

modelling process was finished in ArchiCAD, the realistic visualisation of the building has been created in Artlantis - a program for the visualisation. This will show the best possible realistic appearance of the synagogue in interior and exterior surroundings. All these work mechanisms will be presented and explained.

Kurzfassung

Diese Masterarbeit ist ein Teil der Studie, die sich mit zerstörten Synagogen in Europa beschäftigt. Mit der Verwendung der 3D-Modellierung ist es möglich alles vorhandene Wissen über das Gebäude zu archivieren. Die 3D-Datei enthält alle Informationen über die Farbe, das Material, das Licht und die reale geographische Lage in einer Datei.

Das Ziel dieser Arbeit ist es die Synagoge so realistisch wie möglich zu repräsentieren und die Quellen und die Gültigkeit der Informationen zu zeigen.

Die Synagoge in Rijeka wurde im Jahr 1903 gebaut und blieb bis ins Jahr 1944 unberührt. Im selben Jahr wurde diese vom nationalsozialistischen Deutschen Reich beschädigt und in Brand gesetzt. Das Feuer war auf Grund des Wetters von kurzer Dauer, wodurch die Synagoge in Rijeka bis in das Jahr 1948 an dieser Stelle blieb. Nach dem Zweiten Weltkrieg 1948 wurde die Synagoge von sozialistischen Behörden des ehemaligen Jugoslawiens komplett zerstört, da diese keinen Grund sahen, die Synagoge zu sanieren. An diesem Ort wurde ein neues Wohngebäude erbaut, welches immer noch an diesem präsent ist.

Der Architekt der Synagoge war der bekannteste ungarische Architekt - Lipót Baumhorn. Er war ein berühmter Synagogenplaner und plante über 15 Synagogen in Europa.

Die Geschichtsuntersuchung jüdischer Gemeinde zeigt die Bedingungen unter welchen die Synagoge gebaut wurde. Die Beschreibung und Klassifizierung der Architektur und der Gebäude von Baumhorn zeigen sich beim Präsentieren und Modellieren der Architekturelemente der Synagoge in Rijeka als sehr hilfreich. Neben der Untersuchungen der Gebäuden von Baumhorn, beinhaltet diese Arbeit auch eine Zusammenfassung seiner Biographie und der Einflüsse, die sein Stil geprägt haben. Der Modellierungsprozess beruht auf der Kombination der Informationen, die im Laufe der Untersuchung gesammelt wurden. Die zuverlässigste Quelle sind die Pläne, die

von den Informationen unterstützt werden, welche den Fotos und ähnlichen Beispielen der Gebäuden entnommen wurden. Nachdem der Modellierungsprozess in ArchiCAD erstellt wurde, wird die realistische Darstellung des Gebäudes in Artlantis fertig gestellt, welches als ein Programm für realistische Darstellungen dient. Dieses wird die bestmögliche Darstellung der, sowohl internen als auch externen Teile der Synagoge in der Umgebung ermöglichen. Diese ganzen Arbeitsmechanismen werden sowohl präsentiert als auch erklärt.

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1. Introduction

Using BIM modelling to rebuild or reconstruct buildings that no longer exist is a new method of preserving memories. Unfortunately, many buildings that suffered damage have been replaced by others, which implies that their rebuilding is impossible. With the BIM technology, the application of gathered data is facilitated and it empowers the generation of a virtual model that contains all physical information about the structure. With the constant improvement of the 3D software, the handling of the model is even more accessible and appealing to the wider audience, not only for experts.

The first BIM modelling of a synagogue had begun in 1995 at Technical University in Darmstadt in Germany when three synagogues from Frankfurt (which were demolished in 1938) were reconstructed. In 1998 at the TU Wien the work on the virtual reconstruction of Viennese synagogues was established. In association with graduate students, the work extends to all synagogues from the former Austro-Hungarian Empire. This resulted not only in a “virtual comeback” but also in research about drawing and convenient manipulation of 3D modelling that engendered an improvement of the software itself.

Rijeka, as a part of Istria, was always in the center of changes and it belonged to different countries. It was led by different political ideologies, religions, and was in the middle of different cultural and economic networks in this part of Europe. The synagogue in Rijeka was established because of a long history of the Jewish community in Rijeka, their association and desire for a “gathering house”. The area in which the synagogue was built is characterized by its peculiar site conditions and because of that, the synagogue was unique and distinctive.

The inexistence of the synagogue demanded investigation about if there is any saved

material from which the synagogue can be reconstructed. Fortunately, the archive in Rijeka preserved the plan documentation of the synagogue. To get a further image, besides the plan and photo documentation there was needed a whole set of information about the architect, the history of the Jewish community in Rijeka, the architecture style of the sacral building in this epoch and the style of the architect. The plan documentation was the base for the modelling process and the information from the other sources filled the “information gaps” and the inconsistencies.

The focal point of this work is the virtual reconstruction of the synagogue in Rijeka and it will illustrate the exterior and interior structure. The process of modelling and techniques that were used will be described, as well as a history of the Jewish community, synagogue and the architect.

2. History of the Jewish Community in Rijeka (Istria)

The position of the town of Rijeka had marked Rijeka as a transit spot. Not only was it the main harbor for this part of the Adriatic Sea, but it has always enjoyed a strong industry and trade economy. All these benefits were responsible for many changes that were inevitable in Rijeka, especially in the 20th century.

As a transit spot, it was always an interesting place for different cultures, as well as for the Jewish people. The social position of the Jewish people in Rijeka has always been determined by the political ideology of the town. (Morgani, 2006) Depending on the political climate of the moment, Jewish people managed to achieve their rights for an unobstructed religious and cultural life.



Fig.1: Position of Rijeka in Central Europe

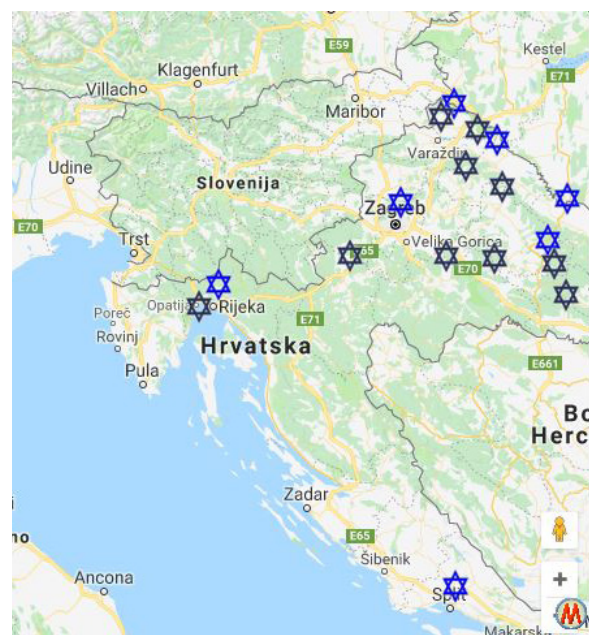


Fig.2: Jewish municipalities in Croatia

2.1 From Rome until 18th century

Historical writings that refer to Jewish people in Rijeka dates to the 15th century when they arrived from the Italian Adriatic coast, the town of Pesaro and the region of Marche. In the beginning, they lived in the part of the town called “Zuccha” or “Zudecca” (Italian-”Giudecca”). The local authorities, in order to ensure the growth of trade, tried to attract more investors in the town, ensuring a place for them to stay - “Giudecca”. (Morgani, 2006, pp. 15) Historical data about Jewish people in Rijeka during the 16th and 17th century do not exist. However, in Rijeka’s library, there is preserved a book from 1531 which contains preaching in Hebrew. The name of the book is “Dibre shalom” – “Word of Peace” and the author was Rabbi Isac Adarbi. (Starčević, 2011, pp. 5)

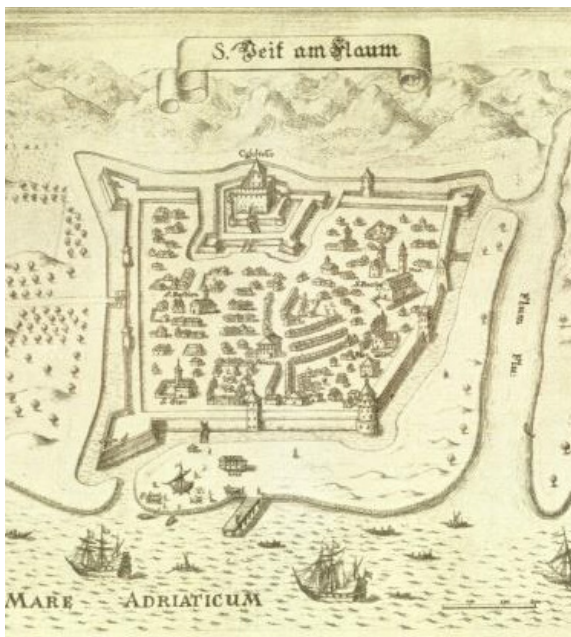


Fig.3: Rijeka about 1550

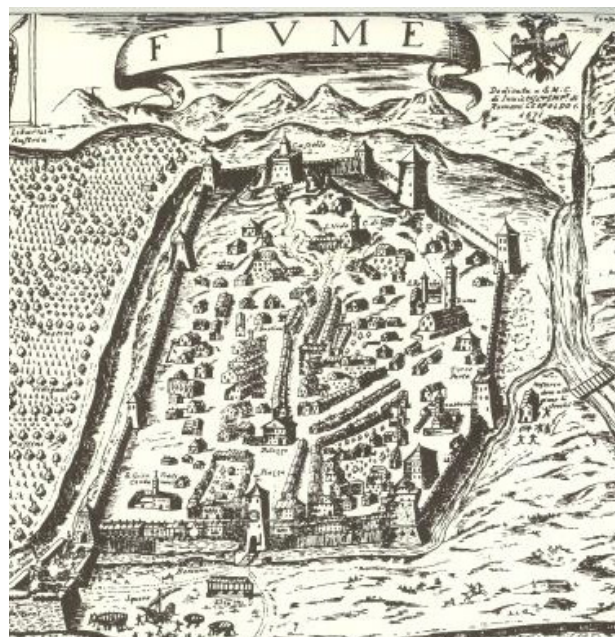


Fig.4: Graphik of Rijeka made by Giorgio Genova from 1761

2.2 18th century and independent Jewish Community

Rijeka received plenty of privileges during the time of Karlo VI. He was a leader of the Austro-Hungarian Empire and certainly the most important asset he brought to Rijeka was the road Karolina, which connected Rijeka with the East. In the 18th century, Rijeka, together with Trieste, was named a free Austrian Empire Harbor, and from this moment on, the number of Jewish and other nationalities in Rijeka increased. (Morgani, 2006, pp. 29-30)

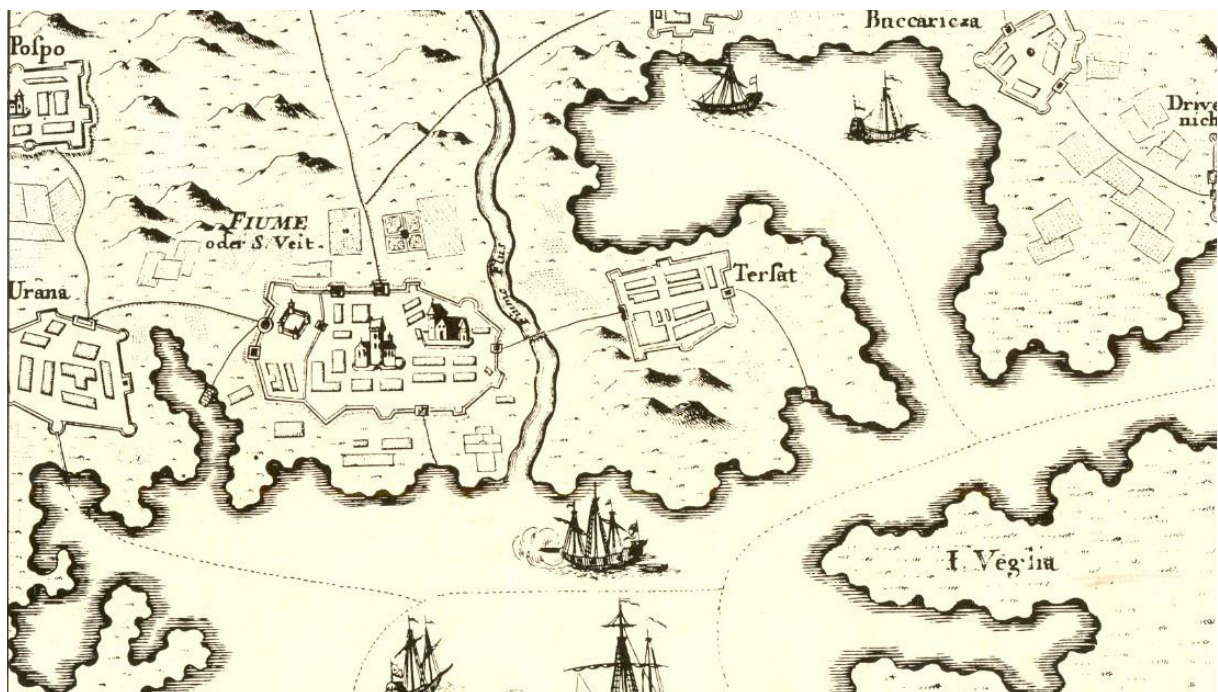


Fig.5: Topographic map of Rijeka from 17th century

After the death of Karlo VI, Maria Theresia ascended the throne and one of the decisions she made was to strengthen a trade network between Trieste and Sen. According to Morgani (2006, pp. 30-31), that decision not only favoured Trieste as a trade centre in comparison with Rijeka but it also represented a politically incorrect decision to Hungary, in whose territory the entire coast of Croatia was positioned. The solution

that Joseph II proposed was that Rijeka (which had been a long time a part of Austria) shall belong to Hungary (1776.) For the short time Rijeka was content with the decision, but afterward the residents of Rijeka realised that their independence was interrupted. (Morgani, 2006, pp. 31).

Maria Theresia established a new regulation named “Diploma” (privilegium, littera, kiváltságlevél, okmány, Freibrief, Urkunde) in 1779 in which Rijeka achieved almost complete independence in the territory of The Hungarian Empire. (Morgani, 2006, pp. 32)

Apart from Italy, the Jewish people were migrating from the town of Split (Venetian Republic), where their position was unenviable. (Starčević, 2011, pp. 8)

In September 1779, Isaac Mihael Penso, with his brothers, Josip and Leon Ventura

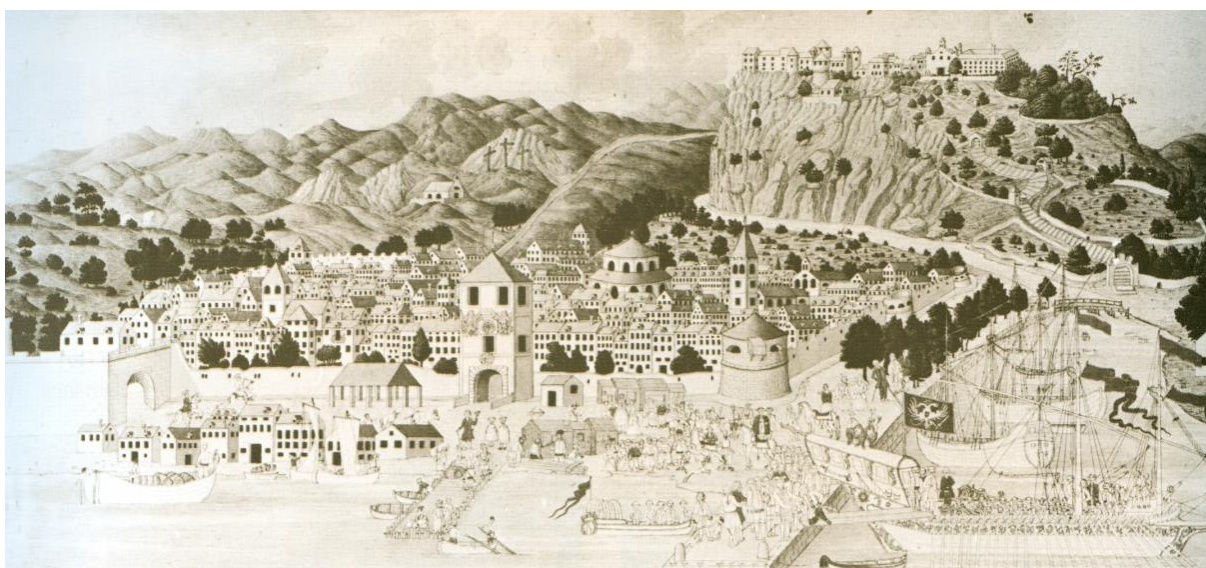


Fig.6: Rijeka in the time of Carlo VI

made an official request to the local government to build a graveyard and to establish a synagogue. Rijeka’s authorities took these requests seriously because they would economically benefit from the Jewish people in Rijeka. (Starčević, 2011, pp.8)

On September of 27, 1779, the local authorities made a decree which permitted Jewish people to provide their own place of prayer – “kehile”. It was organised in the private

house of family Penso, but as family Ventura was against the decision, they rented the building just to ensure the place for praying. (Starčević, 2011, pp. 8)

As Rijeka grew economically, the more Jewish people came to live in Rijeka.

Isak Levi was the first administrator of the Jewish community. As a part of the Austro-Hungarian Empire, the administration in Rijeka, which was under Joseph's legislation, tried to integrate the Jewish people into the local community. With this goal in mind, on the 26th of November 1787, a protocol was enforced. That protocol assured civil rights to the Jewish people and to the independent Jewish community. The model



Fig.8: Plan of Rijeka from 1776 (Benko/Penko)

protocol was "Regulamentum Judaeorum" of Trieste from 1781, which was under the protection of Empress Marie Theresa. (Morgani, 2006, pp.37)

From this moment on, it was easier for the Jewish people to establish other cultural institutions and institutions of other benefits that could be advantageous for their community.

2.3 19th century and the establishment of the Synagogue

In 1867, the Austrian-Hungarian Empire formulated a law proclamation of civil emancipation and from this moment on, the Jewish people participated in every aspect of social and economic life in the Empire. Jewish people, not only from Italy or Dalmatia but also from Germany, Austria, Hungary and Russia relocated here. In 1850 the number of Jewish people in Rijeka was approximately 50-60 persons. (Starčević, 2011, pp. 13) They were integrated and assimilated in the social and cultural life of Rijeka.

The first Synagogue was established in 1837, in the Three Kings Street (later - Via del Tempio). It was based on the donation contract between Moses Saul Levy from Trieste and the Jewish Community in Rijeka. In the beginning, the ceremony and services were held according to Spanish tradition-Sephardi, but later, as the society grew, they embraced the Ashkenazi Jewish tradition. (Morgani, 2006, pp. 63)

In 1882 the community elected a new Rabbi - M. Adolfo Gerloszi. The administrator of the community was Sabato Levy Mandolfo. After he died, in 1895, Arminio Neuberger de Hlinika was selected as the new administrator. (Starčević, 2011, pp. 13)

At the end of 19th century, there were two Jewish traditions in Rijeka: reformed - Ashkenazi and Orthodox tradition. As the number of orthodox followers was insignificant, they belonged to one Jewish municipality - Comuna Israelitica di Fiume. In 1885 there was established a charity organisation named "Chevra Kadischa" – The Hebrew holy society. The main founder of the society was Adolfo Gerloszi with Antonio Matersdorfer and Giuseppe Treusch. The society bought a separate graveyard and they formed a commission that was responsible for obtaining administrative approvals for the new synagogue. Similar to already established practice in other Jewish communities, this society collected regular contribution from their members. Moreover, they utilized it for standard costs of the graveyard and for helping those in need. (Morgani, 2006, pp. 63-65)

According to Morgani (2006, pp.63) in 1895 the Jewish community counted 250-260 families, which amounts to approximately 1600 persons. The general migration of people was typical for this period in this part of the world. With this migration, many Jewish people with different education settled here. Most of them were doctors, lawyers, journalists. Also, there were businessmen traders who brought economic benefit to the community and the town of Rijeka. (Starčević, 2011, pp. 14-15)

In the Sušak area (Sušak Area belongs today to Rijeka's Municipality, but in the 19th century it was a part of Karlovac diocese territory - Kotar), the Jewish people were numerous. They were first under the administration of Karlovac diocese territory, but as the community did not have a synagogue or graveyard, the Jewish people were oriented toward Rijeka. The economic and cultural relations between Rijeka and Sušak were always strong even though they belonged to different countries. Many tradesmen had a market in Sušak as well as in Rijeka. (Starčević, 2011, pp. 14)



Fig.9: Plan of Rijeka with its surroundings from the second half of 18th century (Antonio Pirisi)

2.4 20th century and the building of the Synagogue

In the 20th century, the Royal Grammar and the Business School of Sušak established a special subject “for learning a Judaism”. (Starčević, 2011, pp.16)

As the Jewish community in Rijeka exceeded the number of 2000 members, the old synagogue in Via del Tempio in the old town was not sufficiently large for all members which wanted to attend the ceremony. In 1903, in Via del Pomerio, the community decided to build a synagogue that would be more suitable for a growing population. In 1890, the Jewish community established a special committee that had taken up a voluntary contribution for building the synagogue. (Starčević, 2011, pp. 18)



Fig.10: M. Weiss store at square in Rijeka



Fig.11: Textil shop in Rijeka from of Giacomo Luft

This process lasted for 10 years. Especially engaged in this process was Enrico Sachs – a lawyer that had not only been involved in the collection of contributions but he also represented the Jewish community on the council and collected all correspondence. At the time when they submitted an appeal to build a synagogue, there were 2500 members of the Jewish community in Rijeka. The construction proceeded and the community informed Rijeka’s council on the 18th of September 1903 that the synagogue was completed. They asked for utility admission on the 22nd of October. (Starčević, 2011, pp. 18)

As the Jewish Community of Rijeka did not dispose of significant funds, they painted and decorated the interior much later, in 1907. (Karač, 2009)

The consequence of the First World War was a breakdown of the Austro-Hungarian Empire and association of this part of the Adriatic coast to the Italian Empire. As a reaction of the unstable political and economic perspectives, many Jewish people left Rijeka. Simultaneously the Jewish people from East-European countries and Germany emigrated to Rijeka. (Simper, 2016, pp. 4)

Throughout this period the number of Orthodox Jewish people increased. Thus there appeared an opportunity to organize a separate society in 1920, a free Orthodox Society was constituted in Rijeka. The first president was Ernest Berger and a new orthodox temple was built in Via Galvani. After the proclamation of fascistic laws, these two societies reunited in 1932. The Orthodox society had a section within the Jewish municipality of Rijeka. (Simper, 2016, pp. 4)

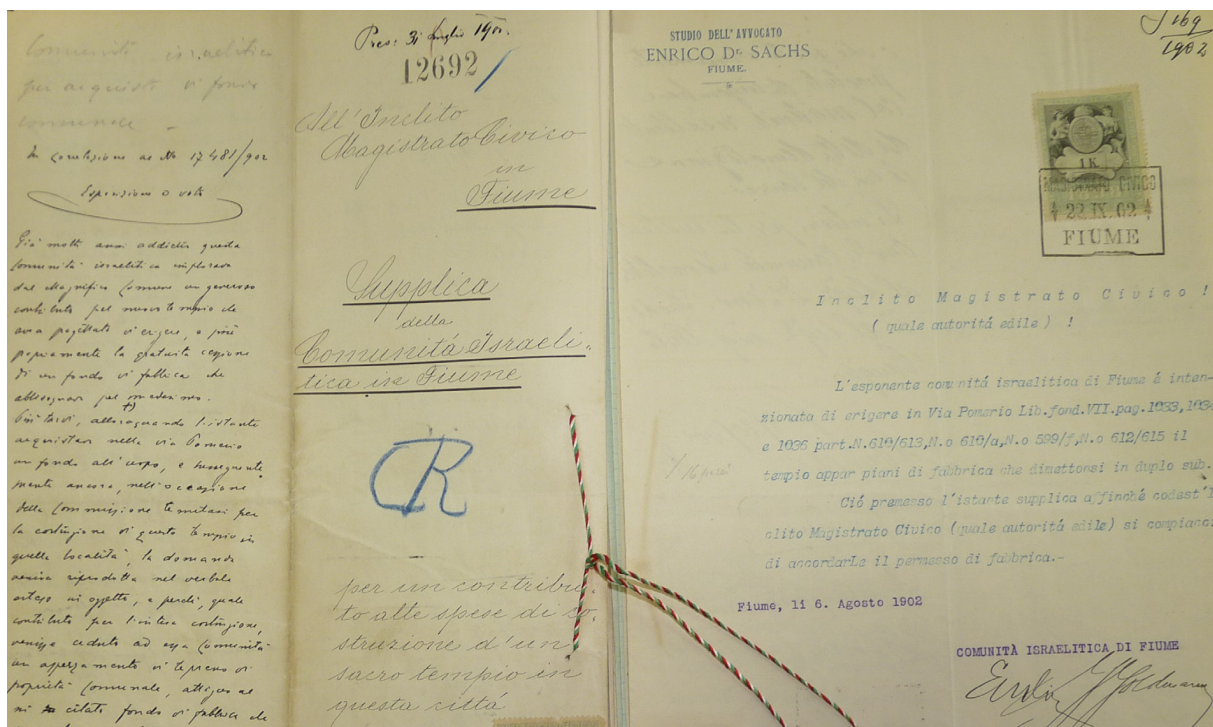


Fig.12: Municipal document that shows the agangement of Enricho Sachs on the building of the synagogue

2.5 World War II

1925 brought a threatening climate for the Jewish people, after a consolidation of the totalitarian regime in Italy. Anti-Semite politics conducted by Mussolini's government at the beginning of 1930 jeopardized the freedom of the Jewish people in Italy. Before the anti-Semitic laws were brought into force, the ground was prepared with different procedures. One of the procedures that ensued was a complete inventory of the Jewish people in Italy. Additionally, a law definition of the Jew was made. After these regulations, the administrative body that was supposed to elaborate the anti-Semitic laws and practice was grounded. The first and the most important body was the one inside the Ministry of Internal Affairs – the so-called Demorazza - The Office for General Direction on Democracy and Race. Oscar Jarobek was a leader of the Demorazza in Rijeka. In their offices were kept all the information on the Jewish people in Rijeka based on investigations that were regularly conducted. (Simper, 2016, pp. 7)

The Manifest of Racial Defence was released in Italy, where they defined a racial doctrine based on the scientific-ideological platform of fascistic racism. The official regulations against Jewish people in Italy were put into effect in 1937, especially after the 10th of November when the new law was passed: for the "protection of the Italian race". Italians could not marry a person of other nationality. This law forbade Jewish people from taking part in military activities, both in peace or war. Jewish people were also not allowed to lead businesses associated with defence or businesses with a number of employees exceeding 100. Working in schools or other public institutions was also forbidden and they could not be guardians to a minor except the ones from the Jewish community. (Simper, 2016, pp.7)

The Jewish who had an independent business could only collaborate with the Jewish clients. (Morgani, 2006, pp. 70)

The newly established government of NDH was established by Ustasha regime, in the territory of Croatia. They implemented racial laws and soon after the country had been established, the Second World War began.

In 1938, 1743 persons were registered in the inventory as Jewish people. 1389 were from Rijeka, 313 from Opatija and 30 from Lovren. (Simper, 2016, pp. 9)



Fig.13: The title and the front page of the racist newspaper (the law "protection of Italian race")

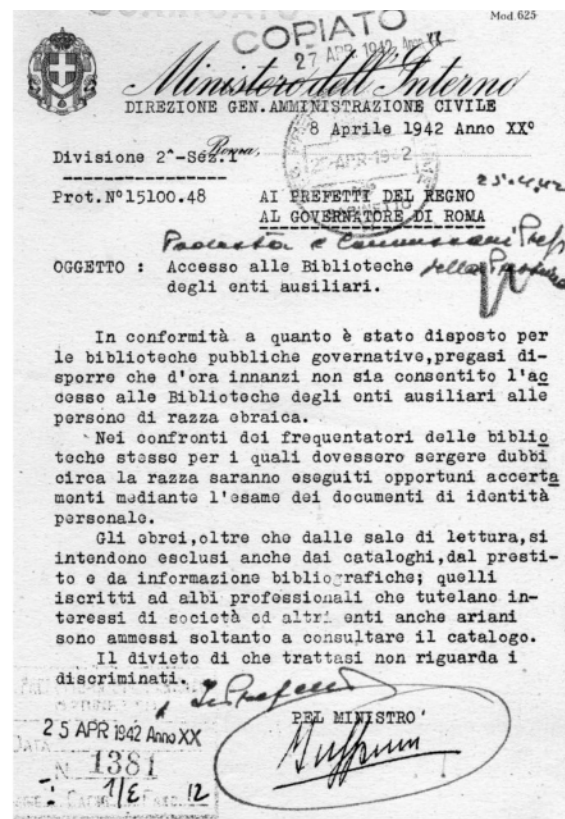


Fig.14: The instruction of ministry to provinces (forbidding the access to libraries)

With this inventory, it was confirmed that the percentage of the Jewish people in Rijeka and Trieste was the largest one in Italy. (Morgani, 2006, pp. 105)

In the following years, these data were of practical use for racial laws: the exclusion of the Jewish students and professors from schools, confiscation of properties and deprivation of citizenships. During the Nazi occupation, the inventory was also used as a

means of identification, and subsequently arresting and sending the Jewish people to death camps in Germany. (Simper, 2016, pp. 11)

The Jewish people were required to be registered in municipality offices in order to obtain a “Jews race” mark in their documents. About 6000 Jewish people emigrated from Italy, mostly to Palestine, the USA, or South America. All these government decisions based on national-socialism laws were published in Rijeka’s newspaper called “La Vedeta di Italia”. As Italy decided to participate in the war in 1940, their administration introduced a regulation on the citizens of unfriendly countries. This regulation was devastating for the Jewish people, who lost the citizenships of Italy and had the status of apatrides (“the stateless”). (Simper, 2016, pp.14-15)



Fig.15: Decree of the Rijeka’s mayor Carlo Colussy on Jewish people responsibility for registration in municipality, Oktober 1938

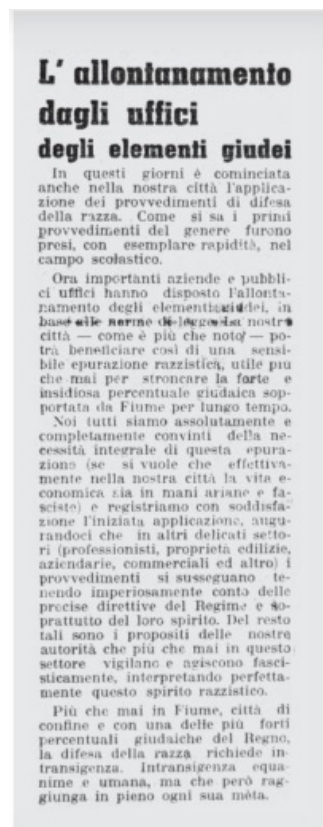


Fig.16: The article from the newspaper about releasing Jewish people from the public services

On the 18th and 19th of June, 1940, in Rijeka, approximately 250-260 Jewish men were arrested. For several weeks they were kept in an improvised prison in Turnic school and subsequently sent to captivity in the following camps: Campagna, Nereto, Notoresco and Tortoreto te Manfredonia. (Simper, 2016, pp. 16)

After Italy capitulated in September 1943, the Third Reich occupied the northern and middle parts of the country. Thus, many Jewish people that happened to be there were arrested and sent to concentration camps. Simultaneously, Jewish property was robbed and confiscated. The synagogue and the interior were burned and destroyed. In the official records from October 1945, it was noted down that 250 Jewish people from Rijeka were arrested and only 10 of them returned. 50 people from Opatija were arrested and five of them came back. After the war, it was estimated that the number of Jewish people that disappeared exceeded 400. (Simper, 2016, pp. 18)

3. Synagogue in Rijeka

On the territory of Croatia, approximately 100 Synagogues were built, 12 of which in the 20th century. Generally, the synagogues were built in the 19th century, in the so-called Historicism era. Until 19th-century, Jewish people, inhabiting the territory of today's Croatia, were not entitled to civil rights which people of other nationalities and religions had. Subsequently, with the decree "Emperor Patent" Jewish people were declared equal rights with other citizens and they commenced building synagogues. (Karač, 2009, pp. 245)

The Greek word synagogue means "assembly" and can refer to the gathering of people. It is the center of the Jewish social life. Services were held inside, but it also served as a place for studying and organising cultural events. (Tachau, 1926, pp. 155) Commonly synagogues were built according to the style and taste of the epoch that formally corresponded to other buildings on the site. In Talmud (the central text of Rabbinic Judaism and the primary source of Jewish religious law and theology), the single text about the building of a temple, suggests that it should have windows, and it should be higher than other buildings surrounding it. These poor instructions had left some space for particular interpretations of the architecture of the synagogue. Certainly, the typical religious rules had to be kept.

Even the architecture was no "Jewish" discipline (Klein, 2010, pp. 110), in the 19th-century synagogue architecture needed expressivity in the sense of style, large scale and new iconography. Around 1900, the Jewish building promoted national styles of the host country, as in Hungary they promoted folklore-inspired and Orientalizing Hungarian art nouveau, the so-called Lechnerian style. (Klein, 2010, pp.111) After the revolution from 1848, Jewish people abandoned the synagogue traditions which had been used so far: "The floor plan changed radically due to the rise in scale, the bimah was

shifted to the east, interior decoration became more luxurious, structure started to use modern materials and technical solutions, and most important of all, the exterior became a built manifesto of the Jewish economic and social success” (Klein, 2010, pp. 113). Synagogues from the 20th century embody characteristics of Art Nouveau style, late Academism stile, Art Deco and early Modern style. Their typological distinction, exotic design with the romantic and oriental mixture in painted works mark them in urban architecture. (Karač, 2009, pp. 245)

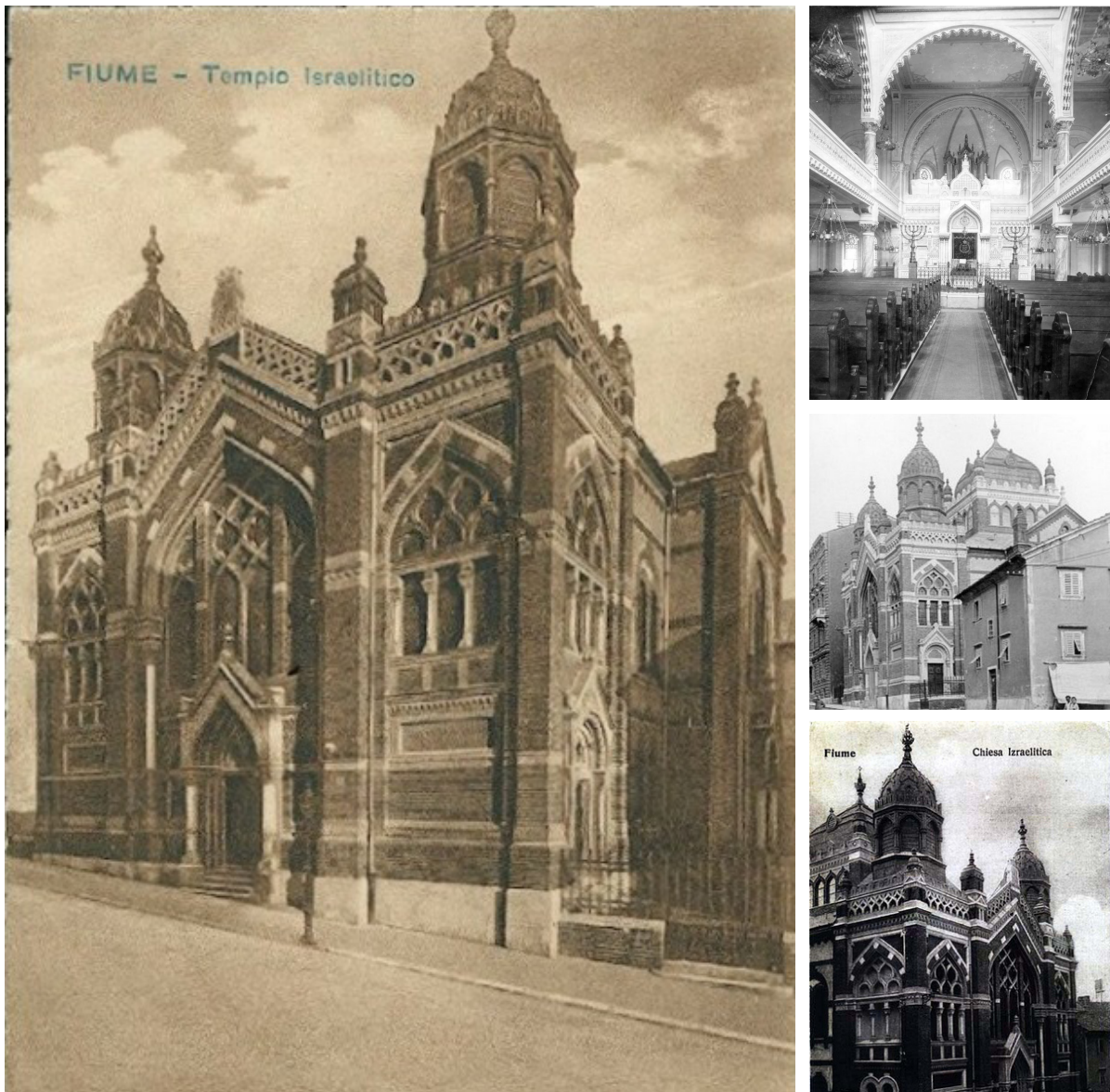


Fig.17:The synagogue in Rijeka, Lipót Baumhorn, 1903-03

3.1 Architect – Lipót Baumhorn

Lipót Baumhorn is known as an architect of 22 synagogues in Europe. Furthermore, he reconstructed and adapted several buildings in his career: mansions, two postal saving banks, house-clubs in Szeged, Timișoara and Ujvidek (today's Novi Sad), etc. He was born on December 28, 1860, in Kisbér, Hungary, as a son of a teacher. Originally, they were Jewish. After the grammar school in Győr/Raab, Baumhorn studied at the "Technische Hochschule" in Vienna from 1878 until 1883. After the studies, he came back to Hungary and continued his work. He worked in an architecture office (Ödön Lechner and Gyula Pártos) in Budapest for 12 years. The most known Synagogue from Baumhorn is the one in Szeged, which was built between 1899 and 1903. Predominantly, his buildings are rated in Historicism, but they also present typical features of Secession and Moorish architecture. Baumhorn opened his own office in 1894, where he worked with his son-in-law György Somogyi. (Oszkó, 2008, pp.398)



Fig.18: Lipót Baumhorn



Fig.19: The Synagogue in Szeged, 1900-03

3.2 Architectural Style

The national reforms were made in the 19th century and the emancipation of the Jewish people was also constituted: they had the same rights as the Christians. In the same period, the Jewish community divided in the Orthodox and Neology (Reformistic) Jewish community. The Reformist had changed the inner space of the synagogue based on the new liturgic rules: they moved the bima from the center to the east wall and brought organs and choir in the synagogue. (Klein, 2010, pp. 113) With these adjustments, the new formulation of the architecture styles progressed. The first architect who had incorporated all these modifications referring the space composition, the styles and decoration of the synagogue, was Ludwig Förster (Synagogue in Tempelgasse-Vienna). He established some "rules" concerning synagogue design, which were later used and transformed in different parts of the Austro-Hungarian Empire. He adjusted the Romanticism with Oriental (Islamic and Moorish) decoration. The other movement was based on the Medieval (Middle Age) styles and the so-called "Rundbogenstil" (Round-arch style). (Oszkó, 2008, pp. 399-400)

As Lipót Baumhorn studied in Vienna, his professors were the most significant architects of that era: Heinrich Förstel, architect of Votiv Church and the University at Vienna's Ring Street; Karl König, the architect of the Synagogue in Turner Street. (Oszkó, 2008, pp. 398) Each of these architects used different styles, such as Historicism, neo-Gothic, Italian High Renaissance. Certainly, they influenced young Baumhorn and caused his architectural approach to be more oriented to European architectural styles. However, these influences were backed with a lot of other circumstances in which he had lived and worked.

According to Aniko Gazda, cited by Klein (2006, pp. 1-2), the 19th century Romanticism was a framework for the synagogue architecture in Hungary, where she distinguishes

two idioms: the neo-Gothic and the Oriental, which sometimes merge. This merging happened mainly in the works of Lipót Baumhorn, who integrated the elements of neo-Romanesque as well. Baumhorn also embraced Lechner's combination of plain plastered surfaces and red or yellow wavy brick string courses, string pilasters, gables, and battlements. He combined them with elements of Islamic architecture but altered them under the influence of Ludwig Förster and the Middle Age art (Neo-Gothic).

(Oszkó, 2008, pp. 399)

From his first Synagogue in Esztergom/Gran (1888) he practiced Oriental (Moorish) elements. He embroidered his Oriental style with three-arch or -round openings, complemented with a raw-brick façade, tracery, triangular pediment and dome. Some elements in the interior are always present such as the decorated arch. Later, in the designing of the Synagogue, the romanian influences were also present (Synagogue in Temesvar and Szolnok). In secular buildings, different elements are visible, such as the rich use of late-historical forms, gothic painted stained-glass windows, the imitation of french-renaissance marble railings, neo-baroque ears, volutes, etc. Modern elements are integrated in the smooth plaster façade, ornamented with partly geometric elements, and on the inside - art nouveau railings. (Oszkó, 2008, pp. 399-400)



Fig.20: The synagogue in Vienna, Tempelgasse, 1853-58, L.Förster,



Fig.21: The synagogue in Vienna, Turnergasse, 1892, Wilhelm von Doderer, 1854-59, L.Förster

3.3 Development of the Synagogue

At the end of the 19th century, the Jewish community counted approximately 2500 members. Enrico Sachs continued collecting contributions for the Synagogue, not only from the Jewish people but also from many other institutions in Rijeka, as the Synagogue was the building that would contribute to the architecture and the appearance of the city. The city community donated 700m² for the building in the street of Pomerio. The governor of Rijeka also donated 2000 krone from his private funds as a contribution.

After 10 years of collecting the contributions, the Jewish community asked Eng. Wilhelm Stiassny, a synagogue expert from Vienna, to plan a Synagogue in the Moorish style. However, this decision was changed in May 1901, and the architect Lipót Baumhorn was chosen for planning the Synagogue. The reasons for the change are not known. The construction works began in November of 1902. Carlo Conighi, an experienced engineer from Rijeka led the construction works based on Baumhorn's plans. The Synagogue was completed in a year, or more precisely, on September 18, 1903, and it was officially opened on October 22, 1903, in the event of Rosh Hashanah, the Jewish New Year. (Glavočić, 2002, pp. 336)

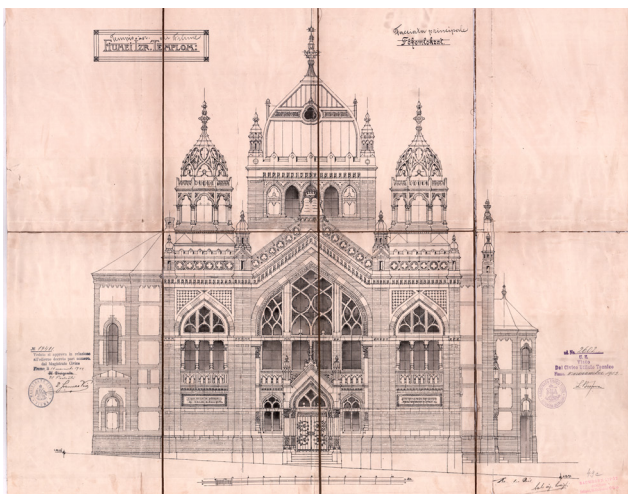


Fig.22: The synagogue in Rijeka, Croatia 1902-1903, Lipót Baumhorn

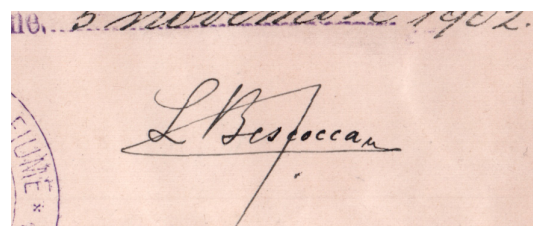


Fig.23: The synagogue in Rijeka, Croatia 1902-1903, Lipot Baumhorn

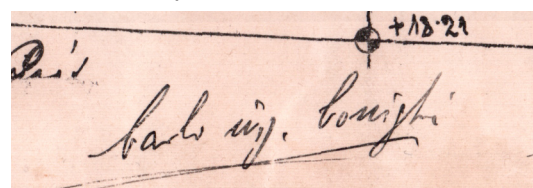


Fig.24: The synagogue in Rijeka, Croatia 1902-1903, Lipót Baumhorn

3.4 Location

The location for the synagogue was almost perfect since it was positioned at the crossing of two new streets (Pomerio and Ciottina), which descended mildly. On the intersection was the so-called Cambieriev square. However, on the square, there was a house that “disturbed” the prescribed orientation (by Talmud) of the synagogue. The Muni house was supposed to be removed, but this did not happen because the owners had decided not to vacate it. (Glavočić, 2002, pp. 336)

Therefore, an exception to synagogue orientation based on the liturgical demands had to be made. The synagogue was unfavorably oriented: north-south. The separate entrance for women and men had to be placed on the west side (Muni house), opposite the almemar (raised platform around Aron-ha-Kodesh), but the entrance from the north side was also opened (Pomerio street). The interior was transversally oriented with the apse for the altar on the east side. (Karač, 2009, pp. 30-31)

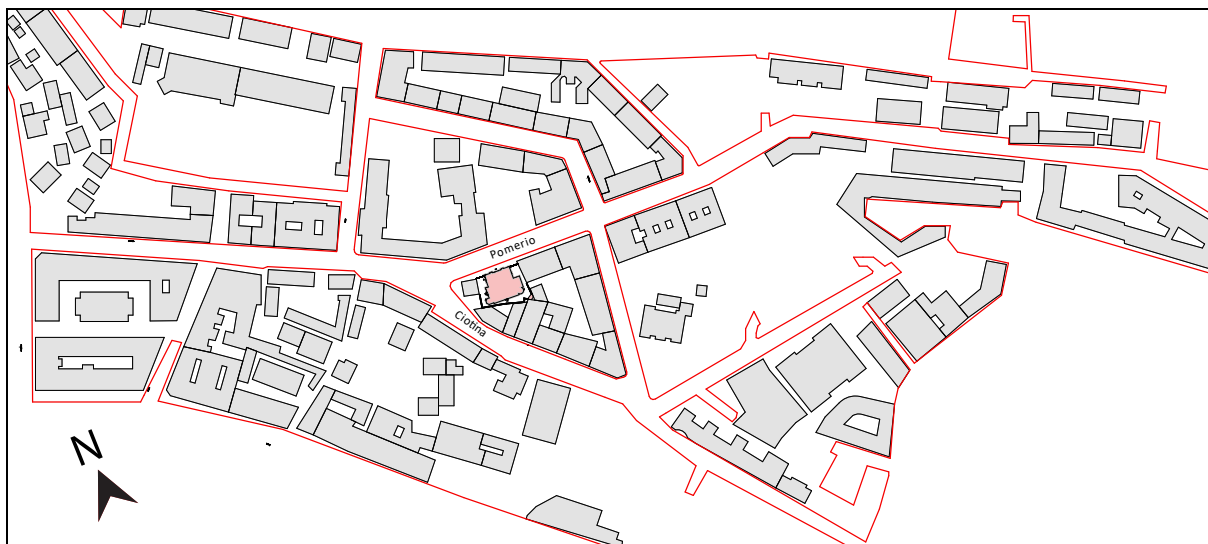


Fig.25: The site plan of Synagogue in Rijeka

3.5 Architecture of the Synagogue

The synagogue in Rijeka was visually highly attractive. It incorporated enormous square space, a galleried basilica inside with a great double dome in the middle (from which one dome was the fake one), and two smaller towers situated on the left and right side. (Karač, 2009, pp. 30) Inside the right tower, there was a staircase that led to the women's gallery. Beside that staircase, there were two more staircases in the corners of side façades. They led to the galleries, but also to the organs on the first floor and to the basement.

3.5.1 Interior space

In the interior space there were three different levels:

- the entrance (Porch)
- the main part with the galleries (Ulam)
- The Holy Ark or Aron-ha-Kodesh (ornamental closet, which contains Torah Scrolls)

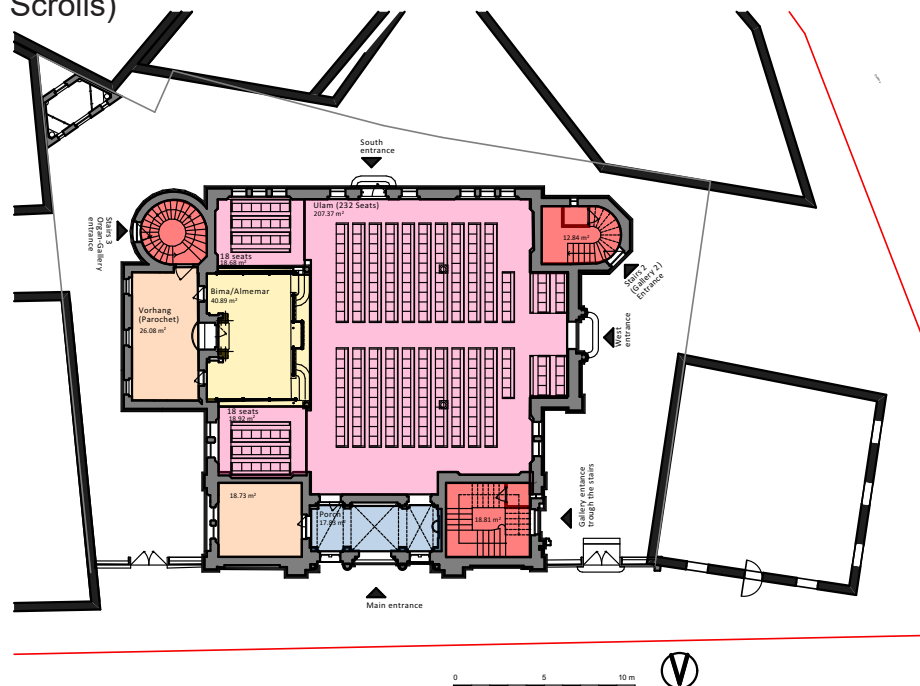


Fig.26: The groundfloor plan of Synagogue in Rijeka (reconstructed graphic)

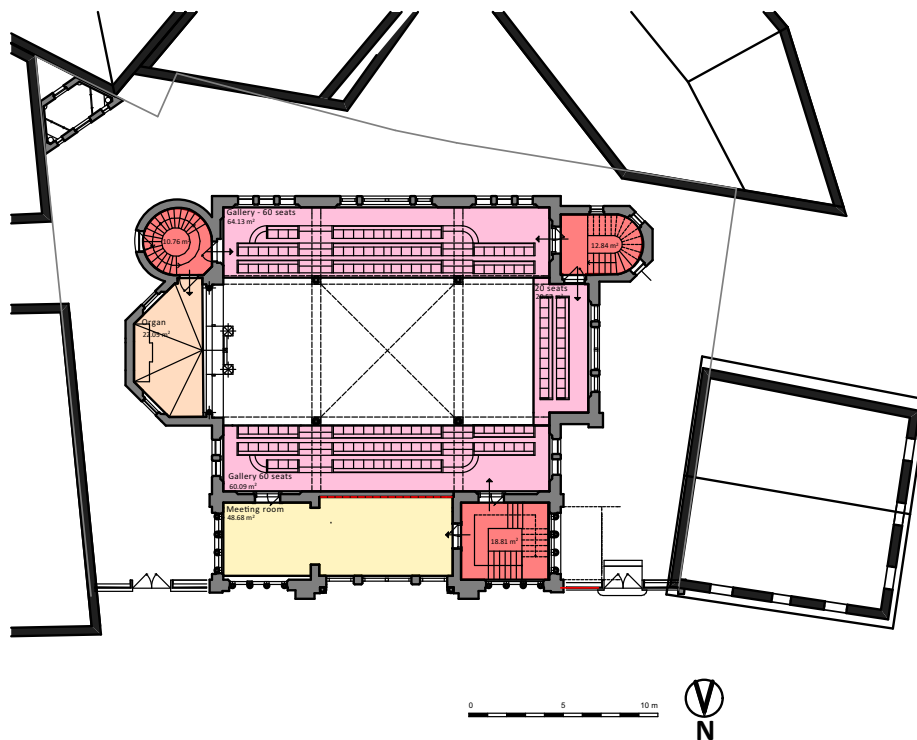


Fig.27: The 1. floor plan of Synagogue in Rijeka (reconstructed graphic)

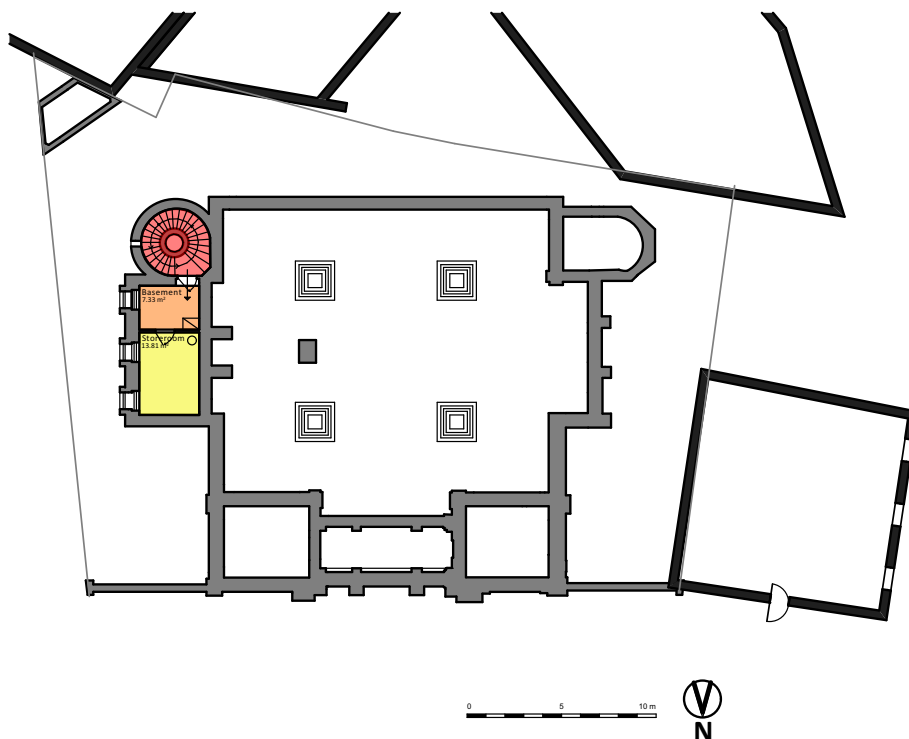


Fig.28: The basement plan of Synagogue in Rijeka (reconstructed graphic)

Entrance (Porch)

The entrance was separated with walls from the main area. It consisted of three sections. The central one that led directly to the main part of the synagogue and two side parts that were slightly than the central one. The central part was covered with groined vaults: two small ones on the side and a larger one in the middle. The west side of the entrance led to the galleries on the first floor and to the meeting room that was positioned directly above the entrance. The so-called women's entrance to this staircase case was outside, located on the west façade.

On the east side to the entrance, there probably was a room that rabbis used for organisations of events.

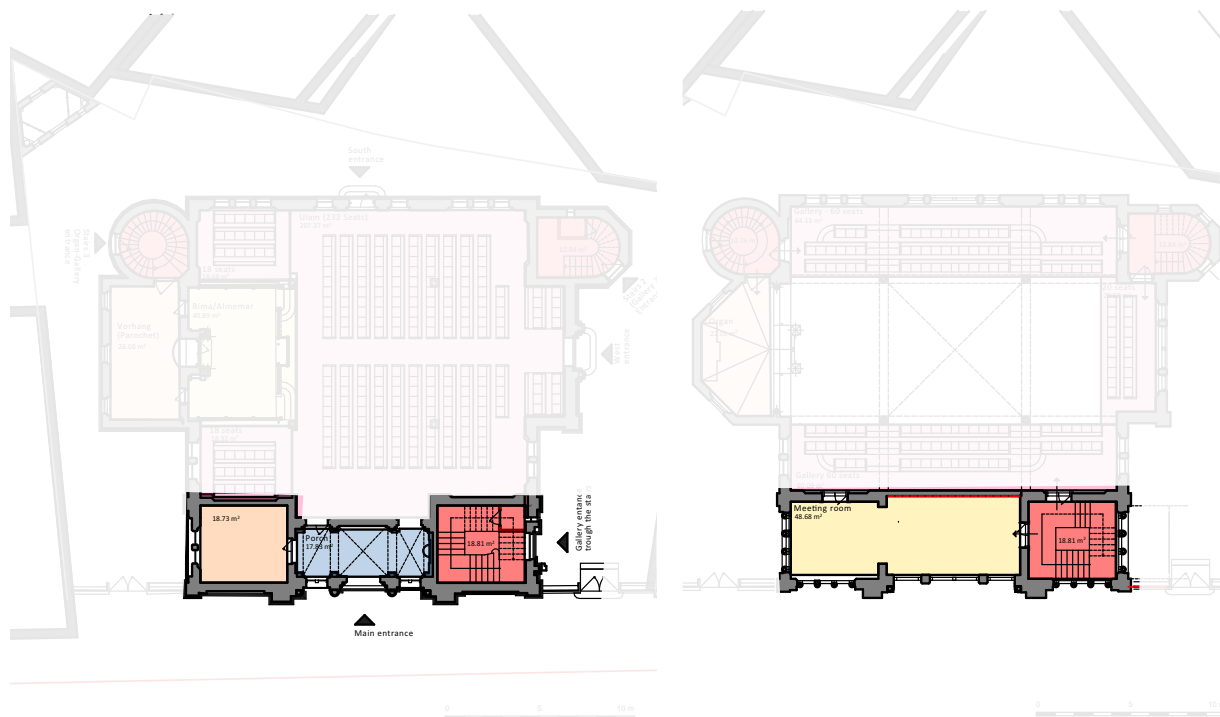


Fig.29: The ground- and 1. -floor plan of Synagogue in Rijeka - entrance (reconstructed graphic)

Main part (Ulam)

The main section is the auditorium part (Ulam). On the ground floor, there were 268 seats, directly oriented to the Holy Ark. Except the entrance from the Pomerio Street, there were also two direct entrances to the main core of the synagogue. The one on the west side was identified, by the rules of the Hebrew tradition, to be the main entrance, because it was situated on the opposite side of the Holy Ark. Nonetheless, the entrance from the Pomerio Street was also kept, because of the orientation of the building to the street. (Glavočić, 2002, pp. 338) The second entrance to the Ulam section is from the south side (façade) and it is positioned in the middle of the south façade.

The women's galleries are situated on the first floor directly above the main core of the synagogue. Big marble columns with golden capitols supported these galleries and four arcades in the middle with golden decorations. At the cross of these arcades, there was a great blue dome decorated with a set of yellow stars. (Morgani, 2006, pp. 121) The other two staircases which led to the women's galleries were situated in the corners of the rear facade.

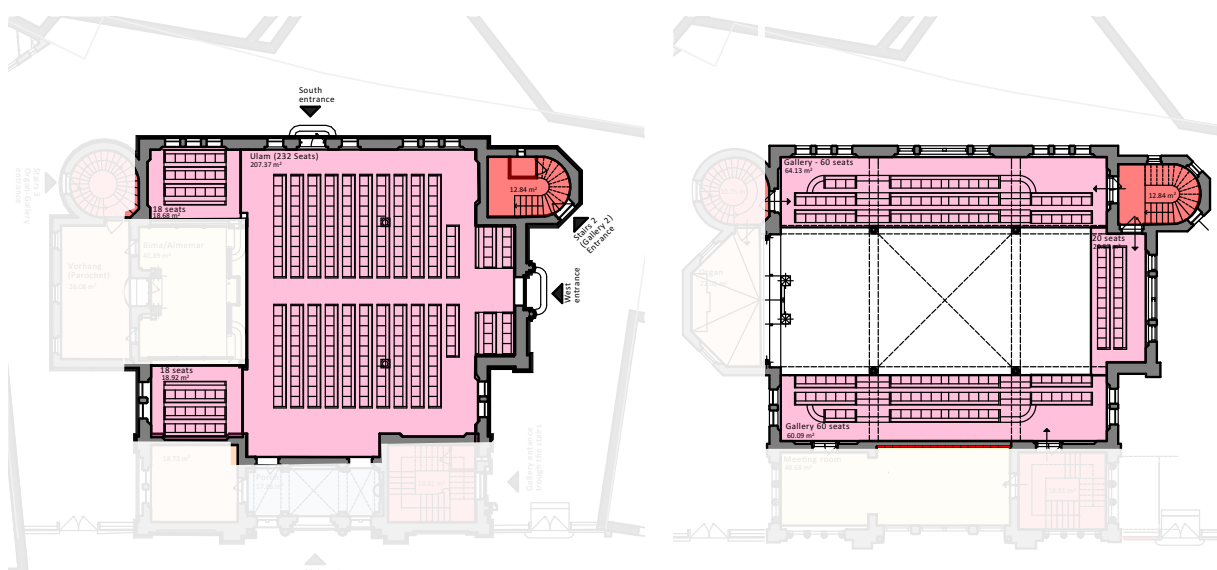


Fig.30: The ground- and 1. -floor plan of Synagogue in Rijeka - main part (reconstructed graphic)

Holy Ark (Aron-ha-Kodesh)

According to the Jewish tradition, the Holy Ark (Aron-ha-Kodesh) is situated on the east side. The ark's central point was a cabinet that was a repository for Torah scrolls (Handwritten copy of the Torah, the holy book in Judaism). During the ceremonial pray, Torah scrolls are used, and the parochet-curtain is moved to the side, revealing the decorated doors of the cabinet. The cabinet is usually filled with the Torah scrolls, donated by many families. The Ark was set on the stage (Bimah). On the stage, there was a desk, from which the Torah was read and occasionally there were chairs for the rabbi and the president. This desk was covered by a mappah - an embroidered cloth. Above the ark there is ner tamid – the eternal light – suggesting the eternal light in the Temple. (Strassfeld, 1976)

On the two sides of the desk, there were round chandeliers with many lights, and the Menors (candlesticks) were placed on marble pillars at the almemar. Bimah or almemar were surrounded by a wrought iron railing. On the first floor in the gallery above the holy ark was situated the organ, the work of the famous organs shop „Józef Angster és fia“ from Pecuh. (Karač, 2009, pp.31)

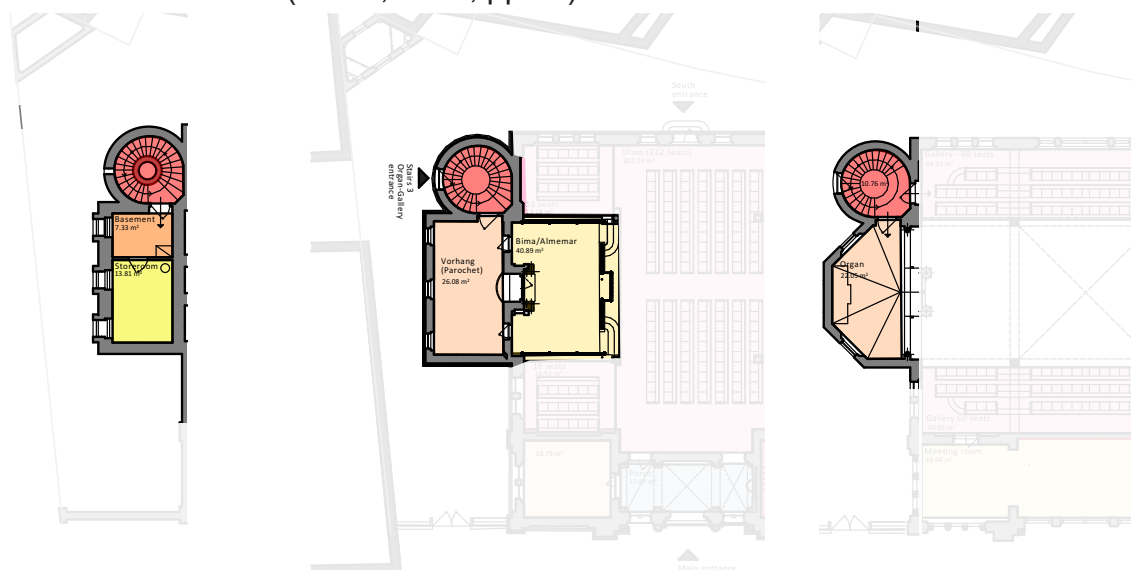


Fig.31: The ground- and 1. -floor plan of Synagogue in Rijeka - Aron-ha-Kodesh (reconstructed graphic)

Roof construction

The roof displays a combination of different roof shapes gathered in one complex roof. The base is a hipped roof with the squatter projecting wings, making a cross-shaped plan. The main dome was in the central position at the crossing of different roof sides. The base is a square, so there was used a “cloister or pavilion vault” construction. It is the combination of four-barrel vaults. The lantern consists of four sides with the same window disposition: five arched-pointed windows, from which two on sides were closed and additionally decorated with a horizontal mullion.

Two smaller domes were positioned on two towers on the main façade. They arose from the square base, which transforms through a pyramid into an octagonal lantern. The lantern ended with the decorated tambour on which the dome is placed. The dome is made of eight facets with parallel stiff connections, based on a wood construction, but completed with a concrete dome façade, richly decorated. The architecture relief decoration was also applied: big triple-arched (The Moorish style) openings and perforated calottes on the dome openings.

On the main façade in the corners of the towers, as well as in the corners of the main dome and the high parapet, there are situated small onion domes. They had a square or octagonal base, which were transformed into small lanterns, and then trough tambour transformed to a dome.

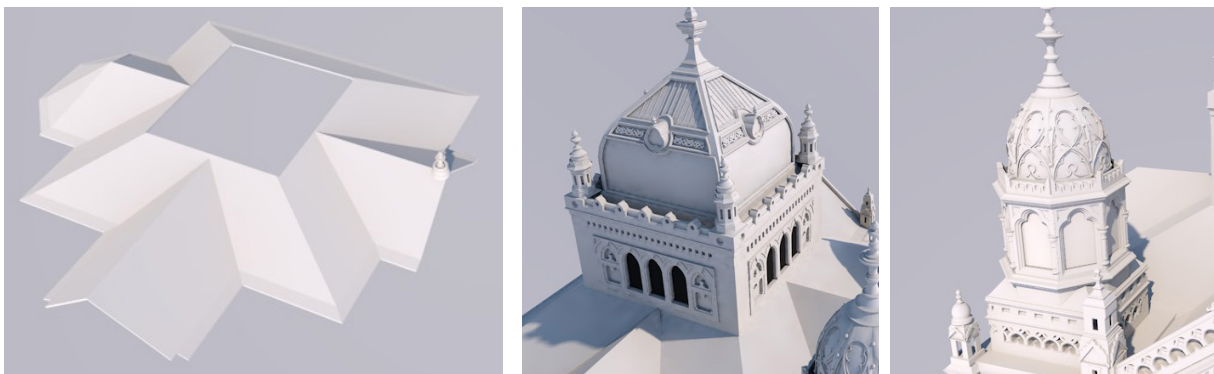


Fig.32: The reconstructed roof shape, main and side dome with lanterne

Façade

Inspired by the Hungarian national style, Baumhorn used red façade bricks, and on the main façade white stones to compose horizontal lines and to create a contrast to the brick-façade. (Viennese and Budapest - Förster style). (Oszkó, 2008, pp. 399)

Baumhorn also applied a triangular gable to the north and west façade and to the decoration of the entrance door. The parapet is also richly decorated with white stone decorations. The main portals were highlighted with pointed and round arches, a decorated tympanum and, on the sides, a combination of jambs.

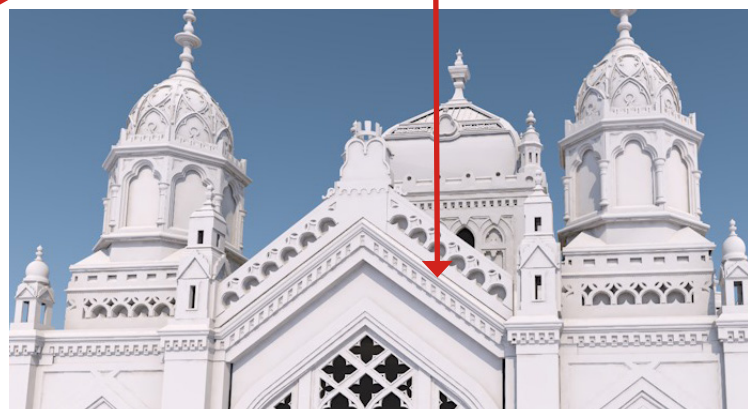
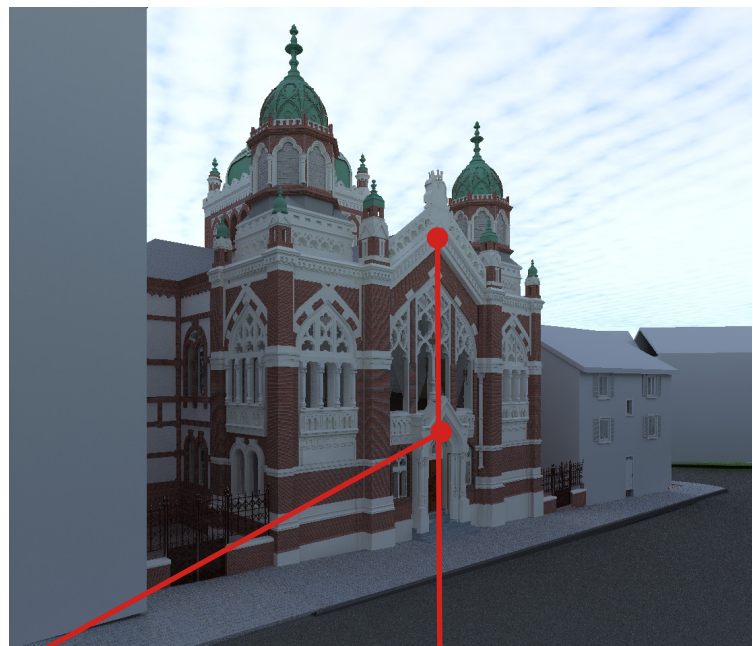


Fig.33: The reconstructed façade: door portals and parapet

Windows on the main façade are symmetrically arranged: the great central one and two smaller ones on the sides. Essentially, they were set in the pointed arch and decorated in the reticulated tracery (Gothic style) with mullions and cusps producing different shapes. Jambs and relief decoration were set between openings.

The windows on the side façades followed the same pattern: they were symmetrically arranged, and also involved gothic style shapes but in the geometrical tracery.

The side façades were finished with white plaster colour and additionally decorated with horizontal and vertical lines built from bricks. The shape of the decoration was determined by the position of the openings. Because the side entrance was positioned on the west façade, this façade features a sculpture decoration on the entrance. A part of the east and west decoration is also mainly covered by bricks, except for the parts on the doors and windows.

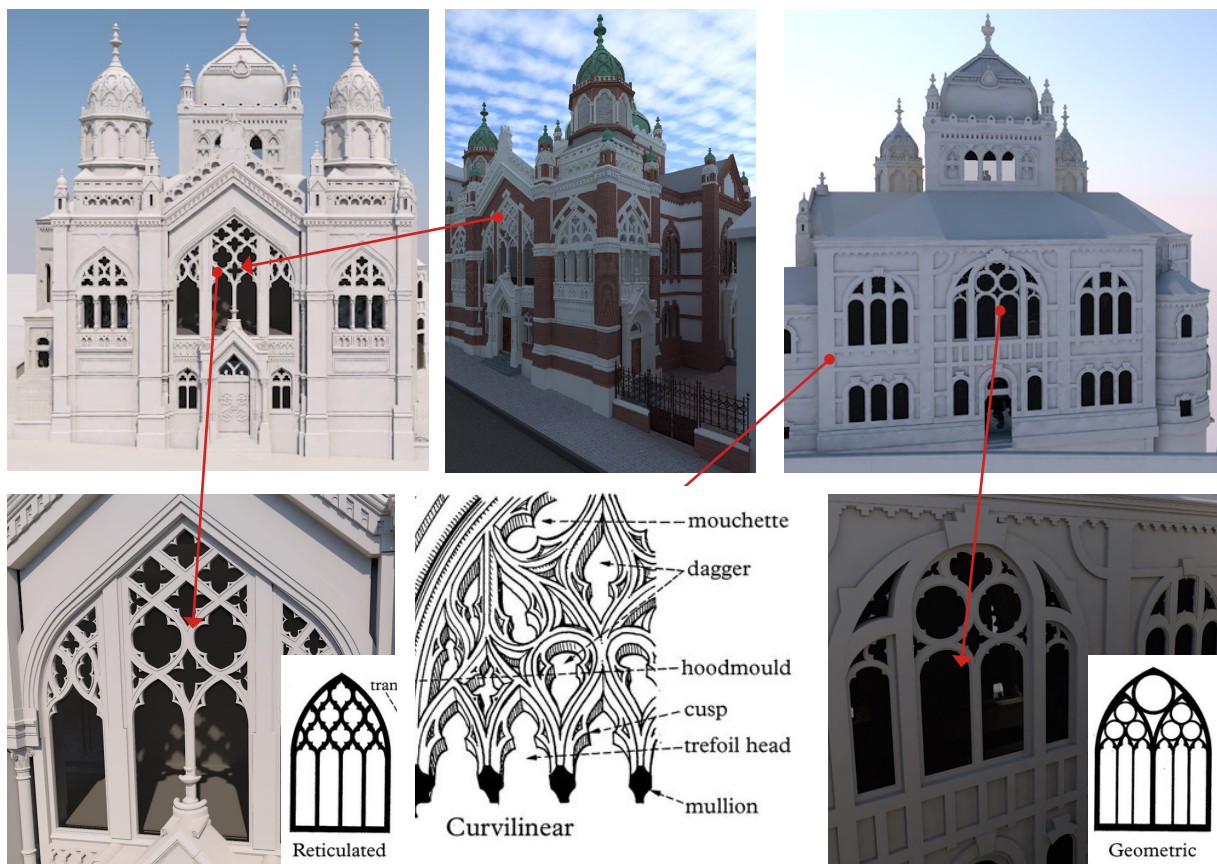


Fig.34: The reconstructed windows: front and rear façade

3.6 Comparison with other Baumhorn's Synagogues

Many of the architecture historians had made the classification of the synagogues based on different typologies. Aniko Gazda, cited by Klein (2010, pp.113) made the first known classification: (1) basic type; (2) Oriental type; (3) eclectic type; (4) Art nouveau synagogue; (5) Proto-modern synagogue.

Rudolf Klein (2010, pp.113-117) had classified synagogues of the 19th century, based on the more complex methodology based on seven criteria:

“(1) interior space— proportions, articulation, limitation, foci (number and placement), scale; (2) size (number of seats); (3) architectural language (decoration) of the typology, interior; (4) architectural language (decoration) of the exterior; (5) bearing structure and building materials in general; (6) exterior mass composition; (7) location (the synagogue in the context of the town, the synagogue and its immediate surroundings).

The certain percentage (5-10%) of synagogues still do not fit any of these categories.

In the Baumhorn's works, there are some influences that can clearly distinguish his synagogues in different groups. However, all these influences are not strictly distinguished, they overlap in every building, but there are some focal points that show the prevailing style. Ágnes Ivett Oszkó made a systematization of his synagogues. In this systematization the Synagogue in Rijeka is settled under the Medieval influence; however, there are a lot of other influences. Also, this synagogue had influenced the work on other synagogues, which were built later.

3.6.1 Oriental Period (1888-1896)

In the context of the Austro-Hungarian Empire, “Oriental” (Klein, 2006, pp. 1) is considered as a relative notion for a multiplicity of expressions. Klein (2006, pp. 1) claims that “Oriental” in architecture is the expression for the other (the unknown, exotic, mysterious) and he avoids terms such as Moorish Style, neo-Moresque Style or Saracen Style.

Lipót Baumhorn merged two idioms during the late Romanticism and Eclecticism: the neo-Gothic and Oriental and incorporated elements of neo-Romanesque style as well. He experimented with new technologies and decorations.

Baumhorn was strongly under the influence of L. Förster and his synagogue in Tempel and Dohani street in Vienna. (Klein, 2006, pp. 1)

Typical oriental elements which Baumhorn used were the polychrome brick façade, very richly decorated battlements and onion-shaped domes.

The Synagogues from this period are the Synagogue in Esztergom (Hungary, 1888) and in Zrenjanin (Serbia, 1896). (Oszkó, 2014)

On the synagogue in Rijeka, oriental influences are visible in the brick façade, interior wall-decoration, richly decorated battlements, onion domes...



Fig.35: The synagogue in Esztergom, Hungary, 1888, Lipót Baumhorn



Fig.36: The synagogue in Zrenjanin, Serbia, 1896, Lipót Baumhorn

3.6.2 Medieval Influence Period (1898-1902)

The Synagogues in Szolnok, Timisoara, Brasov, and Rijeka are clearly under the influence of medieval styles: Germany Romanesque and Gothic. Centered space, covered with the big dome, strongly decorated interior, galleried basilica inside, double- or triple-arched openings, pointed arches, stained glass, gothic-inspired decoration... (Oszkó, 2014)

All these elements are typical for the Rijeka Synagogue. The distinguishing feature was a lot of entrances and high coloration in the interior that were transferred as an influence on the later-built synagogues. Similarities with the Brasov synagogue are obvious in many views. The main façades of the Brasov and Rijeka Synagogue were almost identical: portals, sculpture moulding (capital), the use of materials (red bricks and white stones), windows combination of the mullions. Even the side façades are almost identically threatened: white plaster façade contrasted with vertical and horizontal brick decoration. Bimah is settled in apsidal part, and the stairs are also organised in the same way. The difference is a form of the synagogue: the synagogue in Brasov has the long central hall, while the synagogue in Rijeka had a cross-shaped plan in the ground floor.



Fig.37: The synagogue in Brasov, Romania, 1901, Lipót Baumhorn



Fig.38: The synagogue in Rijeka, Croatia, 1902-03, Lipót Baumhorn

The Synagogue in Szolnok had much simpler decoration, based on plaster façade, and white stones sculptures, while the synagogue in Timisoara, with its multi-layered decoration based on the Eclectic, neo-Moorish and neo-Renaissance style, indicated the next level in the Baumhorns architecture that led to designing his biggest synagogue- the one in Szeged.



Fig.39: The synagogue in Timisoara, Romania, 1899, Lipót Baumhorn



Fig.40: The synagogue in Szolnok, Hungary, 1899, Lipot Baumhorn

3.6.3 Turn-of-the-century (1899-1906)

The Synagogue in Szeged as Baumhorn's masterwork and later restored the Neo-Classical Synagogue in Liptovský Mikuláš, belong to the late historicism with a combination of motifs from different styles. The central plan of the Synagogue in Szeged suggests the Byzantine model of the building, while the decoration of the capitals, arches and accenting the longitude suggests the Romanic. The Gothic elements were used in domes, cross vault, windows and polygonal apse decoration. Moorish elements are also visible. The synagogue in Szeged doesn't belong to any of the "popular" styles of that time. It was the mix of different styles and tastes, and as such, it was chosen to represent a new

representative religious building. (Oszkó, 2008, pp.400-401))

Though, the Synagogue in Szeged was a much bigger than the one in Rijeka, they had a lot of common elements in the composition and in interior decoration: the cross-shaped plan, the central big dome, the position of the towers on the main façade. The perforated dome decoration and the colorisation of the interior decoration were “taken” from Rijeka’s Synagogue.



Fig.41: The synagogue in Szeged,Hungary, 1899-1903, Lipót Baumhorn

3.6.4 Protomodern period (1907-1914)

Postmodernism expresses one “reduced” approach to the Baumhorn’s planning. The cleared-out lines and geometrical form with reduced decoration, the use of a rounded-top triangle, brick lines and points on the plasterwork rooted in the so-called Hungarian Art Nouveau, transformed into modernity. Examples of this period are the Synagogue in Novi Sad and in Budapest. (Oszkó, 2014)

Brick decoration on plaster façade, windows segmentation, the composition of the building with the cross-shaped plan and the big dome above are just one of the elements that are also recognisable on Rijeka’s Synagogue.

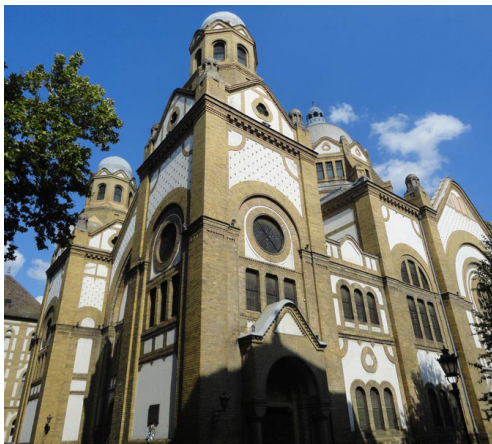


Fig.42: The synagogue in Novi Sad, Serbia, 1906-09, Lipót Baumhorn



Fig.43: The synagogue in Novi Sad-interior, Serbia, 1906-09, Lipót Baumhorn



Fig.44: The synagogue in Budapest, Hungary, Dózsa György Str., 1907–09, Lipót Baumhorn



Fig.45: The synagogue in Budapest, Hungary, Dózsa György Str., 1907–09, Lipót Baumhorn

3.6.5 Post-war buildings (1918-1932)

The situation of the Jews Communities changed after World War I. Architecture followed these political and social changes in Europe in this period. The architecture elements were much more reserved and simplified as the synagogues were mostly hidden and designed for Orthodox use. There are two different lines in this period:

- conservative Neo-classical motifs as pediment, egg, anchor, and gold-blue interior decoration
- Moorish elements mixed with modern construction, based on the function, and all that covered with a hemisphere dome. (Oszkó, 2014)



Fig.46: The synagogue in Nyíregyháza, Hungary, 1918–1932, , Lipót Baumhorn



Fig.47: The synagogue in Nyíregyháza, Hungary, 1918–1932, Lipót Baumhorn



Fig.48: The synagogue in Lučenec, Slovakia, 1924–26, Lipót Baumhorn



Fig.49: The synagogue in Gyöngyös, Hungary, 1929–31, Lipót Baumhorn

Interior construction always followed the same concept. The great columns, supporting the galleries and continuing all the way to the dome.

Some of the Synagogue from this period are the synagogue in Lučenec, in Gyöngyös and in Budapest (Páva street). Though the decoration is much more reduced in comparison with the synagogues from earlier periods, there is still a lot of effort invested in interior decoration, especially in the altar part and columns. The composition of the synagogue is mainly the same: a cross-shaped plan, but the dome shape and the shape of towers in the corners of the main façades were changed.



Fig.50:Fig.63: The synagogue in Lučenec - interior, Slovakia, 1924–26, Lipót Baumhorn

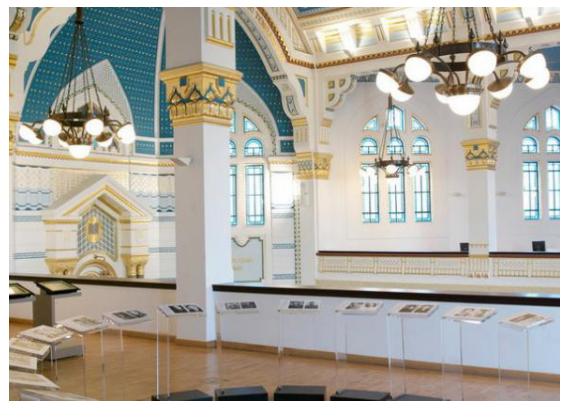


Fig.51: The synagogue in Budapest, Páva Str. 1921-23, Holocaust Memorial Center, Lipót Baumhorn

4. Virtual Reconstruction

This chapter covers the setup of the model. The modelling process starts with collecting the data and then transforming this information into a model. The first step is to research which data are available. Afterwards, it should be checked whether the modelling skills and software are compatible with the information. This questions the possibility of making a model in this program, based on the information one possesses. If one has only photographs without any plans and measurements, then it should be used a software that “reads” the perspective and could make accurate measurements of it. Data are in most cases archived in the archives, libraries or museums. At best, one could find the full plan documentation, including the ground floor plans, sections, and views. Periodically, the static calculation and description are also included. The important content of data are photographs of the building: interior, exterior, the building process, aerial views, etc. Regularly the plans that one can find are not entirely correct - the object implementation made some changes.

ArchiCAD 20 - Graphisoft was used for the modelling process. The overall process is documented in the following chapter.

4.1 Research and sources

Internet research was the first step in the process. The entire photo documentation of the synagogue was found online. For the wider documentation, it was necessary to contact the archive in Rijeka. The contact person was prof. Zlatko Karač from Zagreb who is involved in the research of synagogues in Croatia. He forwarded the contact of the Archive in Rijeka, in which the documentation about the Synagogue was preserved. The Archive in Rijeka preserved the entire plan documentation of the synagogue, not

only the building plans but also a static calculation. The documents were scanned and photographed and the base material for the modelling was collected.

The photo documentation was rather poor: two interior photos with an almost identical view point and some photos and postcards from the street view. Mainly, the photos are black-white, except for the postcard photo of the synagogue exterior, which was colorized. Due to the low resolution of the photos, 3D details that were illustrated in plans were not visible on the photographs.

The plans, especially the views, were filled with a detailed illustration of the façade relief and sculpture. Since it was not visible on the collected photographs of the syna-



Fig.52: The synagogue in Rijeka, Croatia 1902-1903, Lipót Baumhorn, Pomerio street photo



Fig.53: The synagogue in Rijeka, Croatia 1902-1903, Lipót Baumhorn, interior photo

gogue, an additional research regarding the façade moulding was conducted.

The collection of different synagogues made by Lipot Baumhorn and the collection of synagogues with the same façade style and elements were gathered. After the drawings, photos and examples were collected, the drawing and modelling process started. The second contact person was Ágnes I. Oszkó from Budapest. She has been researching the architecture of Lipót Baumhorn for many years. The articles that she has written were very helpful in understanding the time in which Baumhorn had been planning, the architecture and the influences that affected him from different sides.

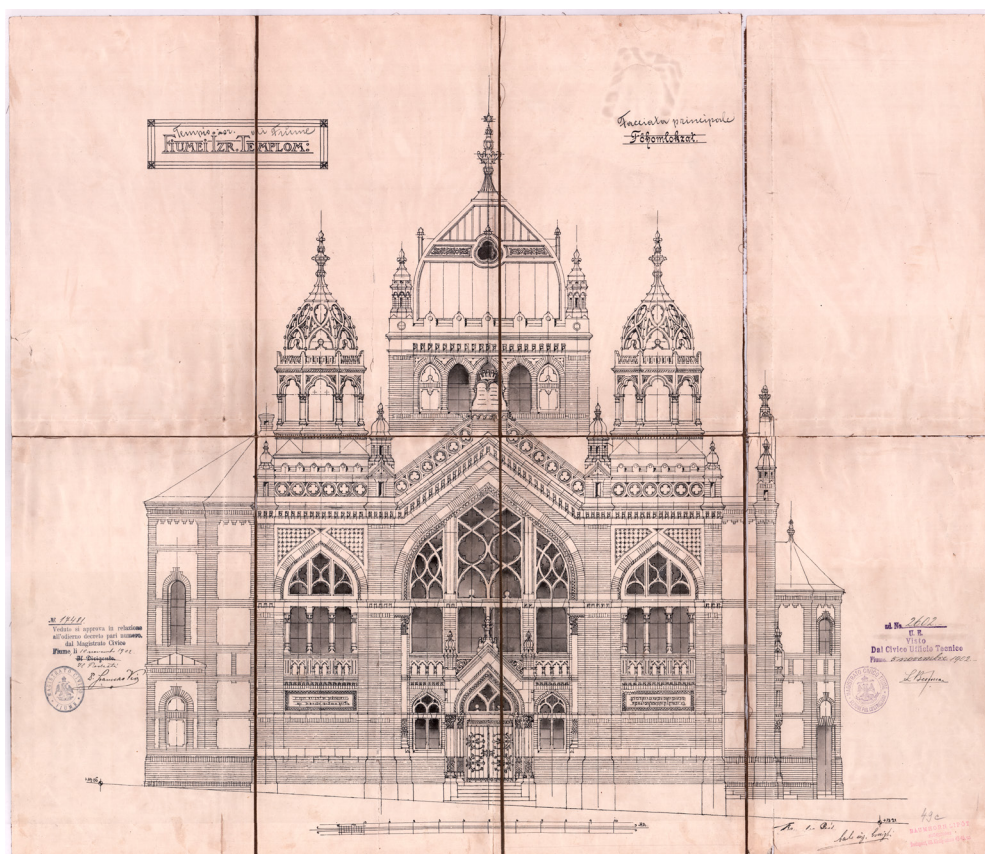


Fig.54: The synagogue in Rijeka, Croatia 1902-1903, Lipót Baumhorn, Pomerio Street-view

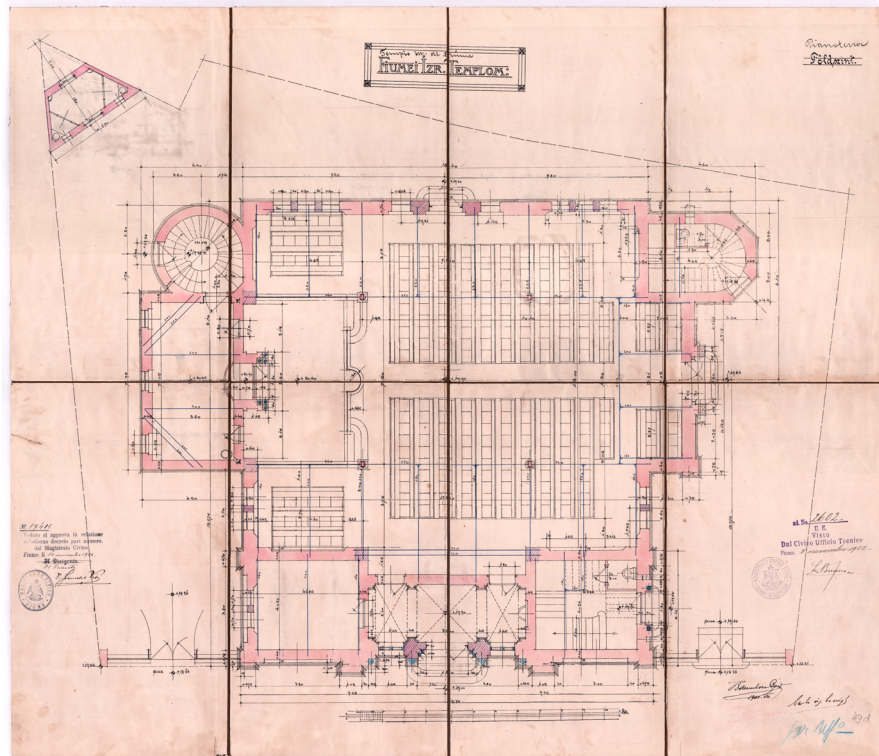


Fig.55: The synagogue in Rijeka, Croatia, 1902-1903, Lipót Baumhorn, ground floor plan

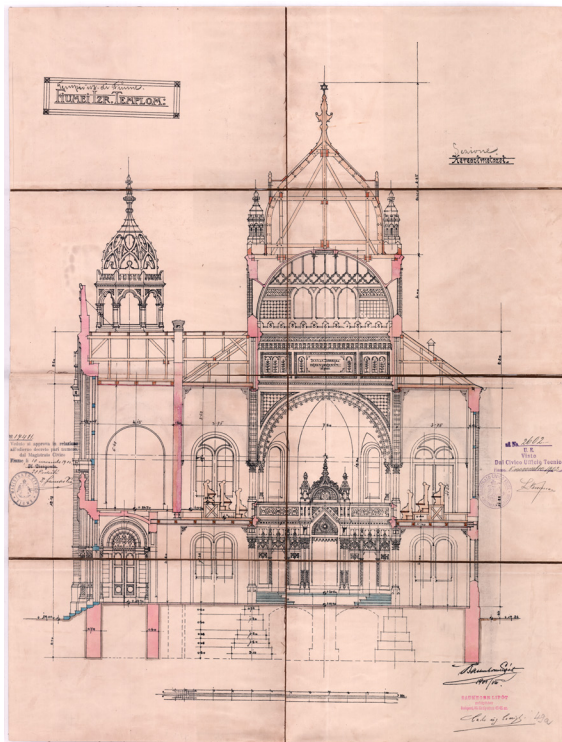


Fig.56: The synagogue in Rijeka, Croatia, 1902-1903, Lipót Baumhorn, cross section

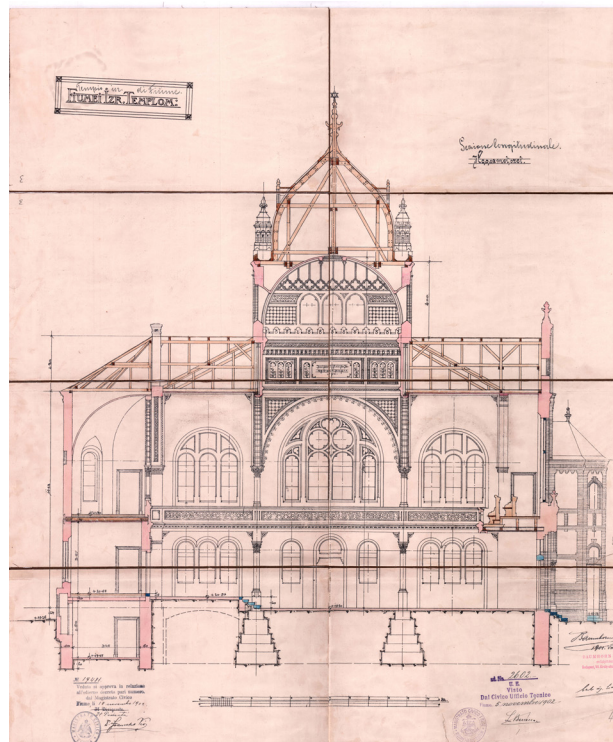


Fig.57: The synagogue in Rijeka, Croatia 1902-1903, Lipót Baumhorn, longitudinal section

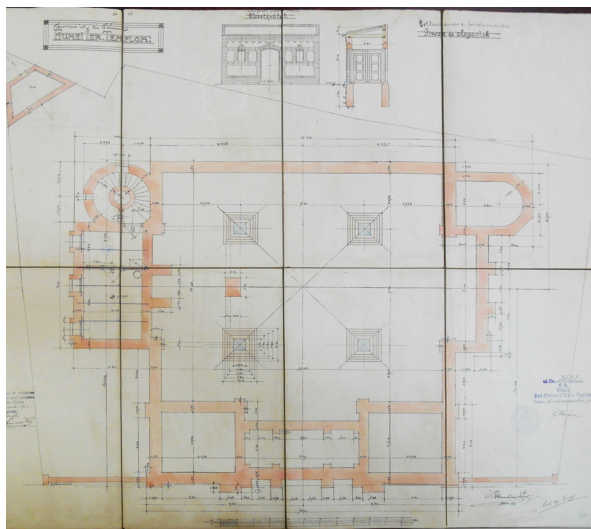


Fig.58: The synagogue in Rijeka, Croatia, 1902-1903, Lipót Baumhorn, basement plan with foundations

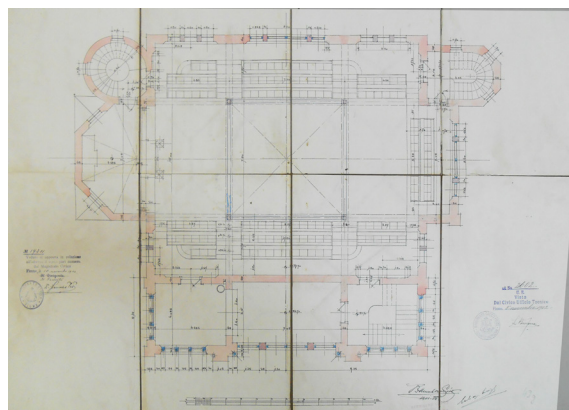


Fig.59: The synagogue in Rijeka, Croatia, 1902-1903, Lipót Baumhorn, first floor plan

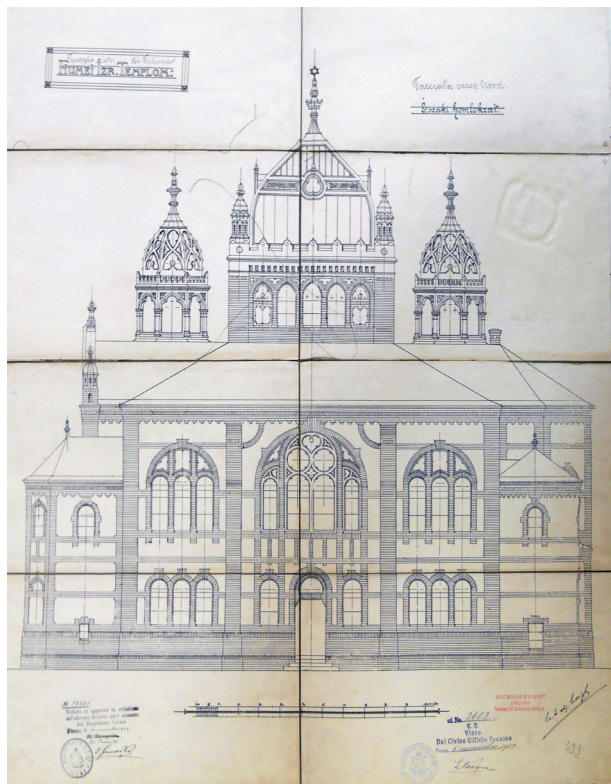


Fig.60: The synagogue in Rijeka, Croatia 1902-1903, Lipót Baumhorn, south view plan

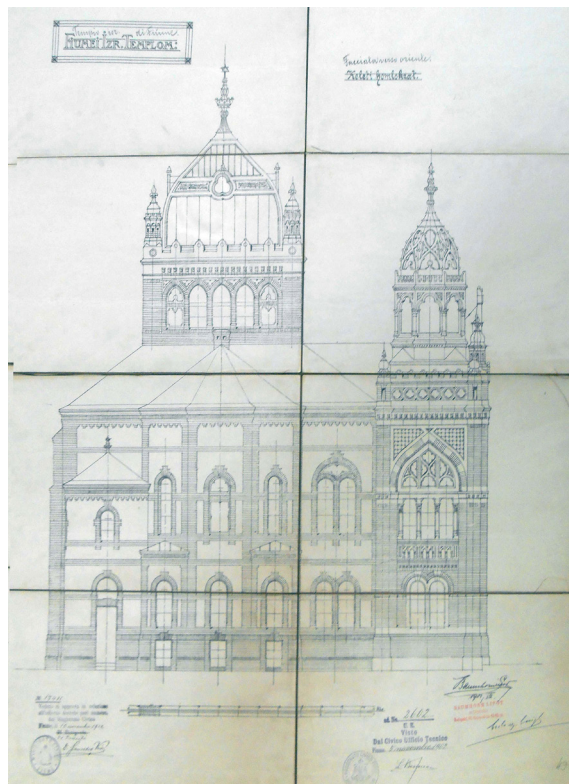


Fig.61: The synagogue in Rijeka, Croatia 1902-1903, Lipót Baumhorn, east view plan

4.2 Work process

4.2.1 Measuring the building and the difference between the plans and the constructed building

The plans, such as ground floor plans and sections, depict dimensions lines as well. Accordingly, mistakes that could occur during the scanning process are avoided. However, in the process of comparing plans and photos of the synagogue, some differences were noticed and correspondingly researched. The photographs were recognised as a more reliable source. Since some elements could not be properly interpreted from the photographs and the plans, their appearance in the model was made based on the examples of other synagogues with the similar elements

- Small domes on the corners of the main façade are based on the octagon in the view plans. However, in reality, there is no octagon base, but a square one. The same applies to the side domes in the corners of the great dome.

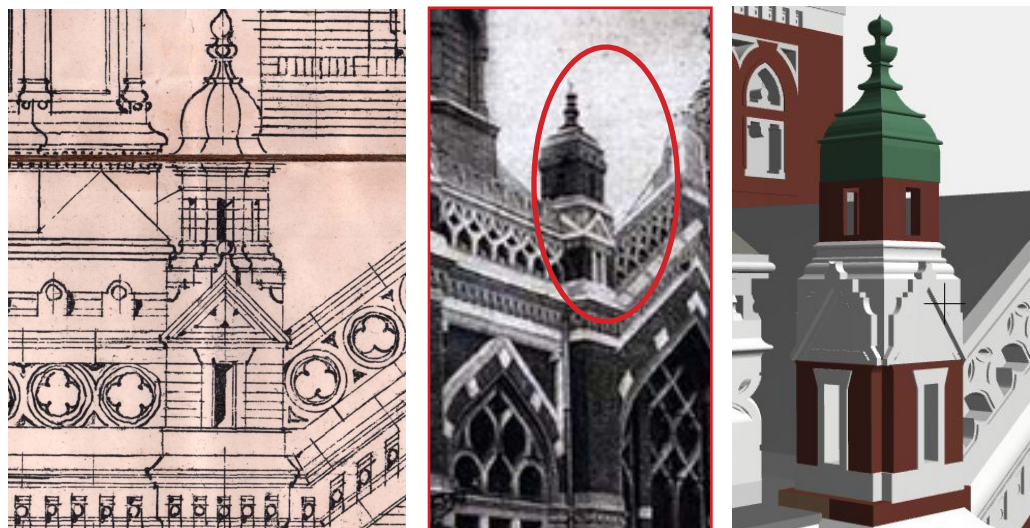


Fig.62: Small domes on the façades-difference between the plan and the photo

- The west façade drawing was not included in the plan documentation. Therefore, the reconstruction was based on the photos and on the ground floor plans. The pattern behind the other façades was interpreted on this one as well.

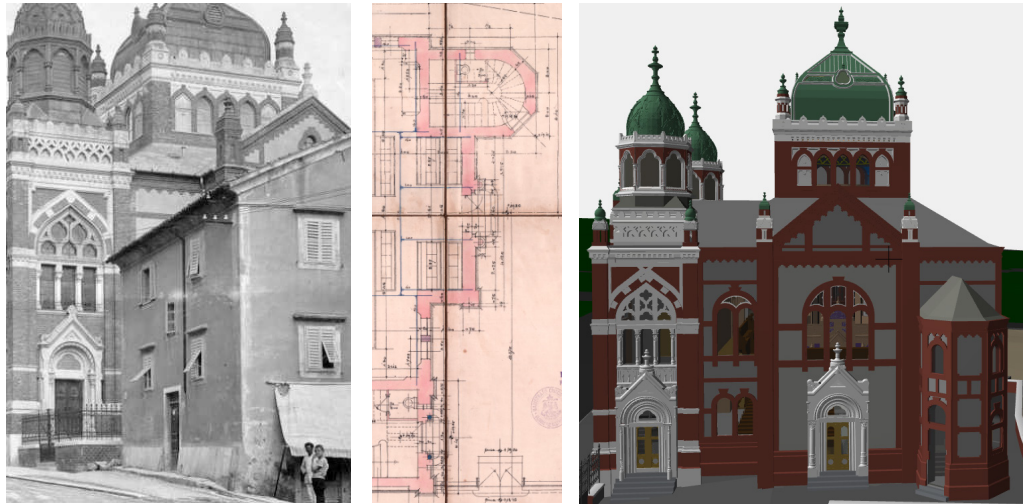


Fig.63: West façade - reconstruction based on the ground-floor plan and photos

- The main difference between the drawings and the photographs was the interior space. The ornaments and the decoration of the Holy Ark were differently implemented; the positions and dimensions of doors, such as the central point (door) and its decoration, were altered.

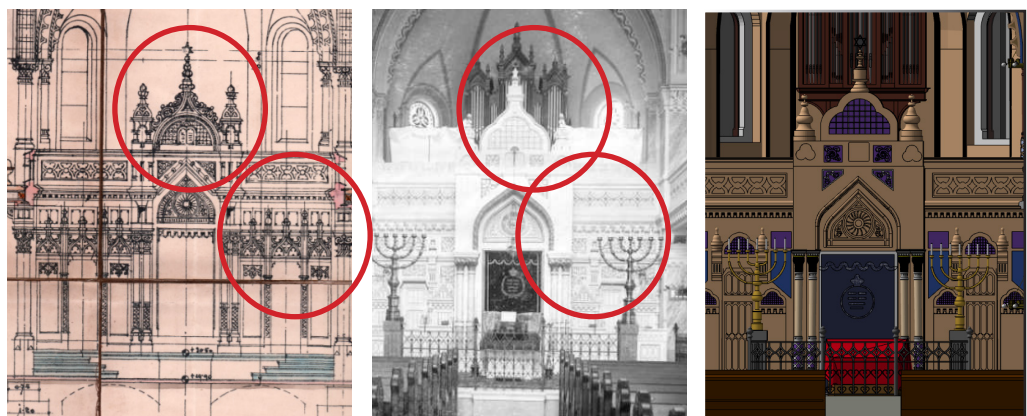


Fig.64: Aron-ha-Kodesh- reconstruction based on interior photo

- Another element in the interior space that is questionable is the interior side of the dome. In the description of Morgani (2006, pp. 121) it is noted that the dome was decorated with many yellow stars on the blue background. However, on the section drawing, it is completed with different ornaments. The section drawing was implemented to the model, because it is the only saved data with a view on the dome.

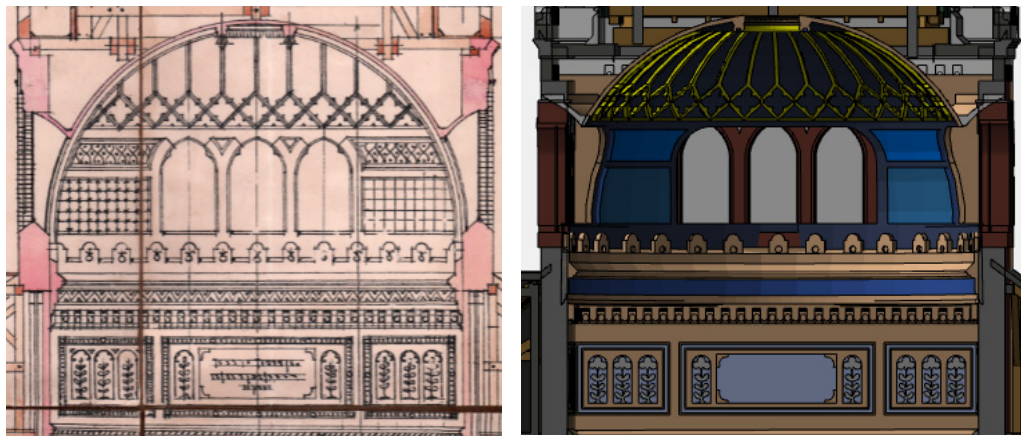


Fig.65: The great dome interior decoration

4.2.2 Roof construction

Main Roof

Concerning the modelling of the roof, different options were used since the intersections of the roof and their angles were not always compatible with the complex roof tool in ArchiCAD. As a result, there was a combination of several tools used, as follows:

- Roof option/multi-plane (two angles)
- Roof option/gable roof (two angles)
- Roof option/simple roof-one plane

The intersected surfaces were “subtracted” with the “Subtract from polygon” command from the contour polygon. The wood construction was modelled with the beam option.

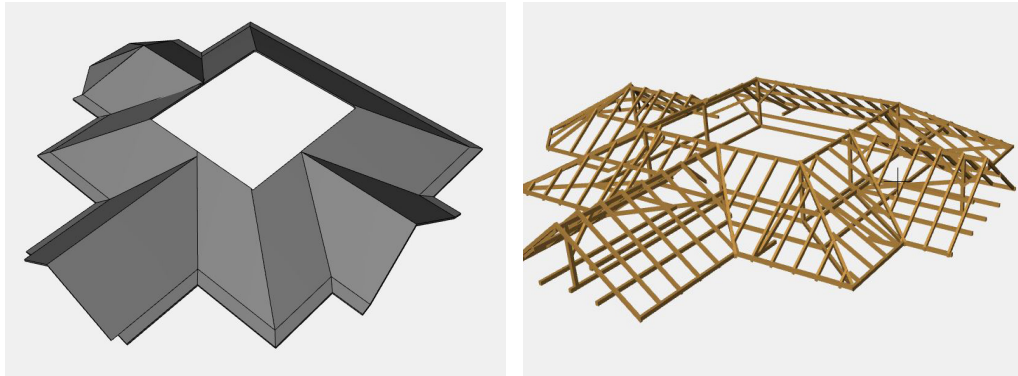


Fig.66: The roof construction modelling

Central dome roof

As the dome is based on the “domical vault” construction, it means that it consists of four dome sides based on the square. The option used for this dome is shell extrusion. A triangle was made in the ground projection and then copied three times (each copy was additionally rotated by 90 degrees).

The top of the dome is modelled with the shell option - revolved command. The profile was reconstructed from the façade drawings.

The construction underneath (wood construction) was modelled predom-

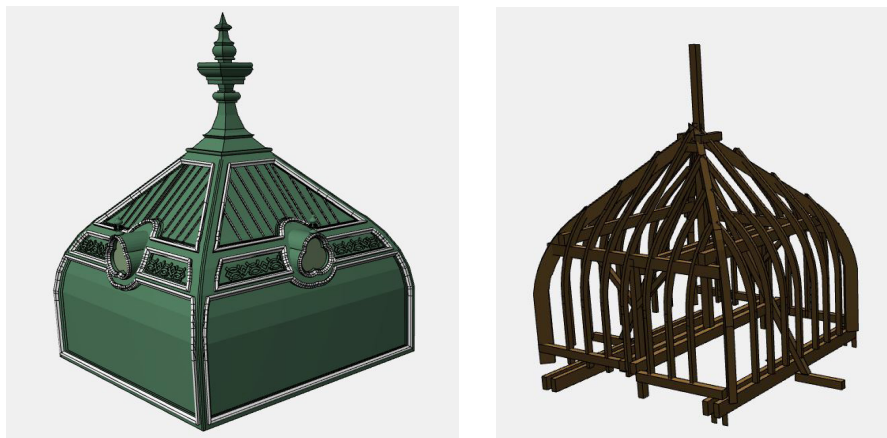


Fig.67: The modelling of central dome roof construction

inantly with the beam option. Where beams are curved, morph option (extrusion) was used.

The decoration on the surface of the dome was made using the boolean operation of the morph tool.

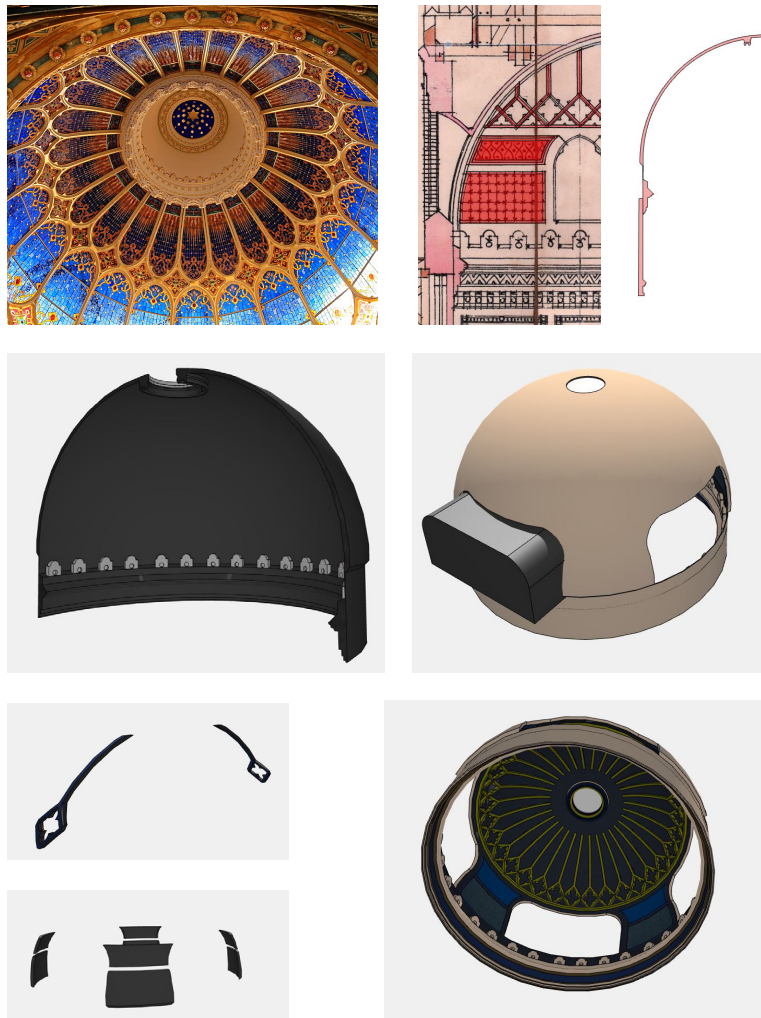


Fig.68: The central dome roof-modelling of the interior element

Side domes

Two side domes on the street façade were basically drawn with the same technique as the main dome: shell intersections, multiplied seven times because the base was octagonal. The decoration was drawn with the multiplication, scaling, morphing and extruding options.

Owing to the great use of shell, morphs and extruding options, the number of polygons increased. The size of the ArchiCAD file had to be reduced so the only option to reduce it was by saving the complicated modelled structures as library objects. Gathering all objects in one, there was produced a significantly smaller ArchiCAD file.

The lantern part is drawn with walls and morphs profiles (on the window frame and for the decorations).

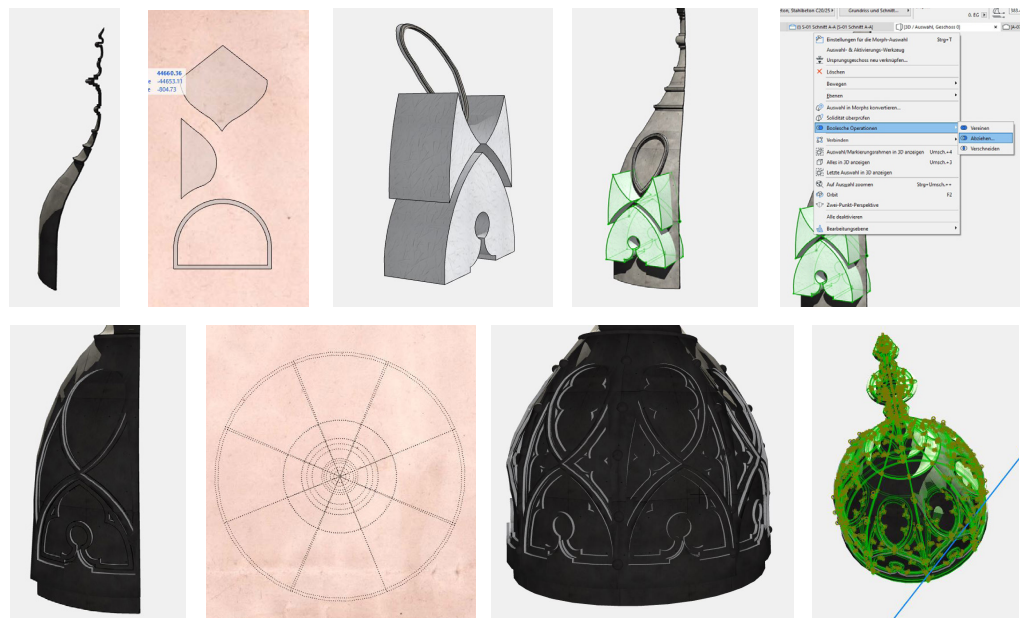


Fig.69: The modelling of the side dome elements

4.2.3 Interior

Holy Ark (Aron-ha-Kodesh)

The 3D base for the altar are regular walls, additionally decorated with profiles, morphs, shells and door elements. The model of the ark was shaped with a slab tool, transformed to the morph and then positioned on the right spot. The small domes on the central position were produced with the shell option. The columns were also drawn with the shell option and then decorated with the same morph elements already used for the exterior columns. All Holy Ark elements were saved as one object, loaded to the library, and further to the ArchiCAD file as well.



Fig.70: Aron-ha-Kodesh reconstruction from the interior photos

Galleries

The profile for the gallery balustrade was created with the profile manager, and afterwards shaped, using a wall tool. The decoration was modelled with slabs, which are occasionally rotated in the vertical position, transformed to morph and loaded as an object in the ArchiCAD file.

In the interior walls, there were some niches planned as decoration elements. The niches were drawn in the following order: openings were modelled with the slab tool; afterwards, these openings were defined as a niche and later loaded to the file.

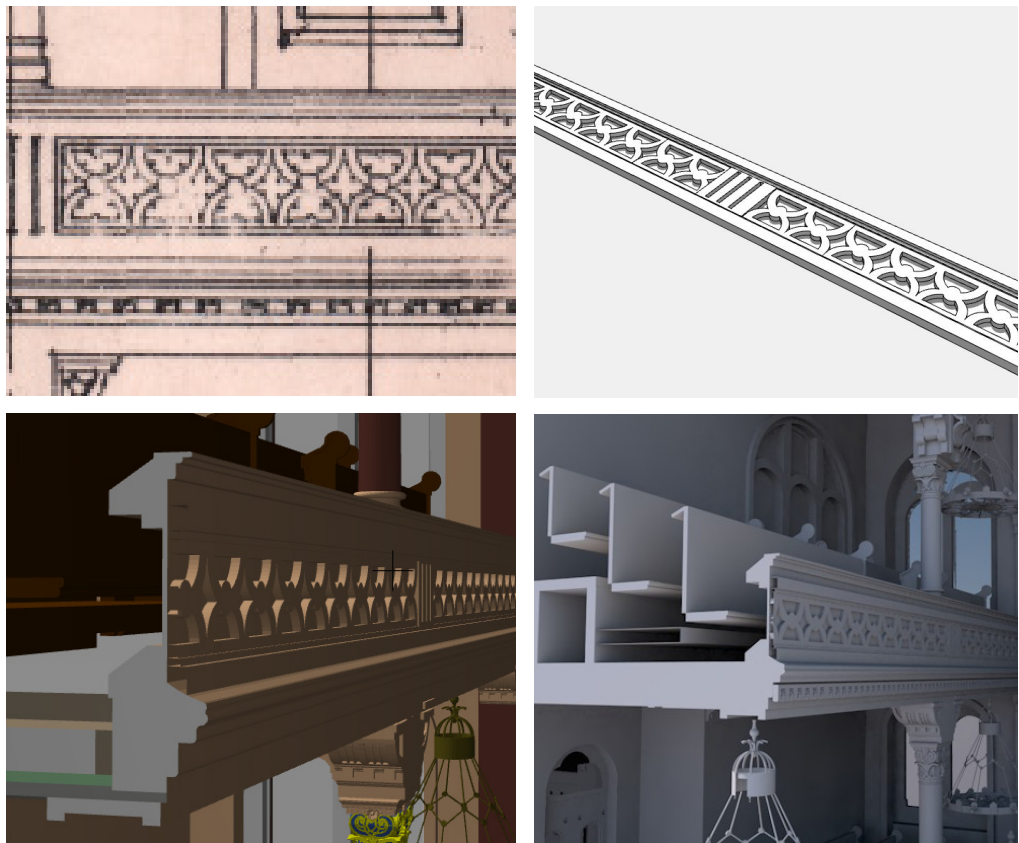


Fig.71: Gallerie profile and galleries decoration modelling

Arc decoration

Arc decorations were modelled with the morph tool. The next step was the soft edge in the morph selection setting. Subsequently, the created morphs were multiplied and saved as a group (ArchiCAD object).

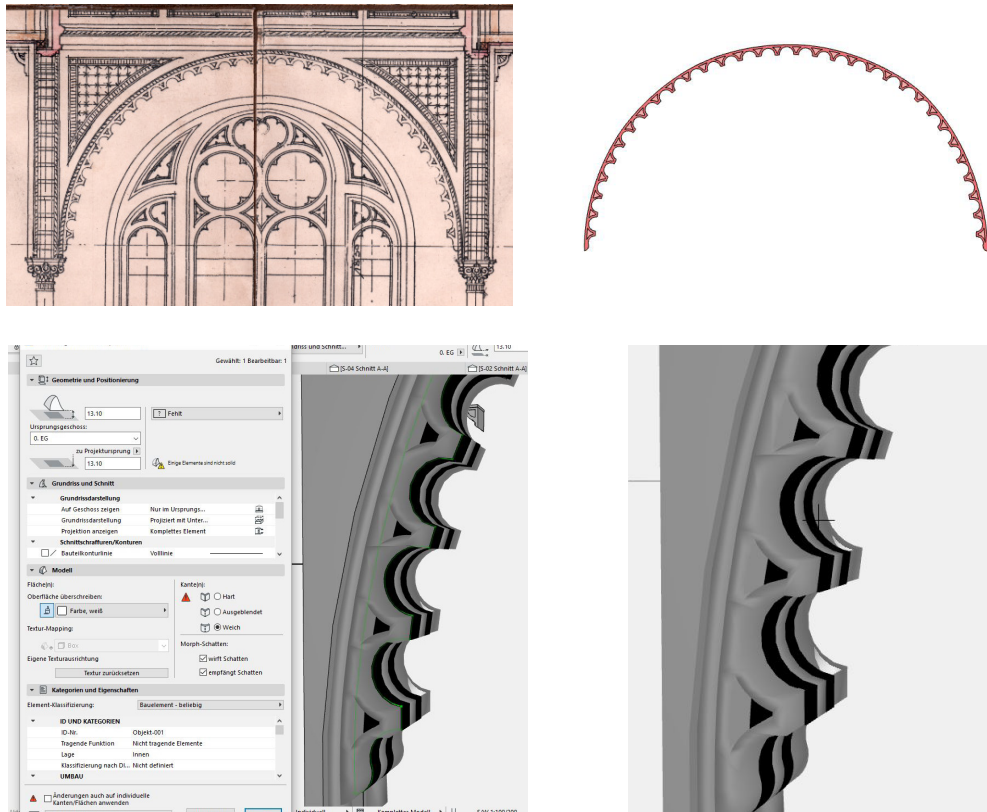


Fig.72: Arc modelling based on the section plan

Benches, chandeliers, candlesticks

All these elements were separately modelled and saved as library objects. The combination of options was applied for bench modelling: a slab for the seats and the morph for the side elements.

Chandeliers were shaped using the slab tool. After completing two levels

of horizontal plates, it was necessary for them to be connected with the leaning morphs, circling around the 'plates'. Light bulbs were drawn with the shell tool.

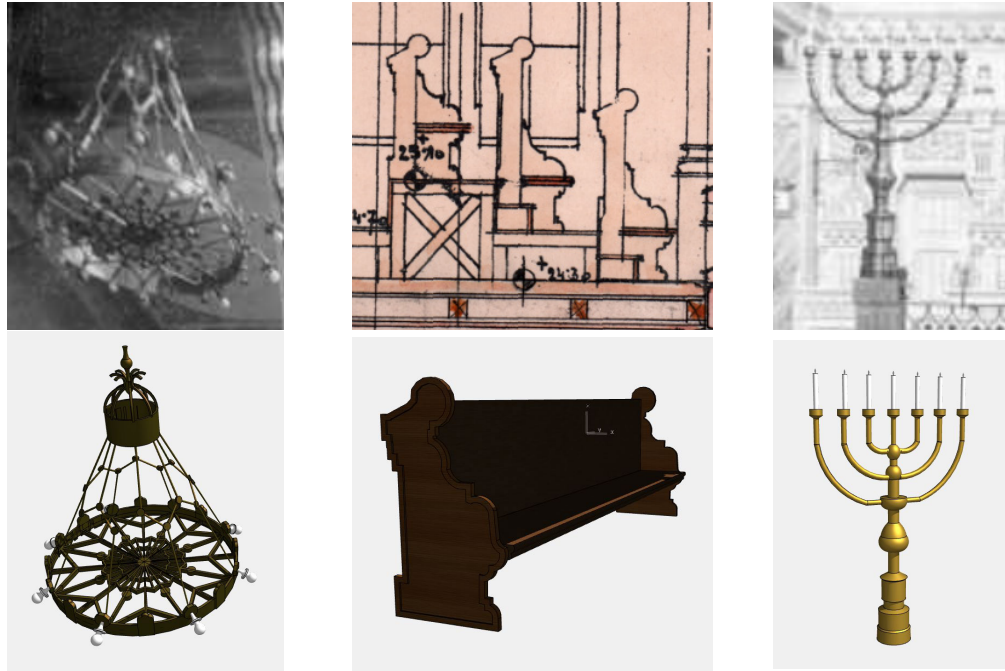


Fig.73: Chandelier, bank and candlestick reconstruction from plans and interior photo

The columns

The columns are almost identical to the one on door portals, but with some differences in colour and in base modelling. They were modelled with the same techniques described on page 58.



Fig.74: The interior capital modelling

Organ

The organ is visible in the photo of the synagogue interior.

Since the bottom could not be seen in the photo, one similar example had to be found to reconstruct the organs (<https://3dwarehouse.sketchup.com/>). An ArchiCAD object with similar properties was retrieved. This morph object was exploded and then changed with the Boolean operation so that only the bottom part was preserved. The upper part was completely reconstructed with the following drawing tools of ArchiCAD: slabs, shells and morphs.

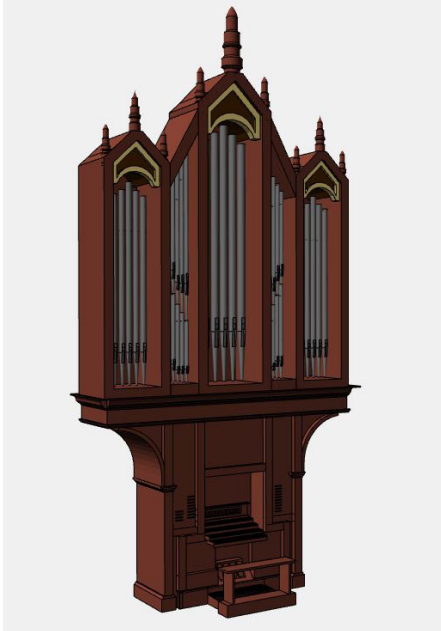


Fig.75: The organ reconstruction

4.2.4 Façade

Walls

Generally, the walls were modelled using the wall-tool with the geometrical method. The wall decoration was created either with the profile manager, if the decoration is linear, or with the morph, if it was three-dimensional. There was also a complex decoration that could not be created directly in the model.

Decoration at the gable on the street façade was rather complicated to be shaped directly in the model. It was drawn in a horizontal (x-y) projection with a slab tool. Subsequently, it was transformed into a morph and rotated vertically in order to be loaded in the synagogue model in the right position.

This method was used for many other model parts, for example for the side door decoration.

The decoration on the side façades (brick decoration) was also modelled in a separate file as a combination of slabs, with the final slab which defines the niche. Eventually, the niche was archived as a window in the library. That enabled more precision, less data (one element only) and the niche was connected directly to the wall. Windows and doors were drawn with the same method, the difference being just the description in the part where glass is (it is a slab with the wallhole description).

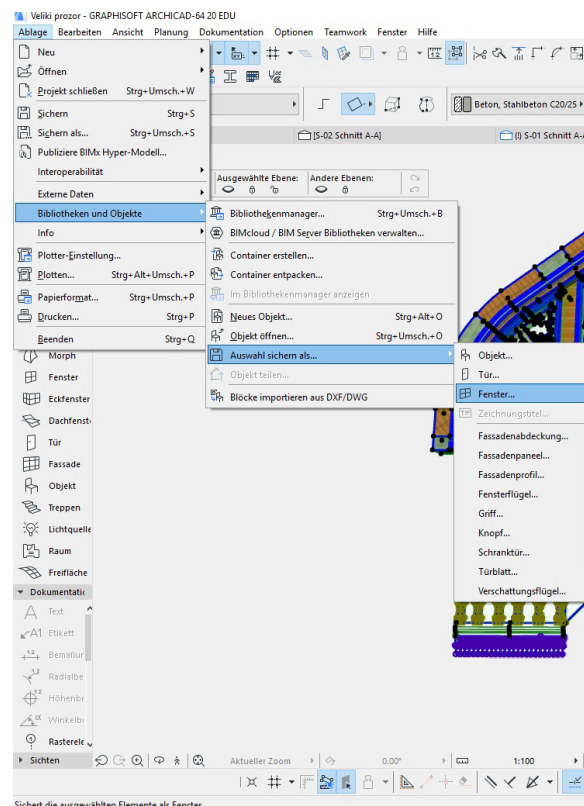
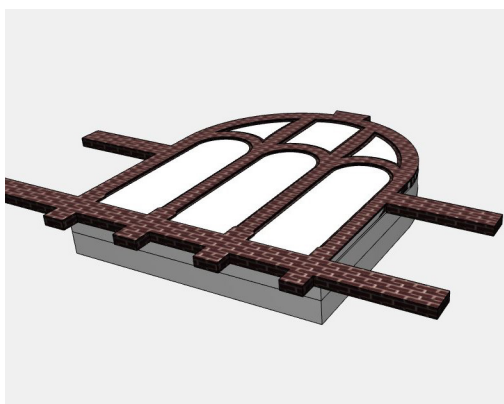
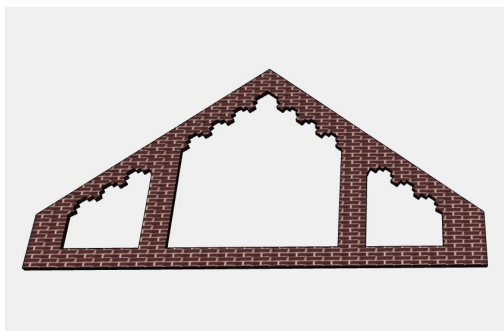


Fig.76: The walls and niche modelling

Some parts of the decoration were especially demanding. The columns on the door portals and pilasters in the windows were modelled with the combination of more tools: morph, shells, walls, slabs, etc.

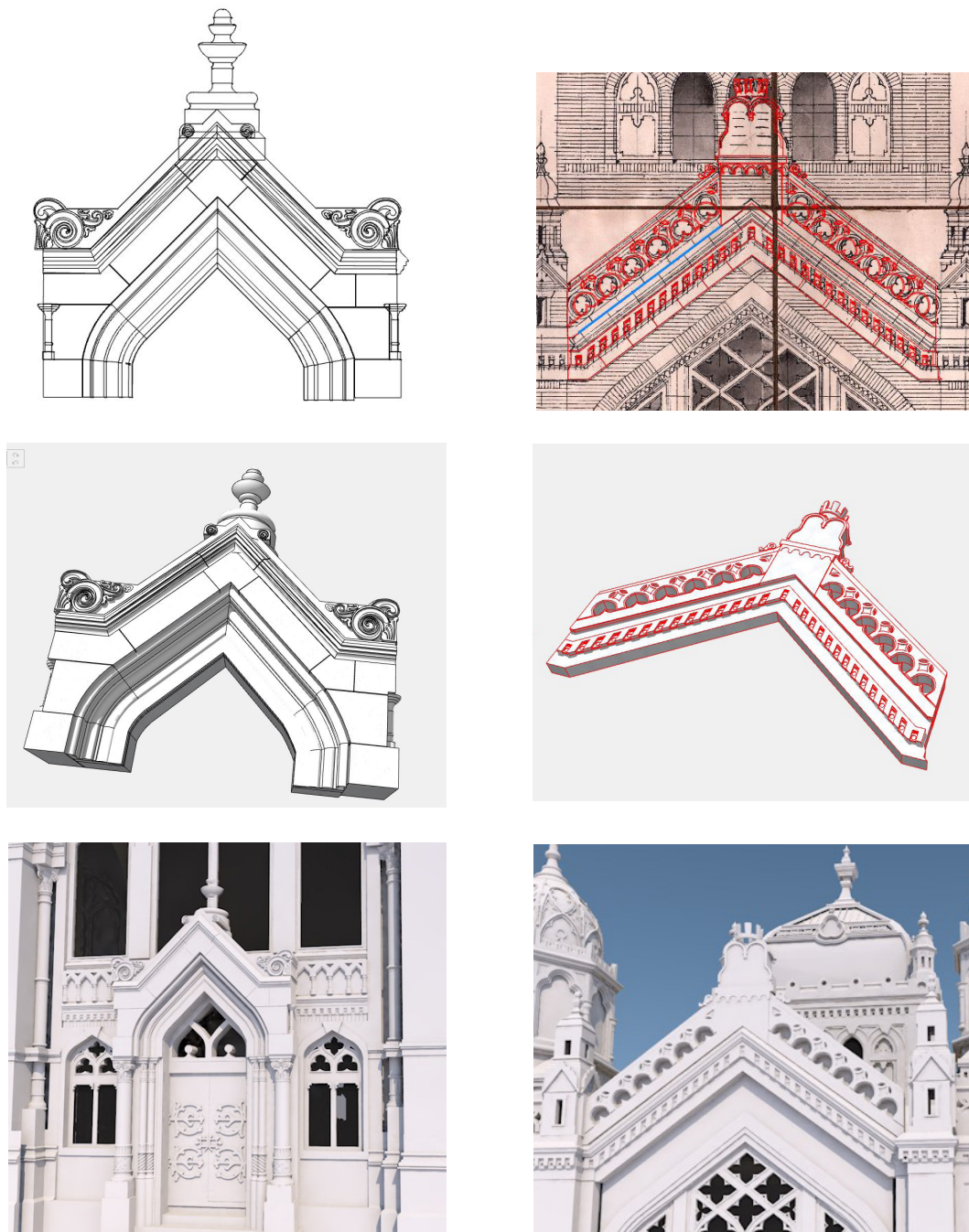


Fig.77: The door portal and gable-parapet decoration modelling

Capital

The Ionic capital with the irregular and unsymmetrical curves was modelled with the morph. First, the shape of the volute was drawn in 2D. Then, the outer part was extruded more than the inner part. As the final step the box stretch command was selected and the volutes were modelled to the right shape. The other part of the capital was modelled with the morph and its boolean operation (union, subtract, intersect).

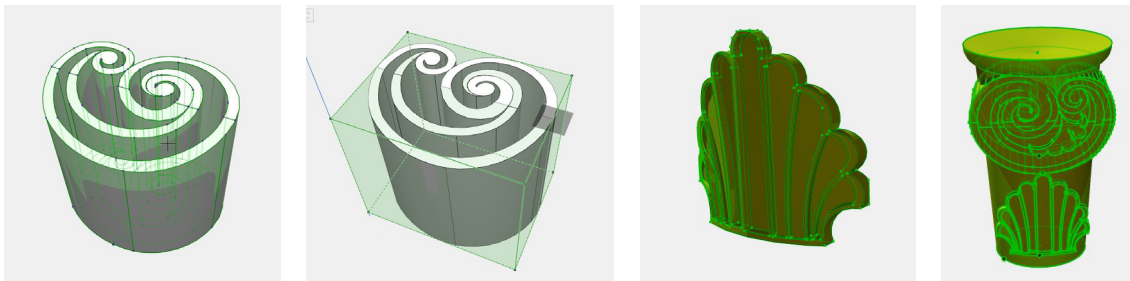


Fig.78: Volute and column decoration modelling



Fig.79: The modelling of the capitals

4.2.5 Situation and Environment

The 3D model of the environment was based on the data from the photos (close environment to the synagogue), and the other ones were based on the present situation in Rijeka. The plans for this area from the period 1903-1945, were not reachable so to understand the position, the present reconstruction of the environment was made. However, a number of buildings surrounding the synagogue have been existing since the 20th century.

The site situation with contour lines of the terrain was made based on the topographic plans of Rijeka. (<http://preglednik.arkod.hr/>)

The modelling tool used for the site terrain modelling was the mesh. Defining different heights, the modelled terrain achieved the realistic proportions and appearance. Another issue to define was material. An operator tool was used. It is similar to the morphs boolean tool, but the extruded parts could be set to the non-visible layer.



Fig.80:3D Site



Fig.81: The postcard of Synagogue in Rijeka

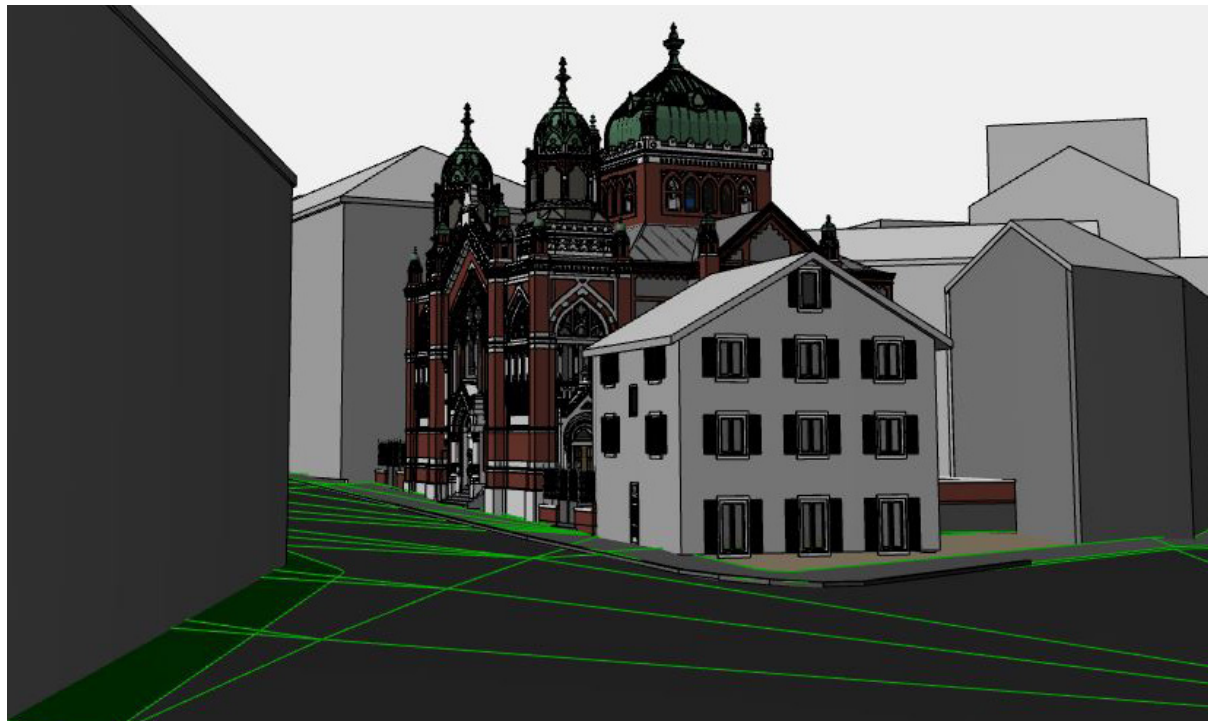


Fig.82: The reconstruction of the synagogue and the site reconstruction-modelling process

4.2.6 Layer Structure

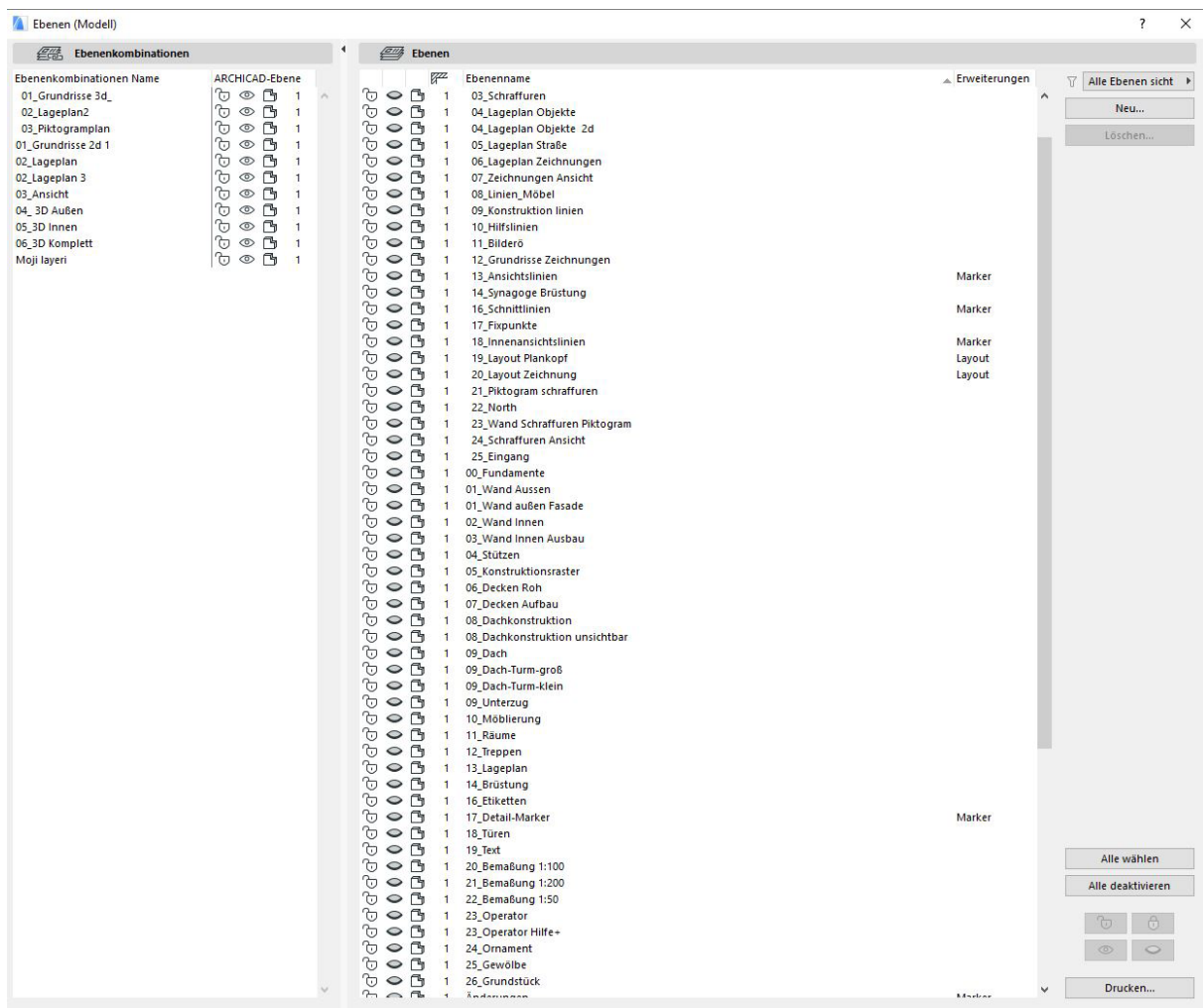


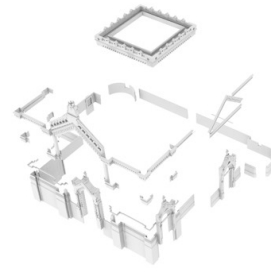
Fig.83:ArchiCAD Layers and Layer Combination



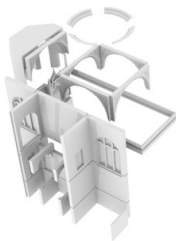
00_Fundamente



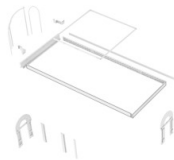
01_Wand Außen



01a_Wand außen Fassade



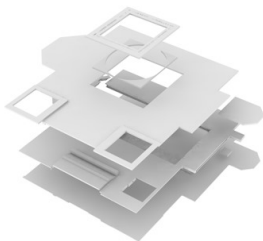
02_Wand innen



03_Wand innen Ausbau



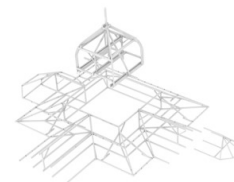
04_Stützen



06_Decken Roh



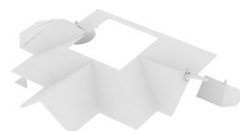
07_Decken Aufbau



08_Dachkonstruktion



08_Dachkonstr. unsichtbar



09_Dach



09_Dach Turm groß

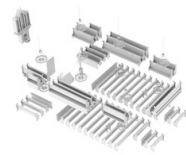
Fig.84: 3D Presentation of ArchiCAD Layers 1



09_Dach Turm klein



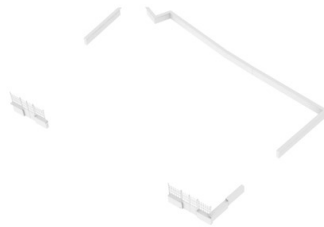
09_Unterzug



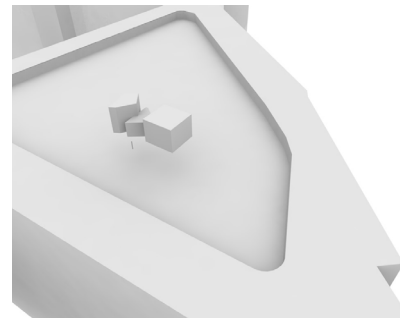
10_Möblierung



12_Treppen



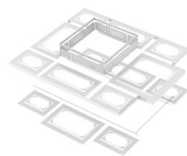
14_Brüstung



23_Operator



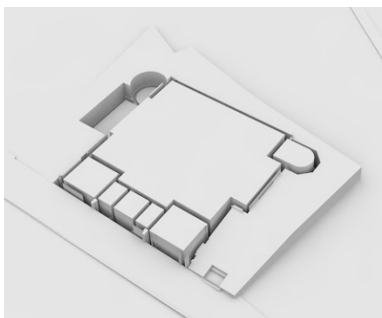
23_Operator Hilfe +



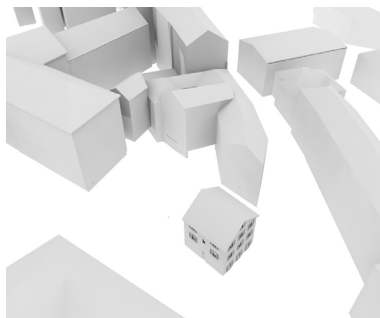
24_Ornament



25_Gewölbe



26_Grundstück



04_Lageplan Objekte

Fig.85: 3D Presentation of ArchiCAD Layers 2

5. Visualisation Process

This part of the work tackles the renderings (a realistic presentation of the model). For the rendering process, Artlantis software was used, which is through the plug-in method connected with the ArchiCAD.

The preparation process for Artlantis started already in ArchiCAD, in defining different materials with different colours. Artlantis is a software that works with shaders, and it recognises only different materials or colours. The materials are defined in Artlantis with the drag and drop option (every shader defines an appropriate material). The default materials in Artlantis are convenient because some of them feature a satisfactory bump and contrast regulation. However, the Artlantis library is limited. Caused by that, some materials had to be made.

5.1 Perspectives and renderings

Material settings

In every rendering program, there are some typical settings for materials. One material becomes realistic when every property is defined (Shader Inspektor in Artlantis): Diffuse, Reflection, Shininess, Bump, Normal, Alpha.

It was necessary for these properties to be set properly so that the end material received every aspect of it.

The materials which were made were: the wood material for the banks, the glass material and the patterns for the decoration of the dome and walls.

The materials and the colours that have been used in interior space are “assumed”, as a result of a lack of colorized photos of the interior space.

The assumption regarding colour is based on the description of the interior

(Morgani, 2006, pp. 121). Based on this description it is assumed that the colourization is similar to Synagogue in Szeged (1905). Therefore, the colours applied to the model are similar to the synagogue in Szeged.

The patterns which have been applied to the model are the Arabic and Jewish ornaments. From the interior photo, this decoration is detectable at the walls, Aron-ha Kodesh, interior dome and the slabs. The precise bravura could not be determined so the patterns that were used for renderings are not original and they are there to demonstrate the exacter appearance of the interior.

Perspective

The positions and angles of the camera are set in a way that the most intricate and significant details of the synagogue could be presented. Some renderings were influenced by the perspective views in existing historical photos. These are predominantly street views. That enabled the verification of the synagogue model. The other camera positions were determined with the “convenient view-points”, which show a lot of information and the realistic position of the visitor sitting i.e. standing.

In order to show some model details (capitals, dome ornaments, etc.) some perspective views were arranged so that those details could be shown.

The bird-eye views were set to show the position of the synagogue in the town (site view).

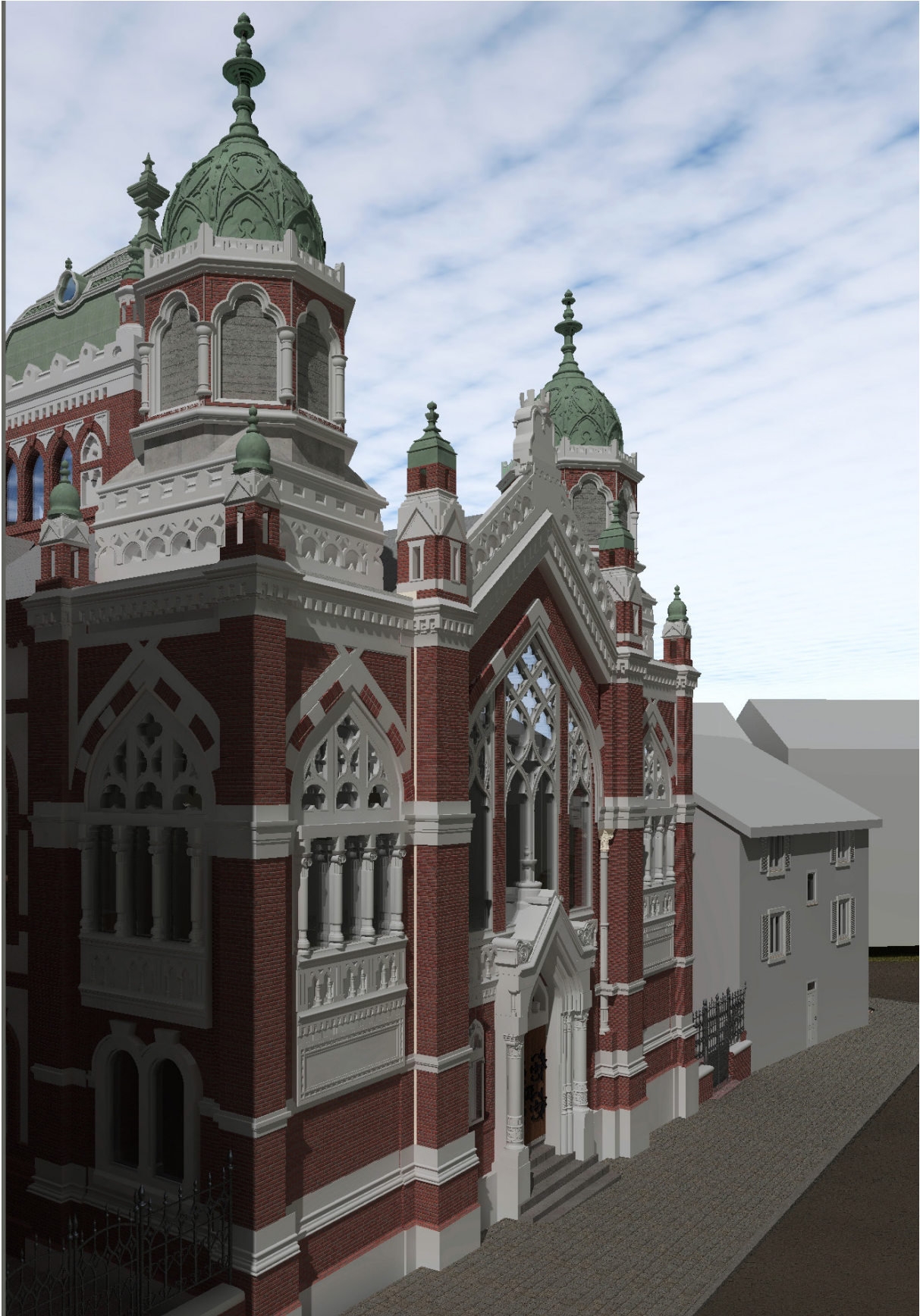


Fig.86: The synagogue rendering - Street View

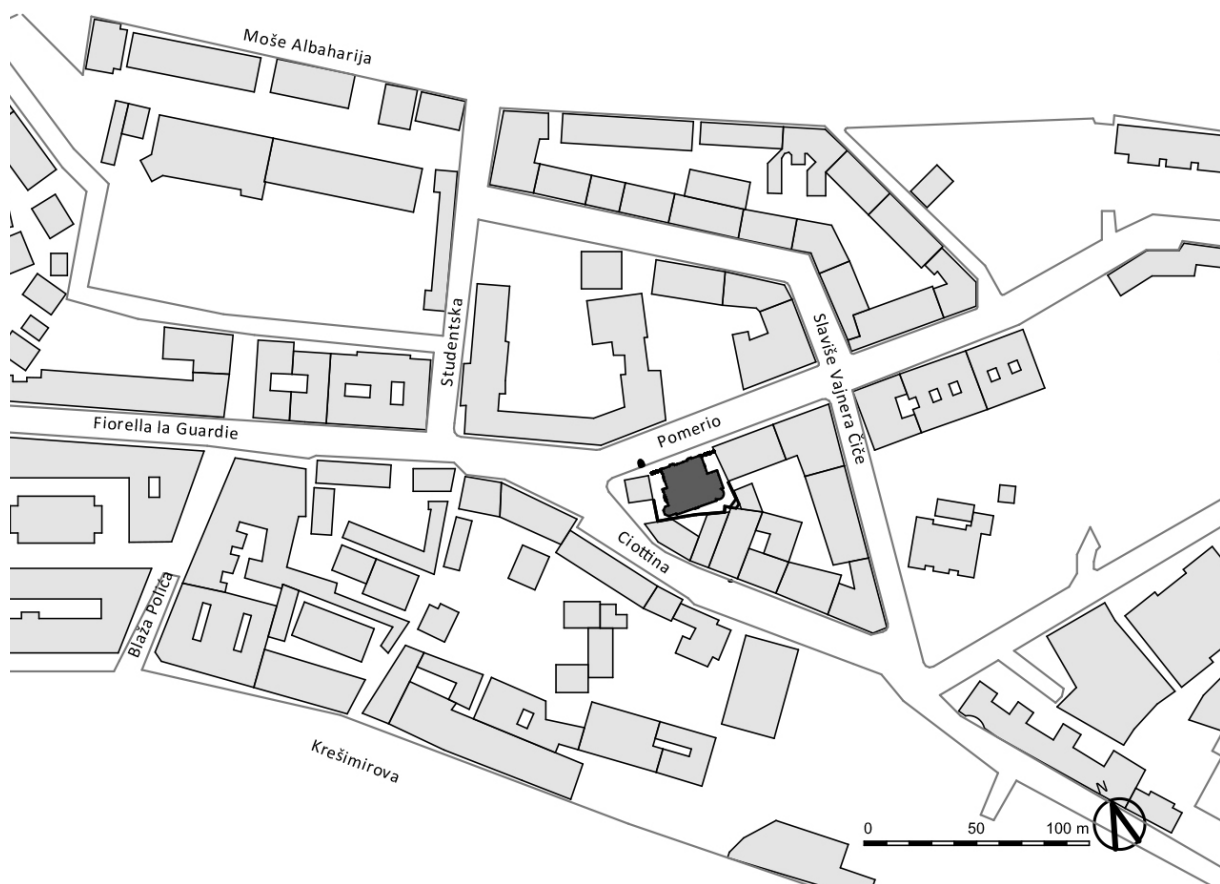


Fig.87: The site view plan (synagogue position)

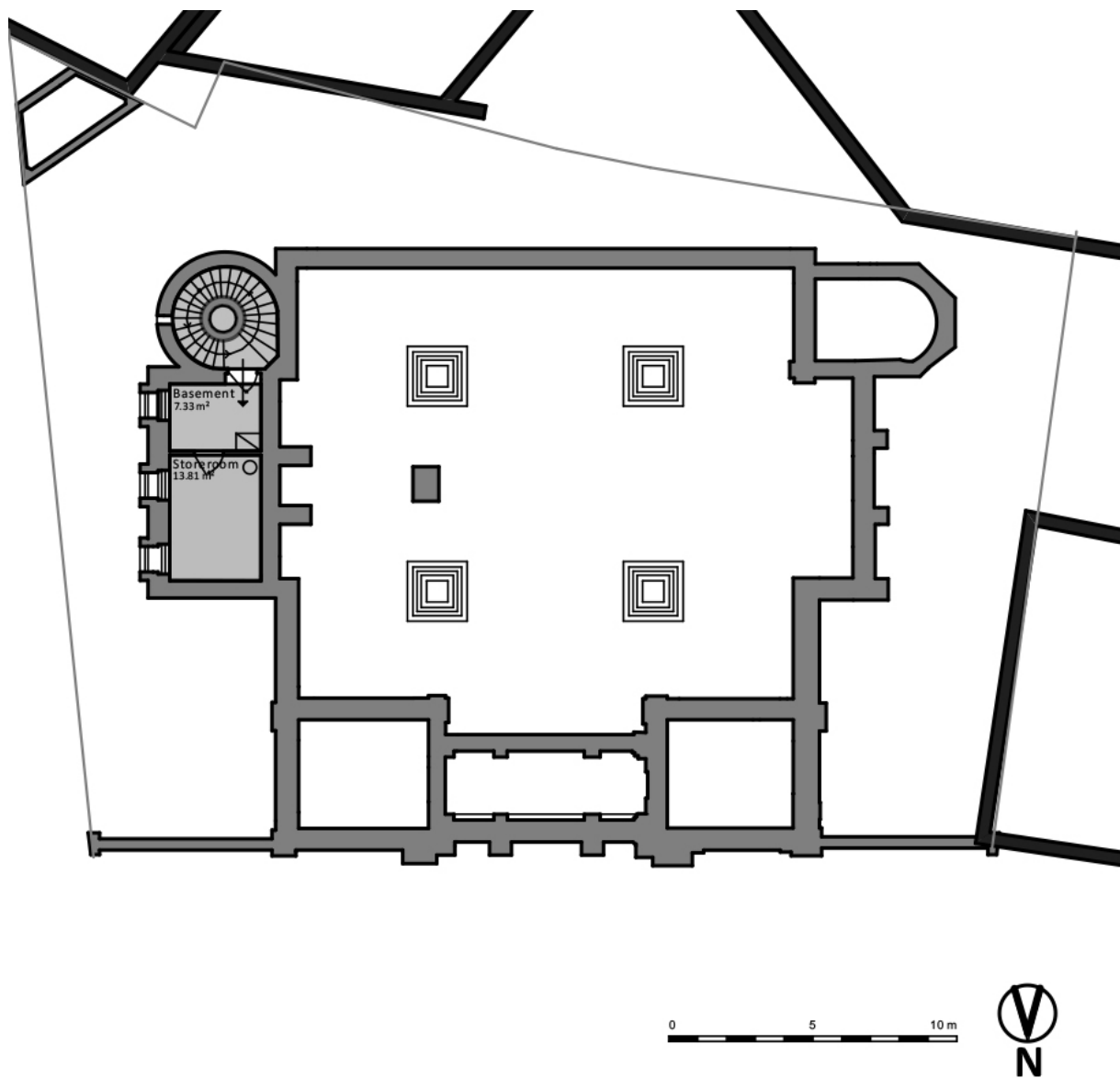


Fig.88: The basement plan

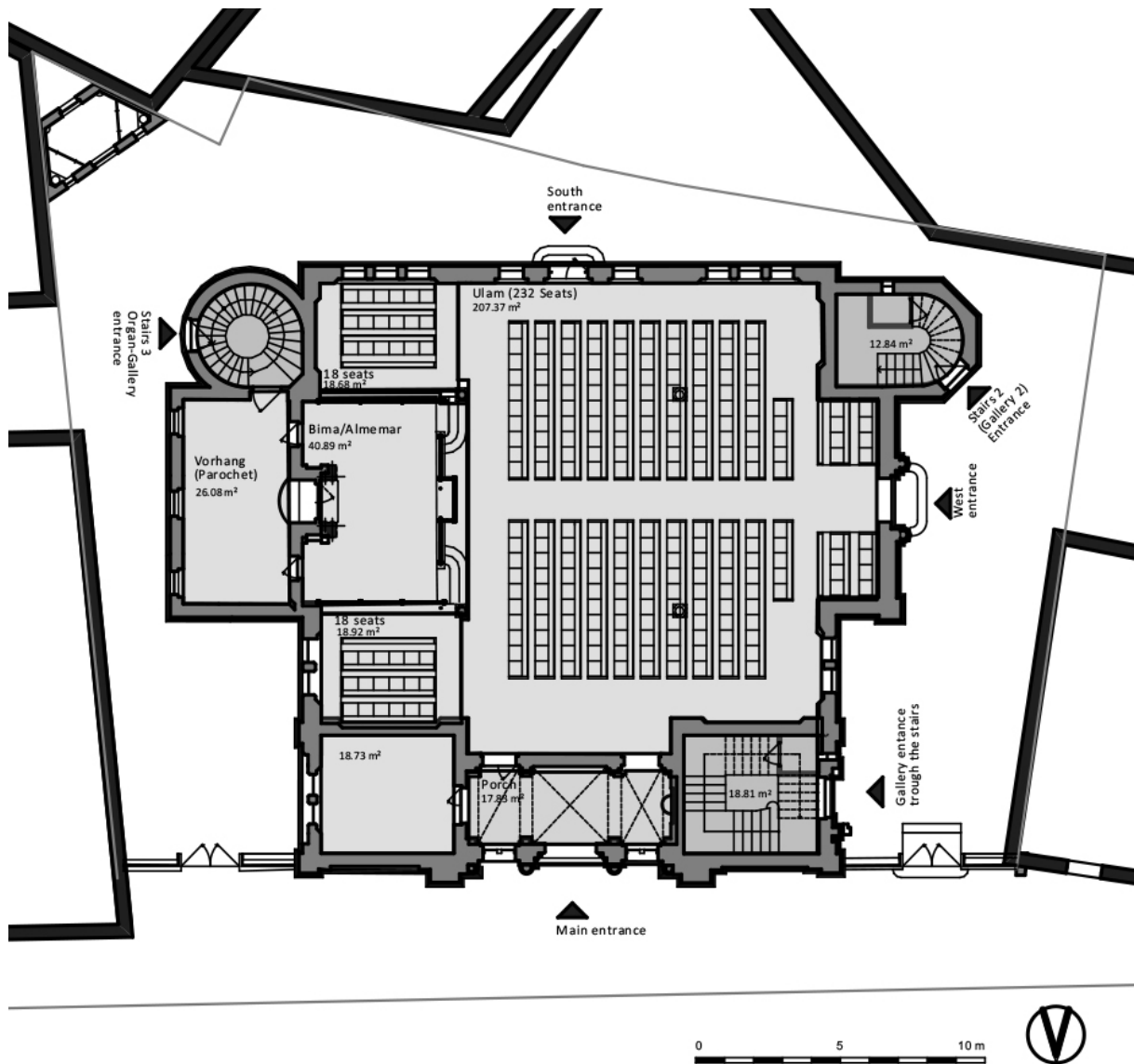


Fig.89: The groundfloor plan

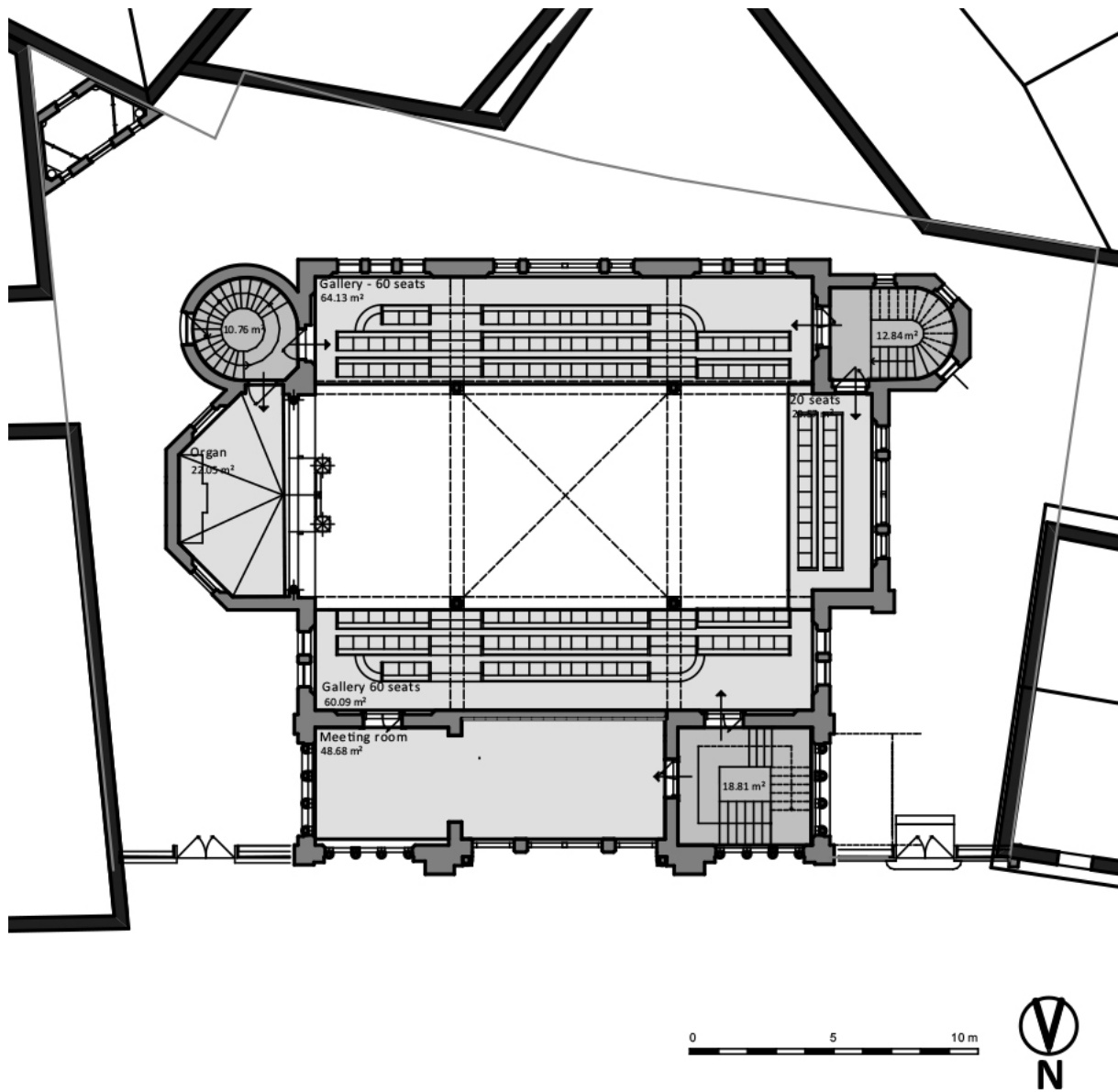


Fig.90: The first floor plan

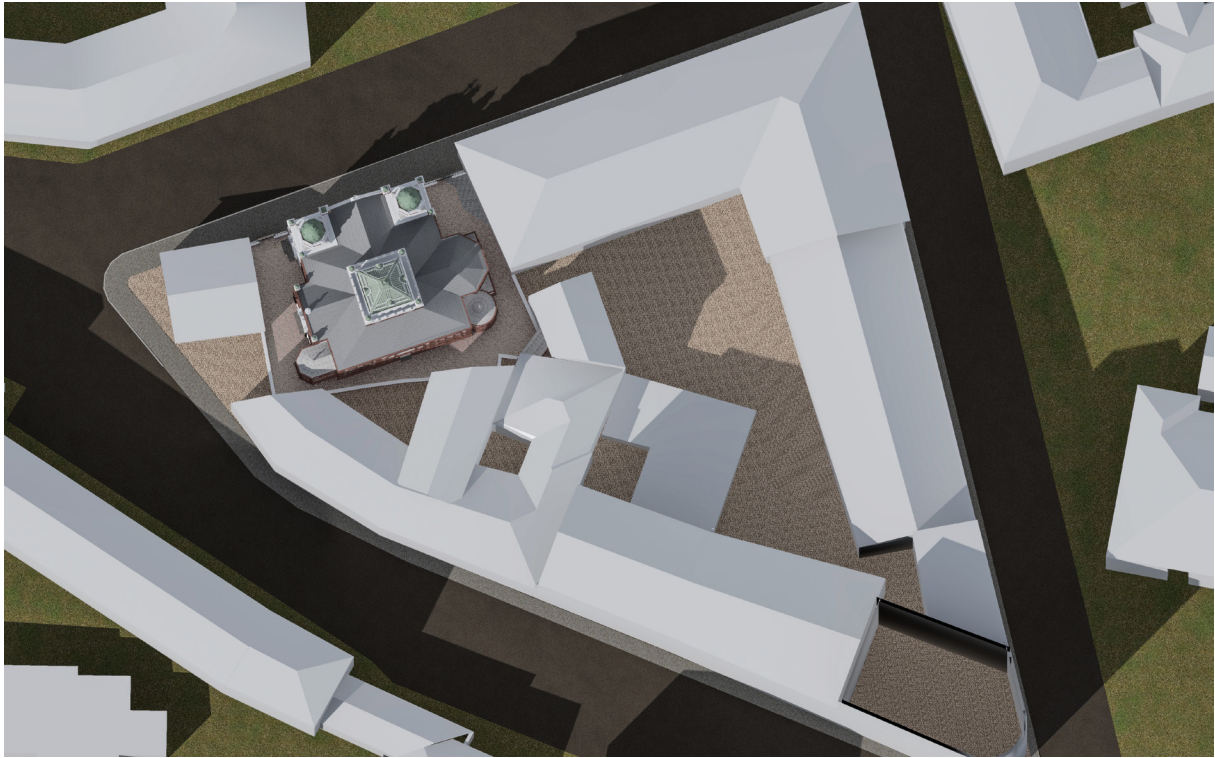


Fig.91: The site view rendering

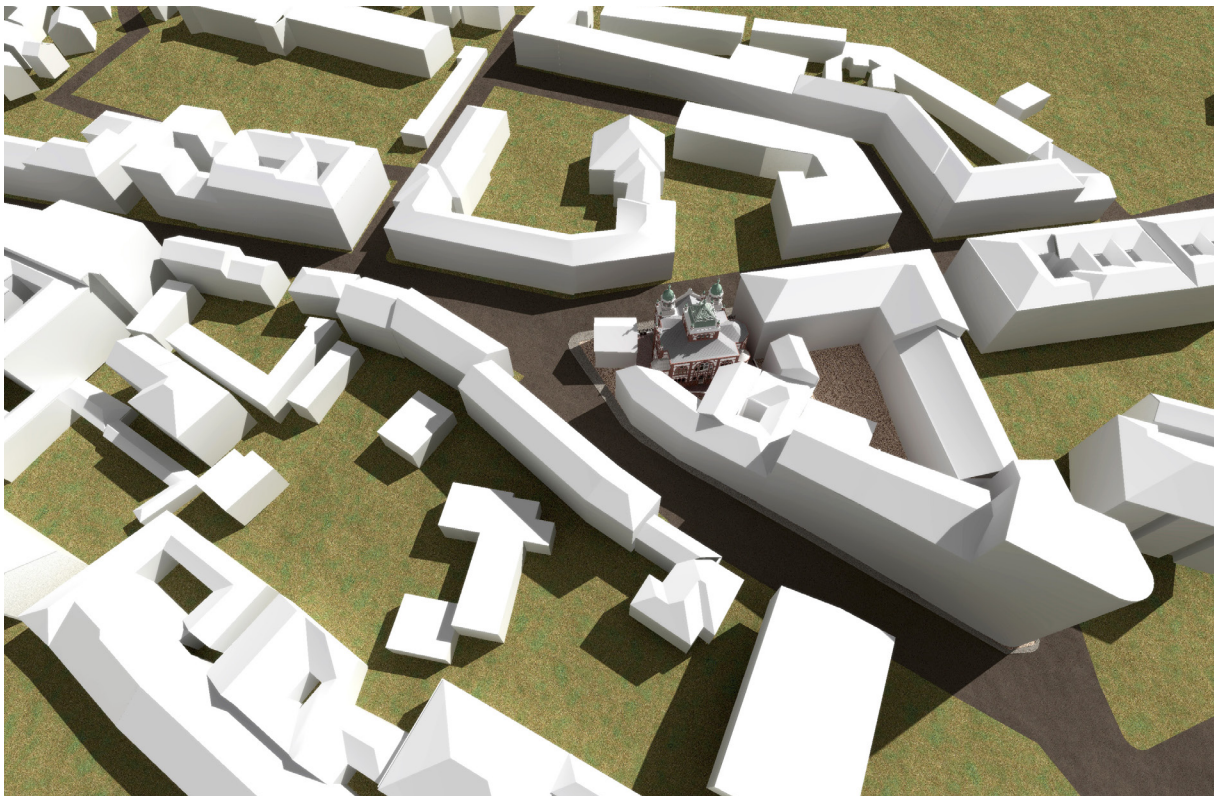


Fig.92: 3D Rendering (position of the Synagogue)



Fig.93: The front (north) view



Fig.94: The west view



Fig.95: The south view



Fig.96: The east view



Fig.97: 3D cross section



Fig.98: 3D longitudinal section



Fig.99: The Synagogue rendering - 3D exterior view

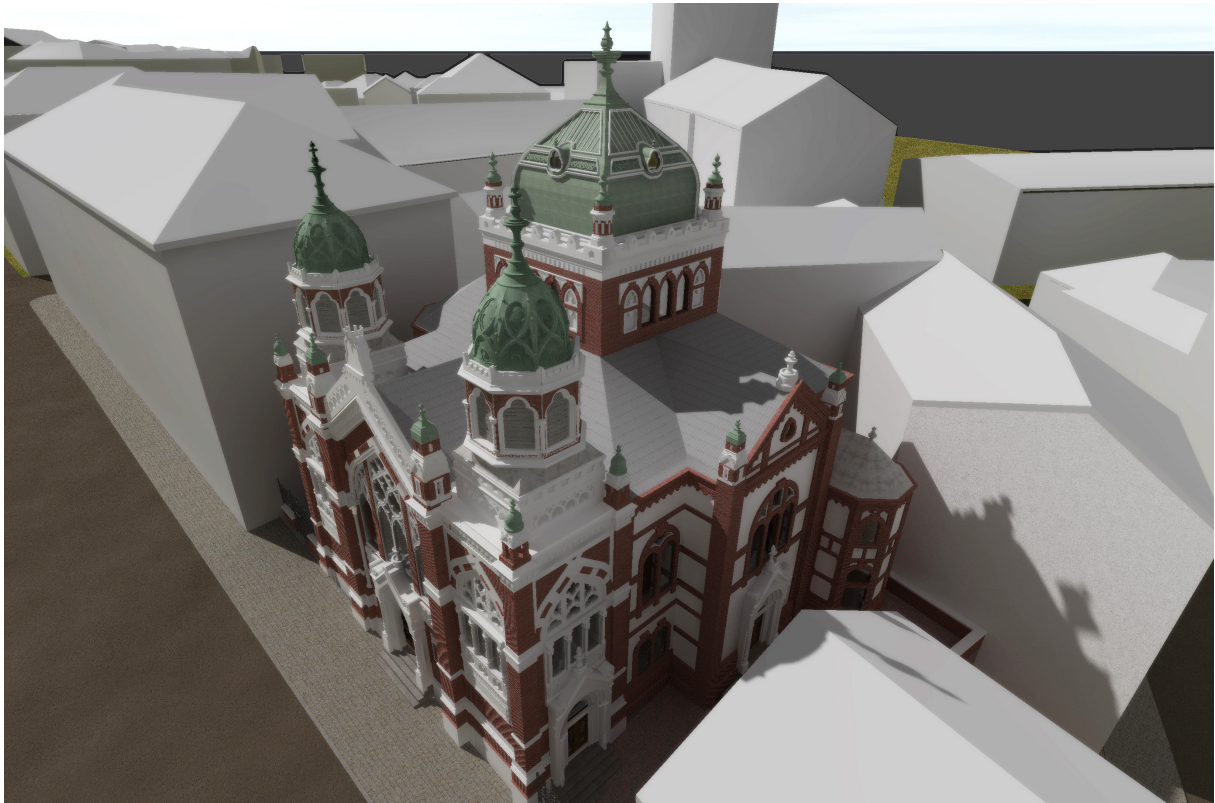


Fig.100: The Synagogue rendering - 3D exterior view



Fig.101: The Synagogue rendering - Interior view



Fig.102: The Synagogue rendering - Interior, galleries view



Fig.103: The Synagogue rendering - interior view



Fig.104: The Synagogue rendering - Interior, dome view

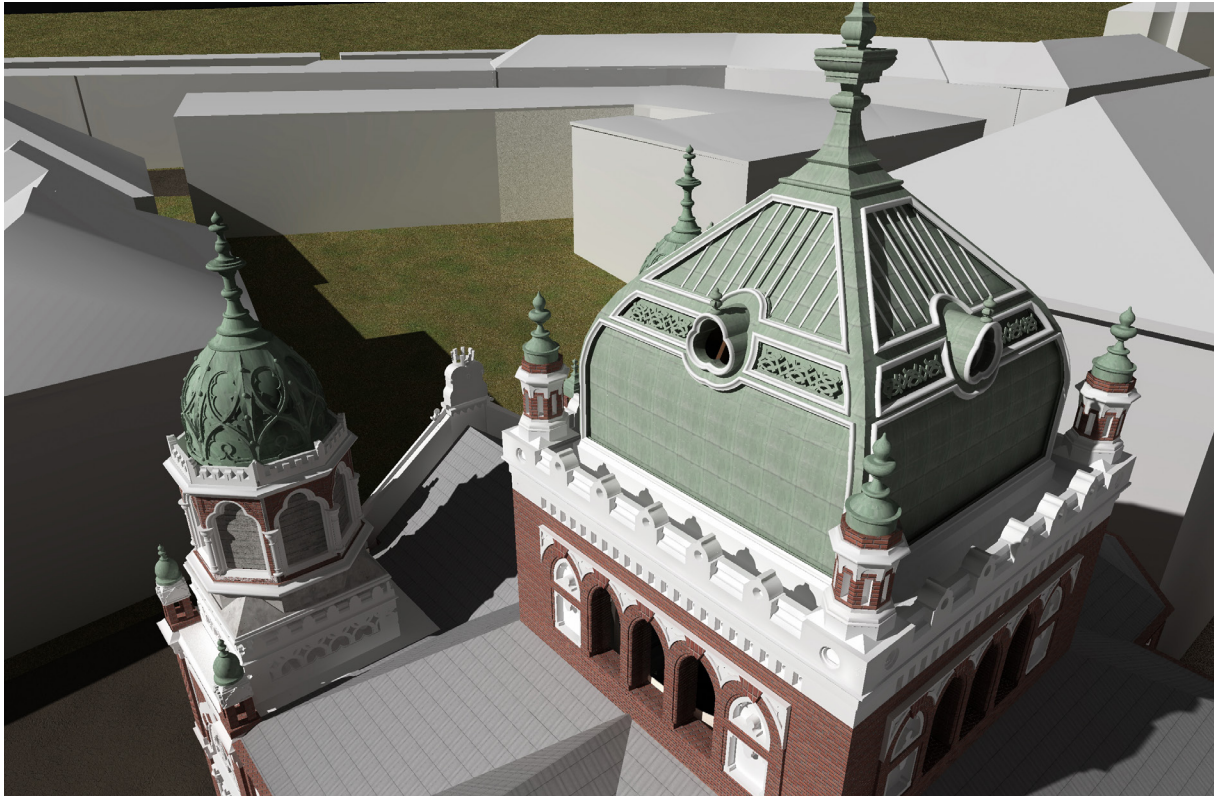


Fig.105: The Synagogue rendering - 3D exterior view, dome detail



Fig.106: The Synagogue rendering - 3D exterior view, capital detail

6. Final Review

Considering the history of the Jewish community, especially the events that happened in WWII, the subject of this work was very delicate. The investigation of the sacral object that no longer exists and the community which have been reduced to the small number of people demanded the distinctive approach. This research and work on the virtual reconstruction of the synagogue opened different questions and attempted to provide adequate answers. One topic was the conditions in which the synagogue was built and the other was the architecture of the building. These processes were extremely important for the correctness of the model. Though the plan documentation was large, some information was missing, so the information had to be reconstructed from the other sources. This problem was especially obvious in the interior design. The method that was used for reconstructing these disagreements was a combination of the plan, photos and other synagogues analysing. In this mechanism, the possibility of making mistakes always exists. Nevertheless, the reconstruction is made and the “foundations are laid” for the further work.

Gathering and manipulating the data in the BIM surrounding lead us in the new concept of the data saving. With the 3-dimensional result is the presentation of it much attractive than earlier. Besides the attractiveness, it gives us a controlling tool of the information's that we collect (in the sense if they are correlating).

On the location where the synagogue was placed there is no memorial monument and except for the plan documentation, there are not many sources about the synagogue to be found. With this reconstruction documentation, all the data are summarised and could be used for different types of researching in the field of history, architecture, design modelling etc.

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Appendix

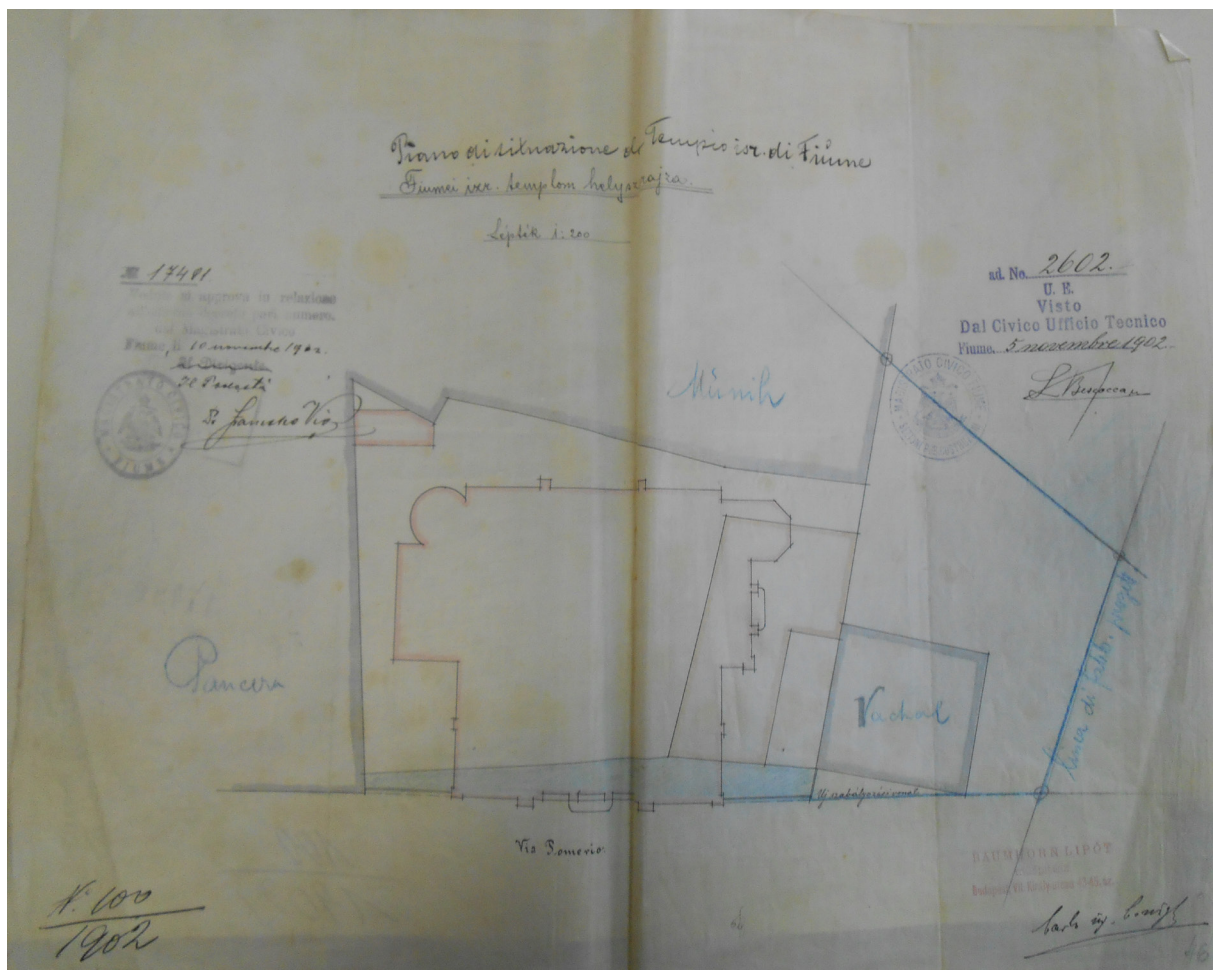


Fig.107: The site plan of the synagogue in Rijeka, Lipót Baumhorn, 1902

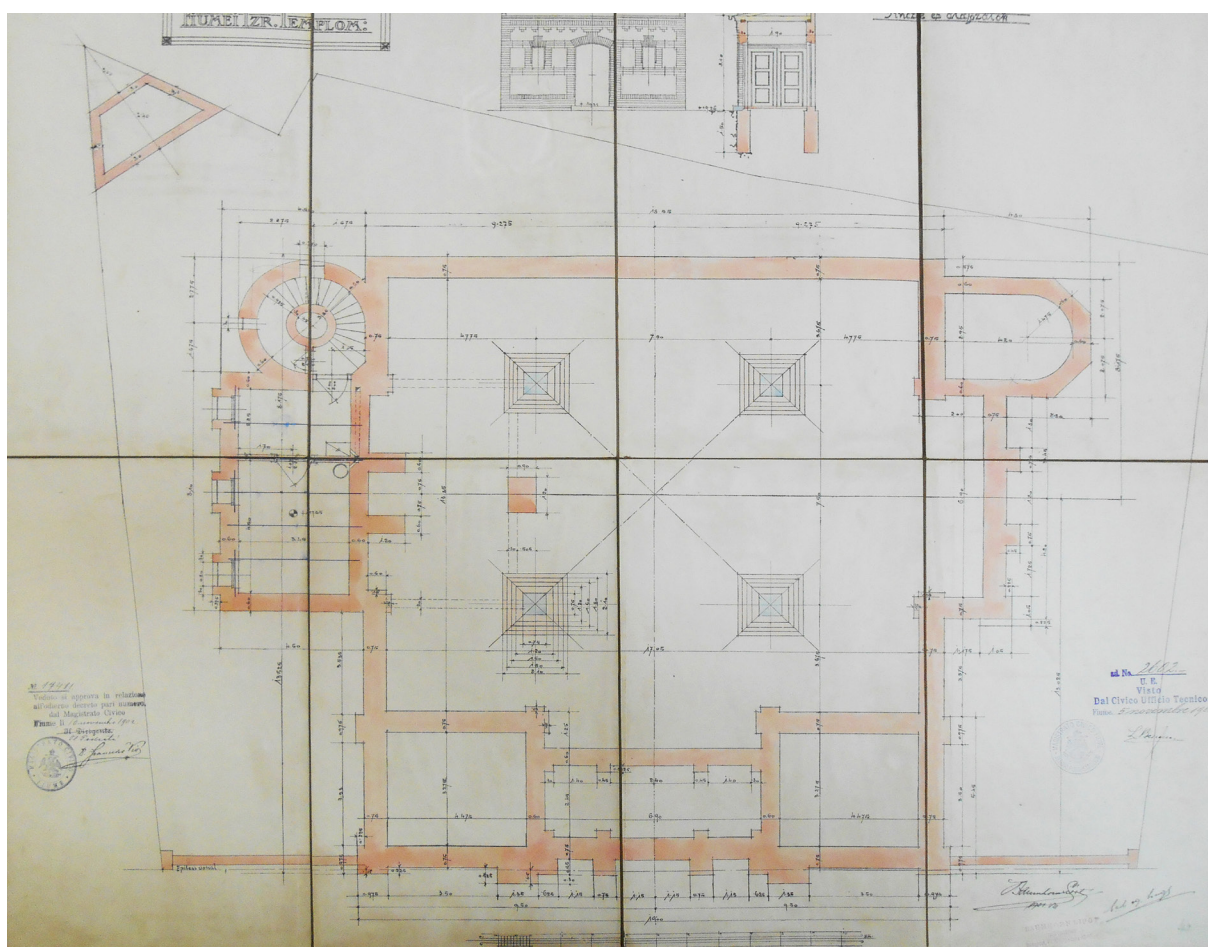


Fig.108: The basement plan of the synagogue in Rijeka, Lipót Baumhorn, 1902

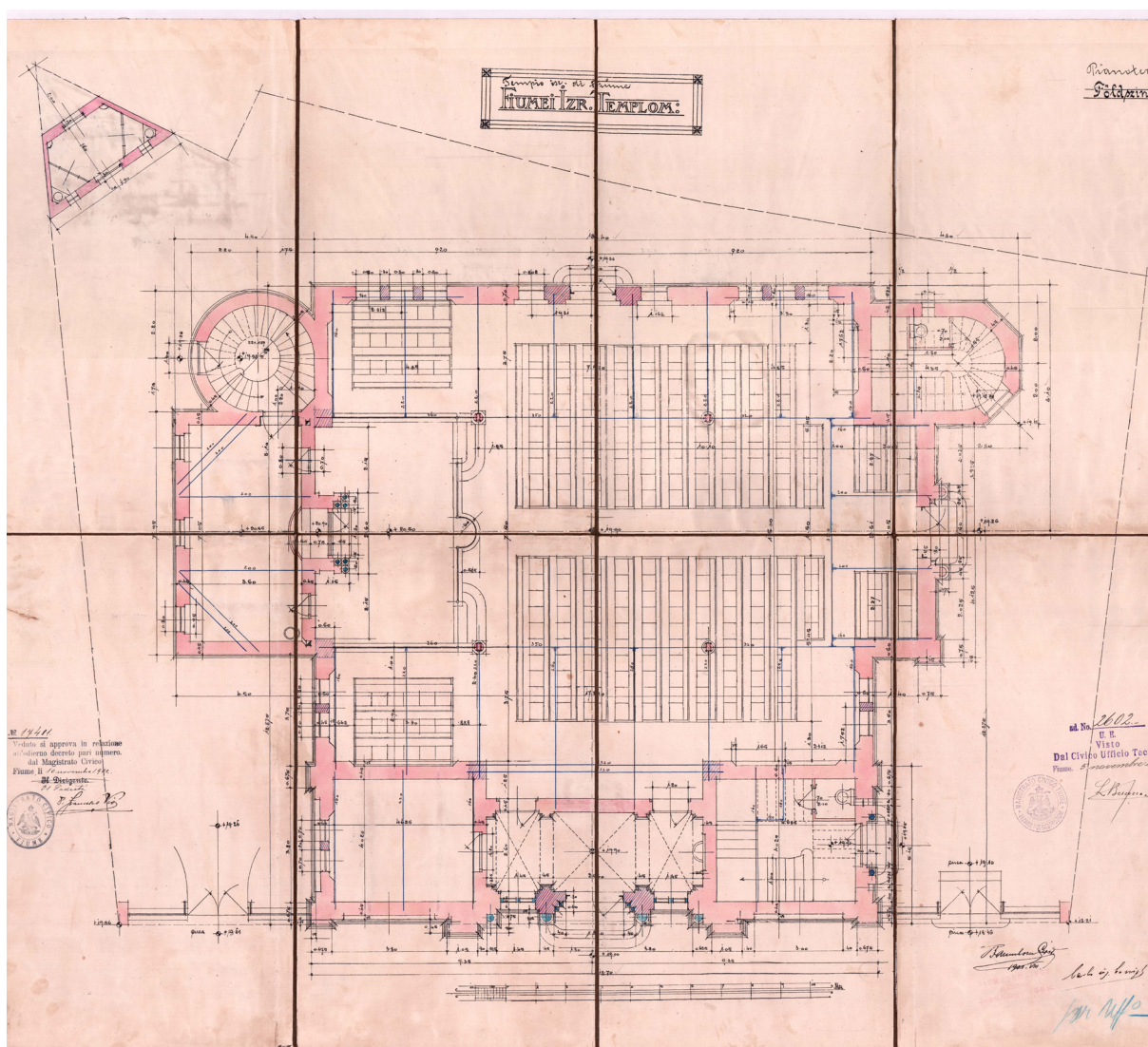


Fig.109: The groundfloor plan of the synagogue in Rijeka, Lipót Baumhorn, 1902

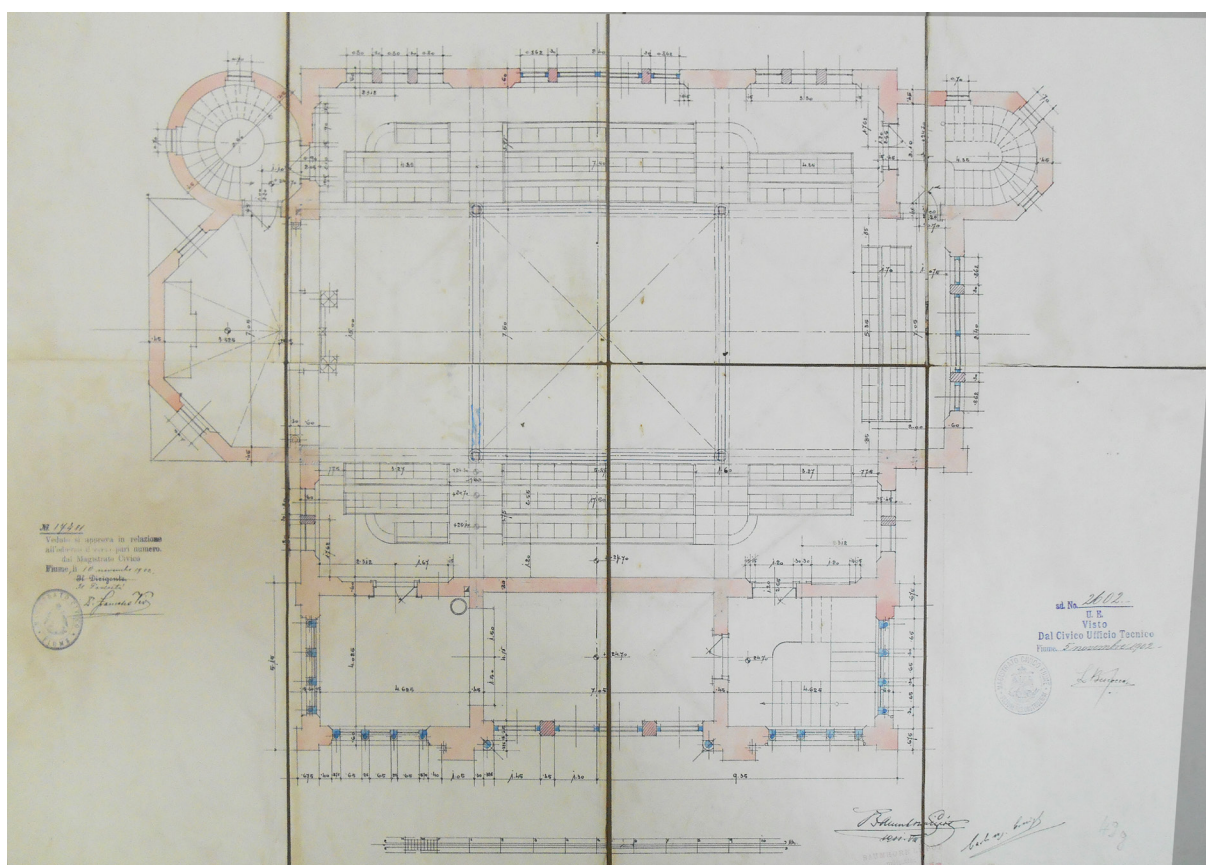


Fig.110: The 1. floor plan of the synagogue in Rijeka, Lipót Baumhorn, 1902

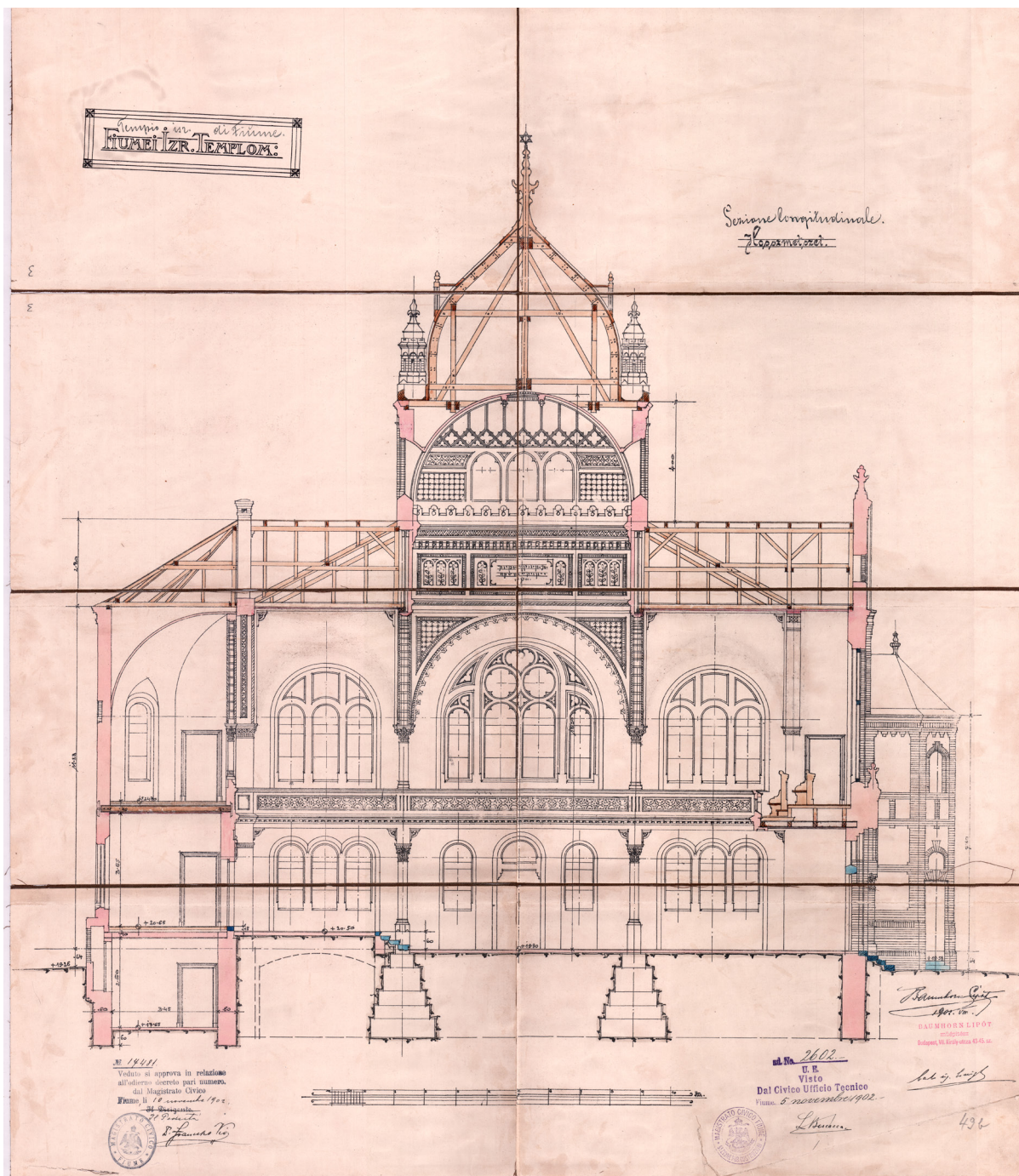


Fig.111: The cross section plan of the synagogue in Rijeka, Lipót Baumhorn, 1902

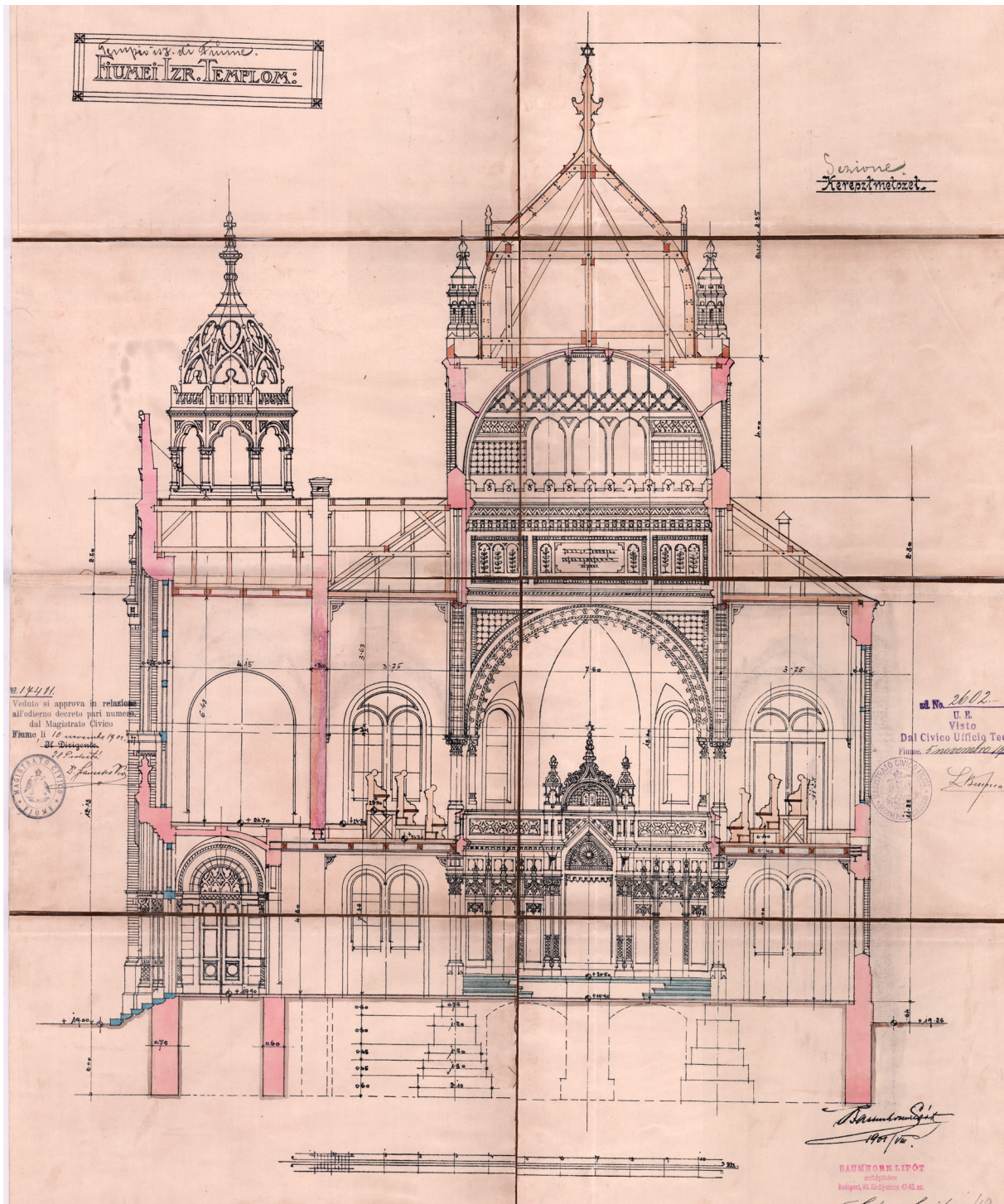


Fig.112: The longitudinal section plan of the synagogue in Rijeka, Lipót Baumhorn, 1902

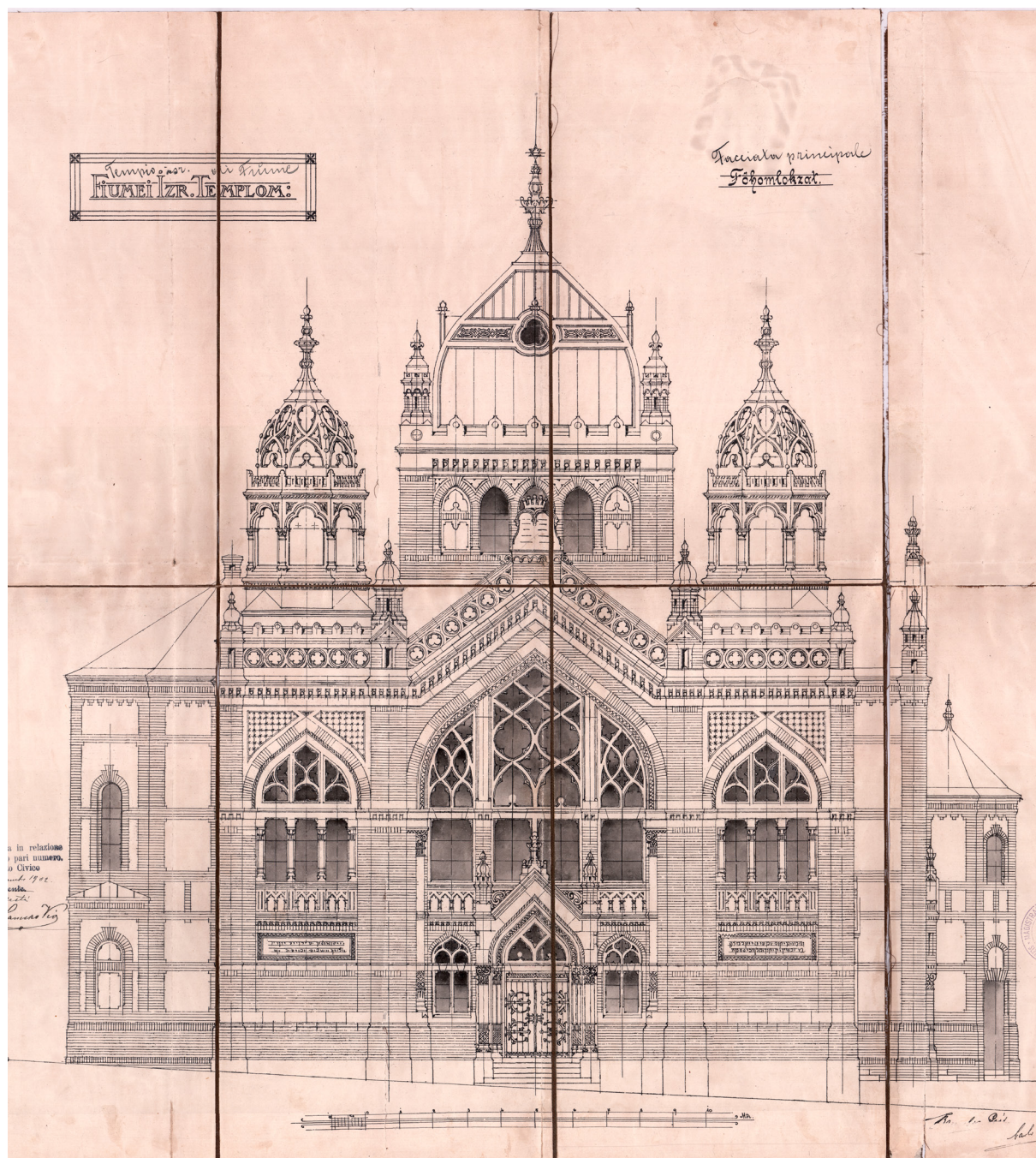


Fig.113: The front (north) view plan of the synagogue in Rijeka, Lipót Baumhorn, 1902

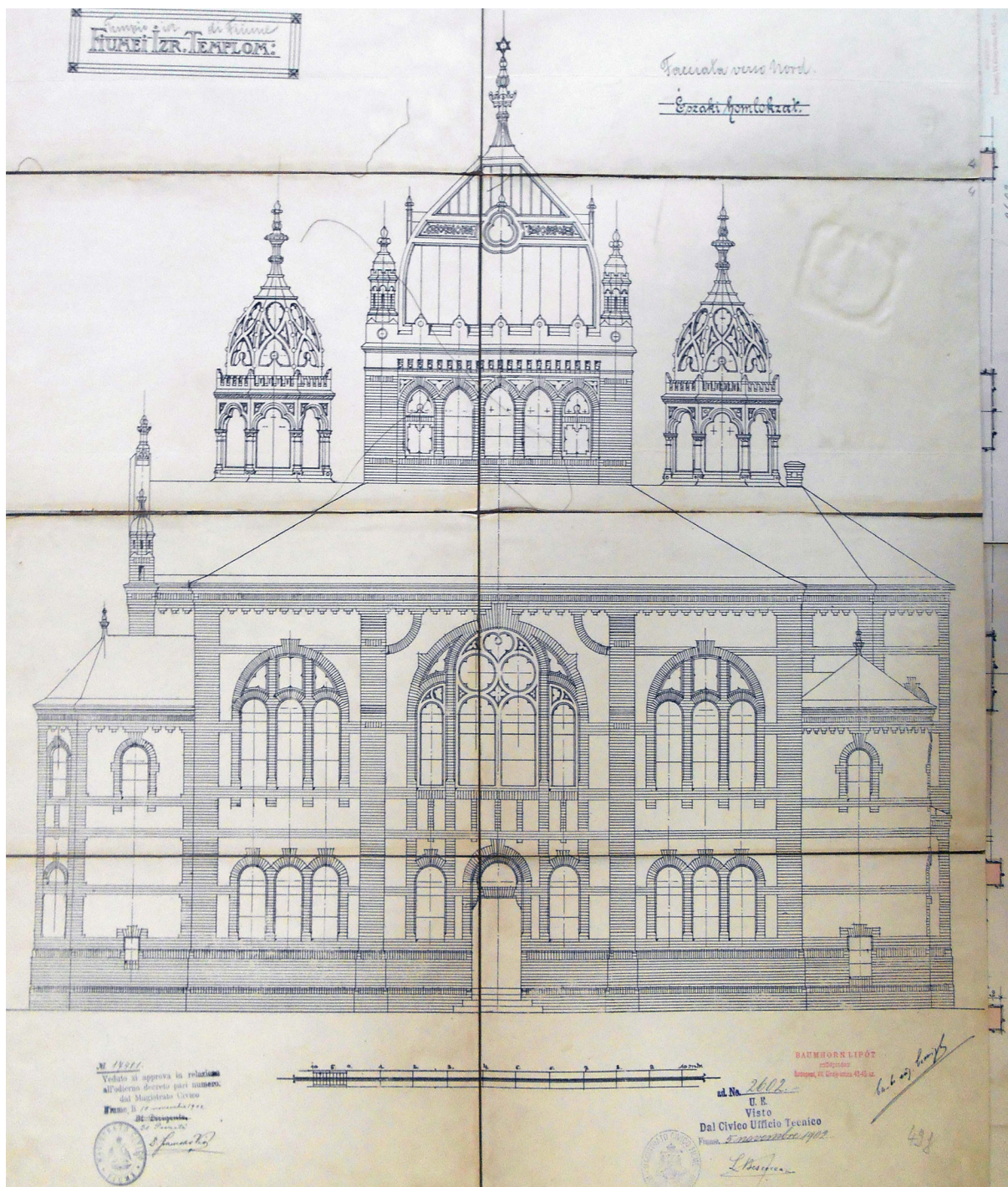


Fig.114: The rear (south) view plan of the synagogue in Rijeka, Lipót Baumhorn, 1902

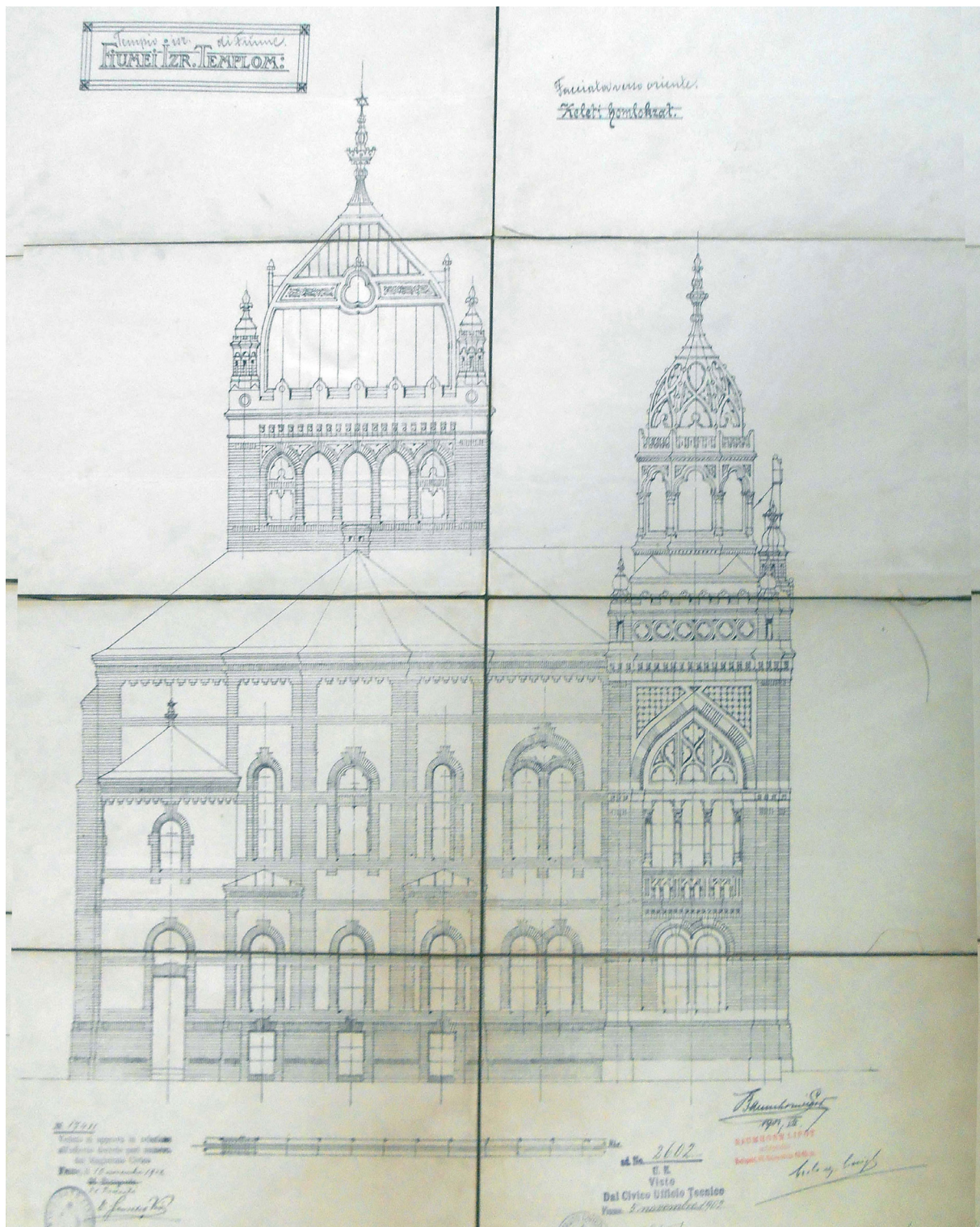


Fig.115: The west view plan of the synagogue in Rijeka, Lipót Baumhorn, 1902

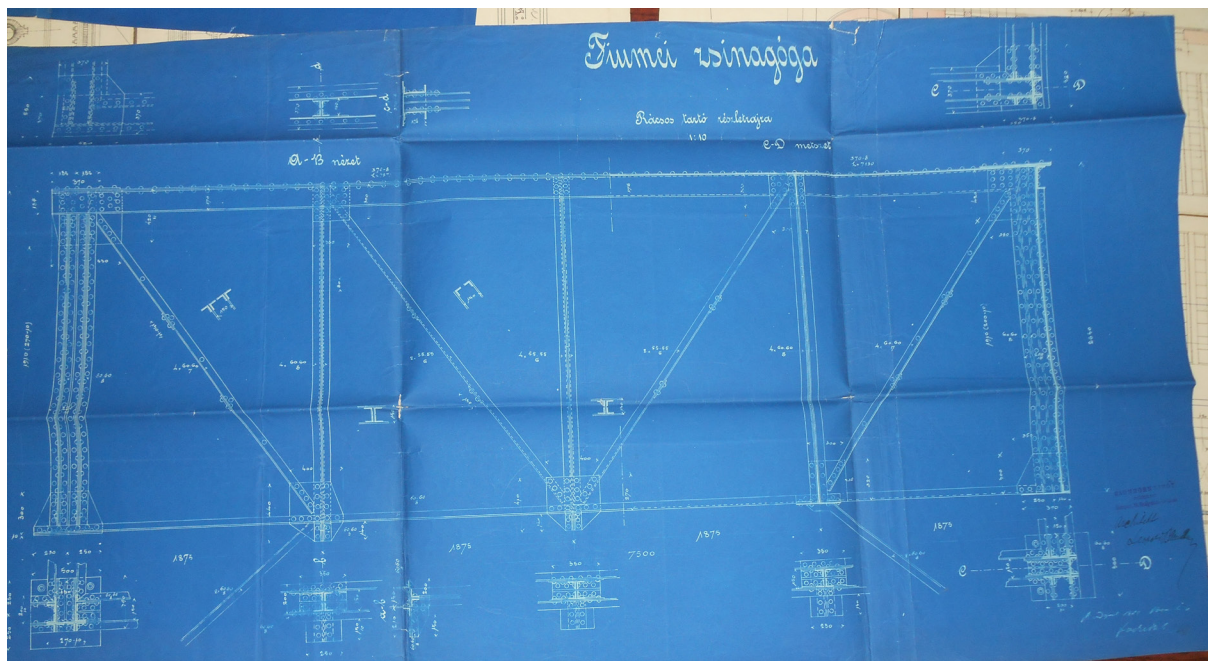


Fig.116: The roof-construction drawing based on static calculation, synagogue in Rijeka, Lipót Baumhorn, 1902

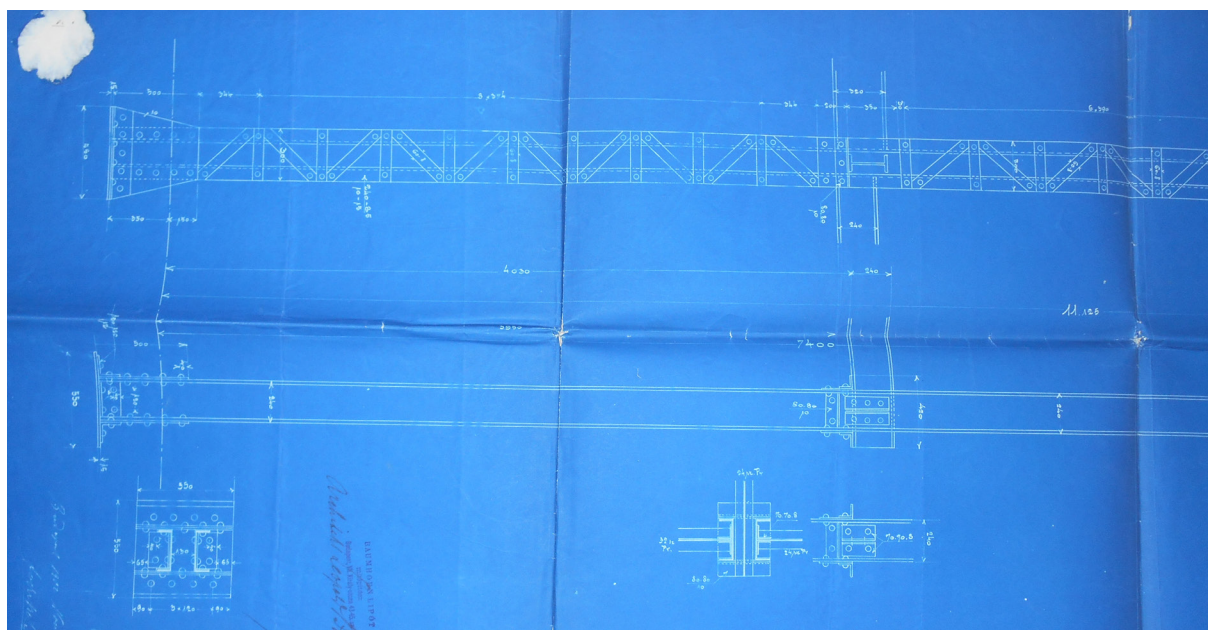
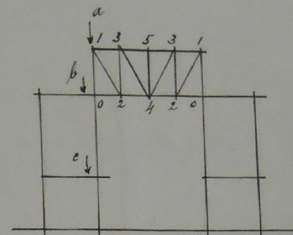


Fig.117: The roof-construction drawing based on static calculation, synagogue in Rijeka, Lipót Baumhorn, 1902

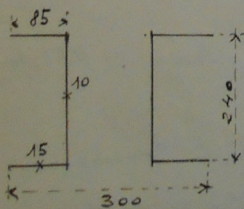
Statische Berechnung der eisernen Säulen und Gitterträger, des isr. Tempels in Püme.

Belastung einer Säule:

- a) Kuppeldach 6.56 Tonnen
 Mauerwerk 24.00 "
 Rabitzkuppel 2.50 "
 Verkleidung des Gitterträgers 1.50 "
- b) Dach- und Deckenconstruction:
 $25 \text{ m}^2 \cdot 340 \text{ kg} = 8.50 "$
 Rabitzbogen 3.00 "
- c) Gallerieconstruction:
 Belastung pro m^2 400 kg
 Eigengewicht pro m^2 250 kg
 $16.2 \text{ m}^2 \cdot 650 \text{ kg} = 10.53 "$
 Brüstungsgesims 0.40 "
 Eigengewicht der Säule 2.71 "
Belastung einer Säule 60.00 Tonnen



Säulendimensionierung:



- 1.) Obertheil: Kraft 51.5 Tonnen, hiervon werden
 8.5 Tonnen excentrisch — 12 cm. von
 der Säulenaxe — übertragen.
 Knickungslänge 7.18 m.
 Bruttofläche des skizzirten Querschnittes 94.25 cm^2
 Effektivefläche 88.28 "
 Knickungsmodul laut der Schwarte- Frankimichs Formel:

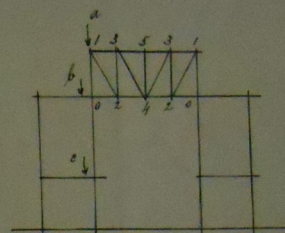
$$n = 1 + 0.0001 \frac{7.18^2 \cdot 94.25}{88.28} = 1.48$$

Fig.119: The static calculation, synagogue in Rijeka, Lipót Baumhorn, 1902

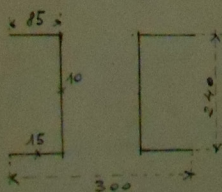
Statische Berechnung der eisernen Säulen und Gitterträger, des inn. Tempels in Rijeka.

Belastung einer Säule:

- a) Kuppeldach 6.56 Tonnen
Mauerwerk 24.00 "
Platzkuppel 2.80 "
Verkleidung des Gitterträgers 1.50 "
b) Dach- und Deckenconstruction:
25 m² à 340 kg 8.50 "
Platzbogen 3.00 "
c) Gallerieconstruction:
Belastung pro m² 400 kg
Eigengewicht pro m² 250 kg
16.2 m² à 650 kg 10.53 "
Brüstungsgesims 0.40 "
Eigengewicht der Säule 2.71 "
Belastung einer Säule 60.00 Tonnen



Säulendimensionierung:



- 1.) Obertheil: Kraft 51.5 Tonnen, hiervon werden
8.5 Tonnen excentrisch - 12 cm. von
der Säulenaxe - übertragen.
Knickungslänge 7.18 m.
Bruttofläche des skizzirten Querschnittes 99.25
effektive Fläche 88.28
Knickungsmodul laut der Schwarte-Planckmischer Formel
$$n = 1 + 0.0008 \frac{71.8^2 \cdot 99.25}{88.28} = 1.48$$

Fig.120: The static calculation, synagogue in Rijeka, Lipót Baumhorn, 1902

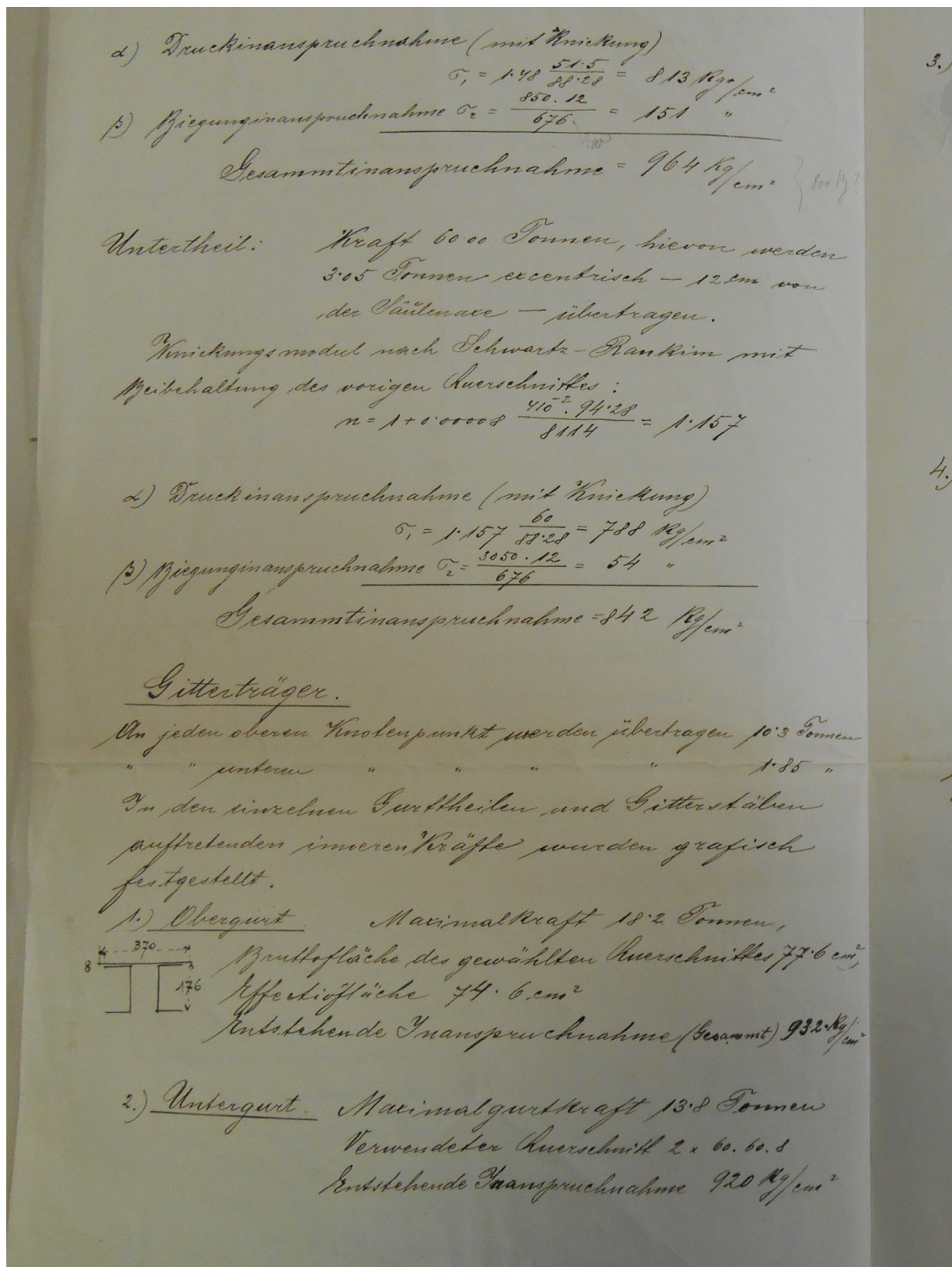


Fig.121: The static calculation, synagogue in Rijeka, Lipót Baumhorn, 1902

3.) Verticale Gitterstäbe:

In mit 0-1 bezeichneten: auftretende Kraft 22.57 Tonne
Verwendeter Querschnitt wurde, wegen Anschluss des anderen Trägers, aus constructiven Rücksichten festgesetzt.

In mit 2-3 bezeichneten: auftretende Kraft 18.75 Tonne
Verwendeter Querschnitt $4 \times 60.60.8$
Entstehende Beanspruchnahme 920 kg/cm^2

In mit 4-5 bezeichneten: auftretende Kraft 10.3 Tonne
Verwendeter Querschnitt $4 \times 55.55.6$
Entstehende Beanspruchnahme 880 kg/cm^2

4.) Diagonale Gitterstäbe:

In mit 1-2 bezeichneten: auftretende Kraft 23.00 Tonne
Querschnitt $4 \times 60.60.7$
Beanspruchnahme 865 kg/cm^2

In mit 3-4 bezeichneten: auftretende Kraft 9.00 Tonne
Verwendeter Querschnitt $2 \times 55.55.6$
Entstehende Beanspruchnahme 858 kg/cm^2

Budapest den 6.ten November 1902

BAUMHORN LIPÓT
mérnök
Budapest, VII. Király-utca 43-45. sz.

[Signature]

Fig.122: The static calculation, synagogue in Rijeka, Lipót Baumhorn, 1902