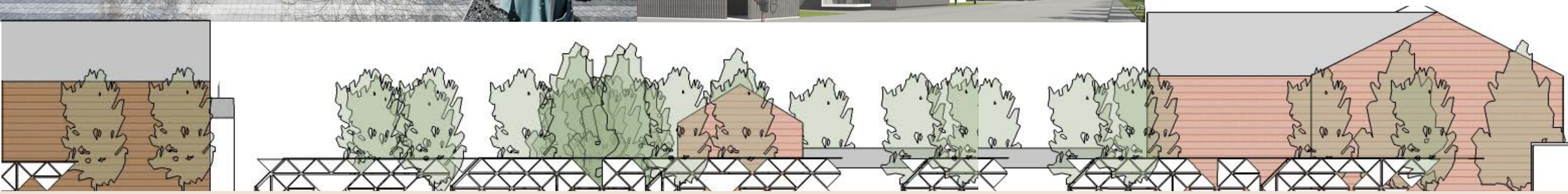
# HISTORIALLISEN KAUPUNKIMILJOON SUOJELUATLAS: OULUN RAKSILA

OULUN YLIOPISTO | ARKKITEHTUURIN TIEDEKUNTA | ARKKITEHTUURIN HISTORIA JA KORJAUSSUUNNITTELU



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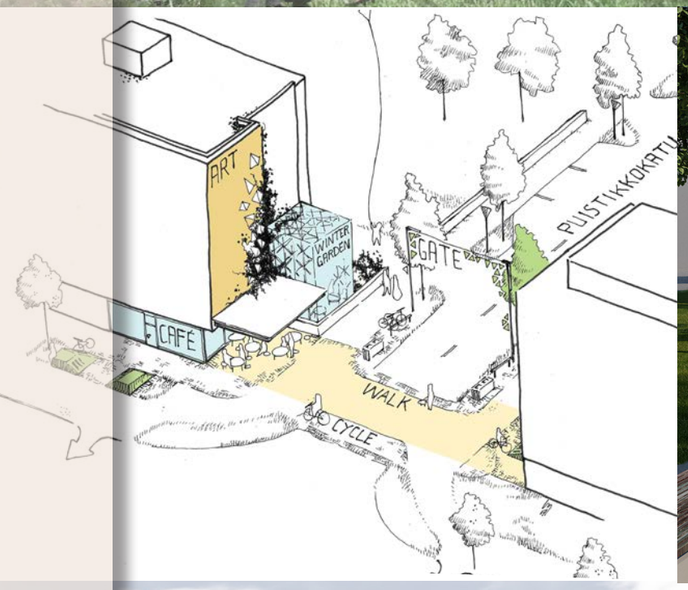
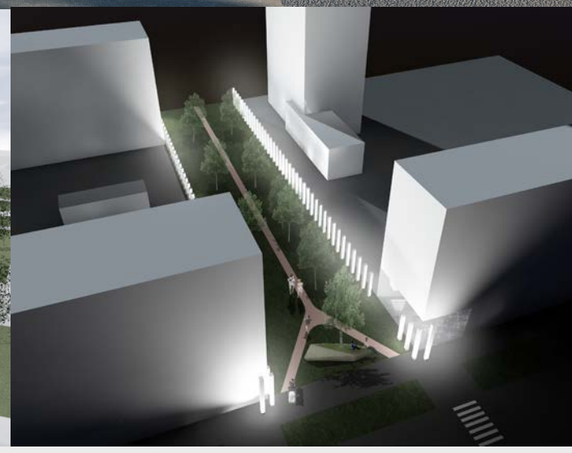
RAKENNUSSUOJELU JA RAKENNETUN YMPÄRISTÖ HOITO | 2017



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OULUN YLIOPISTO

Oulu 2017
ISBN 978-952-62-1786-4
ISSN 2342-9062

# LASER SCANNING SURVEY OF THE STREET FACADES IN RAKSILA

Ratakatu, Syrjäkatu, Puutarhakatu, Karjakatu, Puistikkokatu

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## LASER SCANNER SURVEY as a method for documenting the townscape

Laser scanning technology represents nowadays one of the most efficient type of survey for measuring and documenting architecture and its environment in general. Cities and urban spaces are in fact growing and changing so quickly that urban planners and experts have the necessities to update their technical tools for monitoring these continuos events. This necessity appears even more relevant and urgent for those urban expansions which involve historic archictural realities as Raksila represents.

This scientific report shows in fact that even if a small distric-area as Raksila appears almost regular and simple in its main features, in its reality it is determinated by thousands of sensible differences and important elements which constitute the image and the identity of the place. A detailed analysis like the one shown in the report demonstrate that only through methodological analysis and combined activities, as for example survey and photo documentation, we can discover the key points for preserving the authenticity of the townscape.

Investigations, census activities, inventory catalogues, digital 3D survey database and true metrical information are fundamental in order to understand the formation and development of an architectural entity, village, or city, as well as for planning conservation and restoration projects starting from the present state of a building or distric. Thanks to these information it's possible to recognize the tangible and intagible elements which constitute the *genius loci* of the place (C. Norberg-Schulz, *Genius loci towards a phenomenology of architecture*) for determinating helpful guidelines for the townscape. The survey of Raksila has involved the architecture and its main environment as two essential parts of the same research topic. Below some 3D visualizations and post productions results (as for example digital maps and street sections) are shown in order to demonstrate which can be the main results and outputs achieva ble from these kind of operations.

The laser scanner survey of Raksila has been developed thanks to the European Project of PhD. Arch. Sara Porzilli, PostDoc Fellow of the University of Oulu. Title of the research is "*Preserving Wooden Heritage. Methods for monitoring wooden structures: 3D laser scanner survey and application of BIM systems on point cloud models*"[1] and it concerns the application of digital survey systems for preserving wooden architecture in order to get updated methods for monitoring this precious type of heritage.

[1]Detail of the project: European Commission | Horizon 2020 – Research and Innovation Framework Programme. MARIE SKŁODOWSKA-CURIE ACTIONS – INDIVIDUAL FELLOWSHIP. Call: H2020-MSCA-IF-2016. Scientific Panel: ST-ENG. Duration of the Project: 24 months. Scientific Coordinator and Supervisor is Prof. Anna-Maija Ylimaula. Project results are protected by the Marie Skłodowska Curie grant agreement of the Researcher Phd. Sara Porzilli. The equipment used has been provided by Mitta Oy, official partner of the project.


## THE SURVEY PROJECT: scan positions and resolution of the point cloud

The survey of Raksila has involved the main streets of the area in order to get a general but detailed recognition of the place with its main measures, including both the architecture and the environment. The laser scanner used is one of the latest Zoller + Fröhlich laser scanner, 5010 model. Streets surveyed are:

- Ratakatu (specifically the part of the bus stop parking area considered the “entrance” part to Raksila area). 3 ScanStations with SUPERHIGH resolution;

- Syrjäkatu. 17 ScanStations in HIGH Resolution;

- Puutarhakatu. 29 ScanStations in HIGH Resolution;

- Karjakatu. 14 ScanStations in HIGH Resolution;

- Puistikkokatu. 21 ScanStations in HIGH Resolution;

- Tehtaankatu. 7 ScanStations in SUPERHIGH Resolution. Survey of the part of street between Syrjäkatu and Karjakatu;

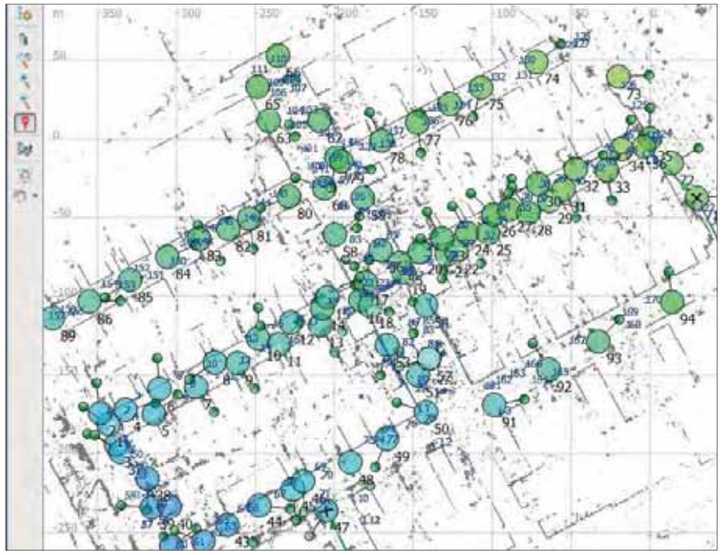
- Teuvo Pakkalan Katu. 4 ScanStations in SUPERHIGH Resolution. The scans wanted to survey the facade of the old School and close the perimeter of Puistikkokatu street;

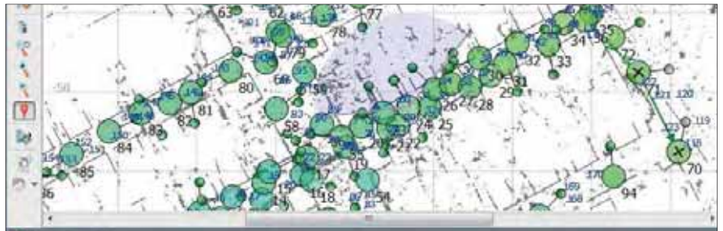
- Kainuuntie. 6 ScanStations in SUPERHIGH Resolution, in order to get the main measures of the street and the opposite site of the river for a general recognition of the distance of Karjasilta side.

Because for the large dimension of the area and because for the presence of the tree crowns still present at the moment of the survey, it has been fundamental to plan a dense project of scan positions. A precise organization of the scan-positions has been defined in advance in order to set the practical activities and quantify the amount of necessary work on field. This operation is sensibly recommended because it gives a real and practical understanding of the work and obligates the surveyor to elaborate in advance all the necessary work strategies useful for carrying out the results. In addition to this, strategic scan positions made with superhigh resolution has given the possibility to obtain a more accurate result and achieve a better compensation of the geometrical error. As underlined in the image always groups of three ScanStations are located whenever possible in an equilateral triangle position in order to keep their mutual angle orientations not over 60 degrees. This operation gives the possibility in post production phase to handle and combine the singular point clouds produced with the minimum level of error. The survey project had the role to measure the street fronts trying to obtain the maximum information of the facades of the buildings avoiding the tree crowns when possible. Thanks to this product it has been possible to elaborate accurate street sections in both trasversal and longitudinal orientation.

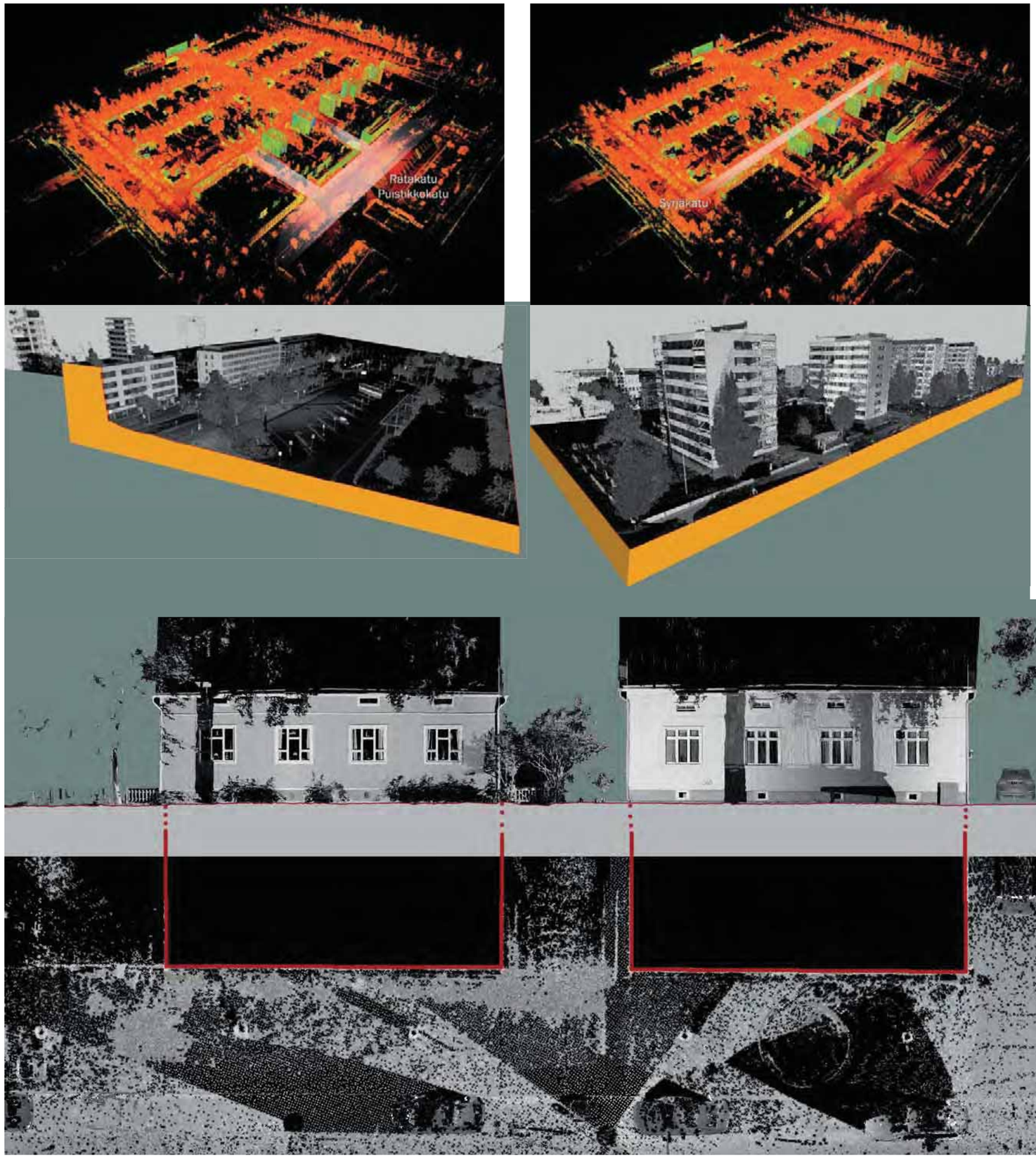
# REGISTRATION OF THE POINT CLOUD AND FINAL METRIC DATABASE

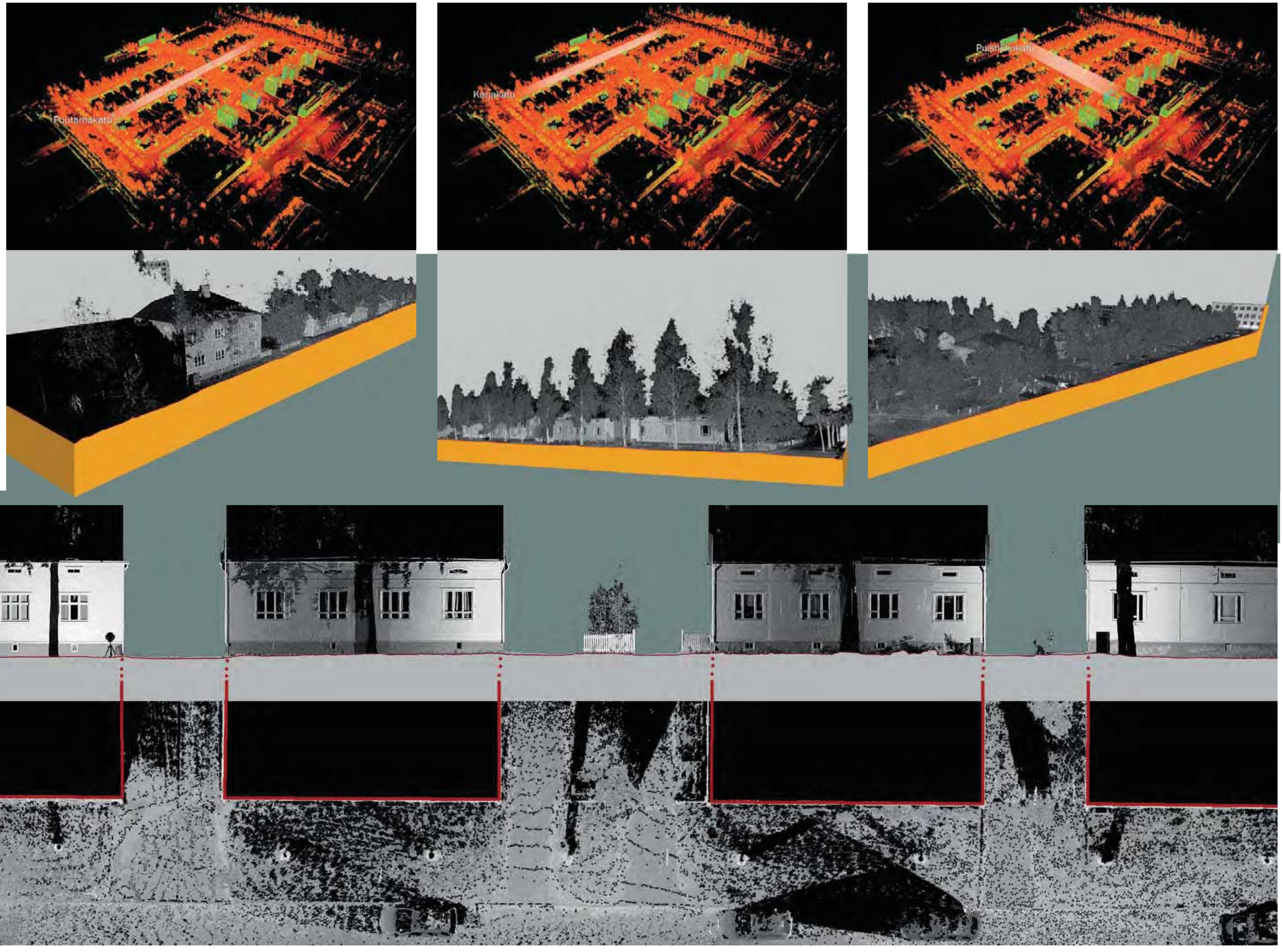
The survey project has been registered by using the Z+F Laser Control Software which allows you to see all the scanwords done in a top view mode directly on the map generated and gives you the possibility to recognize each singular scan position and navigate in it (with a double click on the blue sphere).



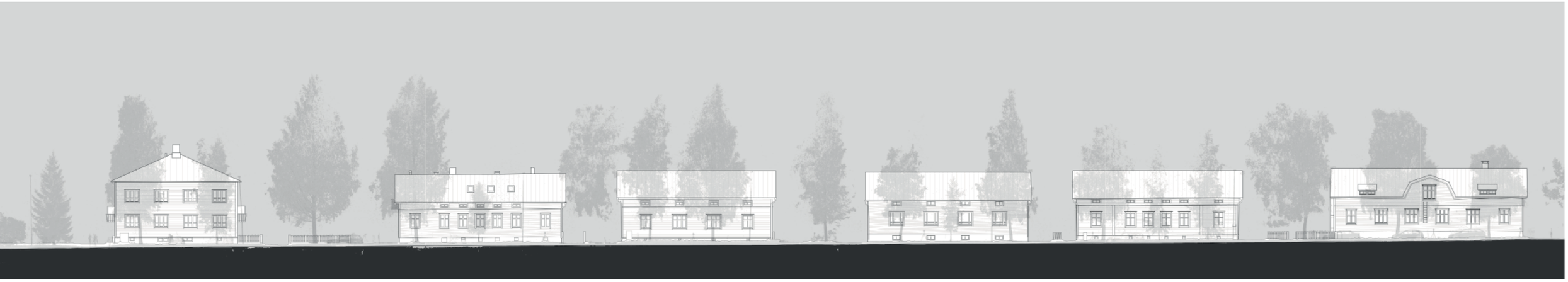



Thanks to this software the final point cloud has a negligible presence of mistake. Each block is located in the right position in relation to the rest of the area. All the facades from the street side have a detailed point cloud. Thanks to the superhigh scans it has been possible to acquire far distances and hights as for example the high buildings in Ratakatu and Syriäkatu. In order to elaborate the sections the metric database has been divided in sub-categories, corresponding with the streets scanned.



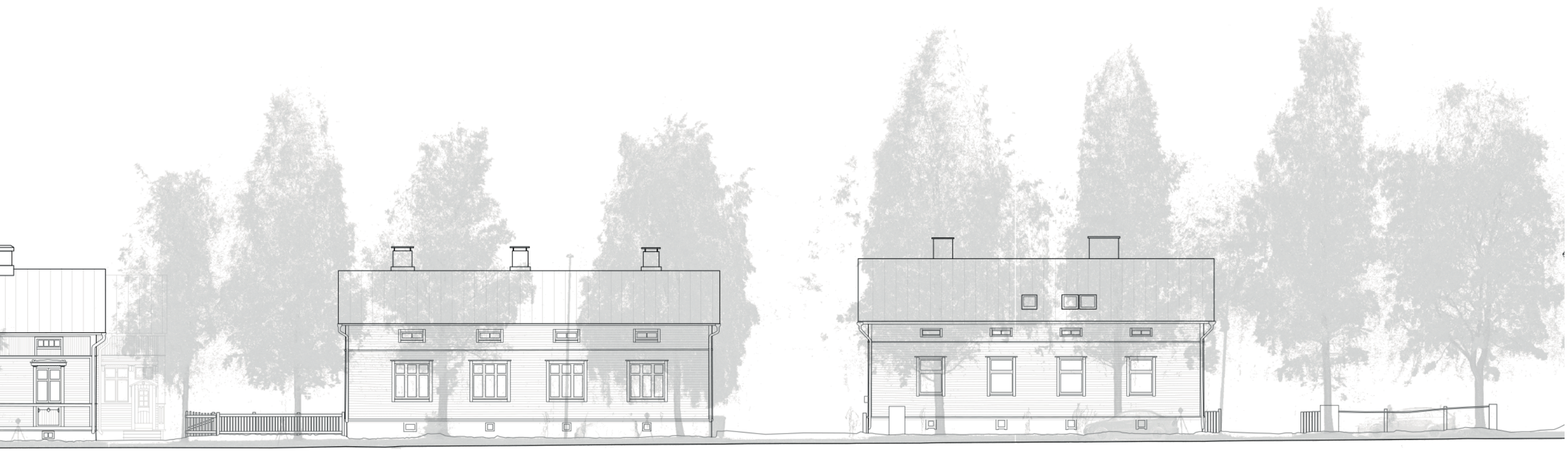

Poutarnakatu
Karjakatu
Puistokatu

# PUUTARHAKATU



0 1 3 5 8 10 mt

Longitudinal section of Puutarhakatu



0 1 3 5 8 10 mt

Detail of the street section of Puutarhakatu

## KARJAKATU

0 1 3 5 8 10 mt

Longitudinal section of Karjakatu

0 1 3 5 8 10 mt

Detail of the street section of Karjakatu

## PUISTIKKOKATU

0 1 3 5 8 10 mt

Street section of Puistikkokatu

0 1 3 5 8 10 mt

Detail of the street section of Puistikkokatu