



LAMMINAHO WOODEN ESTATE: 3D LASER SCANNER SURVEY AND POST PRODUCTION RESULTS



European
Commission
Horizon 2020
European Union Funding
for Research & Innovation



European Commission | Horizon 2020 - Research and Innovation Framework Programme
MARIE SKŁODOWSKA-CURIE ACTIONS - INDIVIDUAL FELLOWSHIP CMC-10200-MAJJA-IP-2016
Project title: "Preserving Wooden Heritage. Methods for monitoring wooden structures: 3D laser scanner survey and application of BIM systems on point cloud models".

SCHOOL OF ARCHITECTURE, HISTORY OF ARCHITECTURE AND RESTORATION STUDIES
UNIVERSITY OF OULU - FINLAND



SCIENTIFIC COORDINATOR: PROF. ANNA-MAIJA YILMAULA
RESEARCHER: EU. PHD. ARCH. SARA PORZILLI

Project results are protected by the Marie Skłodowska Curie grant agreement of the Researcher Ph.D. Sara Porzilli, Post-Doctoral Fellow at the University of Oulu (Finland). This project has been financed by Museovirasto and Senatti Properties.



E
SIPUHE

F
OREWORD

LAMMINAHO WOODEN ESTATE: 3D LASER SCANNER SURVEY AND POST PRODUCTION RESULTS

ESIPUHE

Lamminahon talonpoikainen pihapiiri rakennuksineen on ollut tämän tutkimuksen kohteena. Lamminaho sijaitsee Vaalassa, Niskakosken törmällä, Oulujoen pohjoispuolella. Kiinteistö on lahjoitettu Museovirastolle vuonna 1992. Oulun yliopiston arkkitehtuurin opiskelijat ovat laatineet vuodesta 2010 asti piirustuksia ja tehneet mittauksia perinteisin menetelmin. Museoviraston rahoituksella käynnistettiin tarkempi inventointi LARA3M, joka voitiin viedä loppuun Euroopan Komission Horizontti 2020 -projektin turvin. Paiseen rakennusperimön säilyttämiseen tähtäävällä projektilla dokumentointiainestoa on voitu täydentää laserkeilaamalla kaikki Lamminahon tilan rakennukset. Pistepilvimateriaali on sitten työstetty Auto CAD-muotoon kunnossapidon ja korjaustoimenpiteiden helpottamiseksi. Tutkijatohjuri Sara Porzilli on suorittanut keilauksen ja materiaalin jatkotyöstön tähän LARA3M projektin loppuraporttiin.

Oulussa 15.12.2017

Anna-Maija Yilmäula, professori
Arkkitehtuurin historia ja korjaussuunnittelu
Oulun yliopisto



FOREWORD

Lamminaho's traditional wooden estate has been the object of this laser-scanning survey. Lamminaho is located in Vaala, on the Northern Side of Oulujoki, on the bank of Niskakoski. The estate has been donated to the National Board of Antiquities in 1992. The students of architecture at the University of Oulu have been making drawings since 2010 and measurements with traditional methods. With the funding from the NBA a more exact inventory LARA3M was started, and the work could be carried out with the support of the from European Commission Horizon 2020. The aim of these projects is to preserve the valuable wooden heritage by laser-scanning all the buildings of Lamminaho estate. The point-cloud material has been modified into AutoCAD-form for the maintenance and restoration purposes. Post-doc researcher Sara Porzilli has performed the 3D laser scanning and the post-production to this final report of LARA3M.

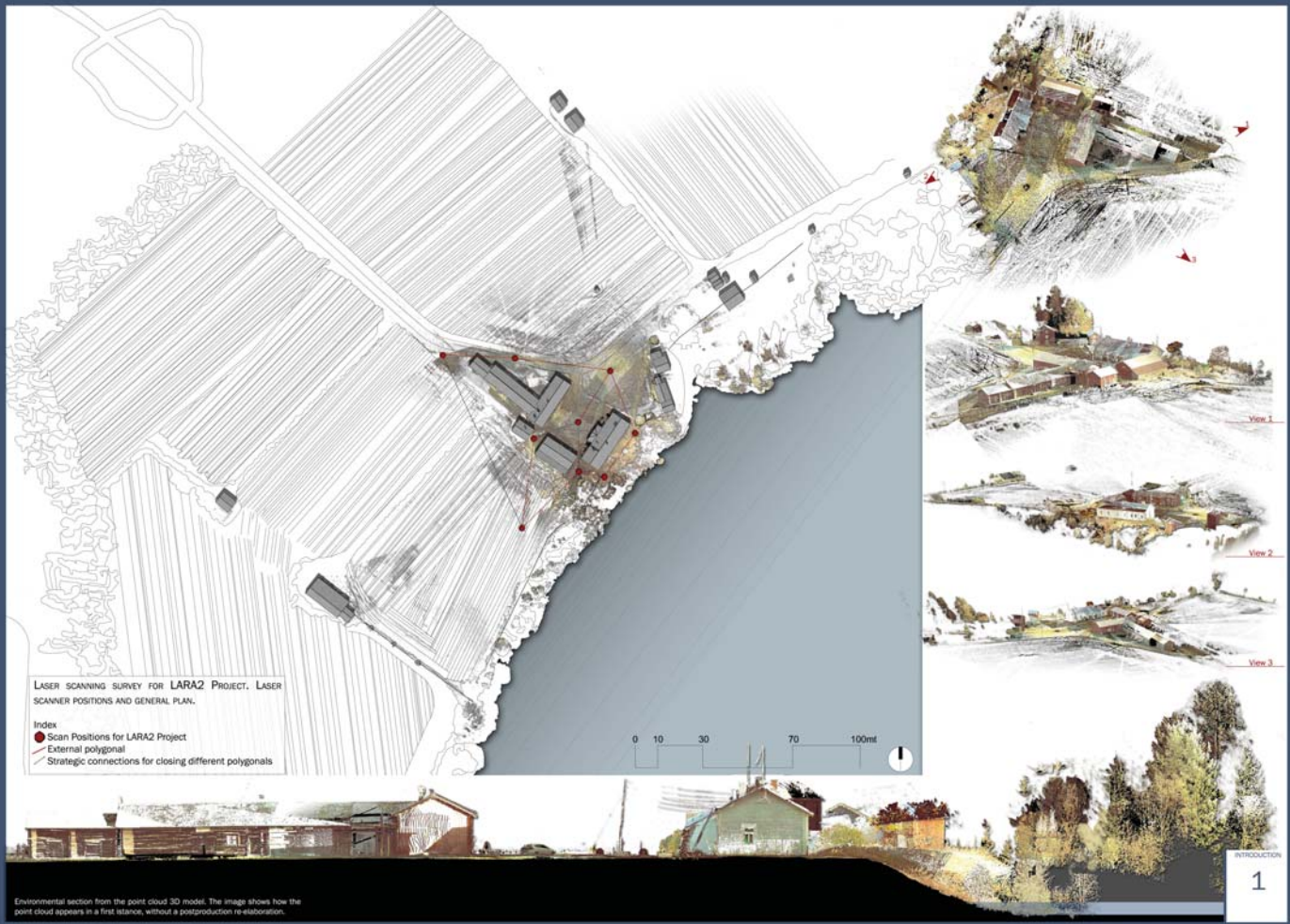
Oulu Dec. 15th, 2017

Anna-Maija Yilmäula, professor
History of architecture and restoration studies
University of Oulu



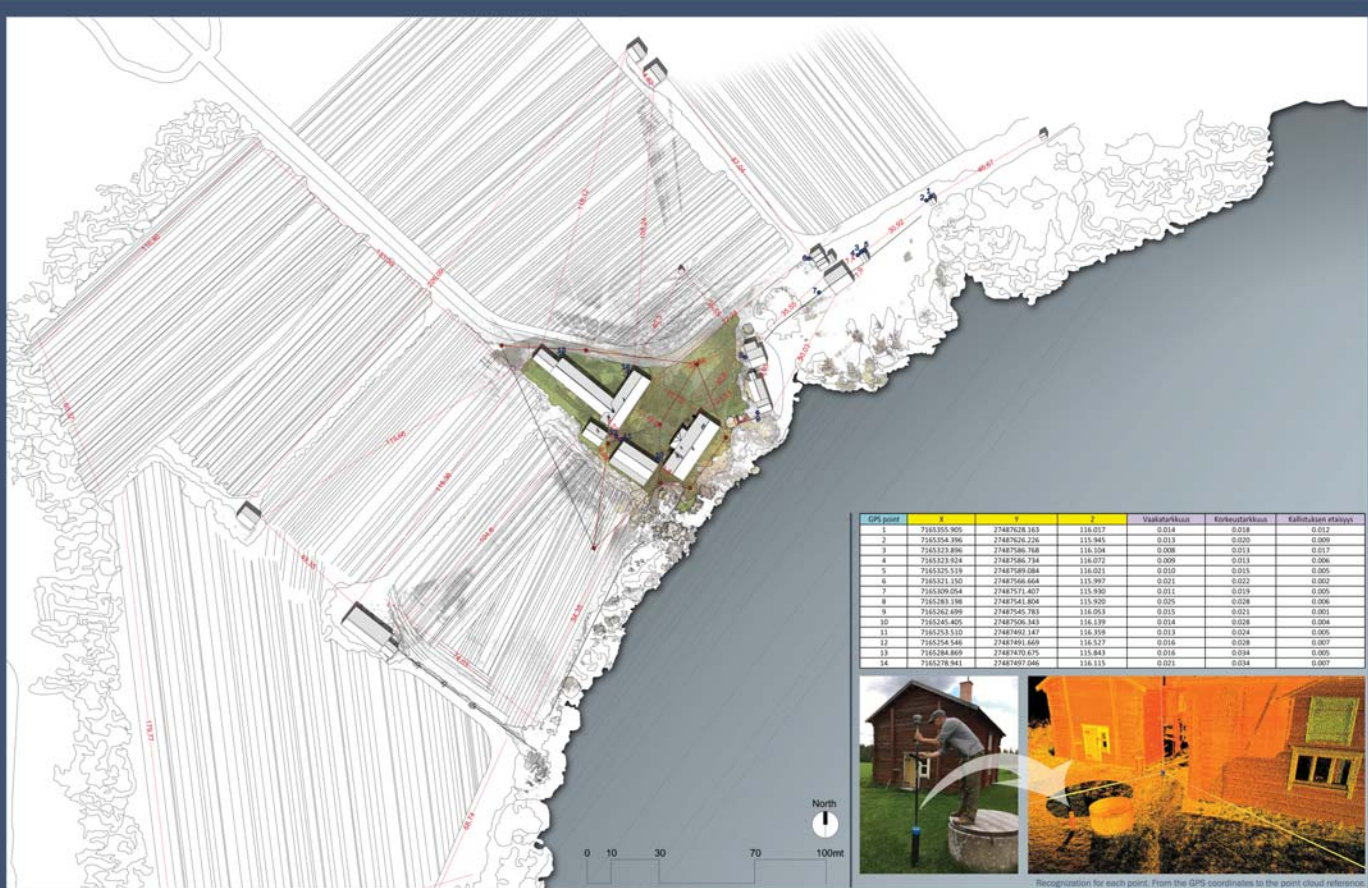
P A G E	
1	LASER SCANNING SURVEY FOR LARA2 PROJECT. LASER SCANNER POSITIONS, RESULTS AND GENERAL PLAN
2	GENERAL PLAN AND RECOGNITION OF THE BUILDINGS
3	GPS SURVEY REFERENCE SYSTEM USED: ETRS-GK27+H2000
4	THE MAIN YARD: GROUND FLOOR PLANS
5	ENVIRONMENTAL SECTION 1: POINT CLOUD, CAD DRAWING, REFERENCE MEASURES
6	ENVIRONMENTAL SECTION 2: POINT CLOUD, CAD DRAWING, REFERENCE MEASURES
7	ENVIRONMENTAL SECTION 3: POINT CLOUD, CAD DRAWING, REFERENCE MEASURES
8	PHOTO DOCUMENTATION AND POST-PRODUCTION PROCESS
9	SECOND LASER SCANNING SURVEY FOR LARA2 PROJECT. NEW LASER SCANNER POSITIONS, RESULTS AND GENERAL PLAN
10	TECHNICAL INFORMATION ABOUT THE RESOLUTION OF THE POINT CLOUD OBTAINED
11	THE RESOLUTION OF THE POINT CLOUD
12	THE POST PRODUCTION PHASE
13	THE POST PRODUCTION PHASE: FROM THE POINT CLOUD TO THE CAD DRAWINGS AND ORTHOPHOTOS
14	1A. PÄÄRAKENNUS. FACADE NORTH-WEST. PHOTOMAP. METRIC SCALE 1:50
15	1B. PÄÄRAKENNUS. FACADE NORTH-WEST. WIREFRAME DRAWING. METRIC SCALE 1:50
16	1C. PÄÄRAKENNUS. FACADE NORTH-EAST. PHOTOMAP. METRIC SCALE 1:50
17	1D. PÄÄRAKENNUS. FACADE NORTH-EAST. WIREFRAME DRAWING. METRIC SCALE 1:50
18	1E. PÄÄRAKENNUS. FACADE SOUTH-WEST. PHOTOMAP. METRIC SCALE 1:50
19	1F. PÄÄRAKENNUS. FACADE SOUTH-WEST. WIREFRAME DRAWING. METRIC SCALE 1:50
20	1G. PÄÄRAKENNUS. FACADE SOUTH-EAST. PHOTOMAP. METRIC SCALE 1:50
21	1H. PÄÄRAKENNUS. FACADE SOUTH-EAST. WIREFRAME DRAWING. METRIC SCALE 1:50
22	2. LUHTIRAKENNUS. PHOTOMAPS OF THE FOUR FACADES. METRIC SCALE 1:100
23	2b. LUHTIRAKENNUS. WIREFRAME DRAWINGS OF THE FOUR FACADES. METRIC SCALE 1:100
24	2A. LUHTIRAKENNUS. FACADE NORTH-WEST. PHOTOMAP AND WIREFRAME DRAWING. METRIC SCALE 1:50
25	2B. LUHTIRAKENNUS. FACADE NORTH-EAST. PHOTOMAP AND WIREFRAME DRAWING. METRIC SCALE 1:50
26	2C. LUHTIRAKENNUS. FACADE SOUTH-WEST. PHOTOMAP AND WIREFRAME DRAWING. METRIC SCALE 1:50
27	2D. LUHTIRAKENNUS. FACADE SOUTH-EAST. PHOTOMAP AND WIREFRAME DRAWING. METRIC SCALE 1:50
28	3A. VIINAKÖÖKI. SECTIONS AND FLOOR PLANS. METRIC SCALE 1:50
29	3B. VIINAKÖÖKI. FACADE SOUTH-EAST. PHOTOMAP AND WIREFRAME DRAWING. METRIC SCALE 1:50
30	3C. VIINAKÖÖKI. FACADE NORTH-EAST. PHOTOMAP AND WIREFRAME DRAWING. METRIC SCALE 1:50
31	3D. VIINAKÖÖKI. FACADE NORTH-WEST. PHOTOMAP AND WIREFRAME DRAWING. METRIC SCALE 1:50
32	3E. VIINAKÖÖKI. FACADE SOUTH-WEST. PHOTOMAP AND WIREFRAME DRAWING. METRIC SCALE 1:50
33	4. NAVETTA. SECTIONS AND FLOOR PLANS. METRIC SCALE 1:100
34	4A. NAVETTA. FACADE SOUTH-EAST. PHOTOMAP AND WIREFRAME DRAWING. METRIC SCALE 1:50
35	4B. NAVETTA. FACADE NORTH-EAST. PHOTOMAP AND WIREFRAME DRAWING. METRIC SCALE 1:50
36	4C. NAVETTA. FACADE SOUTH-WEST. PHOTOMAP AND WIREFRAME DRAWING. METRIC SCALE 1:50
37	4D. NAVETTA. FACADE NORTH-WEST. PHOTOMAP AND WIREFRAME DRAWING. METRIC SCALE 1:50

P A G E	
38	5. TALLI JA TALLILATO. SECTION AND FLOOR PLANS. METRIC SCALE 1:100
39	5A. TALLI JA TALLILATO. FACADE NORTH-EAST. PHOTOMAP AND WIREFRAME DRAWING. METRIC SCALE 1:50
40	5B. TALLI JA TALLILATO. FACADE SOUTH-WEST. PHOTOMAP AND WIREFRAME DRAWING. METRIC SCALE 1:50
41	5C. TALLI JA TALLILATO. FACADE NORTH-WEST. PHOTOMAP AND WIREFRAME DRAWING. METRIC SCALE 1:50
42	6A. MASSINI. FACADE SOUTH-WEST. PHOTOMAP AND WIREFRAME DRAWING. METRIC SCALE 1:50
43	6B. MASSINI. FACADE NORTH-EAST AND NORTH-WEST. PHOTOMAP AND WIREFRAME DRAWING. METRIC SCALE 1:50
44	7A. TORMÄAITTA. FACADES NORTH, SOUTH, WEST, EAST. PHOTOMAPS. METRIC SCALE 1:50
45	7B. TORMÄAITTA. FACADES NORTH, SOUTH, WEST, EAST. WIREFRAME DRAWINGS. METRIC SCALE 1:50
46	8A. KELLARI. FACADES NORTH, WEST, EAST. PHOTOMAPS. METRIC SCALE 1:50
47	8B. KELLARI. FACADES NORTH, WEST, EAST. WIREFRAME DRAWINGS. METRIC SCALE 1:50
48	8C. KELLARI. FLOOR PLAN AND SECTION. METRIC SCALE 1:50
49	9A. PUUJI. FACADE WEST. PHOTOMAP AND WIREFRAME DRAWING. METRIC SCALE 1:50
50	9B. PUUJI. FACADE SOUTH. PHOTOMAP AND WIREFRAME DRAWING. METRIC SCALE 1:50
51	9C. PUUJI. FACADE EAST. PHOTOMAP AND WIREFRAME DRAWING. METRIC SCALE 1:50
52	9D. PUUJI. FACADE NORTH. PHOTOMAP AND WIREFRAME DRAWING. METRIC SCALE 1:50
53	10A. MIESTEN AITTA. FACADES SOUTH-WEST, NORTH-EAST, NORTH-WEST. PHOTOMAPS AND WIREFRAME DRAWINGS. METRIC SCALE 1:50
54	11A. NAISTEN AITTA. FACADES SOUTH-WEST, SOUTH-EAST. PHOTOMAPS AND WIREFRAME DRAWINGS. METRIC SCALE 1:50
55	12A. PIKKUAITTA. FACADES SOUTH-EAST, NORTH-WEST, NORTH-EAST. PHOTOMAPS AND WIREFRAME DRAWINGS. METRIC SCALE 1:50
56	13A. VANHA TALLI. FACADES NORTH-WEST, SOUTH-WEST. PHOTOMAPS AND WIREFRAME DRAWINGS. METRIC SCALE 1:50
57	13B. VANHA TALLI. FACADES SOUTH-EAST, NORTH-EAST. PHOTOMAPS AND WIREFRAME DRAWINGS. METRIC SCALE 1:50
58	14A. TRAKTORIKOPPI. FACADES NORTH, SOUTH, WEST, EAST. PHOTOMAPS AND WIREFRAME DRAWINGS. METRIC SCALE 1:50
59	15A. PAJA. FACADES NORTH, SOUTH, WEST, EAST. PHOTOMAPS AND WIREFRAME DRAWINGS. METRIC SCALE 1:50
60	16A. SYSKOPPI. FACADES WEST, EAST, NORTH, SOUTH. PHOTOMAPS AND WIREFRAME DRAWINGS. METRIC SCALE 1:50
61	18A. YLÄRIIHILATO. FACADES SOUTH-EAST, NORTH-EAST. PHOTOMAPS AND WIREFRAME DRAWINGS. METRIC SCALE 1:50
62	18B. YLÄRIIHILATO. FACADES NORTH-WEST, SOUTH-WEST. PHOTOMAPS AND WIREFRAME DRAWINGS. METRIC SCALE 1:50
63	19A. RIIH. FACADES SOUTH-EAST, NORTH-EAST. PHOTOMAPS AND WIREFRAME DRAWINGS. METRIC SCALE 1:50
64	19B. RIIH. FACADES NORTH-WEST, SOUTH-WEST. PHOTOMAPS AND WIREFRAME DRAWINGS. METRIC SCALE 1:50
65	19C. RIIH. FLOOR PLAN AND SECTIONS. METRIC SCALE 1:50
66	20A. VESI HYVIN. FACADES SOUTH-EAST, NORTH-WEST. PHOTOMAPS AND WIREFRAME DRAWINGS. METRIC SCALE 1:20
67	20B. VESI HYVIN. ROOF PLAN. FACADES NORTH-EAST, SOUTH-WEST. PHOTOMAPS AND WIREFRAME DRAWINGS. METRIC SCALE 1:20
68	21A. ÄLÄRIIHILATO. FACADES SOUTH-EAST, NORTH-EAST. PHOTOMAPS AND WIREFRAME DRAWINGS. METRIC SCALE 1:50
69	21B. ÄLÄRIIHILATO. FACADES NORTH-WEST, SOUTH-WEST. PHOTOMAPS AND WIREFRAME DRAWINGS. METRIC SCALE 1:50
70	21C. ÄLÄRIIHILATO. FLOOR PLANS AND SECTIONS. METRIC SCALE 1:50
71	22A. ELOSUOJA. FACADE NORTH-EAST. PHOTOMAPS AND WIREFRAME DRAWINGS. METRIC SCALE 1:50
72	22B. ELOSUOJA. FACADE SOUTH-EAST. PHOTOMAPS AND WIREFRAME DRAWINGS. METRIC SCALE 1:50
73	22C. ELOSUOJA. FACADE SOUTH-WEST. PHOTOMAPS AND WIREFRAME DRAWINGS. METRIC SCALE 1:50
74	22D. ELOSUOJA. FACADE NORTH-WEST. PHOTOMAPS AND WIREFRAME DRAWINGS. METRIC SCALE 1:50
75	22E. ELOSUOJA. FLOOR PLANS AND SECTIONS. METRIC SCALE 1:100
76	ATTACHMENTS. ANALYSIS OF DAMAGES

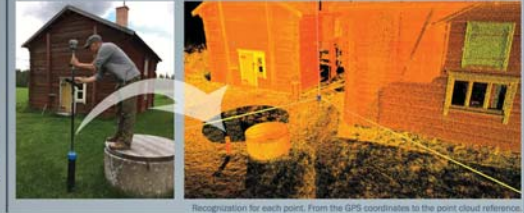




SHORT DESCRIPTION. During the post production phase the raw data obtained from the point cloud elaborations are transformed. Thanks to the use of specific softwares and procedures it's possible to load the data on Autocad software and proceed with vector redrawing. The second step of this procedure is to improve the graphic result of the material with the use of graphic software as Adobe Photoshop and Illustrator. In this case it's possible to appreciate the vector redrawing and the graphic colouring of the map.



GPS point	x	y	z	Vaakokuivaus	Korkeus/latuus	Kallistuksen etäisyys
1	7185355.905	27487628.163	116.017	0.014	0.018	0.012
2	7185354.396	27487626.226	115.945	0.013	0.020	0.009
3	7185323.896	27487586.188	116.106	0.008	0.013	0.013
4	7185323.524	27487585.794	116.077	0.009	0.011	0.006
5	7185325.519	27487589.084	116.021	0.010	0.015	0.005
6	7185323.100	27487566.664	115.997	0.021	0.022	0.003
7	7185309.054	27487571.407	115.990	0.011	0.019	0.005
8	7185283.198	27487541.804	115.920	0.025	0.028	0.006
9	7185262.495	27487465.783	116.051	0.013	0.021	0.001
10	7185241.405	27487506.343	116.139	0.014	0.028	0.004
11	7185253.520	27487492.147	116.309	0.013	0.024	0.005
12	7185254.546	27487591.669	116.527	0.016	0.028	0.007
13	7185284.860	27487470.675	115.843	0.016	0.034	0.005
14	7185276.841	27487497.046	116.115	0.021	0.034	0.007

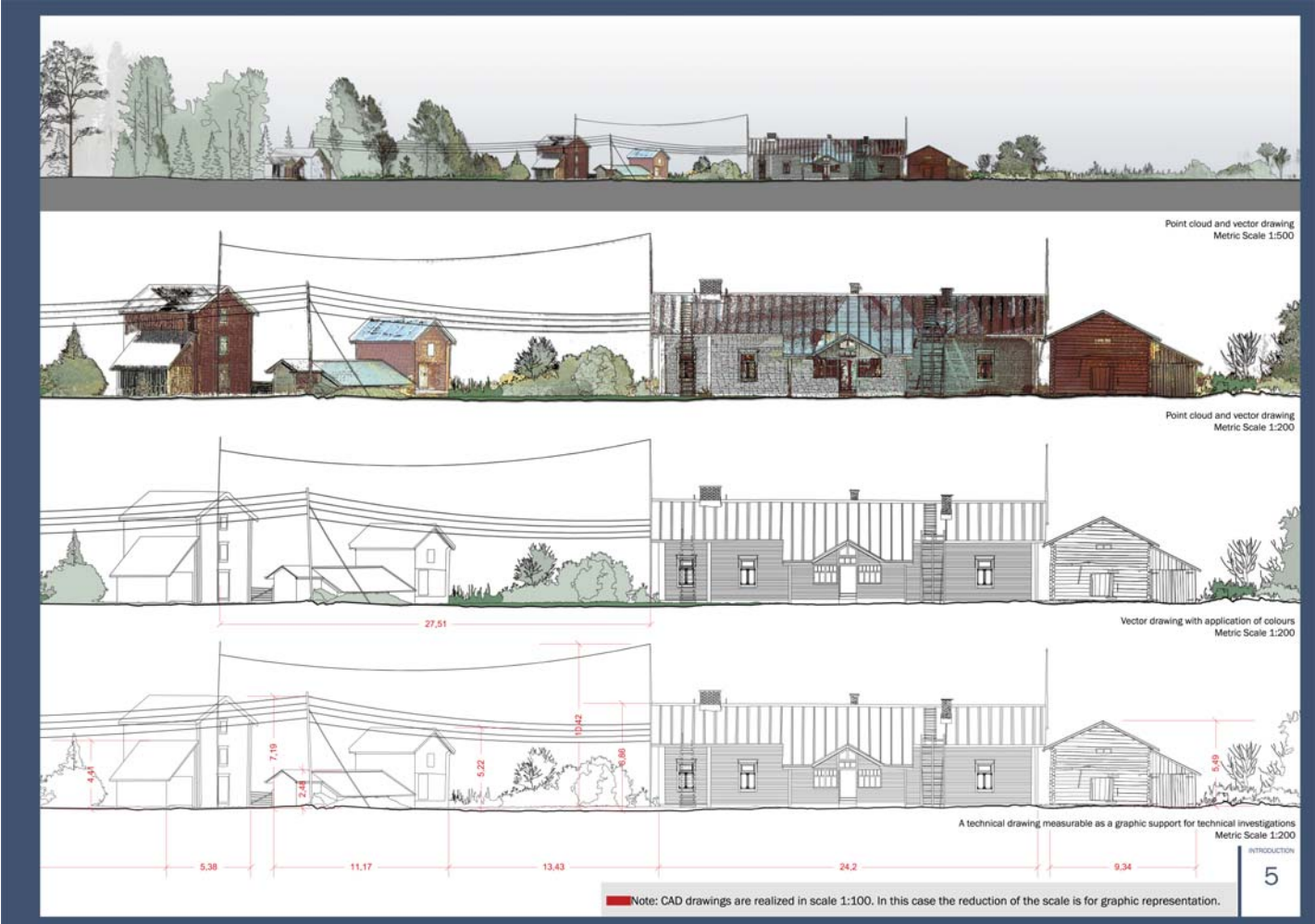


Recognition for each point. From the GPS coordinates to the point cloud reference.

GPS SURVEY Reference system used: ETRS-GK27+N2000
The acquisition of GPF points has been fundamental for the correct orientation of the point cloud according to the reference system used in Vaala region. Coordinate points acquired with this reference system can be transformed and modified if a different reference system is needed. In this case there are specific converters for GPS points. A minimum number of three points is needed. For the Lammihaho GPS recognition 14 points have been acquired, because for the wide dimension of the open areas and for fixing in a more detailed way each singular groups of buildings.



North
Metric Scale 1:200
INTRODUCTION
4



INTRODUCTION
5



Point cloud and vector drawing
0 1 3 7 10 mt

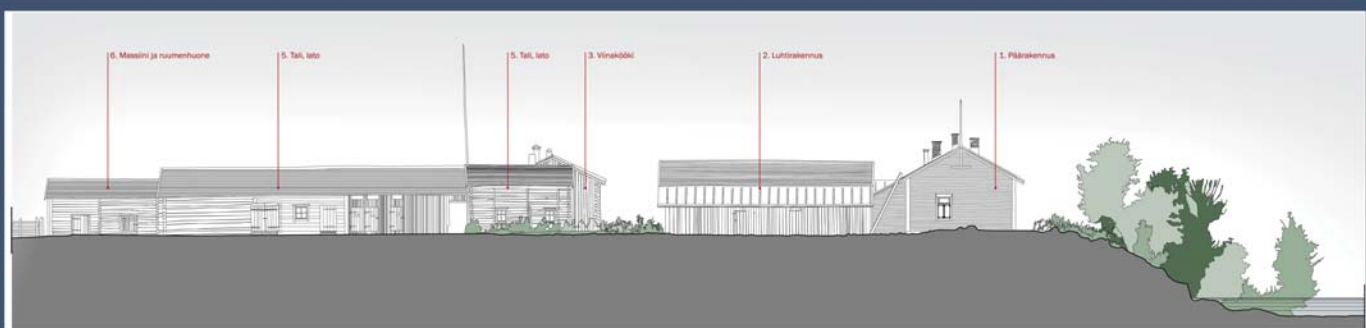


Vector drawing with application of colours
0 1 3 7 10 mt

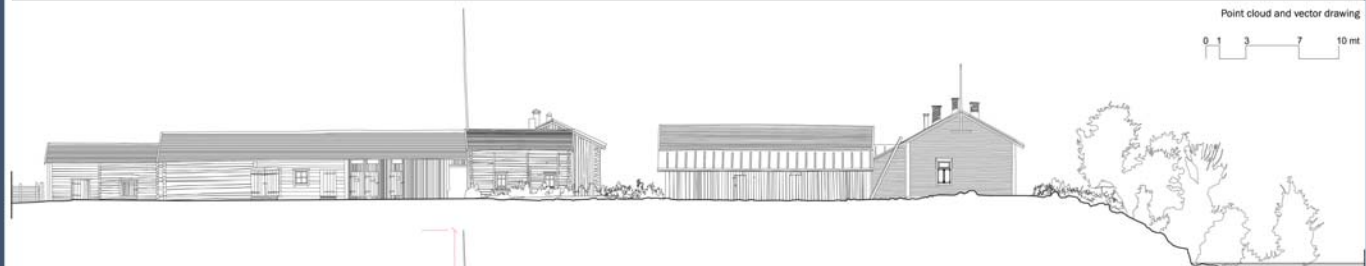


SHORT DESCRIPTION. From the point cloud survey environmental sections have been produced. After technical procedures necessary for obtaining the section on the point cloud, it is possible to realise the vector drawing on Autocad. A third step is constituted a the graphic post production with specific software in order to offer materials usefull for the documentation of the place.

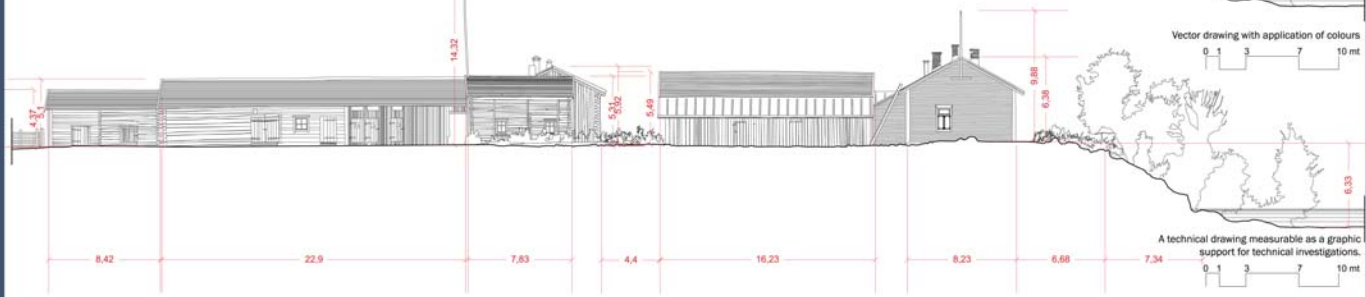
Note: CAD drawings are realized in scale 1:100. In this case the reduction of the scale is for graphic choises.



Point cloud and vector drawing
0 1 3 7 10 mt



Vector drawing with application of colours
0 1 3 7 10 mt



Note: CAD drawings are realized in scale 1:100. In this case the reduction of the scale is for graphic choises.



INDEX

- | | | |
|----------------------------|-------------------|-----------------------|
| 1. Päärakennus | 8. Kivikellari | 16. Sysikoppi |
| 2. Luhtirakennus | 9. Puoji | 18. Lato |
| 3. Viinakööki | 10. Miesten aitta | 19. Vanha riihi |
| 4. Navettarakennus | 11. Naisten aitta | 20. Kalvo |
| 5. Tali, lato | 12. Pikkuaitta | 21. Lato |
| 6. Massiini ja ruumenhuone | 13. Vanha talli | 22. Riihi, elosuoja |
| 7. Törmäaitta | 14. Traktorikoppi | 23. Savusaunan paikka |
| | 15. Paja | 24. Parkkipaikka |

The photo campaign has had the role to create an accurate and technical way of describing the object from the general to the particular scale. This updated database can be used for recognition activities on the state of preservation of the buildings.
 OUTPUT: Realization of a rich digital database where archive immediately most of the fundamental information about both the architecture and the environment.



Example of the photographs taken for each building.
 Case shown: Navettarakennus folder.



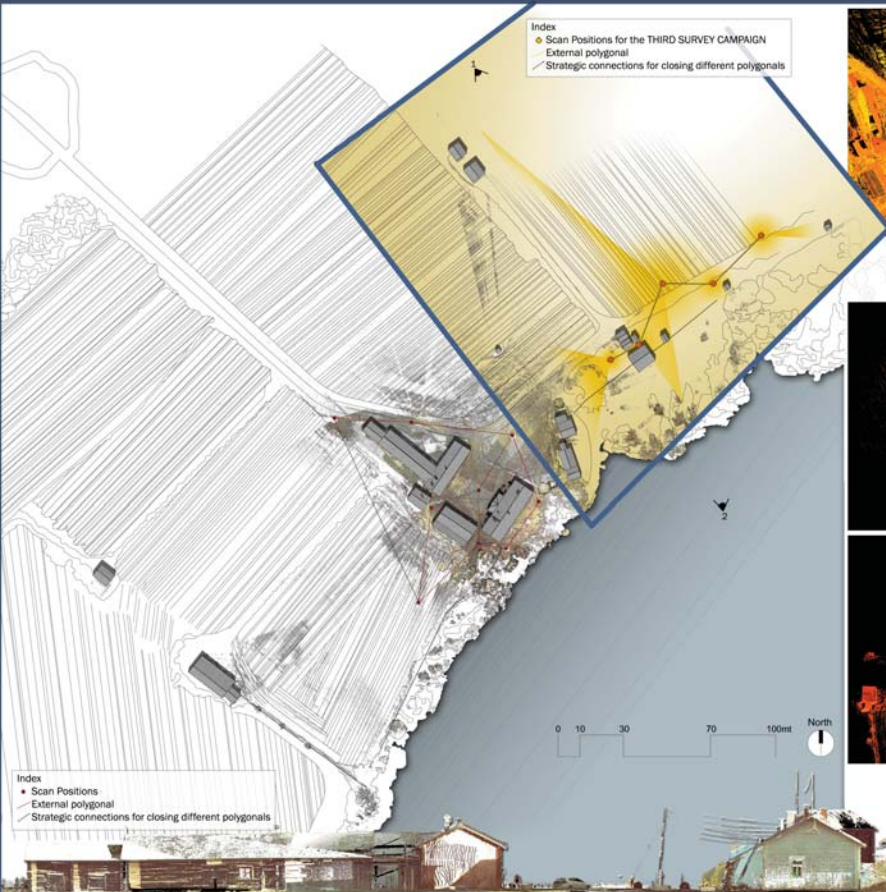
Facade SOUTH-EAST
 Photomap



Facade SOUTH-EAST
 Vector drawing



Combining the contribution of the photo documentation with laser scanner survey it is possible to obtain the realistic photomaps of the facades. The accuracy and high resolution of the photos allow the technicians to produce analysis on the state of preservation of the timber structures and define the damage maps for intervention of restoration.



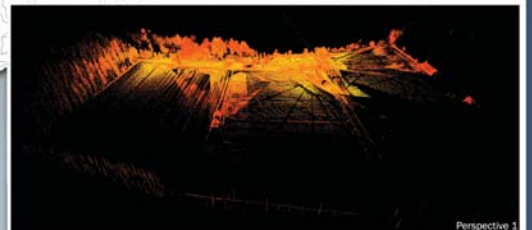
Index
 ● Scan Positions for the THIRD SURVEY CAMPAIGN
 External polygonal
 Strategic connections for closing different polygonals

Index
 ● Scan Positions
 External polygonal
 Strategic connections for closing different polygonals

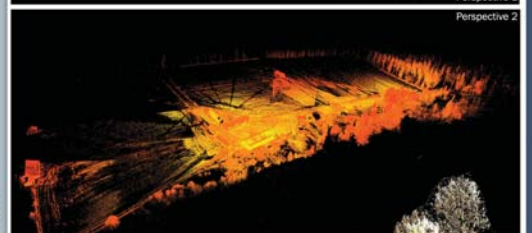


General top view of the new survey

Third part of Lamminaho project has improved the laser survey, taking measures of those buildings far from the main yard. Scan positions are indicated on the map and they were chosen in order to improve the point cloud and be able at the same time to link this new survey campaign with the general point cloud.



Perspective 1



Perspective 2



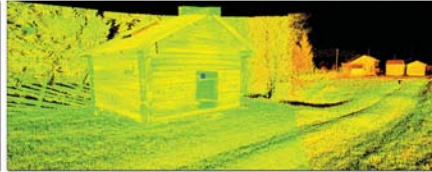
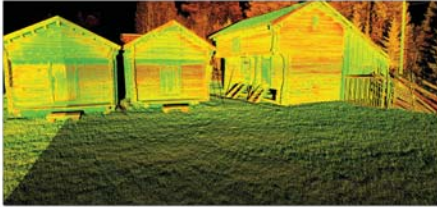
1 Data acquisition

Realization of a 3D laser scanner survey with a high resolution and reliability of the northern part (that part far from the main yard) of Lamminaho settlement for the understanding of the real dimensions and relations between architecture, environment and landscape. For the survey activities it has been used a Leica GeoSystem laser scanner, model: ScanStation2.

Purposes:

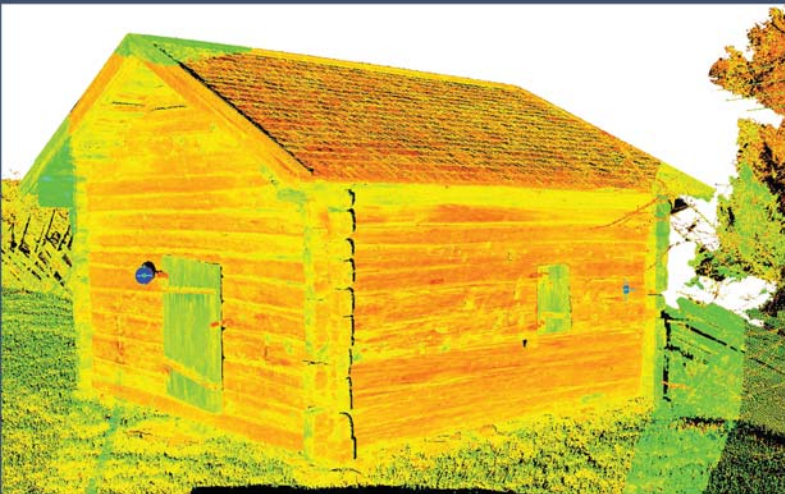
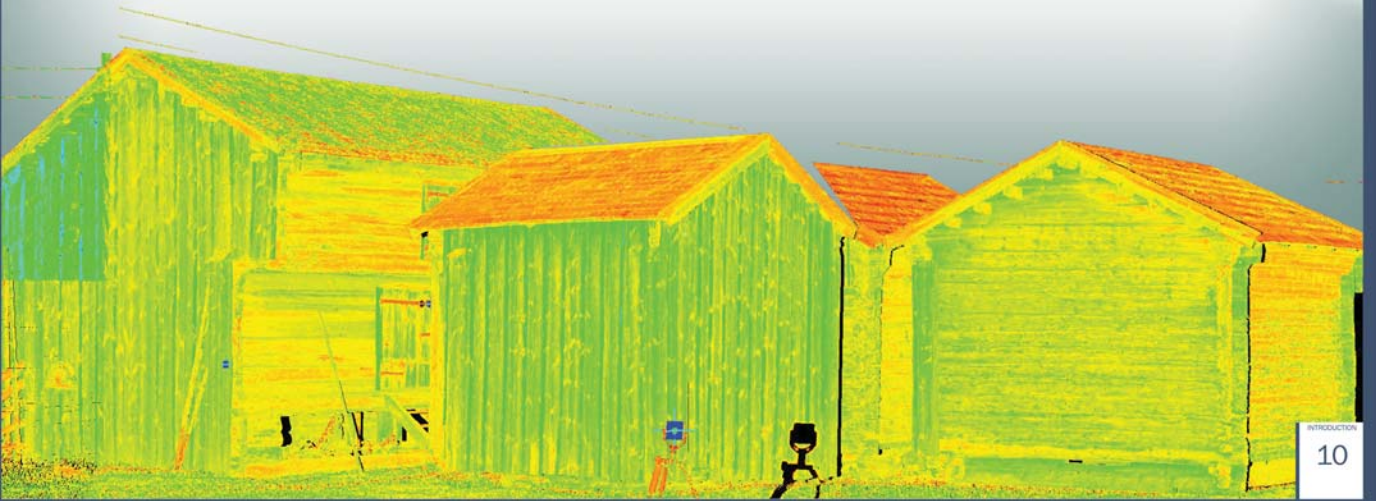
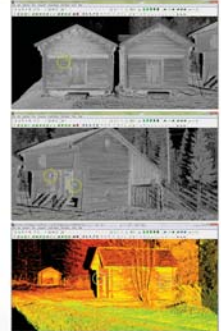
1. Complete the general plan of the entire area of the rural settlement.
2. Complete the environmental sections produced.
3. Complete the technical vector drawings of those buildings not included during the previous survey campaign.

From the combination of all these data it has been possible to obtain an important and precious recognition of the present state of this heritage, updating not only the technical knowledge (made of the mentioned drawings, census, etc.) but also deepened the main deterioration problems found on wooden structures.



2 Identification of targets and operation of renaming for each ScanWorld:

for each ScanPosition the instrument create a point cloud. Thanks to the presence of common points (=Targets) its possible to combine different data in a unique global point cloud.



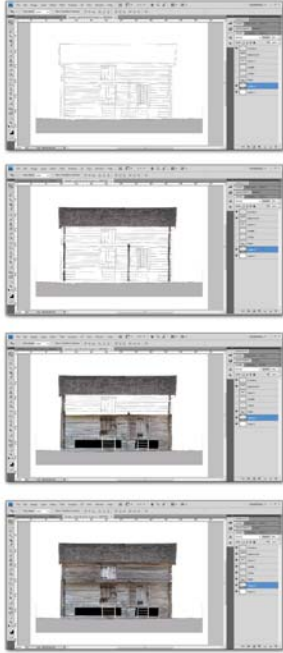
Survey operations have had a testimonial and documentary value for the description of the material characteristics of buildings with their environment. In this sense the point cloud constitutes a reliable model of the object investigated. Intensive measurement campaigns and analysis have demonstrated the importance of the management of both quantity and quality of the data collected. In order to fix information related to the state of preservation of wooden structures all the scanning operations were carried out with HIGH RESOLUTION.



Post production phase

ELABORATION OF PHOTOMAPS/ORTHO PHOTOS FOR EACH FACADE.
EXAMPLE OF VANNA TALLI

The elaboration on photomaps starts with an intensive photo campaign documentation. The general method adopted is to document the building from its general aspects until the detail parts. From the point cloud a CAD drawing is produced. On the base of the CAD drawing starts the photo reconstruction. The last step is to increase and improve the level of detail of the CAD drawings including all those parts not visible from the point cloud but clearly evident on the photo reconstruction.



◀.....•From the point cloud to the photo maps / ortho photos.▶



Example of the process used for the elaboration of the data.

1. Laser scanner survey
2. Orthoimages of facades from the point cloud model;
3. Elaboration of the CAD drawings on the base of the orthoimages imported in CAD softwares;
4. Elaboration of the photo maps or ortho photos;
5. Concluding and detailed elaboration of the CAD drawings adding all the missing information of the point cloud visible on the photomaps.





General Plan
Metric scale 1:1000



Floor Plan
CAD drawing
Metric scale 1:200



Facade NORTH-WEST
Photomap
Metric Scale 1:50



General Plan
Metric scale 1:1000



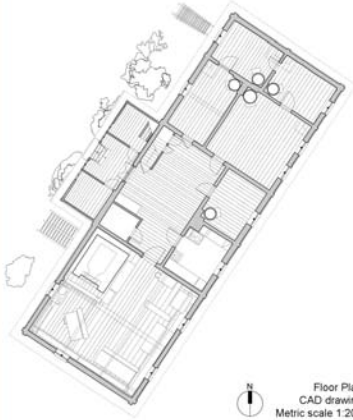
Floor Plan
CAD drawing
Metric scale 1:200



Facade NORTH-WEST
Workline drawing
Metric Scale 1:50



General Plan
Metric scale 1:1000



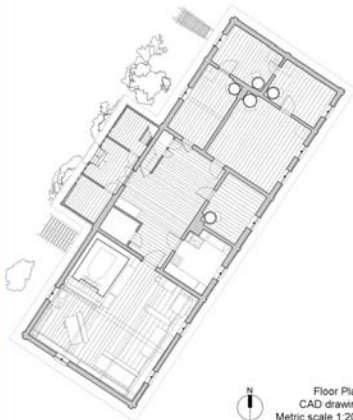
Floor Plan
CAD drawing
Metric scale 1:200



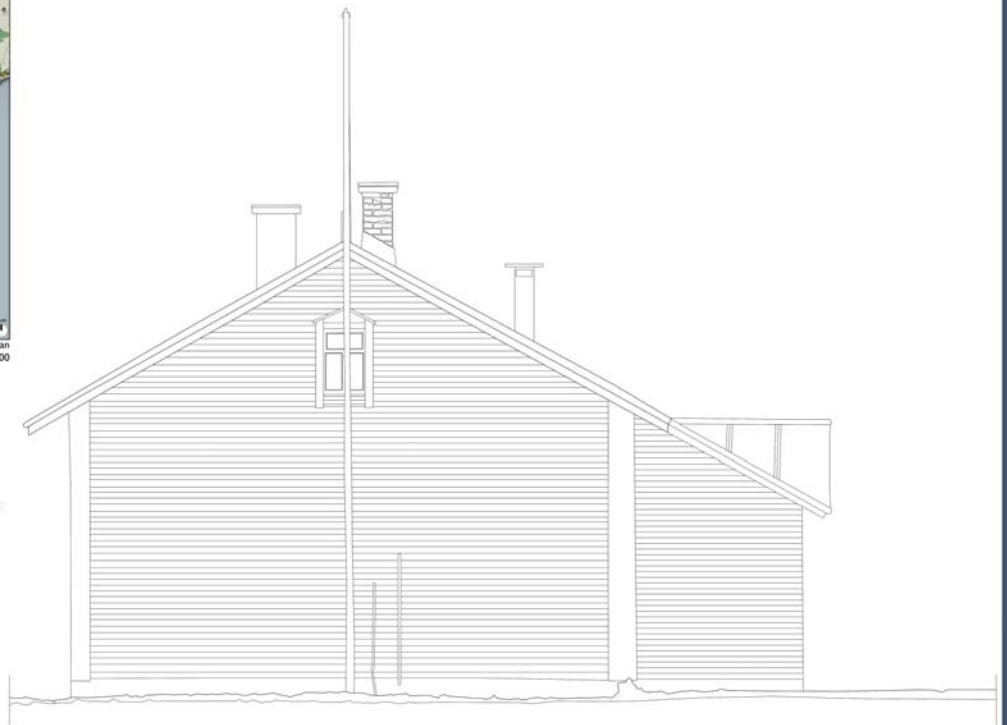
Facade NORTH-EAST
Photomontage
Metric Scale 1:50



General Plan
Metric scale 1:1000



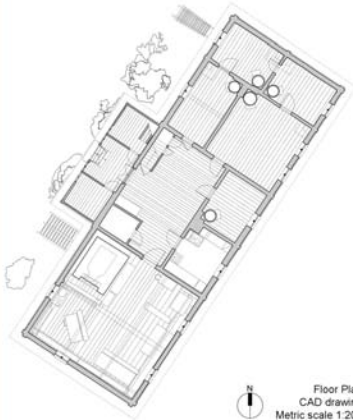
Floor Plan
CAD drawing
Metric scale 1:200



Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric scale 1:1000



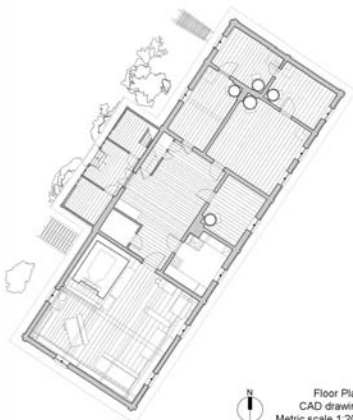
Floor Plan
CAD drawing
Metric scale 1:200



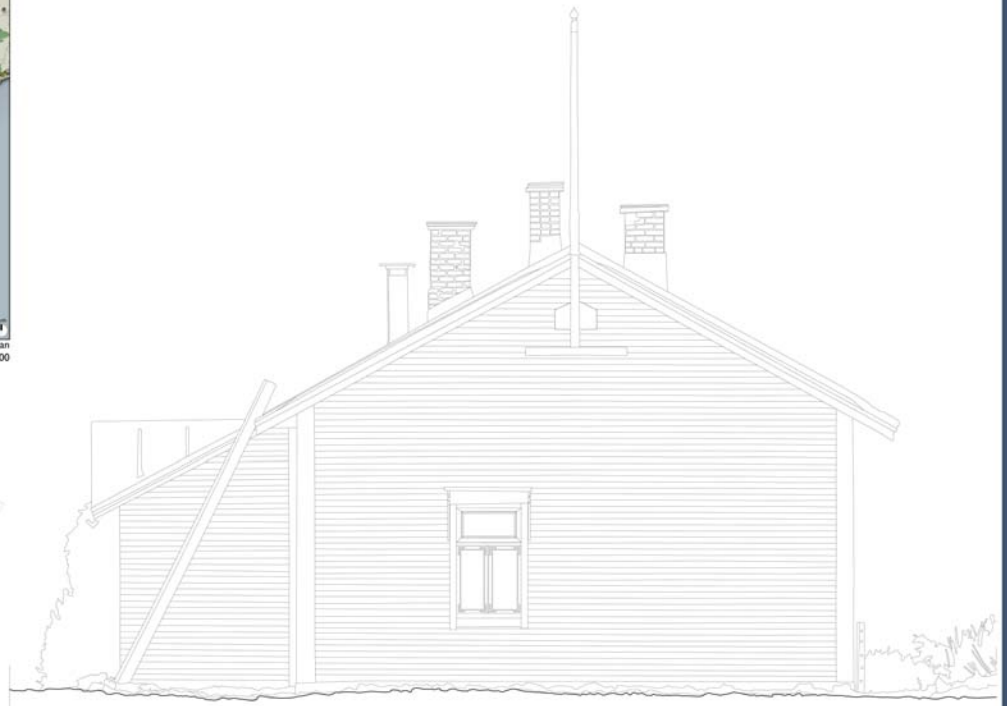
Facade SOUTH-WEST
Photomap
Metric Scale 1:50



General Plan
Metric scale 1:1000



Floor Plan
CAD drawing
Metric scale 1:200



Facade SOUTH-WEST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric scale 1:1000



Floor Plan
CAD drawing
Metric scale 1:200



Facade SOUTH-EAST
Photomap
Metric Scale 1:50



General Plan
Metric scale 1:1000



Floor Plan
CAD drawing
Metric scale 1:200



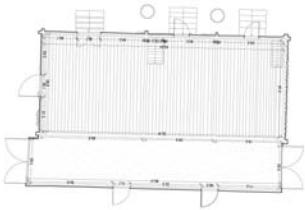
Facade SOUTH-EAST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric scale 1:1000



Roof plan
Metric Scale 1:200



Floor Plan
Metric Scale 1:200



Facade NORTH-WEST
Photomap
Metric Scale 1:100



Facade SOUTH-EAST
Photomap
Metric Scale 1:100



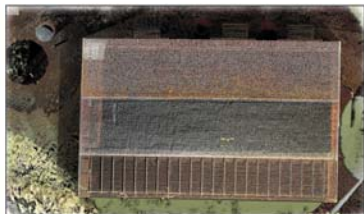
Facade NORTH-EAST
Photomap
Metric Scale 1:100



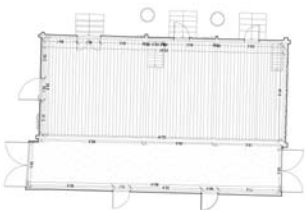
Facade SOUTH-WEST
Photomap
Metric Scale 1:100



General Plan
Metric scale 1:1000



Roof plan
Metric Scale 1:200



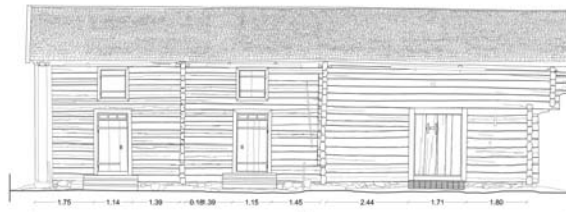
Floor Plan
Metric Scale 1:200



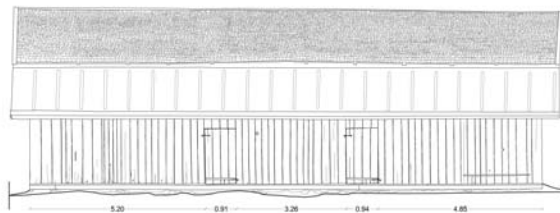
Facade NORTH-WEST
Photomap
Metric Scale 1:100



Facade SOUTH-EAST
Photomap
Metric Scale 1:100



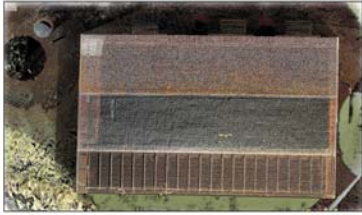
Facade NORTH-EAST
Photomap
Metric Scale 1:100



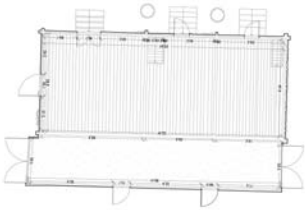
Facade SOUTH-WEST
Photomap
Metric Scale 1:100



General Plan
Metric scale 1:1000



Roof plan
Metric Scale 1:200



Floor Plan
Metric Scale 1:200



Facade NORTH-WEST
Photomap
Metric Scale 1:50



1.96
1.06
5.68
2.14

Facade NORTH-WEST
Wireframe drawing
Metric Scale 1:50

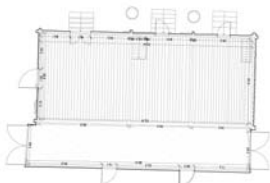
LIIHTIRAKENNUS



General Plan
Metric scale 1:1000



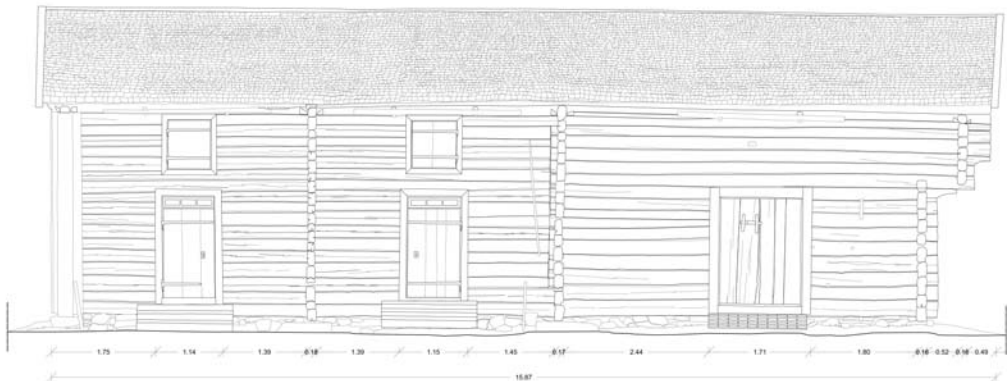
Roof plan
Metric Scale 1:200



Floor Plan
Metric Scale 1:200



Facade NORTH-EAST
Photomap
Metric Scale 1:50



1.17
1.28
5.10
2.24

Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:50

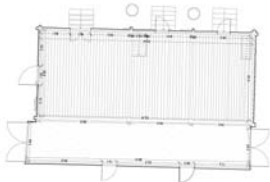
LIIHTIRAKENNUS



General Plan
Metric scale 1:1000



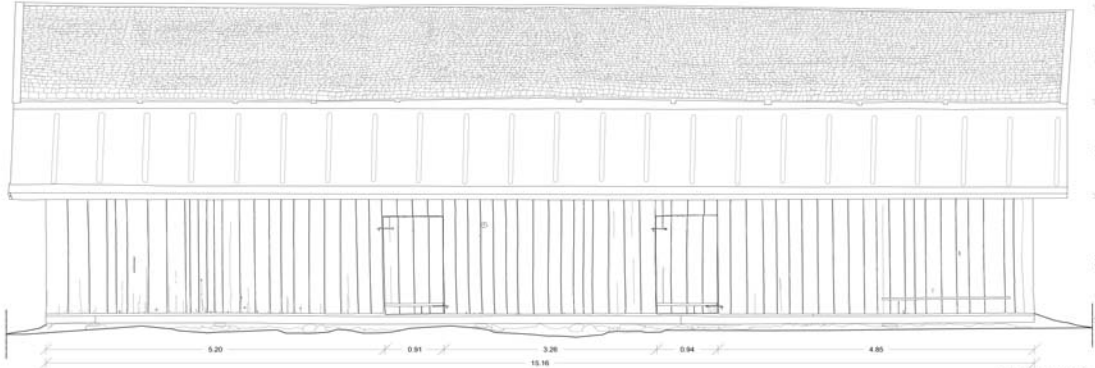
Roof plan
Metric Scale 1:200



Floor Plan
Metric Scale 1:200



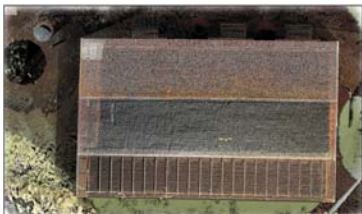
Facade SOUTH-WEST
Photomap
Metric Scale 1:50



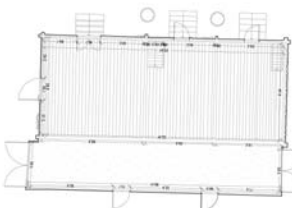
Facade SOUTH-WEST
Wireframe Drawing
Metric Scale 1:50



General Plan
Metric scale 1:1000



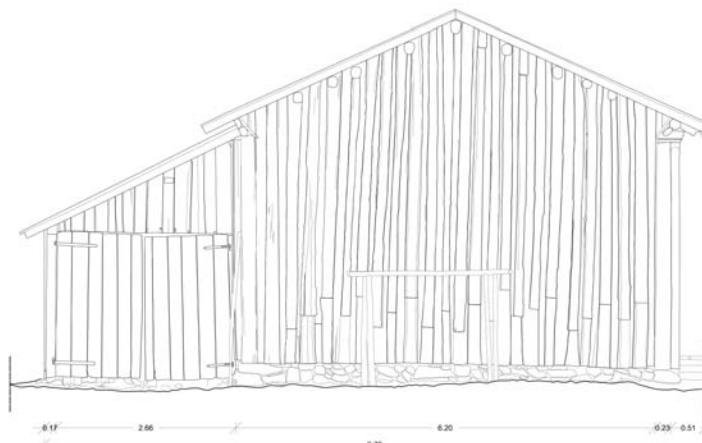
Roof plan
Metric Scale 1:200



Floor Plan
Metric Scale 1:200



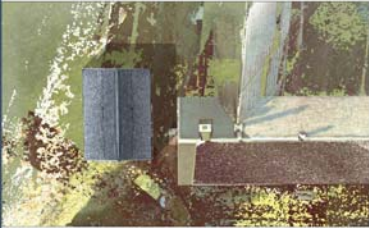
Facade SOUTH-EAST
Photomap
Metric Scale 1:50



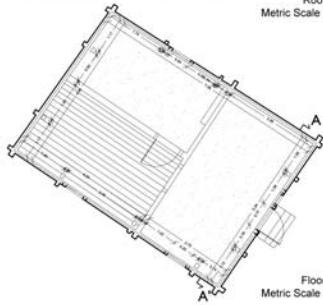
Facade SOUTH-EAST
Wireframe drawing
Metric Scale 1:50



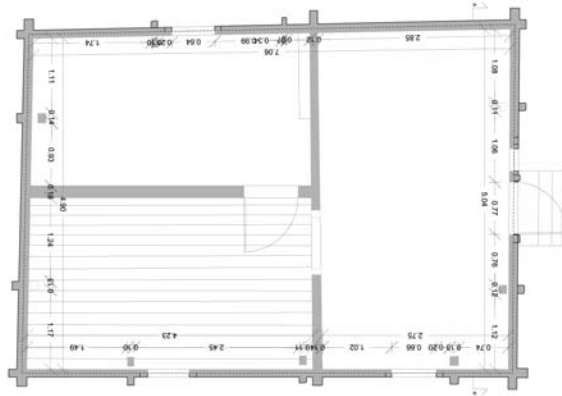
General Plan
Metric Scale 1:1000



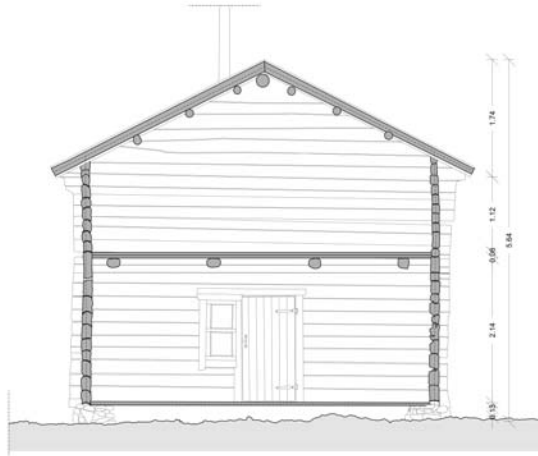
Roof Plan
Metric Scale 1:100



Floor Plan
Metric Scale 1:100



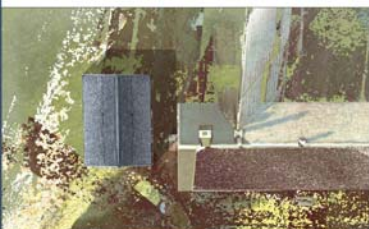
Floor Plan
Metric Scale 1:50



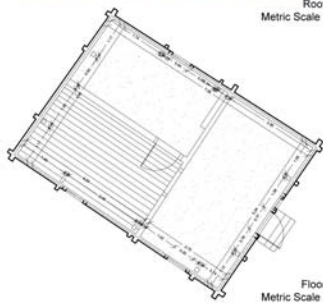
Section AA'
Metric Scale 1:50



General Plan
Metric Scale 1:1000



Roof Plan
Metric Scale 1:100



Floor Plan
Metric Scale 1:100



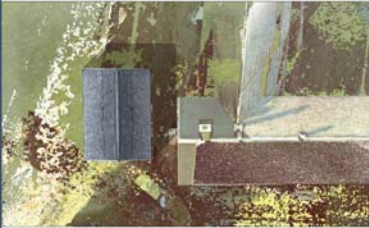
Facade SOUTH - EAST
Photomap
Metric Scale 1:50



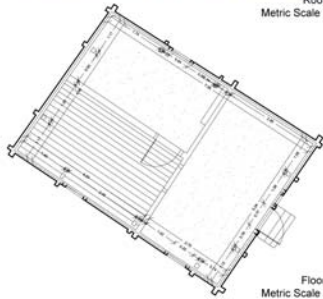
Facade SOUTH - EAST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric Scale 1:1000



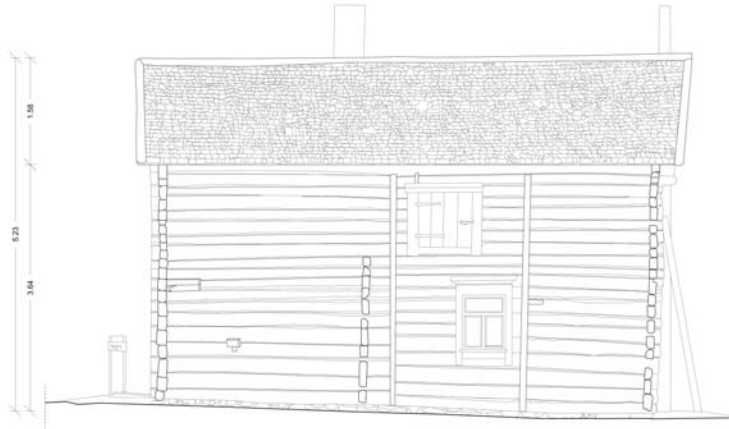
Roof Plan
Metric Scale 1:100



Floor Plan
Metric Scale 1:100



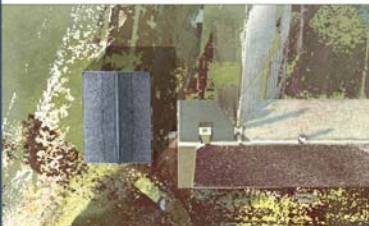
Facade NORTH EAST
Photomontage
Metric Scale 1:50



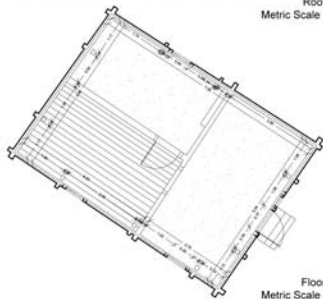
Facade NORTH EAST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric Scale 1:1000



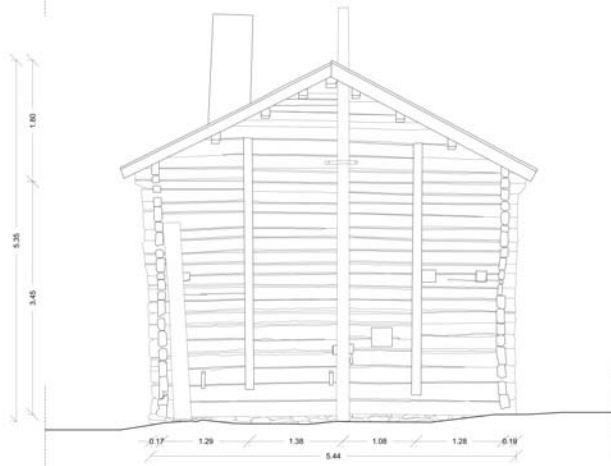
Roof Plan
Metric Scale 1:100



Floor Plan
Metric Scale 1:100



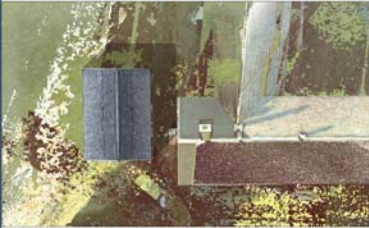
Facade NORTH WEST
Photomontage
Metric Scale 1:50



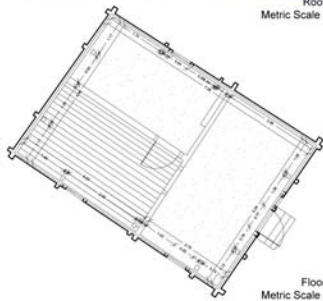
Facade NORTH WEST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric Scale 1:1000



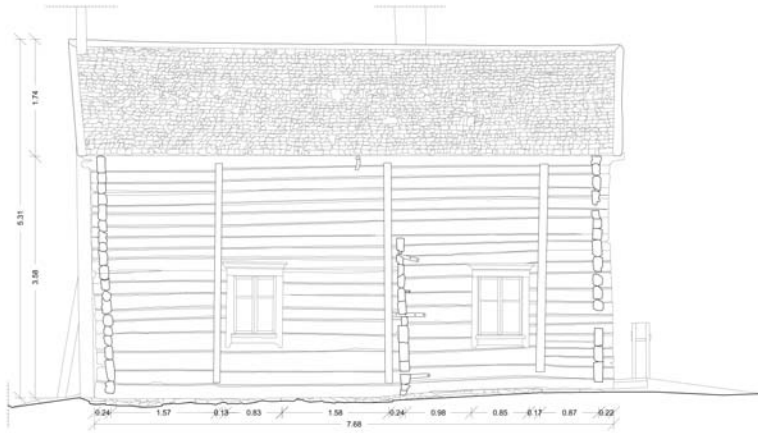
Roof Plan
Metric Scale 1:100



Floor Plan
Metric Scale 1:100



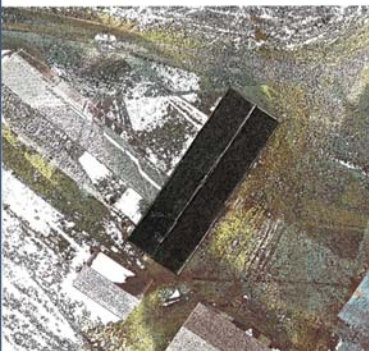
Facade SOUTH WEST
Photomapping
Metric Scale 1:50



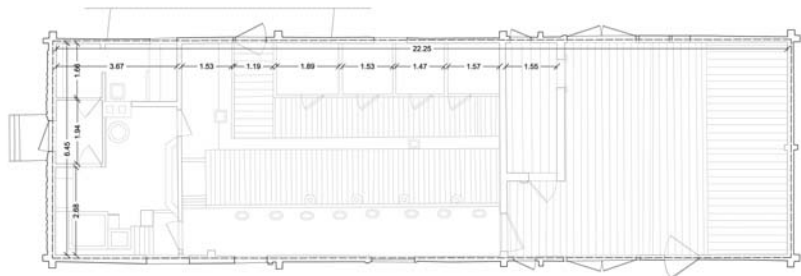
Facade SOUTH WEST
Wireframe drawing
Metric Scale 1:50



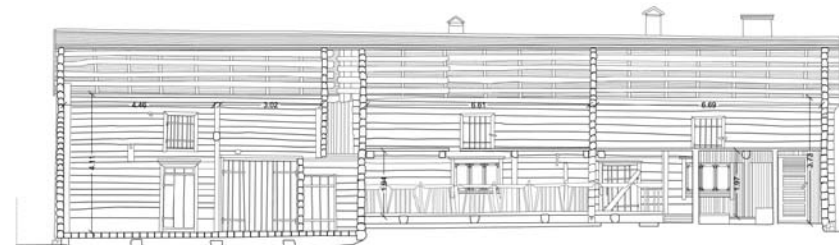
General Plan
Metric Scale 1:1000



Roof Plan from the point cloud
Metric Scale 1:200



Floor Plan
Wireframe drawing
Metric Scale 1:100



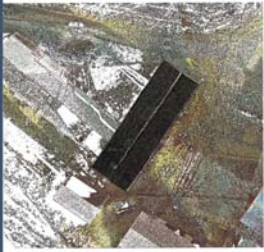
Longitudinal Section
Wireframe drawing
Metric Scale 1:100



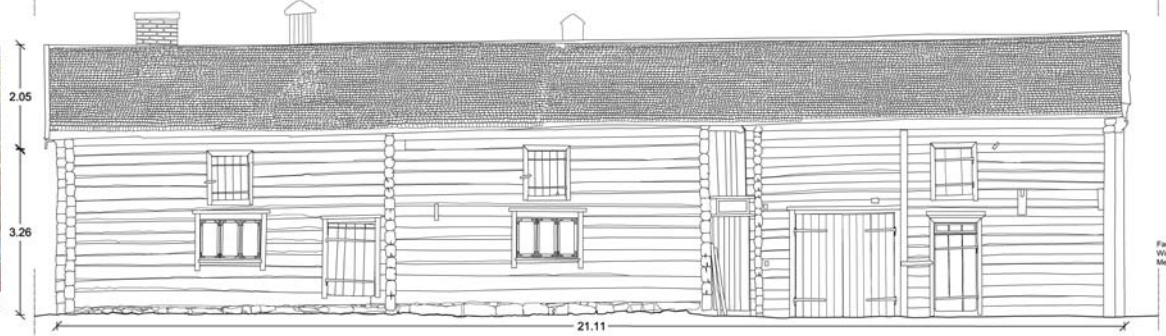
General Plan
Metric Scale 1:1000



Facade SOUTH-EAST
Photomap
Metric Scale 1:50



Roof Plan from the point cloud
Metric Scale 1:200



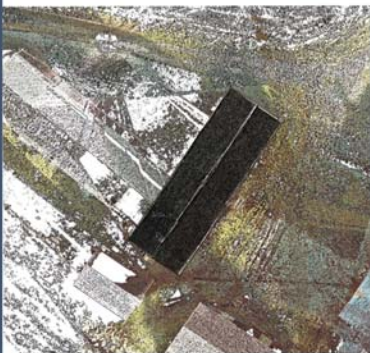
Facade SOUTH-EAST
Wireframe drawing
Metric Scale 1:50



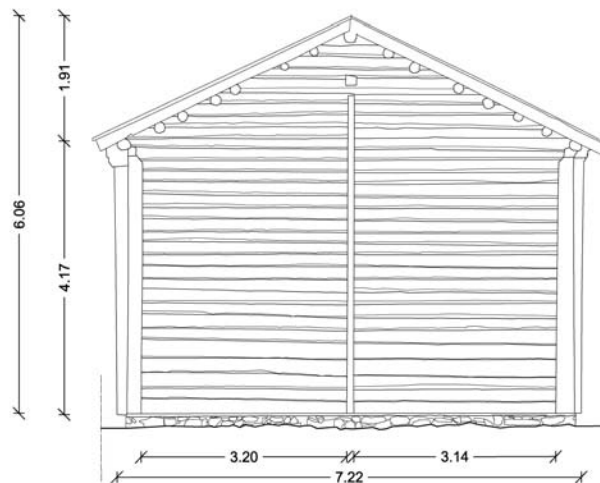
General Plan
Metric Scale 1:1000



Facade NORTH-EAST
Photomap
Metric Scale 1:50



Roof Plan from the point cloud
Metric Scale 1:200



Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:50



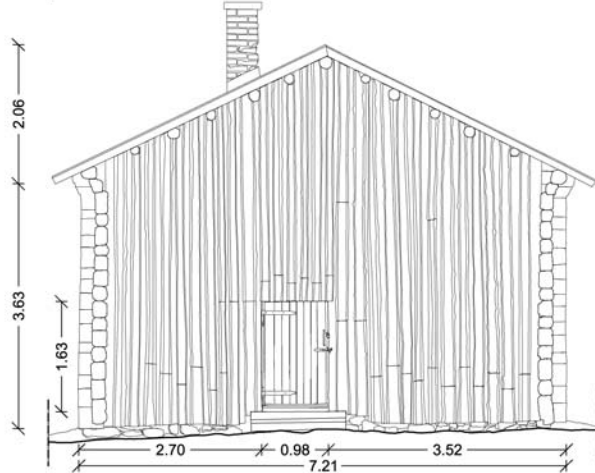
General Plan
Metric Scale 1:1000



Roof Plan from the point cloud
Metric Scale 1:200



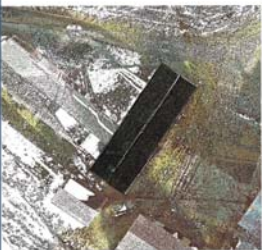
Facade SOUTH-WEST
Photomontage
Metric Scale 1:50



Facade SOUTH-WEST
Wireframe drawing
Metric Scale 1:50



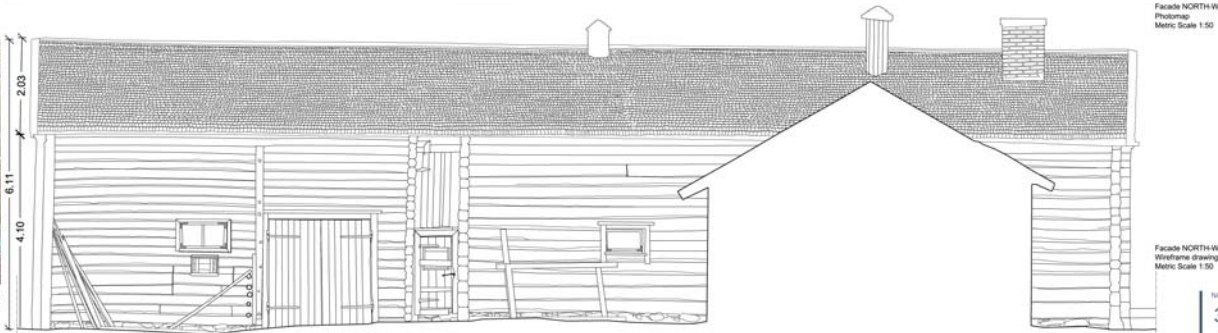
General Plan
Metric Scale 1:1000



Roof Plan from the point cloud
Metric Scale 1:200



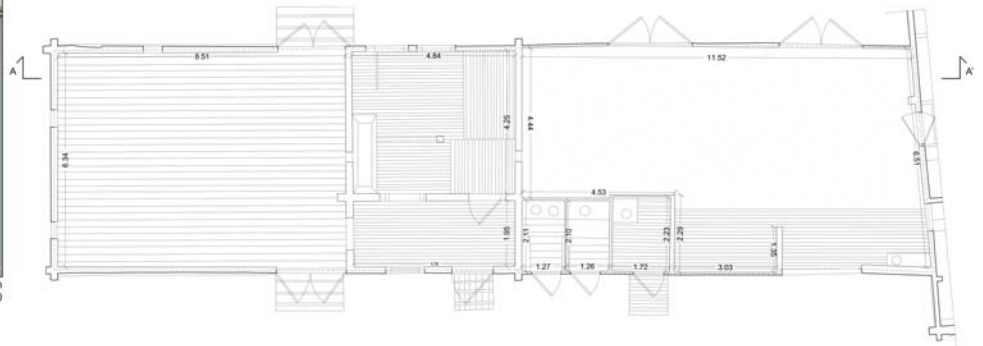
Facade NORTH-WEST
Photomontage
Metric Scale 1:50



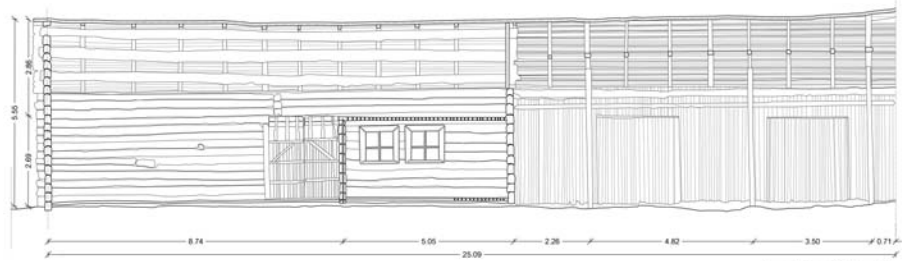
Facade NORTH-WEST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric Scale 1:1000



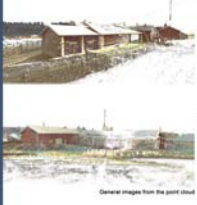
Floor Plan
Metric Scale 1:100



Longitudinal Section A-A'
Wireframe drawing
Metric Scale 1:100



General Plan
Metric Scale 1:1000

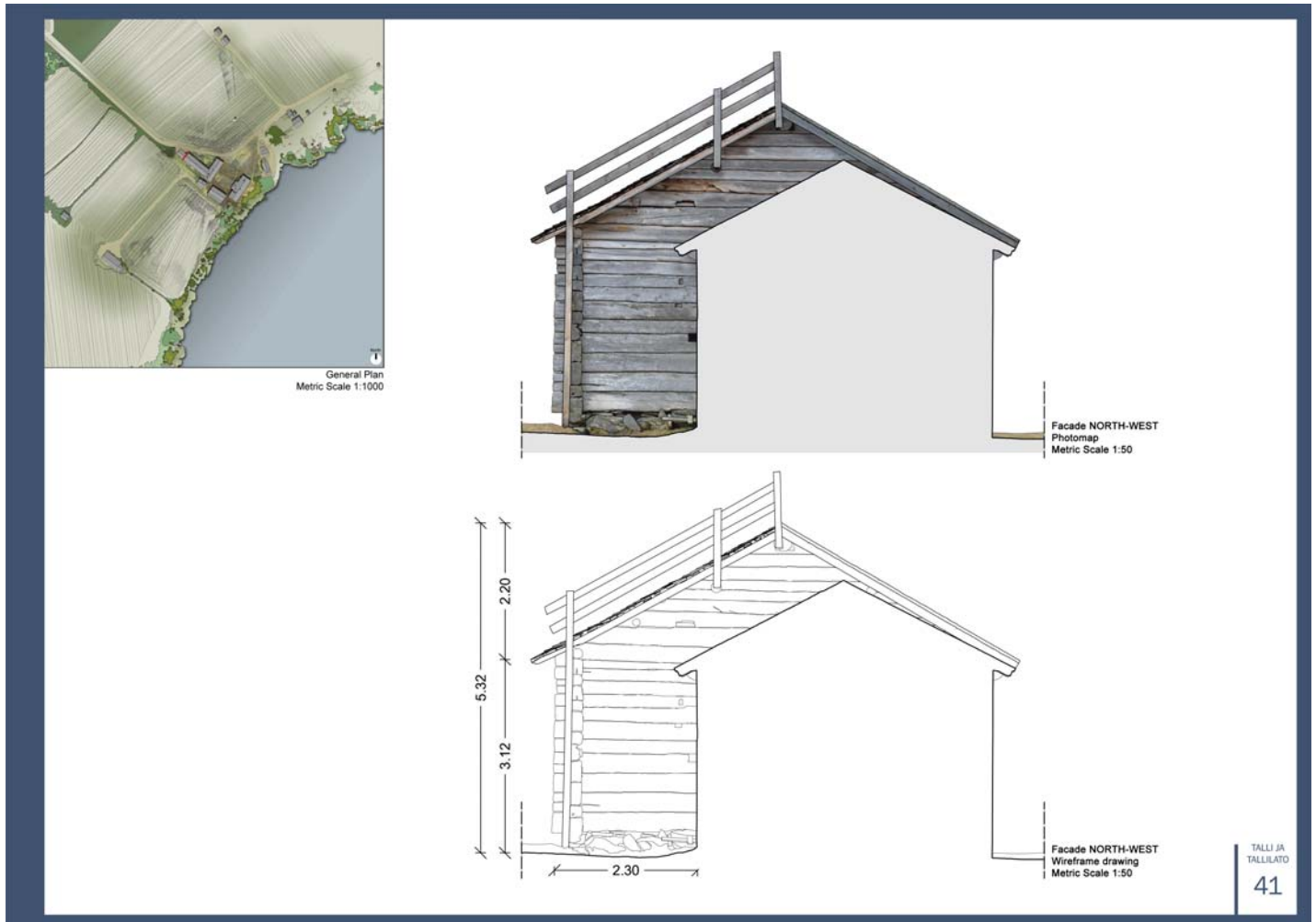


General images from the joint cloud



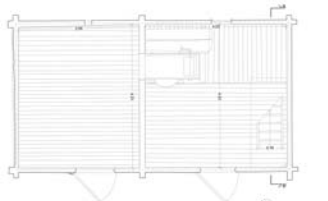
Facade NORTH-EAST
Photogram
Metric Scale 1:100

Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:100

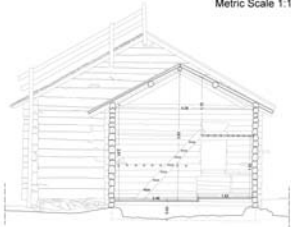




General Plan
Metric Scale 1:1000



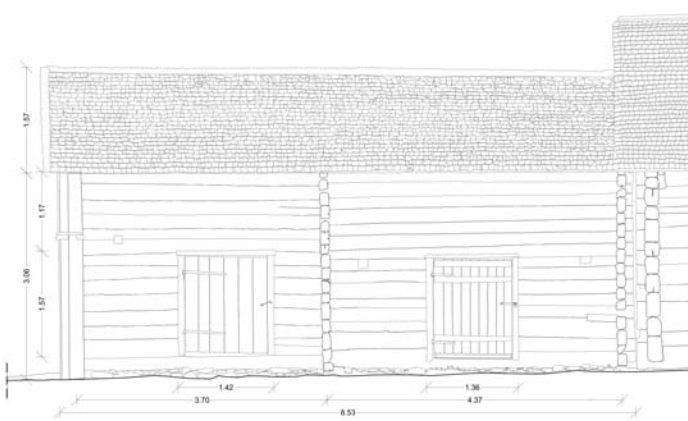
Floor Plan
Metric Scale 1:100



Trasversal Section BB'
Metric Scale 1:100



Facade SOUTH-WEST
Photomap
Metric Scale 1:50



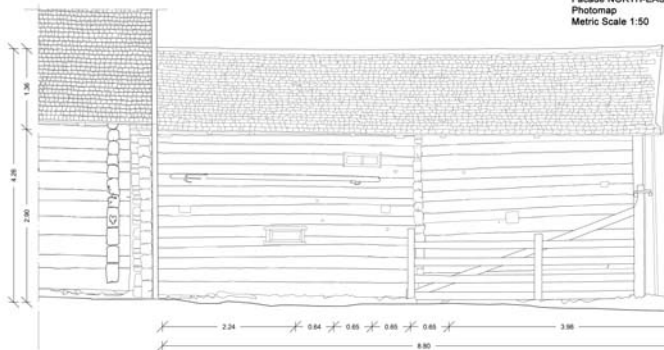
Facade SOUTH-WEST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric Scale 1:1000



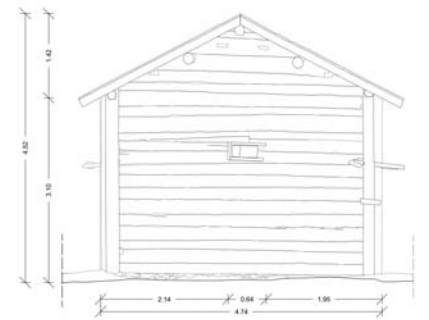
Facade NORTH-EAST
Photomap
Metric Scale 1:50



Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:50



Facade NORTH-WEST
Photomap
Metric Scale 1:50



Facade NORTH-WEST
Wireframe drawing
Metric Scale 1:50



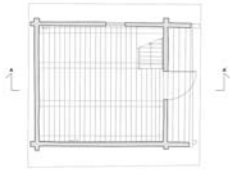
General Plan
Metric Scale 1:1000



Facade SOUTH
Photomontage
Metric Scale 1:50



Facade WEST
Photomontage
Metric Scale 1:50



Floor Plan
Metric Scale 1:100



Facade EAST
Photomontage
Metric Scale 1:50



Facade NORTH
Photomontage
Metric Scale 1:50



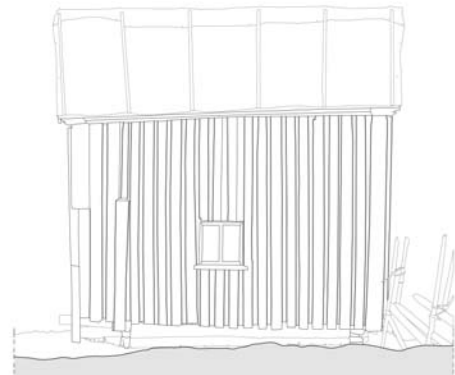
Transversal Section
Metric Scale 1:100



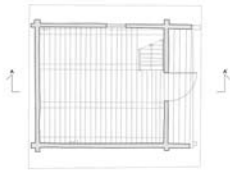
General Plan
Metric Scale 1:1000



Facade SOUTH
Wireframe drawing
Metric Scale 1:50



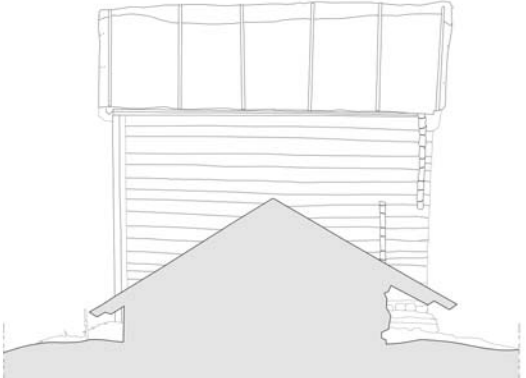
Facade WEST
Wireframe drawing
Metric Scale 1:50



Floor Plan
Metric Scale 1:100



Facade EAST
Wireframe drawing
Metric Scale 1:50



Facade NORTH
Wireframe drawing
Metric Scale 1:50



Transversal Section
Metric Scale 1:100



General Plan
Metric Scale 1:1000



Facade NORTH
Photomap
Metric Scale 1:50



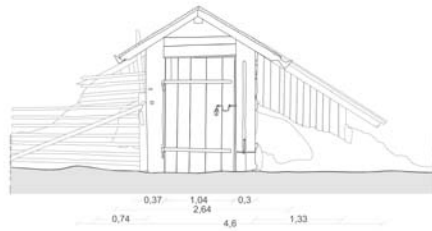
Facade WEST
Photomap
Metric Scale 1:50



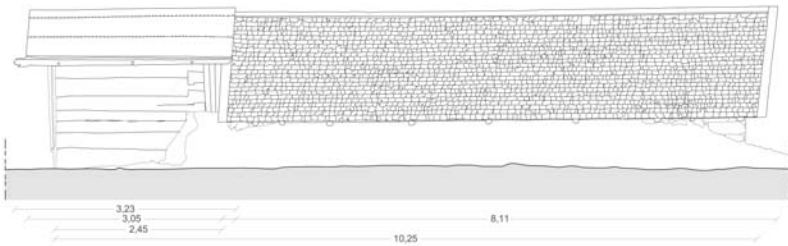
Facade EAST
Photomap
Metric Scale 1:50



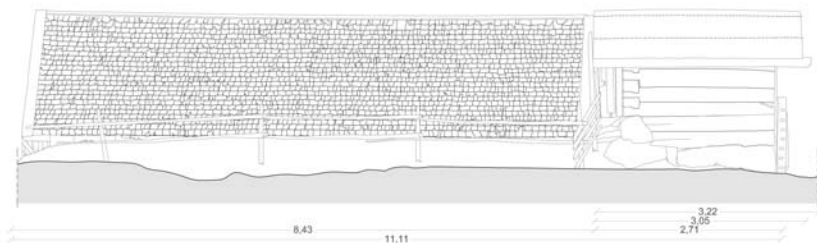
General Plan
Metric Scale 1:1000



Facade NORTH
Wireframe drawing
Metric Scale 1:50



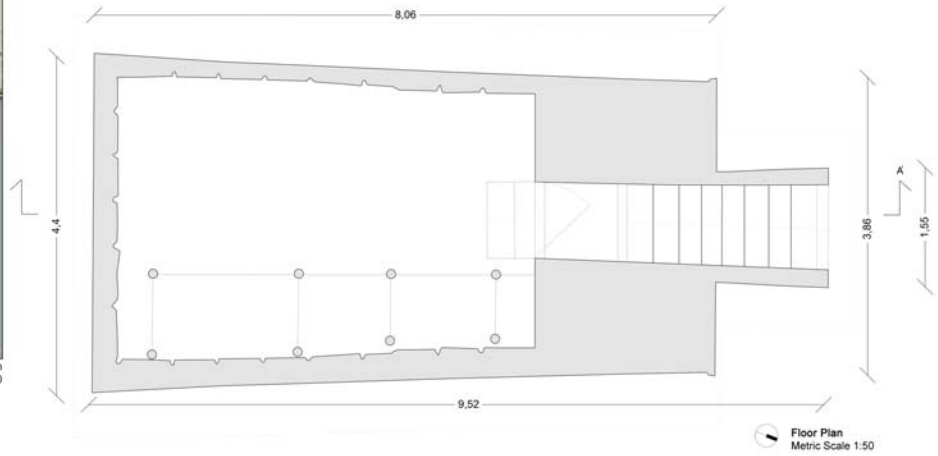
Facade WEST
Wireframe drawing
Metric Scale 1:50



Facade EAST
Wireframe drawing
Metric Scale 1:50



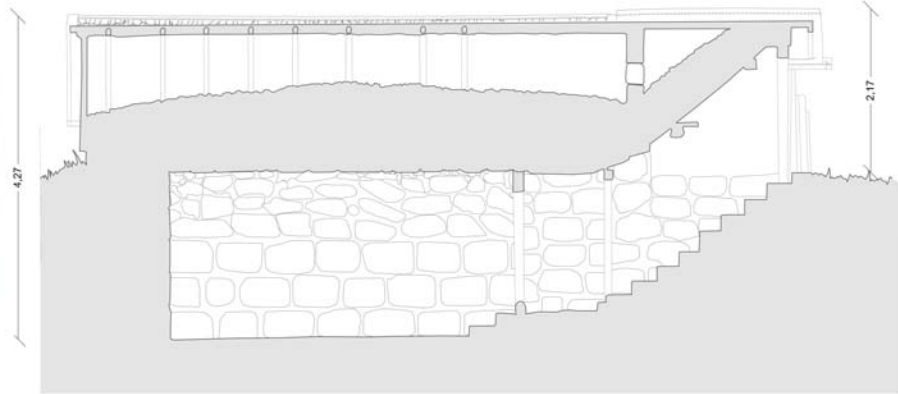
General Plan
Metric Scale 1:1000



Floor Plan
Metric Scale 1:50



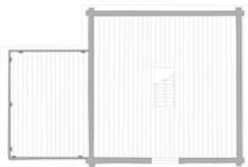
Kellari



Section AA'
Metric Scale 1:50



General Plan
Metric Scale 1:1000



Floor Plan
Metric Scale 1:100



General view from the point cloud



Facade WEST
Photomap
Metric Scale 1:50



Facade WEST
Wireframe drawing
Metric Scale 1:50



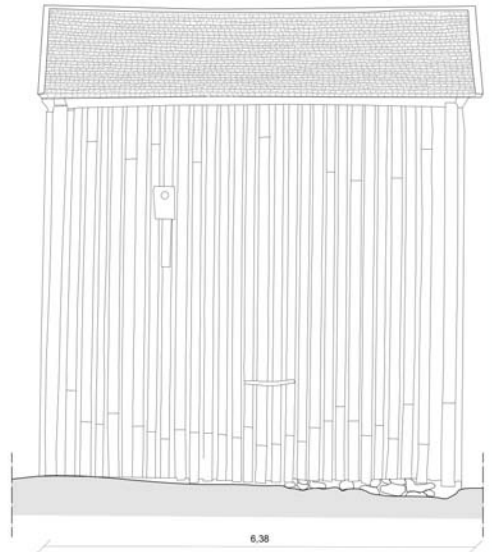
General Plan
Metric Scale 1:1000



Transversal Section
Wireframe drawing
Metric Scale 1:100



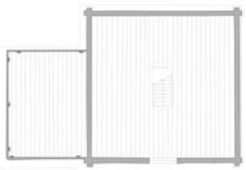
Facade SOUTH
Photomap
Metric Scale 1:50



Facade SOUTH
Wireframe drawing
Metric Scale 1:50



General Plan
Metric Scale 1:1000



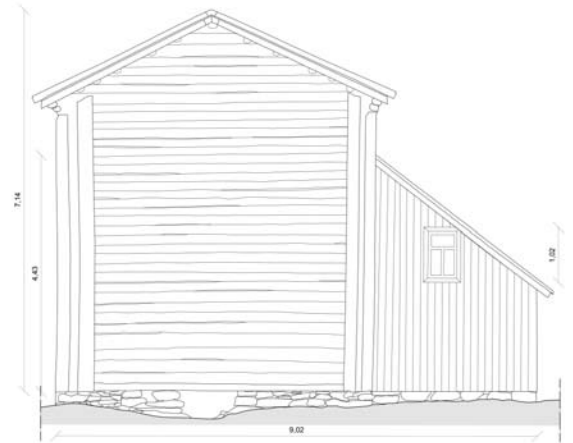
Floor Plan
Metric Scale 1:100



General view from the point cloud



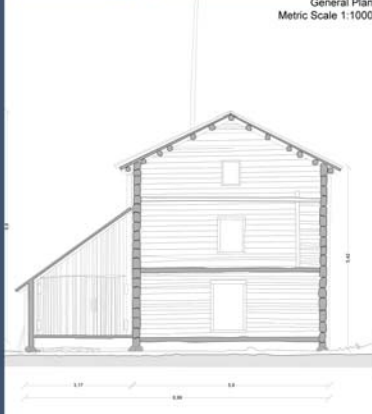
Facade EAST
Photomap
Metric Scale 1:50



Facade EAST
Wireframe drawing
Metric Scale 1:50



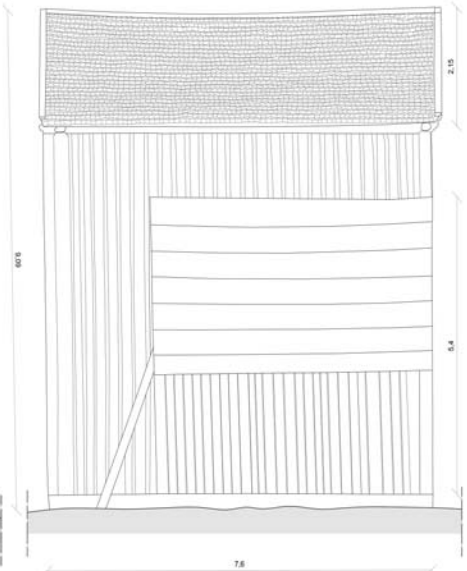
General Plan
Metric Scale 1:1000



Transversal Section
Wireframe drawing
Metric Scale 1:100



Facade NORTH
Photomontage
Metric Scale 1:50



Facade NORTH
Wireframe drawing
Metric Scale 1:50



General Plan
Metric Scale 1:1000



Floor Plan
Wireframe drawing
Metric Scale 1:100



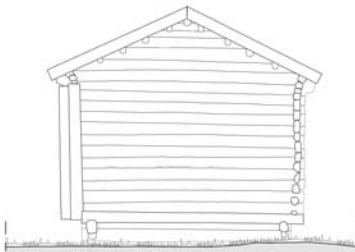
Facade SOUTH-WEST
Photomontage
Metric Scale 1:50



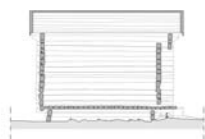
Facade SOUTH-WEST
Wireframe drawing
Metric Scale 1:50



Facade NORTH-EAST
Photomontage
Metric Scale 1:50



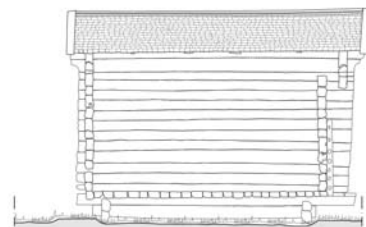
Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:50



Transversal Section
Wireframe drawing
Metric Scale 1:100



Facade NORTH-WEST
Photomontage
Metric Scale 1:50



Facade NORTH-WEST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric Scale 1:1000



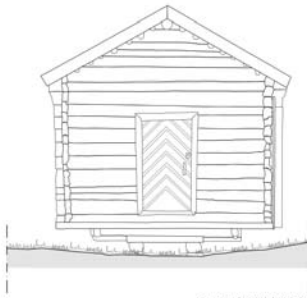
Facade SOUTH-WEST
Photomap
Metric Scale 1:50



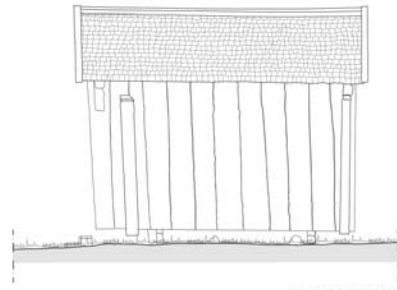
Facade SOUTH-EAST
Photomap
Metric Scale 1:50



Floor Plan
Wireframe drawing
Metric Scale 1:100



Facade SOUTH-WEST
Wireframe drawing
Metric Scale 1:50



Facade SOUTH-EAST
Wireframe drawing
Metric Scale 1:50



Transversal Section
Wireframe drawing
Metric Scale 1:100



General Plan
Metric Scale 1:1000



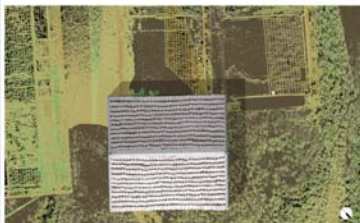
Facade SOUTH-EAST
Photomap
Metric Scale 1:50



Facade NORTH-WEST
Photomap
Metric Scale 1:50



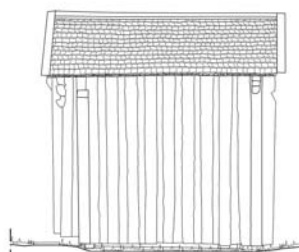
Facade NORTH-EAST
Photomap
Metric Scale 1:50



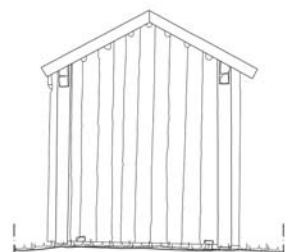
Roof Plan
Metric Scale 1:100



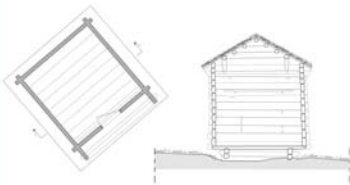
Facade SOUTH-EAST
Wireframe drawing
Metric Scale 1:50



Facade NORTH-WEST
Wireframe drawing
Metric Scale 1:50



Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:50



Floor Plan and section
Metric Scale 1:50



General Plan
Metric Scale 1:1000



Facade NORTH-WEST
Photomontage
Metric Scale 1:50



Facade SOUTH-WEST
Photomontage
Metric Scale 1:50



Floor Plan
Wireframe drawing
Metric Scale 1:100



Facade NORTH-WEST
Wireframe drawing
Metric Scale 1:50



Facade SOUTH-WEST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric Scale 1:1000



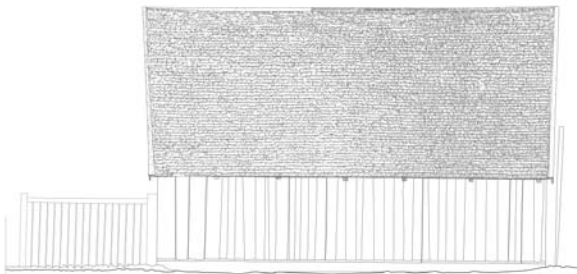
Facade SOUTH-EAST
Photomontage
Metric Scale 1:50



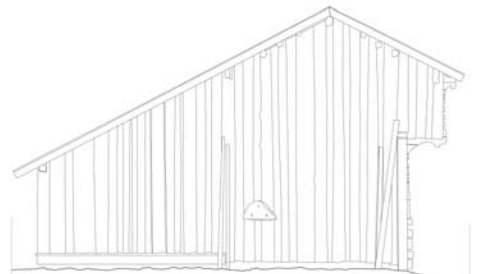
Facade NORTH-EAST
Photomontage
Metric Scale 1:50



Transversal section
Wireframe drawing
Metric Scale 1:100



Facade SOUTH-EAST
Wireframe drawing
Metric Scale 1:50



Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric Scale 1:1000



Facade NORTH
Photomap
Metric Scale 1:50



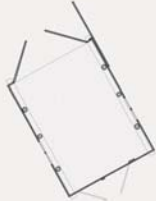
Facade NORTH
Wireframe drawing
Metric Scale 1:50



Facade SOUTH
Photomap
Metric Scale 1:50



Facade SOUTH
Wireframe drawing
Metric Scale 1:50



Floor Plan
Wireframe drawing
Metric Scale 1:100



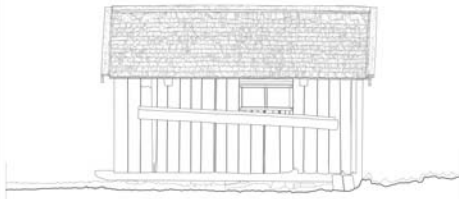
Facade WEST
Photomap
Metric Scale 1:50



Facade EAST
Photomap
Metric Scale 1:50



Transversal section
Wireframe drawing
Metric Scale 1:100



Facade WEST
Wireframe drawing
Metric Scale 1:50



Facade EAST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric Scale 1:1000



Facade NORTH
Photomap
Metric Scale 1:50



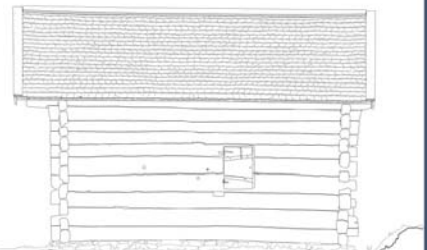
Facade WEST
Photomap
Metric Scale 1:50



Facade SOUTH
Photomap
Metric Scale 1:100



Facade NORTH
Wireframe drawing
Metric Scale 1:50



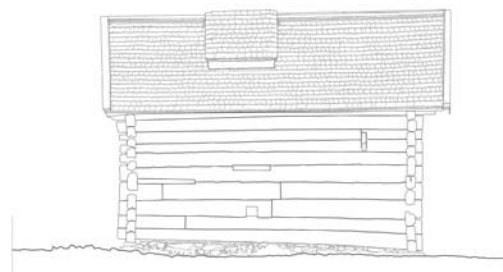
Facade WEST
Wireframe drawing
Metric Scale 1:50



Facade SOUTH
Photomap
Metric Scale 1:100



Facade EAST
Wireframe drawing
Metric Scale 1:50



Facade EAST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric Scale 1:1000



Facade WEST
Photomap
Metric Scale 1:50



Facade EAST
Photomap
Metric Scale 1:50



Facade WEST
Wireframe drawing
Metric Scale 1:50



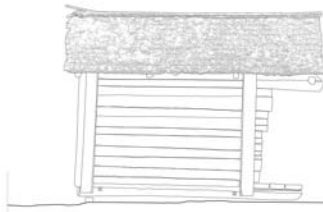
Facade EAST
Wireframe drawing
Metric Scale 1:50



Facade NORTH
Photomap
Metric Scale 1:50



Facade SOUTH
Photomap
Metric Scale 1:50



Facade NORTH
Wireframe drawing
Metric Scale 1:50



Facade SOUTH
Wireframe drawing
Metric Scale 1:50



General Plan
Metric Scale 1:1000



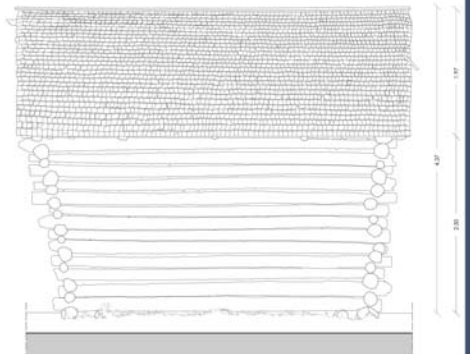
Facade SOUTH-EAST
Photomap
Metric Scale 1:50



Facade SOUTH-EAST
Wireframe drawing
Metric Scale 1:50



Facade NORTH-EAST
Photomap
Metric Scale 1:50



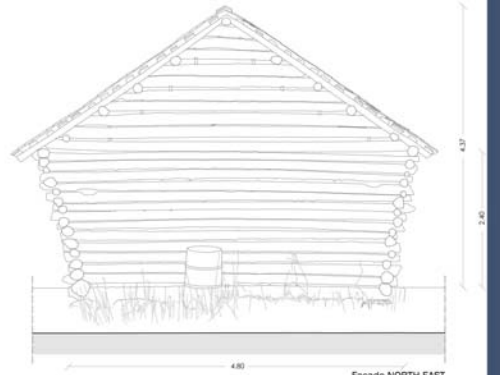
Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric Scale 1:1000



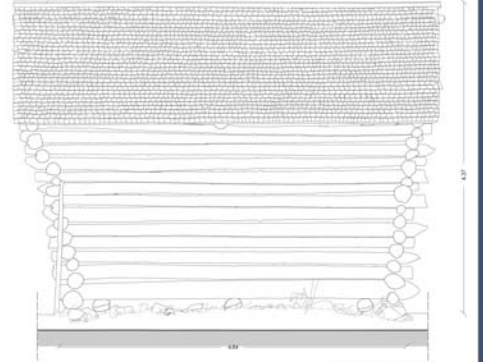
Facade NORTH-WEST
Photomap
Metric Scale 1:50



Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:50



Facade SOUTH-WEST
Photomap
Metric Scale 1:50



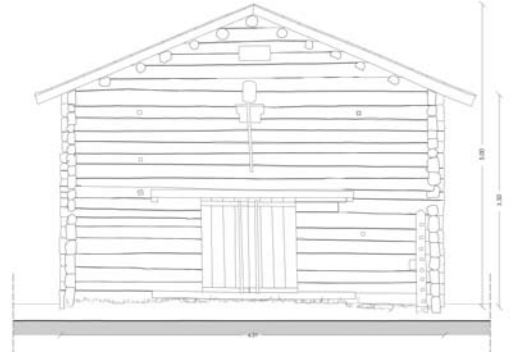
Facade SOUTH-WEST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric Scale 1:1000



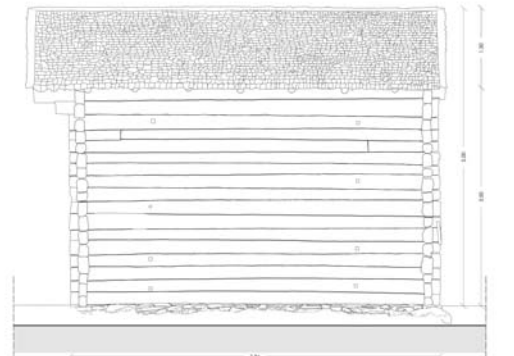
Facade SOUTH-EAST
Photomap
Metric Scale 1:50



Facade SOUTH-EAST
Wireframe drawing
Metric Scale 1:50



Facade NORTH-EAST
Photomap
Metric Scale 1:50



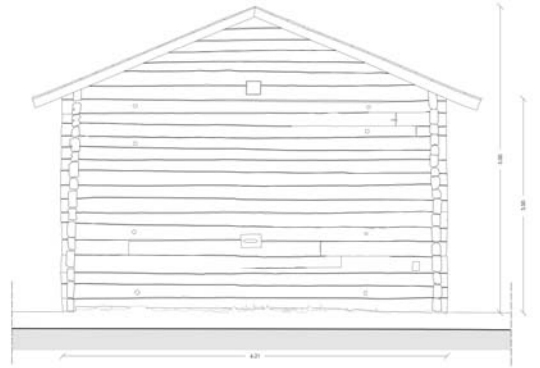
Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric Scale 1:1000



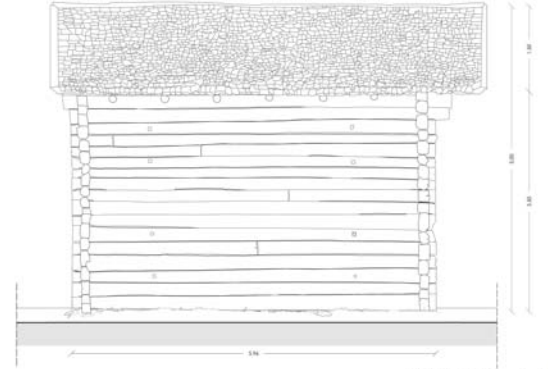
Facade NORTH WEST
Photomap
Metric Scale 1:50



Facade NORTH WEST
Wireframe drawing
Metric Scale 1:50



Facade SOUTH WEST
Photomap
Metric Scale 1:50



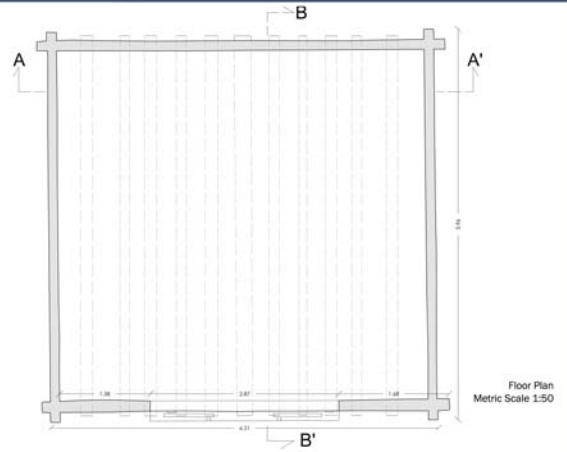
Facade SOUTH WEST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric Scale 1:1000



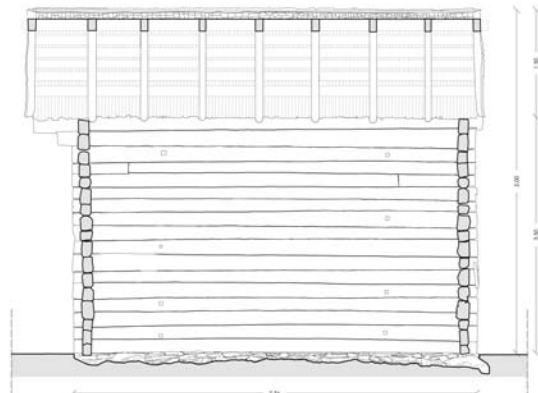
Roof Plan
Photomodelling process
Metric Scale 1:100



Floor Plan
Metric Scale 1:50



Section AA'
Metric Scale 1:50



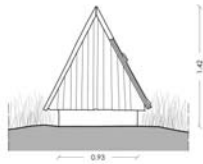
Section BB'
Metric Scale 1:50



General Plan
Metric Scale 1:1000



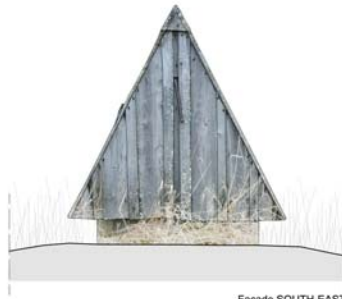
Floor Plan
Metric Scale 1:40



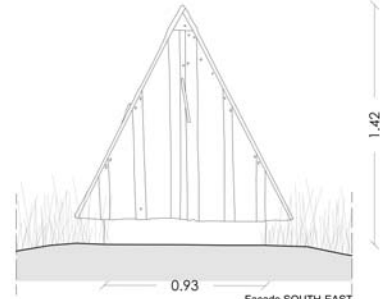
Section AA
Metric Scale 1:40



Section BB'
Metric Scale 1:40



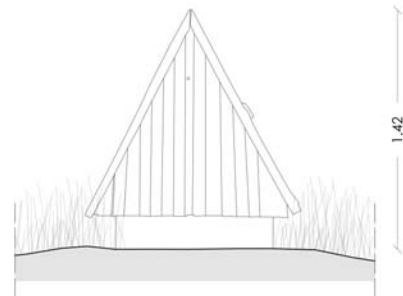
Facade SOUTH-EAST
Photomap
Metric Scale 1:20



Facade SOUTH-EAST
Wireframe drawing
Metric Scale 1:20



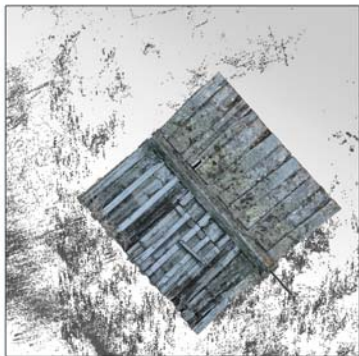
Facade NORTH-WEST
Photomap
Metric Scale 1:20



Facade NORTH-WEST
Wireframe drawing
Metric Scale 1:20



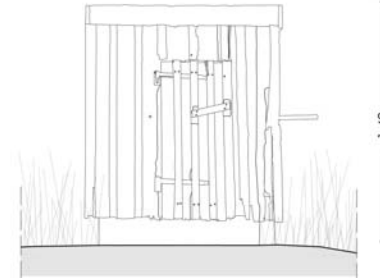
General Plan
Metric Scale 1:1000



Roof Plane
Metric Scale 1:20



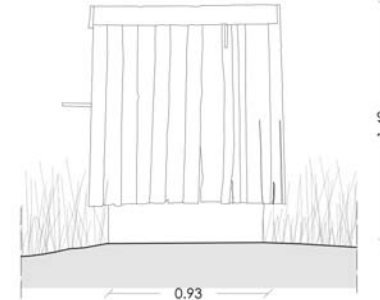
Facade NORTH-EAST
Photomap
Metric Scale 1:20



Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:20



Facade SOUTH-WEST
Photomap
Metric Scale 1:20



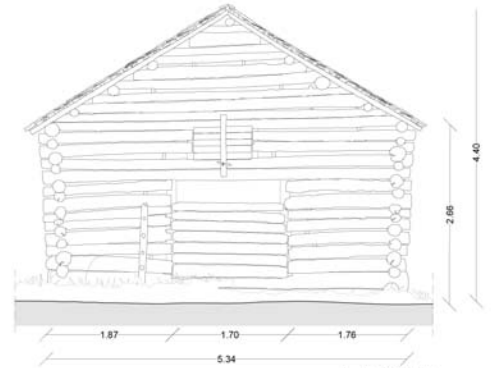
Facade SOUTH-WEST
Wireframe drawing
Metric Scale 1:20



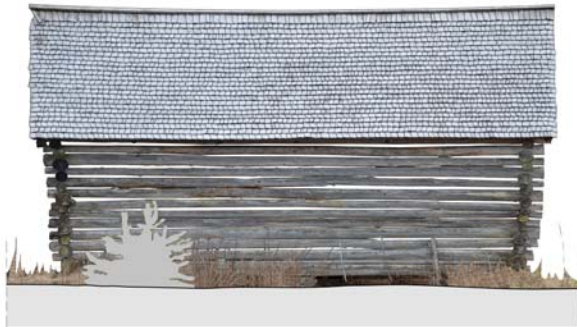
General Plan
Metric Scale 1:1000



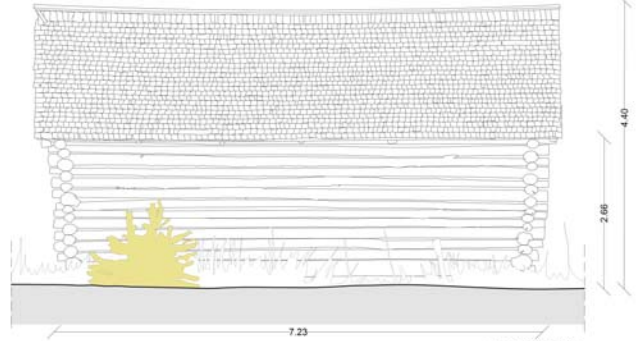
Facade SOUTH-EAST
Photomap
Metric Scale 1:50



Facade SOUTH-EAST
Wireframe drawing
Metric Scale 1:50



Facade NORTH-EAST
Photomap
Metric Scale 1:50



Missing data for the presence of vegetation in front of the facade analyzed.

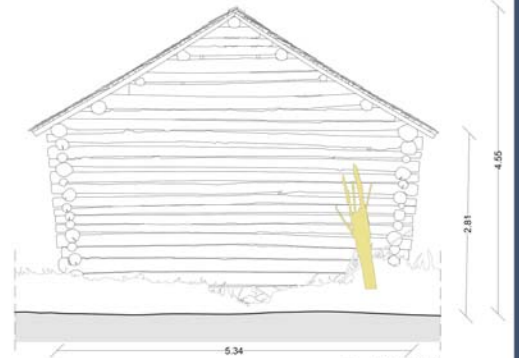
Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric Scale 1:1000



Facade NORTH-WEST
Photomap
Metric Scale 1:50

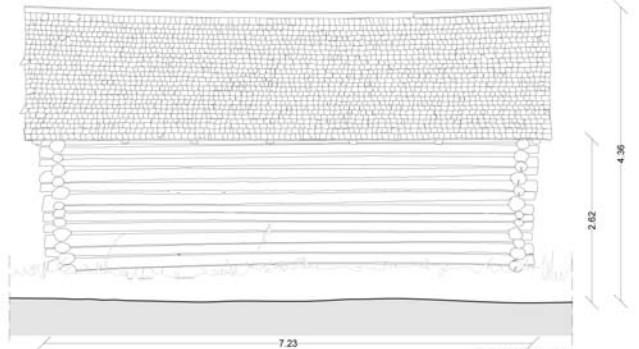


Missing data for the presence of vegetation in front of the facade analyzed.

Facade NORTH-WEST
Wireframe drawing
Metric Scale 1:50



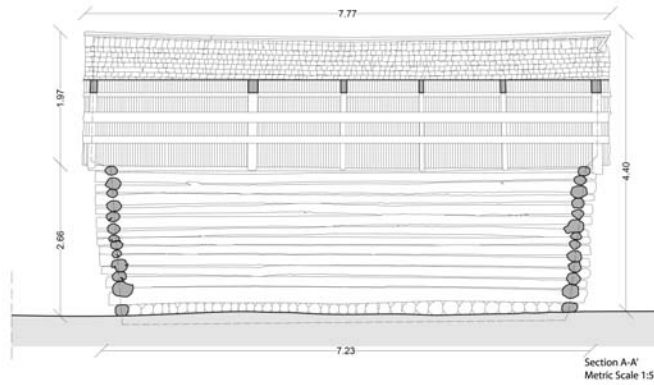
Facade SOUTH-WEST
Photomap
Metric Scale 1:50



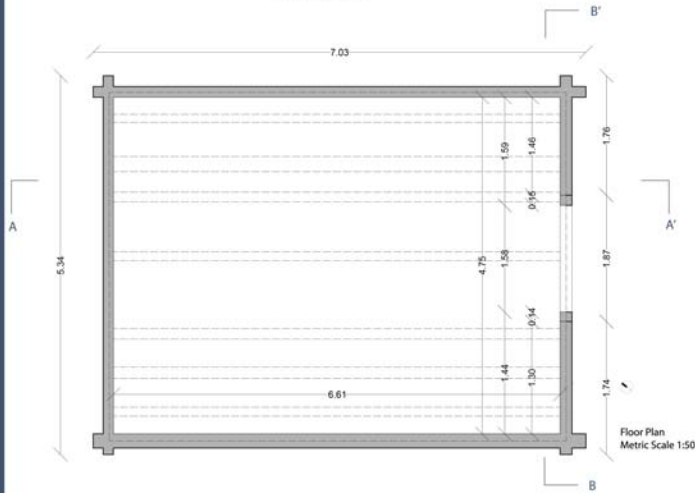
Facade SOUTH-WEST
Wireframe drawing
Metric Scale 1:50



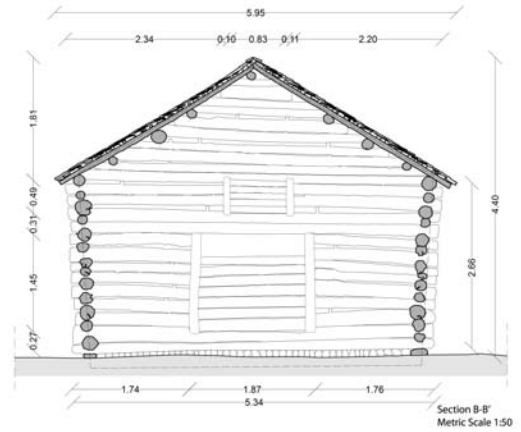
General Plan
Metric Scale 1:1000



Section A-A'
Metric Scale 1:50



Floor Plan
Metric Scale 1:50



Section B-B'
Metric Scale 1:50



General Plan
Metric Scale 1:1000



Facade NORTH EAST
Photogram
Metric Scale 1:50



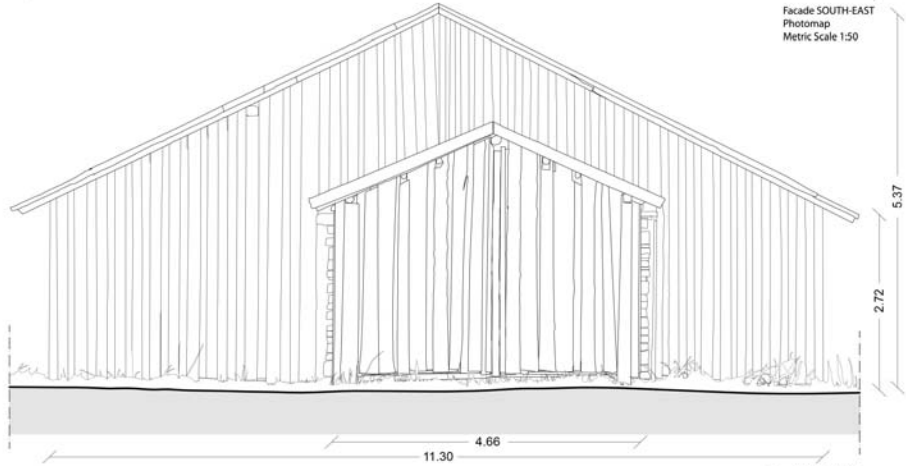
Facade NORTH EAST
Wireframe Drawing
Metric Scale 1:50



General Plan
Metric Scale 1:1000



Facade SOUTH-EAST
Photomap
Metric Scale 1:50



Facade SOUTH-EAST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric Scale 1:1000



Facade SOUTH-WEST
Photomap
Metric Scale 1:50



Facade SOUTH-WEST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric Scale 1:1000



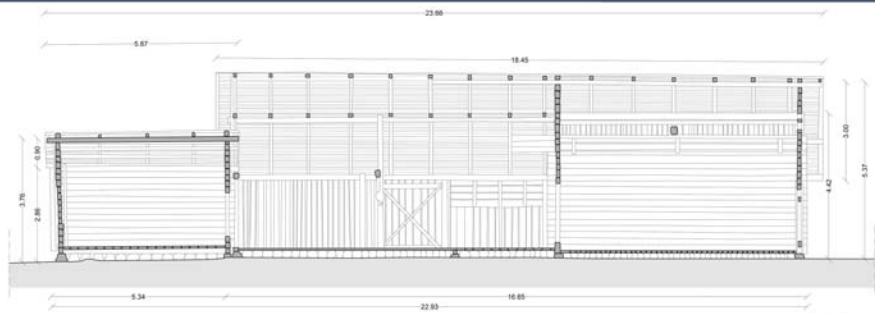
Facade NORTH-WEST
Photomapping
Metric Scale 1:50



Facade NORTH-WEST
Wireframe drawing
Metric Scale 1:50



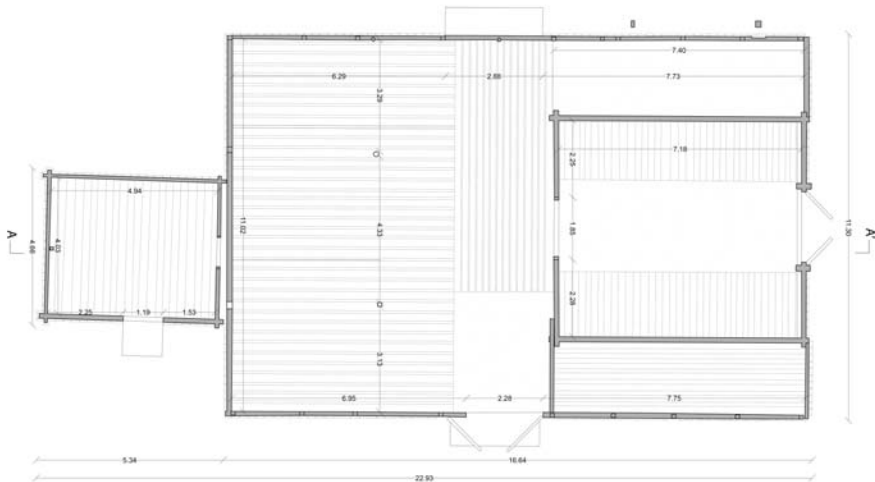
General Plan
Metric Scale 1:1000



Section A-A'
Metric Scale 1:100



General views



Floor Plan
Metric Scale 1:100



General Plan
Metric scale 1:1000

Analysis of Damages - Index

Structural features

- Subsidence** Instability due to the movement of the ground which determines a drag of force.
- Strain distortion** Variation of the shape that affects the entire thickness of the material and its mechanical strength through torsion twisting.
- Cracking / Split** Phenomenon due to the loss of water during the maturing phase. It comes with cracks that move from the surface to the inside.

Intrinsic deterioration of the material

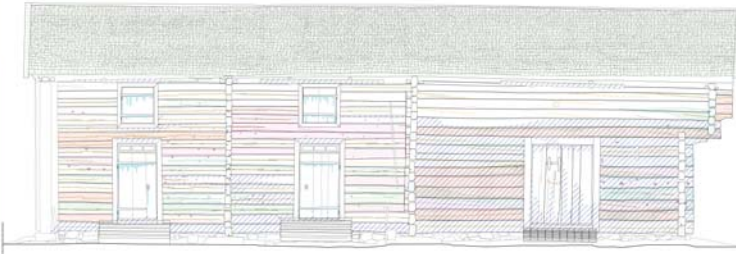
- Node** Discontinuity of the material caused by the presence of joints or knots remaining embedded in the wood. The area around the node is not structurally continuous with the rest of the timber log.
- Switched Fiber** Consequence of the growth conditions of the tree causing the inclination of the fiber in relation to the main axis. Decreases the mechanical strength of the trunk.

Biological elements

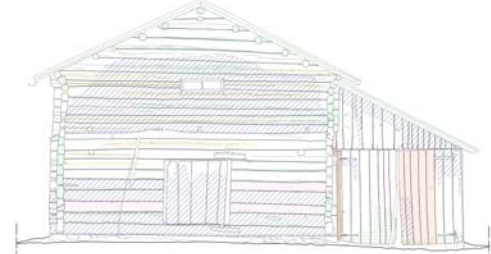
- Molds and lichens** Formation of living organisms due to the presence of moisture contained in the wood. The concentration of these agents is greater in areas directly in contact with water and soil.
- Attack from xylophagous insects and caries** Degradation of wood caused by fungus or by attack of insects, causing massive loss of mass, mechanical strength, hardness.

Weathering

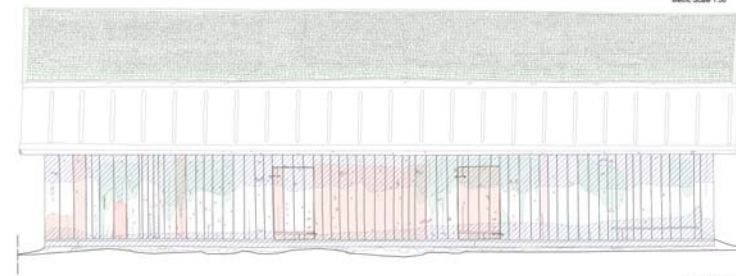
- Chromatic alteration** It is manifested through the variation of color, clarity, saturation. It can manifest itself with different morphologies and refer to large or localized areas.
- Ring shake** Tangential discontinuity of the timber structure, for a short or long portion of the log. It is configured as a gap of two contiguous growth rings. This phenomenon greatly reduces the load-bearing capacity.
- Rusty stain** Chromatic alteration of wood due to the penetration of liquid substance from oxidized iron elements.
- Anthropic action** Form of alteration and / or modification of the state of conservation induced by improper use by human action.



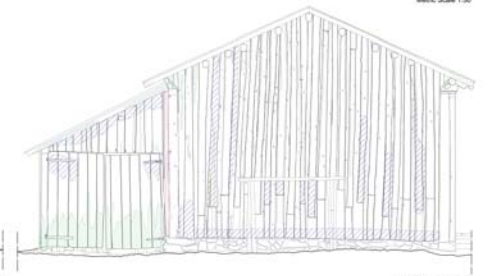
Facade NORTH-WEST
Metric Scale 1:50



Facade NORTH-EAST
Metric Scale 1:50



Facade SOUTH-EAST
Metric Scale 1:50



Facade SOUTH-WEST
Metric Scale 1:50



General Plan
Metric scale 1:1000

Analysis of Damages - Index

Structural features

- Subsidence** Instability due to the movement of the ground which determines a drag of force.
- Strain distortion** Variation of the shape that affects the entire thickness of the material and its mechanical strength through torsion twisting.
- Cracking / Split** Phenomenon due to the loss of water during the maturing phase. It comes with cracks that move from the surface to the inside.

Intrinsic deterioration of the material

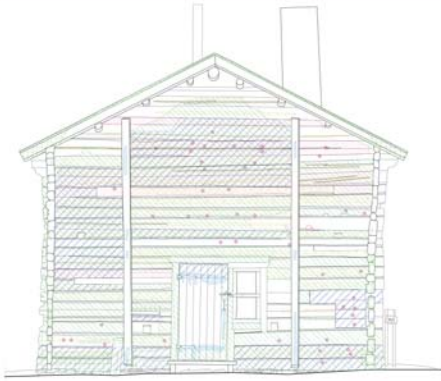
- Node** Discontinuity of the material caused by the presence of joints or knots remaining embedded in the wood. The area around the node is not structurally continuous with the rest of the timber log.
- Switched Fiber** Consequence of the growth conditions of the tree causing the inclination of the fiber in relation to the main axis. Decreases the mechanical strength of the trunk.

Biological elements

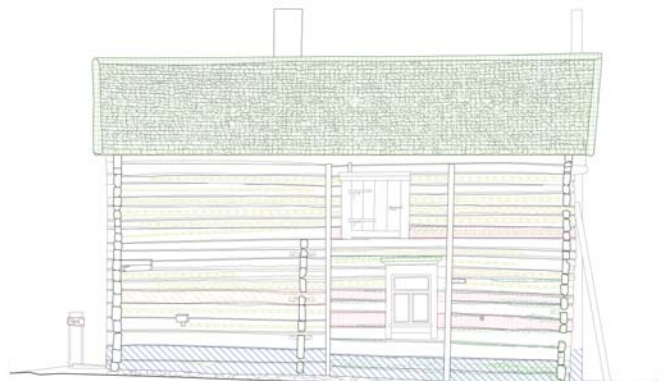
- Molds and lichens** Formation of living organisms due to the presence of moisture contained in the wood. The concentration of these agents is greater in areas directly in contact with water and soil.
- Attack from xylophagous insects and caries** Degradation of wood caused by fungus or by attack of insects, causing massive loss of mass, mechanical strength, hardness.

Weathering

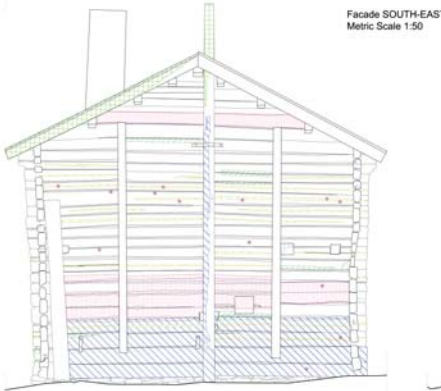
- Chromatic alteration** It is manifested through the variation of color, clarity, saturation. It can manifest itself with different morphologies and refer to large or localized areas.
- Ring shake** Tangential discontinuity of the timber structure, for a short or long portion of the log. It is configured as a gap of two contiguous growth rings. This phenomenon greatly reduces the load-bearing capacity.
- Rusty stain** Chromatic alteration of wood due to the penetration of liquid substance from oxidized iron elements.
- Anthropic action** Form of alteration and / or modification of the state of conservation induced by improper use by human action.



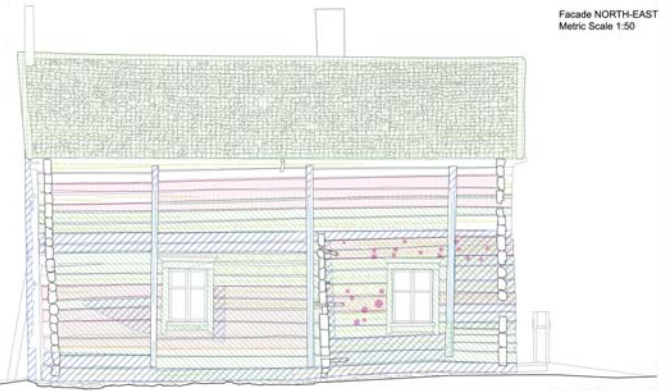
Facade SOUTH-EAST
Metric Scale 1:50



Facade NORTH-EAST
Metric Scale 1:50



Facade NORTH-WEST
Metric Scale 1:50



Facade SOUTH-WEST
Metric Scale 1:50



General Plan
Metric scale 1:1000

Analysis of Damages - Index

Structural features

- Subsidence** Instability due to the movement of the ground which determines a drag of force
- Strain distortion** Variation of the shape that affects the entire thickness of the material and it manifests mainly through ribbon elements
- Cracking / Split** Phenomenon due to the loss of water during the maturing phase. It comes with cracks that move from the surface to the outside

Intrinsic deterioration of the material

- Node** Discontinuity of the material caused by the presence of parts of branches remaining embedded in the stem. The area around the node is not structurally collaborative with the rest of the timber log
- Switched Fiber** Consequence of the growth conditions of the tree causing the inclination of the fiber in relation to the main axis. Decreases the mechanical strength of the trunk.

Biological elements

- Molds and lichens** Formation of living organisms due to the presence of moisture contained in the wood. The concentration of these agents is greater in areas directly in contact with water and soil
- Attack from xylophagous insects and caries** Degradation of wood caused by fungus or by attack of insects causing massive loss of mass, mechanical strength, hardness.

Weathering

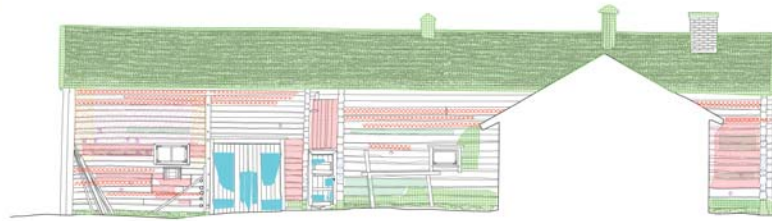
- Chromatic alteration** It is manifested through the variation of color, clarity, saturation. It can manifest itself with different morphologies and refer to large or localized areas
- Ring shake** Tangential discontinuity of the timber structure, for a short or long portion of the log. It is configured as a gap of two contiguous growth rings. This phenomenon greatly reduces the load bearing capacity
- Rusty stain** Chromatic alteration of wood due to the percolation of liquid substance from oxidized iron elements.

Anthropic action

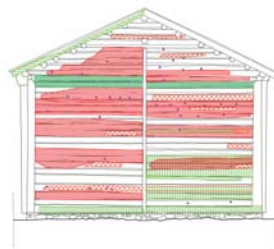
Form of alteration and / or modification of the state of conservation induced by improper use by human's action.



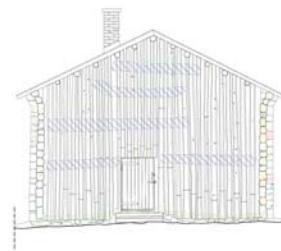
Facade SOUTH-EAST
Wireframe drawing
Metric Scale 1:100



Facade NORTH-WEST
Wireframe drawing
Metric Scale 1:100



Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:100



Facade SOUTH-WEST
Wireframe drawing
Metric Scale 1:100



General Plan
Metric scale 1:1000

Analysis of Damages - Index

Structural features

- Subsidence** Instability due to the movement of the ground which determines a drag of force
- Strain distortion** Variation of the shape that affects the entire thickness of the material and it manifests mainly through ribbon elements
- Cracking / Split** Phenomenon due to the loss of water during the maturing phase. It comes with cracks that move from the surface to the outside

Intrinsic deterioration of the material

- Node** Discontinuity of the material caused by the presence of parts of branches remaining embedded in the stem. The area around the node is not structurally collaborative with the rest of the timber log
- Switched Fiber** Consequence of the growth conditions of the tree causing the inclination of the fiber in relation to the main axis. Decreases the mechanical strength of the trunk.

Biological elements

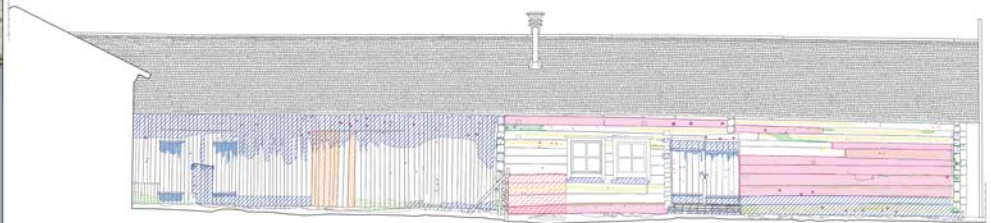
- Molds and lichens** Formation of living organisms due to the presence of moisture contained in the wood. The concentration of these agents is greater in areas directly in contact with water and soil
- Attack from xylophagous insects and caries** Degradation of wood caused by fungus or by attack of insects causing massive loss of mass, mechanical strength, hardness.

Weathering

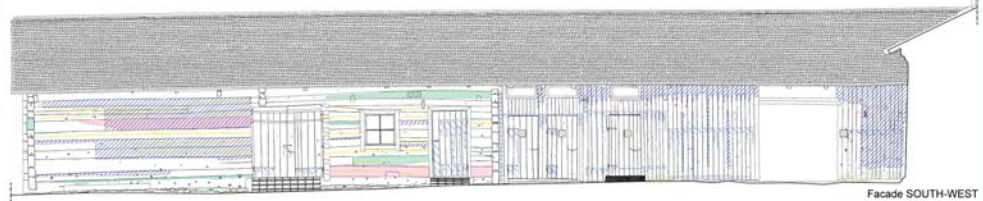
- Chromatic alteration** It is manifested through the variation of color, clarity, saturation. It can manifest itself with different morphologies and refer to large or localized areas
- Ring shake** Tangential discontinuity of the timber structure, for a short or long portion of the log. It is configured as a gap of two contiguous growth rings. This phenomenon greatly reduces the load bearing capacity
- Rusty stain** Chromatic alteration of wood due to the percolation of liquid substance from oxidized iron elements.

Anthropic action

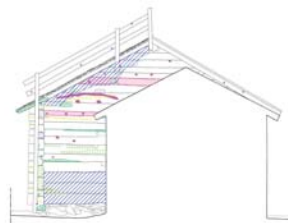
Form of alteration and / or modification of the state of conservation induced by improper use by human's action.



Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:100



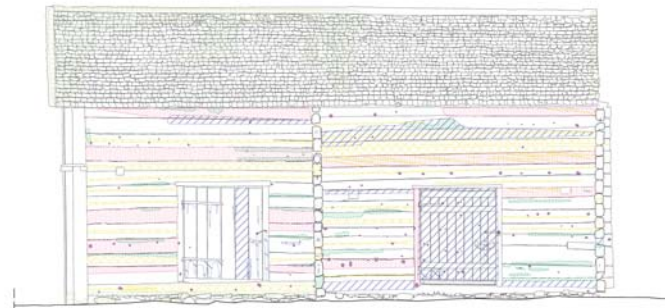
Facade SOUTH-WEST
Wireframe drawing
Metric Scale 1:100



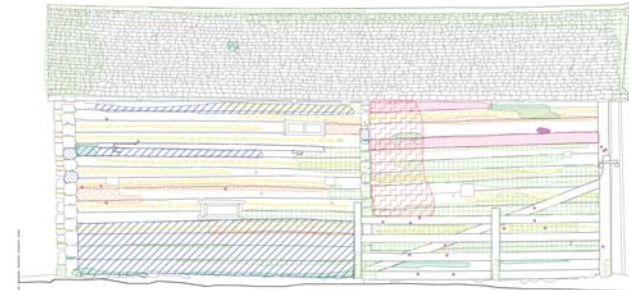
Facade NORTH-WEST
Photomap
Metric Scale 1:100



General Plan
Metric scale 1:1000



Facade SOUTH-WEST
Wireframe drawing
Metric Scale 1:100



Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:100



Facade NORTH-WEST
Wireframe drawing
Metric Scale 1:100

Analysis of Damages - Index

Structural features

- Subsidence: Instability due to the movement of the ground which determines a drag of force.
- Strain distortion: Variation of the shape that affects the entire thickness of the material and its members mainly through ribbon elements.
- Cracking / Split: Phenomenon due to the loss of water during the maturing phase. It comes with cracks that move from the surface to the outside.

Intrinsic deterioration of the material

- Node: Discontinuity of the material caused by the presence of parts of branches remaining embedded in the stem. The area around the node is not structurally collaborative with the rest of the timber log.
- Switched Fiber: Consequence of the growth conditions of the tree causing the inclination of the fiber in relation to the main axis. Decreases the mechanical strength of the trunk.

Biological elements

- Molds and lichens: Formation of living organisms due to the presence of moisture contained in the wood. The concentration of these agents is greater in areas directly in contact with water and soil.
- Attack from xylophagous insects and caries: Degradation of wood caused by fungus or by attack of insects causing massive loss of mass, mechanical strength, hardness.

Weathering

- Chromatic alteration: It is manifested through the variation of color, clarity, saturation. It can manifest itself with different morphologies and refer to large or localized areas.
- Ring shake: Tangential discontinuity of the timber structure, for a short or long portion of the log. It is configured as a gap of two contiguous growth rings. This phenomenon greatly reduces the load-bearing capacity.
- Rusty stain: Chromatic alteration of wood due to the percolation of liquid substance from oxidized iron elements.

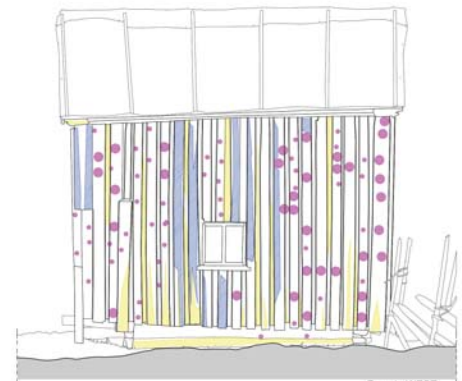
- Anthropic action: Form of alteration and / or modification of the state of conservation induced by improper use by human action.



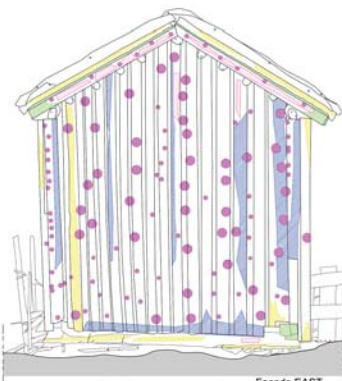
General Plan
Metric scale 1:1000



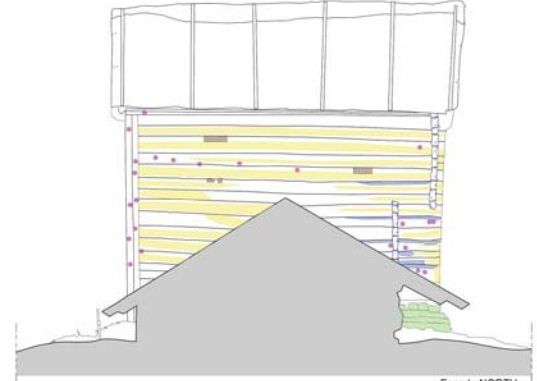
Facade SOUTH
Wireframe drawing
Metric Scale 1:50



Facade WEST
Wireframe drawing
Metric Scale 1:50



Facade EAST
Wireframe drawing
Metric Scale 1:50



Facade NORTH
Wireframe drawing
Metric Scale 1:50

Analysis of Damages - Index

Structural features

- Subsidence: Instability due to the movement of the ground which determines a drag of force.
- Strain distortion: Variation of the shape that affects the entire thickness of the material and its members mainly through ribbon elements.
- Cracking / Split: Phenomenon due to the loss of water during the maturing phase. It comes with cracks that move from the surface to the outside.

Intrinsic deterioration of the material

- Node: Discontinuity of the material caused by the presence of parts of branches remaining embedded in the stem. The area around the node is not structurally collaborative with the rest of the timber log.
- Switched Fiber: Consequence of the growth conditions of the tree causing the inclination of the fiber in relation to the main axis. Decreases the mechanical strength of the trunk.

Biological elements

- Molds and lichens: Formation of living organisms due to the presence of moisture contained in the wood. The concentration of these agents is greater in areas directly in contact with water and soil.
- Attack from xylophagous insects and caries: Degradation of wood caused by fungus or by attack of insects causing massive loss of mass, mechanical strength, hardness.

Weathering

- Chromatic alteration: It is manifested through the variation of color, clarity, saturation. It can manifest itself with different morphologies and refer to large or localized areas.
- Ring shake: Tangential discontinuity of the timber structure, for a short or long portion of the log. It is configured as a gap of two contiguous growth rings. This phenomenon greatly reduces the load-bearing capacity.
- Rusty stain: Chromatic alteration of wood due to the percolation of liquid substance from oxidized iron elements.

- Anthropic action: Form of alteration and / or modification of the state of conservation induced by improper use by human action.



General Plan
Metric scale 1:1000

Analysis of Damages - Index

Structural features

- Subsidence: Instability due to the movement of the ground which determines a drag of force.
- Strain distortion: Variation of the shape that affects the entire thickness of the material and its members mainly through ribbon elements.
- Cracking / Split: Phenomenon due to the loss of water during the maturing phase. It comes with cracks that move from the marrow to the outside.

Intrinsic deterioration of the material

- Node: Discontinuity of the material caused by the presence of parts of branches remaining embedded in the stem. The area around the node is not structurally collaborative with the rest of the timber log.
- Switched Fiber: Consequence of the growth conditions of the tree causing the inclination of the fiber in relation to the main axis. Decreases the mechanical strength of the trunk.

Biological elements

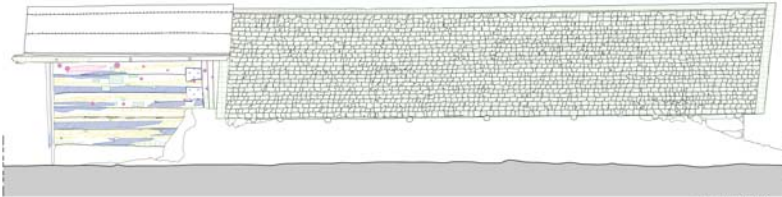
- Molds and lichens: Formation of living organisms due to the presence of moisture contained in the wood. The concentration of these agents is greater in areas directly in contact with water and soil.
- Attack from xylophagous insects and caries: Degradation of wood caused by fungus or by attack of insects causing massive loss of mass, mechanical strength, hardness.

Weathering

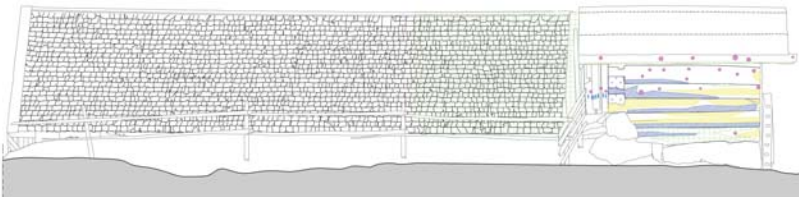
- Chromatic alteration: It is manifested through the variation of color, clarity, saturation. It can manifest itself with different morphologies and refer to large or localized areas.
- Ring shake: Tangential discontinuity of the timber structure, for a short or long portion of the log. It is configured as a gap of two consecutive growth rings. This phenomenon greatly reduces the load bearing capacity.
- Rusty stain: Chromatic alteration of wood due to the percolation of liquid substance from oxidized iron elements.
- Anthropic action: Form of alteration and / or modification of the state of conservation induced by improper use by human's action.



Facade NORTH
Wireframe drawing
Metric Scale 1:50



Facade WEST
Wireframe drawing
Metric Scale 1:50



Facade EAST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric scale 1:1000

Analysis of Damages - Index

Structural features

- Subsidence: Instability due to the movement of the ground which determines a drag of force.
- Strain distortion: Variation of the shape that affects the entire thickness of the material and its members mainly through ribbon elements.
- Cracking / Split: Phenomenon due to the loss of water during the maturing phase. It comes with cracks that move from the marrow to the outside.

Intrinsic deterioration of the material

- Node: Discontinuity of the material caused by the presence of parts of branches remaining embedded in the stem. The area around the node is not structurally collaborative with the rest of the timber log.
- Switched Fiber: Consequence of the growth conditions of the tree causing the inclination of the fiber in relation to the main axis. Decreases the mechanical strength of the trunk.

Biological elements

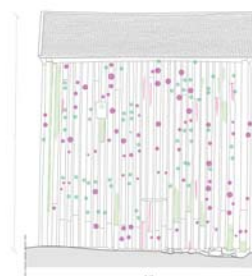
- Molds and lichens: Formation of living organisms due to the presence of moisture contained in the wood. The concentration of these agents is greater in areas directly in contact with water and soil.
- Attack from xylophagous insects and caries: Degradation of wood caused by fungus or by attack of insects causing massive loss of mass, mechanical strength, hardness.

Weathering

- Chromatic alteration: It is manifested through the variation of color, clarity, saturation. It can manifest itself with different morphologies and refer to large or localized areas.
- Ring shake: Tangential discontinuity of the timber structure, for a short or long portion of the log. It is configured as a gap of two consecutive growth rings. This phenomenon greatly reduces the load bearing capacity.
- Rusty stain: Chromatic alteration of wood due to the percolation of liquid substance from oxidized iron elements.
- Anthropic action: Form of alteration and / or modification of the state of conservation induced by improper use by human's action.



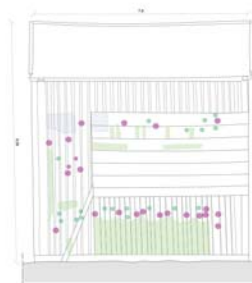
Facade WEST
Wireframe Drawing
Metric Scale 1:100



Facade SOUTH
Wireframe Drawing
Metric Scale 1:100



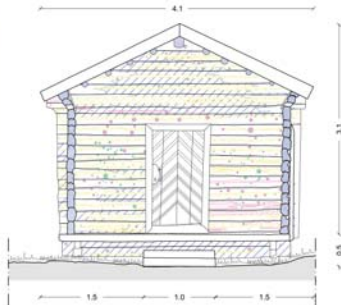
Facade EAST
Wireframe Drawing
Metric Scale 1:100



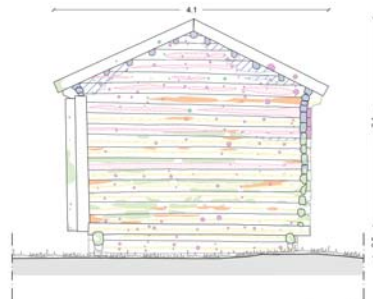
Facade NORTH
Wireframe Drawing
Metric Scale 1:100



General Plan
Metric scale 1:1000



Facade SOUTH-WEST
Wireframe drawing
Metric Scale 1:50



Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:50

Analysis of Damages - Index

Structural features

- Subsidence: Instability due to the movement of the ground which determines a drag of force
- Strain distortion: Variation of the shape that affects the entire thickness of the material and its members mainly through ribbon elements
- Cracking / Split: Phenomenon due to the loss of water during the maturing phase. It comes with cracks that move from the marrow to the outside

Intrinsic deterioration of the material

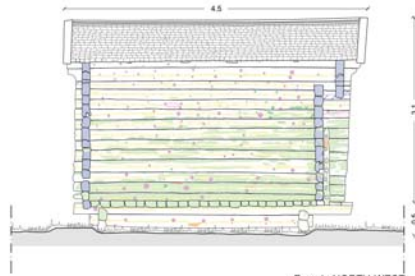
- Node: Discontinuity of the material caused by the presence of parts of branches remaining embedded in the stem. The area around the node is not structurally collaborative with the rest of the timber log
- Switched Fiber: Consequence of the growth conditions of the tree causing the inclination of the fiber in relation to the main axis. Decreases the mechanical strength of the trunk

Biological elements

- Molds and lichens: Formation of living organisms due to the presence of moisture contained in the wood. The concentration of these agents is greater in areas directly in contact with water and soil
- Attack from xylophagous insects and caries: Degradation of wood caused by fungus or by attack of insects causing massive loss of mass, mechanical strength, hardness

Weathering

- Chromatic alteration: It is manifested through the variation of color, clarity, saturation. It can manifest itself with different morphologies and refer to large or localized areas
- Ring shake: Tangential discontinuity of the timber structure, for a short or long portion of the log. It is configured as a gap of two contiguous growth rings. This phenomenon greatly reduces the load bearing capacity
- Rusty stain: Chromatic alteration of wood due to the percolation of liquid substance from oxidized iron elements
- Anthropic action: Form of alteration and / or modification of the state of conservation induced by improper use by human action



Facade NORTH-WEST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric scale 1:1000



General views of the building

Analysis of Damages - Index

Structural features

- Subsidence: Instability due to the movement of the ground which determines a drag of force
- Strain distortion: Variation of the shape that affects the entire thickness of the material and its members mainly through ribbon elements
- Cracking / Split: Phenomenon due to the loss of water during the maturing phase. It comes with cracks that move from the marrow to the outside

Intrinsic deterioration of the material

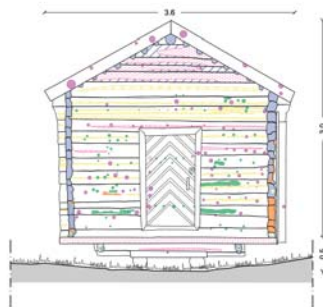
- Node: Discontinuity of the material caused by the presence of parts of branches remaining embedded in the stem. The area around the node is not structurally collaborative with the rest of the timber log
- Switched Fiber: Consequence of the growth conditions of the tree causing the inclination of the fiber in relation to the main axis. Decreases the mechanical strength of the trunk

Biological elements

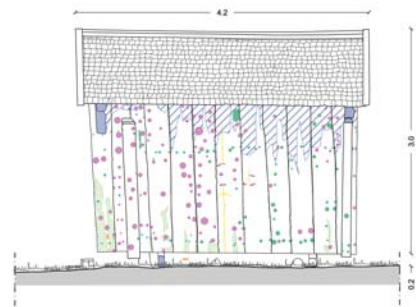
- Molds and lichens: Formation of living organisms due to the presence of moisture contained in the wood. The concentration of these agents is greater in areas directly in contact with water and soil
- Attack from xylophagous insects and caries: Degradation of wood caused by fungus or by attack of insects causing massive loss of mass, mechanical strength, hardness

Weathering

- Chromatic alteration: It is manifested through the variation of color, clarity, saturation. It can manifest itself with different morphologies and refer to large or localized areas
- Ring shake: Tangential discontinuity of the timber structure, for a short or long portion of the log. It is configured as a gap of two contiguous growth rings. This phenomenon greatly reduces the load bearing capacity
- Rusty stain: Chromatic alteration of wood due to the percolation of liquid substance from oxidized iron elements
- Anthropic action: Form of alteration and / or modification of the state of conservation induced by improper use by human action



Facade SOUTH-WEST
Wireframe drawing
Metric Scale 1:50



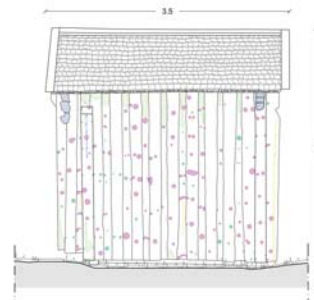
Facade SOUTH-EAST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric scale 1:1000



Facade SOUTH-EAST
Wireframe drawing
Metric Scale 1:50



Facade NORTH-WEST
Wireframe drawing
Metric Scale 1:50

Analysis of Damages - Index

Structural features

- Subsidence: Instability due to the movement of the ground which determines a drag of force.
- Strain distortion: Variation of the shape that affects the entire thickness of the material and its manifests mainly through ribbon elements.
- Cracking / Split: Phenomenon due to the loss of water during the maturing phase. It comes with cracks that move from the marrow to the outside.

Intrinsic deterioration of the material

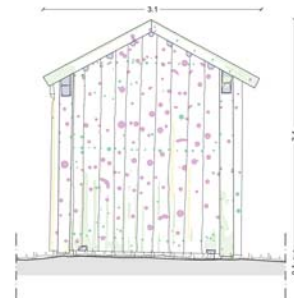
- Node: Discontinuity of the material caused by the presence of parts of branches remaining embedded in the stem. The area around the node is not structurally collaborative with the rest of the timber log.
- Switched Fiber: Consequence of the growth conditions of the tree causing the inclination of the fiber in relation to the main axis. Decreases the mechanical strength of the trunk.

Biological elements

- Molds and lichens: Formation of living organisms due to the presence of moisture contained in the wood. The concentration of these agents is greater in areas directly in contact with water and soil.
- Attack from xylophagous insects and caries: Degradation of wood caused by fungus or by attack of insects causing massive loss of mass, mechanical strength, hardness.

Weathering

- Chromatic alteration: It is manifested through the variation of color, clarity, saturation. It can manifest itself with different morphologies and refer to large or localized areas.
- Ring shake: Tangential discontinuity of the timber structure, for a short or long portion of the log. It is configured as a gap of two contiguous growth rings. This phenomenon greatly reduces the load bearing capacity.
- Rusty stain: Chromatic alteration of wood due to the percolation of liquid substance from oxidized iron elements.
- Anthropic action: Form of alteration and / or modification of the state of conservation induced by improper use by human's action.



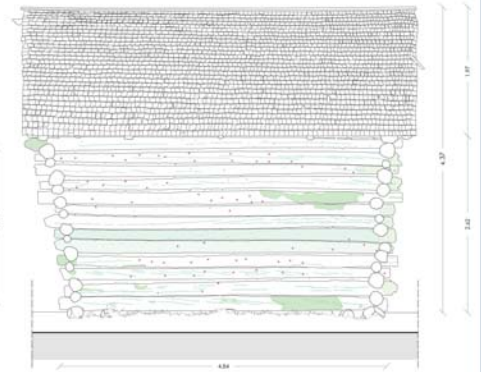
Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric scale 1:1000



Facade SOUTH-EAST
Wireframe drawing
Metric Scale 1:50



Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:50

Analysis of Damages - Index

Structural features

- Subsidence: Instability due to the movement of the ground which determines a drag of force.
- Strain distortion: Variation of the shape that affects the entire thickness of the material and its manifests mainly through ribbon elements.
- Cracking / Split: Phenomenon due to the loss of water during the maturing phase. It comes with cracks that move from the marrow to the outside.

Intrinsic deterioration of the material

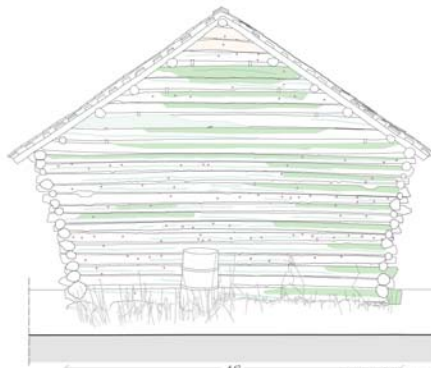
- Node: Discontinuity of the material caused by the presence of parts of branches remaining embedded in the stem. The area around the node is not structurally collaborative with the rest of the timber log.
- Switched Fiber: Consequence of the growth conditions of the tree causing the inclination of the fiber in relation to the main axis. Decreases the mechanical strength of the trunk.

Biological elements

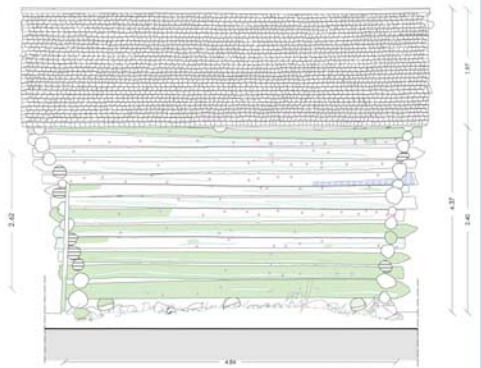
- Molds and lichens: Formation of living organisms due to the presence of moisture contained in the wood. The concentration of these agents is greater in areas directly in contact with water and soil.
- Attack from xylophagous insects and caries: Degradation of wood caused by fungus or by attack of insects causing massive loss of mass, mechanical strength, hardness.

Weathering

- Chromatic alteration: It is manifested through the variation of color, clarity, saturation. It can manifest itself with different morphologies and refer to large or localized areas.
- Ring shake: Tangential discontinuity of the timber structure, for a short or long portion of the log. It is configured as a gap of two contiguous growth rings. This phenomenon greatly reduces the load bearing capacity.
- Rusty stain: Chromatic alteration of wood due to the percolation of liquid substance from oxidized iron elements.
- Anthropic action: Form of alteration and / or modification of the state of conservation induced by improper use by human's action.



Facade NORTH-WEST
Wireframe drawing
Metric Scale 1:50



Facade SOUTH-WEST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric scale 1:1000

Analysis of Damages - Index

Structural features

- Subsidence** Instability due to the movement of the ground which determines a drag of force.
- Strain distortion** Variation of the shape that affects the entire thickness of the material and its manifests mainly through ribbon elements.
- Cracking / Split** Phenomenon due to the loss of water during the maturing phase. It comes with cracks that move from the margins to the outside.

Intrinsic deterioration of the material

- Node** Discontinuity of the material caused by the presence of parts of branches remaining embedded in the stem. The area around the node is not structurally collaborative with the rest of the timber log.
- Switched Fiber** Consequence of the growth conditions of the tree causing the inclination of the fiber in relation to the main axis. Decreases the mechanical strength of the trunk.

Biological elements

- Molds and lichens** Formation of living organisms due to the presence of moisture contained in the wood. The concentration of these agents is greater in areas directly in contact with water and soil.
- Attack from xylophagous insects and canes** Degradation of wood caused by fungus or by attack of insects causing massive loss of mass, mechanical strength, hardness.

Weathering

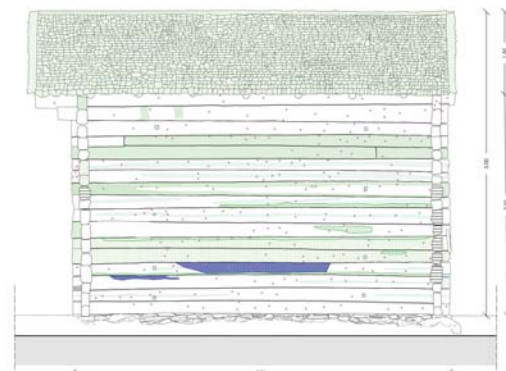
- Chromatic alteration** It is manifested through the variation of color, clarity, saturation. It can manifest itself with different morphologies and refer to large or localized areas.
- Ring shake** Tangential discontinuity of the timber structure, for a short or long portion of the log it is configured as a gap of two contiguous growth rings. This phenomenon greatly reduces the load bearing capacity.
- Rusty stain** Chromatic alteration of wood due to the percolation of liquid substance from oxidized iron elements.

Anthropic action

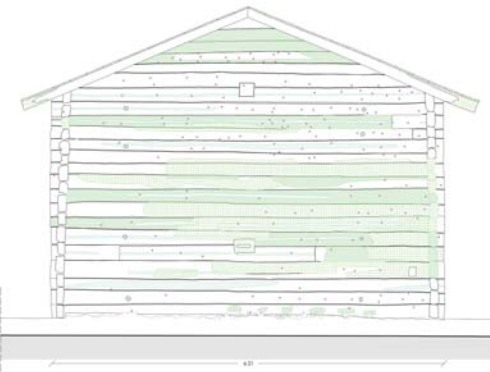
Form of alteration and / or modification of the state of conservation induced by improper use by humans' action.



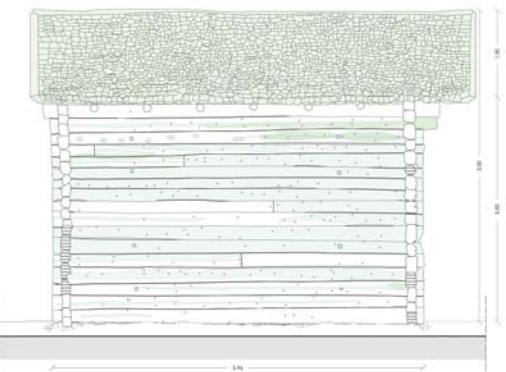
Facade SOUTH-EAST
Wireframe drawing
Metric Scale 1:50



Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:50



Facade NORTH-WEST
Wireframe drawing
Metric Scale 1:50



Facade SOUTH-WEST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric scale 1:1000

Analysis of Damages - Index

Structural features

- Subsidence** Instability due to the movement of the ground which determines a drag of force.
- Strain distortion** Variation of the shape that affects the entire thickness of the material and its manifests mainly through ribbon elements.
- Cracking / Split** Phenomenon due to the loss of water during the maturing phase. It comes with cracks that move from the margins to the outside.

Intrinsic deterioration of the material

- Node** Discontinuity of the material caused by the presence of parts of branches remaining embedded in the stem. The area around the node is not structurally collaborative with the rest of the timber log.
- Switched Fiber** Consequence of the growth conditions of the tree causing the inclination of the fiber in relation to the main axis. Decreases the mechanical strength of the trunk.

Biological elements

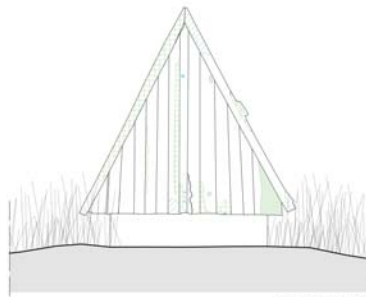
- Molds and lichens** Formation of living organisms due to the presence of moisture contained in the wood. The concentration of these agents is greater in areas directly in contact with water and soil.
- Attack from xylophagous insects and canes** Degradation of wood caused by fungus or by attack of insects causing massive loss of mass, mechanical strength, hardness.

Weathering

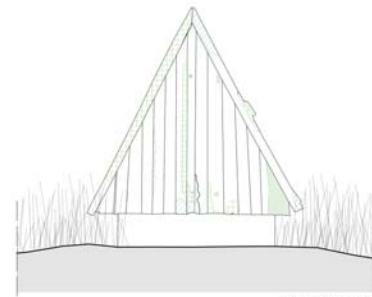
- Chromatic alteration** It is manifested through the variation of color, clarity, saturation. It can manifest itself with different morphologies and refer to large or localized areas.
- Ring shake** Tangential discontinuity of the timber structure, for a short or long portion of the log it is configured as a gap of two contiguous growth rings. This phenomenon greatly reduces the load bearing capacity.
- Rusty stain** Chromatic alteration of wood due to the percolation of liquid substance from oxidized iron elements.

Anthropic action

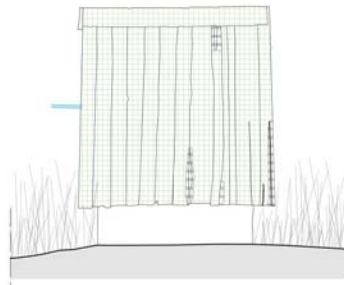
Form of alteration and / or modification of the state of conservation induced by improper use by humans' action.



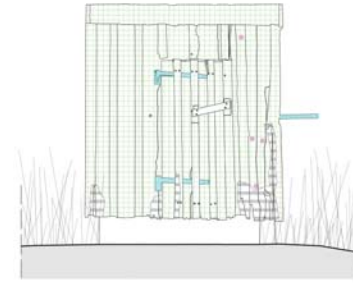
Facade SOUTH-EAST
Wireframe drawing
Metric Scale 1:20



Facade NORTH-WEST
Wireframe drawing
Metric Scale 1:20



Facade SOUTH-WEST
Wireframe drawing
Metric Scale 1:20



Facade SOUTH-EAST
Wireframe drawing
Metric Scale 1:20



General Plan
Metric scale 1:1000

Analysis of Damages - Index

Structural features

- Subsidence: Instability due to the movement of the ground which determines a drag of force.
- Strain distortion: Variation of the shape that affects the entire thickness of the material and its members mainly through ribbon elements.
- Cracking / Split: Phenomenon due to the loss of water during the maturing phase. It comes with cracks that move from the narrow to the outside.

Intrinsic deterioration of the material

- Node: Discontinuity of the material caused by the presence of parts of branches remaining embedded in the stem. The area around the node is not structurally collaborative with the rest of the timber log.
- Switched Fiber: Consequence of the growth conditions of the tree causing the inclination of the fiber in relation to the main axis. Decreases the mechanical strength of the trunk.

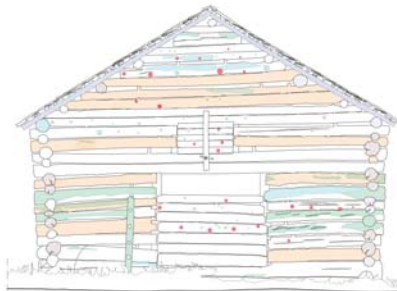
Biological elements

- Molds and lichens: Formation of living organisms due to the presence of moisture contained in the wood. The concentration of these agents is greater in areas directly in contact with water and soil.
- Attack from xylophagous insects and caries: Degradation of wood caused by fungus or by attack of insects causing massive loss of mass, mechanical strength, hardness.

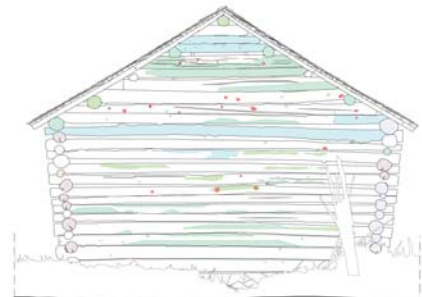
Weathering

- Chromatic alteration: It is manifested through the variation of color, clarity, saturation. It can manifest itself with different morphologies and refer to large or localized areas.
- Ring shake: Tangential discontinuity of the timber structure, for a short or long portion of the log. It is configured as a gap of two contiguous growth rings. This phenomenon greatly reduces the load bearing capacity.
- Rusty stain: Chromatic alteration of wood due to the percolation of liquid substance from oxidized iron elements.

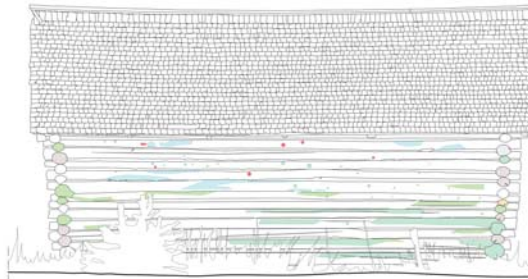
- Anthropic action: Form of alteration and / or modification of the state of conservation induced by improper use by human action.



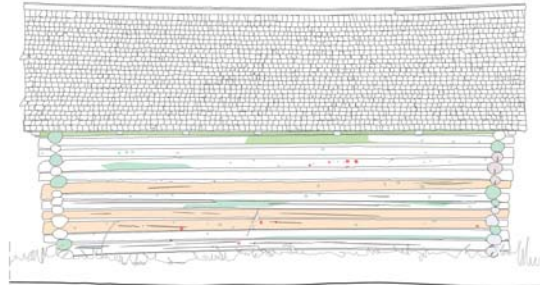
Facade SOUTH-EAST
Wireframe drawing
Metric Scale 1:50



Facade NORTH-WEST
Wireframe drawing
Metric Scale 1:50



Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:50



Facade SOUTH-WEST
Wireframe drawing
Metric Scale 1:50



General Plan
Metric scale 1:1000

Analysis of Damages - Index

Structural features

- Subsidence: Instability due to the movement of the ground which determines a drag of force.
- Strain distortion: Variation of the shape that affects the entire thickness of the material and its members mainly through ribbon elements.
- Cracking / Split: Phenomenon due to the loss of water during the maturing phase. It comes with cracks that move from the narrow to the outside.

Intrinsic deterioration of the material

- Node: Discontinuity of the material caused by the presence of parts of branches remaining embedded in the stem. The area around the node is not structurally collaborative with the rest of the timber log.
- Switched Fiber: Consequence of the growth conditions of the tree causing the inclination of the fiber in relation to the main axis. Decreases the mechanical strength of the trunk.

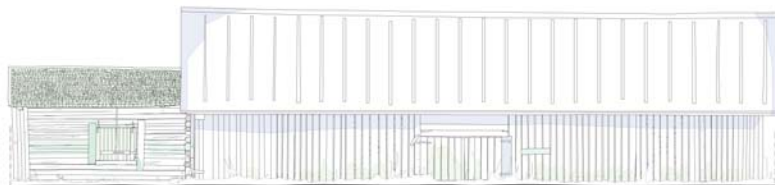
Biological elements

- Molds and lichens: Formation of living organisms due to the presence of moisture contained in the wood. The concentration of these agents is greater in areas directly in contact with water and soil.
- Attack from xylophagous insects and caries: Degradation of wood caused by fungus or by attack of insects causing massive loss of mass, mechanical strength, hardness.

Weathering

- Chromatic alteration: It is manifested through the variation of color, clarity, saturation. It can manifest itself with different morphologies and refer to large or localized areas.
- Ring shake: Tangential discontinuity of the timber structure, for a short or long portion of the log. It is configured as a gap of two contiguous growth rings. This phenomenon greatly reduces the load bearing capacity.
- Rusty stain: Chromatic alteration of wood due to the percolation of liquid substance from oxidized iron elements.

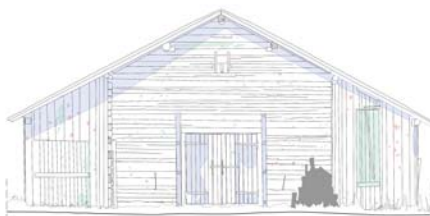
- Anthropic action: Form of alteration and / or modification of the state of conservation induced by improper use by human action.



Facade NORTH-EAST
Wireframe drawing
Metric Scale 1:100



Facade SOUTH-WEST
Wireframe drawing
Metric Scale 1:100



Facade NORTH-WEST
Wireframe drawing
Metric Scale 1:100



Facade SOUTH-EAST
Wireframe drawing
Metric Scale 1:100