

Saimaa University of Applied Sciences
Faculty of Technology, Lappeenranta
Double Degree Programme in Civil and Construction Engineering

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CUSTOMER RELATIONSHIP MANAGEMENT IN THE SAIMAA GARDENS PROJECT

Bachelor's Thesis 2011

ABSTRACT

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Customer Relationship Management in the Saimaa Gardens Project, 29 pages,
6 appendices

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Double Degree Programme in Civil and Construction Engineering

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The objective of the study was getting, collecting and analysing the information, which connects the construction to the customer. In the thesis the term "customer" is accepted as a person who makes a contract to build the object, the future owner. All the processes between the company and the customer are defined and described.

In the theory part of the study the main issue was the collection of materials: drawings, schemes and technical descriptions. Data for this study was collected from the previous documents, new drawings, the Internet, by interviews, visits to the building site and direct observation. In addition, the task was to supervise and describe the building process taking into account changes decided by customers or accepted because of another reasons. Information about such changes is based on communicating with customers.

As a result of this customer contact the apartment user guide and info-folder were structured. The apartment user guide contains buildings' documentations, as well as guidelines for their operation and maintenance. This thesis was written on the request of Miriensis Oy for getting the user guide.

Keywords: Customer, Customer Relationship, Future Owner, Technical Descriptions, Documents, Building Process, Apartment User Guide, Info-Folder.

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1 INTRODUCTION

This Bachelor's Thesis presents research work, based on the materials of company Miriensis Oy. The main issue is on gathering and systemizing facts and rules for making customer manuals in Saimaa Gardens project.

Saimaa Gardens presents a developing resort zone which will offer tourist activities around the year. There will be a golf centre, a multi-function arena, several restaurants and shops on the territory of over 300 hectares. (Saimaa Gardens). Figure 1 shows the location of Saimaa Gardens at the coast of Lake Saimaa, close to Imatra, Joutseno and Lappeenranta. Internationally Saimaa Gardens waits for guests from Finland, Russia and all Europe.



Figure 1. The Location of Saimaa Gardens

The question of accommodation will occupy an important role in the management in this future leisure time resort developed by Miriensis Oy. The resort is supposed to accommodate 8,000 over-night visitors. And one of the ways is to locate guests in the large number of holiday housing apartments.

In this project a large number of objects are constructed at the same time, and they all are unique, they have individual details and they satisfy customer needs. A 3D view of the future resort is shown in Figure 2. The customer relationship management becomes a special task. It provides organization and control of the processes from the beginning, from the first meeting, to the

commissioning of a facility and further support. The task is to carry on negotiations, to take into account all the wishes of the customer, to consult in details at the site, to develop the apartment user documents and to keep other nuances in contact with the future owner.



Figure 2. Coming Resort, 3D View

Miriensis Oy is responsible for the development of this future resort. Also new objects building and comfortable accommodation are the tasks of management company Miriensis Oy. All the holiday apartments are envisaged for renting or selling, so this service should be at the highest level to provide the growth of customer inflow. Making apartments ready for guests is a labour-intensive and liable process, which requires good organization. Also, there is an opportunity for customers to have some changes in the inner view of the house. The development concept of customer oriented construction dominates. This requires an integrated approach to the construction and maintenance in conjunction with the customer.

Documentation is a part of customer management. A client has an interest in information about all construction issues; he reads the apartment user guide, which contains the main issues about the construction project, electric equipment, contacts, guidance etc. This guide is composed for every apartment separately and contains common and individual information. It is realized in English, Finnish and Russian.

The compiling of information for the guide requires data from the building site, the project drawings and final interior solutions. Writing the guide accompanies the whole building process. The report is diarized regularly during the erection of the cottage. Negotiations with customers also require knowledge of the project.

The negotiation is a way to constantly keep in touch with the customer. The representatives of the customer and the contractor meet to discuss the timing, progress of the work, payments, innovations and changes in the project.

Consequently, customer relationship management in the construction field implies integrated approach to all the building procedures.

2 FIRST MEETING

The company holds the promotions and participates in real estate exhibitions to attract future customers. Although the estate is designed for customers from all over the world, most activity comes from Russian buyers. Often after a tourist trip people have immediately begun to be interested in purchasing a real estate. Currently, the investment activity of Russian companies in Finland is guaranteed by economic stability, fund investment safety, effective and predictable legal system, respect for property rights and guarantees of acquired rights (Rant).

At the first meeting the customer gets common information about the project. There are several opportunities to realize the customer's own design or take the suggested one. The main part is to determine general issues, taking into account requests.

Function, purpose, construction company design and external view are the main aspects. The insurance, interiors, landscaping and others aspects are also discussed. The preliminary time schedule is drawn up. There is a schematic list of issues (Figure 3) to demonstrate the cause-effect connection.

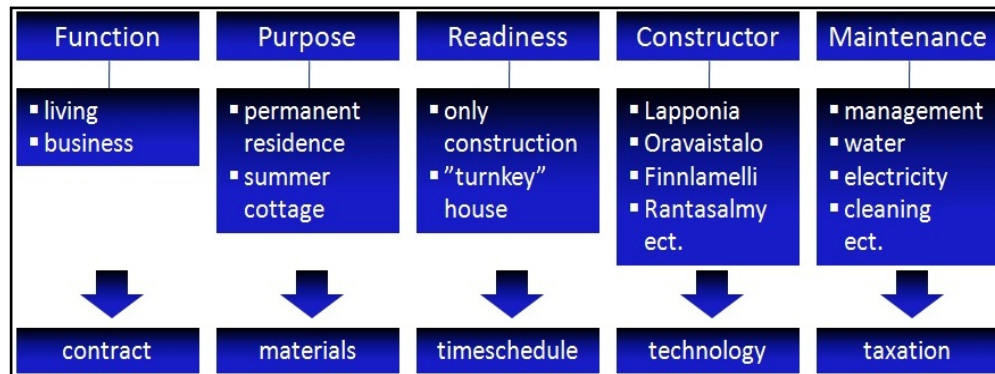


Figure 3. Schematic List of Issues

2.1 Function

Function is the first and the most important question because a contract depends on it. In this territory two types of real estate are allowed in accordance with the function: for living or for business. The real estate for living means that the customer becomes the end user of the house. The real estate for business means that customer owns and leases out the holiday housing apartments.

2.2 Purpose

There are two types of houses depending on building materials stone/wood ratio: permanent residence apartments and summer cottages. All the regular projects are designed for temporary residence and only customer's own project can contain enough stone material to be accepted for permanent living.

2.3 Readiness

The contractor provides the customer with the schedule of the construction work. The intermediate stages of the construction work are fixed in the schedule. Also there are the dates until which the customer has to make the

decisions about the procurement (equipment for kitchens, bathrooms, toilets, bedrooms and fireplaces)

If the customer wants to implement the inside works by himself, the construction stops after the structure montage. The decision about the readiness level influences the time schedule. As the rule, the future owner prefers to order the entire project including house erection, furniture, garage, planting shrubs, paths and fence.

2.4 Constructor

The customers have the right to select the constructor company for their own project. Miriensis Oy has a number of partner companies, such as Lapponia, Finnlamelli, Oravaistalo, Honka, Rantasalmi etc. Each of them offers different technology: logwood house, glum laminated, carcass, ready modules. The constructor company provides architectural project. General plan is drawn up by the contractor with the help of architectural firm. The construction period directly depends on the choice of technology. As a rule the turnkey-cottage requires about 7 months to be ready. But the duration could increase in winter time, because in extreme conditions, as low-temperature and strong wind, external works are undesirable.

The contractor orders and pays for the technology drawings (electricity, water and ventilation) and provides it to the supervisor companies. The contractor requests a building permit according to the project in Lappeenranta.

The area owner gives the authorization to the contractor to solve problems with the permissions. The contractor agrees to execute the project under the terms of the construction permit and the requirements of generally accepted good practice.

As a rule, the draft contract already includes the planting, paving in the courtyard and planting some trees in the area.

2.5 Maintenance

The selection of building maintenance company is a very important part in the object management.

The maintenance company constantly controls heating, electricity, water and other equipments and supplies. A landscaping the area, removing garbage, shooting down icicles and washing windows are also tasks of maintenance company.

2.6 Changes in the project

Also the changes in the ready project are taking into account. Sometimes a price can be a determining factor. The customer agrees to introduce changes to the project rather than exceed a certain price. This can be achieved not only by decreasing a building volume, but for example by the reduction of the number of rooms equipped with water. Also it is possible to cut the floors, move not-bearing walls, reflect the plans, raise the ceiling and add windows. All customer wishes to change the project are fixed, and then the architect updates the drawings. After the refreshing the new drawings will be shown again to the customer. Usually this period takes quite a long time.

3 BUILDING CONTROL

After everything has been discussed building starts. Of course, the customer wants to know all the details and needs consultation. At any stage of the construction the customer can visit and control his object, make changes.

The municipal representative controls the implementation of the construction works on the municipality territory in the interest of the public good and looks

after the compliance of rules and regulations. The appointed by the municipality commission performs as official government construction supervision. (Nykänen, P. 2009).

An independent municipal inspector comes after every ready phase to approve the work.

The contractor is responsible for all the obligations on the wages, insurance, health and safety of its workforce at the facility. The contractor is required to make the notification about the beginning of the work on the site to the occupational health authorities. The contractor is responsible for the worker ensuring at the facility, the household and storage premises, the providing of the electricity and the water and for their expenses.

The contractor company insures the facility during the construction and provides the customer with a copy of the insurance policy.

The regular holiday housing apartments are designed by Pöyry Oy.

There are 40 already built apartments at the Saimaa Gardens territory. As the rule, the identical cottages are grouped along one line and poetically named. For example, grouped Marina Village 1-4. At this moment construction works are produced and the building site of Marina Village 5. It will be described below.

3.1 General situation

Marina Village is located on the shore of Saimaa near the wharf and yacht parking. That is how it got its name. Marina Village is destined for rent. The master plan is presented in Appendix 1.

The exemplary external view is presented in Figure 4. In contrary to Marina Village 1-4, which are grouped in four, MV 5 includes 6 cottages that are combined together. Every building has been connected to each other by

firewall. The cottages are two-storied with wood covering. Planes, facades and sections are showed in Appendix 2.



Figure 4. Exemplary External View

The project is planned by Pöyry Oy. All the works at the building site are provided by subcontractor Protec Project Oy on the request of Miriensis Oy.

3.2 Foundation

It was rationally decided to start ground works for all 6 cottages at the same time.

The geological situation research was based on the borehole results. The investigations show that the underlying layer is moraine rock. It was decided to do a preliminarily rammed (200-400 kg) sand-gravel layer with the thickness of 20 cm 3 times. The geological conditions allow laying the foundation at the depth of 0.6-0.8 m. It has 20 cm in thickness and is made of concrete in winter time above -8°C without warming. As the reinforcement 2 bars $\varnothing 10$ were used.

After the foundation was done construction works continued with the basement walls for two southern cottages. After the frame was ready cellar wall works went on.

The basement wall was made of Leca blocks, which have the dimensions of 490x190 mm and weight 9.9 kg. Basement outer walls must always be equipped with perimeter drains. Below ground level, basement walls build of LECA building blocks must be grounded, asphalted and coated with mortar. (LECA® Building Blocks). Between the blocks two steel bars were laid in each row with 20 cm lapping; then the blocks were joined by mortar (Figure 5). On the upper row of the blocks bitumen material is laid on the mortar layer, after that the construction may be erected.



Figure 5. Leca Blocks



Figure 6. Styrox Insulation

The internal side of basement walls is insulated with 5 cm Styrox (Figure 6). Also the list of Styrox serves as frost prevention outside under the ground.

Basement walls have ventilation holes covered with metal pipes. That is why there is no need to install a special pipe for radon gas.

3.3. Montage works

The construction over ground started first with frame works for the two southern cottages.

The bearing frame is connected to the basement by anchors. For this purpose, a special block is filled with a concrete mix, which is drilled after getting hardness. The anchor is hammered through the bitumen material and it can be regulated by two nuts. Finally, the column is connected by metal shoes.

There are wooden columns with the step of 60 cm. The cross section is 47x197 mm of ready calibrated spruce from Myllyahon Saha Oy (Myllyahon Saha Oy). The same beams and the Puhos board Lattia-Wilhelmi Standard are used for the floor structure. *“There are plenty of thicknesses and sizes to choose from in our Puhos board collection: you will be able to design their use so that material loss is as minimal as possible”* as Puhos Board says. In Marina Village 5 the board thickness is 22 mm and board size is 600 x 2400 mm. (Puhos Board).

First of all, the columns should be erected for the height of two stores. The diagonal connect boards are established to avoid the loss of sustainability. For the connection glued nails are used. Then there is the first beam based to the console and services as a support for the secondary beams, as it is seen in Figure 7. For the internal wall frame wooden columns and beams are used as well. The tubes under the ceiling also require the wooden frames and boxes (as in Figure 8). Moreover, the building has two balconies which rest to the structure as a console with metal connections and have two columns inside.



Figure 7. First Secondary Beams



Figure 8. Wooden Frames and Boxes

There should be a firewall between apartments. For this requirement two lists of gypsum plasterboard Knauf were installed at all the height of structure.

The roof system presents the wooden frame. Workers rise up the readymade frame and reliably fix it. The connections in frame are performed with nails through the plywood plates, connections of roof frame - wall frame are only with nails. The connections are presented in Figure 9. After the perpendicular lathing the decks basic roll ruberoid material with grid is laid. At the ridge of a roof and joints the metal lists are installed and fixed. The external housetop material is also bitumen and looks like tile pieces, as in Figure10.



Figure 9. Connections in Roof Frame



Figure 10. Bitumen Material

The second floor presents a mansard type with raised walls, so the roof frame is at the height of 1.53 m. In this way the second floor area does not diminish and is equal to the first floor area.

3.4 Materials

The house skeleton starts to accrete and be filled with materials. The first step is to montage the wind protection panels. Soft boards are widely used as insulation and soundproofing materials; it also provides wind-protection and rigidity in wall, ceiling and floor structures (Viisnurk). The construction stapler is enough for fixing the panels. The wooden lathes over the wind protection provide an air gap of 4 cm required for a ventilated facade. In Figure 11 there is a lower edge of a ventilated facade.

Painted Myllyahon Saha profiles are used for external wood covering. They should be cut and nailed. Workers nail a temporarily board along the lower edge to adapt the profiles to the size (Figure 12). It should be removed to provide the ventilation facade. The paint used for outside wood is the Swedish paint “Eskaro Muldväry”, the tone is red-Swedish; and the window’s and corner moldings are covered with the “Tikkurila” paint, white tone. Special cover, based on a copper triazole, saves wood at the porch from fungal and insect attacks (Tanalith E).



Figure 11. Ventilated Facade



Figure 12. Temporarily Board

Thermal and sound insulation is made of ecological tested material. The ceiling system between floors does not require the thermal insulation because there is open space between the first and second floors. The 10 cm panel of Rockwool is used, and it is enough for sound insulation. The necessary thickness of thermal insulation should be wider in external walls. Therefore more than 20 cm of Ekovilla is applied. Insulation is made of recycling paper, and it is a clean and effective material. However, recycling paper insulation requires special equipment for installation (Figure 13). "The installation of Ekovilla is done by blowing or spraying it directly into place. That is why it forms a seamless insulation mattress filling all the smallest cavities and corners." (Ekovilla). Also it is used for the cellar floor. In this way there are different insulation materials, combined in one structure (Figure 14).



Figure 13. Special Equipment for Installation



Figure 14. Different Insulation Materials

Especially for sauna insulation SpuEristeet panels with a foil cover.

3.5 Engineering Systems

Engineering systems connection takes place at the stage of the construction erection. Intake, preparation, filing and distribution of water for the needs of consumers come through the plastic tubes with insulation under floor (distribution is shown in Figure 15). An electric center is installed once for 6 cottages (Figure 16), so it becomes an independent point for the group of objects (separate room at the plan, Appendix 2). The same factor occurs with heating center. Often there is a Danfoss pump installed (the same as in Figure 17).

After the water and electricity connection, installation of a fireplace, an expert also approves the work; expert must have a Europe model license, because otherwise it is impossible to take out insurance.



Figure 15. Distribution



Figure 16. Electric Center



Figure 17. Danfoss Pump

As a heating method a combined system applies: traditional radiators under the windows are the main heating source, and secondary water heating floor can maintain a comfortable temperature. The scheme is given in Appendix 3.

The symbol $\frac{150/10}{56}$ indicates this:

- 150 - distance between the tubes (mm);
- 10 – number of tubes in the same direction;
- 56 - total length of the contour (m).

The system consists of several loops of plastic pipe, jointed by a collector on the floor. The hydraulic balance is not calculated for small areas. In average in a room of 30 m² there should be 2-3 contours that avoid fireplace and an area under the stair. A higher number of contours lead to the higher temperature. Therefore, there are three contours in the room in the last cottages, others have two. Tubes are placed and fixed on chipboard with the specified step, as it is shown in Figure 18. Pieces of gypsum plasterboard can be placed between the tubes. As a coupling a special reinforced fiber fluid is used (Figure 19), it allows the temperature of deformation and excepts cracking. Thus there is no need in damping compensatory tape. After pouring a list of gypsum plasterboard and laminate are added.

The water heating floor is effective at the area over 50 m², because the minimum unit of heating floor (pump with a harness, collector and water mains) is the same for both 50 m² and 150 m², and this fact significantly affects the costs.

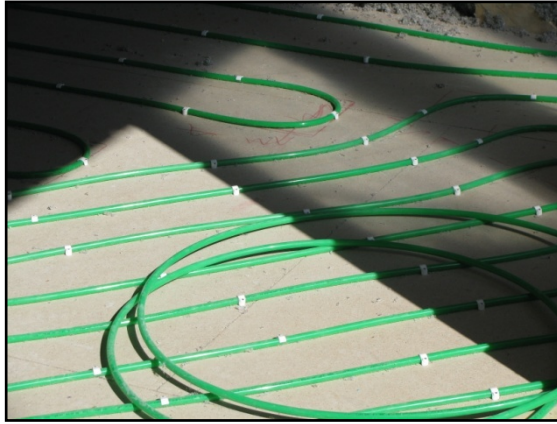


Figure 18. Placed and Fixed Tubes



Figure 19. Special Reinforced Fiber Fluid

3.6 Internal works

One of the most difficult internal works is insulation in the sauna. The technology uses KIILTO materials for hydro-insulation. The surfaces and seams are covered with synthetic rubber material (Figure 20). The layer is applied to the fabric base with a roller at least two times, coating thickness is min 0.6 mm for walls and floors. After that the surfaces can be finished with tiles (Figure 21).



Figure 20. KIILTO Cover



Figure 21. Tiles

Wall thermo insulation is covered by water vapor barrier inside. Gypsum plasterboard is fixed directly after water vapor barrier (as in Figure 22), or with OSB in case of kitchen wall (Figure 23), where the load of furniture is bigger.



Figure 22. Plasterboard



Figure 23. Plasterboard with OSB

Walls and ceilings are wooden and covered with Viva Colorin Akva lacquer, color tvt 3466. One of the walls is of gypsum plasterboard; painted with Eskaro Symphatia, white tone.

The floor is laminated with parquet. The shower, sauna and hall floors are tiled. The wall tiles are colored with Indian Crème 11a and Indian Coffee 11b and wall strip is colored with Indian Crème 11a. The floor tiles in the shower-room are 10x10 graffiti bronze M80 and the floor tiles in the hall are 30*30 graffiti bronze 89. The seams are made by MIRA and painted with floor MIRA 140 and wall MIRA 130 and 114.

The windows are 3-sectioned, opening inside and white painted. The interior doors are made of pine. The sauna door is made of glass. The exterior doors are made of wood and painted white outside as well as inside.

4 COMMISSIONING OF A FACILITY

4.1 Documentation

Documentation is a part of customer relationship management (Figure 26). A client has an interest in information about all construction issues; he reads the owner manual, so-called apartment user guide, which contains the main issues of the project. This manual is composed for every apartment separately. The compiling of information for apartment user guide requires data from the building site, the project drawings and final interior solutions. The report is diarized regularly during the erection of the cottage. Often this document is written in English, Finnish and Russian.

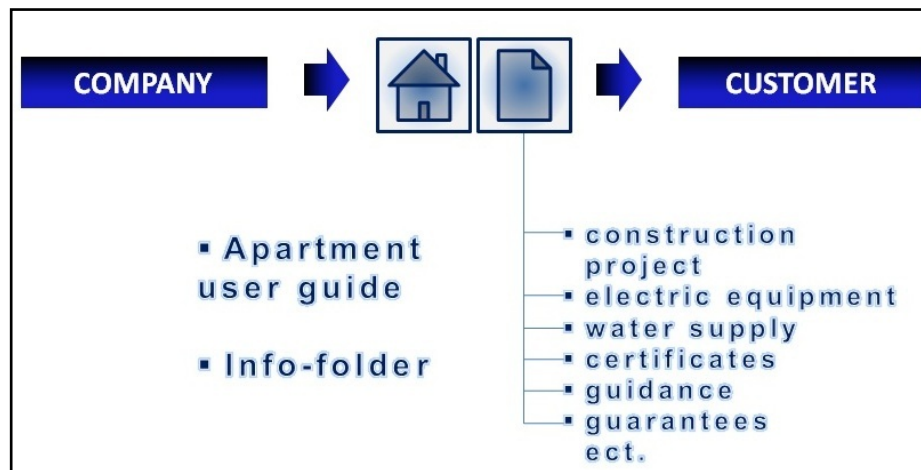


Figure 24. Documentations Scheme

The apartment user guide is a folder where all the construction issues are covered. The table of contents of user guide of Marina Village 5 will be as follows.

1. House details.

There are drawings (plans, facades and sections as in Appendix 2) and brief description of the structure and the building process in this section.

2. Construction details.

There is a list of contacts, all responsible persons are presented. The details are: construction works, electric works, furniture and household

- appliances, windows, painting and tiles, heat recovery, hall closet, stairs and exterior doors, plumbing.
3. External works: roof, painting etc.
Architecture view, materials, elements, colors.
 4. Internal works: windows, doors, painting, stairs etc.
Finishing materials are described. This part contains certificates for ecology, effective and safety evaluation (examples in Appendix 4).
 5. Interior: furniture, consumer electronics etc.
There is a short description of furniture and consumer electronics (3d model in Appendix 5).
 6. Household appliances guarantees and exploitations
This part is the biggest, because household appliances manuals are described fully.
 7. Ventilation & electric heating installation and guidance.
Description, schemes, guidance and tables (reference materials in Appendix 6).
 8. Heating floor
Guidance, plans (like in Appendix 3).
 9. Electricity
Table of consumption, list of electrical appliances.

The info-folder does not contain all construction aspects, just fire safety and some guidance.

4.2 Final expertise

After all construction works are completed, the communications are connected; the independent municipal inspector comes to make a final inspection.

The building can be taken into the commission only after the final inspection and the acceptance being suitable for using. In some cases, the apartment user guide is required at this moment. (Nykänen, P. 2009).

The Construction company sets to zero the water and electric meters. The customer gets the key, documents and manuals.

4.3 Further supports

The relationships do not end at this moment. Service companies become active with waste, landscaping and roads.

The owner has certain guarantees: 2 years for defects, because a wooden house settles even with glum laminated technology, and 10 years for construction mistakes.

In many cases a few holiday apartments' owners join into the user's community – the Stock Corporation. They choose an accounting company and other service companies. Also it allows reducing real estate taxes.

If the holiday apartment is intended for business and the owner needs to find tenants, the management company can handle this task.

5 RELATIONSHIP MANAGEMENT

There are two main schemes of maintaining customer relationships:

1. There is an account manager – he is the only one in the project who communicates with the client at all stages. Project Manager leads the manufacturing process and transfers all information to Account Manager. Account Manager analyses and handles it, translates it into the client language - in fact, he is the buffer between the company and clients.

The advantage for the client is a single "window", where he comes with his task and solves problems. The advantage for the company is a clear separation of duties – the Project Manager controls the production, the Account Manager engages a client and leads him further.

2. All employees are involved in customer management. In this case the customer communicates with different specialists who are relevant in each question. The company should have really effective system.

The applying of the method, that engages all employees, could be shown on the examples. There are two systems of maintaining customer relationships.

5.1 Buildercom

Computer software is necessary in a project with large amount of constructions at the same time. Every participant takes and changes information and creates new information. In even rather well-organized systems confusing situations can appear: where have the information gone?

Such service as Buildercom is an Internet based toolkit for designing, controlling and documentation of property care. As the example of the positive experience is the Health facilities information system in Helsinki (Buildercom). Buildercom can create InfoBank, archive of technical documentation, construction drawings, and project and facility information. The main task is to collect life cycle data. The benefits of this system include openness and centralized reporting. Constructors, management company and customers have different accesses. At any time the exact current situation is available to provide reliable planning (schematically the system is showed in Figure 24)

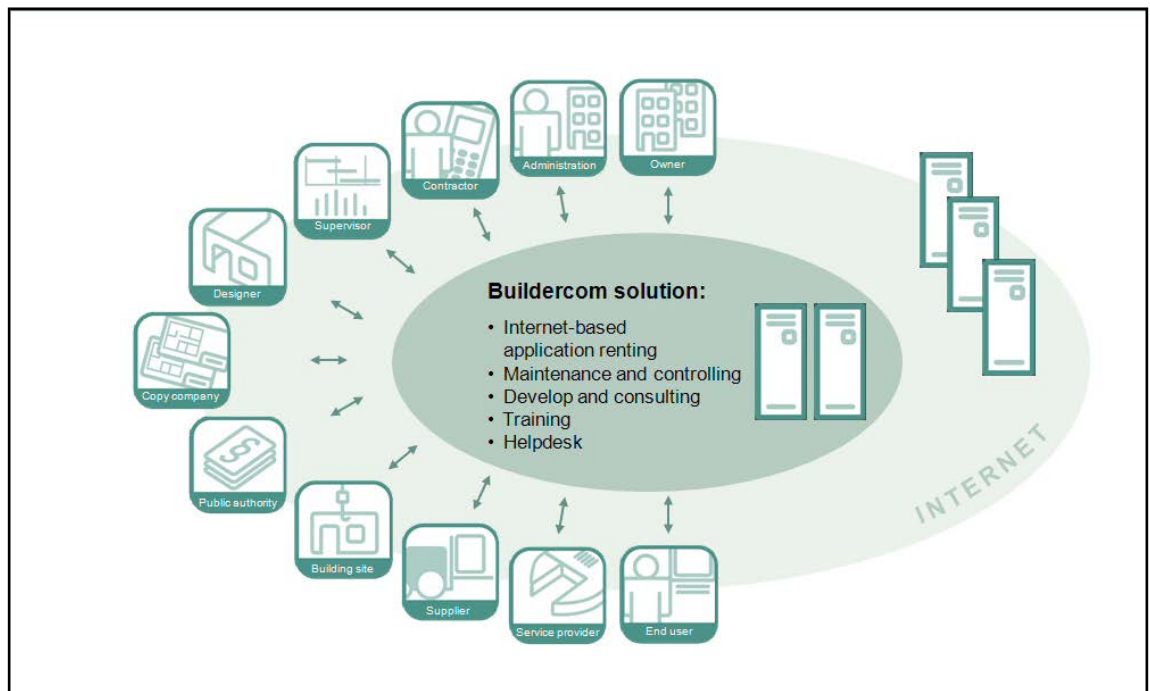


Figure 25. Buildercom System

5.2 CRM system

A CRM system is a simple and convenient scheme that is used to organize clients' data and transactions with them. As the rule, this system is realized as the computer program for the immediate information exchanging.

A "just-in-time" CRM system is an integrated management system. Nowadays a customer wants to receive: the highest quality in the shortest time and the lowest price. Also the customer wants to make his own demands and expects a rapid response.

A CRM program provides an integrated approach: a convenient and easy access to information about the project, guarantees, service contracts, repairs and maintenance. Combining data with a customer base, the reporting and information finding processes can be automated.

Systems of CRM processes are not really complicated; they are schematically presented in Figure 25.

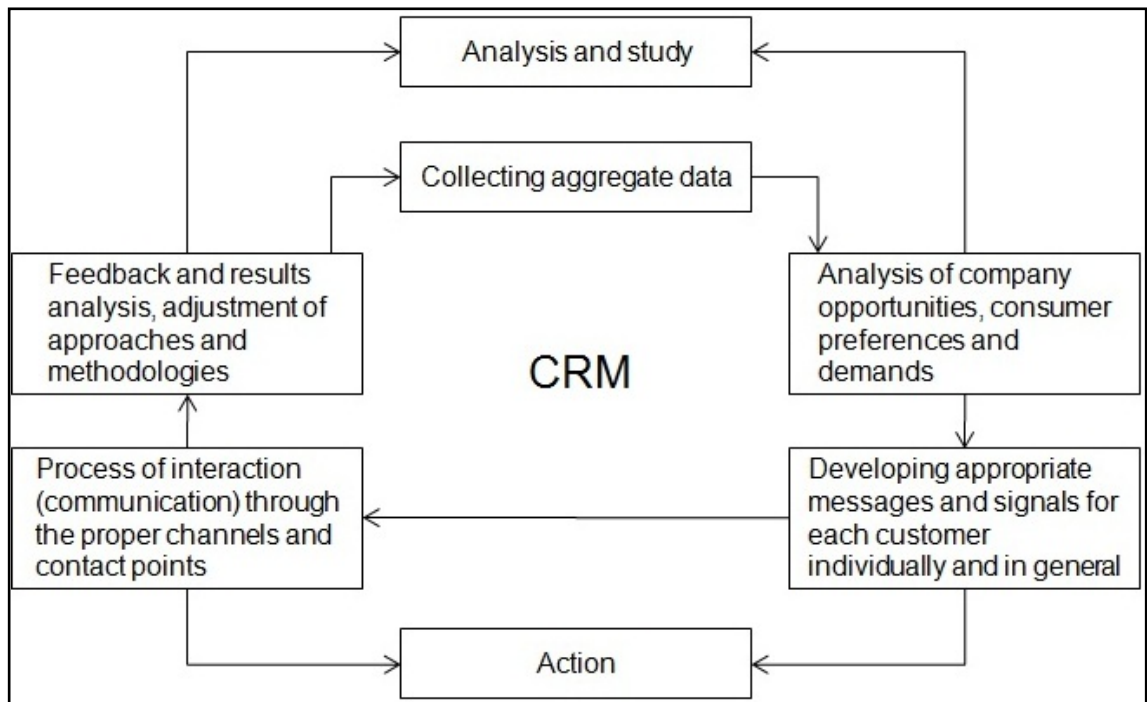


Figure 26. System of CRM Processes

CONCLUSION

In every company there are plenty of specialists, who are experts in their field. But the allocation of the customer relationship department is unprofitable for the small office. It is better to organize customer management through all the personnel. Any employee who communicates directly with the customer about the project is a customer manager.

Analyzing the customer management process, it should be noted that more effective results are given by computer tools. Database is formed from the first issues and ideas to the last stage of house erection and further. Customer relationship management in the construction field implies integrated approach to all the building procedures and relationship between the company and the future owner.

In this thesis there are aspects, described in details, which the customer manager faced. A special attention is paid to construction technology, customer documents and the way to organize quick and easy applied system.

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Figure 24. Documentations Scheme (property of the author).

Figure 25. Buildercom System (property of Buildercom Oy)

Figure 26. System of CRM Processes (property of the author)

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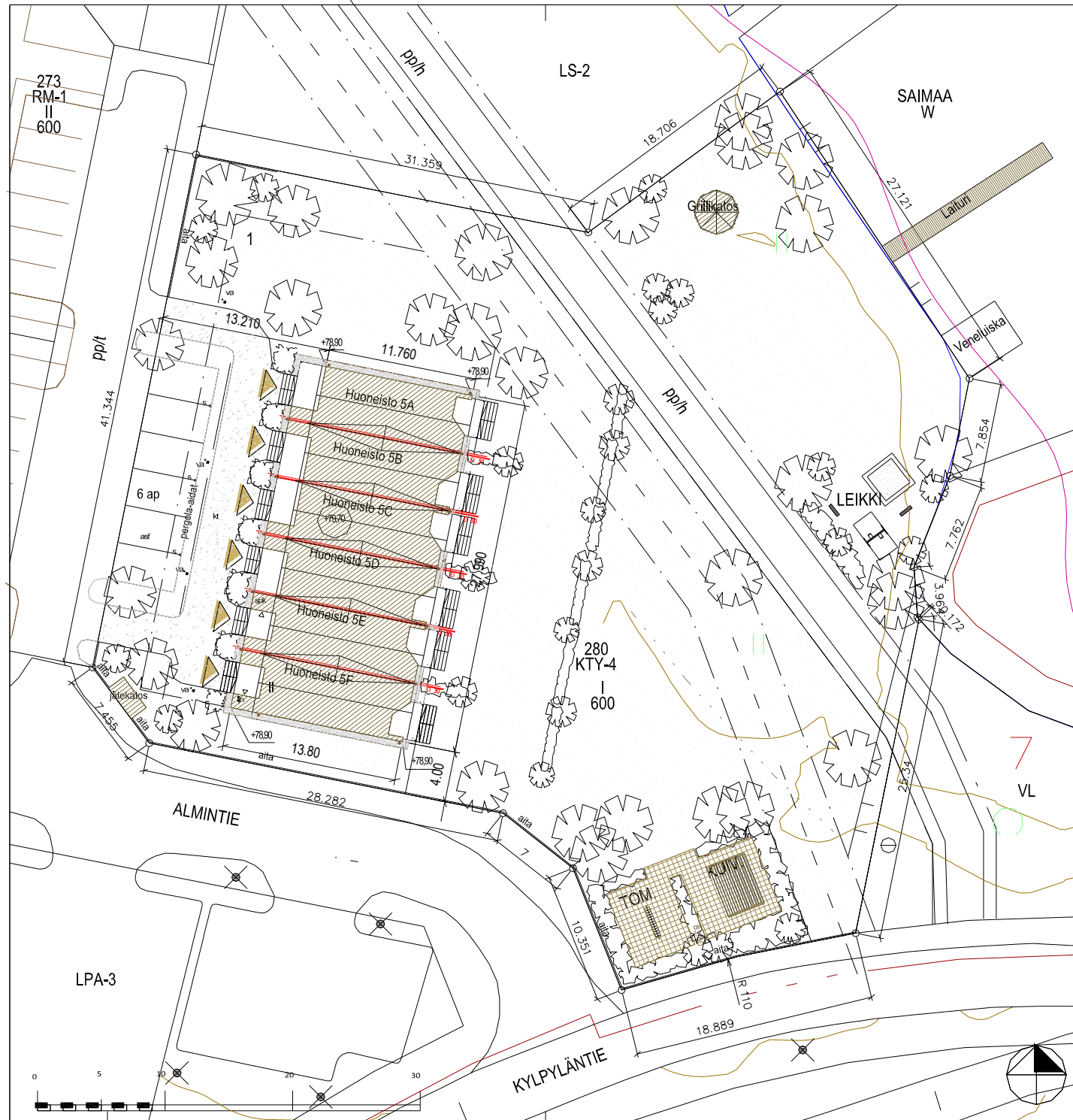
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<http://www.viisnurk.ee/korporatiiv.aspx/3/menu/370> (Accessed on 30 May 2011)

Master Plan



Merkintöjen selitykset:

- asf asfaltti
- kt kivituhka
- n nurmi
- luonnonkivi sokkelin vieressä luonnonkivi sokkelin vieressä
- sisäänkäynti sisäänkäynti
- luvan kohteena oleva rakennus luvan kohteena oleva rakennus
- spk sähköpääkeskus
- ljh lämmönjakohuone
- p pihavalaisin
- auton sähkölämmitystolppa auton sähkölämmitystolppa
- istutettava/säilytettävä puu istutettava/säilytettävä puu
- pensas pensas
- syöksytörvi syöksytörvi

Asemakaavamääräykset:

- KTY-4 Toimitilarakennusten korttelialue, jolle saa sijoittaa toimitoimisto-, majoitus- ja palvelutiloja, terveydenhoitoa palvelevia tiloja sekä ympäristöhäiriötä aiheuttamattomia työtiloja. Alueelle saadaan rakentaa kiinteistökohtaisia muuntamoita. Asuintilojen osuus alueen kerrosalasta saa olla enintään 1/3.
- Ohjeellinen tontin raja.
- Rakennusala.
- Maanalaista johtoa varten varattu alueen osa.
- Yleiselle jalankululle ja polkupyöräilylle varattu alueen osa, jolla tontille ajo on sallittu.
- Yleiselle jalankululle ja polkupyöräilylle varattu alueen osa, jolla huoltoajo on sallittu.

Yleiset määräykset:

- Rakennusten, kulkuteiden ja pysäköintialueiden ulkopuolelle jäävä osa tontista tulee istuttaa.
- Kaava-alue sijaitsee tärkeällä pohjavesialueella. Alueella on kielletty sellainen rakentaminen ja muut toimenpiteet, joista voisi aiheutua vesilain 1 luvun 18 §:n (pohjaveden muuttamiskielto) sekä ympäristön-suojelulain 8 §:n (pohjaveden pilaamiskielto) ja 7 §:n (maaperän pilaamiskielto) tarkoittamia seurauksia.
- Kaava-alueen maaperästä purkautuu radonkaasua, joka on huomioitava rakennussuunnittelussa. Asuntojen huoneilman vuosikeskiarvot eivät saa ylittää STM:n antamia kulloinkin voimassa olevia ohjevoja.
- Autopaikkoja on alueella varattava seuraavasti:
KTY-4-alueet:
- Loma-asunnoille 1 ap/ asunto
- Hotellihuoneille 1 ap/ 80 k-m²
- Muulle toiminnalle 1 ap/ 80 k-m²
RM-1-alueet: 1 ap/ asunto.

Rakentamisessa ja rakennusten sijoittamisessa tontille tulee huomioida Saimaan ylin tulvakorkeus (HW 1/50), joka on + 77,31 metriä. Rakennusten alin sallittu tulvasta vaurioituva taso on + 77,90 metriä.

Rakennusoikeuslaskelma:

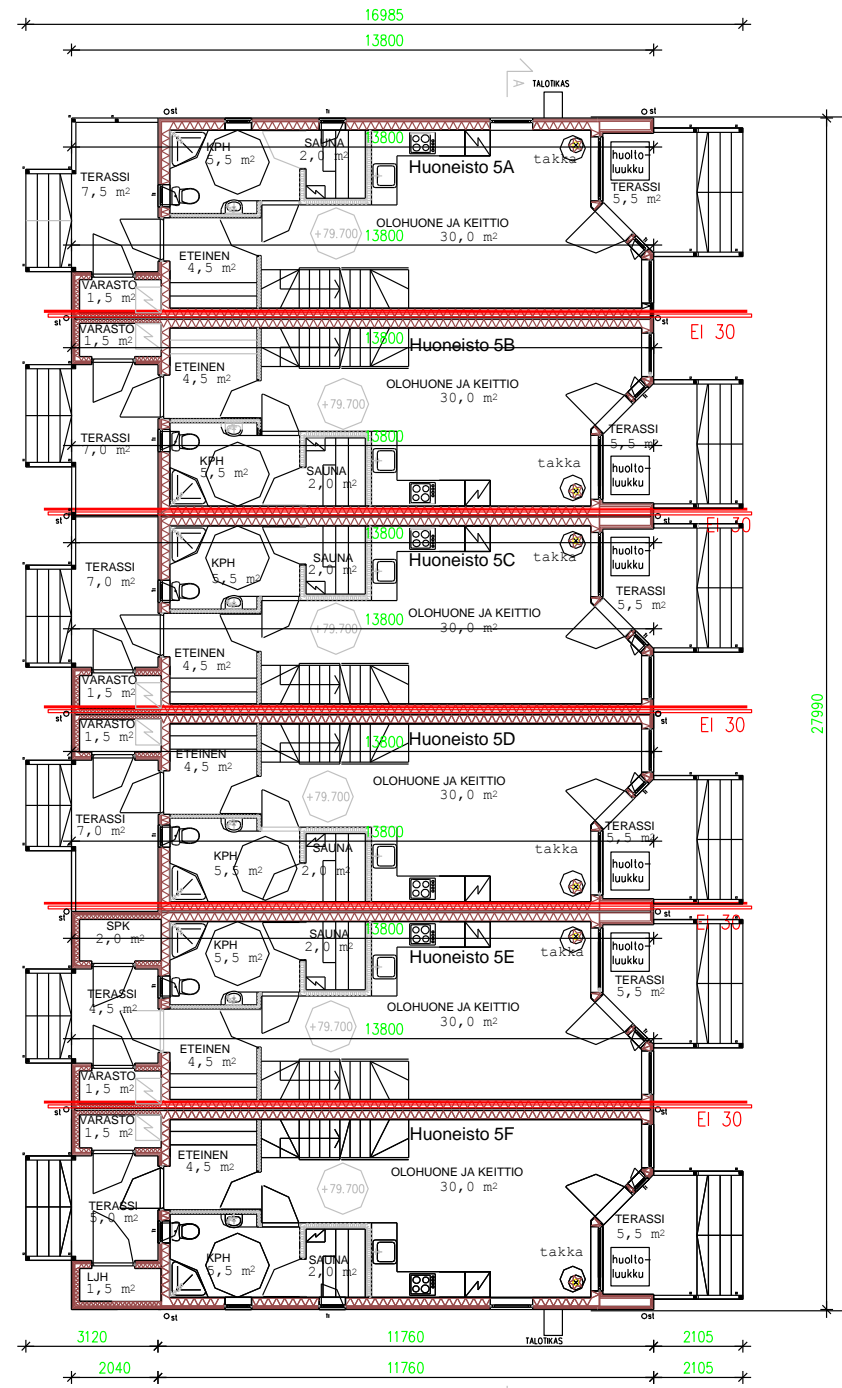
Luvan kohteena olevan tontin pinta-ala on 3240 m².
Rakennusoikeus luvan kohteena olevalla tontilla on 600 k-m².
Tämän luvan kohteena olevan rakennuksen kerrosala 250 mm ulkoseinäpaksuuden mukaan on 586 k-m² ja todellisen ulkoseinäpaksuuden mukaan 594 k-m².
Huoneistoalaa yhteensä 498 htm².
Rakennuksen tilavuus on 1870 m³.

Autopaikkoja on varattu 1 ap/ asunto.

Rakennuksen paloluokka on P3.
Rakennus varustetaan lämmön talteenotolla ja koneellisesti ilmanvaihdolla.

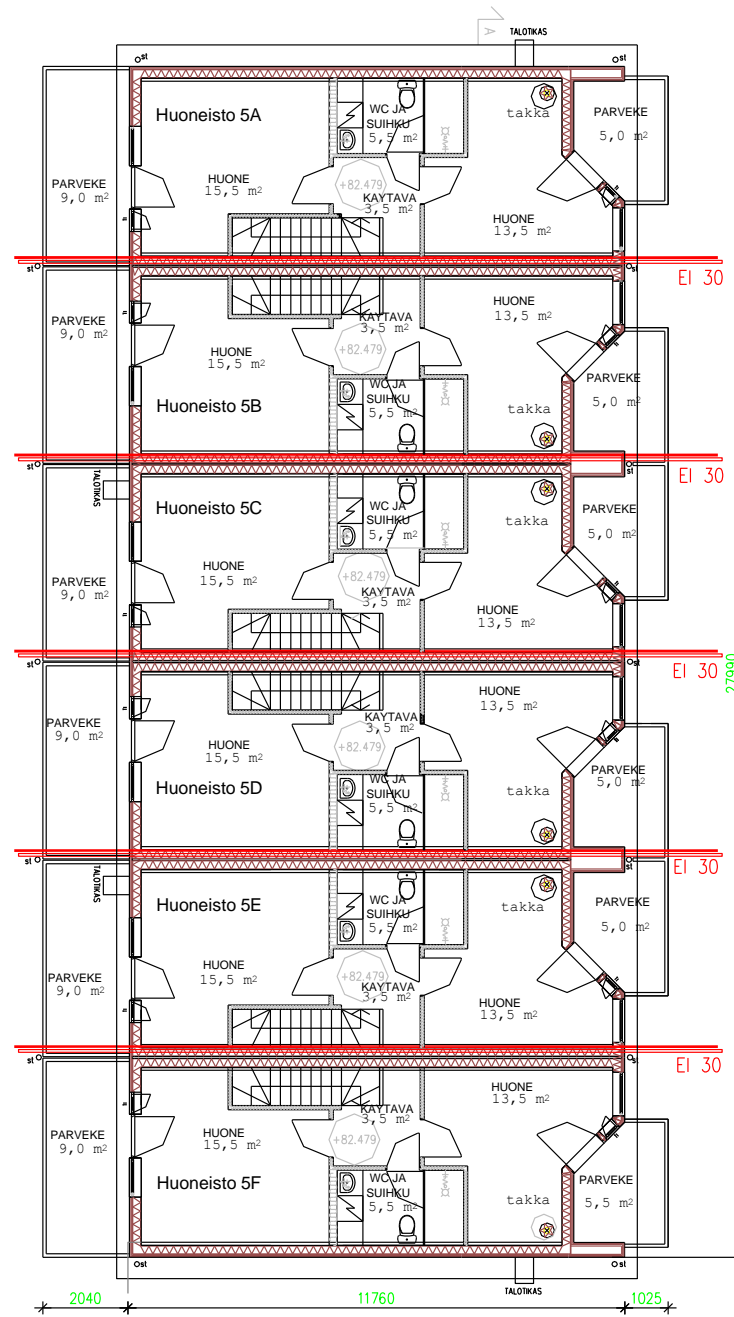
muuostunnus ja aihe		Rakenteiden päivitys (ulkoseinä ja yläpohja) -> pääpiirustus		pvm	piirtäjä
A				21.10.2010	SKK16
Tark.	Kaiteet lisätty, kokonaisuus päivitetty				
K.osa/työ	Korttel/Tila	Tontti/Rek.nro	Viranomaisen arkistointimerkintä/vorien		
563	Tiurunieniemi	280			
Rakennustoimenpide			Piirustusloj	Juoks.nro	
UUDISRAKENNUS			PÄÄPIIRUSTUS	1/1	
Tilaoja, suunnittelukohteen nimi ja osoite			Piirustuksen sisältö	Mittakaavat	
KOY MARINA VILLAGE 5			ASEMAPIRUSTUS		
ALMINRAITTI 1			Tontti 1		
55320 RAUHA			Huoneistot 5A- 5F		
	Suun MKPI	Työn ja piirustuksen n:o		Muutos	
Voihtokatu 25, 53100 LAPPEENRANTA Puh. 05-541 8300, Fax 05-541 8351	Piirt. SKK16	ARK 101			
HYV.	TARK.	Pvm. 04.10.2010			
			Yhteyshenkilö	Sanna Kokko	

Plans, Facades, Sections

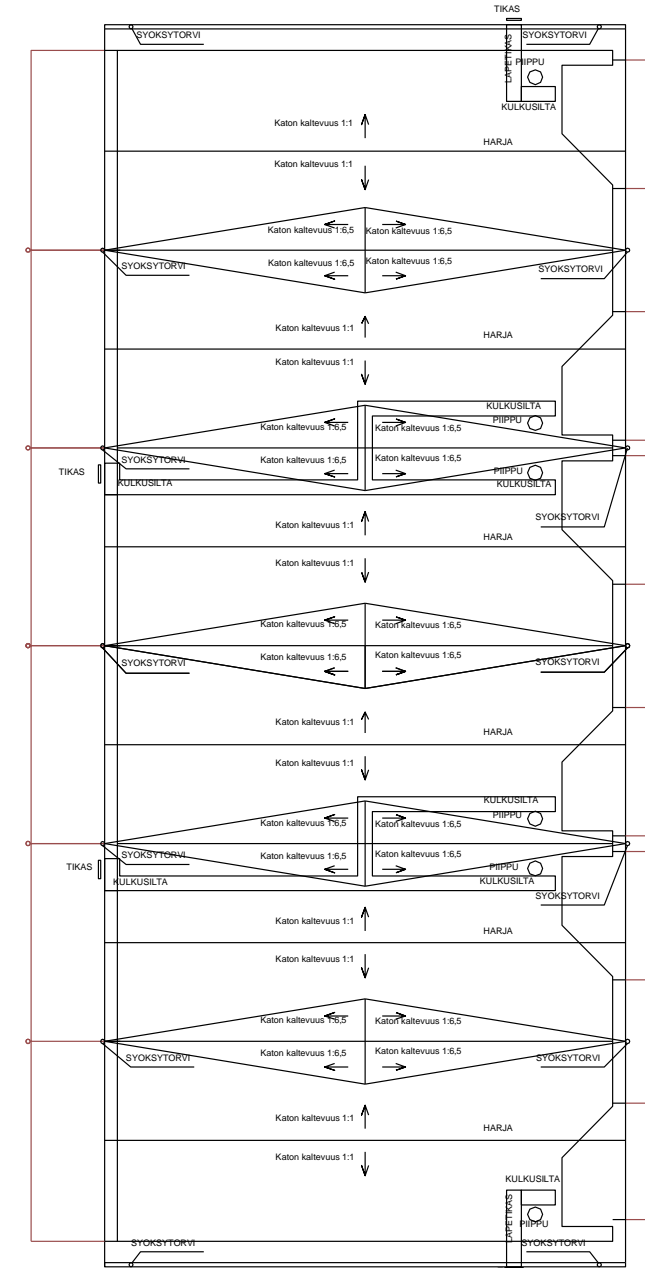


1.KRS

TAKAN HORMI ON
TYYPPIHYVAKSYTTY
TEHDASVALMISTEINEN
METALLISAVUHORMI



2.KRS

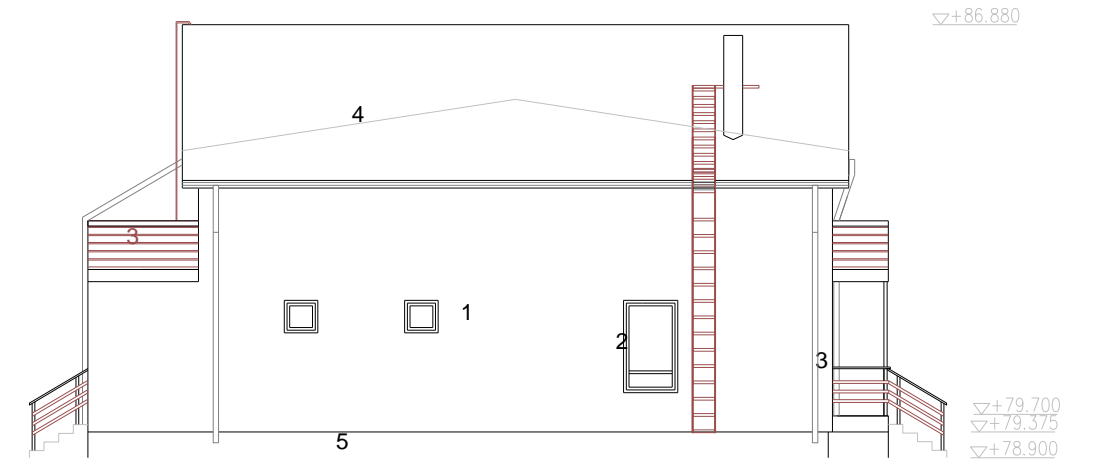


KATTOPIIRUSTUS

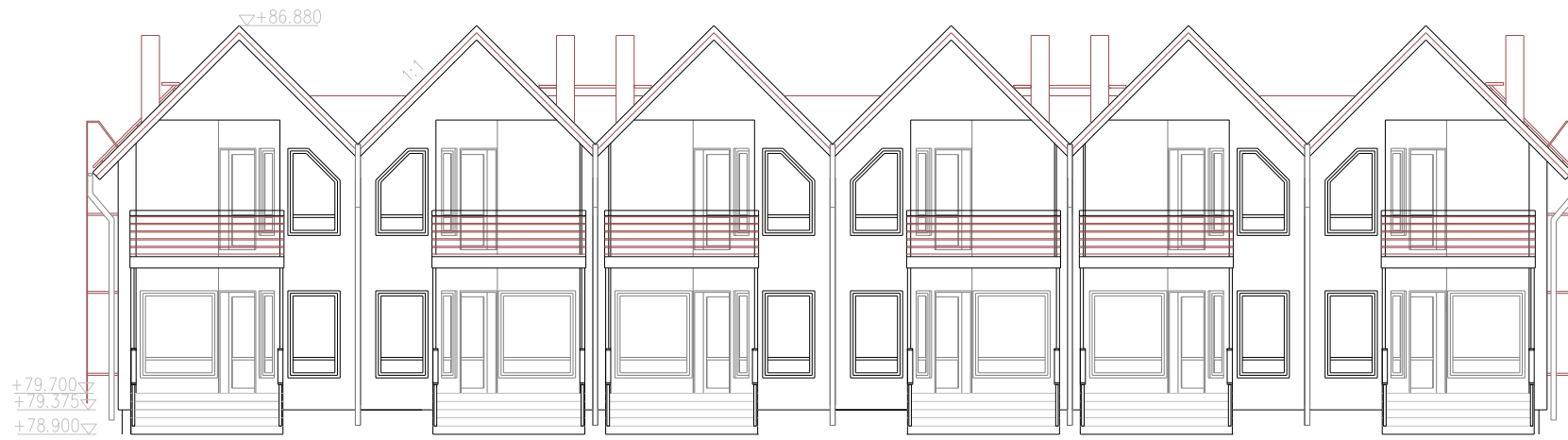
Plans, Facades, Sections



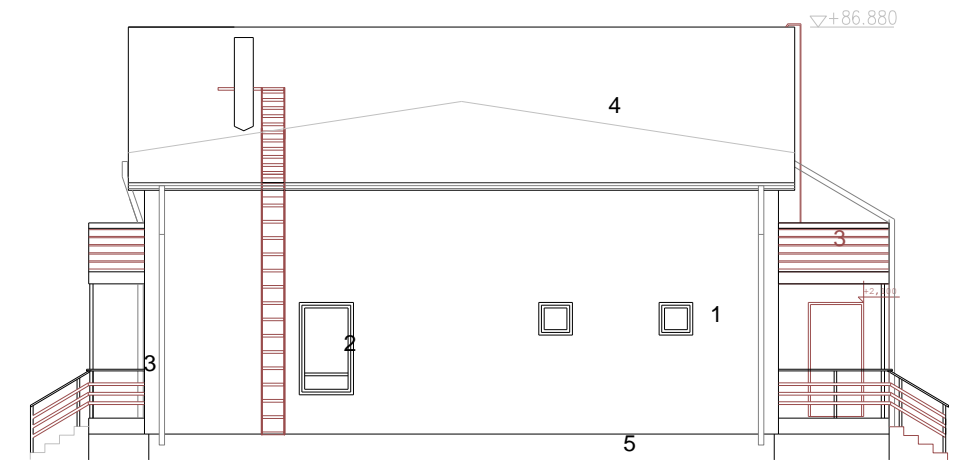
Julkisivu lanteen 1:100



Julkisivu etelaan 1:100



Julkisivu itaan 1:100

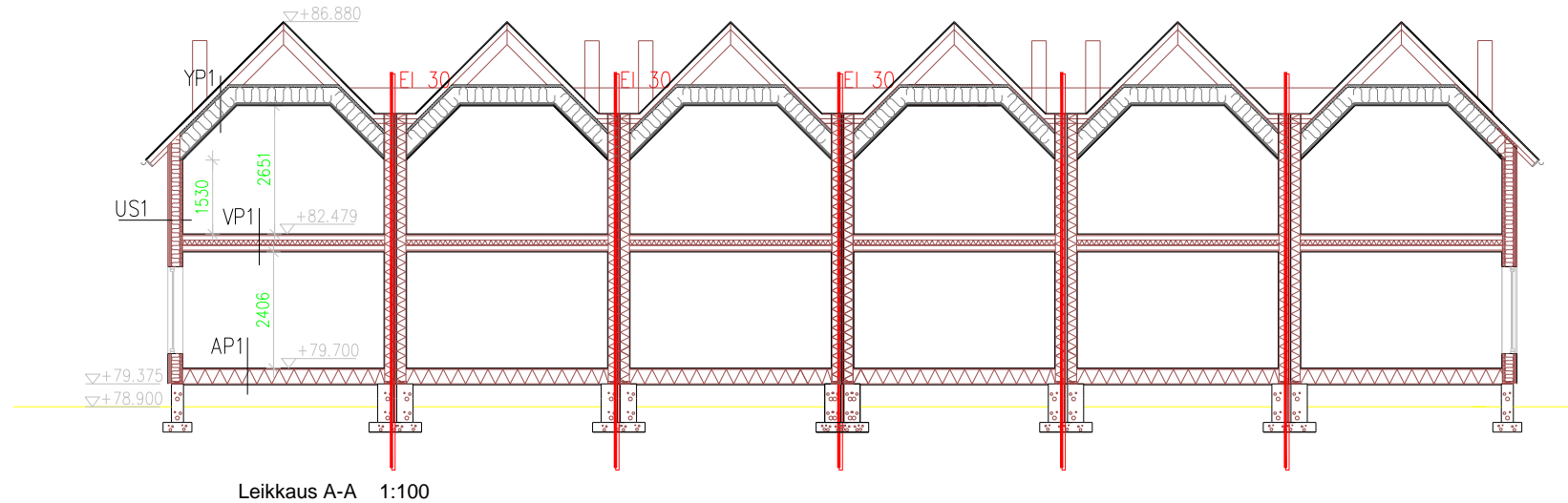


Julkisivu pohjoiseen 1:100

JULKISIVUVARITYS JA MATERIAALIT

1. JULKISIVUJEN PAAMATERIAALI:
PYSTYLAUDOITUS, VARI PUNAMULTA
2. IKKUNAT VALKOISET
3. NURKKALAUDAT, VUORILAUDAT, PARVEKKEEN
KAITEET VALKOISET
4. KATTOHUOPA TUMMAN HARMAA
5. PERUSTUS BETONI HARMAA

Plans, Facades, Sections



RAKENNETYYYPIT:

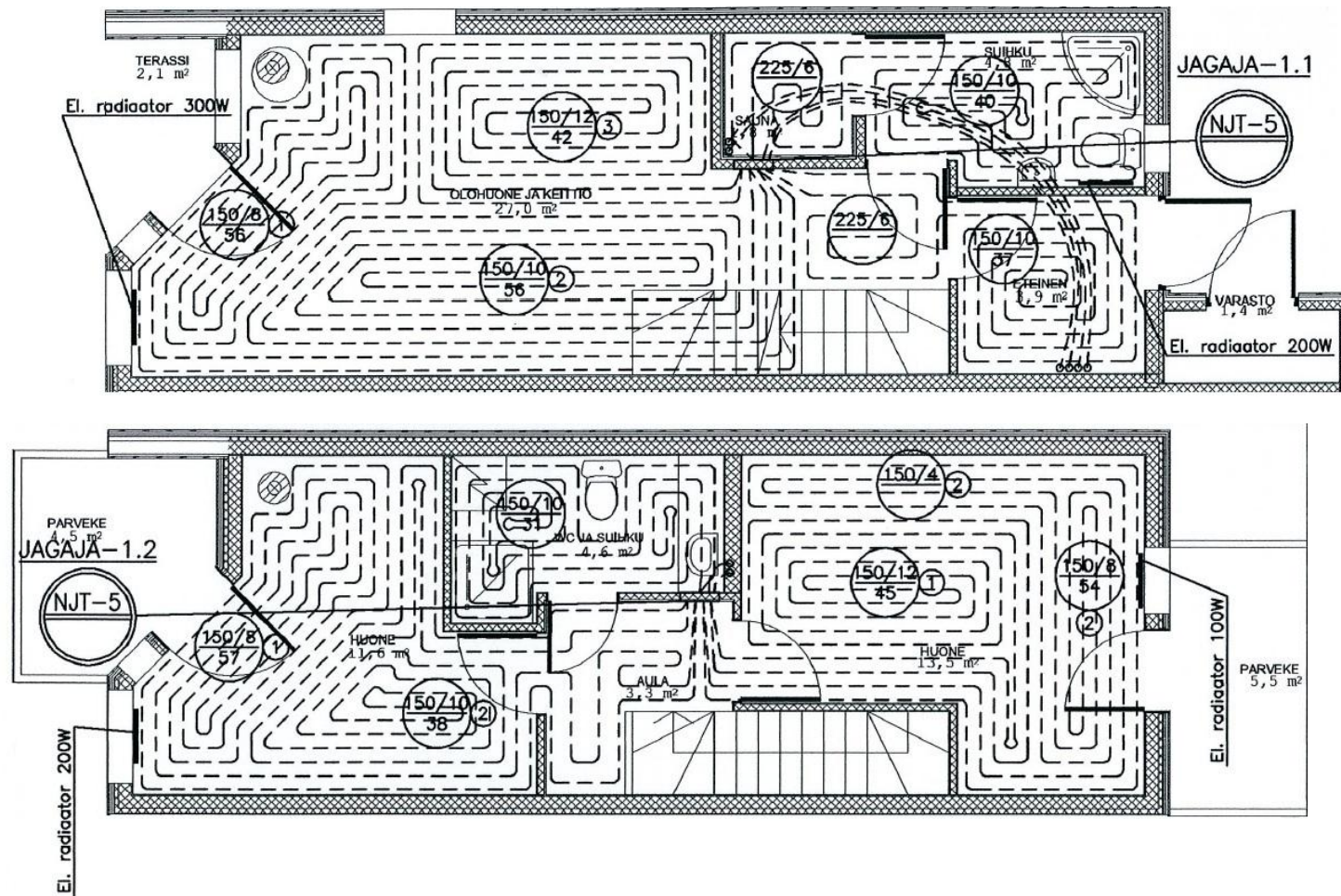
US1 PYSTYPONTTILAUTA UTV 23x120
 RUODELAUDOITUS 2*22 mm
 TUULENSUOJA JA LAMMONERISTE,
 GYPROC GST 9 mm
 LAMMONERISTE 175 mm JA
 KANTAVA RUNKO k600
 HOYRYNSULKU
 LAMMONERISTE 50 mm JA
 KOOLAUS 50x50 k600m
 PINTAMATERIAALI

YP1 Rakenne ylhaalta alaspain:
 HUOPAKATE alusrakenteineen rakennesuunnitelmien mukaan
 TUULETETTU ILMATILA ?100 mm
 TUULENSUOJA JA LAMMONERISTE 50 mm, asennetaan kattokannattajien valesiin
 LAMMONERISTE 325 mm, KATTOKANNATAJAT RAKENNESUUNNITELMIEN MUKAAN
 JAYKKA LAMMONERISTELEVY 25 mm
 HOYRYNSULKU
 HARVALAUDOITUS 22x100 mm k300
 PINTAMATERIAALI

VP1 LAMINAATTI 13 mm
 LASTULEVY 22 mm
 RUNKO 195 mm
 OSB 10 mm
 RUNKO 95 mm
 RUODELAUDOITUS 25 mm
 LAMMONERISTYS
 KIPSILEVY 13 mm

AP1 LAMINAATTI 10 mm
 KIPSILEVY 2X13 mm
 LASTULEVY 18 mm
 HOYRYNSULKU
 RUNKO 195x45 mm
 RUNKO 95x45 mm
 LAMMONERISTYS 300 mm
 TUULENSUOJALEVY 12 mm

Heating Floor Scheme



Certificate

RT Environmental Declaration Ekovilla Oy, Ekovilla insulation material



1(2)
 27.12 (Building 2000)
 Valid until 4 May 2012
 No. 24.1

Ekovilla thermal insulation materials

Ekovilla Oy

Katajaharjankatu 8, FIN-45720 Kuusankoski
 Tel. + 358 5 750 7500

www.ekovilla.com



1. PRODUCT SPECIFICATION

Object definition

This RT Environmental Declaration describes the Ekovilla thermal insulation material.

Product description

Ekovilla is an insulation product made from certain types of newspaper. During the production process, fire retardants are added to the insulation material. The material is used as insulation in roofs, walls and floors. When used for walls, the Ekovilla insulation material is sprayed with hose and an Eko adhesive is added to the material at the same time.

The installation can be done by either the builders themselves or an authorised contractor.

RT K-36873.



Conversion factors

Density	Package density 120 kg/m ³ Installation density 30 kg/m ³
Volume weight	kg/m ³
Loft insulation	30
Floor insulation	45
Vertical cavity wall insulation	65
Sprayed frame construction wall insulation	35
Slanting or sloping cavity insulation	45

Technical properties

Type approval resolution YM36/6221/2005

Type approval resolution YM36/6221/2004

Normal thermal conductivity: 0.41 W/M²K depending on the structure of the casing.

The U value depends on the strength and structure of the insulation.

RT Environmental Declaration is based on the national methodology following the basic principles stated in the ISO standard series 14040 and 14020. The method also considers also the preliminary results achieved within ISO CD 21930. It is developed in cooperation with Confederation of Finnish Construction Industries RT, The Building Information Foundation RTS, VTT Technical Research Centre of Finland and companies of construction business companies.

Certificate

RT Environmental Declaration Ekovilla Oy, Ekovilla insulation material

2. ECO-PROFILE OF THE PRODUCT

The eco-profile includes the life cycle stages from the acquisition of raw materials to the factory gate.

2.1 USE OF RESOURCES

Energy

Use of energy	MJ/kg
Non-renewable energy resource consumption	3.0
Renewable energy resource consumption	0.25
Energy resource consumption in pros.+ transp.	3.25

Energy in transport *	MJ/kg
Energy resource consumption in transports	Not specified

Process energy *	MJ/kg
Consumption of electric energy in processes	0.33
Consumption of fossil energy in processes	Not specified
Consumption of biotic energy in processes	Not specified
Total energy in processes	Not specified

Feedstock energy of raw materials	MJ/kg
Fossil feedstock energy of raw materials	Not specified
Biotic energy in raw materials	0.34
Feedstock energy of raw materials	Not specified

* Optional information

Raw materials

Consumption of raw materials ¹	g/kg
Non-renewable natural materials	202
Renewable natural materials	18.9
Hidden material flows	Not specified
Total consumption of raw materials	220.9

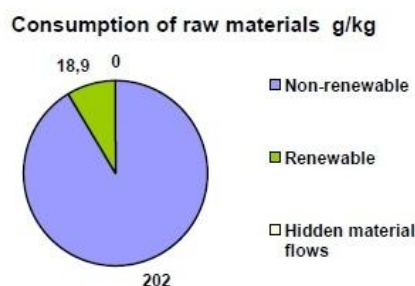
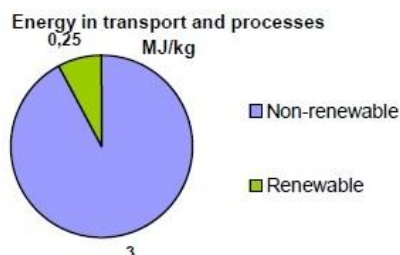
¹calculations do not include paper consumption

2.2 EMISSIONS

Emissions to air	g/kg
CO ₂	180
CO	0.12
SO ₂	1.1
NO _x	1.2
CH ₄	0.075
NM VOC	44×10 ⁻³
N ₂ O	7.5×10 ⁻³
PM ₁₀	0.23
Heavy metals (Hg, Cd, Pb, As, Cr, Zn, Ti)	0.054×10 ⁻³
Dust	0.56
Other particles	Not defined

Emissions to water	g/kg
COD	0.49
BOD	0.14
P _{tot}	0.48 × 10 ⁻³
N _{tot}	0.003
Solids	Not defined

Process waste	g/kg
Waste to dumping area	Not defined
Hazardous waste	Not defined



3. OTHER ENVIRONMENTAL ASPECTS

CONSTRUCTION Product transport

Loss at site

Indoor air emissions

- Ekovilla materials that belong to the emission group M1 are listed on the Building Information Foundation RTS website at www.rts.fi.

RISKS

SERVICE LIFE

SERVICE AND MAINTENANCE

FINAL DISPOSAL

Recycling

- The product can be reused as thermal insulation as such, or as soil amendment when weakened, in which case it should be made sure that the concentration of boric minerals is not too high. Empty paper sacks are used to produce Ekovilla insulation material.

Utilised energy

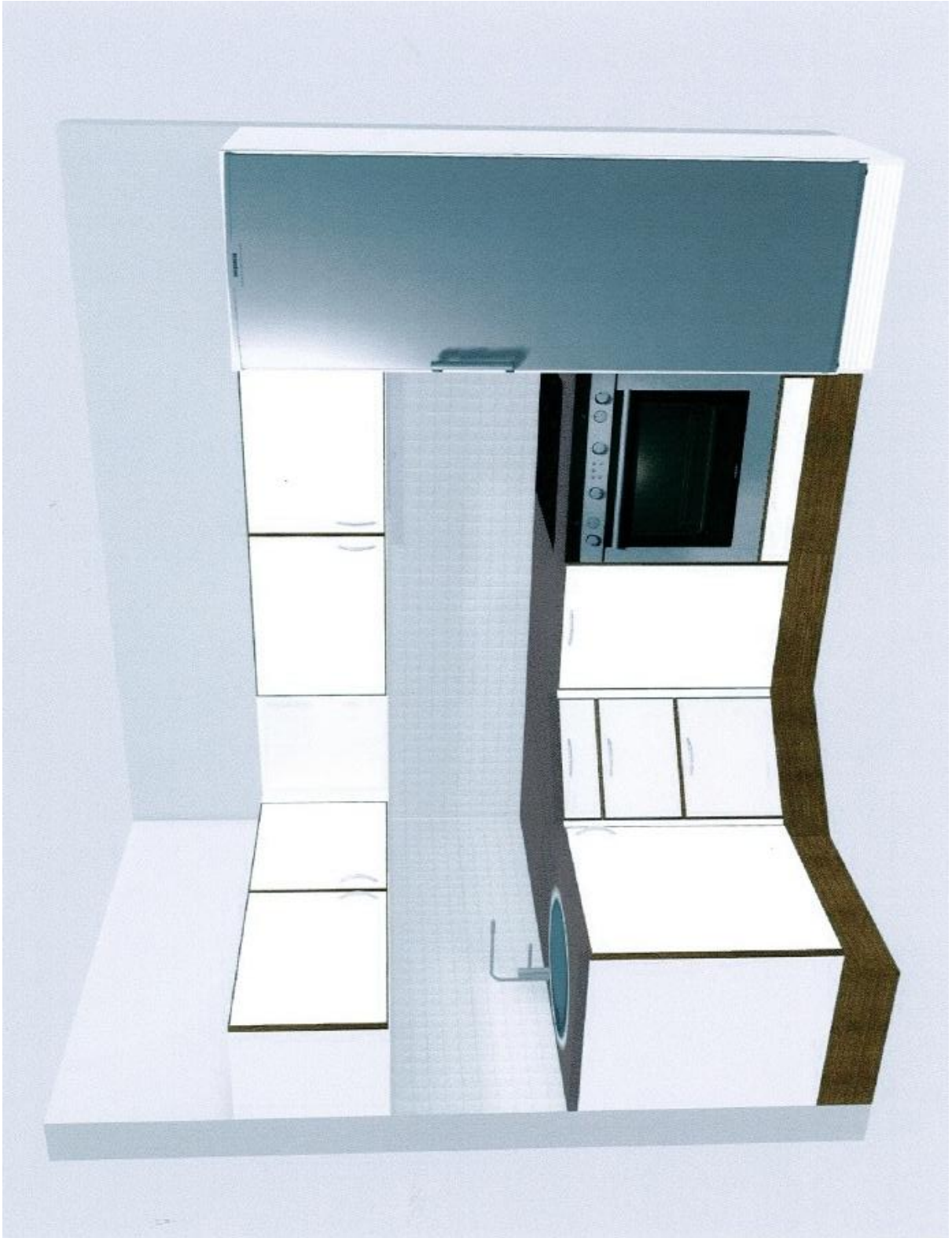
- Fuel value: Not defined

Treatment of waste

- Location and quality: Not defined

ADDITIONAL INFORMATION

3d Model of Furniture



Reference Materials

Air exchange manual

Fl. 1

Room №	Room name	Internal temperature °C	Room square m ²	Exhaust air system		Supply air system	
				System №	Volume per second l/s	System №	Volume per second l/s
1.	Living room and kitchen	21	27	V-1 V-2	20 30	S-1 -	45 -
2.	Sauna	24	1,8	V-1	8	S-1	8
3.	Shower-room	24	4,8	V-1	20	-	-
4.	Hall	21	3,9	V-1	5	-	-

Fl. 2

Room №	Room name	Internal temperature °C	Room square m ²	Exhaust air system		Supply air system	
				System №	Volume per second l/s	System №	Volume per second l/s
1.	Vestibule	21	3,3	V-1	4	-	-
2.	Bedroom	21	11,6	-	-	S-1	12
3.	WC and shower-room	24	4,6	V-1	20	-	-
4.	Bedroom	21	13,5	-	-	S-1	12