South-East Finland – Russia
ENPI CBC 2007 - 2013

SOUTH-EAST FINLAND - RUSSIA ENPI CBC PROGRAMME 2007-2013
Efficient use of natural stone in the Leningrad region and South-East Finland

Historical use of natural stone in the Southern Finland and St. Petersburg area

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1. Introduction to the use of natural stone

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1.1. Stone construction

Finland's old cultural landscape has been characterised by the harmony between nature and the constructed environment. Trees from own forests were used to make buildings. Wooden constructions characterised Finnish construction activities for a long time, both in the countryside and in cities. Vyborg was the first city in Finland to have stone buildings because using flammable material near the border was risky. In other cities, buildings were mainly made of wood until the middle of the 18th century.

In 1747, according to a report ordered by the King on "the state of cities in Sweden", Finland of that time had 47 stone buildings, 46 of which were in Turku and one in Helsinki (at that time, Vyborg did not belong to the kingdom of Sweden). From the middle of the 18th century, also stone buildings were erected in cities, specifically on the grounds of fire safety. However, the construction of intermediate floors and roof structures in stone houses was still identical to wooden buildings and it was not till the 1870s that iron bars were used to make intermediate floors. This opened the opportunity to build "stone cities" with higher buildings. The first "stone city" of Finland arose in Helsinki, around Esplanade. Other technical solutions did not supersede wooden constructions in many smaller cities until after World War II. (Gardberg 2002, 7-11.)

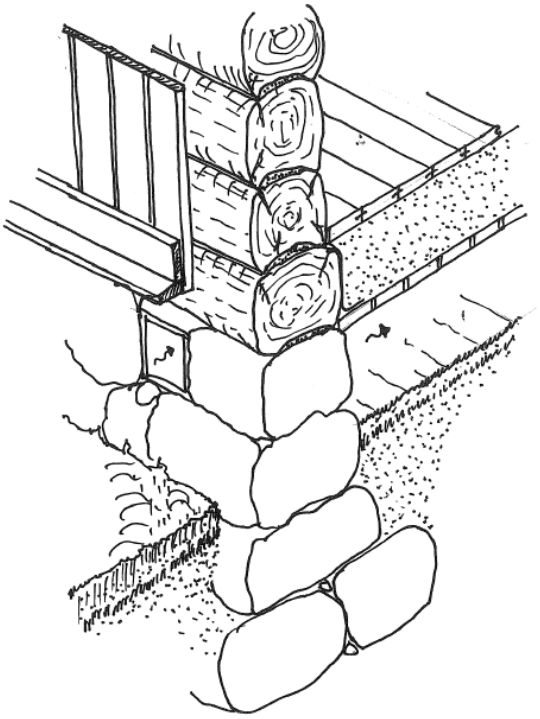

Figure 1. Foundations and foundation wall; town building with log frame

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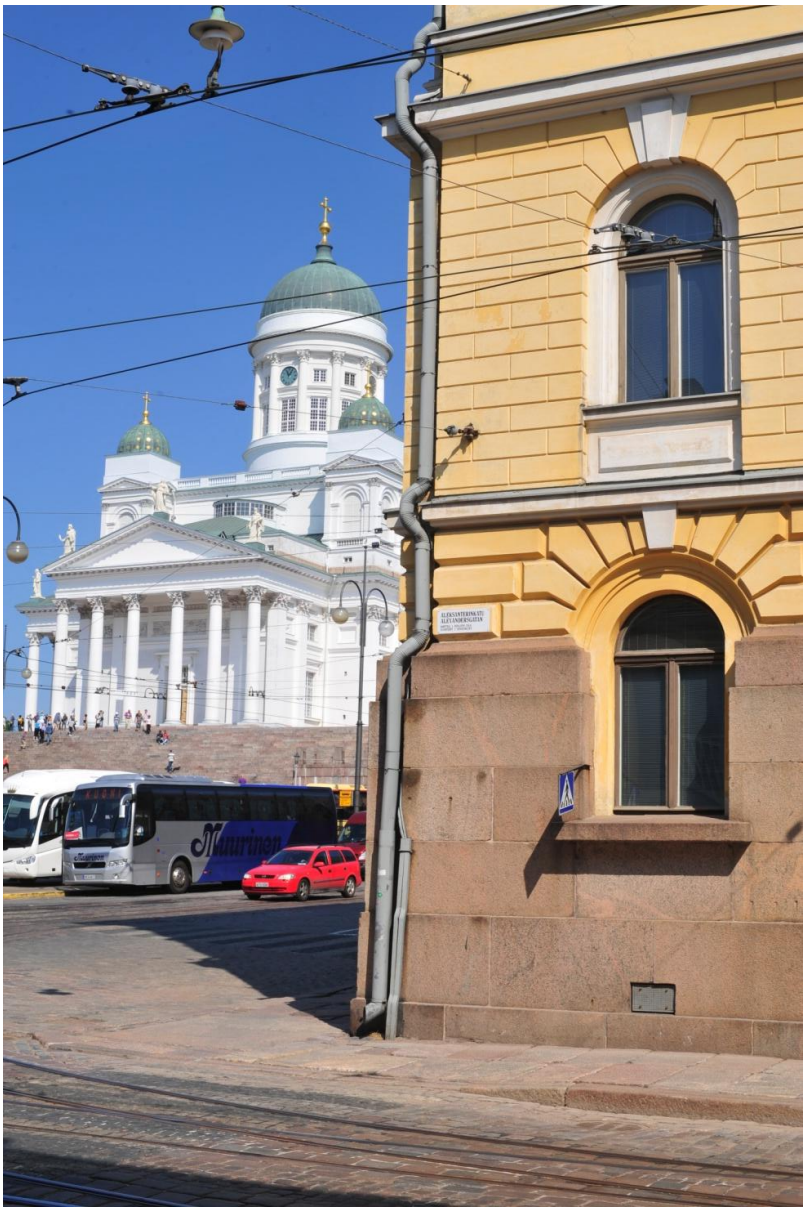

Figure 2. Helsinki Senate square

1.2. Castles and fortresses

The actual medieval-style construction of castles began in Finland during the latter part of the 13th century. The oldest defense fortresses, the castles of Turku, Häme and Vyborg, were built at the end of the 13th and the beginning of the 14th century. The construction of Kuusisto Castle began at the same time. The construction of the Raseborg, Kastelholm and Korsholm fortresses began at the end of the 14th century. The construction of Olavinlinna and the ten-tower city wall of Vyborg commenced at the end of the 15th century. The Kajaani Castle was founded in 1605. For a long time, castles were used both for accommodation and defense purposes. Among other factors, the development of firearms helped to steer accommodation and defense in different directions.

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Especially the castles of Turku, Häme, Vyborg and Olavinlinna have been built, rebuilt and greatly altered during the different centuries. (Gardberg 2002, 25-71.)

Figure 3. Olavinlinna castle in Savonlinna

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After the Treaty of Nystad in 1721, Vyborg and Karelia remained behind the border in the east, and Sweden started to arm Hamina and Lappeenranta. The Treaty of Turku saw the border being drawn along Kymijoki River, which resulted in the loss of Hamina and Lappeenranta. After this, Sweden founded the fortresses of Loviisa and Svartholm. Located in front of Helsinki, the construction of Viapori (nowadays Suomenlinna) began in the middle of the 18th century. (Gardberg 2002, 162-173.)

General Aleksandr Suvorov led fortification operations east of the border and the whole chain of fortresses is now called the fortress chain of Suvorov. This fortress chain extended from the current-day Kotka area to Olavinlinna (located in Savonlinna), including in the current-day Kotka area the fortresses of Ruotsinsalmi (built in 1790-1808) and Kyminlinna (built in 1791-1792 and the first years of the 19th century), Hamina fortresses (built in 1722-1809), fortresses of Liikkala (built in 1791 and 1804-1805), Utti (built in 1791-1792), Taavetti (built in 1773-1781 and 1791-1796), Järvitaipale (built in 1791-1792) and Kärnäkoski (completed in 1793), the fortification of the Lappeenranta fortress (built at the beginning of the 1790s), the new parts of Olavinlinna (built in 1791-1807) as well as Suvorov's canals: Kutvele, Käyhkää, Kukonharju and Telataipale (built in the 1790s). (Korhonen and Vangonen, 26 and 80 and 108-109; Kymenlaakson rakennuskulttuuri (The construction history of Kymenlaakso) 1992, 10; Suhonen 2011, 182 and 232; Sinisalo 1986, 48-62.)

Figure 4. Fort Katariina, one part of the Ruotsinsalmi fortress in Kotka

Figure 5. Kyminlinna fortress in Kotka

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Figure 6. Utti fortress

Figure 7. Taavetti fortress

Figure 8. Kärnäkoski fortress

Figure 9. Lappeenranta fortress

1.3. Manors

In the 16th century, approximately twenty manors in Finland were made of stone. Construction of the first ones, at least the Sundholm Manor located near Uusikaupunki, Kuitia Manor in Parainen and the Grabbacka Manor in Karjaa, began at the end of the 15th century. The number of stone manors increased during the following centuries. (Gardberg 2002, 72; 129-141.)

1.4. Churches

Construction of the stone building of Turku Cathedral began at the end of the 13th century. The church has been built and altered during several centuries. A large number of stone churches were built in the regions of Varsinais-Suomi, Uusimaa, Häme, Satakunta, Ostrobothnia and Åland Islands in the Middle Ages. Located in this project's area of interest, the grey stone church in Pyhtää was built approximately in 1460 (the church of Pyhtää). All in all, there are 14 grey stone churches in the Uusimaa region, for example in Espoo, Vantaa, Porvoo and Pernaja. St. Mary's stone church

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of Vehkalahti in Hamina was built at the end of the 14th century, but the church has suffered from several fires and its exterior appearance has been altered during several renovations. The church received its current appearance during the 19th century, differing greatly from the original (St. Mary's church in Hamina-Vehkalahti). Bricks were typically used on the masonry of window and door frames as well as decorations in grey stone churches. (Gardberg 2002, 73-96.)

1.5. Stone in city buildings

During the last decades of the 19th century, multi-story residential and business buildings were built in Finland's largest cities. Natural stone was used in the foundation walls. At the end of the 19th and the beginning of the 20th century the most typical structure in highrises was a massive full brick wall. The outer walls functioned as supporting walls and there were longitudinal bearing walls in the middle of the buildings. During the first decades of the 20th century, the ground floors of buildings were often cladded with granite. The peak era in the use of massive natural stone was 1895-1910, in other words the National Romantic era, as well as Art Nouveau. During this era, the massive exterior walls of buildings were made of baked bricks and massive domestic natural stone served as the cladding of the façade. Architectural themes were selected from the homeland and national themes - often the recent history or the Kalevala. During this era, the first "national" buildings of our country were built, such as the National Museum, National Theatre, the main railway station in Helsinki and Tampere Cathedral. Architects of that time sought international stone-related training in Scotland, especially Aberdeen. Neuvonen 2006, 12; 14; 16; 32; 43; 75; 81)

Figure 10. National museum in Helsinki

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Figure 11. National theatre in Helsinki

An inspiring figure in stone architecture was especially an American architect admired by the Finns, Henry Richardson. In Finland, natural stone cladding became thinner toward the middle of the century and by the 1930s, natural stone façades were no longer made. Bricks, roughcast and concrete became more popular materials in the façades of buildings and natural stone became a decorational material in façades. It can be seen around the main doors, windows and foundation wall in roughcast buildings. At the end of the 19th century and during the first decades of the 20th century, Reval or Tallinn limestone was used in the steps and the floors of entrance halls in buildings' staircases. (Neuvonen 2006, 12; 14; 16; 32; 43; 75; 81)

1.6. Engel's observations on stone construction in St. Petersburg

C. L. Engel, a German architect who worked in St. Petersburg, Tallinn and Helsinki, created a complete illustrated report in 1815-1816, called *Bemerkungen über die Art in Petersburg zu bauen, und über die Beschaffenheit der Baumaterialien* (*Observations on construction methods in St. Petersburg and characteristics of building materials*), which includes the methods and materials used in the construction of St. Petersburg. (Engel 1982.)

In his writing, Engel observes the use of stone to a great extent: *A common material in foundations, steps, columns, sidewalks and floor plates is the fairly easily workable limestone, which is quarried in the Potilow area but which is quite porous and crumbly and which looks crude and unfinished, as if it has been painted with brownish red, yellow and green. When chiseled, this stone is grey and*

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yellow and full of little holes, like pumice stone. Due to this, it is difficult to turn this stone into sharp-edged pieces. When polished, the stone looks dotted with brownish red, yellow and green. During polishing, the small holes in the stone are filled with a type of composite. Granite is also used in the cladding of the bases of buildings. The limestone used in the burning of lime is quarried in the Tosna area. (Engel 1982.)

Stone quarried from the Pudow area was used in the Kazan Cathedral and Engel defines it as a sponge because it is full of holes. *At first, this stone is very soft and therefore it can be shaped easily but it becomes harder when it is in contact with air. When used in columns and many other structures, the holes are filled with plaster, even though the end result will not be neat nor defined. Due to its high price, the dark green, very hard limestone is barely ever used. This stone is primarily suitable for stairs and balconies.* (Engel 1982.)

Marble is used very often. Domestic types of marble have been used for example in the Marble Palace and St. Isaac's Cathedral. Marble was used in several buildings belonging to the gentry, often in the balcony and window structures, columns and stairs. (Engel 1982.)

According to Engel, the most beautiful and the most excellent building stone is the Finnish granite. Its colour is usually reddish and black-hued blue. Due to its hardness, difficult workability and the long transportation distances, granite was very expensive. Despite this, it was often used in construction in the 19th century St. Petersburg. Granite was used extensively, not only in buildings but also in the structures of canals and bridges. (Engel 1982.)

2. Natural stone structures

Most medieval natural stone structures in Finland are churches and castles. The majority of these were built between the 13th century and the beginning of the 16th century. The construction of various fortress systems continued late into the 18th century, especially in the south-eastern Finland. Manors have been built of stone since the 15th century, although most of the stone manors have been built during the later centuries. After the extensive fires, city buildings were built of stone starting in the 18th century. The use of stone in the construction of residential city buildings became more common in the 19th century. Natural stones were used as supporting structures and as non-supporting cladding structures. Various mixed structures were also very typical. In these, natural stones were complemented with bricks, concrete and steel, for example.

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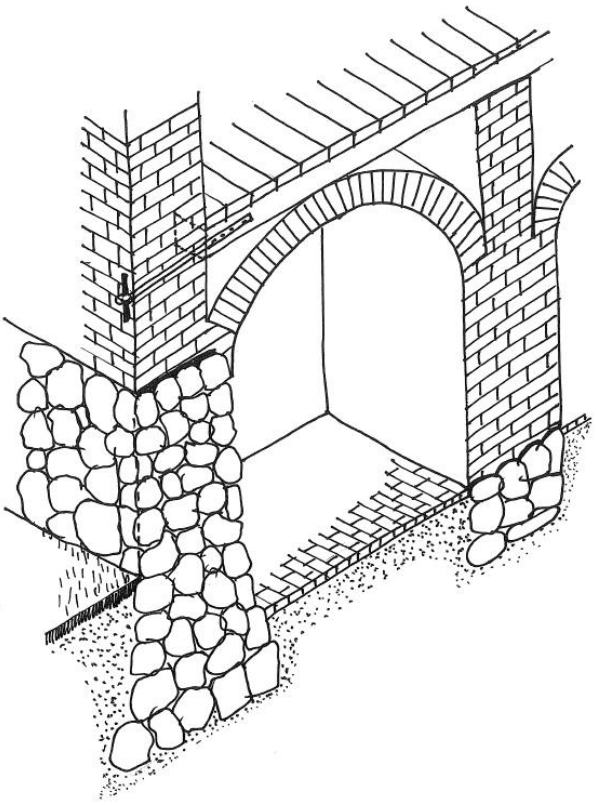

Figure 12. Foundations and foundation wall used on castles and churches (1300)

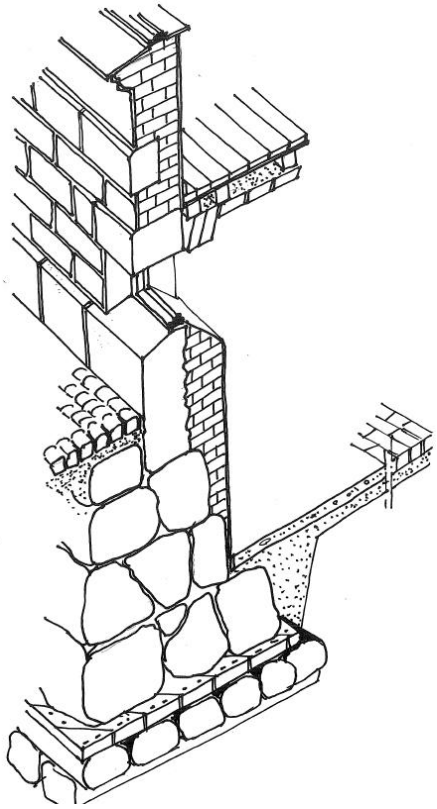

Figure 13. Foundations and foundation wall used in blocks and flats (1900)

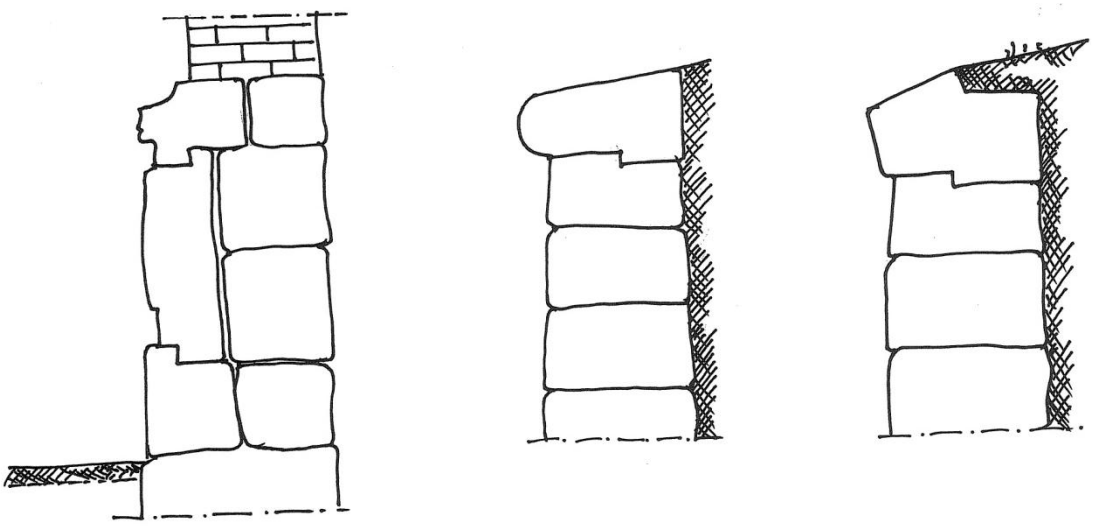

Figure 14. Terrace walls with bond stones

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Stone structures used in castles and churches were various grey stone walls. Brick frames on the openings for doors and windows were typical of grey stone structures.

Grey stone structures can be divided into three groups based on the construction method:

- dry wall, also known as dry-stone wall
- cast wall, commonly used to build churches and castles
- blockworks, also known as rustic ashlars, became common in Finland in the 19th century in conjunction with manor and city construction.

Figure 15. Brick frames on the door opening

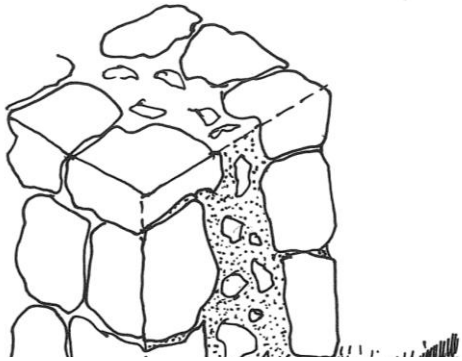
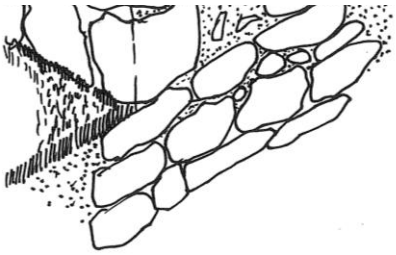


Figure 16. Cast wall for fortification and walls



Masonry without mortar means that stones are overlapped without mortar. The stones required a lot of work in order to fit them better and to strengthen the structure.

Cast walls were built by stacking stones, both on the inside and the outside of the wall. These stacks were at least half a metre wide and they were balanced by stone wedges. These served as the supporting ure as well as a mold for filling the core of the wall. The better the stones overlap and the larger the stones are, the better the structure. Various internal bonds, angles and vaultings within the wall (for examples windows) also strengthen the structure.

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Figure 17. Wall of Olavinlinna castle

The core was filled with stones and mortar. Stones are in contact with each other also in this core structure. Mortar is stuffed into the core so that all holes are filled and the mortar oozes out of the exterior seams. The purpose of mortar is mainly to fill empty spaces and prevent water pockets from forming inside the structure of the wall (water and ice inside the structures cause damages to the wall). The water shield built on top of the wall must be as leak-free as possible. Traditionally, these water shields were made of clay and birch bark.

The façade of a **blockwork** is formed by stones shaped like rectangular blocks.

When different natural stone structures are repaired and restored, it may be necessary to largely demolish the wall structures and rebuild the whole wall. When maintaining natural stone structures, it is important to make sure that water cannot seep through to the structures. Based on each individual situation, separate water shield structures (for example the ruins of Raasepori castle) or water shields inside structures (for example Olavinlinna) have been built during repair and restoration work. The roots of trees and bushes can also damage wall structures.

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Figure 18. Fort Katariina in Kotka

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Natural stones have been used not only as massive walls, such as grey stone walls, but also as non-supporting façade claddings, either as thin façade masonry or thin façade plates that were plastered or hung on brackets.

Massive brick walls cladded with natural stones formed our most common external wall structure on residential buildings and churches at the beginning of the 1900s. One of the first buildings constructed using this type of a structure was the church of Eura from 1898, designed by Stenbäck, and the last one was the Parliament House from 1931, designed by Siren. The structure of a massive brick wall, cladded in natural stone, consists of a supporting brick wall, the width of which ranges between 400-1,000 mm. The layer of natural stones is usually attached to the brick wall with bonding stones and a layer of mortar. Another bonding option was to use stone hooks made with iron, which had to be protected from rust by using either pitch or liquid mortar.

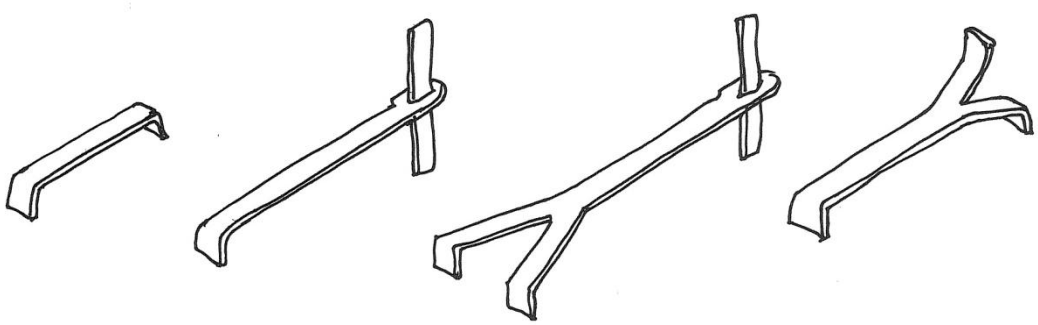

Figure 19. Iron stone ties and anchors

In low-rise buildings, the bonding could be done even with mortar if the shape of the façade stones was suitable. The thickness of façade stones ranged between 100-300 mm, depending on the height of the building. Using stones was technically challenging because the stones had to fitted to the façade and at the same time, the brick wall had to be built and the stones had to be attached to the brick wall. In the end, the stones had to be sealed with mortar while removing the temporary supports. The new technique required new training which is why these techniques are described for example in Gustaf Asp's textbook *Huonerakenteiden oppi* [Lessons in room structures] from 1904. The problem of massive brick walls with natural stone claddings is the structure's ability to withstand the cold in Finland's harsh climate. Corrosion damage on stone cladding brackets and residual water accumulated in the seams have caused structural damages, leading to arduous special work.

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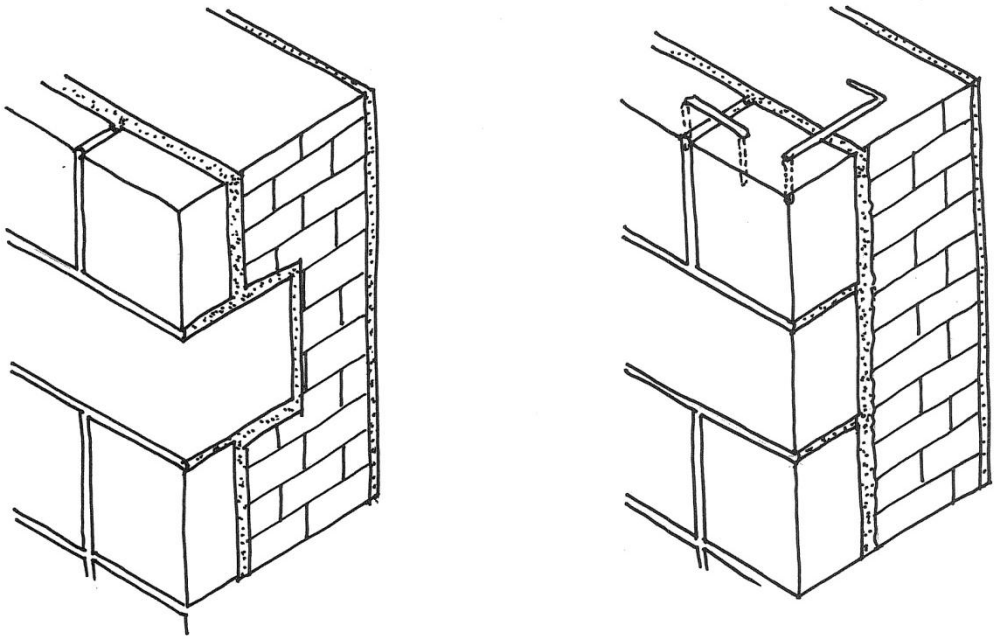

Figure 20. Bond stone and mortar fastening on the left and iron tie and mortar fastening on the right.

The stone industry of Finland originates from that era. Professionals of stone processing were needed. The first larger companies in the stone industry were for example Ab Granit, founded in 1886, and Ruskealan Marmori, founded in 1886. Geological Survey of Finland also played a role in the development of the stone industry, as Suomen Kiviteollisuus was founded in 1900.

Currently, the majority of natural stone façades are built with thin (50-70 mm) stone plates, as so-called aired structures. In this method, stones are hung on the façade with metal brackets. Bracket holes are cut on the edges of stone plates or the stone plates are attached using a anchor pin fixing. In both cases, the seaming of stone plates has to be done by using a special seaming material. The problem of aired structures is that stone plates arch.

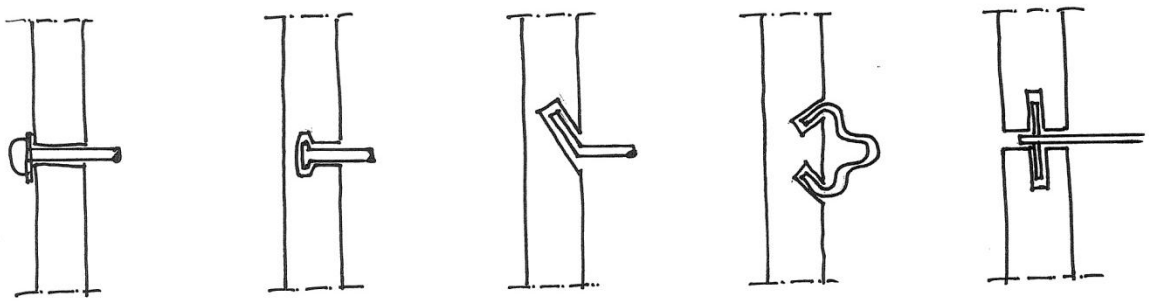

Figure 21. Fastening systems for stone tiles

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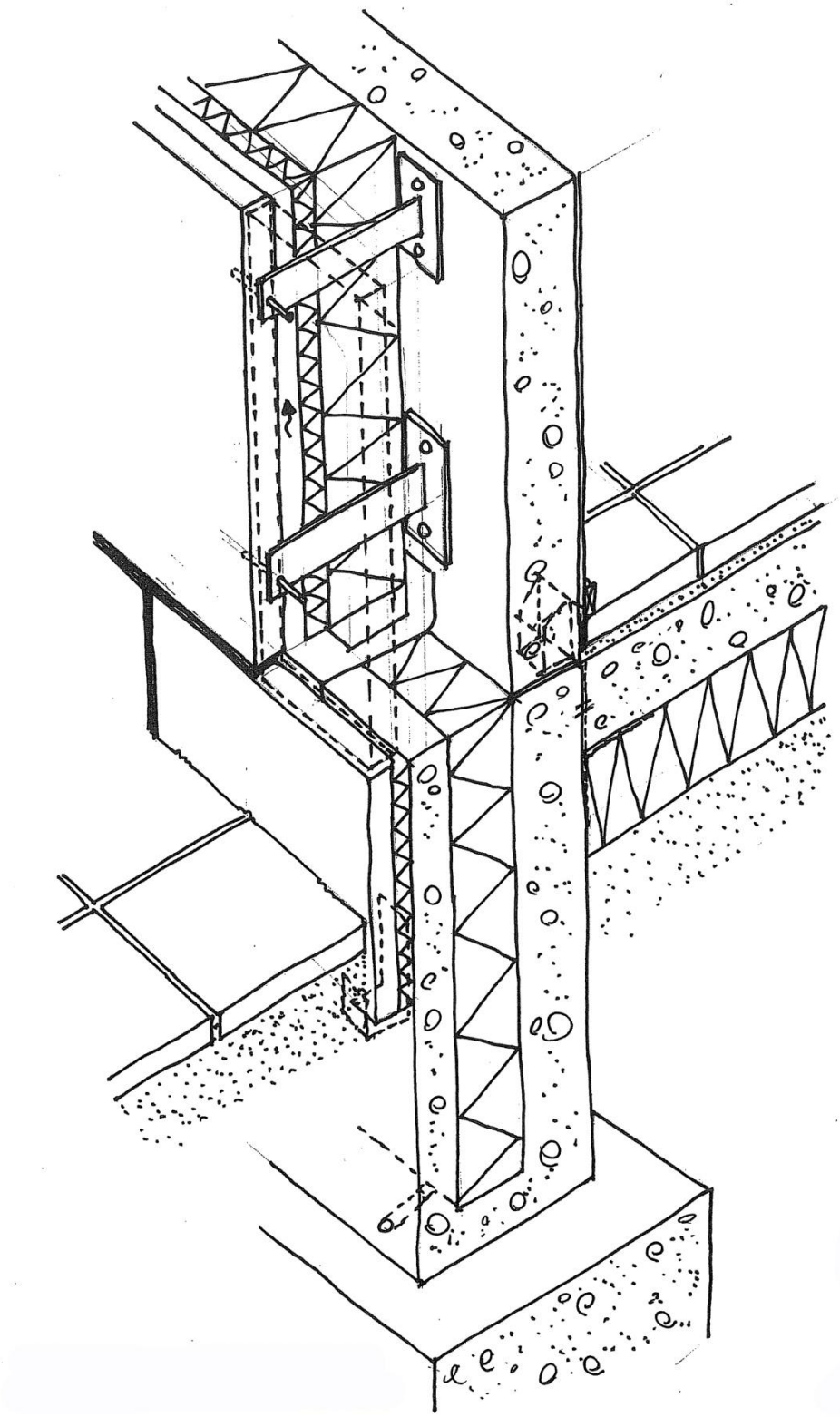

Figure 22. Modern ventilated and pin supported system

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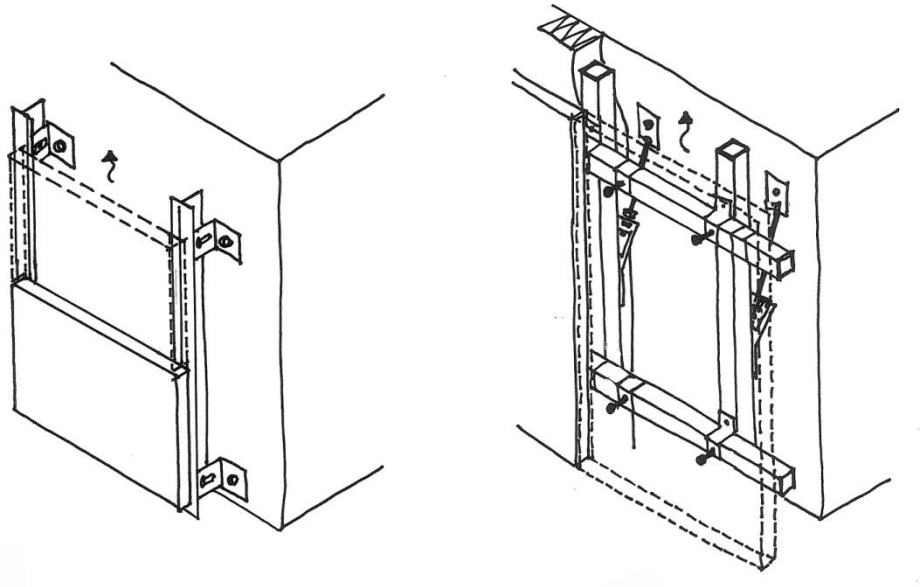

Figure 23. Modern steel frame support system, bonded tiles on the left, modern steel frame support system with pins on the right

It is also possible to attach natural stone to various façade elements. The most common method is to attach thin stone plates (15-30 mm) directly onto concrete elements using mortar. It is also possible to use spring bolts and glue bolts. In the newest techniques, stone plates are glued directly onto a metallic rail structure or polyurethane. Stone plates cannot exceed a certain maximum size in these cases.

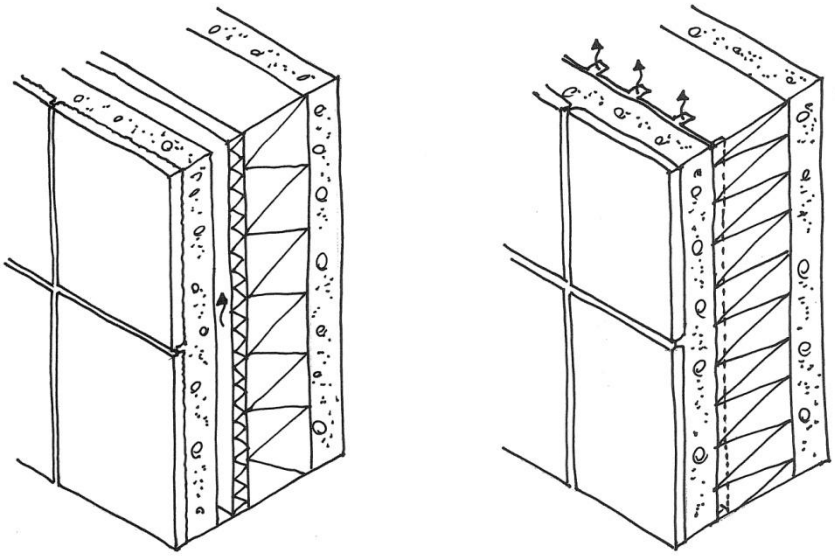

Figure24. Stone tiles in the ventilated concrete shell element on the left and stone tiles in the ventilated sandwich element on the right

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There are differences between the durability, porosity, hardness and other characteristics of different stone types, which mean that not all stone types are suitable for outdoor use. Stone types best suited for outdoor use are granites and steatites, as well as some quartz sand stones and shale.

The finish of stones greatly affects the way the stones look, how slippery they are, how dirty they become and how they are kept clean. Various finishes can only strengthen certain characteristics of various stones types, emphasising the significance of knowledge of stones and proactive planning.

The natural colour changes and pattern changes specific to certain stone types must be taken into consideration even when planning and implementing the stacking of stones in order to avoid additional unwanted patterns.

The use of stones in façades always requires careful planning and research on the stone's overlap patterns so that awkward assembly errors and work errors can be avoided. Additionally, responsible stone companies with knowledgeable staff are needed in order to produce good end results.

(back to massive walls)

Natural stone walls are divided into different groups based on the ways the stones are stacked:

- irregular wall (Figure 25a), or a mixed wall, made of stones in different shapes and sizes
- polygonal wall (Figure 25b), made of multi-angle stones. Typically, the stones are at least pentagonal.
- round stone wall, made of round stones in different sizes. The stones are located so that the most even side of the stone faces the outer wall
- uncoursed ashlar (Figure 25c), made of stone blocks in different sizes. Seams are not continuous and horizontal seams are disconnected by vertical stones
- coursed wall, made of stone blocks that are of the same or different size, the blocks are placed so that the horizontal seams are continuous.
- chequered brickwork, built so that both the horizontal and vertical seams are continuous, and the stones are of the same or different size.



Figure 25.
a) Irregular wall b) Polygonal wall c) Uncoursed ashlar

In the past few decades, gabion walls supporting the structure of the landscape have become common in environmental construction. Gabion walls are made by making steel mesh baskets and filling them with stones.

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3. St Petersburg - Excursion 1

Start Point - the Arch of the General Staff
End Point – The Nabokova's House
Route length - 1,6 km
The nearest M – Admiralteyskaya

General composition:
Andrey Bulakh, Professor, St Petersburg State University
Texts: Andrey Bulakh, Nataly Abakumova
Photos: collections of Andrey Bulakh and Joseph Romanovsky, Professors, St Petersburg State University
Layout: Alexander Spiridonov, student, and Andrey Bulakh, Professor,St Petersburg State University
Translation: E.I. KravtsovaAlong by Bolshaya Morskaya Ulitza = Big Naval Street

Bolshaya Morskaya (Great Naval) street is located in the very centre of the city of St Petersburg. It attracts attention of architecture-lovers over and over again.

In spite of the fact that buildings situated in this and adjoining streets do not represent any unified ensemble because of difference in their styles, ages and used materials, nevertheless, being observed all together, they compose the specific harmony. In many respects such congruousness results from a great deal of stone decoration that often completely covers facades of buildings where former banks and joint-stock companies were housed lately in the XIX-th — early in the XX-th centuries.

See more in *A. G. Bulakh, N.B. Abakumova, J.V. Romanovsky* ST PETERSBURG A History in Stone Printed by St Petersburg University Press, 2011. 173 p.
ISBN 978-5-288-050200-6

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AZOV-DON TRADE BANK 1907-1910 F.I. Lidval 3-5, the Great Naval Street

Figure 26. Azov-Don Trading Bank

The building of the former Azov-Don Trading Bank is faced with grey granite from somewhere at the Vuoksa River. It was erected in 1907—1910 by the architect F.I. Lidval in Modern Neo-Classical style. The building has an asymmetrical facade typical for this style. It is decorated with four columns fluted at the bottom and with six pilasters.

Of particular interest are oval medallions fixed between windows of the third floor and stylized multifigured bas-reliefs by the sculptor V.V. Kuznetsov that are arranged on the level of the ground floor.

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Figure27. The oval medallions.

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Figure 28. The multifigured bas-reliefs.

The main entrance to the bank is decorated outside with glassy-polished, motley-banded, white-black stone. We suppose it to be plagiogneiss. For decoration of interiors of the Azov-Don Bank green and brownish-green marbles from Sweden were applied.

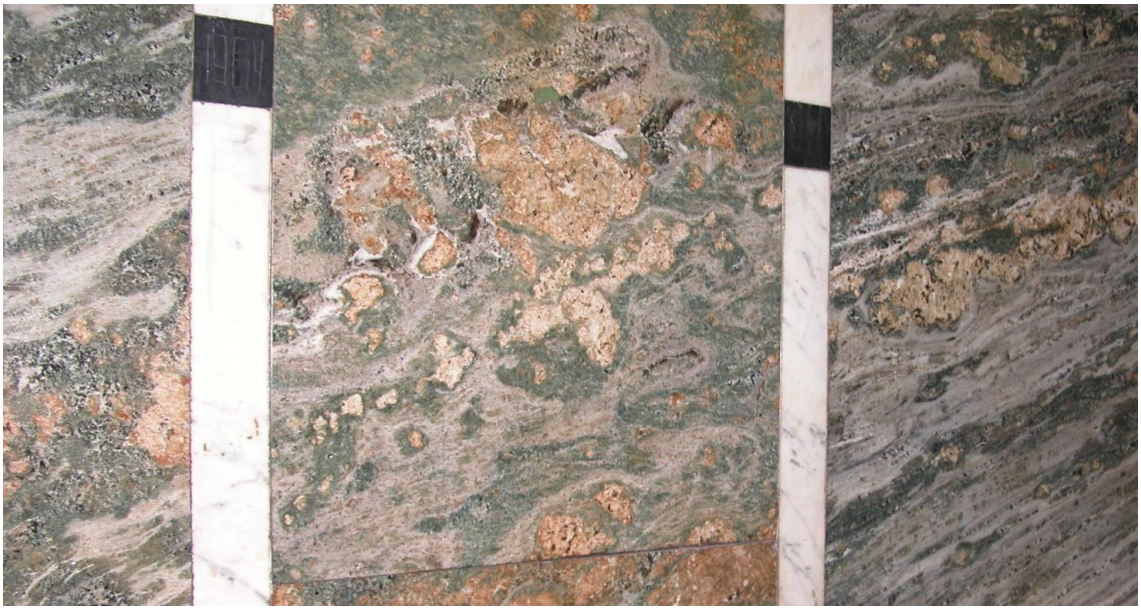

Figure 29. Plagioclase gneiss in the bank entrance.

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RUSSIAN TRADING AND INDUSTRIAL BANK 1912-1914 M.M. Peretyatkovich 15, the Great Naval Street

Figure 30. Russian Trading and Industrial Bank.

Grey Nystad Granite was used for the entire facing of the majestic edifice of the former Russian Trading and Industrial Bank built to the design of M.M.Peretyatkovich. Blocks of the granite have “rocky” or pointed surface structure. Key-stones of windows of the second storey of the building are adorned with masks of the same granite. The third and forth storeys are united by massive round columns, especially attracts our attention the stone balustrade on the third floor. The relieved frieze is decorated with mascarons in the form of male profiles and heads of rams, as well as with cartouches and compositions of armour.

All those sculptural details of the bank building had been carved by L.A.Ditrich and V.V.Kozlov constantly co-operating with M.M.Peretyatkovich. The diversity of the finishing and variety of the stone decor reliefs make light and shade play on the plastic architectural details of the building and yet more accentuate its monumental bottom part supporting the upper storey colonnade up.

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Figure 31. Details of the interior of the Russian Trading and Industrial Bank

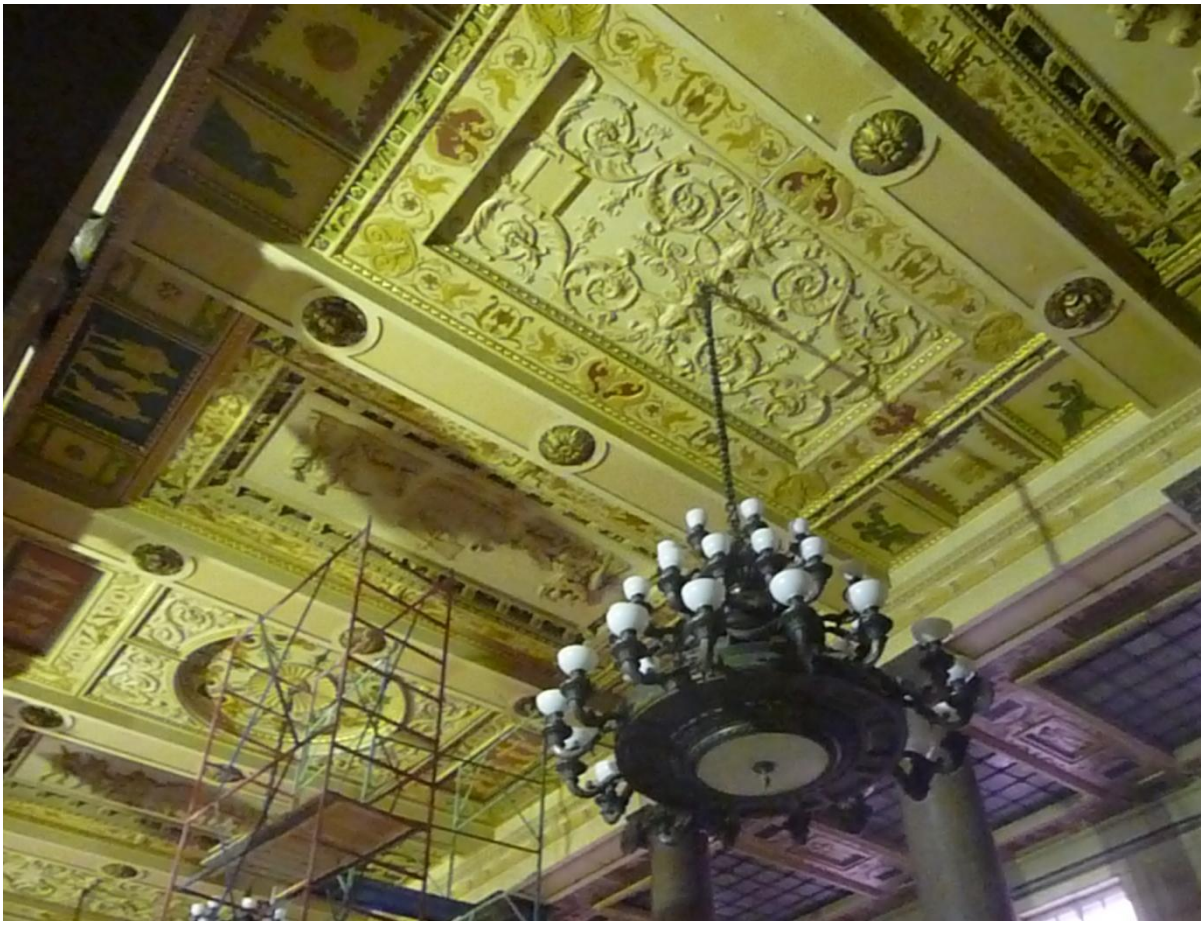

Figure 32. Details of the interior of the Russian Trading and Industrial Bank.

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CENTRAL TELEPHONE STATION 1903-1904 K.V. Baldi 22, the Great Naval Street

Figure 33. Central Telephone station.

Rich and complex decoration of stone is shown by this house. Two-coloured sandstone from Poland was used for its facing. The ground floor is faced with red sandstone worked up in different manners. One can see the stone surfaces that are either roughly uneven, or wavy (fluted, or corrugated), or speckled with small points.

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The upper storeys are faced with grey sandstone. The same stone was used for carving of ornaments over the windows, complex garlands disposed on each side of the big window of the clock-tower and the emblem (coat of arms) of Petersburg that represents a crossed sceptre and two anchors: one of which is marine (with 2 flukes) and another — river (with 4 flukes).

Figure 34. The stone ornaments were complemented with small details of ceramics.

Figure 35. Stone ornament.

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FABERGE'S HOUSE 1899-1902 K.K. Schmidt 24, the Great Naval Street

Figure36. The Facade of the Faberge's House

The building was erected by the architect K.K.Schmidt in 1899—1902 for a shop of a well known jewellery firm — the Faberge House. The whole of the facade of the house was clad with nothing but the red Gangut (Hanko) Granite. However the granite was worked up in different techniques, so at least three shades can be distinguished in the colouration of the building.

Figure 37. A detail of the front facade in the Faberge's house.

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The facing was executed in a highly masterly way, the slabs being brought to the conformity in the stone pattern with extreme precision and delicacy.

Slabs facing the ground floor embellished with massive columns have polished surfaces. The polish had intensified the deep red colour of the granite. Slabs of dark-red colour are placed above the columns. The upper storeys were faced with slabs having a fine-pointed surface structure giving rise to the smoky light-rosy colouration of the granite, while the outstanding window frames and some other details have the “rocky” facture and, as a consequence of it — the darker rosy colour.

Figure 38. Lower part built from Gangut (Hanko) granite brought from Finland.

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RUSSIAN FOREIGN TRADE BANK 1887-1888 V.A. Shreter 32, the Great Naval Street

Figure 39. The front facade of the Russian Foreign Trade Bank.

Coloured sandstones from Germany were applied for cladding of the house. This building intended for the Russian Foreign Trade Bank was erected in 1877—1888 to the design of architect V.A.Shreter.

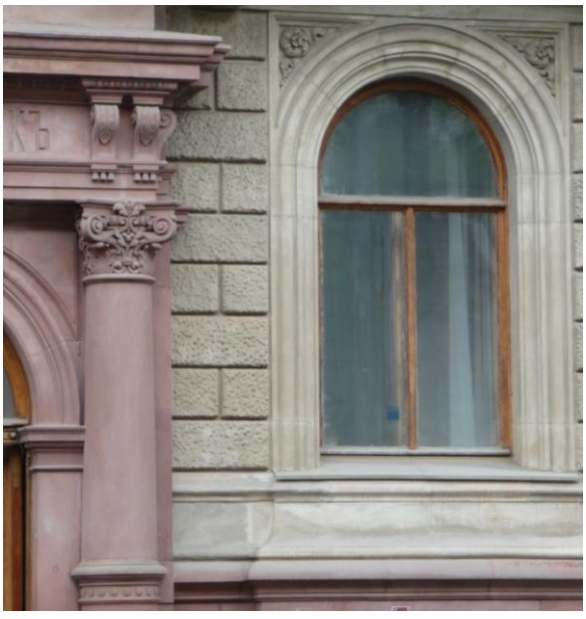

Figure 40. Details of the facade. The stone decor is complemented with complex ornamental details made of ceramics.

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Both the socle floor and high, carved portal with two columns were faced with slabs of red sandstone. The first floor was finished with rustication of green sandstone. The two upper storeys are cased with yellow sandstone and united with Corinthian pilasters cut from the yellow sandstone as well. The stone decor is complemented with complex ornamental details made of ceramics.

DWELLING HOUSE OF THE RUSSIA INSURANCE COMPANY 1905-1907 Architects A.A. Gimpel, V.V. Il'yashev Artist N. Roerich 35, the Great Naval Street

Figure 41. The front facade of the Dwelling House of the Russian Insurance Company.

Blocks of the red Gangut (Hanko) Granite finished in the “rocky” techniques were also used for the revetment of the ground floor of the house N 35 built in the style of Modern in 1910.

The upper storeys were covered with the smoky-pink granite from the deposit Kovantsaary, while for the bottom of the edifice black polished slabs of the specific small-spotty rock known as gabbro were applied.

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Figure 42. Drawings of the Russian north.

The combination of the black, red and greyish-pink stones makes the whole construction very effective. Together with the stone decor of the building, majolica compositions created after drawings of N.K.Roerich on the subject of Russian North plays the important role here.

37, The great naval street

Figure 43 House built for Insurance company "Russia" with red Gangut granite and yellow Württemberg sandstone

The house is built for the Insurance Company "Russia" in the beginning of last century, the upper storeys were plastered and only the plinth, cornices and portals were faced with the red Gangut

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Granite. The granitic decor was complemented by the light-yellow Württemberg Sandstone, outside frames of huge windows having been cut from the rock.

AT THE CORNER OF THE GREAT NAVAL STR. AND ISAAC SQUARE (N.8)

Here is the building of the Astoria Hotel. It was one of the biggest hotels of Petrograd set up by the architect F.I.Lidval in 1914. The edifice was built in Modern style with use of some elements of Classicism. The two lower storeys are faced with pink and pink-grey granite from the deposit Antrea. The facades are decorated with oval medallions with masks, garlands and stylized vases cut out of the same granite.

N 40, the Great Naval Street

Figure 44 Building of the first Russian Insurance Company made of sandstone

The casing of the house is made of sandstone. It is the former building of the First Russian Insurance Company erected in 1889—1901 after the project by L.N.Benois day. The basement of the building is finished with well-polished pink-red Valaam Granite having very heterogeneous, spotted, or banded structure and turning in places into gneissoid granite. The upper storeys are faced with pink and yellow Sandstones and covered with a complex ornament carved of light-grey sandstone.

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A square opposite the Hotel Astoria MONUMENT TO NICHOLAS 1859 Architect Au. Montferrandt Sculptors P.K. Klodt, N.A. Ramazanov, R.K. Zaleman

Figure 45 Equestrian statue of Nicolas I

The equestrian statue of Nicolas I stands in the centre of St Isaac's Square. The monument was designed by the sculptor Pyotr Klodt and by architect August Monrferrand and was erected in 1859. The base of monument is constructed with pink Rapakivi and grey Serdobol granites. The pedestal is decorated with red Shoksha quartzite and white Italian marble. Four high reliefs and allegories of

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Justice, Faith, Wisdom, and Strength surround the statue. It is worth mentioning that the tomb of Napoleon in the *Hôtel des Invalides* in Paris is also cut from the Shoksha stone.

Figure 46 Particular of the equestrian statue of Nicolas I- allegories of Justice, Faith, Wisdom, and Strength

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Figure 47 Particular of the basement of the statue of Nicolas I

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GERMAN EMBASSY 1911-1912 P.Behrens N 41, the Great Naval Street

Figure 48 German embassy

Natural stone abounds in the decor of the house erected after the project of the prominent German architect P.Behrens in 1911—1912 (the German Embassy was housed there).

Through all their height the facades of the edifice were faced with thick slabs of Swedish granite coloured uniform rich red. Due to the rocky and small-knobby surface structure of the stone its bright colouration is lusterless.

The three-quarter columns of the main (eastern) facade of the building are very impressive. They were clad of rounded blocks of granite, each of them being 0.7 m in height.

The building was topped with a heavy sculptural group presenting bronze statues of two youths restraining horses. In 1914 they were thrown down on to the ground and drowned in the river Moika by a crowd of people incited by patriotic sentiments.

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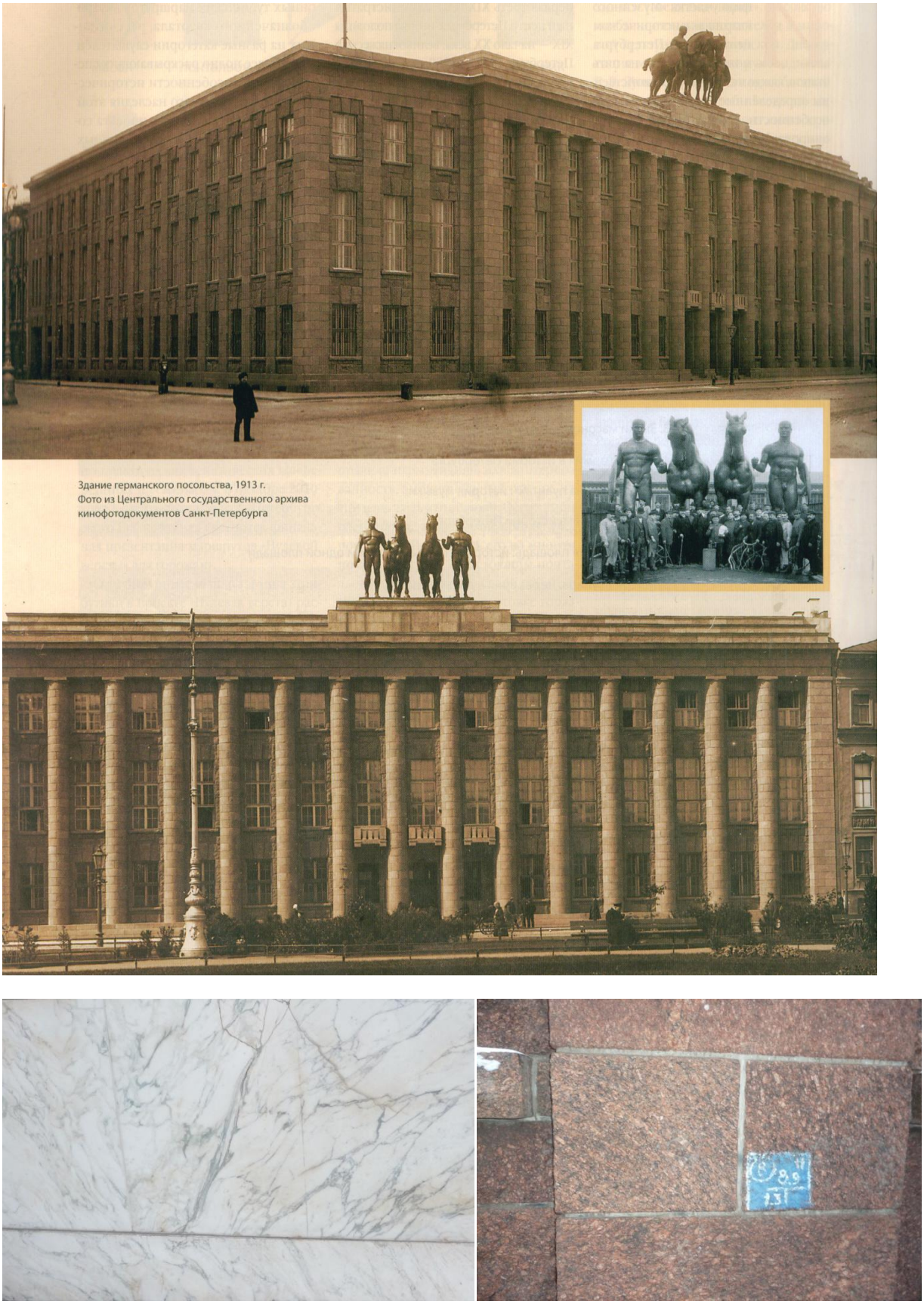

Figure 49 On the top – the German embassy building in an historical photo from 1913, in the bottom - the materials used in the building.

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DEMIDOV`S HOUSE 1840s Au. Montferrandt N 43, the Great Naval Street

Figure 50 Demidov's house

House at was erected to the design of Au. Montferrand in 1836 for the owner of factories at the Urals P.N.Demidov.

The base of the house is faced with polished Serdobol Granite and the ground floor is finished with rustics of white Italian marble. The marble slab surface was worked up in the original manner, so that it was speckled with rare small holes of round or elongated forms. Such a technique of finish made smooth stone to look like porous tuff.

Carved of white marble are six germae with male and female half-figures propping up a marble balcony of the first floor. The marble bas-relief group "Glory" created after a model of the sculptor T.Jacquot is fixed above the balcony in the centre of the facade.

On each side of the gate there are two niches for fountains. The niches are lined with slabs of white polished marble.

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Figure 51. Particular of the Demidov's house

Figure 52 Particular of the upper level of the Demidov's house

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N 13. N 45, the Great Naval Street

Adjacent to Demidov's house this edifice built by Au.Montferrand in 1840 and possessed by V.F.Gagarina is located. The asymmetrical facade of the mansion is decorated with a large open balcony adorned with four marble busts wrecked rather considerably at present.

NABOKOVA'S HOUSE 1901-1902 M.F. Heisler, B.F. Guslistiy N 47, the Great Naval Street

Figure 53 Nabokova's house

Appearing smart is the former house of Nabokovs the ground storey of which is faced with red sandstone and the upper storeys are faced with grey sandstone. The facing slabs of sandstone are finished in such a way that some of them are smooth while others have rocky surfaces.

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Figure 54 Particular of the Nabakova's house

Garlands carved of sandstone and a mosaic frieze of majolica that depicts red tulips and light-blue lilies against a golden background embellish the top of the building facade.

Figure 55 Mosaic of majolica on the Nabakova's house

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Figure 56 Particular of the noble floor in Nabakova's house. Red and grey sandstone

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Deposits of St Petersburg ornamental stone

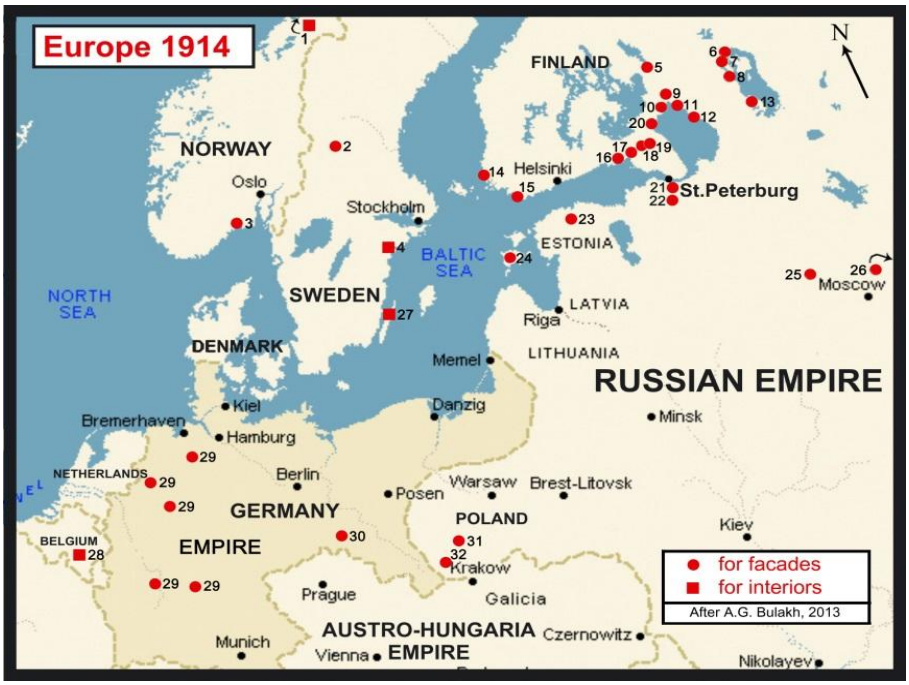

Figure 57 Map of the deposits in Europe in 1914

1	Marble pink*, Є-S	12, 15-18, 19	Granite pink, AR-PR
2	Blyberg porphyry, PR	20	Almandine gneiss, PR
2	Garberg granite, PR	21	Platy limestone, O
2	Åsby diabas (dolerite), PR	22	Tufa, Q
3	Larvikite, P	23, 27	Limestone, Marbled limestone*, O
4	Marbles green and other*, PR	25	Limestone, C
5	Soap stone, PR	26, 28	Marble, Marble black*, C, and others
6, 7, 9, 11	Marble, PR	29-31	Colored sandstones, T - K
8	Black schist, PR	32	Marble, J
10, 19	Granite grey, PR	-	Marbles from France, Italy, Norway, Poland, Spain, Germany*
13	Quartzite, PR		
14	Granite grey, PR		

* Only in interiors

See more in:

A. G. Bulakh. ORNAMENTAL STONE IN THE HISTORY OF ST PETERSBURG ARCHITECTURE / *Towards International Recognition of Building and Ornamental Stones*. Geological Society Spec. Publ. London. 2014.

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4. Stone Town Guide St Petersburg N 2 Excursion 2

Figure 58 Map of the Excursion 2

From the House of Lobanov-Rostovsky to St Isaak's Cathedral and along by Admiralty Embankment

Start Point – the Lions Palace Hotel

End Point – the Admiralty garden Route length - 1,5 km
The nearest M - Admiralteyskaya

This excursion route goes along by the most famous places of St Petersburg including its central squares and embankments of the Great Neva River

HOUSE OF LOBANOV-ROSTOVSKY 1817-1820 Au. Montferrandt Lion Palace Hotel

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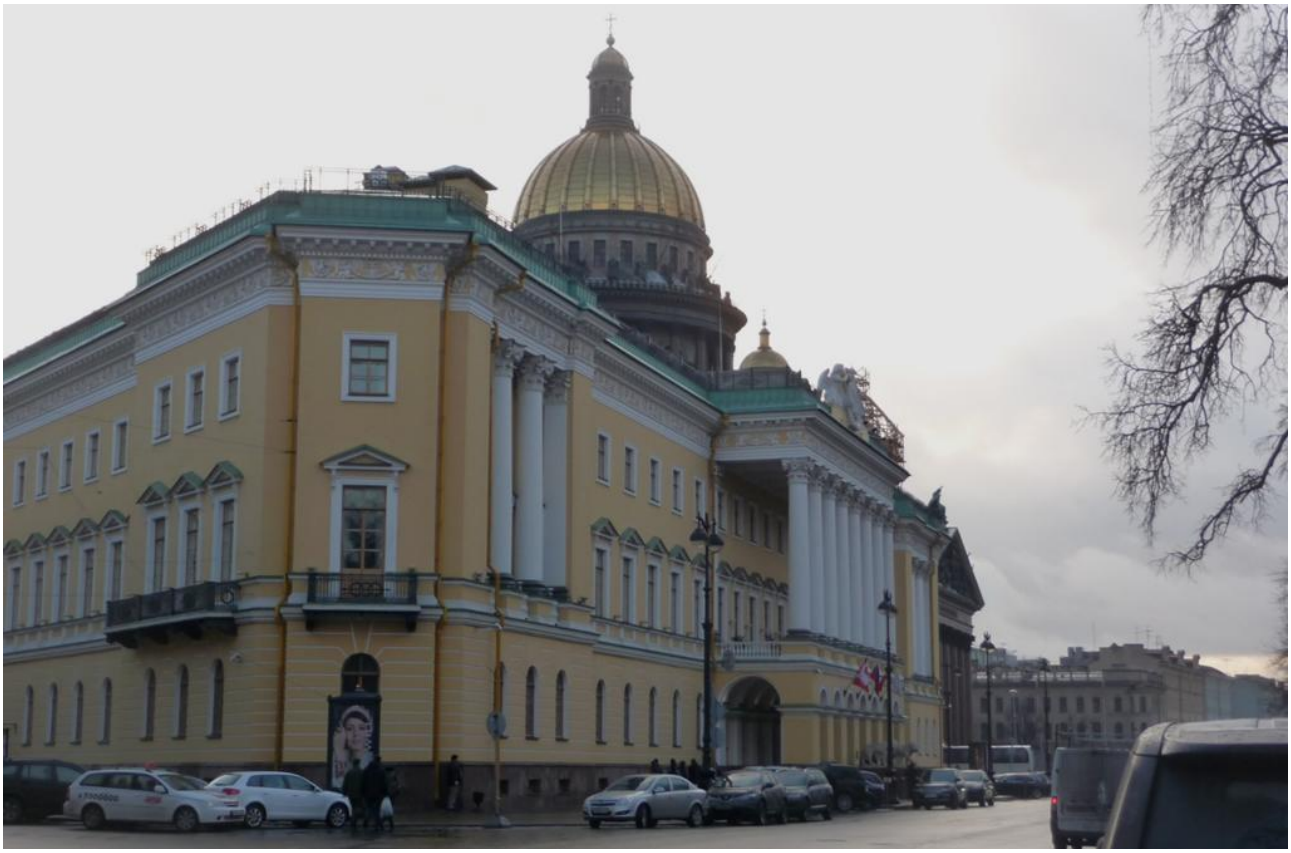

Figure 59 House of the Prince Lobanov-Rostovsky

It is the former residence of the Prince Lobanov-Rostovsky. Now a hotel places occupies the building. The central parts of the facades of the house looking out onto the Neva and St.Isaac's Cathedral 61 were created as powerful porticos of many columns with arcades. They rest on massive stylobates faced with slabs of rapakivi-granite. The plinth of the building along all its perimeter had been revetted with slabs of the same kind.

Figure 60 A particular of the entrance' statues

Two marble guard lions by the sculptor Paolo Triscorni adorn the entrance from the Admiralty side. During the Great Patriotic War (1941-1945) several pits resulted from fragments of shells appeared on a ball under a paw of one of the lions. Those pits have been blocked up with stone patches today.

In 2014, the Lion Palace Hotel was opened in the building. It's interiors are decorated with a lot of type of nice decorative stone from all the World deposits.

This project is co-funded by the European Union, the Russian Federation and the Republic of Finland

Figure 61 The view of the main entrance decorated in precious marbles

This project is co-funded by the European Union, the Russian Federation and the Republic of Finland

Figure 62 The view of the house, now a hotel

Figure 63 Particulars of the paving done in marbles

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Figure 64 Particulars of the paving

Figure 65 Particular of the interiors of the house

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ST ISAAC'S CATHEDRAL 1818-1848 Au. Montferrandt

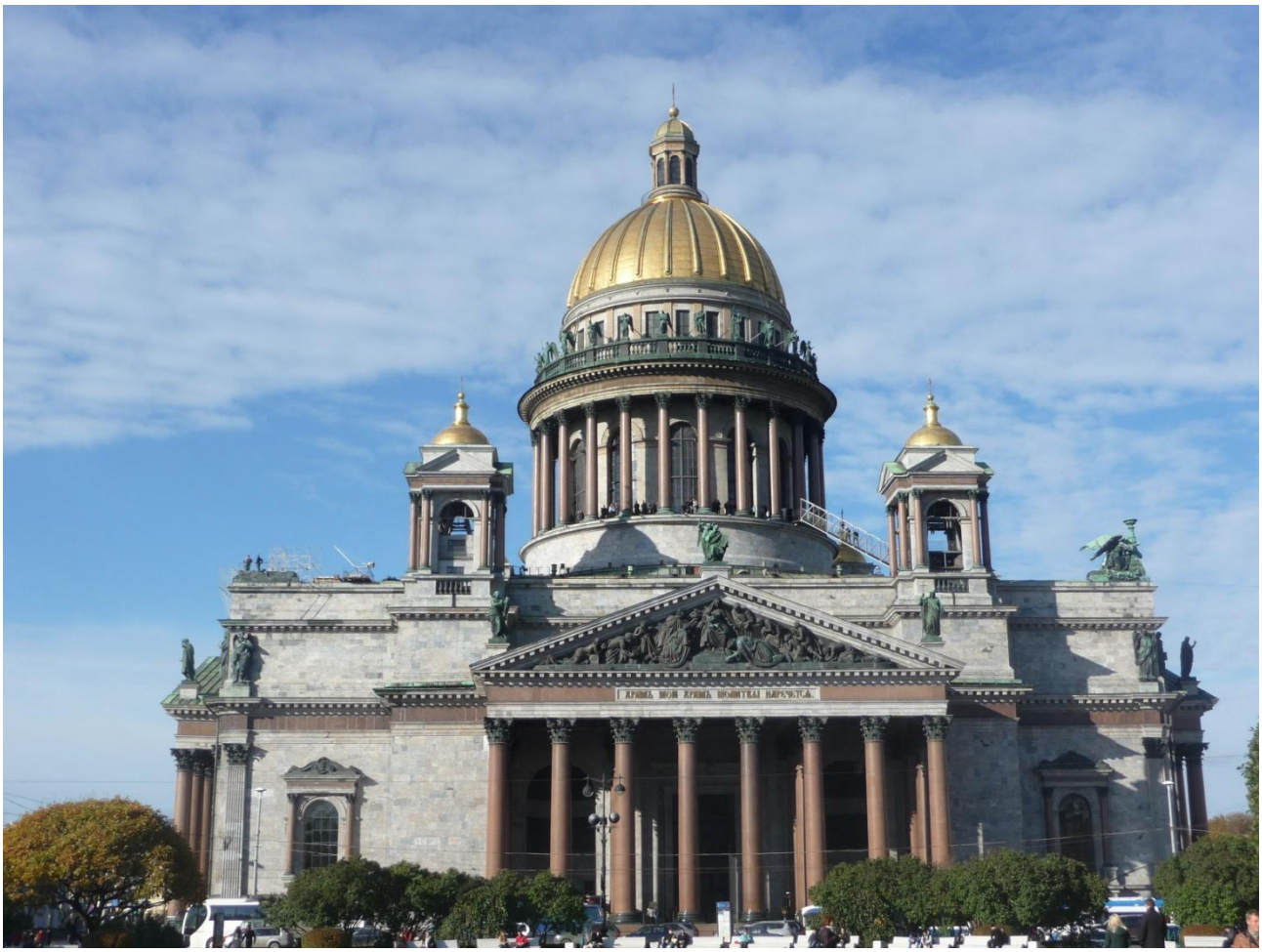

Figure 66 View of St.Isaac Cathedral

This cathedral is one of the most grandiose dome constructions in the world and main architectural dominant of the centre of the city of St Petersburg. Columns of dark-pink rapakivi-granite arrest our attention first and foremost among the exterior decorations of St.Isaac's Cathedral. Particularly grandiose columns had been installed on the massive granitic stylobates of the four majestic porticos of the cathedral: sixteen at a time — in the northern and southern porticos and eight at a time — in the eastern and western ones. The columns are crowned with the entablature, frieze of which is also cut out of dark-pink rapakivi-granite.

Figure 67 Particular of the columns of the cathedral in dark pink rapakivi granite

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Wide granitic steps lead down from the columns to the basement of the cathedral. These 48 columns, each weighing 114 tons, are 17 m high, with diameter of 1.85 m. They are among the most gigantic columns in the world and are second in the size only to the Alexander column, also set up after the design by Au.Montferrand. Above the portico, in the drums of cupolas and in belfries, as well as on each side of every window the rows of columns of the same pink granite are as if in the clouds over the city. Altogether 112 granitic columns adorn the cathedral.

Figure 68 Particular of the cathedral, the upper columns

The walls of the cathedral were constructed after the columns of the porticoes had been established. Outside they are faced with large slabs of light-grey Ruskeala Marble. The carved porticos of doors with bronze reliefs ornamented with many figures had been cut out of the same marble. The Ruskeala Marble proved to be very unstable and began to decay rather soon. Therefore in the 1870—1890-s, during the first restoration of the cathedral not a few slabs of Ruskeala Marble were replaced by insertions of more homogeneous pale-grey Italian marble *Bardiglio* from the deposit near Serravezza.

The huge St.Isaac's Cathedral can hold 15 thousand people at one time. Its interior is lined with coloured stone in plenty and looks triumphantly rich. Especially impressive is the iconostasis the cost of which amounted to one tenths of the total cost of the cathedral building. The iconostasis had

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been cut out of white statuary marble quarried in Serravezza in stone pits of *La Vinkarella*, *Falkovaya* and *Monte Altiesimo*. It is embellished with eight columns and two pilasters made of malachite in the manner of "Russian mosaic".

These columns 9.7 m high and 0.62 m in the diameter are unique. The two central columns of the iconostasis, 4.9 m high and 0.43 m in the diameter, are faced with dark-blue Badakhshan lazurite Lazurite in the manner of "Russian mosaic" too. Favourite Ancient Greek ornament — that is meander, or *bordure a la grecque* is also lined of lazuritic plates in the arches of the side chapels of the iconostasis.

Figure 69 Interiors of the cathedral with the columns decorated in the manner of Russian mosaic

Steps to the altar and the bottom part of the iconostasis were hewn out of dark-red Shoksha Quartzite. Made of the same stone is the cornice topping the whole interior stone decor. The wide friese of that quartzite fringes the floor of the cathedral around its periphery. The floor is composed of slabs of dark-grey and light-grey Ruskeala Marble arranged chess-board fashion.

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Figure 70 Interiors of the cathedral

The central part of the floor, situated under the cupola of the cathedral, represents the splendid mosaic in a huge circle form called “rosas” that is a rose. It is inlaid of pink and cherry-red Tivdiya Marble and put in a frame of a border “a la grecque”.

The lower part of the walls and enormous pylons are faced with slabs of black slate. The upper part of the cathedral’s walls is lined with white Italian marble and embellished with pilasters and columns of Tividiya pale-rosy and cherry-red Marble. Altogether there are 8 columns and 172 pilasters, half-pilasters and quarter-pilasters of Karelian marbles in the cathedral.

The columns and pilasters, decorated with cannelures, are pale-rosy of warm tint, while the dark cherry-red pilasters, standing at the corners of the cathedral, have smooth surface.

In some slabs, for instance in those situated at the south-west corner of the cathedral, we can see, how delicate rosy colour of the marble grades into cherry-red and in places the stone turns ash-pink, almost grey. Installed in frames of Tivdiya (Belogorsk) Marble arranged below the pilasters are round medallions and narrow ornamental boards made of perfectly polished Solomino Breccia.

Huge plates of marble of different colours, brought from various places, are fitted in the recesses between the pilasters: green rock from Genoa, or *Verde di Levanto*; red one — *Rosso di Levanto*; yellow marble from Siena. Large tables of French marble *Griotto*, placed under the mural icons that are ornamented with white carved Italian marble, attract our attention. Indeed, this very valuable marble is picturesque because of its rich red colour contrasting with white round spots of fossilized shells.

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In the southern nave, the bust to Auguste de Montferrand — the author of the project and builder of St.Isaac's Cathedral stands. The disciple of the famous architect, sculptor A.Foletti, had created that bust from all kinds of stones used by Montferrand for finish of the cathedral.

Figure 71 Bust to Auguste de Montferrand

He carved out the face of Montferrand of white Carrara Marble, the hair — of grey granite, the collar of the uniform — from slate, the cloak — of crimson Shoksha Sandstone, the cordon — of green marble, and the orders — of yellow Siena marble and crimson quartzite. Pink Tivdiya Marble served for the pedestal of the bust.

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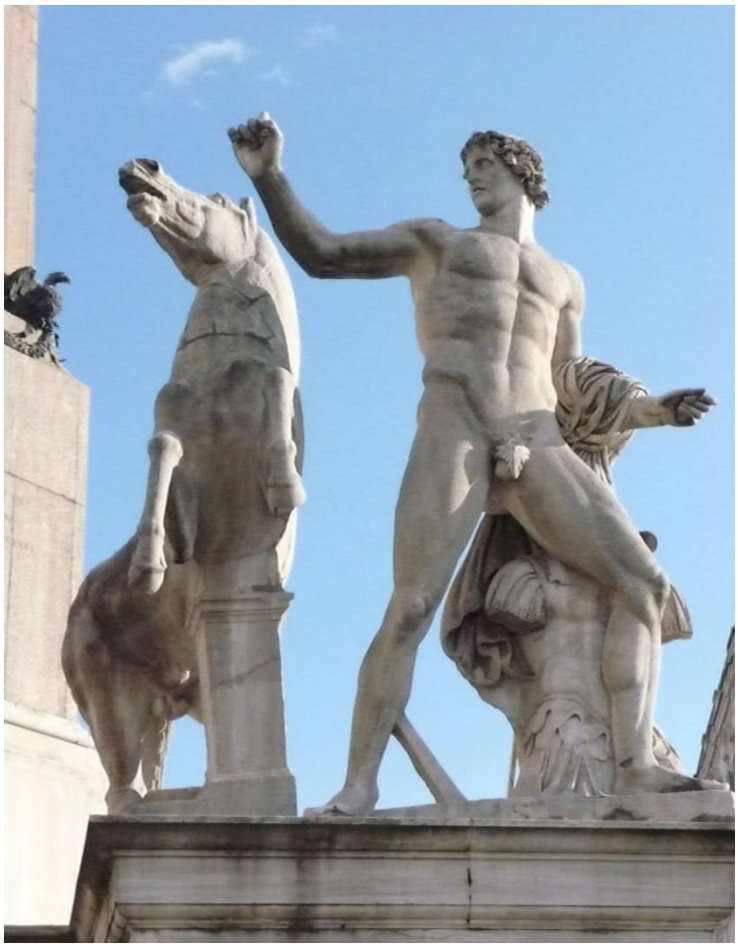
MANEGE OF HORSE GUARD REGIMENT AND DIOSKURS 1807, G. Quarenghi



Behind St Isaac's Cathedral, the Admiralty Avenue is closed with the fine, tersely simple in adornment portico of the Horse Guards Manege (Riding School). It designed by G. Quarenghi and represents one of the models of Strict Classicism. The basement of the building was made of Putilovo Limestone slabs. The pedestals of columns of the portico, steps and stylobate are granitic.

The designation of the building was emphasized by sculptural bas-reliefs fixed over the entrance. Carrara Marble groups of Dioscuri are established in front of the portico. The sculptures are designed by Paolo Triscorni on the antique originals standing on the way up to the Quirinal Palace in Rome.

Figure 72 Manege of horse guard regiment and Dioskurs - Romanian prototype is pictured here

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TWO COLUMNS WITH STATUES OF NIKE 1854-1856 N.E. Efimov

Figure 73 Column with statues of Nike

They stay between the Manege and Synod buildings, in the very beginning of the Konnogvardeisky (Horse Guards) Boulevard. Bodies are monolithic and are cut off Serdobol grey Granite in

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accordance with design by the Russian architect Carlo Rossi in 1827. But they were erected by the architect N.E. Efimov in 1845-1846.

He put on tops of columns bronze sculptures of Goddess Nike which were created by T.D. Rauh in Berlin in 1837. Friedrich Wilhelm IV of Prussia presented them to Nicholas I in 1845.

Total height of a column is 12.5 m including both a pedestal and a statue.

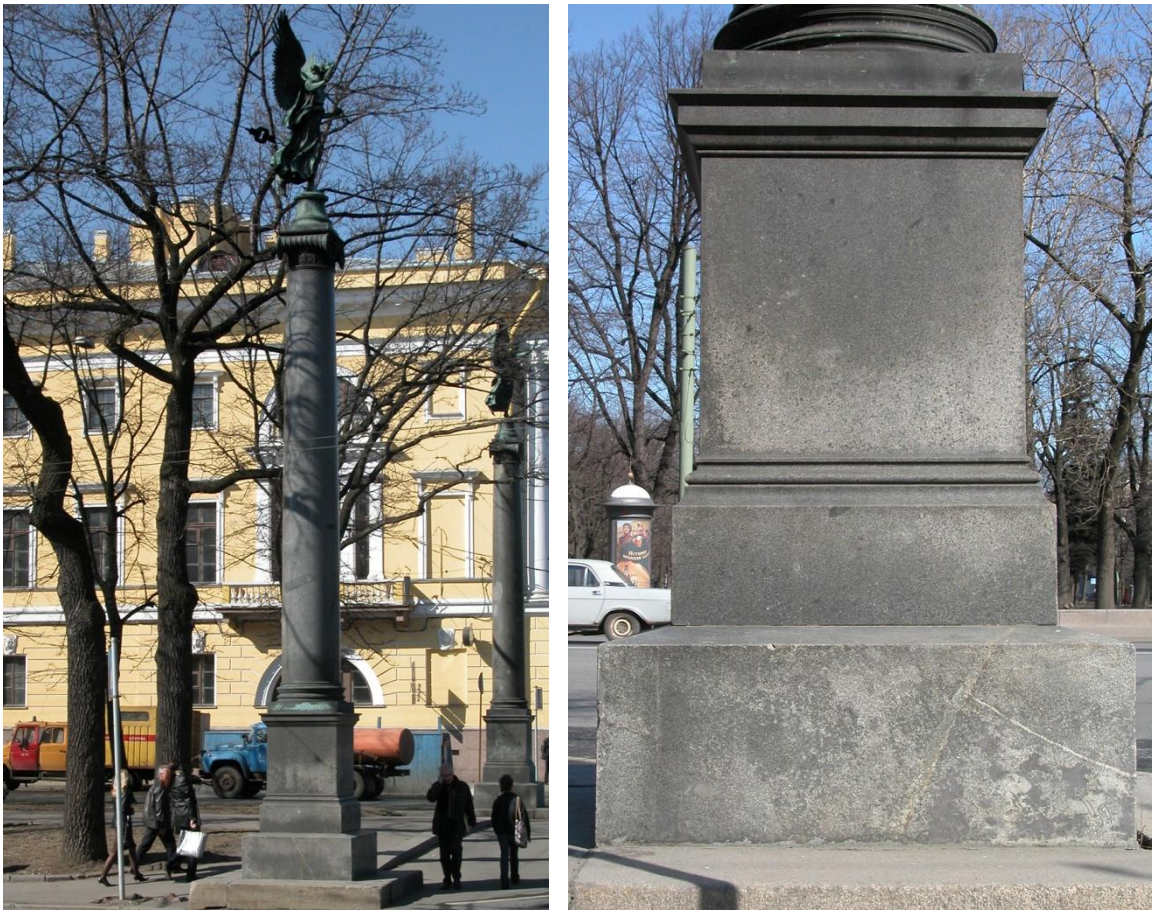

Figure 74 A total view of the column with the statue of Nike on the left, and particular of the basement on the right

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SENATE AND SYNOD

(now the President Library after B. Eltzin and the Constitution Court Yard of the Russian Federation) 1829-1834 C. Rossi

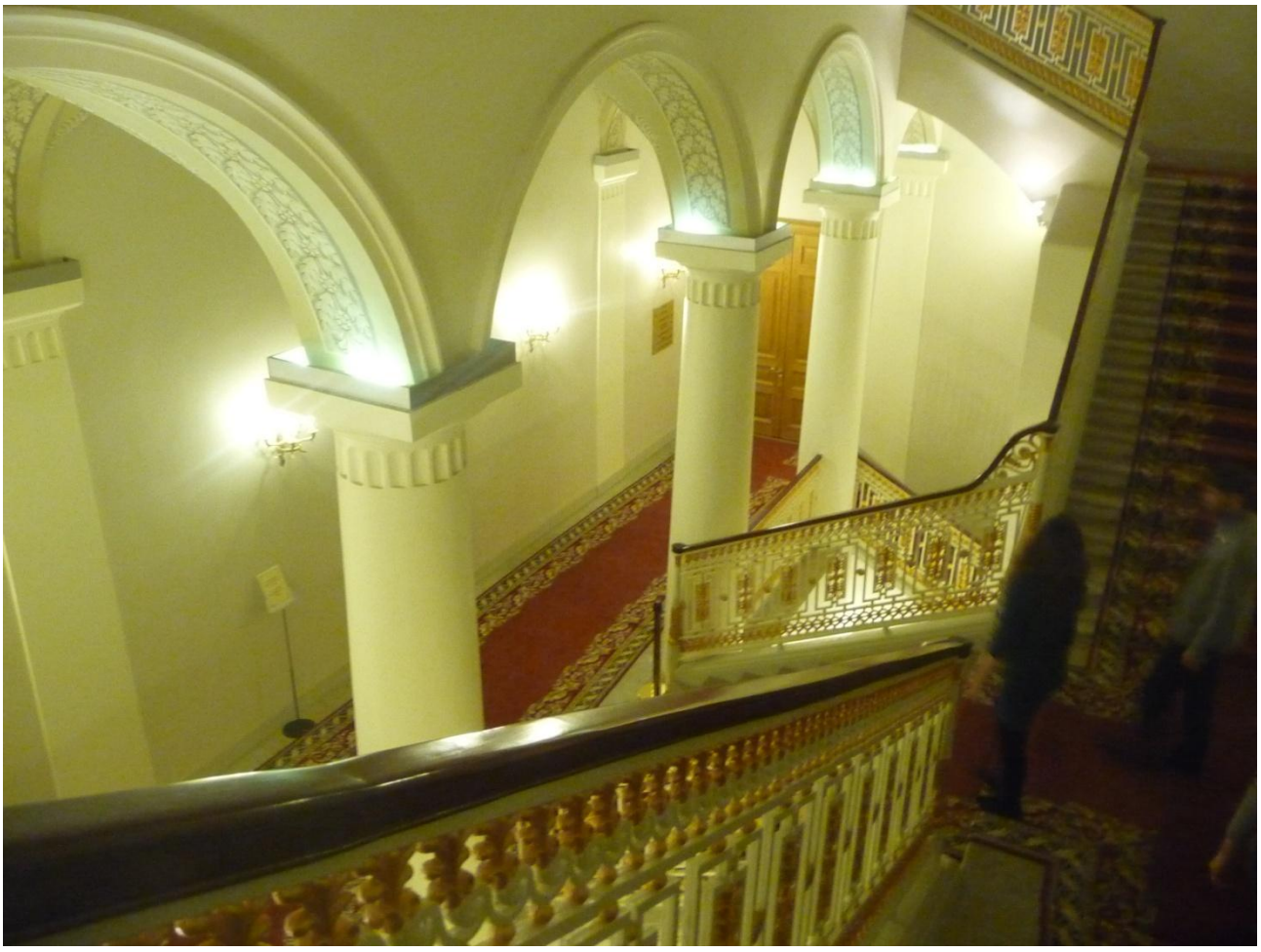

Figure 75 View of the interiors

These two buildings set western bounderies of the Ploshchad Dekabristov (Decembrists' Square) and are connected with the Admiralty through a similar compositional peculiarity: the relatively low plinth of the Senate and Synod buildings is the basement of the colonnade.

The socle is faced with three rows of slabs of pink granite rapakivi, a narrow cornice of Putilovo limestone running along above the slabs separates them from the wall surface.

Outside staircases and kerbstones of the wide spread *pentre douce* are also made of granite rapakivi and the descents themselves are paved with pieces of diabase.

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BRONZE HORSEMAN 1768-1782 E. Falkonet

Figure 76 Statue: Bronze Horseman

This famous Bronze Horseman was designed by the French sculptor Etienne Falconet, but the head of Peter the Great was sculptured by Maria Anne Collo. The pedestal shaped as a crest of wave cut out of three blocks of pink coarse grained microcline granite. They are parts of a huge glacial boulder which was found near the settlement of Lahta at the North beach of the Finnish Gulf. It is traditionally named Rapakivi but has another structure.

Figure 77 Drawing of the carving of a huge boulder that formed the basement of the statue

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ADMIRALTY EMBANKMENT AND TWO SWEDISH VASES 1818-1874

It is an embankment along by the Big Neva River between the Synod Building and the Palace Bridge, or in another words, between Petrovskaya and Admiralteyskaya landing-stages. The Embakment and landing stages were constructed and reconstructed part after part in 1816-1821s, 1873-1874s, 1914-1916s.

Figure 78 View of the embankment

Granite rapakivi blocks for the embankments cut in quarries at islands and sea bluffs between Vyborg and Kotka.

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A SWEDISH VASE 1818-1874

A dark grey vase of Äsbo diabase manufactured in Älvdalen, Sweden, in 1830s. By the way, the second one cracked because of frosts, relics lie at a store now.

Figure 79 View of a Swedish vase of Äsbo diabase

TSAR AS CARPENTOR 1910 Sc. L.A. Bernschtam Recreated in 1996

The monument after Peter I (so called Tsar as carpenter) tells about his visiting Holland where he trained at ship yard near Amsterdam in 1697. Bronze carpenter (sculptor L.A. Bernschtam) stands on pedestal of grey granite rapakivi from the Vozrozhdeniye quarries near the city of Kamennogorsk (former Antrea).

Figure 80 Statue of the Tsar as carpenter

This project is co-funded by the European Union, the Russian Federation and the Republic of Finland

THE PALACE OF GRAND DUKE MICHAEL 1885-1891 M. Messmacher

Figure 81 View of the Grand Duke Michail Michailovich's Palace with rapakivi granite basement

Grand Duke Michail Michailovich Palace stands here. Basement is covered with rapakivi granite. Walls at the Neva façade are covered with ochre-red and mustard-green sandstones from Stuttgart region, other facades plastered. A little gala courtyard places at left part of the building. Its fence and gate are decorated with red Stuttgart sandstone.

This project is co-funded by the European Union, the Russian Federation and the Republic of Finland

Figure 82 Particular of the basement of the palace.

ADMIRALTY 1806-1823 A.D. Zakharov

The building had acquired its face after the reconstruction and rebuilding in 1806—1823. The architect A.D. Zakharov had not managed to complete the works that were continued in accordance with his ideas and to his drawings by A.G. Bezhanov, D.M. Kalashnikov, and I.G. Gomzin.

This project is co-funded by the European Union, the Russian Federation and the Republic of Finland

Figure 83 View of the admiralty.

The stone sculptures had been executed by F.F. Shchedrin, V.I. Demut-Malinovsky, S.S. Pimenov, A.A. Anisimov and plaster high reliefs on friezes, attics and walls by I.I. Terebenev.

Of stone Pudost Limestone (tufa). F.F. Shchedrin had hewn into shape the statues of the antique heroes: Achilles, Ajax, Alexander Macedonsky and Pyrrhus set on the corners of the lower storey of the Admiralty tower. At first the sculptures of the upper storey carved by F.F. Shchedrin and S.S. Pimenov were stone as well.

The total number of them was 28. They were pair statues personifying four elements: Fire, Water, Air, and Earth; four seasons: Spring, Summer, Autumn, and Winter; four winds: South, North, East, and West; and two pair figures: the Muse of Astronomy Urania and Isida Egyptian, who, from traditional story, was the first to build a ship and to navigate on its board looking for her husband.

This project is co-funded by the European Union, the Russian Federation and the Republic of Finland

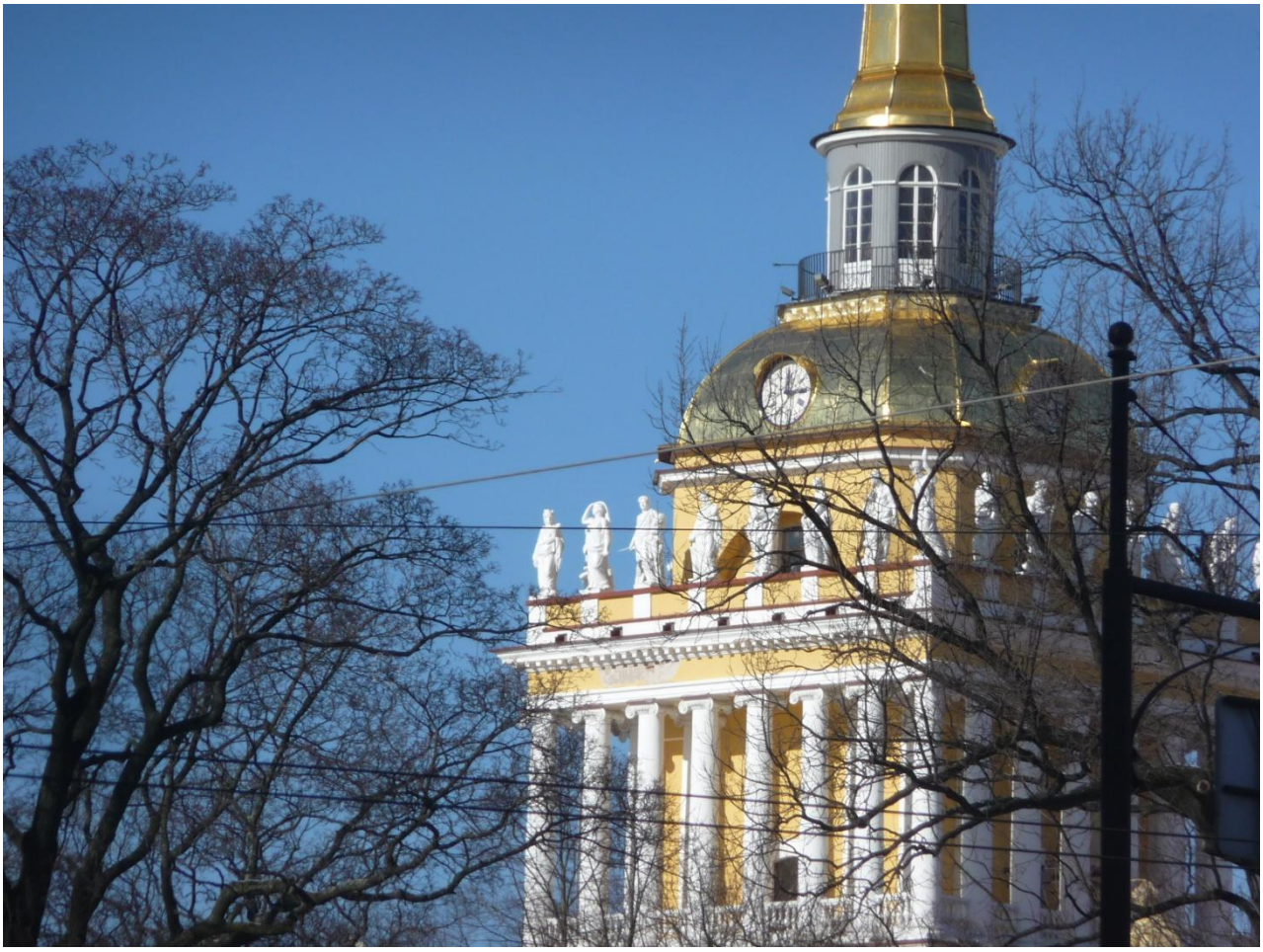

Figure 84 Particular of the columns and statues around the tower of the building

At the present time 24 of those statues are metallic, as the stone had rapidly weathered and began to crumble into small pieces. Four statues lost through bombing during the siege (1941-1945) had been reconstructed of cement.

Along either side of the archway of the tower with the spire on the top, on high pedestals of rapakivi-granite the groups of sea nymphs supporting the terrestrial and celestial spheres stand. They are cut out of Pudost Limestone by F.F. Shchedrin.

Figure 85 Particular of the statues

This project is co-funded by the European Union, the Russian Federation and the Republic of Finland

Figure 86. Nymphs with earthly spheres. Two sculpture compositions flank the arch above the main entrance into the Admiralty yard. They are composed by F.F.Shchedrin in 1812. The material is Pudost stone while pedestals are of granite-rapakivi

In the first half of the XIXth century the porticoes and pediments of the Admiralty were decorated with many additional sculptures carved of limestone standing on granitic pedestals. In 1860 all those statues were taken off and huge cast iron anchors were put instead some of them.

Apart from the stone sculpture granite was skilfully used for building decoration. Coarse-grained rapakivi-granite with crystals up to 5—7 cm in size was used for making of plinths, sandriks and pediments of front doors, pedestals of columns, facing slabs of the porticos foundation and steps of entrances. Recently the socle of long buildings situated between the porticos was clad with thin slabs of pink coarse-grained banded gneissoid granite.

This project is co-funded by the European Union, the Russian Federation and the Republic of Finland

FLORA AND HERCULES

Figure 87: Flora in 2012, after restoration, Hercules in 2012, before restoration

The antique sculptures of Flora and Hercules carved of marble are of special interest in the garden. They were set up at the corners of the Admiralty boulevard in 1832. The figure of Flora continues to stand at the side of the alley, while the statue of Hercules proved to be in the middle of the garden that today occupies a part of the Decembrists' square. At the present time both the statues are standing on the tall rectangular pedestals cut out of pink rapakivi-granite.

Fountain and monuments

Figure 88 View of the fountain facing the tower of the admiralty

In front of the tower of the Admiralty the big fountain was erected of slabs and shaped blocks of grey Serdobol Granite almost instantly after the laying the garden out, in 1872-1874.

In 1896 the busts of the poet M. Ju. Lermontov, writer N.V. Gogol and composer M.I. Glinka executed by the sculptors V.P. Kreitan and V.M. Pashchenko were mounted on the stone pedestals near the fountain and in 1998 the bust of the renowned Russian diplomat of the XIX-th century A.M. Gorchakov appeared here. The pedestals of the busts are made of rapakivi-granite.

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The monument to N.M.Przhevalsky

In 1892, closer to the St Isaac Cathedral, the sculptor A.G. Bilderling put up the original monument to N.M. Przhevalsky: at the pedestal with the bust of the famous traveller and researcher of Asia a loaded camel is lying near a high rapakivi-granite rock.

Figure 89 Bust on rapakivi rock.

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5. St Petersburg - Excursion 3

St Petersburg - Excursion 3 Along by Bolshaya Morskaya Ulitza = Big Naval Street
Start Point - the Arch of the General Staff
End Point – The Nabokova's House
Route length - 1,6 km
The nearest M – Admiralteyskaya
From the Palace Suare to the Marble Palace and Field of Mars

Figure 90. Map of the excursion 3

General composition:
Andrey Bulakh, Professor, St Petersburg State University
Texts: Andrey Bulakh, Nataly Abakumova
Photos: collections of Andrey Bulakh and Joseph Romanovsky, Professors, St Petersburg State University
Layout: Alexander Spiridonov, student, and Andrey Bulakh, Professor,
St Petersburg State University
Translation: E.I. Kravtsova

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GENERAL STAFF 1819-1929 C.I. Rossi
ENSEMBLE OF GENERAL STAFF

Headquarters

Figure 91 Buildings of the former General Headquarters, view of the entrance arch.

The edifice of the former General Headquarters consists of buildings united by the common façade and the Triumphal Arch. The scale of the edifice as a whole, its monumental, grandiose character are emphasized by the massive socle, 2.5 m high, faced along all the perimeter with three rows of rapakivi-granite slabs. A slab length approximates 2.2 m, its width may be as much as 15—17 cm. The granite ranges in colour from pink to rather rare for such a rock light-grey and whitish-grey. The pink stone was applied in the facing of the left part of the main semi-circular edifice, the grey granite can be seen to the right of the Archway.

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Figure 92 View of the former General Headquarters from the square, where is visible also the Alexander column

Bases of columns decorating the semi-circular part of the facade are made of pink rapakivi-granite, four balconies of the first floor are constructed of thick slabs of the same type, and of granitic consoles and balusters for lattices. Curiously, an opening for runoff of rain-water from every balcony slab had been drilled.

A pavement along by the buildings is constructed in 2003. Two granites are used. They are Baltic Brown and from the Vozrozhdeniye quarries.

At last, building for departments of Ministries for Foreign Affairs and of Finances looks onto the Moyka River. Its low socle is covered with plates of Putilovo Ordovician limestone.

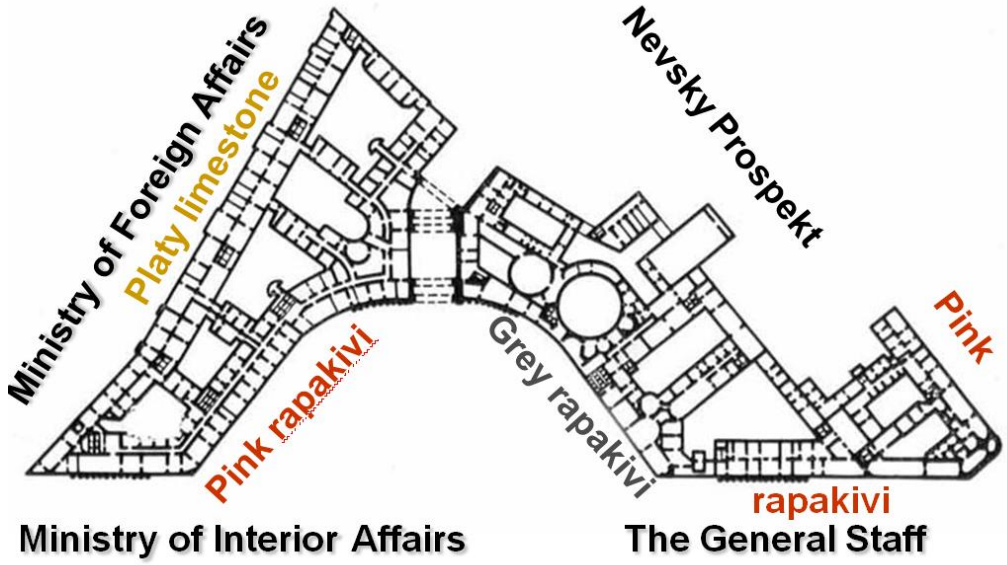

Figure 93 Map of the buildings and of the materials used

A corner-house stands both at the very beginning of the Nevsky Avenue (odd side) and at the Palace Square. It flanks the main building of the former General Headquarters at the Palace Square. The house was added to the latter at the expense of reconstruction of a three-storey house of the Russian Free Economic Society. The added house is almost indistinguishable in the facade

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decoration from the General Headquarters. However the socle of this part of the common facade is faced with slabs of pink rapakivi-granite while grey rapakivi granite covers the basement of the General Headquarters.

Figure 94 Particular of the basement

Door-cases are embellished with red, glassy polished rapakivi-granite. Facing of entrances comes to the meander frieze and looks very festive at a distance, the appearance of the doors with their hard folds decorated with reliefs is enhanced by it. The height of the doors comes to 7 m.

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ALEXANDER COLUMN 1829-1834 Au. Montferrandt

Figure 95 View of the Alexander column

The 704-ton monolith of the Alexander monument is 84 (83.85) feet high. It is cut out of pink rapakivi-granite at Piterlaks quarries. Au. Montferrand tried to use proportions of the Trojan's column in Roma to give forms that Peterlaks monolith. They are 8:1 (height : bottom diameter) and

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8:9 (top diameter : bottom diameter), so sizes of the Alexander column are like following: 84 feet : 10 feet 4 inch : 12 feet, or the same 25.58 : 3.19 : 3.66 meters. The column is not attached to the pedestal, only the force of gravity keeps it in the place. The pedestal is made of granitic blocks and rests on a thick fundament constructed of stone and lying, in its turn, on a pile basement. The fund amentand pile basement lie down the level of the square and hide under huge, massive granitic slabs.

Figure 96 Particular of the basement

The stone pedestal of the column is covered with bronze at the top and decorated with four bas-reliefs. From the bottom it is faced with smoothly polished slabs of granite and has a rectangular low stylobate with three stone steps and kerbstones on the corners.

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Figure 97 Particulars of the column

The column is crowned with the square bronze capital that is combined with the cylinder and semi-sphere on which the angel with the cross is standing.

A foundation pit 5.1 m deep (5.25 m on other evidence) had been dug out for the column. 1250 wooden piles 26 cm in diameter and 6.4 m in length had been driven into the bottom of the pit. A wooden tower with a monkey that weighed 830 kg (1200 kg — on other evidence) had been built for it.

The monkey was being risen with a help of a capstan and horse attractive force. It took three months to drive all piles in the ground over the area that occupied 23x23m. On that pile basement the foundation constructed of 12 rows of granite blocks, every 40—60 cm thick, was laid. The foundation was encircled with a stonework consisting of waste of granite, marble, rubble slab packed up with addition of mortar.

A granite monolith 6 x 6 m2 in size, weighting as much as 410 tons was put on the foundation. The monolith represented the pedestal of the column. It was pulled to the edge of the platform and carefully thrown down on the sand. Then it was taken 90 cm up in order to put the mortar between the monolith and foundation.

The stone lay down inexactly and had to be shifted with two capstans. Still two more monoliths: 203 and 215 kg in weight, together with smaller blocks had been set on the base stone later. Today they are covered with bronze and concealed behind the bas-reliefs. Just on that pedestal the column was installed with the help of the portal crane.

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The model of the acting crane during the process of the column rising is exposed at one of the departments of the Museum of the History of St Petersburg in the Peter and Paul Fortress. After the installment the prominences of the column were hewn off and two hundred men were polishing the monolith daily for five months.

PALACE SQUARE 1976-1977 G.N. Buldakov et al

In 1976—1977, pavements of the Palace Square were designed by architects G.N. Buldakov, G.A. Baykov, F. Romanovsky and the artist V.A. Petrov. Quadrangles lined with pink granite from the quarry Vozrozhdeniye and with grey granite from Kamennogorsk quarry are artistically paved with grey-black dyabase stones. Later, before 300 anniversary of St Petersburg pavements were renovated.

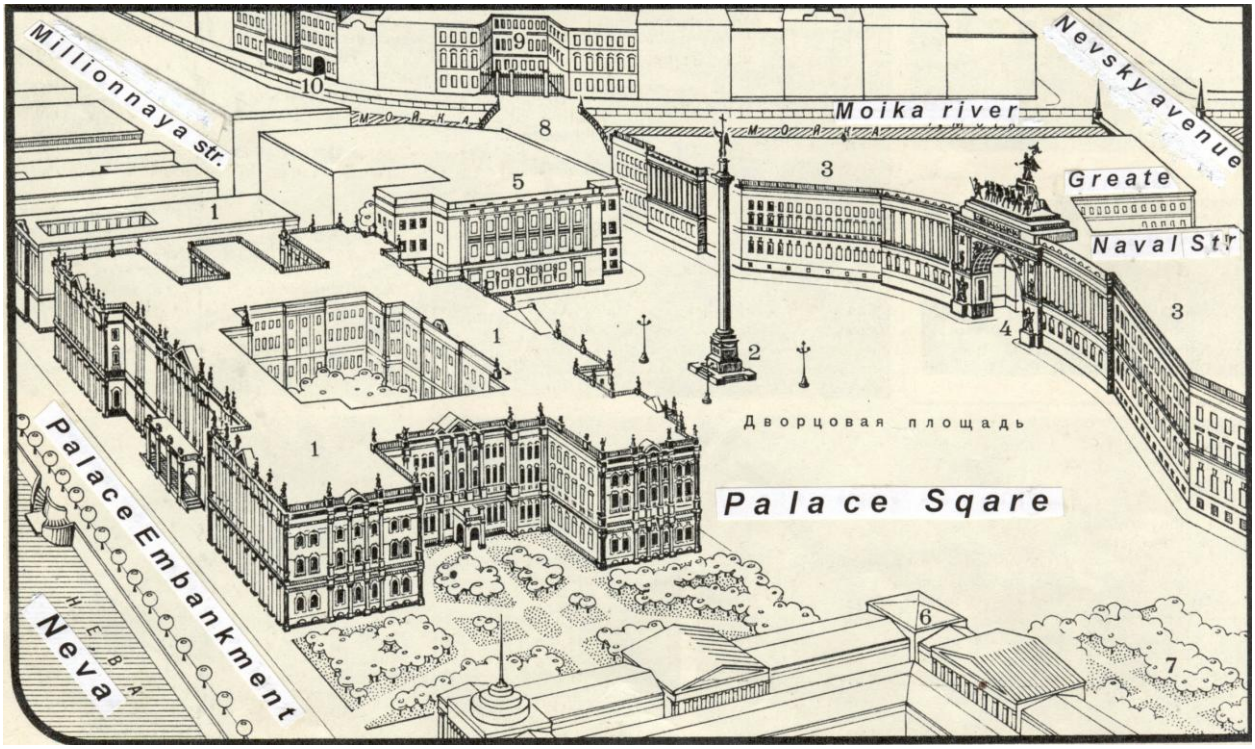

Figure 98 Isometric view of the palace square

This project is co-funded by the European Union, the Russian Federation and the Republic of Finland

Figure 99 Photo of the square: the Winter Palace and Alexander column

WINTER PALACE 1754-1762 B. Rastrelli

Figure 100 The Winter Palace

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Figure 101 Particulars of the gate's decorations

Stone decoration of the Winter Palace is very modest and unpretentious, as well as of all edifices built in Baroque style. At the foundation of the palace facades simple, dull slabs of Putilovo Limestone are seen, and the same material was used for pedestals of the columns and for their cubical parapets (in 2000s they were unsuccessfully restored and replaced with new slabs, they were destroyed again soon). Earlier, 128 statues hewn out of limestone were standing on the roof of the building along all the perimeter of it, but they were quickly broken up and in 1892 were replaced by bronze replicas. Besides the Putilovo Limestone, pink rapakivi-granite had been used for the Winter Palace decoration. In the 1880-s *pentre douces* of the main entrances from the Palace square were clad with granitic slabs. Massive rectangular small posts of the cast iron railing of the *pentre douces* were also cut from the same stone.

WINTER PALACE *INTERIORS*

Figure 102 Particulars of the stone marquetry

This project is co-funded by the European Union, the Russian Federation and the Republic of Finland

Figure 103 Particulars of stones used as decorative element

This project is co-funded by the European Union, the Russian Federation and the Republic of Finland

Figure 104 Particular of interior decorations

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THE NEW HERMITAGE1839-1852 L. Klenze

The building erected in the very beginning of the Millionnaya (Million) Street to the design of the architect L. Klenze. It is decorated on the ground floor with stone door-cases and outside window frames made of slabs of yellow fine-grained, dense Kirna Limestone and with metallic figures of great masters of the past mounted in niches of the plastered walls and on the consoles. The portico of the New Hermitage with wonderful sculptures of atlases is particular beautiful and triumphal. The atlases are carved from grey Serdobol Granite by the sculptor A.I. Terebenev.

Figure 105 Image of the New Hermitage

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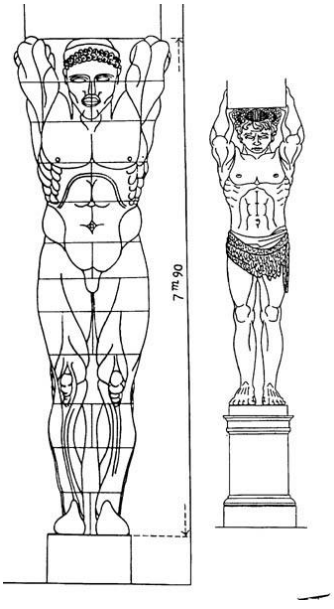
Figure 106 Particulars of the statues in grey Serdobol Granite



The pedestals of the atlases, parapets of the *pente douces*, steps, facing slabs of the building socle were made of pink rapakivi-granite, the driveways of the *pente douces* being paved with stone too.

The columns and architrave of the portico, small columns of the balcony are constructed of blocks of dense yellow limestone. Slabs of the same rock are lying on the socle of the edifice drawing a line round the walls base.

Figure 107 Drawings of the statues

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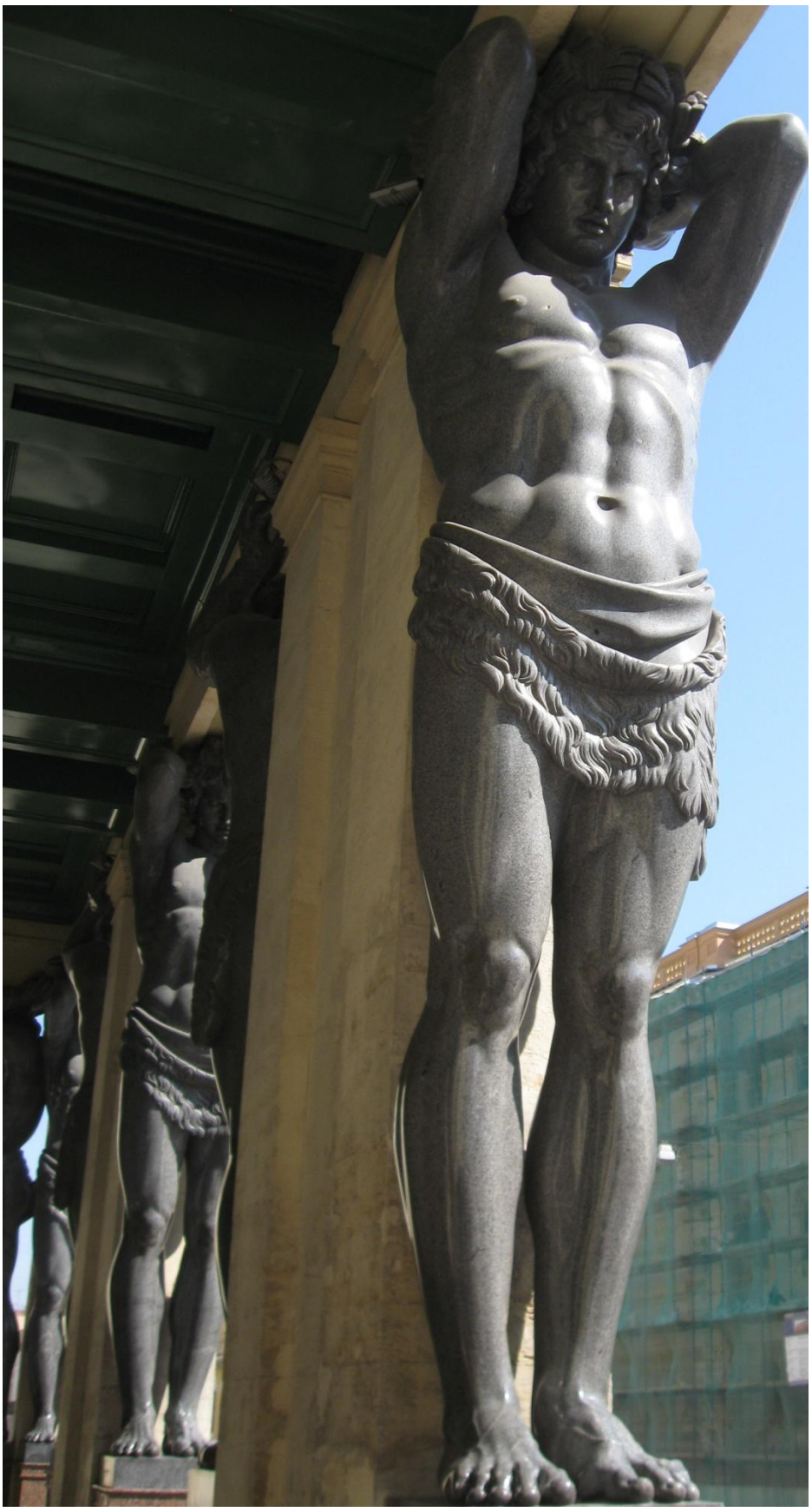

Figure 108 Particulars of the statues

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THE HERMITAGE BRIDGE

The Hermitage Bridge was the first one in St Petersburg which was made of bricks and faced with granite rapakivi in 1763-1768. Only some earlier, the Palace Embankment and wall of Winter Canal (Zimniaya Kanavka) were clad with rapakivi. In 1783, arch. J. Felten constructed an arch and gallery to join the Hermitage buildings. It replies the Bridge of Sighs in Venice.

Figure 109 Drawing of the Hermitage bridge by J.A. Ivanov, 1810s

Figure 110 Comparison of views between Venice and St Petersburg

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HOUSE OF APRAKSIN1770s

22-24, Millionnaya street
HOUSE OF THE COUNT F.A. APRAKSIN

It has come down to us with considerable changes. In the 1770-s added to the mansion was a portico with four columns of Ionic order. They were cut from Joensuu Marble that shows distinct pattern of contrasting white and black bands.

Figure 111 View of the House of Apraksin's columns

This project is co-funded by the European Union, the Russian Federation and the Republic of Finland

Figure 112 View of the house on the left, and particular of a column on the right- the material used had been Joensuu marble.

MARBLE PALACE 1768-1785 A. Rinaldi

It was presented Count G. Orlov by Catherine II. He died and Catherine bought the Palace for Romanov's family.

Figure 113 Marble Palace

This project is co-funded by the European Union, the Russian Federation and the Republic of Finland

For the construction of the Marble Palace special search for marbles and “agates” were undertaken over the Urals and other regions of Russia. Marble was brought to the building site from stone quarries discovered on Ladoga Lake shores, in Karelia and Eastland just at that time. “Wild stone”, as granite was then called, arrived from Finland. White and coloured marble was carried from Italy and Greece Some part of the marble was conveyed from the Office of Isaac’s Cathedral buildings.

The monumental ground lower floor of the Marble Palace is faced with pink rapakivi-granite. It serves as a basement for the more light-coloured upper part of the palace, two floors of which are united by pilasters and columns of Corinthian order.

Figure 114 on the right. Particular of a decoration

Walls of the first and second storeys are faced with grey Serdobol Granite. The architrave, upper cornice and outside window-frames of the ground floor are made of the same rock. Outside window-frames of the first and second storeys are cut out of light-grey Ruskeala Marble.

The pilasters and columns are hewn of rosy Tivdiya Marble and their capitals and bases are carved of a white Uralian one.

Garlands placed above the windows of the first floor are carved of the same marble. Slab-panels, on which the garlands are fixed are made of Juven Marble brought from the island Joensuu situated near Serdobol. The frieze and high attic of the edifice are faced with rosy Tivdiya Marble.

Set up on the roof of the Marble Palace were vases of light-grey Revelsky dolomitic Marble (some of them had been replaced by rude concrete mouldings in 2000s).

Figure 115 Particular of the top roof decoration

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Figure 116 Facade of the Marble palace

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Carved of white Italian Marble from Serravezza were cartouches on the northern and southern facades, a vase on the clock-tower, and two figures standing on each side of the tower. The same rock was used for vases and compositions of armour installed on pillars of the garden railing.

The inner decoration of the palace was carried out in stone as well. Steps of the Grand Staircase are made of dark-green, almost black, Brusna Sandstone. The banisters and balustrade, pilasters and columns of the Staircase, as well as niches for sculptures are made of grey, patterned marble from the Urals. Marble statues are standing in niches.

Figure 117 View of interiors

Made of the yellowish-grey marble are massive outside window-frames in window niches on staircase landings.

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Figure 118 Particulars of interiors

The grandeur of the staircase is accentuated by rich fretted cases of doors leading to the private appartments of the palace. As the material for them served the same banded black-white Juven Marble that was used for the panels established on the facades of the building. Rather thick zigzag black and greyish-white layers in this marble have sharp contacts and are clearly defined. Stone-cutters hewed out the door-cases intricate in their design and profile. It was done in such a way that bands have generally vertical orientation, therefore the stone decoration produces the impression of the aspiration upward.

The effect of the just proportion, harmony and elegance in the refinement of the Grand Staircase had been accomplished by those means. Garlands above the doors, rosettes of the capitals and bases of the columns are cut out of white marble. Most likely it is the same rock that was used for the analogous garlands fixed on the facades of the palace.

Among other apartments of the Marble Palace the Marble Hall produces much more impression.

Walls of the hall through the height of the lower storey are lined with natural stone of different colours, adorned with gilded bronze and embellished with bas-relief panels performed of white marble.

Grey and yellowish-grey coarse-grained Uralian Marble identical with that used for the Grand Staircase decoration is of minor importance in the Marble Hall. The rock serves as the background for other marbles and is used rather miserably: in the piers between pilasters, near the doors, as frames of panels made of brightly coloured marbles.

In some places in the grey and yellowish-grey marble fine concentric banding of grey and brown-yellow colours is observed. Its pattern resembles a cut of a tree's trunk. The marble of such a type

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was quarried at the Fominsk deposit and sometimes it is used for decoration of modern buildings. Pale-rosy, of very delicate shade, in places with dark-red veinlets Tivdiya Marble is applied for pair-pilasters covered with cannelures and standing along all the walls, for frames of panels cut of white marble and fixed above the doors, and for lining of the window niches. Cherry with white and rosy veinlets Tivdiya Marble, often very dark, was used for decoration of the lower part of the walls. The wide plinth along the perimeter of the floor under the pilasters are performed of the same rock. Green serpentine Italian Marble with white calcite veinlets represents almost a breccia. Such a marble was called *Verde Antico* (Green Antique) and most likely was brought from stone quarries existing in the proximity of the Italian town Levanto, hence is its second name — *Verde di Levanto* (Green Levantian). Cut out of this rock are slab-panels under the pilasters.

Figure 119 View of the Marble Hall

Golden-yellow Italian Siena Marble is used in combination with blue lazurite from the Slyudyanka river in the South-Baikal area. Lapis-lazuli is the worthy background for the valuable marble bas-relives while the panels of lazurite is framed by golden-yellow Italian Marble. White statue marble imported from Greece was used for sculpture. Russian sculptors M.I. Kozlovsky, F.I. Shubin and Italian statuary A. Valli had carved both bas-relieves arranged on the walls of the Marble Hall and sculptural ornaments: branches with leaves and flowers, eagles keeping garlands and vases in their

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claws.
The upper tier of the hall that appeared at the reconstruction of the Marble Palace in the middle of XIX century was made of artificial marble. Among stone decorations of other premises of the Marble Palace eight perfectly polished columns of grey Serdobol Granite standing in the oval passage room survived until the present time.

In 1996 the equestrian statue of Alexander III was put in the *cour d'honneur* of the palace. Until 1937 it was standing on the huge granitic base in front of the Moscow Railway Station. Granitic monolith was quarried at Syyskuunsari in Finland by Valamo monks.

Figure 120 Equestrian statue of Alexander III

MONUMENT TO SUVOROV 1799-1801 M.I. Kozlovsky

Bronze sculpture stands on monolithic pedestal of Granite Rapakivi.

This project is co-funded by the European Union, the Russian Federation and the Republic of Finland

Figure 121Monument to Suvorov done in rapakivi.

MONUMENT TO REVOLUTIONARY FIGHTERS 1917 L.V. Rudnev

In the middle of the Field of Mars a monument to revolution fighters is located. It is one of the first memorial constructions that appeared after October 1917. The memorial was built to the design of the architect L.V. Rudnev. It is composed of large blocks of dark-pink rapakivi-granite laid in such a way that they form shelves around graves of heroes of February and October revolutionary events, 1918, and Civil War in Russia. Blocks are from a destroyed old store. Butt-ends of the monument bear lofty epitaphs composed by A.V. Lunacharsky.

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Figure 122 Monument to revolutionary fighters - particular

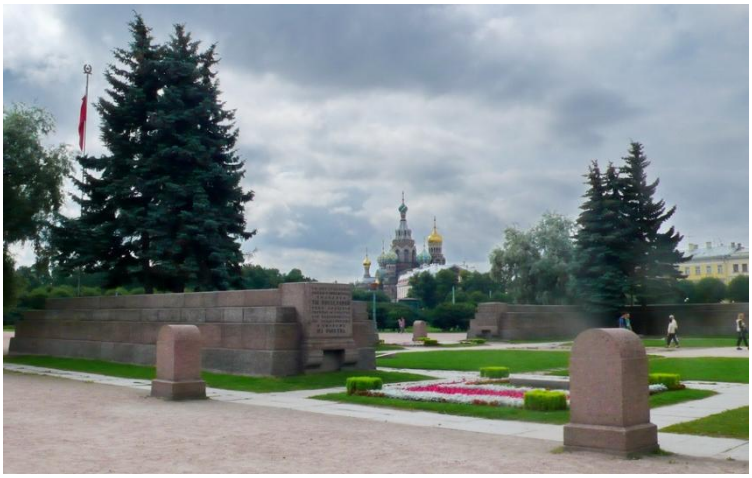

Figure 123 General view of the monument to revolutionary fighters

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6. St Petersburg - Excursion 4

The Vasiliy Island Start Point – The Rumyantsev Garden
End Point – Stock Exchange House (Naval Museum, 1939-2012) Route length - 1,3 km
The nearest M "Admyralteyskaya", and then by bus 7 or 24 and trolleybus 1 or 10, and 11 to the stop "Pervaya Liniya (The First Line)"

Figure 124 Map of the excursion

RUMYANTSEV GARDEN

There are the famous Rumyantsev's Obelisk and two new monuments to artists I. Repin (1844-1930) and V. Surikov (1848-1916) in the garden.

Field Marshal Pyotr Rumyantsev (1725-1796) was a hero of Russian-Turkish war 1768-1774, and words "To Rumyantsev's victories" are cut at a plate on the monument. It is designed by V. Brenna in 1799. Serdobol and Rapakivi granites, Ruskela, Tivdia and Greek (Italian?) marbles are used.

First, it stood on the Field of Mars, and in 1818 it was moved in the garden.

Monuments to Great Russian artists Repin and Surikov were opened in 1999. Grey granite from the Karelian Isthmus (nearby Kamennogorsk, or former Kovantsari) is used to cut pedestals.

This project is co-funded by the European Union, the Russian Federation and the Republic of Finland

RUMYANTSEV OBELISK

Figure 125 Photo and historical drawing of the Rumyantsev obelisk

ACADEMY OF ARTS 1832-1834 C. Ton (17, University Embankment)

Figure 126 View of the academy of arts

This project is co-funded by the European Union, the Russian Federation and the Republic of Finland

Facades. A high socle of the building faced with two varieties of granite rapakivi. At the front, it is rather rare pinkish-grey granite whilst a socle at sides of the building is covered with ordinary pink granite. Looking with attention, one can find borders between these two varieties of rapakivi.

Interiors. Floors in all corridors are covered with limestone plates from Putilovo (or from Estonia). The most effective deal is using natural stone in construction of the main staircase. Unique wide steps and plates are monolithic and cut of granite rapakivi. One can see marbled limestone plates from the Åland Island, Sweden, upstairs.

Figure 127 View of the stairs of the academy of arts done in monolithic steps of rapakivi granite

G*arden behind the building* hosts a monument to 25th anniversary of the Academy of Arts. It was designed by A.N.Voronichin in 1808 and A.P.Brullov in 1840s and consists of granite rapakivi (1), Ruskeala marble (2), and limestone basement (4) Do not forget to have a look at a modern monument to sculptor P. C. Klodt (1805-1867). It is quite near, in the same garden. Granite from a new deposit at the Karelia Isthmus is used in a postament. Klodt created a horse and a horseman in the monument to Nicholas I and sculptures groups "Horse Taming" on Anichkov Bridge.

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PIERS WITH EGYPTIAN SPHIXES 1832-1834 C. Ton

Figure 128 View of the Egyptian sphinx in granite

Architect C. Ton used old Egyptian sphinxes (with faces of Amenhotep III) to design the granitic pier. These two granite (syenite) monolithic sculptures were found in 1820 and brought to St

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Petersburg in 1837. They are the largest stone sphinxes abroad Egypt. C. Ton put them on pedestal of granite rapakivi. Compare the color and texture of these two rock types. They are similar.

UNIVERSITY EMBANKMENT (old and new works)

Figure 129 View of the different granites used on the embankment in older times

It is one of the most nice and beautiful places and sight-seeing walks along-by the Neva. Constructing began at so called Strelka of the Vasiliy Island in 1804, moved step by step to the East, and was finished in 1837. Granite rapakivi was used.

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Figure 130 Particular of the rapakivi granite

In 1990s, the embankment was repaired. Unluckily, that time the city Government had not both money and tradition to buy an original stone in Finland. That is why one will see a lot of other stone materials in parapets.

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REMAINS OF THE ST ISAAC BRIDGE and new constructions

Figure 131 View of the granitic stairs bringing to the pontoon spring-autumn bridge.

This pontoon spring-autumn bridge acted in 1727-1912. Two granite rapakivi stairs and a bank abutment were built in 1819-1821, building engineer A. Betankourt of Spain projected them.

In 1990s two street-lamps, a stone in memory to Betankourt and "An opened book" were input into the composition of the Remains of the St Isaac Bridge. The pedestal of street-lamps are blocks of pink gneissoid granite from Kuznechnoe (Kaarlahti) near Priozersk (Käkisalmi), Betankour's block is Ukranian pink granite rapakivi from the Kapustino deposit. "An opened book" with poetry to Youth by Alexander Pushkin is made with grey granite rapakivi "Vozrozhdenie". So, one can see at the same place and compare three different rapakivi rock types.

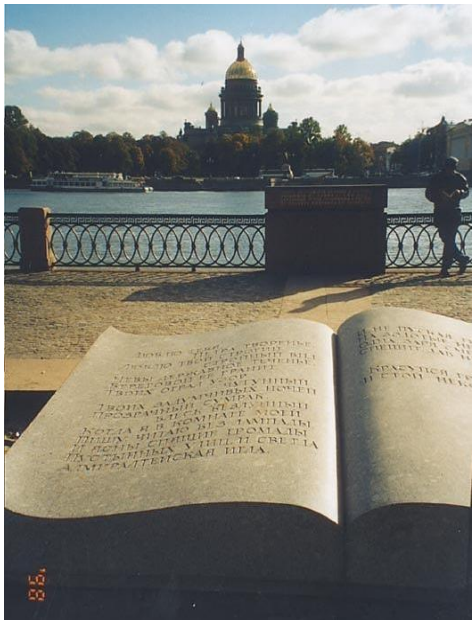

Figure 132 Particular of sculpture "An open book"

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MENSHIKOV'S HOUSE 1710-1721 D. Fontana et al

Figure 133 View of the Menshikov's house

This typical baroque house is built from bricks, and with a plaster façade. Natural stone is Putilovo slab limestone being used to face a socle, and limestone from Eastland is used to frame doors in portal.

Figure 134 View of the interiors

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Figure 135 View of the frame of the portal

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TWELVE COLLEGIA BUILDING 1722-1742 L. Trezini et al

Figure 136 Views of the buildings

Figure 137 View of the building

That was the home of Peter the Great's "Ministries". It was designed in the baroque, built from bricks, and with a plaster façade. Ordovician platy limestone from from Putilovo (Tosno and some other places) was used for the outside facing of the brick wall at the building's base.

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MONUMENT TO LOMONOSOV 1986 Sc. V. D. Sveshnikov and B. A. Petrov Arch. I. A. Shahov and E. A. Tyah

This modern monument is collected of great blocks of pink gneissoid granite from Kuznechnoe (former Kaarlahti).

Figure 138 Monument to Lomonosov

THE MAIN BUILDING OF ST PETERSBURG ACADEMY OF SCIENCES 1783-1789 G. Quarenghi (5, University Embankment)

It is a typical building of classic architectural style. High podium is fully decorated with great quadras of granite rapakivi. We recommend everyone to rise up to portico to have a look to the Neva River from this position of view. Try to feel yourself in old times of Ekatherine II without buses and asphalt.

This project is co-funded by the European Union, the Russian Federation and the Republic of Finland

Figure 139 Main building of St Petersburg academy of sciences

Figure 140 View from the other side of the embankment

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KUNSTKAMMER (3, University Embankment)

Now turn, please, to the left into a short and narrow side-street. It leys between Peter's the Great lovely Kunstkammer and some other buildings. Kunstkammer was built by N. F. Gerbel in 1718-1734 and partly reconstructed by S. I. Chevakinsky, 1754-1758. Bases of walls are accurately faced with grey and yellowish-grey slabs of Putilovo Limestone.

Figure 141 Peter's the Great Kunstkammer

Coming through this lane you would find yourself at semi-circle building and would see almost real Greek Poseidon classic peristyle in front of you. It is Stock Exchange.

Figure 142 Particular of a base wall in limestone

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STOCK EXCHANGE 1805-1810 J. F. Tomon

Figure 143 Drawing of the stock exchange building

Two color types are used in four rows of plates which cover a high podium of the building. They are pink and grey ones (Bulakh, Selonen, 2013). Two upper rows are grey, two ground rows are pink. Grey granite plays role of bases of columns.

Figure 144 The stock exchange buidling

Look attentively at granite staircases, upper steps are grey, lower ones are pink. This play of colors is in harmony with grey granite rapakivi pedestals of Rostral Columns.

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Figure 145 The granitic stairs of the stock exchange building have grey colours on the top part, and pink colour of the lower part..

A stone high relief decorates each of two attics. They are cut by S. Sukhanov in joined together blocks of Pudost stone (tufa) and covered with lay of lime. The high relief to the Neva River images Neptune and two rivers, where as Mercury, Navigation and two rivers are at other high relief.

Figure 146 Particular of the granites

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ROSTRAL COLUMNS 1805-1810 J. F. Tomon

High pedestals are covered with blocks of grey granite rapakivi. Figures of rivers (Neva, Volkhov, Dnepr, and Volga) are cut in Pudost stone (tufa). Pavements around columns and between them are covered with Baltic brown and Balmoral red granites in 2000s. A stone symbol to memory of 300th anniversary of St Petersburg is made of metal and pink gneissoid granite from the Ladozhskoe deposits near Priozersk (former Kaarlahti). At last, two granite rapakivi (pink and grey ones) could be seen in walls of way to the Neva River, diabase squared stones cover this way.

Figure 147 View of the Rostral column built in different stone types

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