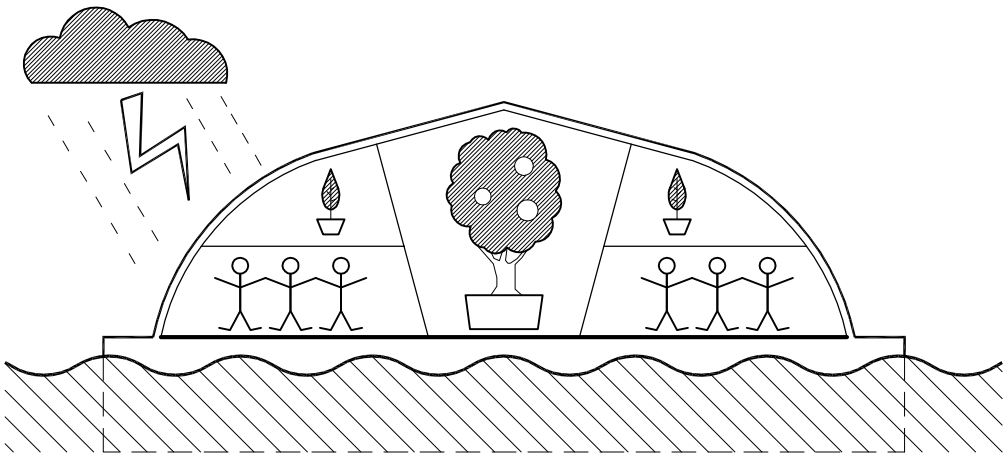
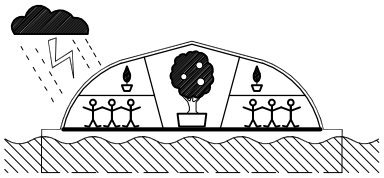
PROJECT TURTLE SHELL

by Fabienne Lehmann
Diplom Architect ETH Zurich



Project Turtle Shell is on one hand a **strategy** for humanity to survive global warming and on the other hand a **concrete idea** on how to adapt as a global community to severe weather events and rising global average temperatures. It's main strength lays in teamwork and innovation.

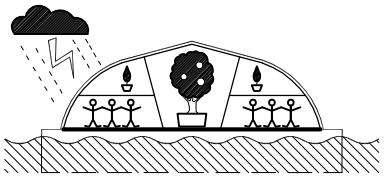
Thinking outside the box.



ITINERARY FOR STRATEGY

ITINERARY FOR CONCRETE IDEA PROJECT TURTLE SHELL

PLANS FOR TURTLE SHELL



CLIMATE CHANGE - PLAN B

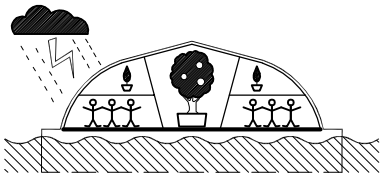
The biggest challenge human kind has to face is the man and woman made climate change. All species are facing the same challenge and only those species who will adapt successfully will survive. Humans are no exception to the rule.

There are three more or less promising ways to adapt as a species.

Our current method is business as usual, reacting to each severe weather event separately, hoping that help will be provided by governments, the Red Cross, volunteers and donations. In the long run this method will be the least successful due to helper fatigue and an ever increasing need for help.

A second approach would tackle climate change individually.Each person and community would adapt on their own with whatever means they have available. This approach has a major drawback, because most people have just enough means to survive now, but lack means to adapt, most people live in poverty.

I am proposing a third method, consisting of a global adaptation plan called "Plan B". "Plan A" by the way stands for cutting greenhouse gas emissions, reduce, reuse and recycle. "Plan B" will go much further. Imagine we will not reduce greenhouse gas emissions enough to prevent a global average temperature rise of more than 2 degrees, which right now is the direction we are heading for. We will need a plan on how we can survive more frequent extremely severe weather events on a never before seen scale. "Plan B" would include a global safety net for each person, a global food security system, provisions for sustainable adapting of all human activity and a way to finance such a plan. The last approach is the most successful, because as a team, we will have the best odds to survive.



PLAN B - UNIVERSITY STUDENTS

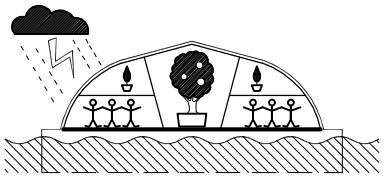
As an architect, a mother and a fellow human being I will say we need to make a plan for climate adaptation now.

My idea would engage everybody on this planet to work together on finding the best possible way to survive. I would like that everyone brings their ideas on the table by sending them to a university of their choice. All university students across the globe will gather the ideas, sift through them and compare them. They will choose the best ideas and create a "Plan B". The university students will bring the "Plan B" (and there might be a "Plan C or D") in front of the people for voting. We as a global community will take charge of our destiny and decide which plan we want to follow. This has never been attempted in human history before and hopefully we will never come to such a difficult age ever again.

The university students will then implement "Plan B" in all jurisdictions. This is going to be the point when governments will get involved. We as global community will be asked to force our plan on our governments. Governments tend to only implement what is in their best interest. They do not care about our survival, we have to stand up for our needs ourselves. With the students leadership we are asked to make sure our governments do what we have decided.

I am proposing the university students across the globe to be in charge of "Plan B", because they are independent from corporations and lobbies, representing the people's interest the best. They are our youngest and brightest, still believing that anything is possible with the longest time to live on a more and more inhabitable planet. Their own drive for real change will guaranty the success of the operation. They are the ones who will be young and energetic implementing change.

The university students will organize themselves and with the help of the Internet connect with us and each other.



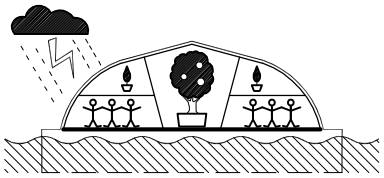
BIGGEST PROJECT EVER

This winter after watching a documentary on effects of global warming and another on Superstorms I got the idea to design buildings with indoor gardens and shelters. As I thought more about the idea I found myself in a place between reality, possibility and imagination, a place called creativity. I allowed myself to think outside the box and now I would like to invite you to do the same. Our way of life has brought us as species to a very dangerous place and we need to get serious about our situation. We need to get proactive and tackle the biggest project humankind has ever had to work on. Let's not wait any longer.

Our survival chances will increase if we work as a team, respecting each other and serving one another, giving freely of ourselves for each other. I am making a first step by asking everybody to consider the possibility for a "Plan B" and to consider contributing to its successful implementation. A special call goes out to university staff and professors to make an effort to support the students. Another call goes out to my colleagues, the architects, and all the other academics to contribute their ideas freely as I did.

Another call goes out to you. Maybe your idea is the best and your name will make history.

I went with my son, Jacy, to a Chinese buffet and at the end of the meal we both got a fortune cookie. His read "You will never have financial problems." Mine read "Do not underestimate yourself, you have unlimited potentials." First I was irritated that I picked the wrong cookie. On second thought I understood that the key to success is to understand that anything is possible if we believe in ourselves. "Plan B" could be a chance to improve our society and learn from past mistakes. We can do whatever we imagine. Our survival could happen with dignity and comfort if we choose so.



BASIC STANDARDS FOR PLAN B

Any strategy "Plan B" will use should have at least the following basic standards.

1. No fossil fuels should be used in any project. Use only sustainable energy sources. Burning fossil fuels brought us to the difficult situation of global warming we are in now .

2. Any emergency shelters should be off grid to provide a safe environment for people during severe weather events,which are likely to cause infrastructure failures and power outages.

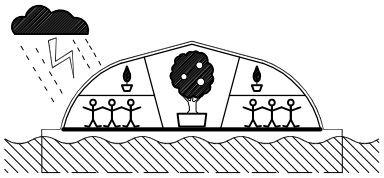
3. Emergency shelters should be accessible to everyone who needs a safe shelter. There should be a certain number of accessible beds and washrooms provided in each facility.

4. "Plan B" should include safe public transportation, which can run independent of the weather. The public transportation should ideally provide access to the public emergency shelters.

5. We need to include a global food security system. Food and shelter are the basic needs for humans. Any plan has to consider access to food. Global warming will make it very difficult to grow food in the traditional ways around the globe.

6. Any plan needs to have a strategy on how to provide the financial means to carry out the plan. We need to come up with realistic ways to finance projects considering at the same time the impact of severe weather events on our economy.

7. Any plan should consider rising seawater levels impacting coastal areas and islands. Many mayor cities will be affected by Superstorms like Sandy ravaging through New York in October 2012. There might be a considerable population movement to higher grounds in the future.



PROJECT TURTLE SHELL
WHAT IS IT?

Project Turtle Shell is a concrete idea how we as a global community can survive severe weather events related to man and woman made global warming.

This project is free to use by anybody. I, Fabienne Lehmann, have had the idea and have put it on paper for you.

Project Turtle Shell is a global safety net providing shelter for every human being during severe weather events. These shelters are open to anybody.

Furthermore project Turtle Shell revolutionizes our concept of food production providing a secure, sustainable global food safety net.

Project Turtle Shell offers an alternative to current public transportation including air traffic.

Project Turtle Shell provides a revolutionary vision for a financing solution.

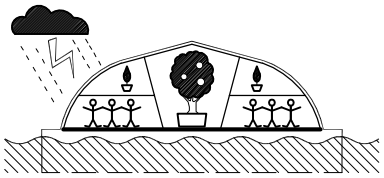
Project Turtle Shell postulates how we could adapt our cities to global warming.

Project Turtle Shell proposes safe hospitals with indoor gardens in order to provide safe hospital stays for all patients. The worst thing in a storm would be to move critically ill patients to safety.

Who is the author?

I am not important. I am just an average person with two children, a husband and the hope that we can do anything we can imagine. I have not been paid for any work on this project nor do I expect any payment other than to profit from the end result and know my and your kids are going to be safe. I have used my spare time to work on this project.

I can provide a autocad drawing of the project. email: projectturtleshell@yahoo.ca



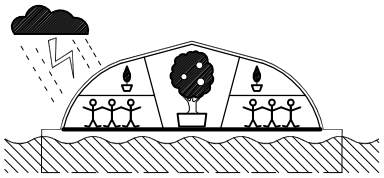
PROJECT TURTLE SHELL
GLOBAL SAFETY NET

When severe weather events like superstorms, tornados, hurricanes, hail, severe downpours, wildfire, drought and flooding will become more frequent, current buildings will likely not withstand enough to keep us safe. To illustrate I have found an article on the weather network about Superstorm Sandy: "The storm made landfall as a post-tropical cyclone along the southern coast of New Jersey on October 29, 2012. Sandy nearly wiped out entire shorelines, destroyed homes and knocked out power to millions of people across the eastern U.S. At least 113 people were killed in the U.S. and another 18 in Canada. The storm caused $50 billion in damages, making it the second-costliest storm to ever hit the U.S. At the height of the storm, more than 8 million people were left without power and more than 12,000 flights canceled. New York was among the hardest hit, with its financial heart closed for two consecutive days. The storm caused the worst damage in the 108-year history of the city's subway system, which was inundated with water. The National Hurricane Center has since retired the name "Sandy" from its list of tropical cyclone names."

Wouldn't it be nice to have public shelters, which are safe from flooding and wind damage, which kind of look like turtle shells and can be used by about 3,000 people living around the shelter?

When shelter is needed the population can be safe, if after the storm homes are destroyed, people can have a safe place to stay and don't need to live in unsafe tents.

During stable weather those shelters could be use by the public for schools, adult education, workshops, community assembly halls and any other public use as long as furniture can be removed easily in case of an emergency.

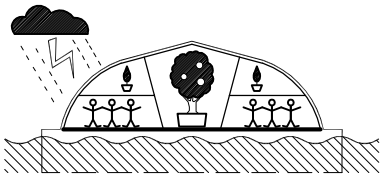


PROJECT TURTLE SHELL
WHY SHELLS?

Severe weather will affect buildings in many ways, the main safety concerns for humans are high winds and flooding. When wind speeds reach Category 1 (119 km/h or 74 mph) we can expect debris to become airborne and act as lethal weapons, penetrating light build walls made of wood and siding. When wind speeds reach Category 2 (154 km/h or 96 mph) buildings start to disintegrate. Category 3 (178 km/h or 111 mph) will damage roofs, Category 4 (209 km/h or 130 mph) will destroy some roofs and walls and Category 5 (252 km/h or 157 mph) will destroy most of the framed buildings. Floods usually threaten the main storey and the basement of a building. Even cars can get airborne in tornados. Although they are designed aerodynamically to save gas, any wind coming from the side or rear has much less problems to lift up a vehicle. Imagine the damage airborne vehicles could make.

Did you know that turtles have their backbone and ribs transformed into a shell? Did you know that concrete withstand damage by flying debris the best? Did you know that a dome shape is the most aerodynamic form for a building?

Imagine we would build a structure out of concrete like a shell with openings for windows and doors. When wind speeds go above a certain level we would have metal shutters closing all the openings and we could be safe. Imagine further that the first and second floor would be used to store rain water and electric cars. Imagine our shelters to be on the third and fourth floor safe from any flooding and we could have indoor gardens on the fifth and sixth floor. You have just imagined a typical shelter of Project Turtle Shell.



PROJECT TURTLE SHELL
SECURE FOOD PRODUCTION

The average global temperature rise will cause more water evaporation, which in turn will translate into more fuel for storms. The water will eventually come down again somewhere. We will experience more Tornados, Hurricanes, Severe Downpours, Flooding, Hail Storms and Droughts. (These will be weather events with capital letters!) What we experience right now is just the beginning, worse is still to come. Food production will come under pressure. Rising food prices due to food shortages will cause widespread famines, which in turn will lead to revolts.

The key element of project turtle shell is the concept of indoor gardens. Indoor gardening allows for ideal conditions for each plant to grow. No storm, flood, hail, drought or wildfire will devastate a harvest.

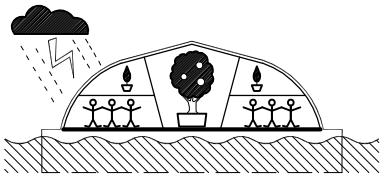
There are several advantages indoor gardens provide.

First farmers will have a **reliable source of income**, harvest won't depend on the weather just on the know how of the individual farmer.

The second advantage is **longer food production**. With artificial light the daylight can be supplemented in the morning and evening. This way we can have at least two harvests per year instead of only one.

The third advantage is the **improved pest control**. We can control the inflow of pests and we can control the spread of pests. We can isolate infected crops and protect neighbouring food production rooms.We will need less fungicides and pesticides.

The forth advantage lays in the proximity of food production and it's consumption. Indoor gardens can be build anywhere near the end consumer. This means most importantly fresher vegetables and fruits with more vitamins. Less transportation



PROJECT TURTLE SHELL
SECURE FOOD PRODUCTION

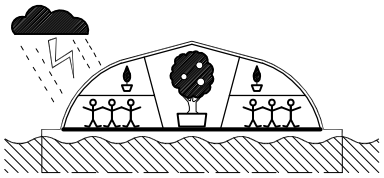
time and distance with less fuel costs. This will encourage a rise in local farming and even organic farming. More money can be earned by small farmers and we will be less dependant on large scale farms.

The fifth advantage is very important. Indoor gardens can be build on land, which is not favorable for food production. We can turn waste land into indoor gardens. We can combine agriculture with residential, commercial or even low hazard industrial uses. We can farm on top of a factory or even the parliament building. We could live in safe buildings with apartments having indoor roof gardens and interior atriums with indoor fruit trees. We could have livestock housed in safe elevated buildings with food growing just above.

The sixth advantage is the economical use of water in irrigation. We would collect the rainwater from the roof and store it under or in the building for later irrigation of the crops. Excess water will not accumulate in overflowing rivers, but can be stored for times of drought. Waste water from the plants could be used to flush toilets etc.

The seventh advantage indoor plants provide is the oxygen they produce during photosynthesis. Humans produce CO2 when they breath, which in turn helps plants grow more. There could be a kind of profitable coexistence in a building.

The eighth advantage is kind of clever. In a severe weather event humans could seek shelter in a building with indoor gardens. The food growing there could provide nutritious meals for the trapped people.



PROJECT TURTLE SHELL FINANCING SOLUTION

Building any type of safety net with shelters and a food security system will come at a high price.

Nowadays average citizens are struggling with their day to day expenses. Governments are running deficits and cut services to manage public debt servicing. Many countries are faced with austerity measure.

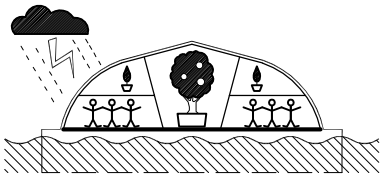
Global warming is due to harmful human activity causing future generations to pay a steep price to survive. We are that future generation.

I am proposing a clever solution to the problem,where everyone will win (except 1% of the population, that 1% who has been used to taking advantage of each hardship in the past).

Communities or governments who want to build public Turtle Shells or any other public project proposed by "Plan B" and have public debts will pay the interests owing on the debt to the university students instead of their creditors.

Once the students receive payment of the interests, they will publicly post receipt of such payment for the taxpayers and creditors to see. From here on the creditors will have no legal right to the interests anymore. The students will now use the payments to finance the Turtle Shells or any other public project from "Plan B" in the community or country the interest payment has originated.

In other words instead of paying interests on public debts we use the money to pay for our own safety. The creditors of public debt will come under worldwide austerity to free up funds in order to save lives. The creditors don't really suffer either, because they do not work for the money in the first place. They money suddenly stops working for them.



PROJECT TURTLE SHELL
NET GAIN

In the name of saving humankind form extinction due to rising global average temperatures and giving each human a safe shelter we would have a net additional benefit.

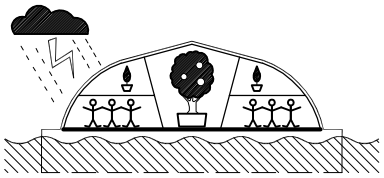
a. The Turtle Shell buildings could be used everyday either for emergency shelters or for any public use as long as furniture can be removed easily. We could house our public schools, daycare centres, adult learning centres, community colleges, AA meetings, concerts, festivities, theatre productions and much more.

b. We could use the gardens for the benefit of the community, school kids could be taught how to grow food indoors and they could grow food for the other school kids. We could provide children around the world with nutritious snacks and meals during school.

c. The shelters will produce jobs, first during construction, later for maintenance and food production.

d. Communities who struggle with the costs of servicing public debts have had to cut public programs, neglect infrastructure, hold off investing in new projects. These communities will get a big boast through project Turtle Shell.

e. Public schools and daycare centres in Turtle Shells would give parents peace of mind, knowing that their offspring is in a safe structure, while they are at work. In case of an emergency their kids would already be at the shelter. Parents can go directly from work to the shelter.



PROJECT TURTLE SHELL TECHNOLOGY

The outer shell of the building would be made of concrete. There would be concrete walls between the shelter rooms stiffening the structure further.

Openings in the outer shell would be hexagons with windows. Hexagons will not weaken concrete as much as squares. All openings will be covered in an emergency by hurricane shutters.

The rain water will be collected around the perimeter of the third floor and will be channeled to an interior water storage tank. That tank will be used for irrigation of the plants.

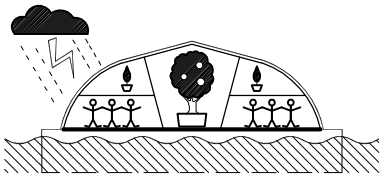
The main floor and second floor will house the electric cars and water tanks. We will have a geothermal heating and cooling system. which will be housed in the second floor as well. We need electric cars in order to eliminated toxic emissions in the building. Students should try to find a way to remove gas engines from cars and replace them with electric engines. I am afraid that the automobile industry will not provide this technology, they want to sell new cars. We need to make it affordable to use our existing cars in a safer way.

The main floor will not have doors in order to be safe during flooding. The second floor would have watertight doors if the water should rise to this level. In some areas we might not need to worry about flooding and the access could be directly form the street to the main floor.

We would have solar panels on the shell to produce electricity and we could warm our water as well.

We would have our main entrance on the third floor.

The axis of the building should be aligned with the main wind direction of the location.



PROJECT TURTLE SHELL
NEW CITIES & TRANSPORTATION

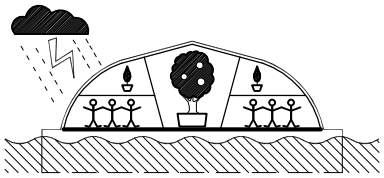
I am envisioning a city with aerodynamic structures all aligned in the main wind direction. Some of the structures might be round shells. All buildings would have indoor gardens in the upper most floors.

We would have a great public transportation system joining buildings and cities. The problem with cars will be the storms in the future and the potential for cars to be lifted off the road or parking spaces. We will need to think about transportation in tubes above ground (less likely to be inundated by floods), like magnetic trains. We could have two tubes running in two directions with indoor gardens above them all the way. The indoor gardens could be accessible independently.

We could have grocery stores with indoor gardens above producing the fresh food sold in the stores.

We could replace neighbourhoods destroyed by storms with shells providing duplexes with their own roof gardens and interior courtyards with fruit trees.

We will have to think about air traffic as well. Aside from wasting fossil fuels, air traffic can be very dangerous in storms. Most flights will be grounded and in the future air travel will be very unreliable, same problems for ships. Again we have nowadays magnetic trains traveling at 581 km/h and with the right design in tubes the speed could possibly be increased.



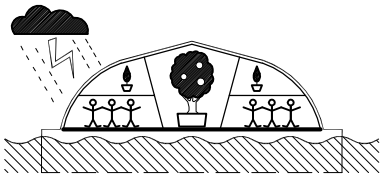
PROJECT TURTLE SHELL
HELP AFTER LOSING HOME

Imagine in the hopefully not so near future storms destroy a majority of buildings. If many buildings are destroyed at the same time, insurances will not cover the damages, because they simply can't. People will turn to help form elsewhere and will end up with nothing, but a mortgage on their destroyed house. Now I hope I am totally wrong with this prediction. Nevertheless after the Tsunami in Japan, this is what happened to a lot of Japanese victims.

In order to avoid this scenario worldwide I am proposing to rethink buildings all together. Buildings of the future should produce energy not waste it and produce food not just take up valuable space. We should seriously work on finding ways to improve energy production for home owners.Owning a property in the future will pay for itself over time and this way it will be much easer to qualify for the financing of a new building. In order to get insurance for a building it will be very important to build with severe weather in mind.

The safety net provided with the Turtle Shells will help destroyed communities to organize themselves and to have a safe home for the victims.

More thought should be given to existing buildings as to how we could make them safer and change them into buildings that could withstand severe storms. Money saved today at the wrong spot will be tomorrows headache. It is always better to prevent than to fix a problem when it is too late.



PROJECT TURTLE SHELL HOSPITALS

Last but not least my favorite subject, hospitals.

Hospitals are usually build like efficient factories fixing sick people. The food is usually very bad. (sorry I must have always been hospitalized when the food was bad).

I am proposing to build Turtle Shell like structures for hospitals, where hospital beds are oriented towards the indoor gardens. This way the structure of the building will withstand severe storms and the patients don't have to be evacuated.

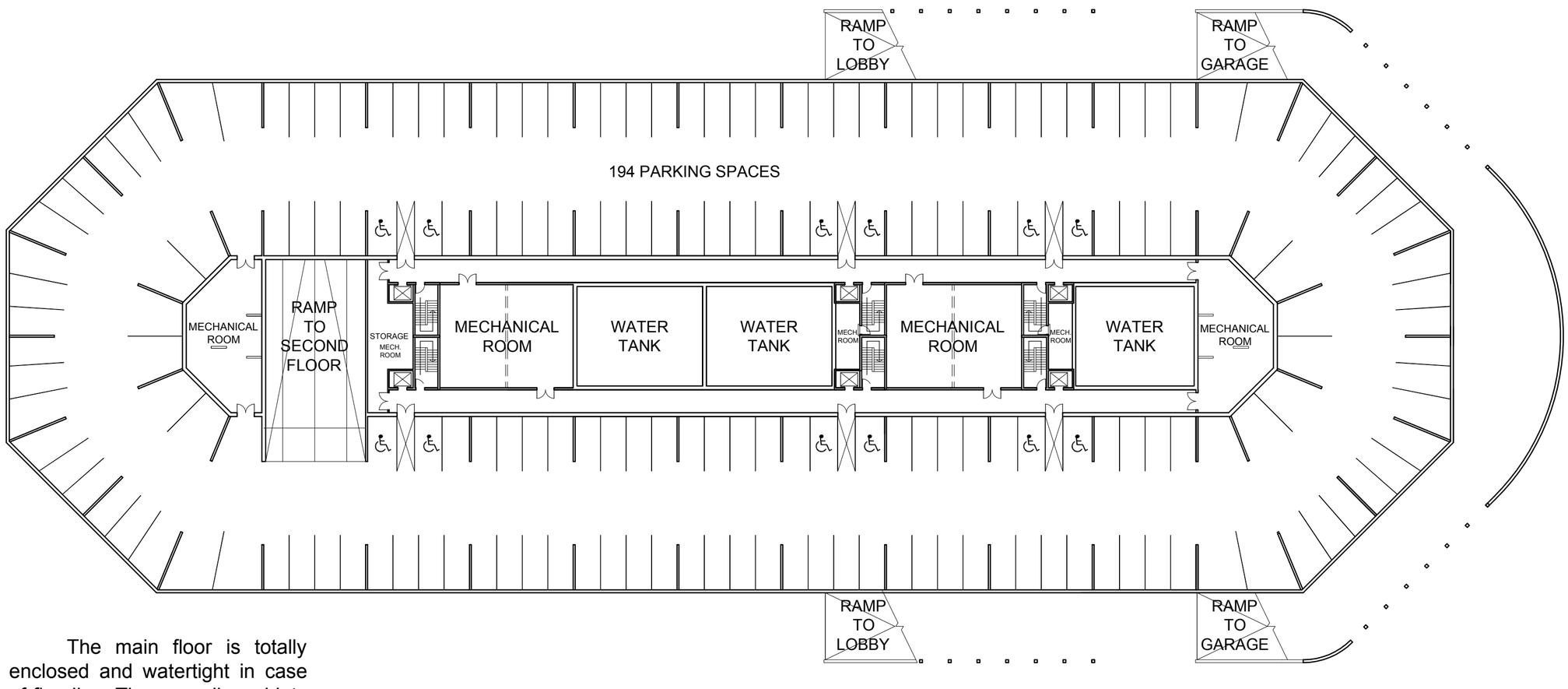
The indoor gardens will produce the healthy nutritious food I believe should be served in hospitals. There could be medicine grown right in the hospital.

It is a known fact that healing occurs within the patient in a very mysterious way. Nature and seeing nature though improves healing. Orienting the hospital beds away from walls towards windows looking at gardens would surely help patients recover quicker. I do not know about any diseases plants transfer on humans or vice versa. I could totally imagine that anybody could profit from a stroll through indoor gardens.

DESIGN BY FABIENNE LEHMANN
DIPLOM ARCHITECT ETHZ

PROJECT TURTLE SHELL
MAIN FLOOR

10 0 20 40 meters
5 10 30

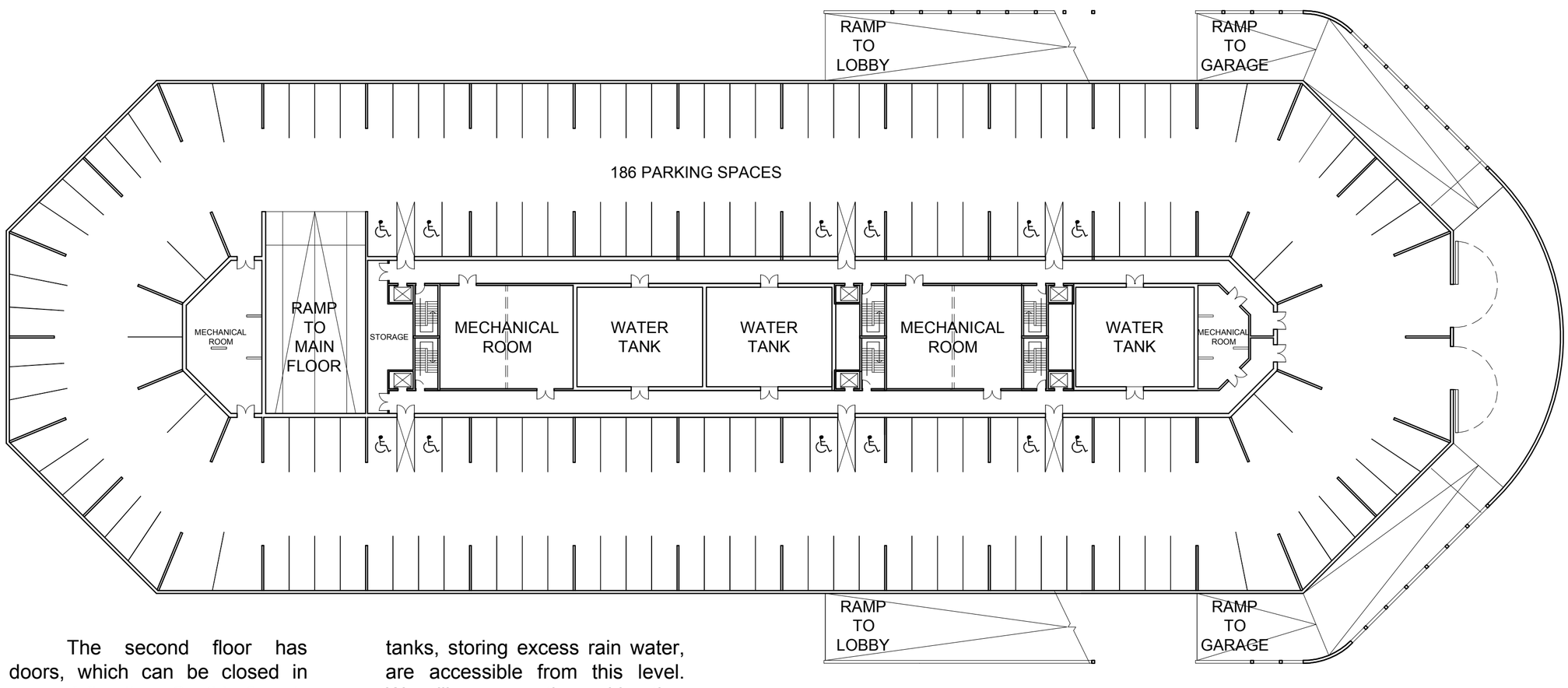


The main floor is totally enclosed and watertight in case of flooding. The cars allowed into the structure are to be electric. During stable weather conditions the car garage will be used by the customers of fresh vegetables and fruits markets.

DESIGN BY FABIENNE LEHMANN
DIPLOM ARCHITECT ETHZ

PROJECT TURTLE SHELL
SECOND FLOOR

10 0 20 40 meters
5 10 30

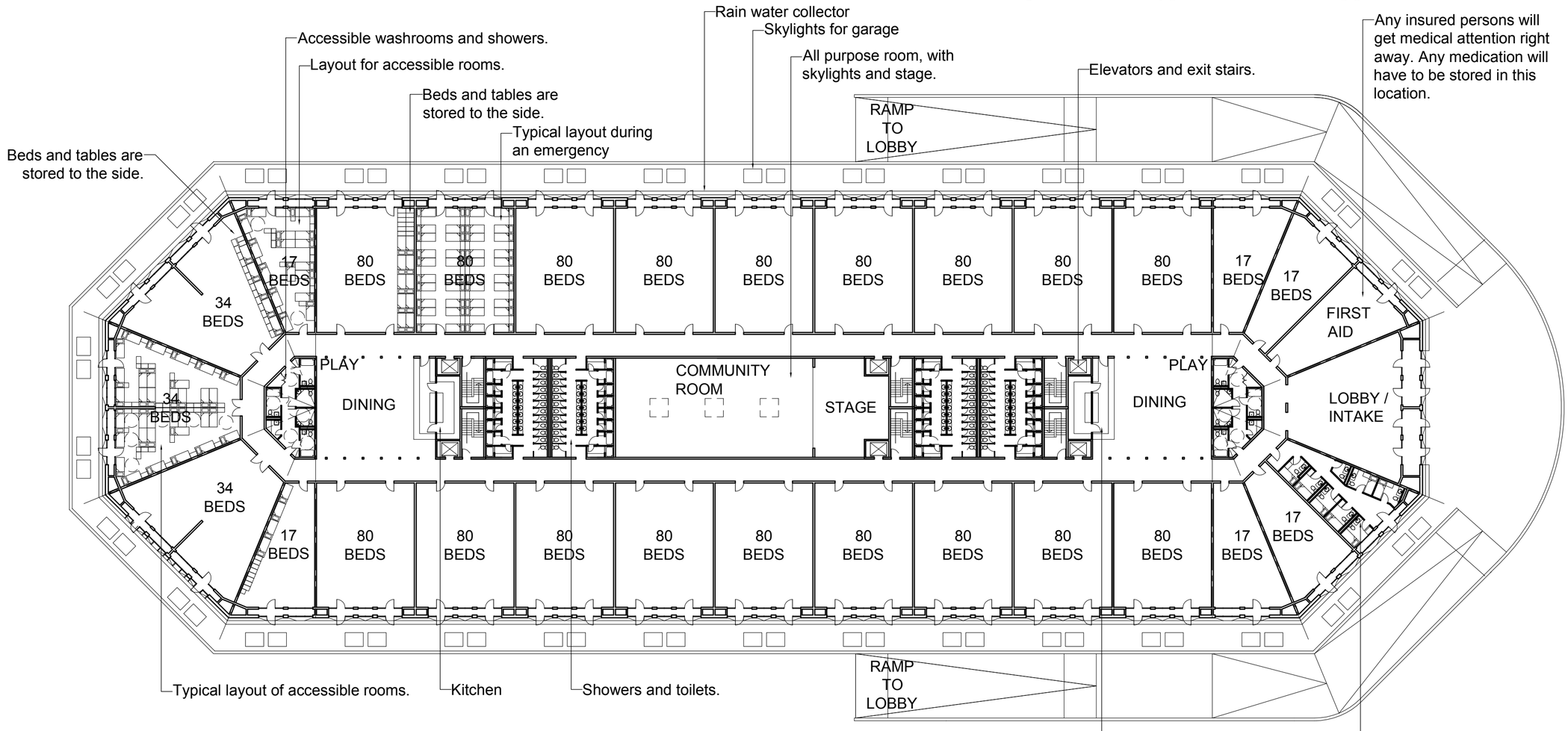


The second floor has doors, which can be closed in case of flooding. On this floor is the main entrance to the garage. A ramp leads to the main floor. There are some skylights along the edge of the roof. The water tanks, storing excess rain water, are accessible from this level. We will use a geothermal heating and cooling system situated in the mechanical rooms.

DESIGN BY FABIENNE LEHMANN
DIPLOM ARCHITECT ETHZ

PROJECT TURTLE SHELL
THIRD FLOOR

10 0 20 40 meters
5 10 30

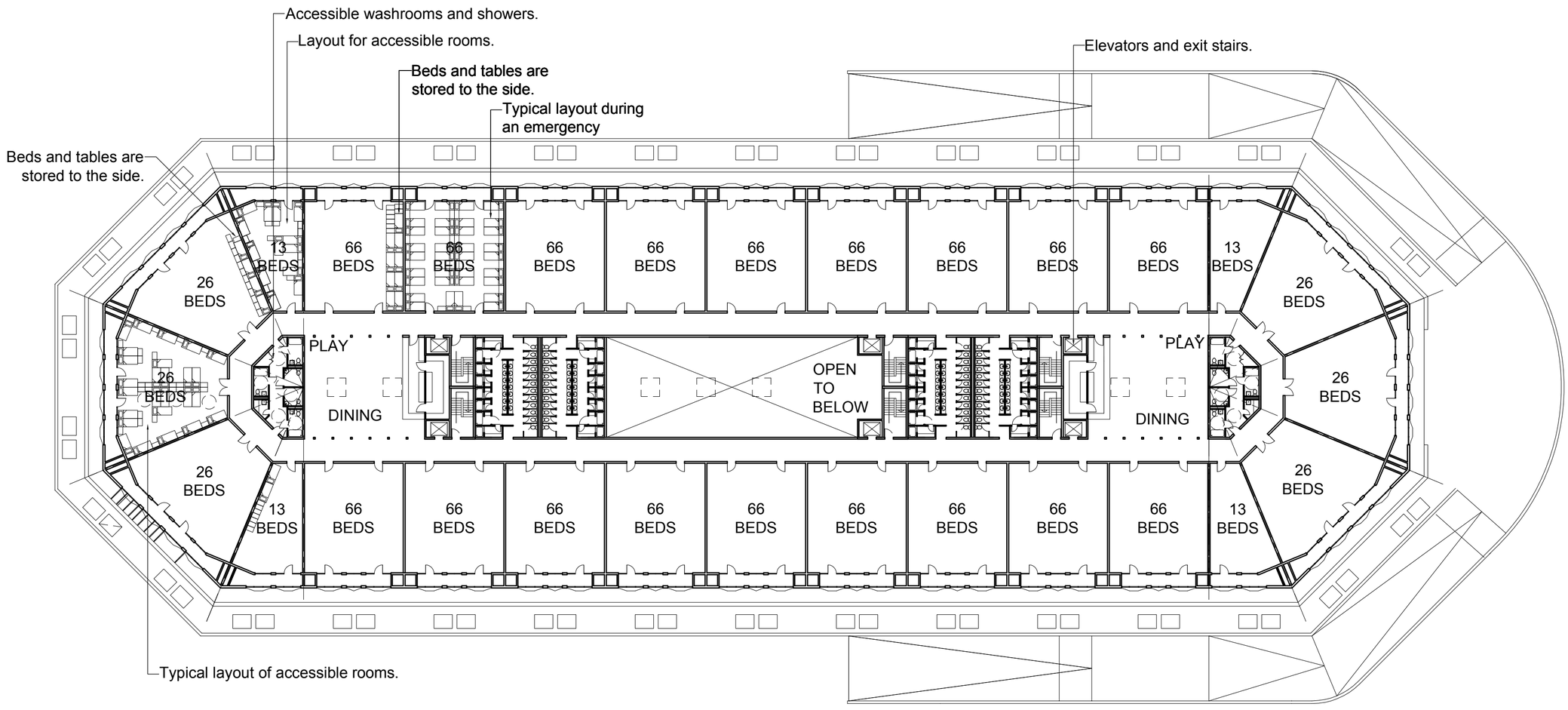


The third floor is the main shelter level, which can be used for schools and other community uses as well. We can provide shelter to 1,651 persons on third level, including 204 accessible beds. In the dining room we can serve food from the indoor gardens as well from some stored goods. Volunteers could cook and serve the food. The multi purpose room is double the floor height and can serve as entertainment room.

DESIGN BY FABIENNE LEHMANN
DIPLOM ARCHITECT ETHZ

PROJECT TURTLE SHELL
FOURTH FLOOR

10 0 20 40 meters
5 10 30

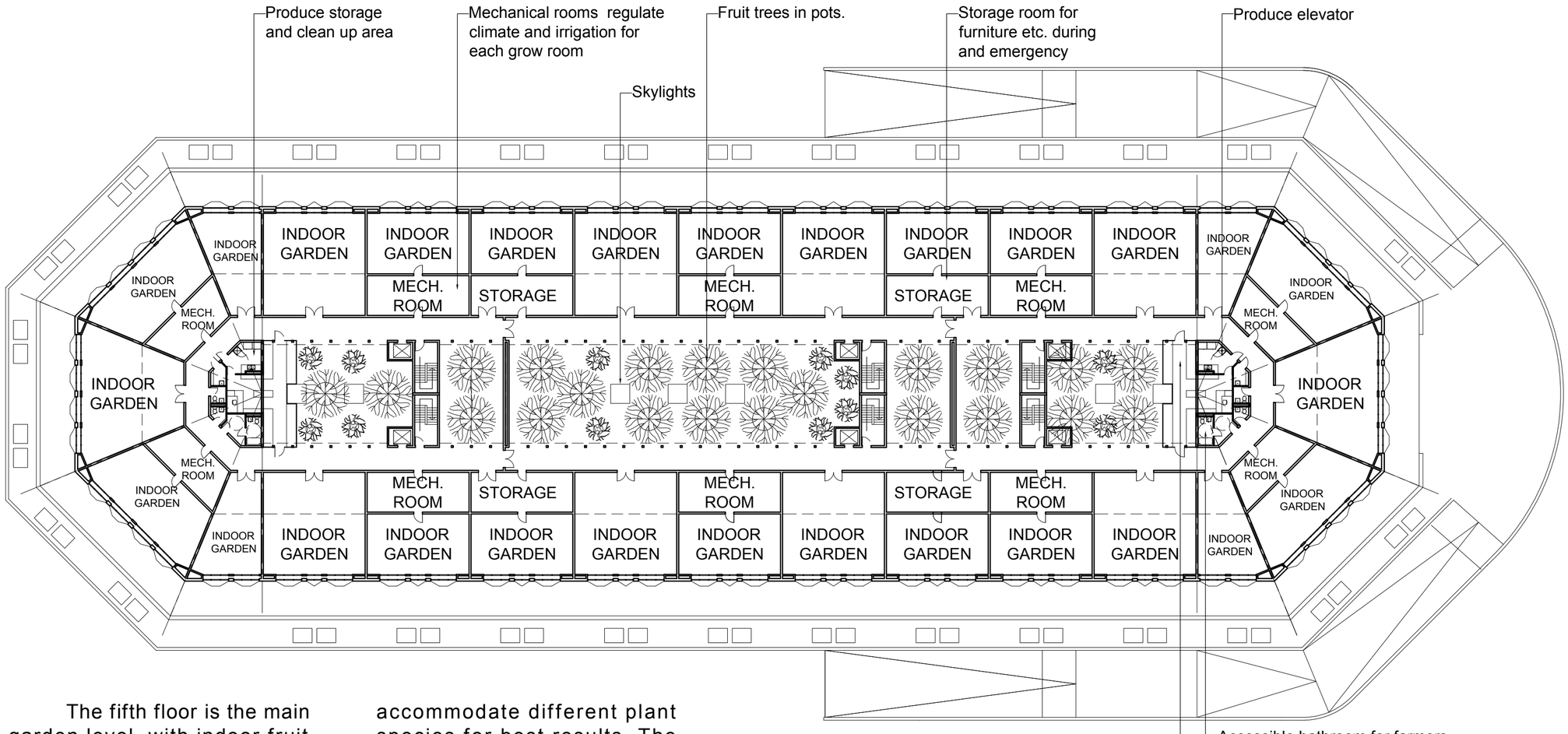


The fourth floor is the secondary shelter level, which can be used for schools and other community uses as well. We can provide shelter to 1,396 persons on third level, including 208 accessible beds. In total we would have 3,047 beds available. In the dining room we can serve food from the indoor gardens as well from some stored goods. Volunteers could cook and serve the food. The dining room has skylights.

DESIGN BY FABIENNE LEHMANN
DIPLOM ARCHITECT ETHZ

PROJECT TURTLE SHELL
FIFTH FLOOR

10 0 20 40 meters
5 10 30

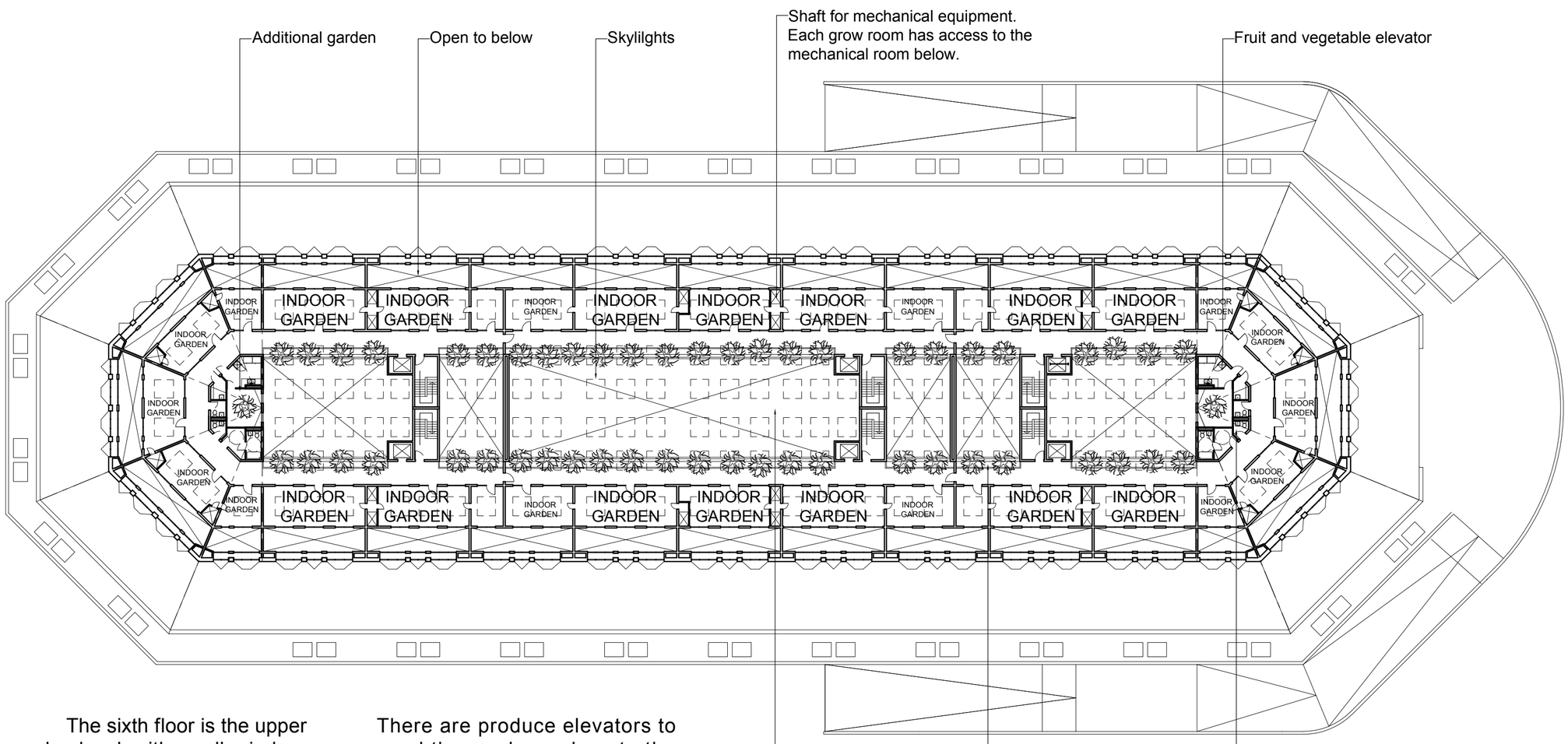


The fifth floor is the main garden level, with indoor fruit trees and two fruit and vegetable markets. The gardens are separated in order to protect the plants from any decease outbreak. This way each room can have a different climate to accommodate different plant species for best results. The storage rooms are needed to store any furniture during an emergency. They are close to the elevators. The gardens can be used for recreation during a severe weather event.

DESIGN BY FABIENNE LEHMANN
DIPLOM ARCHITECT ETHZ

PROJECT TURTLE SHELL
SIXTH FLOOR

10 0 20 40 meters
5 10 30



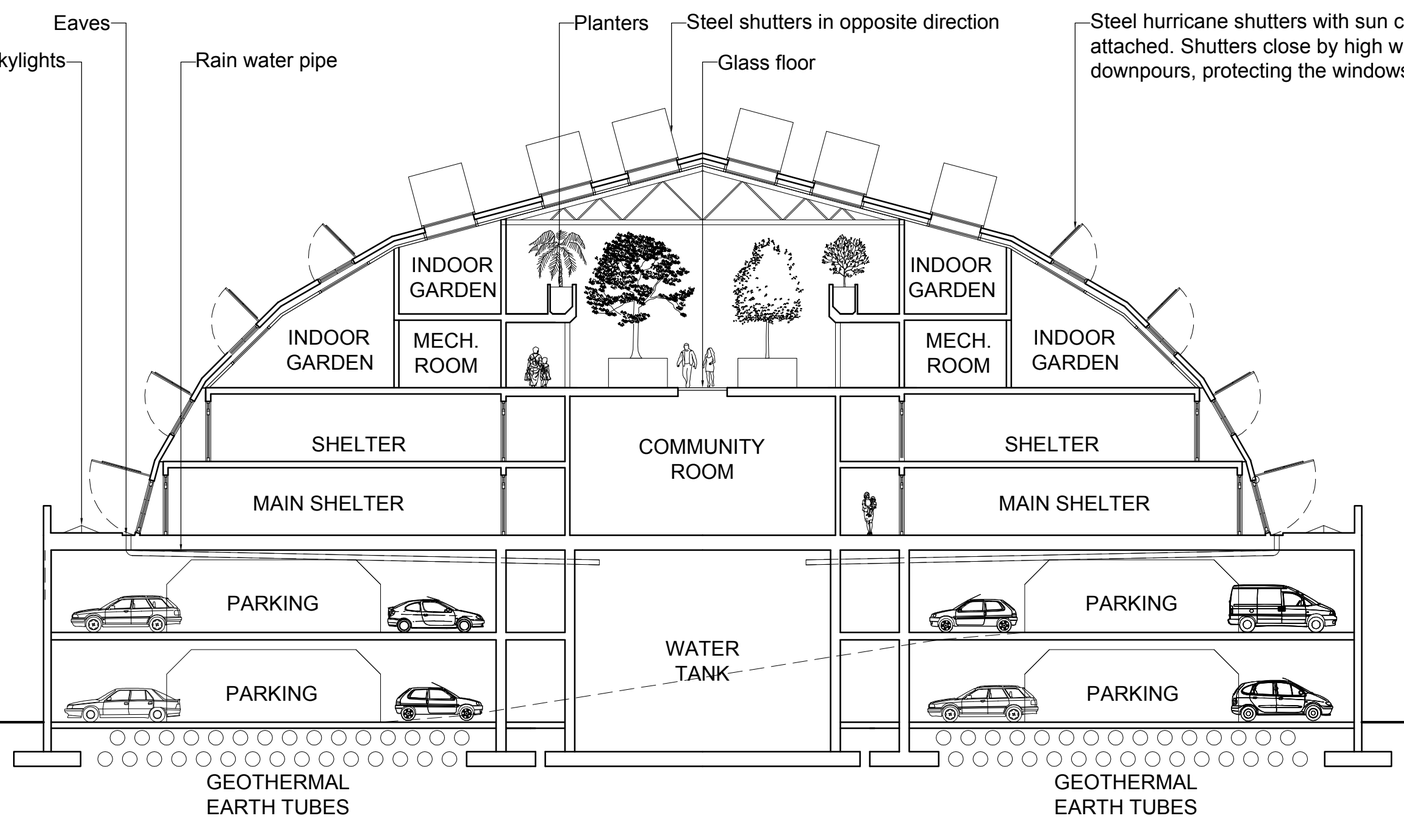
The sixth floor is the upper garden level, with smaller indoor fruit trees and two produce cleaning and washroom areas. The gardens are separated in order to protect the plants from any decease outbreak.

There are produce elevators to send the ready produce to the market below. Numerous skylights provide sunshine to the interior courtyard below. The upper indoor gardens have shafts connecting them to the mechanical rooms below.

DESIGN BY FABIENNE LEHMANN
DIPLOM ARCHITECT ETHZ

PROJECT TURTLE SHELL
SECTION

5 0 10 20 meters
2.5 5 15



This typical section illustrates the general idea behind the Turtle Shells. The first two storeys are closed off to the elements and provide protection against flooding. Under the parking area we would lay out earth tubes providing the energy for the geothermal heating system. In the centre of the Turtle Shells are giant water tanks holding the rain water for the irrigation of the gardens. Pipes collect the rain water around the base of the Shell.

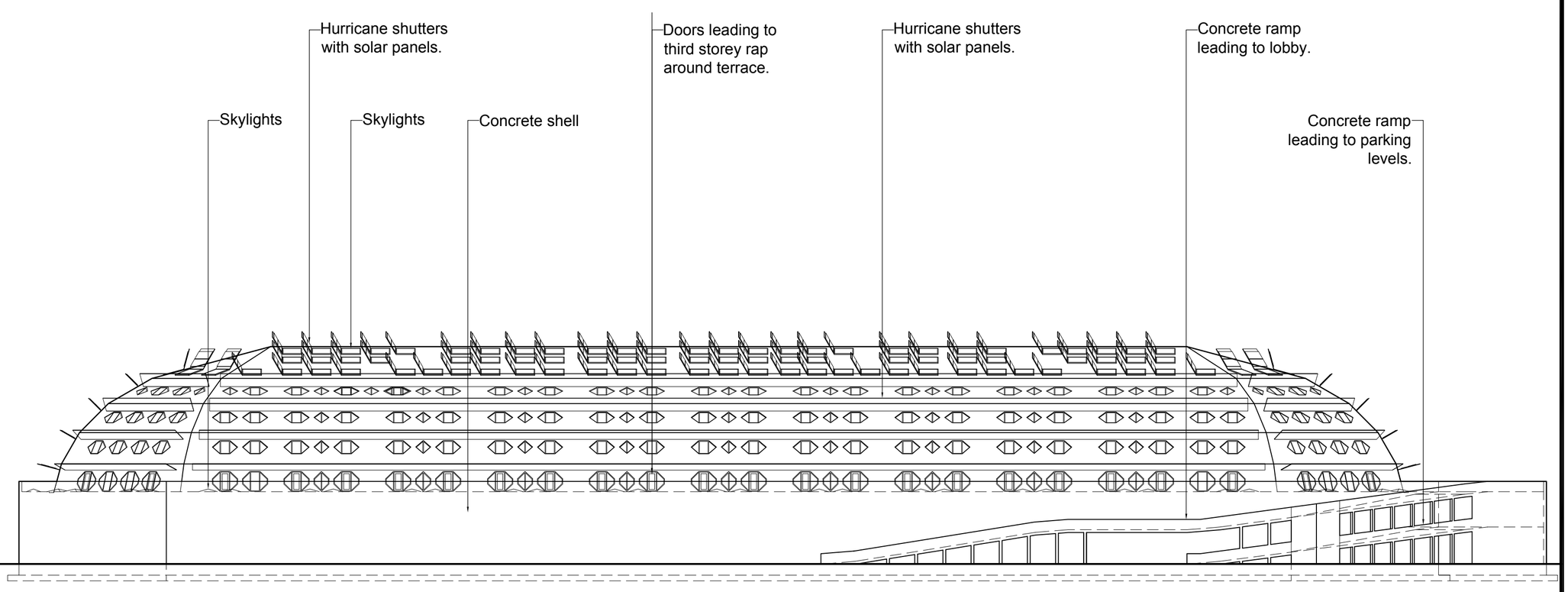
The Shell has hurricane shutters, which in stable wind conditions will be opened up and support sun collectors for our electric energy needs. The collectors could be made to follow the sun.

The garden levels on top have mostly skylights. In the centre are the fruit trees. The vegetables will be grown in the smaller gardens. There are planters for smaller trees on the sixth floor. There are glass floors over the community room.

DESIGN BY FABIENNE LEHMANN
DIPLOM ARCHITECT ETHZ

PROJECT TURTLE SHELL
SIDE ELEVATION

10 0 20 40 meters
5 10 30



According to my son, Erik, the Turtle Shell looks from the side more like a ship. The first two storeys do not have any windows to prevent water infiltration during any flood. The openings for windows in the concrete shell are shaped like hexagons to allow for greater spans of the roof / wall structure. The hurricane shutters will have solar panels on them and can be closed in high winds. The short ramp leads to the parking level, the longer one to the lobby.