The Kizhi Federal Museum of Architecture and Cultural History
Cultural Heritage Site of Special Value of the Russian Federation

The Detailed Report

on Preservation of Kizhi Pogost Monuments (Kizhi Pogost, C 544) in 2010

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Dear colleagues!

The Kizhi Museum Director E. V. Averyanova

The following annual broadened report concerns measures of maintenance of the World Heritage Site - Kizhi Pogost in 2010.

We have implemented a large amount of work on preservation of the Kizhi Pogost ensemble and on restoration of the Church of the Transfiguration thanks to long-term preparatory works that had been done previously. Contacts with the World Heritage Committee are of considerable importance in this process, namely the reaction monitoring visit of the joint UNESCO-ICOMOS mission to Kizhi in 2010. Mission experts developed certain suggestions and recommendations which we have used in our work.

The most important event of the year was the implementation of the 1st stage of restoration of the Church of the Transfiguration. The church log walls have been suspended successfully, the lower, VIIth restoration tier has been dismantled, the underground part of the foundation has been build. Restorers have modern, specially equipped Restoration Complex at their disposal, thus they are ready to perform thorough and well-considered restoration of every log and tier.

Another important event is the development of a project for protected (buffer) zones of Federal Heritage Site – Kizhi Pogost and approval of this project by the Federal historical and cultural commission of experts. Now the project is submitted for the endorsement to the Ministry of Natural resources of Russian Federation.

The development of the management plan for World Heritage Site – Kizhi Pogost has started. Requirements for specifications have been worked out in collaboration with the Institute of Economics of the Karelian Research Centre, RAS. In two years we expect to have a valid document, which could serve as a basis for collaboration of all the parties interested in preservation of the World Heritage Site.

The authors of this report expect your suggestions, remarks and wishes and will be thankful for your collaboration in preservation of the World Heritage Site.

Director
of the Kizhi open-air museum E. V. Averyanova

PART I «Measures of the WHS Kizhi Pogost Maintenance in 2010»

The World Heritage Site "Kizhi Pogost" (Kizhi Pogost, C544), the object of Federal ownership, is in day-to-day management of the Kizhi Federal Museum of Architecture and Cultural History, which is subordinated to the Ministry of Culture of RF. All kinds of management of Kizhi Pogost are controlled by the Russian Federal Surveillance Agency for Compliance with the Law in Cultural Heritage Protection, and Russian branch of the Committee of the World Heritage UNESCO.

1.1 Site Management

The site is managed according to the legislation in force and the recommendations of the United Nations Educational Scientific and Cultural Organization (UNESCO) for the preservation of cultural and natural heritage on the basis of strategic and current planning to be undertaken by the Kizhi Federal Museum of Architecture and Cultural History.

Fig. 1. Visit of His Holiness the Patriarch of Moscow and All Russia Patriarch Kirill to Kizhi

Requirements for specifications in the development of a management plan for the World Heritage Site – Kizhi Pogost have been worked out in 2010. A contract for the development of a management plan for Kizhi Pogost based on the requirements for specifications will be signed with a specialized organization in 2011-2012.

On 29th of October, 2010, the meeting of Section for wooden architecture within the Federal methodical council of Ministry of Culture of Russian Federation was held in Moscow. The restoration of the Church of the Transfiguration was discussed, and it was decided to establish the Federal Committee for coordination of restoration work. Now the document is submitted for the endorsement.

On 27th of January, 2010, the Russian Federal Surveillance Agency for Compliance with the Law in Cultural Heritage Protection officially permitted (by license № 05-4/141) to continue works of the first stage of complex restoration of the Church of the Transfiguration in 2010.

On 9th of March, 2010, the Russian Federal Surveillance Agency for Compliance with the Law in Cultural Heritage Protection officially permitted (by license № 05-4/15) to implement repair and emergency works on the roof and the porch of the Church of the Intercession.

On November 2nd, 2010, a special web-page for exchanging the information with the World Heritage Committee experts was created on the museum web-site. The concise report on restoration works of the Church of the Transfiguration implemented in 2010 and the project of Statement of the outstanding universal value of the World Heritage Site – Kizhi pogost were published on this web-page.

1.2. Financing

In 2010, state budgetary financing in the amount of 40 632, 3 thousand RUB was secured for the restoration of the Kizhi pogost monuments including:

- complex restoration of the Church of the Transfiguration, 1st stage - 26 253,4 thousand RUB
- restoration of the iconostasis of the Church of the Transfiguration - 3585,2 thousand RUB.
- development of research and design works for complex restoration of the Church of the Transfiguration - 2725,0 thousand RUB
- engineering supervision for the implementation of the 1st stage of complex restoration of the Church of the Transfiguration - 740,9 thousand RUB
- preparation of the 1st lot of measurement drawings for the refectory and cost estimation for restoration of the Church of the Transfiguration foundations - 92,0 thousand RUB
- development of a project for protected (buffer) zones of the Federal heritage Site «Kizhi Pogost architectural ensemble» - 184.8 thousand RUB
- development of a project «Alarm system of the Kizhi pogost perimeter» - 95,0 thousand RUB
- Mounting of an alarm system of the Kizhi pogost perimeter on Kizhi - 4 573,8 thousand RUB.
- Completion of development of fire-fighting water pump station for Kizhi Pogost - 445,3 thousand RUB
- 3d scanning of the Church of the Transfiguration structural elements - 1592,1 thousand RUB
- developing requirements specification for the management plan of the WHS – Kizhi Pogost - 95.0 thousand RUB
- monitoring of wood biodestruction for the Pogost monuments and its architectural surroundings - 90,0 thousand RUB
- monitoring of deformations of the Kizhi Pogost monuments - 60,0 thousand RUB
- description of «Protected values of the heritage site – monument of Kizhi Pogost architectural ensemble» - 99,8 thousand RUB

1.3. Protected and buffer zones

On 8th of December, 2010, the museum submitted the project of protected (buffer) zones of Kizhi Pogost which was approved by State historical and cultural expertize for consideration and confirmation to the Russian Federal Surveillance Agency for Compliance with the Law in Cultural Heritage Protection. After the consideration, Federal organization responsible for the protection of culture «Rosochrancultura» submitted the documents for endorsement to the Ministry of natural resources of Russian Federation.

Protected zones of the World Heritage Site – Kizhi Pogost include Kizhi island and adjacent Onega lake basin. Four regimes of land use and town planning were

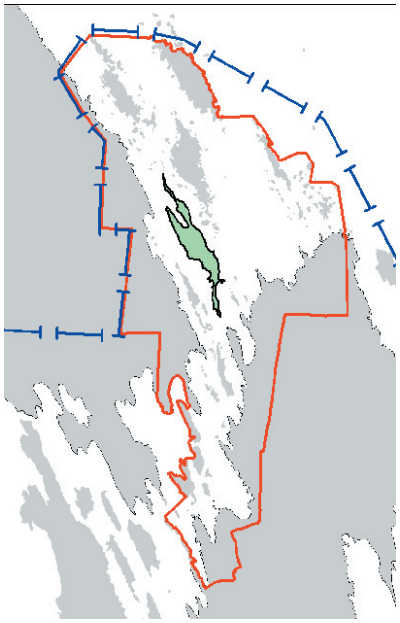


Fig. 2. Protected zone of the Kizhi open-air museum

fixed for Kizhi island to secure the development of the Kizhi museum infrastructure.

Boundaries of protected nature landscape coincide with the boundaries of the museum protected area fixed by Decree of the Supreme Council of the Repubic of Karelia N X П- 16/484 as of February 19, 1993. Zones with regulations for land use and town planning were fixed within the boundaries of protected landscapes in historic villages.

Buffer zone for Kizhi Pogost will include all protected zones of the Kizhi Pogost.

1.4. Protection from emergency situations

Management of the Site security system is accomplished by the personnel of the Security of the Kizhi Museum, Subdivision of the General Board of Ministry for Civil Defense, Emergency Management, and Natural Disasters Response of the Republic of Karelia, and Subdivision of Ministry of Internal Affairs of the Republic of Karelia.

Fig. 3. Inaguration of the reconstructed office of the Karelian Division of the Ministry of Internal Affairs on Kizhi

In 2010, the project of the Kizhi pogost alarm system with infrared scanners and annunciators located along the perimeter was developed. The mounting of the system has started, all necessary equipment was purchased and delivered to Kizhi. The mounting is scheduled prior to the tourist season in 2011. The alarm system enables round-the-clock watching of territory adjacent to the Kizhi Pogost.

In May and October 2010, seasonal testing of fire-fighting system and changes of their winter/summer operating regime were done. Testing and maintenance of fire-fighting system is done on regular basis.

Systems of alarm, fire-alarm and people evacuation were tested two times by commissions through the year.

Touchpen Commander system was installed on the security patrol route on the safeguarded territory.

In summer, when the museum territory is overcrowded with tourist groups, safeguarding was reinforced by additional patrols and the museum security post guards.

«Stroy Project» Co Ltd performed works on modernization of electric supply system for all the monuments on the main exhibition sector of the museum in line with the State contract. They are scheduled for operation for the year 2011. As a result, the Kizhi Pogost has two independent sources of power supply – from the basic and alternative diesel generators.

In 2010, maintenance and repair of the equipment were done to provide the reliable work of the alternative diesel generator.

In 2010, the reconstruction of external electric power supply to Kizhi island was continued within the framework of the contract with Public Corporation «Inter-region-

al distributive network of the North-West». The completion of this work and bringing into service the upgraded electric communication networks is scheduled for the year 2014.

In 2010, the project of outdoor fire-fighting system for Kizhi Pogost was corrected by the suggestion of Co ltd «Spetsprojectrestavratsia» Institute (St. Petersburg). According to the remarks made, all the buildings and facilities will be buried deep in ground to preserve visual panorama of the Kizhi Pogost. The project was corrected by «Sever Stroy Project» Co Ltd. In November, the museum submitted a request to the Ministry of Regional Development of Russian Federation for performing the State examination of the project. The Kizhi Museum plans to start the project in 2012.

Timber flooring in the Church of the Transfiguration were treated with fire retardant agent.

In July 2010, Karelian subdivision of the General Board of Ministry of the Russian Federation for Civil Defense, Emergency Management, and Natural Disasters Response in cooperation with respective museum services and non-departmental security agency of Petrozavodsk and Medvezhiegorsk district performed the training of «Extinguishing simulated fire in the Church of the Intercession»

The office of a centralized TV monitoring system which integrates alarm, fire protection systems and video monitoring operates near Pogost and works round-the-clock year-round.

Museum employees received training and instructions for emergency situations and use of fire fighting equipment during the year.

1.5. Protection and monitoring

The Kizhi Museum in cooperation with researchers from the Forest Research Institute of the Karelian Research Centre, Russian Academy of Sciences (Petrozavodsk) and "Spetsprojectrestavratsiya" Institute (Moscow) continued a complex monitoring of Kizhi Pogost monuments.

Fig. 4. 3d-scanning of the interior of the Church of the Transfiguration

Reference points on church facades were allocated during complex geodetic survey of the monuments (the Church of the Transfiguration, the Church of the Intercession and the bell-tower). The investigation has not revealed changes in heights and turns of the monuments. The ascertained changes in coordinates lie within the measurement error and have seasonal character.

Microclimate was monitored in main premises of the monuments including idle ones - basements and attics. Regular airing of monuments during warm period of the year as well as in-time conservation for winter helped to create optimal service conditions.

The general condition of the Church of the Intercession and the bell tower can be estimated as a stable one. New defects of the structural elements, new zones of high wood moisture content and zones destructed by fungi and insects and water

leakage were not revealed.

Permanent monitoring, preventive conservation and maintenance was carried out during the year.

In October-November, the restoration company Co Ltd "Atrium" (St. Petersburg) made 3d laser scanning of the Church of the Transfiguration in line with the contract with the Kizhi museum. As a result, a high-precision measurements of all the monument structural elements in its today position was done.

High-precision three-dimensional fixation of the today position of logs was done by the means of electronic tacheometer before the dismantling of the lower restoration tier.

1.6. Study

The Kizhi Architectural Ensemble is the main tourist sight of the Kizhi Museum and the focal point of the main outdoor tourist exposition. Thus, the main research is one way or another focused on Kizhi architectural ensemble. Total amount of tourists in 2010 comprised 167 783 persons.

Fig. 5. The interior of the Church of the Intercession

22 permanent exhibitions were organized in the monuments in the immediate neighborhood of Kizhi Pogost ensemble in 2010. In the Church of the Intercession the following exhibitions were made: interior exposition in the Church proper, Icon painting exhibition in the refectory and History of Kizhi parish in the hall. In addition to that, the Church bells were exhibited in the bell tower.

During the year researchers of the Kizhi Museum developed the following research and development projects: «The History of the Kizhi Architectural Ensemble», «Interiors of Kizhi churches», «History of Kizhi district in peasants genealogy (XVI-XIX cc.)» and «Historical and ethnographic study of villages in Kizhi district».

In 2010, the regular 13th issue of collected research papers «Kizhi vestnik» was prepared in the Kizhi open-air museum. Articles on building and study history of the Kizhi Pogost architectural ensemble will be published in this issue along with the others.

Fig. 6. Archeological trench excavated on Kizhi Pogost revealed remains of the old foundation of the older bell-tower

Archeological heritage of the Kizhi Pogost is studied on regular base. In summer 2010, the trench was excavated near the south wall of the Church of the Transfiguration to study cultural depositions. They found remains of the old foundation of the older bell-tower which was dismantled in 1862 due to dilapidation.

In addition to that, a final report on R & D project «Architectural study of medieval villages of Kizhi district» was prepared in 2010.

1.7. Promotion program and information support

Information support of works on preservation and restoration of the Kizhi Pogost is one of the main activities of press service of the Kizhi Museum.

In 2010, monthly paper "Kizhi" published 10 materials on restoration of the museum monument No1, and the news bulletin was supplemented with 12 news. In addition, materials focused on the course of restoration works were published in local and federal printed matters. 12 materials were published in local newspapers: «Karelia», «Moskovsky komsomolets» in Karelia, «Molodezhnaya gazeta Karelii», «Karjalan sanomat», «Karel'skaya gubernija». 3 materials were published in Russian printed matters – newspapers «Stroitel'naya gazeta», «Rossijskaya gazeta», in «Dizajn and stroitel'stvo» magazin.

In 2010 the museum press-service prepared six press releases on the course of restoration works done, and these releases were sent to more than 500 addresses.

Sections "Architecture" and "Restoration news" of the official web site of the Kizhi Museum are constantly supplemented with new information, press releases and publications. In 2010 the site was supplemented with 28 materials, 4 videos on restoration of the Church of the Transfiguration: "Mounting of metal constructions", "Reconstruction of historic foundation", "Dismantling of the lower restoration tier", "Transportation of the monument dismantled elements to the Restoration Complex"; 4 videos "One day on Kizhi", "Patriarch Kirill visit to Kizhi", "Inhabited island"; photo album "Restoration of the Church of the Transfiguration. 2010".

A live telecast "National focus" on the topic of the Church of the Transfiguration restoration was broadcasted in the beginning of the year 2010.

Fig. 7. Video filming of works on Kizhi Pogost

Press conference "The results of the UNESCO-ICOMOS mission visit" was organized for the representatives of Karelian mass-media; press tour was made to demonstrate the results of restoration work on Kizhi in 2010.

The restoration of the Church of the Transfiguration during the season is covered by electronic mass media. There were 12 broadcasts on this topic on TV channels of Karelia and 9 broadcasts on Russian TV channels: «NTV- St.Petersburg», TK «Kultura», «Rossia», RTR «Vesti-24» and a broadcast on «Golos Rossii».

Journalists abroad show deep interest in restoration of the Church of the Transfiguration. The Museum press service organized the work of survey squad of TV channel «Russia-Today» (News 24) in 2010.

The majority of press-service materials were published in Internet. 76 references were publised on web-sites of Russian and Karelian agencies, news digests and portals.

Creative interpretaion of Kizhi architectural ensemble was presented on exhibitions: "Harmony of contrast", "Museum in kids' art", "Wooden architecture of Kizhi" and photo exhibitions "Karelia. Image in time", "Kizhi. Seasons", "Kizhi Almost Unreal".

Museum visitors can visit the museum information center and attend 10 lectures on Kizhi architectural ensemble, visit photo exhibition "Summer on Kizhi – 2010" with photos on restoration of the Church of the Transfiguration, watch movie "Kizhi in the Lace of Time", take free booklets «In front of the World (restoration news)», «Carpenter Centre of the Kizhi open-air museum», «Restoration of the Church of the Transfiguration»,

Info materials were distributed during the exhibitions «MATKA» (Helsinki, Finland), «Economics of the Republic of Karelia», and also the All-Russia museum festival «Intermuseum» and during the meeting with tourist companies-partners of the museum. E-catalogs were sent to 160 large tourist companies.

5 kinds of printed matter which was published by the Museum Publishing Centre referred to the restoration of the Church of the Transfiguration. UNESCO logo was used in 20 kinds of advertizing and info matter (10 145 copies).

The museum has produced 40 kinds of souvenirs and published goods (calenders, notebooks, magnets, tableware, textile, books, etc.) with the image of the Architectural Ensemble of Kizhi Pogost and its short description.

1.8. Preservation of landscapes, natural and architectural environment

Preservation of landscapes, natural and architectural environment is one of the important tasks for the Kizhi open-air museum.

The Commission on preservation of the historic landscape annually evaluates the extent to which trees and bushes are overgrown on the territory, and it records other changes as well.

Program on clearing Kizhi landscape is going on; it is aimed at preservation and reconstruction of historic landscape.

The next stage of landscape research was performed within the program of ecological monitoring of nature in Kizhi museum. It resulted in the development of a complex landscape map for protected area of the Kizhi open-air museum.

1.9. Development of the museum infrastructure

The construction of loading terminal on Kizhi which had started in 2008 was continued. In 2010, «Gidrostroy» Co. Ltd. won the State contract for 115,8 mln RUB and drew 36,0641 mln RUB.

The construction works will be continued in 2011.

Fig. 8. Transportation of dismantled logs from Kizhi Pogost by reconstructed island roads

In 2010 the Kizhi museum repaired roads on Kizhi island to improve security of the World Heritage Site and provide comfort for visitors. The amount of contract was 5,5 mln RUB. After that, real arrival time of a fire-fighting brigade and the personnel of Subdivision of Ministry of Internal Affairs from their headquarters to Kizhi Pogost was cut a half. It raised the efficiency of reaction to emergency situations on Pogost and museum territory.

1.10. Implementation of recommendations of UNESCO-ICOMOS reaction monitoring mission in 2010.

UNESCO-ICOMOS reaction monitoring mission visited Kizhi in April 2010. The decision of the mission was approved on the 34th session of the World Heritage Center and it gives some recommendations both to the State Party under the Convention on World Cultural and Natural Heritage Protection and to the Kizhi museum. The Kizhi museum did their best to implement the decisions, but more active participation of the State Party is required to solve certain problems.

Thus, the 1st stage of the restoration of the Church of the Transfiguration was continued in 2010.

The development of the management plan for World Heritage Site – Kizhi Pogost has been started in collaboration with the Institute of Economics of the Karelian Research Centre, RAS. Detailed requirements for specifications have been developed, and the management plan will be made in 2011-2012 in line with the contract which will be signed with a specialized organization.

The Kizhi museum has developed "Project of protected (buffer) zones for Federal Heritage Site Kizhi Pogost" and submitted it for endorsement to the Russian Federal Surveillance Agency for Compliance with the Law in Cultural Heritage Protection.

On October 29, 2010, the meeting of wooden architectural section of Federal methodical council of Ministry of Culture of Russian Federation was held in Moscow. The restoration of the Church of the Transfiguration was discussed and it was decided to establish the State Committee for coordination of restoration work. Then the Kizhi museum addressed the Ministry of Culture RF to establish special State Committee for coordination of restoration work.

Since 7th till 21st of September, 2010 a training course for Kizhi museum carpenters was organized. Leading restorers, wood scientists from Petrozavodsk State University, Russian Academy of Sciences, design and restoration companies lectured at the course.

Fig. 9. Training of carpenters- restorers

In November 2010, a special web-page was created on the museum web-site to exchange information on Kizhi Pogost preservation between the museum and WHC experts. The page can be upgraded according to wishes of parties. The access to the page is provided to WHC experts and authorized museum specialists.

Technical feasibility for installation of additional web-cameras on Kizhi Pogost and the Restoration workshop will appear later than mid-2011. However, we can place technical photos and videos of all restoration processes on the special web-page in order to provide necessary information on restoration of the Church of the Transfiguration to WHC.

"Spetsprojectrestavratsija" Institute in collaboration with the Kizhi museum experts develops the manual "Approaches for repairing and restoring logs and elements of the Church of the Transfiguration" on the basis of UNESCO experts recommendati-

ons and Russian experience. The proposed approaches will be presented to UNESCO-ICOMOS mission experts in February, 2010 on Kizhi.

Translation of documents for World Heritage Centre is done by specially appointed Kizhi museum employee.

The project of Statement of Outstanding Universal Value of WHC has been developed and submitted to World Heritage Centre in January 2011.

Part 2. «Implementation of the complex restoration of the Church of the Transfiguration of Kizhi Pogost in 2010»

Introduction

In 2010 the 1st stage of the complex restoration of the Church of the Transfiguration was continued.

The preparation work on sections I -II of the "Main Stages of Works on the Restoration of the Church of the Transfiguration on Kizhi Island and their Fulfillment vs.Time. 1999-2014" had been done by the beginning of the year. The work was described in details in previous reports (2003-2008). The works stipulated by items III.1 - III.4 of the above mentioned scheduler had been done at the end of the year 2009.

At the beginning of the year 2010, the state of the restoration work of the Church of the Transfiguration (see Section III of the scheduler) was as follows:

- the porch was dismantled and the details were warehoused;
- the refectory was dismantled and their details are under restoration;
- the lifting system had been mounted, the debugging of the system for lifting, hanging up and suspension of the engineering restoration tiers of the Church had been done;
- the Church framework restoration tiers had been lifted and effectively clamped;
- the object was conserved for winter to preserve constructions, equipment and the monument elements.

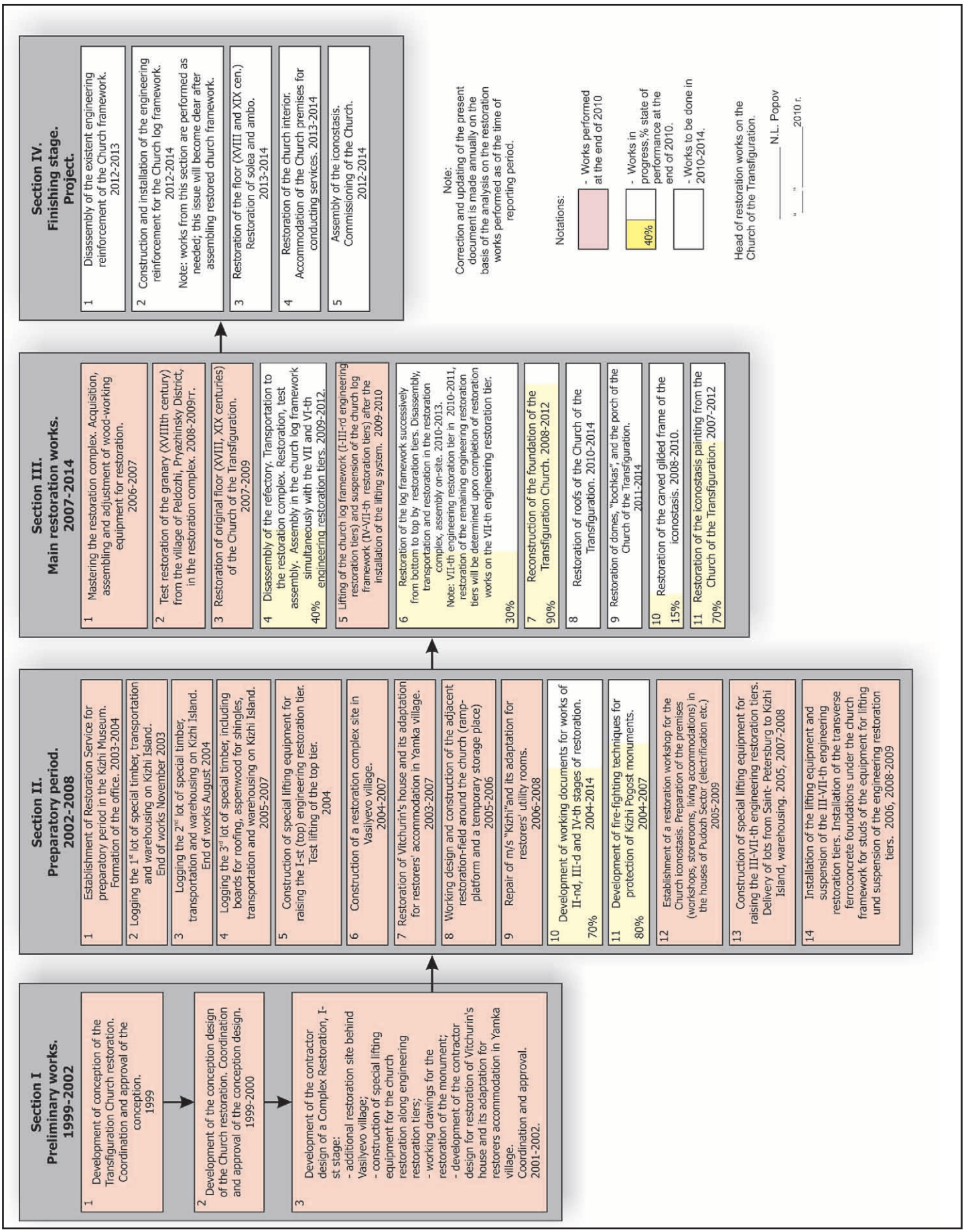
In 2010 the work planned in Section III of the scheduler was continued and carried out according to the schedule. The report describes in details the course and results of the work carried out in 2010. The report is supplied with graphic materials and photos that provide insight into the progress and results of the work done.

Fig. 10. Reconstruction of foundation

Fig. 11. External lifting uprights, general view from north

Fig. 12. Movable lifting mechanisms of lifting system: a console, beams and two types of lifting jack

Main Stages of Works on the Restoration of the Church of the Transfiguration on Kizhi Island and their Fulfillment vs.Time. 1999-2014. The situation described as to the end of 2010.



2.1. Monitoring of the lifted log walls condition and lifting equipment in winter period and spring after snow melting

For the reason that the upper restoration tiers of the church were kept lifted and hanged up for winter 2010-2011, the instrumental monitoring for the condition of lifted log walls and the reliability of the lifting system was required for the period of cold winter 2010 and spring when snow was melting.

The professionals from the SLR "Strojreconstructsija" (the company developed the lifting system for log walls) were involved to this work. In concordance with the approved monitoring plan, the instrumental control of the possible deformations of the construction, details of log walls and lifting system had been done two times – in February and April.

In was mentioned in the given report, that:

- The results of the proof-of-principle work showed that load-bearing elements of the Church of the Transfiguration, metalwork for the lifting and fixation of engineering restoration tiers has not been deformed and are in the operational condition;
- Monitoring revealed the necessity of some additional measures to strengthen the existing lifting system by installation of 12 additional outdoor jack posts with crawls. The posts were mounted on north-west, south-west and south-east diagonal walls between +9,40 and +15,90 marks. The length of metal posts is increased for 7 m;
- Maintenance and service experience of the mounted metalwork for lifting shows that it is necessary to equip new outdoor posts on diagonal log walls with staircases from access boards to the top (+15,00 level). The staircases must have protection baskets and crossing platforms every 5 m. The guard platforms must be done at the post levels of +10,40 and +13,00 m to provide the safe work with jacks during the reassembling of log walls.

Fig. 13. Equipment of lifting system with crossing platforms and staircases with protection baskets

The suggestions mentioned in the above-mentioned report were accepted and implemented in 2010.

2.2. Provision of conditions for the WHC UNESCO - ICOMOS mission - 2010

After the dismantling of refectory and preparation of the elements for restoration, it was necessary to develop criteria for evaluating log condition and studying the possibility of their restoration or replacement. It was also needed to develop restoration and repair approaches for historic timbers taking into consideration damage type and degree.

In this connection, the experimental restoration of the granary (built in the XVIIIth century) with the logs almost identical in degree of preservation and condition to those from the Church of the Transfiguration was implemented in 2008-2009. The restoration technology for logs with different types and degree of damage was tested as well as preliminary assembling of the log walls in the assembly department of the Restoration Complex and final assembly of the restored log walls on the original place.

The restoration results were summarized in the detailed scientific and technical report with conclusions and recommendations for the approaches to restoration of historic logs. This report was sent to WHC and ICOMOS for investigation and recommendations.

Fig. 14. Restoration of the Church refectory logs

After the analysis of this report by WHC and ICOMOS experts and taking into account our request, it was decided to perform an inspection of the conservation state of the Kizhi Pogost monuments and consider accordingly the issues of complex restoration of the Church of the Transfiguration in April 2010.

During the preparation for WHC-ICOMOS mission the experimental restoration of the refectory dismantled logs was done in the Restoration complex by the technique tested at the restoration of the XVIII c. granary. This was made in addition to the above mentioned monitoring of the Church of the Transfiguration structure elements and the lifting system.

2.3. Joint WHC UNESCO- ICOMOS mission visit to Kizhi, April 2010

Joint WHC - ICOMOS mission worked on Kizhi on April 5-7, 2010. The main topics of the mission and Russian experts' work are as follows:

1. The reliability and stability of the systems for lifting, hanging up and fixation of the restoration tiers installed in the Church of the Transfiguration were carefully studied during the mission work and by the experts on-site. During the discussion, the correctness and effectiveness of the accepted and implemented project decisions were confirmed again.

2. The sequence of the lifting procedures during the process of logs dismantling was discussed. It was noted that the technology for sequential lifting of the three upper restoration tiers from the level +11,50 to +37,00 with the subsequent dismantling of the unloaded lower part starting from the foundation up is not known in the traditional restoration practice yet. During the consideration into the process details that ensure this work order, the project decisions and practical experience were thoroughly examined by experts and approved in whole. Expert remarks and suggestions expressed during the discussion were taken into account and became the basis for the correction of the project within technical and field supervision in 2010.

Fig. 15. ICOMOS experts. Operational meeting on Kizhi

3. The complicated problems of repair and restoration of logs were discussed. The refectory logs were restored in advance, prepared and demonstrated to the mission experts. Having examined and analyzed the restored logs, the experts not-

ed the excellent workmanship of the restorer carpenters and nevertheless mentioned the shortcomings, stipulated by insufficient knowledge about the natural dynamics of repairing large timbers, large number of patches in one log and recommended the limitation of using the glued wood patches. According to their opinion, the number of patches in the log must be less than two (three patches as an exception).

Fig. 16. New wood insertion in a log from the refectory – preservation of a destroyed structural element

4. The Mission recommended that the training course for the carpenters in wood dynamics, traditional carpentry and application of conservation principles is needed to avoid splitting, cracking, and other failure of repairs.

5. The mission experts had developed and presented to the museum "Guidelines for selecting log repair at Kizhi Pogost".

During the Mission work the problems that accompany the restoration of a unique monument were discussed, and the exchange of opinions took place.

At the final stage of the discussion, the Mission recommended to inspect the Site every two years, instead of annual inspection as it was done usually. It indicates the correctness of the chosen restoration approach and that the World community believes in the success of the project implemented by the existing restoration team.

2.4. Training of the Kizhi open-air museum carpenters

According to the WHC-ICOMOS Mission recommendations, the 72-hours training course for carpenters was organized in the Kizhi museum in summer 2010.

Fig. 17. Lecture for Kizhi carpenters

The lectures of the Course covered the following topics:

- wood structure; physical, chemical and strength properties;
- guidelines for the restoration of wooden architectural monuments;
- traditional carpentry.

Workshops were devoted to diagnostics of wood defects, restoration training, fire-safety of the monuments, etc.

The program of the training course is attached.

«Implementation of the 1st stage of complex restoration of the Church of the Transfiguration (section II of the scheduler) »

II.10

«Development of working documentation for the 3d and 4th stages of the complex restoration design of the Church of the Transfiguration»

Elaboration of working documents for completion III and IV stages of Complex Restoration was going on. Chief designer "Spetsprojectrestavratsiya", Saint-Petersburg, continued project works in collaboration with subcontracted organizations.

The work concerns correction of the project during reconstruction of the rubble concrete strip foundation with consolidating reinforced concrete belt located under the church and the refectory, location of electrical and fire-safe equipment compartments in the basement, section concerning the restoration of the VIIth engineering restoration tier including the element inspection, drawings and design drawings.

The government contract is valid until December 2011, that's why the development of the design drawings for every dismantled element of the VIIth restoration tier is going on. In 2011 the analysis of present condition of loaded historic log wall elements and their reliability evaluation is planned.

Implementation of the 1st stage of the Complex restoration of the Church of the Transfiguration (Section III of the scheduler)

The Complex restoration of the Church of the Transfiguration (Section III of the Scheduler) was continued in 2010. As it was mentioned above, the works on items III.1 – III.4 were implemented in 2008-2009, therefore the items of the next section were implemented in 2010.

In concordance with the planned volume of restoration work, the tender documentation was worked up and the competitive tender for the restoration contract was carried out. To provide good results and continuous running duty, the contract was concluded for two years - 2010 and 2011.

As a result of the tender SKF "Alekon" was awarded the state contract.

It simplified the implementation of the contract in 2010, because the "Alekon" company had big experience in preliminary restoration of the just that very monument – the Church of the Transfiguration and the company employees were acquainted with the Church structure and the documentation on its Complex restoration in details.

Taking into consideration big volume and complexity of the work, engineering supervision was done by "Stroyreconstructsija" Co Ltd (St. Petersburg) as long as this organization is the project author for foundation, lifting and suspension systems for the Church of the Transfiguration.

Field supervision was done by Chief designer "Spetsprojectrestavratsiya", Saint-Petersburg.

III.4 «Restoration of refectory elements dismantled in 2009»

Structural elements of the refectory dismantled in 2009 were inspected and restored in 2010. The work was done step-by-step and included the following:

1. Inspection of every structural element, making drafts and working drawing for their restoration. The work included the following:

- description of a structural element: making sketches, overall and fragment photofixation before restoration, patching of damaged zones and photofixation after restoration;
- making drafts and working drawing for their restoration.

Fig. 18. Inspection and fixation of the refectory structural elements

2. Refectory structural elements restoration included the following:

- Extracting destroyed parts from structural elements;
- Making and fixing of insertion, crowns and patches.

Fig. 19. Restoration of the refectory structural elements with due regard to location of contiguous (upper and lower) elements

The material for the insertions was selected form the sound part of logs dismantled from the refectory in 2009 in case the whole log had unsatisfactory quality and could not be re-installed to the structure or from special timber stocked in 2004. When selecting material, they took into consideration wood moisture content, physical characteristics and condition of the wood surface.

Fastening insertion pieces on the restored elements was done with adhesive composition «Клейберит ПУР 501» (Germany) using additional pegs of birch wood, dowels or self-tapping screws if necessary.

All pieces, inserted in refectory structural elements were marked by «ПЦ» label (Carpenter Center) with index, date and carpenter's name. The label was burned or written by special pencil.

The restored elements of the refectory are stocked in the storage area, detailed tables and maps of stacking are made.

About 21% of the structural elements (52 of 242 elements) had been restored as of the 1st of December, 2010. The work is going on. In future restoration of the refectory structural elements will be continued simultaneously with the logs of the VIIth restoration tier dismantled in 2010.

III.5 "Lifting log walls (I – III restoration tiers) and suspension (IV-VI restoration tiers) after completing the lifting system »

Lifting and fixing of the I – III engineering restoration tiers was implemented in 2009 and revealed the necessity to upgrade the lifting equipment so that to improve the restorers working conditions and fire safety of restoration. The designer put forward the proposals and developed technical documentation for production and installation of additional posts with staircases and crossing platforms on diagonal log walls from +9,40 to +15,90 levels (Fig.). Manufacturing and installation of the equipment was done by SKF "Alekon" Co Ltd in August 2010. The similar metalwork on north-east wall was installed in 2009.

Fig. 20. Metalwork workshop

After installation of the additional metalwork the I – III restoration tiers were lifted to design marks again and fixed. As a result, the weight of lifted and suspended restoration tiers (appr. 160 ton) was shifted onto metalwork (installed in 1980). Therefore the weight of the unlifted log walls (appr. 270 tons) significantly decreased and the estimated load to the new foundation during the dismantling of the IV-VII restoration tiers decreased as well.

Fig. 21. Elongated posts mounted on diagonal Church log walls

III.6 «Dismantling, transportation and restoration in the Restoration Complex, on-site assembling»

1-2. The lower log sets of the church log walls were dismantled along the perimeter.

According to the technological project, the dismantled logs had to be set successively on the constructed belt foundation under the ground level in order to disassemble log sets of the lower restoration tier. 65 adjustable legs installed along the Church perimeter between the foundation and lower logs with gaskets were used for this purpose. After the dismantling of 2 or 3 lower log sets the weight of log walls is shifted to the transverse beam of suspension system, and then adjustable legs are removed.

Fig. 22. Initial stage of the dismantling – the Church is supported by jack posts with crawls along the perimeter

When the underground part of rubble concrete belt foundation was built and strengthened, adjustable legs were installed on the foundation along the perimeter and brought to the lower log set. After that adjustable legs were removed in consecutive order starting from the altar giving a chance to remove logs from the wall through the opening. Then logs were removed from the wall and delivered for restoration. When the lower log was removed from the wall, the adjustable legs were brought to the log in the upper log set.

These manipulations were repeated until the lower part of the tier could be placed on the transverse beam and console of the system for the log wall suspension. Since that time the weight of the intact part of the restoration tier was shifted to the suspension system. The other log sets of the VIIth restoration tier and ground floor beams were removed by rearranging movable cross-beams of log walls in consecutive order. 250 logs were dismantled and delivered to restoration workshop. The height of the dismantled part is 2,5 m in average. The remaining log walls were securely adjusted on the existing supporting structure and systems for lifting and suspension.

Fig. 23. Dismantling of 12-m long log from northern wall of the Church

Fig. 24. "Wave" dismantling of the Church framework with the use of lifting system and jacks

Fig. 25. Fixing of walls after dismantling of an element

3. Logs were transported to the Restoration Complex, cleaned, washed up, air-dried and stacked before restoration.

Dismantled logs were placed on the site platform, then put on a special transporting carriage and transferred to the temporary storehouse by wooden technological bridging. Then they were carefully moved to the Restoration Complex by timber lorry with a hydraulic manipulator. In order to prevent the damage of historic timber during the transportation, loading and unloading, the timber lorry trailer was equip-

ped with special felt-covered cradle and a clamp system of the hydraulic manipulator was covered by special soft material.

Logs delivered to the Restoration Complex were unloaded to a washing ramp, then they were washed by water jet from high-pressure device "Karcher" and air-dried during 2 or 3 days (depending on weather conditions). After washing and air-drying logs were transported to the indoor store-house of the Restoration Complex for temporary storage on special single-layer stacks equipped with felt-covered cradles.

Fig. 26. Loading of logs with the use of special band for transportation to the Restoration Complex

Fig. 27. Washing and air-drying of logs before stacking

Real condition of monument logs

Historic logs were carefully inspected, photofixed and measured during storage. Inspection of logs removed from the VII restoration tier was made during the dismantling and storage and this **inspection revealed extremely bad condition of the majority of the logs.** The obtained results were much different from that obtained before the dismantling and were unexpected for restorers. The logs protected from environmental factors (located in the refectory shade or beams in the basement) were in better condition.

Fig. 28. Inspection during dismantling revealed extremely bad condition of some logs

This fact supports the validity of the restoration method used because the disassembly of a structure tier by tier enables to restore historic logs with high efficiency provided that the quantity of those logs being restored at a time is not large; and also this method enables to select the restoration technique that suits best to preserve maximum historic material.

4. Covering of a missing part in Church walls after the disassembly of the lower (VIIth) restoration tier.

Fig. 29. Conservation of the object for winter. The SKF "Alekon" director A.A. Savel'ev

The cover made of reinforced poly-film mounted on a wooden frame was made in line with working project on completion of restoration in 2010. It was done to protect the reconstructed rubble concrete foundation, structural openings that appeared after the dismantling of lower logs as well as electrical equipment, remote control and fire-alarm systems installed in the Church from snow and rain. Small roofs were built along perimeter of the log walls to protect them against melted snow and rain-water.

5. Pre-restoration test-assembly of the restoration tier in the assembly workshop of the Restoration complex

Fig. 30. Start of test-assembly of the restoration tier in the Restoration complex

Fig. 31. Installation of beams to historic places – determination of original (XVIII c.) framework geometry

The log walls of the Church of the Transfiguration have been exposed to different factors for nearly 300 years and got significant deformations. This affected its present outline. The research made before and during the Church dissassembly revealed declinations from the original location of log walls on the historic foundation. The lower log sets were moved from their original places as shown by the beam ends shifted considerably (more than 10 cm and up to complete dislocation). Significant deformations are observed in a vertical section of log walls, which results in the declination of the Church vertical axis to north-west and defect of the historic indent up to 40 cm in height.

In order to determine the ways of eliminating floor declination, the preliminary assembling of non-restored elements (5 preserved log sets from the VII restoration tier) was performed in the assembly workshop of the Restoration Complex. Vertical and horizontal declinations were estimated as a preliminary which made it possible to place log sets in the way of original outline of church walls and to set the floor horizontal indent on the upper log set.

The assembled part of historic log walls will be demonstrated to WHC-ICOMOS mission experts during their visit in February 2011. During the next inspection of WHC-ICOMOS mission restorers and designers are planning to discuss and approve methods of eliminating floor declination and logs restoration.

Restoration of the logs from the VIIth tier and experimental assembly of the

tier after restoration will be done after the decisions are agreed upon and then it will be presented to the joint commission.

III.7 «Reconstruction of the Church foundation»

The underground part of the belt foundation was built in August-September 2010 in line with 255/06-KM project and working project.

The D part was built of rubble concrete in parts between existing transverse foundations for the equipment intended for suspension of the engineering restoration tiers which works as a counterfort and is a part of the Church foundation.

The depth of foundation bed along the perimeter is more than 1,65 m from day surface.

Rubble stones were poured in the foundation by the use of pervibrators. Stones were first carefully selected and prepared: stones were collected from the Church disassembled foundation and Pogost territory, sorted, calibrated and washed.

The upper part of the foundation was leveled for 40 cm below daylight surface along the perimeter, at the same time anchors were set for connecting the reinforced concrete belt. When the foundation strengthened up to the designed values, boxing was removed and pockets were filled with consolidated sand.

Fig. 32. Pouring of the underground foundation part in parts

Fig. 33. Pouring of the foundation below lifted Church framework

Fig. 34. Additional support during foundation pouring

III.10 «Restoration of carved gilded frame of the iconostasis»

In 2010 restoration of carved gilded frame of the iconostasis of the Church of the Transfiguration was continued.

Conservation of gilded surface of the lower tier of the iconostasis started in 2009 and was finished in 2010. The contractor was Moscow art research and restoration directorate.

In April-May 2010, this organization won the competitive tendering for the restoration of the Prophets tier of the iconostasis. Working contract covenanted not only conservation of gilded layer of the tier but also the restoration of carvings. In 2010 significant part of gilded layer was restored and reconstruction of lost carved parts was started.

Iconostasis monitoring system observes the state of preservation, analyzes obtained data and uses analytical results for the further preservation. In 2010 some works were done on this subject.

Fig. 35. Restoration of the gilded surface of the iconostasis by specialists

Fig. 36. Restoration workshop on Kizhi

Monitoring of the preservation state and analysis of the obtained data were continued.

Museum art-restorers continued a detailed examination of the preservation state of all dismantled parts and fragments of the iconostasis.

In addition, restorers from St. Petersburg OOO "Atrium" Co. Ltd were contracted to examine carefully the preservation state of the Deisis tier of the iconostasis frame. They made technical, technological and chemical analysis of gilded surface. The obtained results significantly supplemented previous research made by the State Russian Museum and Restoration department of Bavaria monuments conservation directorate in 1990.

«Measures to ensure safety of the Kizhi pogost ensemble...» (decree N 1633-p of Russian Federation government on 07.11.2008) stipulated «Creation of electronic data base for monitoring the iconostasis of the Church of the Transfiguration». The works are to be completed in 2010 in line with this document. During the program implementation, the Kizhi open-air museum purchased "Restoration" programming module to enhance capabilities of KAMIS software which unites the museum databases on historic and cultural monuments. In 2010, "Restoration" programming module was adapted to the specific character of the museum and creation of a special database has been started since the end of the year. It should be mentioned that this software needs to be debugged and tested.

The financing for restoration of the iconostasis is guaranteed and will be continued in 2011.

Part 3. «Preservation of the Church of the Intercession (Kizhi Pogost)»

Restoration of the Church of the Intercession roof was done during last year and it still continues. The porch restoration started in November.

Restoration was done in line with the «Project for the 1st restoration stage. Restoration of roofs, onion domes and framework of the Church proper and porch» developed by "Spetsprojectrestavratsiya", Saint-Petersburg, in 2009 on the basis of the Permission № 05-4/15 on March 09 2010 issued by the Russian Federal Surveillance Agency for Compliance with the Law in Cultural Heritage Protection.

Shingles on onion domes were restored and northern slope of the roof of Church proper was changed in 2010. The completion of roof and porch restoration is scheduled for the year 2011. Restoration was done by the museum Carpenters Centre.

Fig. 37. Restored onion-domes of the Church of the Intercession. Fall 2010.

Fig. 38. Dismantling of scaffolding from the northern part of monument and preparation of scaffolding for roof restoration

Conclusion

A huge amount of preliminary work done during the long period of time (2003-2009) enabled the restoration team to reach the main goal in 2010 – suspension of the Church of the Transfiguration, foundation restoration and dismantling of the lower VIIth restoration tier.

The chosen restoration approach that does not require complete disassembly of the Church but implies restoration of logs in consecutive order and foundation restoration has evidently proved to be correct.

It should be mentioned that as a rule logs removed from the log walls were heavily destroyed and great efforts and time are needed for their treatment and, unfortunately their main part must be changed during restoration.

Based on the above mentioned facts we can only regret that the attempts done in 1980-s didn't result in proper restoration. It resulted in real destruction of wood that happened within 30 years. Russian and Karelian opponents who declared a rabid war with the today restoration are responsible for it. They try to ignore evident achievements in the implementation of this complicated project.

At this stage it is necessary to consolidate all the efforts of the participants – restorers and governmental authorities and continue the work on revival of the Church of the Transfiguration on Kizhi with the support of public, collaboration with UNESCO and Federal organization "Rosochrancultura" RF experts. The process cannot come to a stop under no circumstances.

Head of restoration works
on the Church of the Transfiguration,
Vice-director N.L. Popov

Chief Custodian of the stationary
monuments, A.J. Lyubimtsev

the Island of Kizhi, January, 2011.

Appendix 1

Fig.1. Ditch digging for belt rubble concrete foundation under lifted Church framework. Work of people in narrow conditions.

Fig.2. Pouring of lower part of rubble concrete foundation (underground part)

Fig. 3. Poured foundation in boxing; boxing is removed after 7 days of exposure

Fig. 4. Initial stage of dismantling. Birch bark is placed between jacks and monument timber

Fig. 5. Initial stage of dismantling. Logs are dismantled along the perimeter in consecutive order

Fig. 6. Careful dismantling of logs, their placing on a site platform

Fig. 7. Transportation of logs on a special transporting carriage to the temporary storehouse

Fig. 8. Transferring of a log by hand to temporary storehouse. Extremely bad condition of a log

Fig. 9. Transportation of a small number of logs by specially equipped timber lorry

Fig. 10. Stacking of logs on stacks equipped with felt-covered cradles in the Restoration Complex

Fig. 11. Invisible defects of logs. The log notch is completely destructed

Fig. 12. Sequential dismantling of the Church framework upwards. Regular observations show stable condition of the framework

Fig. 13. Final stage of dismantling. Mechanisms of lifting system located along the monument perimeter start to work

Fig. 14. Dismantling of beams, including 12-m long beams was done without difficulties

Fig. 15. Movable lifting mechanisms of lifting system: consoles, beams, jacks

Fig. 16. Final stage of dismantling. General view.

Fig. 17. Final stage of dismantling. General view. 2 timber sets are left along the perimeter

Fig. 18. Final stage of dismantling. General view. 1 timber sets is left along the perimeter

Fig. 19. “ In front of the World” concept works! Restoration and tourist activity go at the same time

Fig. 20. General view of restoration workshop, lifting constructions and fragments of a dismantled restoration tier

Appendix 2

Program for the Kizhi museum carpenters -restorers training

#	Lectures	Duration, ac.hours
	1. Wood structure, physical, chemical and mechenical properties	
2.	Wood species. Micro- and macro-structure of wood.	1
3.	Chemical and physical wood properties (chemical composition, wood moisture content, density, water and gas permiability).	1
4.	Mechanical and processing properties of wood (mechanical properties – general information, compression, bending strength MOE, impact of chemical and physical agents on wood properties). Wood properties anisotropy.	1
5.	Defects of stem and structure of wood. Methods of defects determining. Defects effect on wood quality and its proceeding. Lumber grades, requirements, allowed number of defects.	1
6.	Drying types and timber storage rules	1
7.	Durability and wood protection. Modern and traditional ways for protection of wood against biodeterioration. Fireproof treatment of wood.	1
2.	**Guideline principles for conservation of wooden architectural monuments**	
8.	*World Heritage Convention on the Protection of the World Cultural and Natural Heritage. History. Venice charter. The inscription of properties on the World Heritage* List and the List of World Heritage in Danger. Protection and conservation of World Heritage properties.	1
9.	ICOMOS principles for preservation of historic timber structures (1999). Special approaches to preservation of wooden architectural heritage: inspection and documentation, monitoring and interventions, repair and restoration, modern materials and technology.	2
10.	Preventive conservation of historic timber structures.	1
11.	The World Heritage Site – Kizhi pogost. History, development, preservation and restoration.	1
12.	History of monuments conservation in Russia. Modern Russian Federation legislation on monuments protection	1
13.	Open-air museums in Russia and abroad	1
3.	**Traditional carpentry**	
14.	Wooden architecture concept. History. Design of old Russian timber structures and their main elements. First chronicle records of wooden structures in Russia. Wooden architectural heritage in the Republic of Karelia.	2
15.	History of carpenter trade. Evolution of carpenter tools. Types of carpenter and cabinet-maker tools and their application.	1
16.	Foundations, walls, doors and windows for traditional wooden	1

	structures	
17.	Roof design: rafter roofs, nailless roofs, curve roofs, domes. Methods for board roofs repair.	1
18.	Building drawings and their notation conventions. Types of building drawings. Plan, facade, cross-section and longitudinal section drawings. Working drawings for timber constructions. Reading of building drawings for timber structures. Measurements and drawing of the elements.	4
19.	Dating methods for wooden architectural monuments: by wood treatment method, by notch type and wooden elements shape, by metal elements used etc. The developed for Zaonezhje region architectural-archeological scale for dating wooden civil and religious monuments.	2
20.	Application of theory of strength of materials and structural analysis to wooden buildings.	1
21.	Ways of joining and connection of wooden structures	1
22.	Safety engineering	4
	Workshops	
	Wood quality, defects and methods for their determination.	4
	Fire safety for wooden architectural monuments	4
	Dating of wooden monuments. The Kizhi museum monument case study	2
	Problems of wooden architectural monuments restoration	8
	Practical training	20
	End-of-term test	4
	Total	72