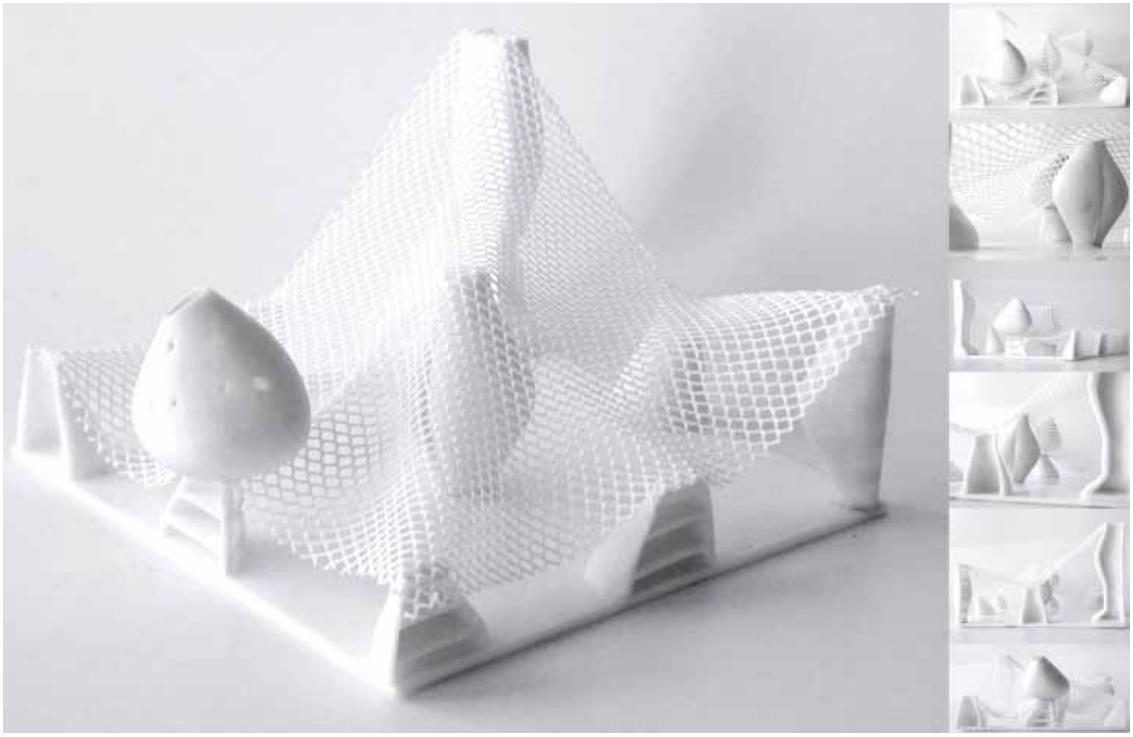
Salt, Emergence and Formation at the Dead Sea

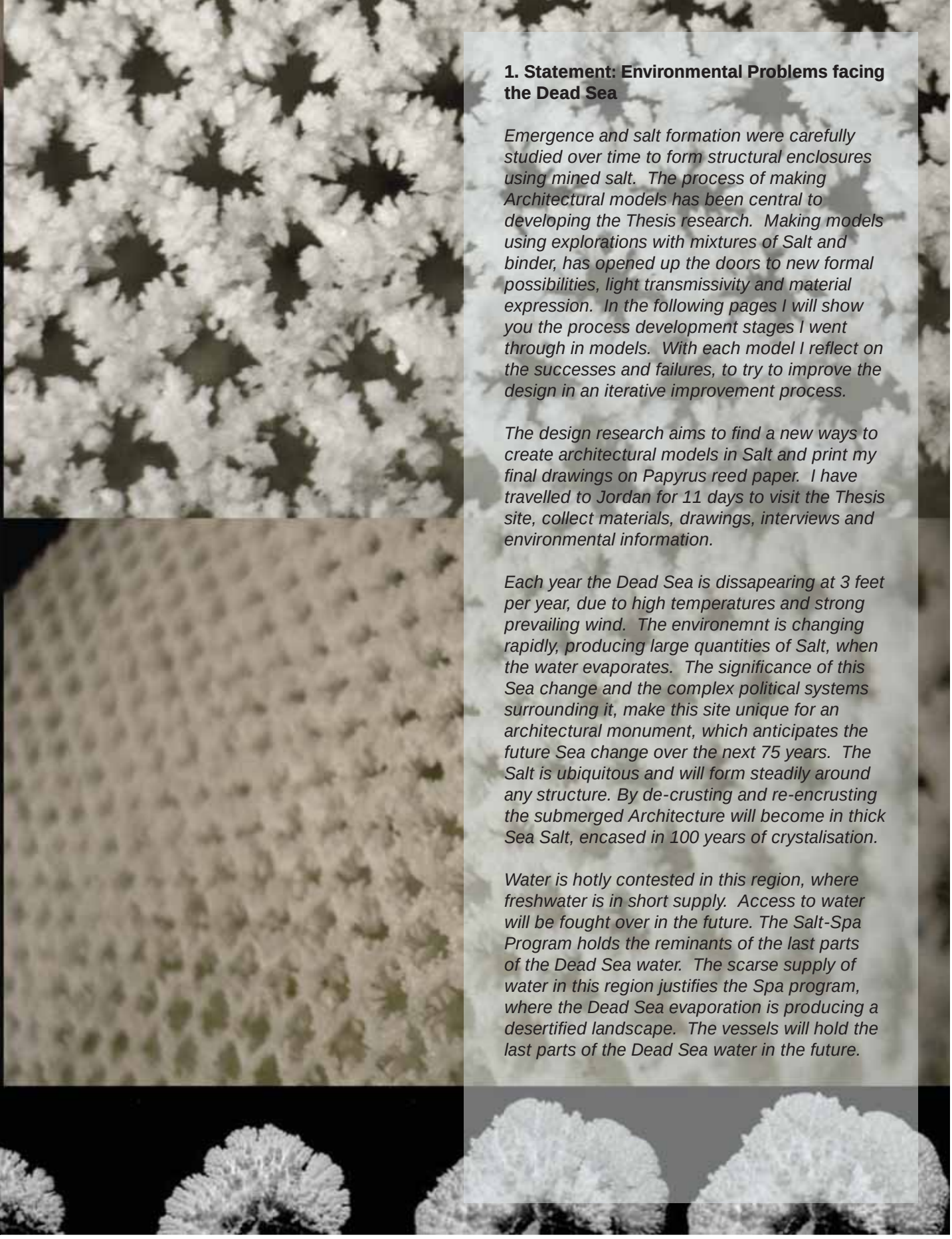
Mark A. Kelly

contents



DEVELOPMENT MODEL: MADE FROM 10 SALT 3D-PRINTS, COTTON NET AND AN ACRYLIC BASE- MARCH 2012

contents



1. Statement: Environmental Problems facing the Dead Sea

Emergence and salt formation were carefully studied over time to form structural enclosures using mined salt. The process of making Architectural models has been central to developing the Thesis research. Making models using explorations with mixtures of Salt and binder, has opened up the doors to new formal possibilities, light transmissivity and material expression. In the following pages I will show you the process development stages I went through in models. With each model I reflect on the successes and failures, to try to improve the design in an iterative improvement process.

The design research aims to find a new ways to create architectural models in Salt and print my final drawings on Papyrus reed paper. I have travelled to Jordan for 11 days to visit the Thesis site, collect materials, drawings, interviews and environmental information.

Each year the Dead Sea is dissapearing at 3 feet per year, due to high temperatures and strong prevailing wind. The environemnt is changing rapidly, producing large quantities of Salt, when the water evaporates. The significance of this Sea change and the complex political systems surrounding it, make this site unique for an architectural monument, which anticipates the future Sea change over the next 75 years. The Salt is ubiquitous and will form steadily around any structure. By de-crusting and re-encrusting the submerged Architecture will become in thick Sea Salt, encased in 100 years of crystalisation.

Water is hotly contested in this region, where freshwater is in short supply. Access to water will be fought over in the future. The Salt-Spa Program holds the reminants of the last parts of the Dead Sea water. The scarse supply of water in this region justifies the Spa program, where the Dead Sea evaporation is producing a desertified landscape. The vessels will hold the last parts of the Dead Sea water in the future.

Precedent

Hotel of Salt: Salar de Uyuni, Bolivia

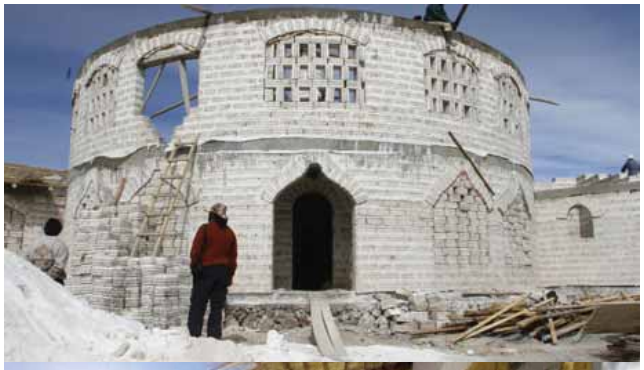
There is already an existing tradition of Building in Salt shown here. This hotel is constructed solely from salt blocks in Salar de Uyuni, Bolivia. A local native walks outside a salt hotel in the Salar de Uyuni, Bolivia. The first salt hotel was erected in 1993-1995 in the middle of the salt flat, and it soon became a popular tourist destination. The Salar serves as the major transport route across the Bolivian Altiplano. Salar de Uyuni is estimated to contain 10 billion tonnes of salt, of which less than 25,000 tonnes is extracted annually. Salar de Uyuni is the largest salt flat in the world at 4,085 miles. The desolate white Salt flats of Bolivia are 12 times larger than the Dead Sea canyon in my project.

The Salar in Bolivia was formed as a result of transformations between several prehistoric lakes, which left large salt flats. Tourists visit a salt hotel in the Salar de Uyuni, Bolivia. The construction of salt serves as an insulator to withstand the low temperatures at night in Uyuni. The nights are cold throughout the year, with temperatures between -9 and 5 °C. Tourists walk inside a salt hotel located in the entrance of the Salar de Uyuni in Bolivia. The hotels are constructed mainly of bricks of salt, and are visited by thousands of tourists throughout the year. I read someone put up the warning note on the bulletin board of a hotel in Salar de Uyuni in Bolivia "Please don't lick the walls"— a hotel made entirely of salt. Salar de Uyuni, a pre-historic lake near the Chilean border, rests 12,500 feet above sea level.

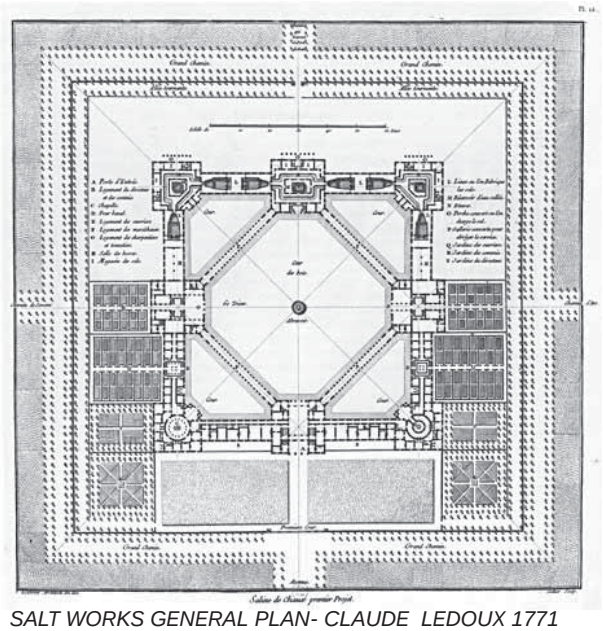
Resourceful construction uses a quibuitious earth material to form shelter. The Salt is shovelled into brick-making moulds. Then water is poured into the brick formwork and left out in the hot sun, to evaporate and form hard salt bricks. People need to wear sun-block to prevent solar radiation bouncing off the Salt, causing them to burn.

The Salt uses wooden window frames and a light-weight wooden roof, to make the structure weather-tight. The salt bricks are held together with mud-salt mortar from the earth.

Credit for the Photography goes to a blog by Ramsai

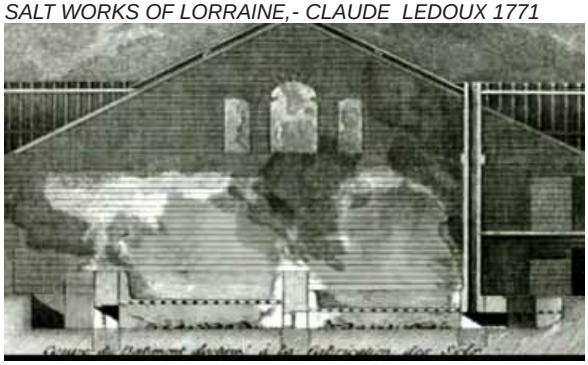


EXTERIOR OF THE SALT HOTEL IN SALAR DE UYNUNI, BOLIVIA



SALT WORKS GENERAL PLAN- CLAUDE LEDOUX 1771

SALT WORKS OF LORRAINE,- CLAUDE LEDOUX 1771



INTERIOR ROOM FOR SALT PRODUCTION 1771

SECTION THROUGH LEDOUX'S SALT WORKS 1770

Precedent

The Salt Works of Lorraine, D'Arc de Senans. Designed by Claude Nicolas Ledoux in 1771

The Salt Works of Lorraine and Franché-Comté was built by Claude Nicolas Ledoux in 1771 to extract Salt. The Salt works was buit just 10 years before the French Revolution by Louis XIV. In the evaporation rooms where the salt was made, there were eight large fires which burned day and night, these large rooms had swirling vapours at 140 degrees farenheight. It was probably hell for the workers producing Salt, in high temperatures with poor ventilation.

Salt was highly valuable in france during the 18th century. The residents of D'Arc de Senans built a salt works in the second half of the 18th century for Louis XIV, completed in 1779. In Ledoux's treatise "Architecture considered in respect to Art and Custom", he showed buildings he wanted to build including the Salt Works. Salt was a government monopoly and one of the principle sources of state revenue.

Source: Video documentary on Ledoux by Richard Copains and Stan Neumann

NATURAL SALT DEPOSITS AT THE DEAD SEA

ENVIRONMENTAL PROJECTION OF THE DEAD SEA 1960-2050

BORDEUX, FRANCE: A ROOM CLAD IN SALT BRICKS

SALT DEPOSITS FORMING AROUND ISRAEL'S SIDE OF THE DEAD SEA- 2005

TIDAL WATER ALLOWS ROCK SALT TO FORM

SALT BRICKS IN ALGARVE, SPAIN

A HOUSE IN SWITZERLAND USES SALT BRICKS

AERIAL SHOWING SALT DEPOSITS FORMING ON THE SEA COASTLINE

DEAD SEA SALT WORKS: SATELLITE PHOTO

Climatic description

Salt is highly available which can be applied specifically to walls. I was awarded the T.Y. Lin Fellowship and the Chester Miller Thesis Fellowship to visit salt processing plants at the Dead Sea and thoroughly understand the traditional process. The dead sea is the largest salt lake, 48 miles long [North to South] and 10 Miles wide [East to west], 1310 feet deep and covering a 360 square mile area. The salinity of the Dead Sea water is five times that of ocean water, that is, 23 to 25 per cent salt as opposed to 4 to 6 per cent in ocean water.

The Dead Sea's climate offers year-round sunny skies and dry air with low pollution. It has less than 100 millimetres (3.94 in) mean annual rainfall and a summer average temperature between 32 and 39 °C (90-102°F) The shore is the lowest dry place in the world. Proximity to the sea affects temperatures nearby because of the moderating effect a large body of water has on climate. During the winter months, sea temperatures tend to be higher than land temperatures, and vice versa during the summer months. This is the outcome of slow penetration of the sun's rays into the sea, which is a huge mass that takes a long time to warm up.

"Ocean water is 97.2% of water on the planet" (USGS 2010).

"Salt can be produced very cheaply for $4 for 25lbs." (Taylor Gilbert 2011).

"Salt reserves are practically inexhaustible. In a sole cubic km of sea water 25 million tons of edible salt, sodium chloride are found." Oxford University Geology Report (2003)

The T.Y. Lin Award is for consumable model supplies for this project. The success of this project has been evaluated with salt structure models using 3d-printing rapid prototyping, made using the T.Y. Lin Prize. The Dead Sea presents amazing opportunities for thesis development, research exploration and professional development. I have spent considerable time researching material production, qualities, translucency and uses.

Final Review: May 5th 2012 - Mark Kelly
Jury: Leigh Christy, Peter Testa, Javier Arbona, David Gissen, Nicholas de Monchaux, SFMOMA's Joseph Becker, Melanie Kaba, Ronald Rael

RR. Ron Rael:
Please let me introduce Mark Kelly and his project: 'Salt, Emergence and Formation at the Dead Sea. Thank you, Mark:
MAK. Mark A. Kelly
Jordan's minister for culture could not be here today. I will translate his special message. [Arabic Message plays in the background] In the next 75 years, the Dead Sea will have literally died. Climate change, urbanization and the complex political systems that define Jordan and Israel are quickly depleting the water resources that sustain this historically and geographically important body of water, however two interesting phenomena could contribute to the making of a monument to Dead Sea through it's own demise. Salt crystallization can form structural enclosures as the sea evaporates and mined salt can be used to fabricate architecture using large-scale 3D printing technology. From these natural and man-made processes, which I call slow and rapid manufacturing, a monument to the Dead Sea will emerge over the next 75 years, where naturally occurring salt crystallises on the side of the vessels. The natural salt crystallisation process is forming the building over the next 75 years, using salt vessels as crystalline salt armatures which anticipate future Sea evaporation and create a monument to the Dead Sea. Each year 3 feet evaporates by high temperatures and strong prevailing winds.
[The Jury wear the white gloves provided to touch the salt models and papyrus drawings.]
Natural processes form the building, casting salt around the vessels, de-crusting, re-encrusting. I request you wear gloves to handle these museum artefacts [points to the Egyptian papyrus drawings on a stand] The Architecture anticipates future environmental changes in the Sea, however nature forms the building, doing the work for me over the next 75 years. All of these papyrus scrolls are in the style of the Dead Sea Scrolls, so they should be handled with care. The Salt vessels are constructed in a dry dock, next to the Sea. Once these vessels are complete, thy are allowed to freely float out onto the Sea, covered in varnish; floating across the surface. I have already tested and proven that varnished salt vessels will not dissolve. [points to salt development models]

***2012**-SALT VESSELS BEFORE THE SEA EVAPORATES*

***2105**- GEOGRAPHY FUNNELS VESSELS INTO A LINE*

As the Sea drops, these vessels which are freely floated are going to be funnelled down by the canyon geography into a beautiful line, to define a simple line on the border between Jordan and Israel. So this is a very simple project about a line of vessels in the landscape. A naturally formed line of vessels embed themselves into the Sea bed in 2105, defining a new border. As seen here in the section. Lightweight delicate walkways are build hovering over the sea-bed, inter-connecting vessels for visitors. The bridges never touch the Sea-bed, only the smallest disruption is caused where people enter a spa program, inside the smooth salt vessels.

The drawings evoke the memory of the Dead Sea scrolls, printed on handmade papyrus paper.All of the models are made entirely from Salt, show the real salt the Architecture will be made from.

Let's turn from spectators into participants- in next 100 years this is what you will see. [point towards the last model] Let me show you how you can walk between the Salt-Spa vessels. [Points towards the walkways on the model] You can enter with an equal number of access points from either side in Jordan or Israel- indicating the egalitarian position of the program. These light walkways circulate inside and around the Spas, delicately supported above the Salt bed, never directly touching the sacred Salt. Walking around the vessels, you can bathe in the remaining Dead Sea water. [as seen in these Sections] The vessel interior is smooth- since the sealed vessels trap air to float on the Sea surface. The outside is hard crusted, thick in Sea Salt, encased in 100 years of crystallisation. Nature will build the Salt itself, yet only I can orchestrate it the forms. After this project, I want to return my models to the Sea – where the Salt originally came from. I would like you to wear these gloves to inspect the scrolls because I really value these drawings as artefacts. The frames protect the pieces from decomposition. And as you can see the section is etched on the side of the model, and the etched plan shows the new border between Israel and Jordan.

Peter Testa *Did you make the Papyrus?*

MAK. Mark A. Kelly

I imported the papyrus from Egypt.

SF MOMA's Curator: Joseph Becker

I am hesitant to make this my first comment, before I actually talk about the Architecture is the models which I am really drawn to.

MAK. Mark A. Kelly
This is the actual Dead Sea Salt, which I brought back from a 10 day trip to the Dead Sea. [Holding up a piece of the Dead Sea crust- The Jury stand up to come closer to the models] These are the best photographs from my trip.

Javier Arbona
My initial comment is actually about the geo-political system itself. Is it a positive notion to highlight the boundary between these two states? And is it more of a provocation to think of the Sea as being occupy able on its own. Your project can become a cross-dialogue, instead of reinforcing this boundary line, when there is this unity by the Water. In 100 years from now , the concept of boundary will shift. Is there something about that which is interesting for you?

MAK. Mark A. Kelly
This is a demilitarised program which exists in a highly political area. It is deliberately designed to be penetrable and porous from either side. I am encouraging people to walk between the States. It is a free territory which exists on its own. This drawing shows the Sea in 2105 with less water. And the other drawing shows the present this summer in 2012 with more water.

Nicholas de Monchaux,
When Salt is the actual landscape, it is unique. I really applaud the way your project tackles the idea of decomposition, which we were talking about before in Marisha's project. Does it matter to you the salt you are showing is white, yet the real salt will be grey? This salt the water will leave behind material, will be stained and earth-toned. [Nicholas points to the Salt block in the display] The salt in your models looks whiter than the sample of grey Salt you brought back, can you explain this?

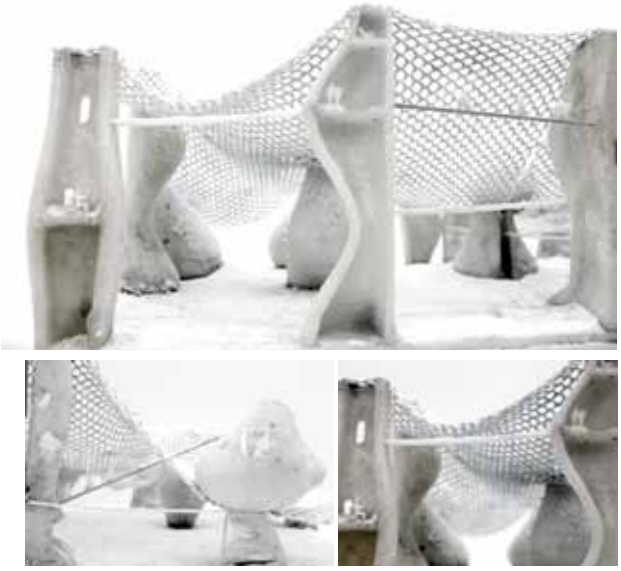
MAK. Mark A. Kelly
The lower part of the Salt contains dark sand. The higher area is whiter salt. This colour gradient of shades will happen in the architecture, producing a whiter area at the top. This was dug up straight from the beach.

Ronald Rael
Although the mined Salt will be pure white, like the models shown here.

Peter Testa
Can you describe how this piece was made? [Points to a mall crystallised 3D-printed model] 7min42

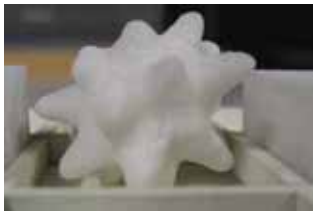
MAK. Mark A. Kelly
This piece is combining the two processes. This is a rapid prototyped mode in 3D-printed salt with Salt crystals growing on it. I was trying to combine the two processes.

Organisation from above: Development of Vessels and Net forms

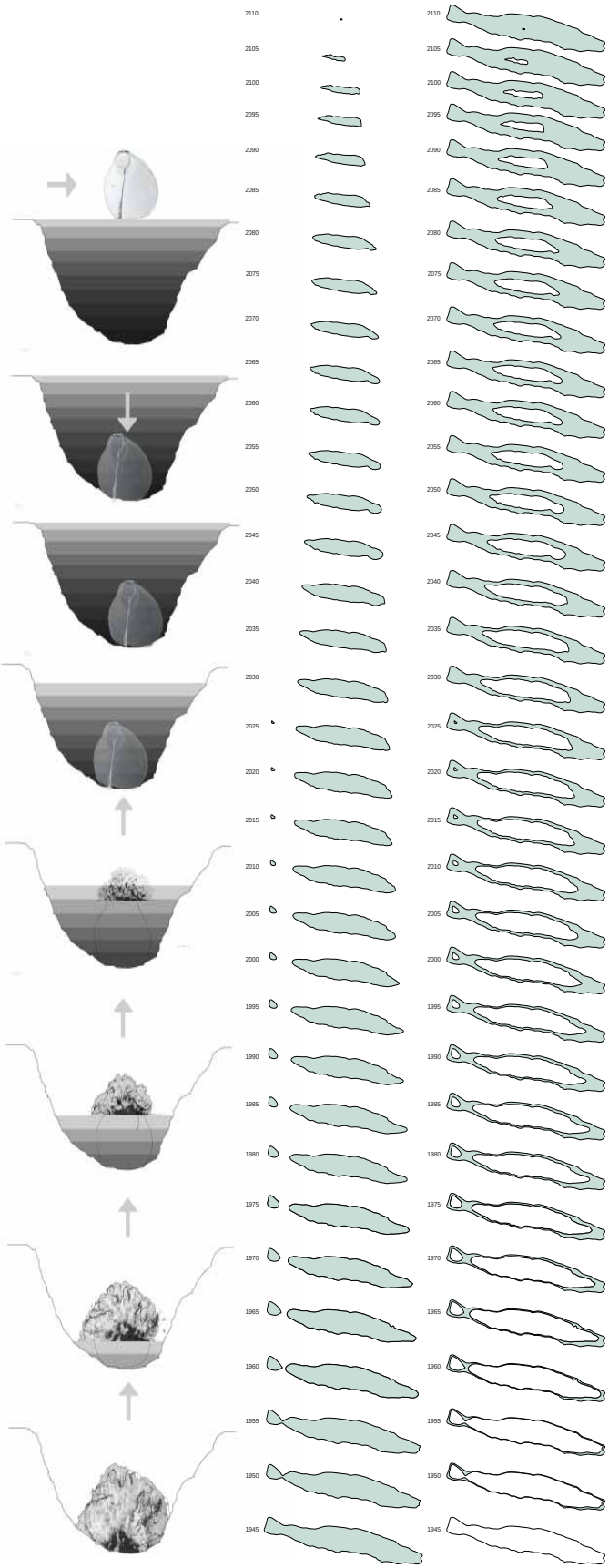


DEVELOPMENT MODEL OF VESSELS AND NET FORMS MARCH 2012

CRYSTAL GROWTH SEQUENCE



3D-PRINTED SALT STUDIES



DEAD SEA DISSAPEARING - 1960-2105

Peter Testa

So do you still use that process?

MAK. Mark A. Kelly

Yes. I used this concept in the first studies, where I was working with how to make the building. Salt is ground into essentially a powder and mixed with a liquid alcohol binder. At be beginning I used Walgreens Salt, with different types of Alcohol, rubbing alcohol, and then Sake…

Peter Testa

This is a wonderful presentation, well done. My question is what makes this a monument? I am not questioning this is a monument: on an anthropological, philosophical level, what makes this a monument? Why is it a monument?

MAK. Mark A. Kelly

Currently this is going to be a canyon. So I am proposing to have a series of Spas, built into the landscape. The phenomena in and unto itself, is a memorable program.

David Gissen

I am totally fascinated by it, there is something wonderful about a monument being totally made from Salt. Very exciting. Our ability to understand it as a monument, is different for every person from both States.

MAK. Mark A. Kelly

Each one of these scrolls is translated into English, Hebrew and Arabic. It is very important to acknowledge people from either side equally.

Tom Buresh

Can you guys open it up a little bit? [The Jury were standing up, huddled around the work, preventing others behind from seeing the work.]

MAK. Mark A. Kelly

This top-left panel shows the four different types of Salt Spa vessels.

Nicholas de Monchaux,

If they are being rapid prototyped, can they each be unique from one another? I am interested in the forces that would act on these things: crystallisation, erosion etch; so they would end up in different conditions. So I think that wold be very convincing. I think the kind of sameness, defaults to a Cristo land art aesthetic, of having identical vessels over the landscape. I just wondered what your attitude to sameness was.

MAK. Mark A. Kelly

The vessels are slightly different; each one has a different characteristic. They land in a naturally formed line, which is in itself random. Then I am proposing an orthographic grid of walkways transposed on the embedded vessels, to enter into each space sequentially.

Leigh Christy
Which representation is the closest to how you see it? Here it is identical vessels dropping, in the big model it is somewhat disparate vessels arranged randomly yet in the 3D-visualivation the centrepiece in the middle has multiple different formations. Which vision is closest to that?
MAK. Mark A. Kelly ,
This model was the very first stages, the middle and the end. The perspectives show the before and after.
Javier Arbona
So the salt vessels are floating? Is that possible?
MAK. Mark A. Kelly ,
Yes, I proved it works.
Javier Arbona
Did you do that yourself?
Tom Buresh
It must be true.
Javier Arbona
That's probably not possible. But that is alright. Is there proof that they won't dissolve?
MAK. Mark A. Kelly ,
When Salt is coated in epoxy resin, bees-wax, varnished or painted it will not dissolve.
Javier Arbona
It is an incredible body of work and a magnificent projection of the future ecology and archaeology. It should be shown in an exhibition. Or in a show dedicated to it. This leads me to a broader question: my spider sense goes off like I will not be invited to a review at Berkeley again question. What is the role of Architecture"? A lot of the projects feel a responsibility to engage in broader issues: whether it be climate change, nuclear, or others in an area like this, where the water is disappearing. Each one does not try to engage with a solution but understanding the process. So does Architecture try to depart as an agent of change? What is the trajectory? [Javier turns to the faculty for an answer]
Peter Testa
Oh well I do not know.
Javier Arbona
I think it is a really important question. I think it is incredible work. It seems to be creating a monument to its own destruction, if you can call it that.. In each case the work tries to look at how this works as ornamentation. I am not characterising this as ornamentation. How this works with the larger question.
SF MOMA's Curator: Joseph Becker
I am curious how this is a natural monument. Why does it even need to be stretched into a monument? Does this even need to be placed in the Dead Sea?

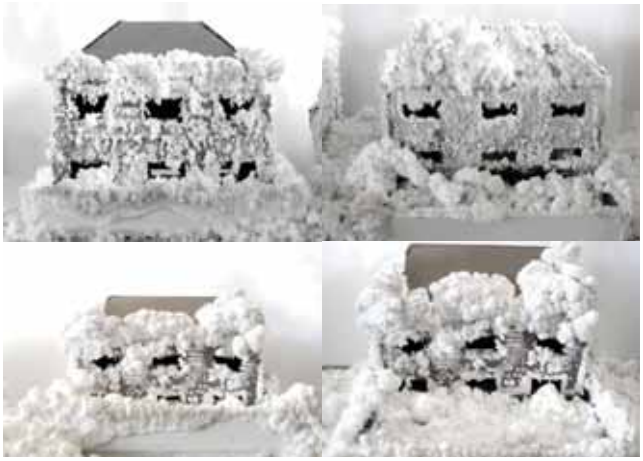
1: 100,000 SCALE SITE MODEL OF THE DEAD SEA

Site Model shows the new single line of Salt Vessels in 2105

2105- one hundred years in the future: SALT SPA VESSELS

CRYSTALLISATION OVER SALT 3D PRINTS
One Salt 3D-print was covered in Epoxy resin and placed in a Salt water bath until Salt crystals started to appear.
April 2012

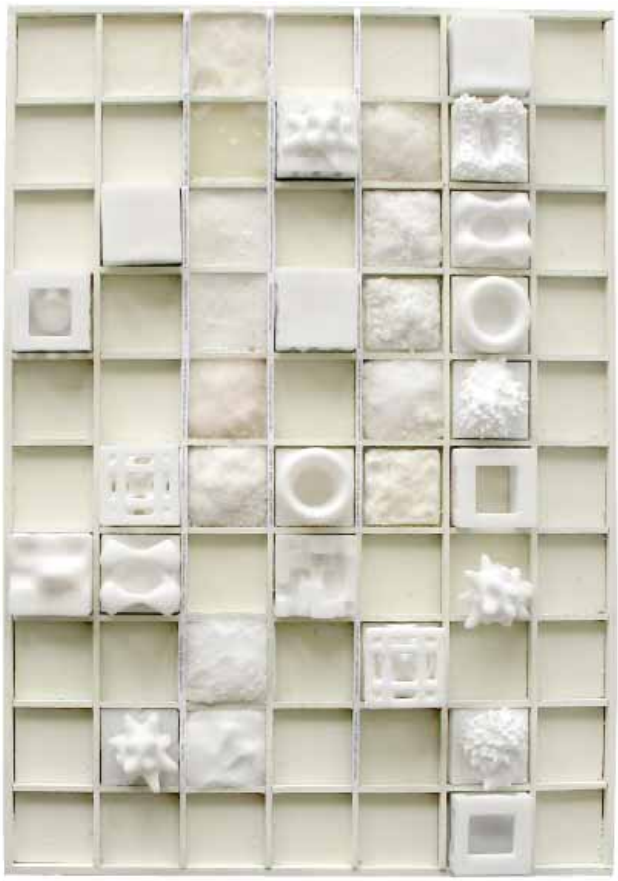
STUDY IN STRETCHED NYLON FABRIC OVER SALT 3D PRINTS
4" X 6" Salt Vessels with white nylon stockings
March 2012



SALT CRYSTALS GROWING ON CARDBOARD BY OSMOSIS
Brown Corrugated Cardboard + Salt Water
November 2011

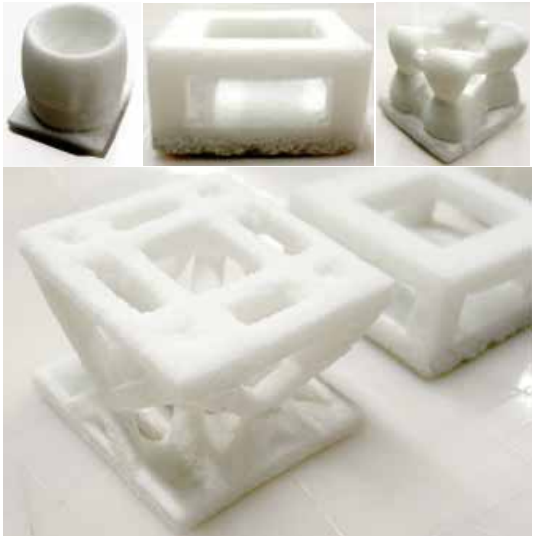
MAK. Mark A. Kelly ,
Water is very scares in this part of the world. This is the place where Jesus was baptised. Two world religions are based here. I think the disappearance of the Sea more than merits a monument.
Leigh Christy
So in your critique you are saying the disappearance of the water in itself merits the building of a monument?
SF MOMA's Curator: Joseph Becker
The lands geology and disappearance of the water is not enough. The land and history of the place, can be enough on its own. Why can't that be enough by itself?
MAK. Mark A. Kelly ,
My Architecture is made of the place. I am not saying the monument is not enough by itself. I am just saying that by my intervention, I am increasing the value.
Nicholas de Monchaux,
You are talking something unique and sublime, to distil into the project. I have enjoyed the project all along. I loathe critiquing something I admire, but I am going to do it anyway. I think the project is so extensively temporal. You have really sorted out your attitude towards space in the project but I am not sure that you have yet adequately resolved the question of time. These pillow like forms are entropic in their geometry, the kind of hanging bag.
MAK. Mark A. Kelly ,
A water drop.
Nicholas de Monchaux,
Yes, "a water drop"- a minimal surface. A thin shell structure is going to be assaulted by time. The vessels may decay catastrophically or decay slowly over time. In compressive structures, the shell needs to be supported internally, which you do not see. In the issue of monument, you are giving these vessels a lot of responsibility. Normally a block of granite has a permanence. Yet this monument will not last for ever. I think it will be a really great monument.- they will itself be subsumed. The old man on the mountain. The papyrus pushes the project back in time. But there should also be an effort to push this project two thousand years into the future- this would be valuable. It would be more impressive when it does not have the weight of the pyramids on its shoulders. In a recent edition of the American Geographic Survey from the University of Arizona, went to re-photograph the Temple of Solomon, before and after. In these series of photographs it is not so much a rural landscape where a single house has cropped up, or an incredible mining town was just gone entirely. That's just what this landscape does.

David Gissen
You are arguing for no project whatsoever. How does the papyrus take away from the project?
Nicholas de Monchaux,
If we sat here, in this building for 200 years, you would have decomposed and so would this project.
David Gissen
Every project would decompose. What is your point?
Leigh Christy
Its curious that some projects come and go, the salt is going to disappear. Yet you still imagine the border is going to endure, 100 years from now. There is still somehow a discourse to it, that the two States are still somehow at war. Somehow this poject is going to be maintained here. A type of tense peace will exist here, in the future. [21mins 05] In the future people will walk into these Spas and walk in. It just strikes me as peculiar, that the political divide still exists intact. The things that you take for granted are perhaps the things you should question. The border may not exist intact in the same configuration in the future. These assumptions are the things you should question and get messy with. You may have to intervene.
Ronald Rael
I think it is actually the opposite. While there is this program of Spa, which holds the last parts of Dead Sea water. That seems like the battleground of the future. Access to water will be fought over in the future.
Leigh Christy
That is interesting. The fight for water part justifies the program. Architecture and monuments and typologies of these things are unique. The thing about a monument, is that it does not relate directly to the needs of the present generation, the living. It is purely representational, a program without utility. If you are interested in making monument, where this project becomes exciting is where it lacks utility. You have this water, which is no longer sacred or religious, so it is held without a program.
SF MOMA's Curator: Joseph Becker
How is the water kept from evaporating once it is inside these vessels? How long will it maintain a functionality in the future?
MAK. Mark A. Kelly ,
The two things causing evaporation are sun: so I am creating shade. And prevailing wind so I am creating shelter.
Leigh Christy
The water will evaporate anyway. Have you thought about diversifying the program for living, or dwelling. Is there something more exciting that a series of pods with little gangways outside?

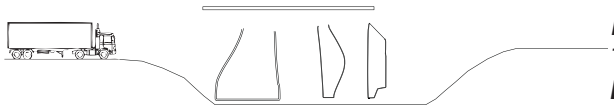


MATERIAL INVENTION BOARD- This board shows different Salt mixtures I tested to create a material which could be 3D-printed. The board shows Salt mixed with (i) Walgreens 92% rubbing alcohol- Ethanol (ii) Sake: Japanese rice wine (iii) Distilled Water

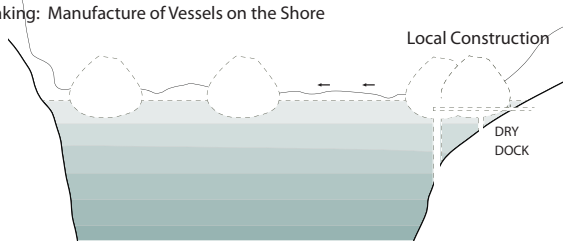
18" x 24" Wood board with 2"x2" squares
November 2011



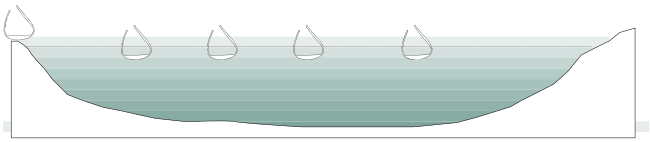
3D-PRINTED SALT STUDY CUBES 2"x2" - NOVEMBER 2011



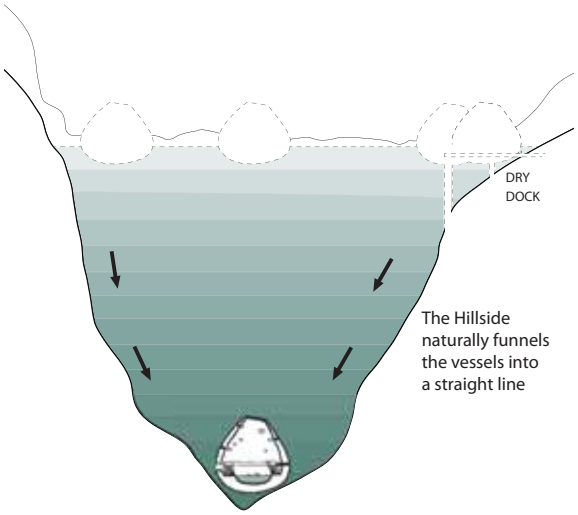
Making: Manufacture of Vessels on the Shore



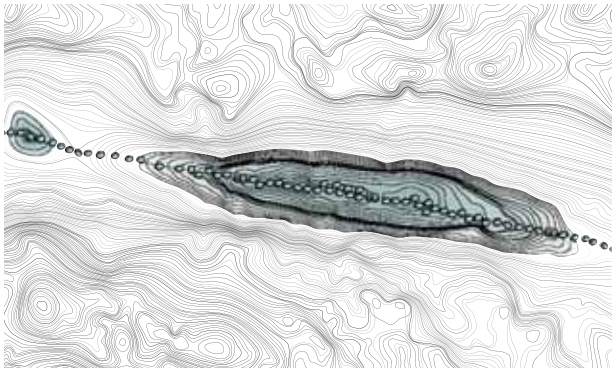
The Salt vessels are constructed in a dry dock, next to the Sea



Floating: Salt vessels are floated out into the Sea, using trapped air for buoyancy



As the Sea drops, vessels are funnelled into a beautiful line, by the natural canyon geography



A naturally formed line of vessels embed themselves into the Sea bed in 2105, defining a new border.

MAK. Mark A. Kelly ,
That is really exciting.
Leigh Christy
Yes it is totally exciting.
Ronald Rael
Really? If you went to the dead sea and someone had taken away all the water, you would ask why someone had not kept some. But if there was a bunch of vessels with things to do, you would get more excited.
Leigh Christy
In order for me to go there and spend money, because it is a salt hamman- [Laugh]– then it needs people there in order to support the activity. Then it would diversify the area.
Nicholas de Monchaux,
I would like to go back to Javier's comment about the border condition, which I think is unresolved. To think about going back in two years if the border changes, the project could change. We could shift the project according to history, to here was once a border, now the border has changed.
David Gissen
Wait a minute. I do not understand that. Are you talking about the erasure of two different countries?
Nicholas de Monchaux,
The future is always stranger than what we imagined it was going to be.
David Gissen
Of Course!
Nicholas de Monchaux,
So it would make sense, if a large conflict of the twenty first century was to change things and be resolved in some unexpected way.
SF MOMA's Curator: Joseph Becker
Can I bring it back a bit? I think that your preciousness is de-railing the project a bit. Because there is something so ephemeral about everything, it is decaying, so I think that if you were to rephrase the project as something which lasts a blip. This is something which gives you on last moment with the dead Sea. It is made of the Salt. It is made of the Sea. That is all it is really made of. Then it is left to decompose.
MAK. Mark A. Kelly ,
In this development model, which is decomposing, I think this really gets to the heart of the issue.
SF MOMA's Curator: Joseph Becker
Exactly. You have created this ephemeral, lasting decaying moment of history. You are not really changing the landscape, per-se. It is beautiful.

Leigh Christy

There is a few things. If I keep touching this model, I am brushing it away. It is decomposing before my eyes. But by inserting people inside the monument, which I buy. These vessels landing in the landscape is great. For me, it presents a geo-political issue of monumentalising the dead Sea between two countries. That was why I was asking which version was the closest, since that one model has a very different condition than the visualisation, which I am drawn to the scattered nature. You are coming up with a construct, then you are standing back and letting nature do the work for you. Ultimately for me, a person in the future who is coming through to brush these salt crystals off, there is still an assumption that it is still under your control. It is absolutely not controlled. Time comes into it for me, since you have taken me 100 years into the future. Not me. [Laugh] So you are talking my descendants into the future but you are not acknowledging what you are going to see. I do not mind the papyrus. For me I want to see the reality.

Melanie Kaba

You are making the drawings too precious.

MAK. Mark A. Kelly ,

Just the papyrus, not the salt.

Melanie Kaba

[Laugh] The thing that you are setting up, which I think would last the longest, is this orthogonal grid. It would be interesting to see how these walkways weather, when the vessels have dissolved and the orthogonal walkways still exist there, I think that is another drawing entirely, well into the future. How is that activated? Another version of the moment of decay into the future, is fascinating.

Peter Testa

This is an amazing project. Really amazing work. I think that everyone is so concerned with meaning and with humans. When in fact there is the crystallisation of minerals in process here, which is really extraordinary. Some of these images and in the obsessive engagement with the actual material process; has real value beyond any of this actual discussion. In and of itself.

Melanie Kaba

I totally agree. Another iteration should look at a form that makes sense.

Nicholas de Monchaux,

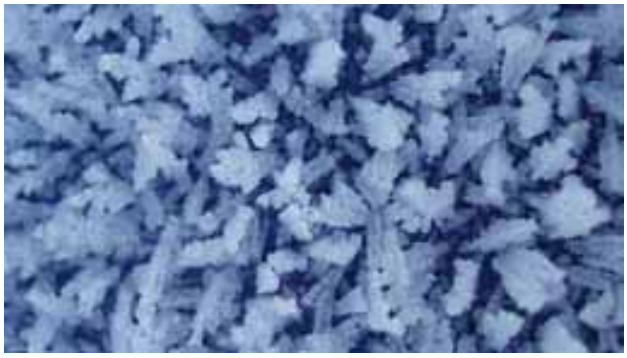
There are many ways to present this project. You have choose to present this as a narrative, so you are being critiqued on the narrative. I think Peter Testa is right, there are two or three equally valuable discussions we could have about the material performance

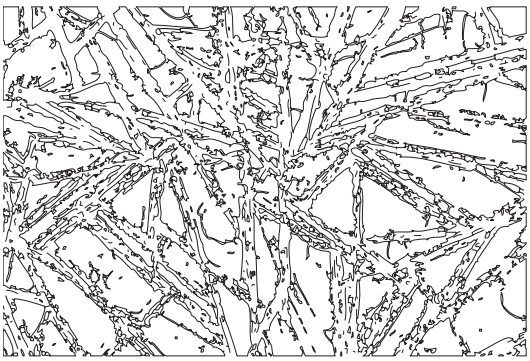
DEAD SEA SCROLLS- I choose to screen-print my final printed drawings on Egyptian-Papyrus reed paper, to represent the ancient style of the Dead Sea Scrolls. The drawings were produced in a very slow custom screen-printing process at Magnolia Editions.

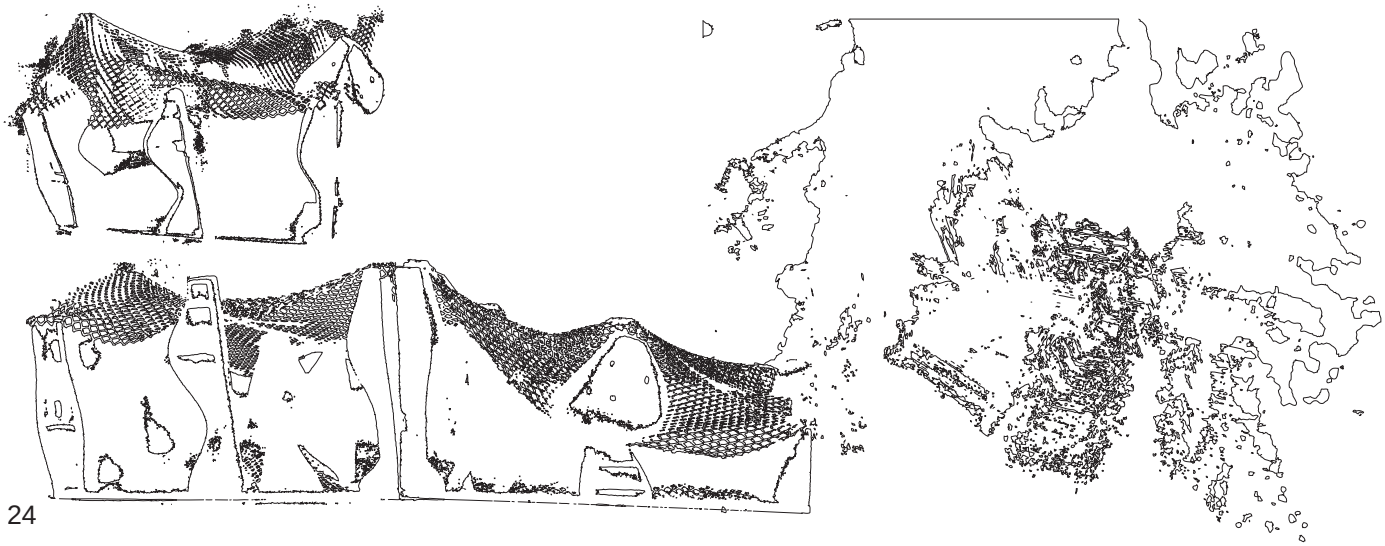
Original Dead Sea Scrolls at Jordan National Museum

1: 100,000 SCALE SITE MODEL OF THE DEAD SEA

2010- PHOTOGRAPH SHOWS A USELESS BRIDGE AT THE DEAD SEA, WHICH ONCE TOUCHED THE WATER. NOW THE BRIDGE IS JUST LEFT, FAR FROM THE RECEEDING WATER.



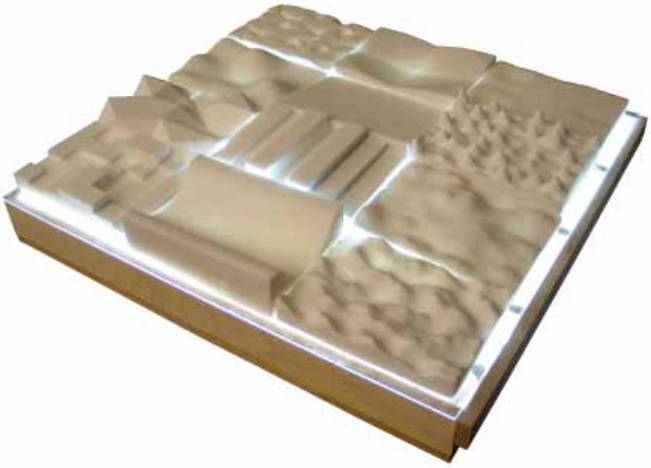




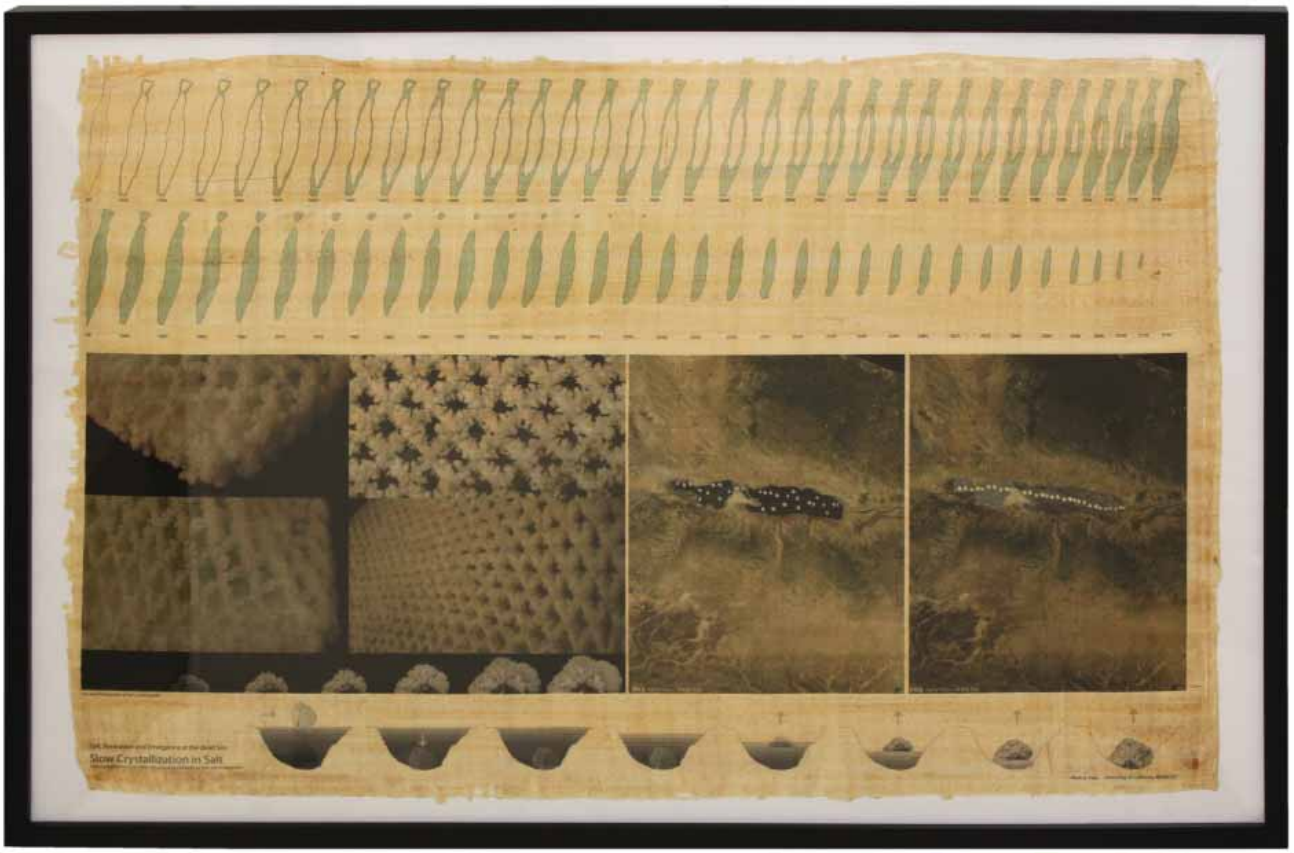
Materials
Transparency in Salt: The Light box Materiality test

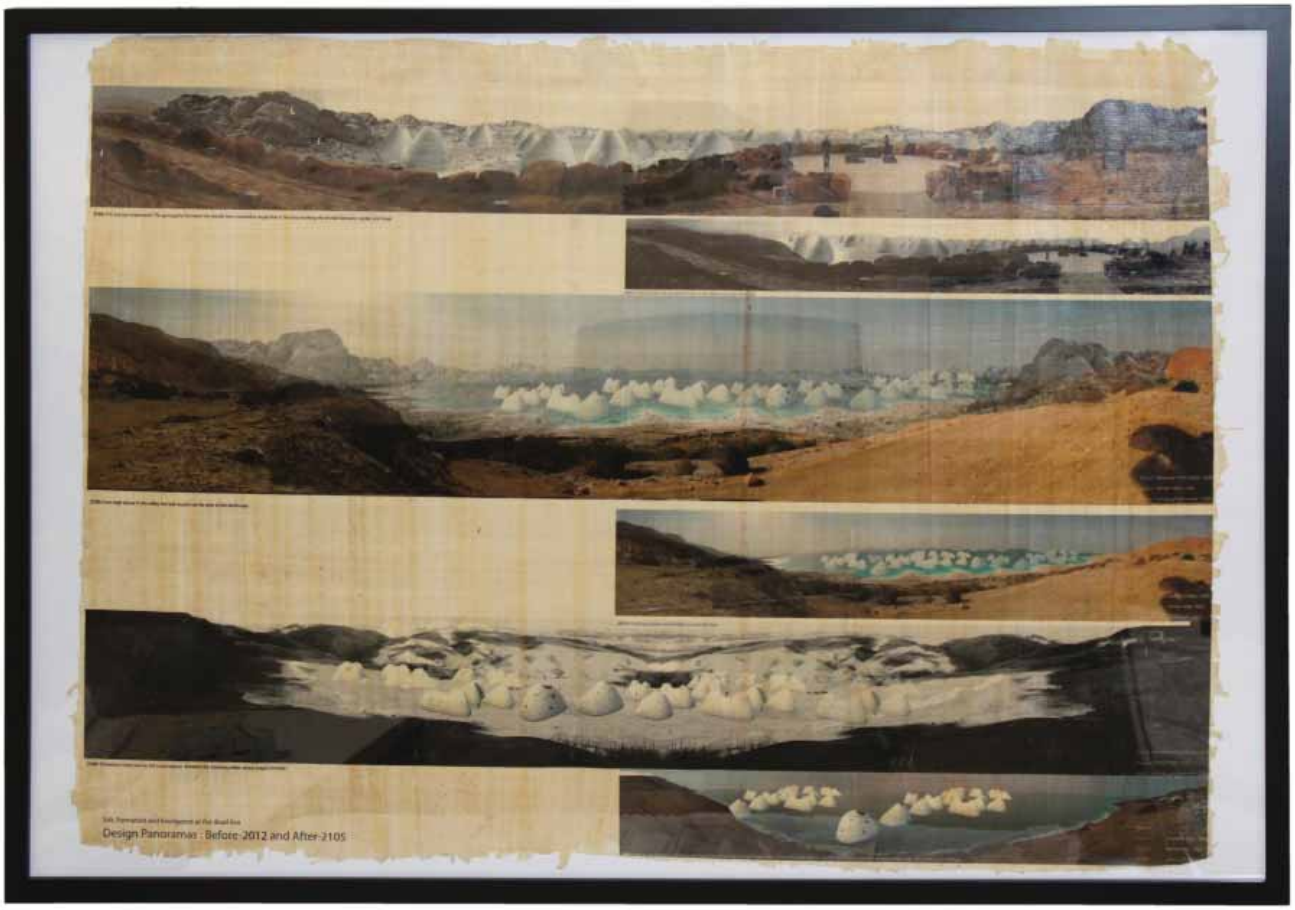
The 3D-printed Salt material transmits light according to the thickness. There are twelve 3D prints on this page, each measuring 4" x 6", which were placed on a light box. The crystalline structure of the Salt transmits light internally. The

SALT 3D PRINTED MODELS ON A L-E-D LIGHT BOX
TWELVE 4"x6" SALT MODELS - OVERALL 16" x 18"

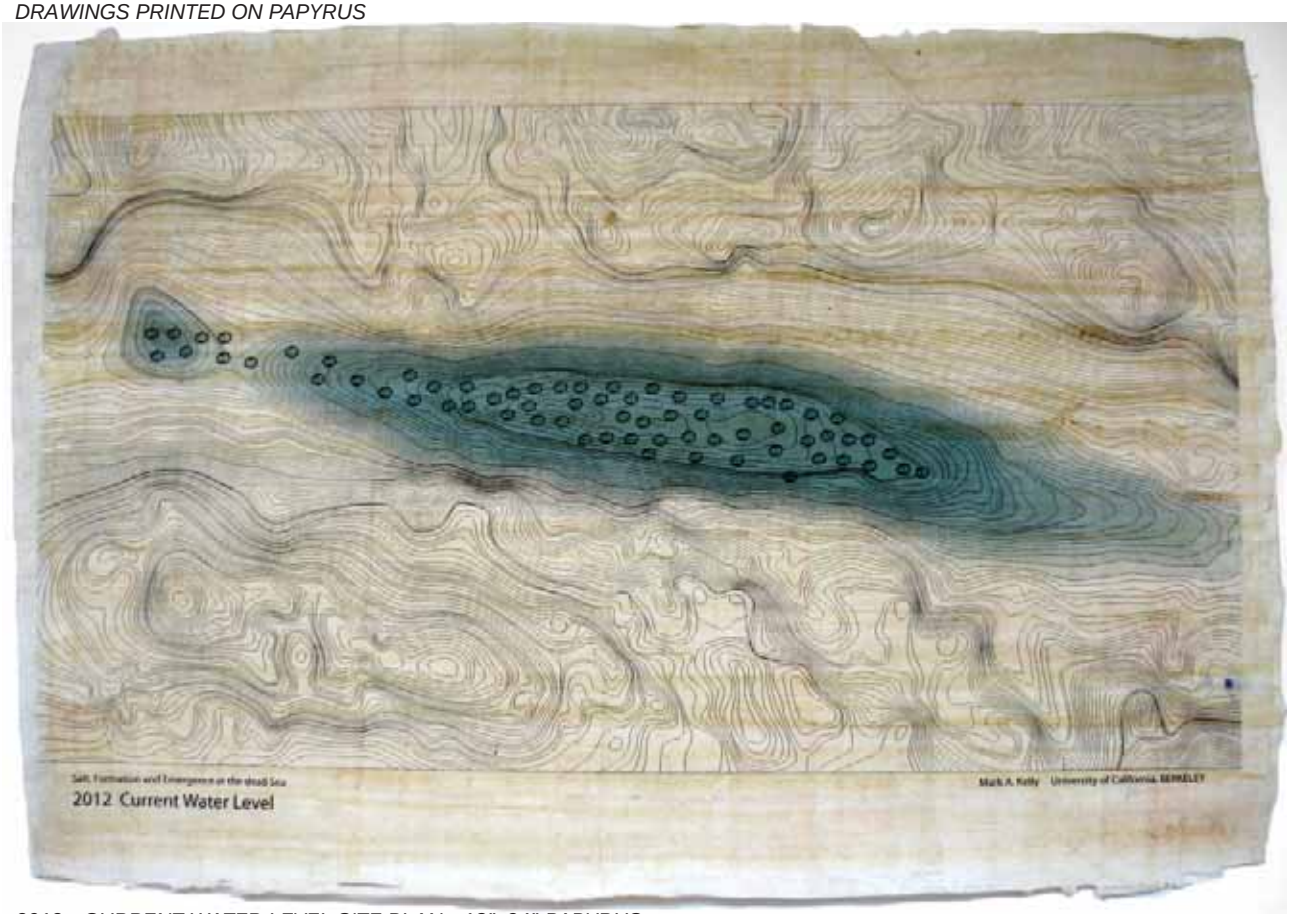


THE SALT MATERIAL ALLOWS SOME LIGHT TO BE TRANSMITTED


Slow Crystallization in Salt

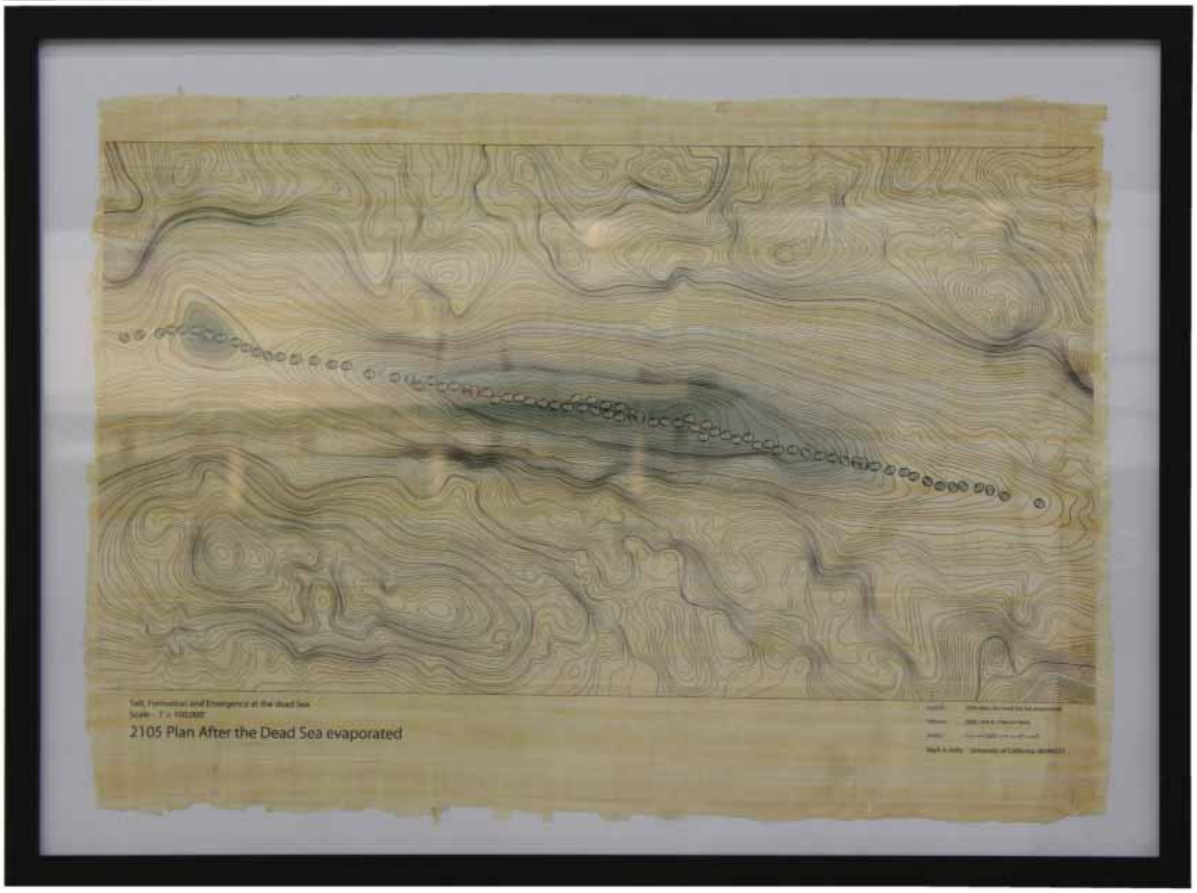

Design Panoramas : Before 2012 and After 2105

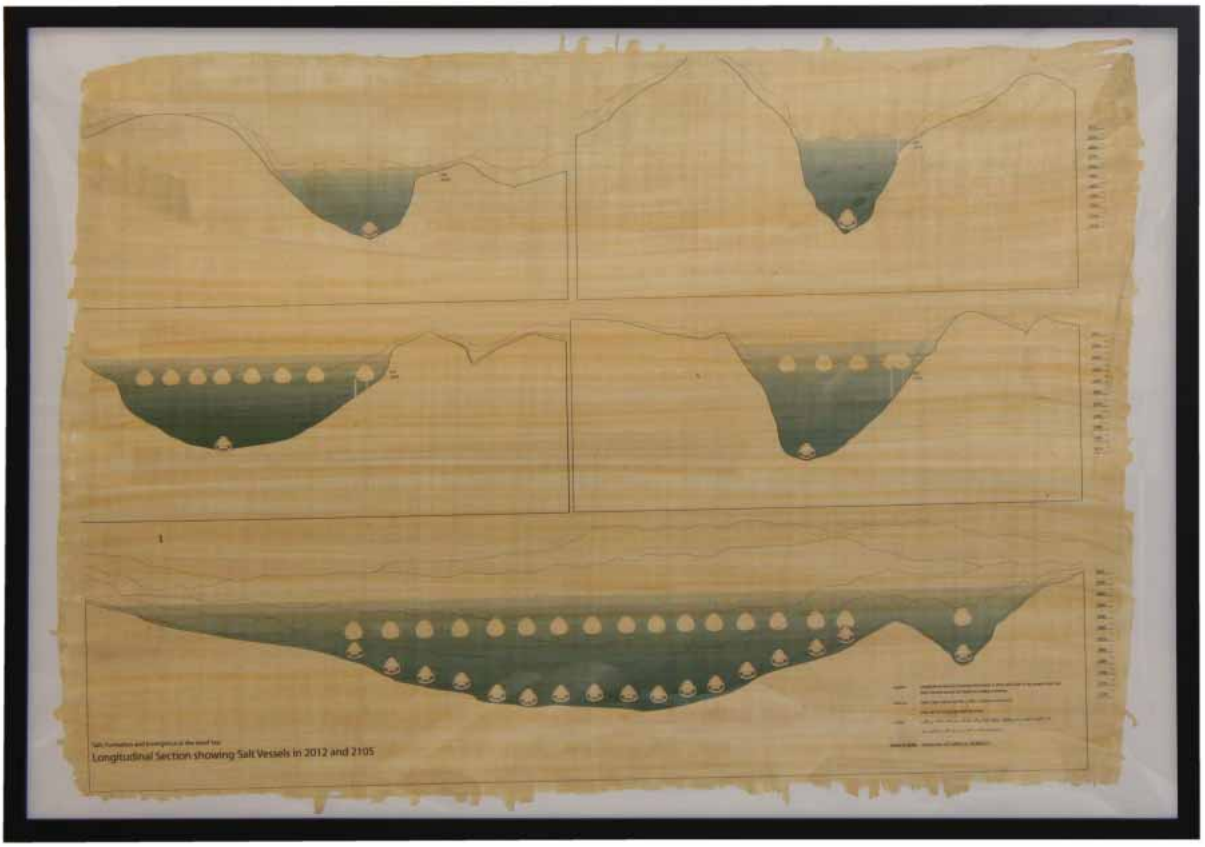
DRAWINGS PRINTED ON PAPYRUS

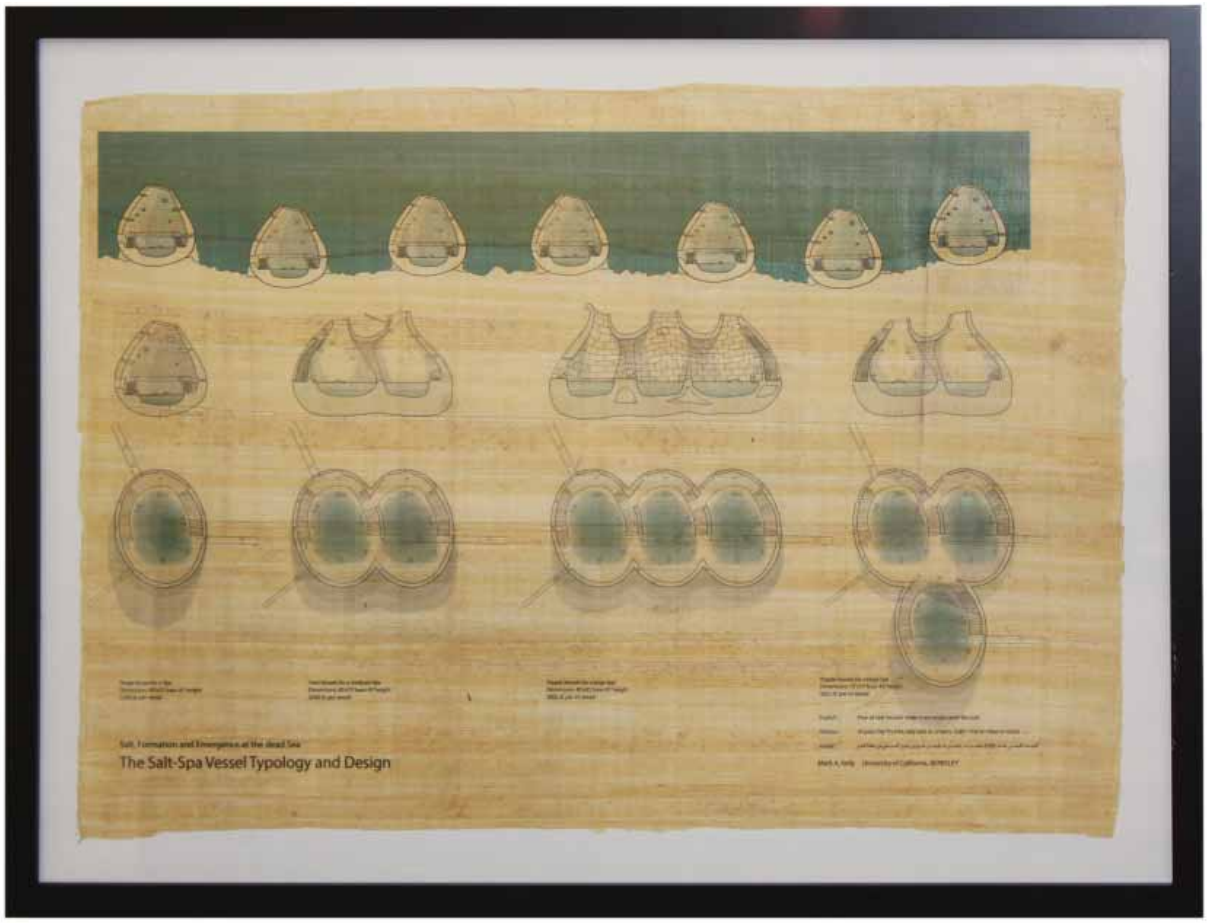


2012 - CURRENT WATER LEVEL SITE PLAN - 18”x24” PAPYRUS


Salt, Formation and Emergence at the dead Sea
2012 Current Water Level
Mark A. Kelly University of California, BERKELEY


Salt, Formation and Emergence at the dead Sea
2105 Plan After the Dead Sea evaporated


Longitudinal Section showing Salt Vessels in 2012 and 2105


Salt, Formation and Emergence at the dead Sea
The Salt-Spa Vessel Typology and Design

DRAWING SHOWING THE CONSTRUCTION SEQUENCE AND A VISUALISATION OF THE DRY SEA IN 100 YEARS

REVIEW DISPLAY TABLE - DEVELOPMENT MODELS, REAL DEAD SEA SALT, PAPYRUS DRAWINGS AND WHITE GLOVES

RAISING THE 3D-BUILD BED

LOWERING THE FEED TRAY

BUILD BED AT MAX. ELEVATION
BRUSHING BEGINS

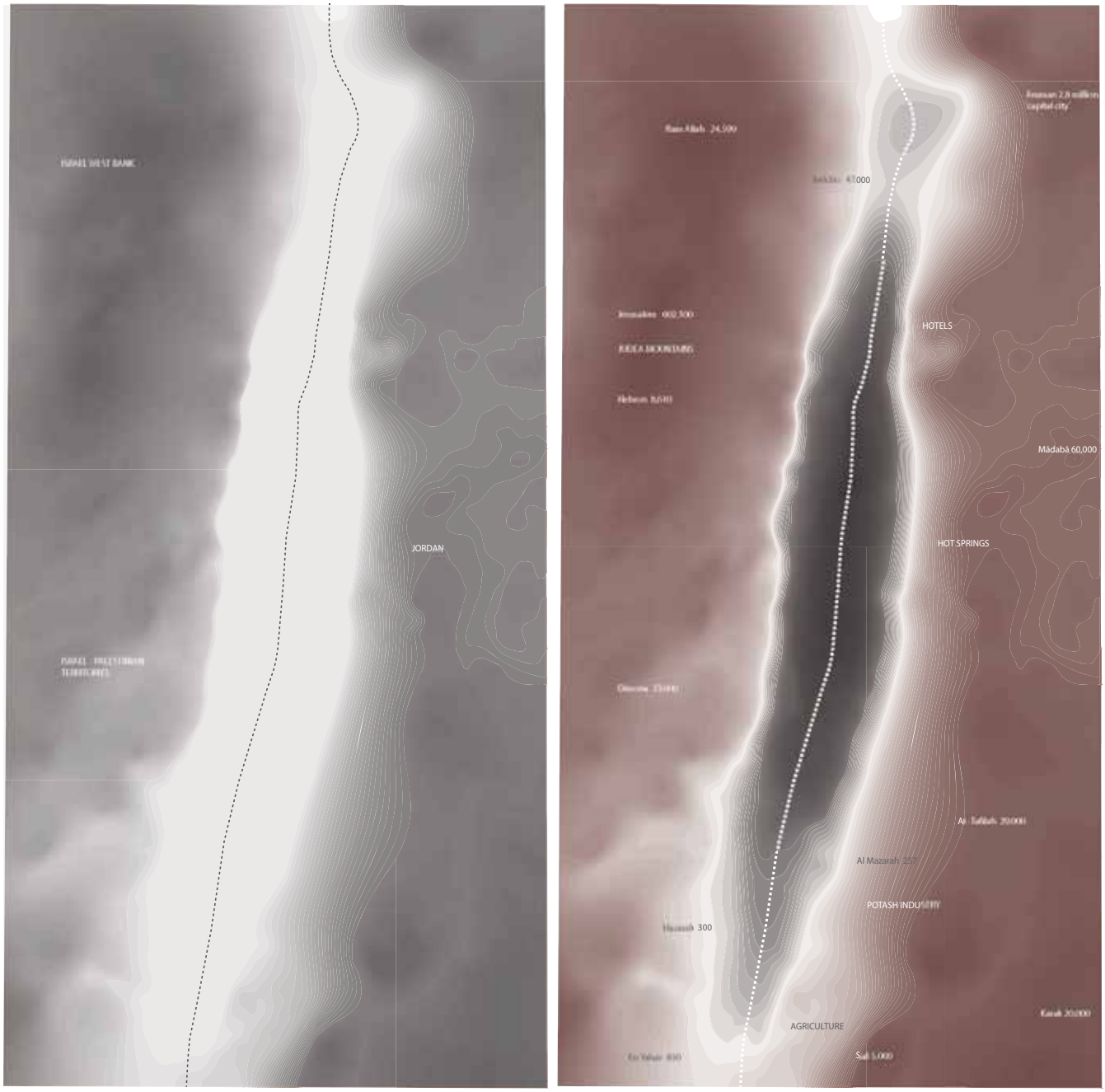
DELICATE CLEANING OF THE PART

Methods

Rapid prototyping in Salt using a Z-corp 3D printer

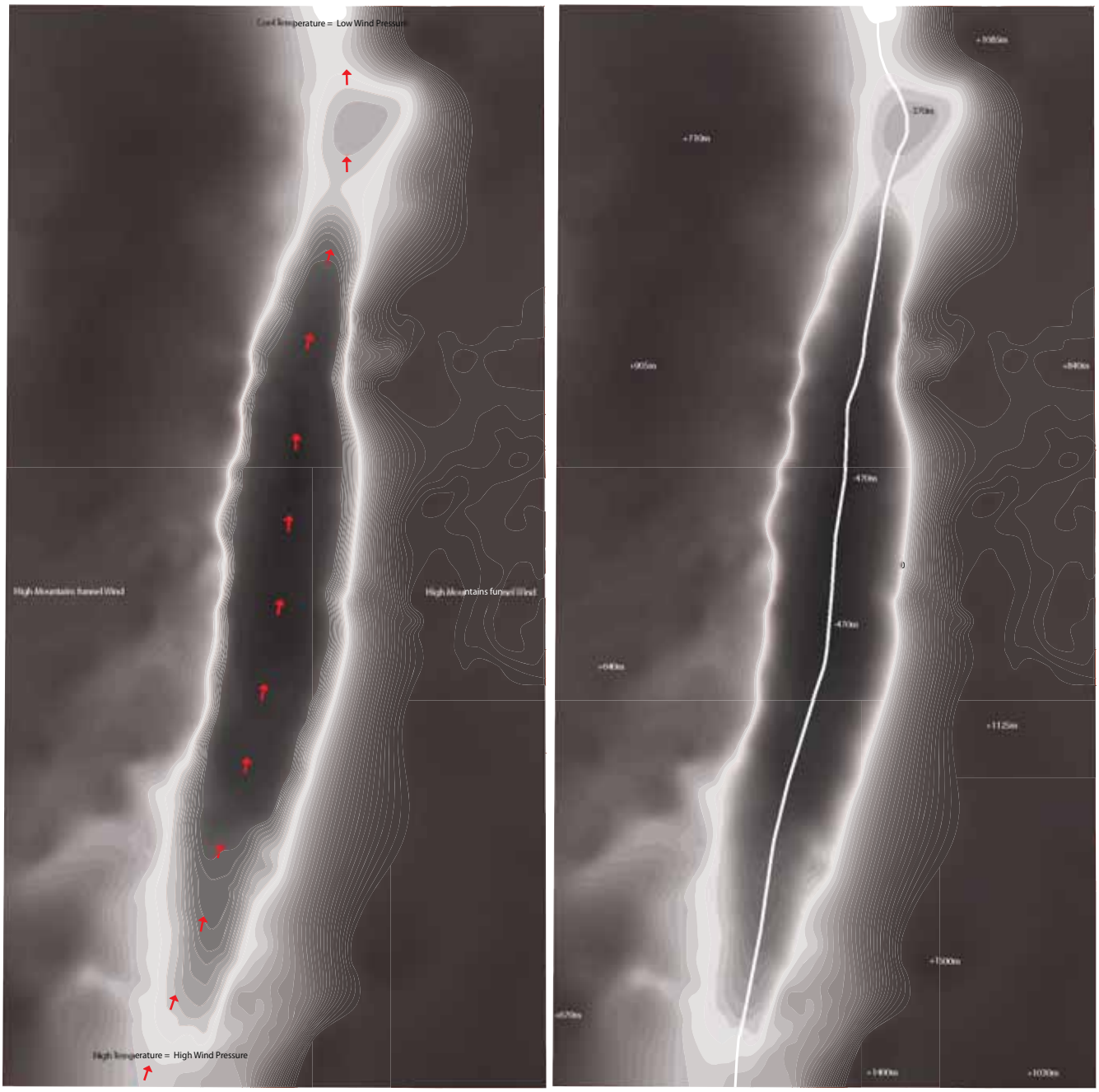
Rapid prototyping in Salt has proven to be highly successful. The cost is far lower tan any other alternative, at $0.25 per lb, when I used 40lb Pool Salt bags with standard Sake as a binder fluid. The image sequence on this page shows the excavation process after the part has been printed. First I had to use a blender to grind the salt into a fine powder for use in the printer. The granules of salt needed to be small, to spread evenly and create fine detail on the 3D-printed models. There are two beds in a 3D-printer: (i) a supply (ii) a build bed. The powder starts in the supply bed and is pushed over to the build bed many times in 0.004 inch amounts (0.1016 mm in metric), where a thin layer of binder fluid is applied to the powder, where the form is being built. The powder is stuck together by the binder fluid, according to a 3-dimensional model, to create an accurate rapid prototyped piece.

I tested different mixtures of ground Salt with malt-o-dextrin sweetener and different alcohol binder fluids. The binder cannot be aqueous because the water will cause the machine to rust and corrode. Using a garden-spray I tested the process to find a fine powder which would hold together adequately using a binder, to form a strong solid block. The 3D-printing process is relatively straight-forward, requiring a fine powder and a liquid. Some of the stronger materials which contained water had to be eliminated, to prevent the steel machine components from corroding over time.



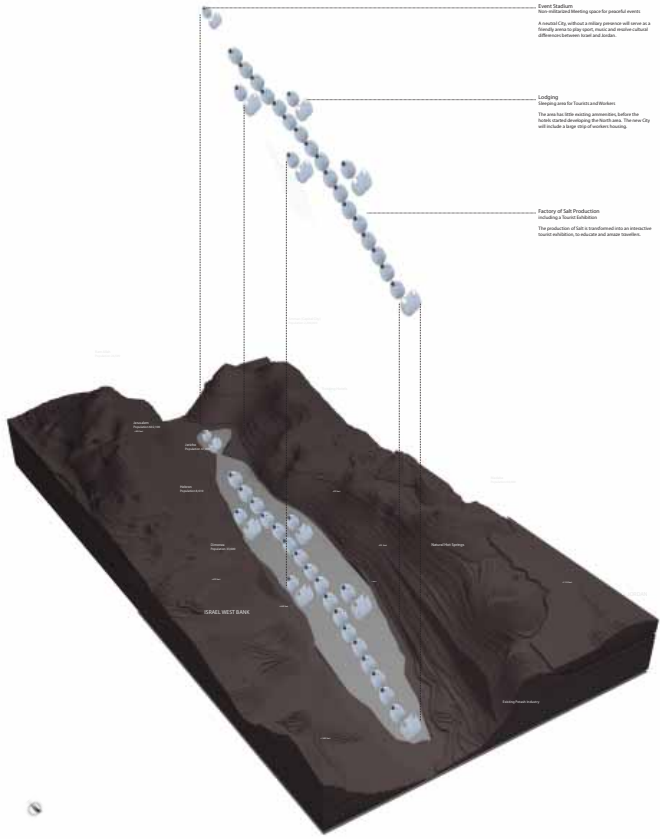
POLITICAL MAP: SHOWS BORDERS AND GOVERNMENT TERRITORY | POPULATION AND INDUSTRY MAP

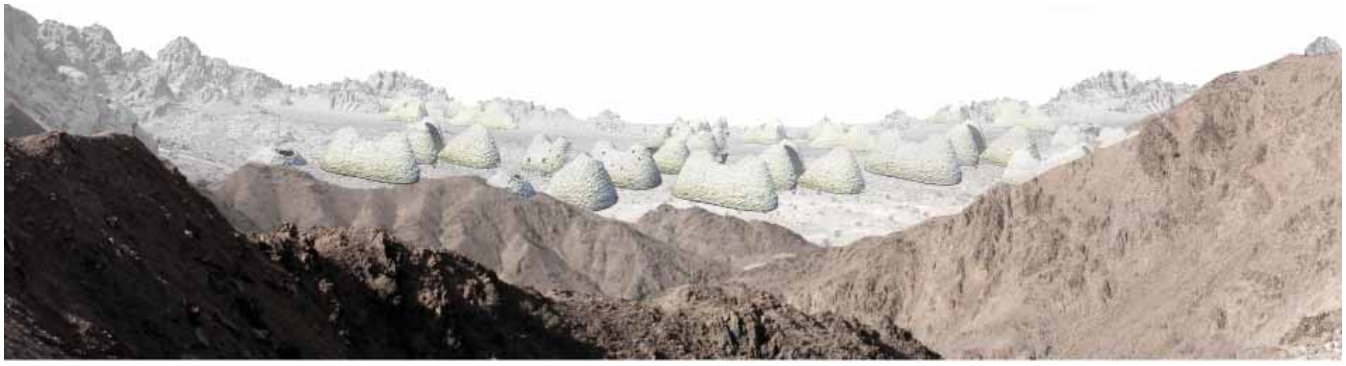
***2105**- GEOGRAPHY FUNNELS VESSELS INTO A LINE*

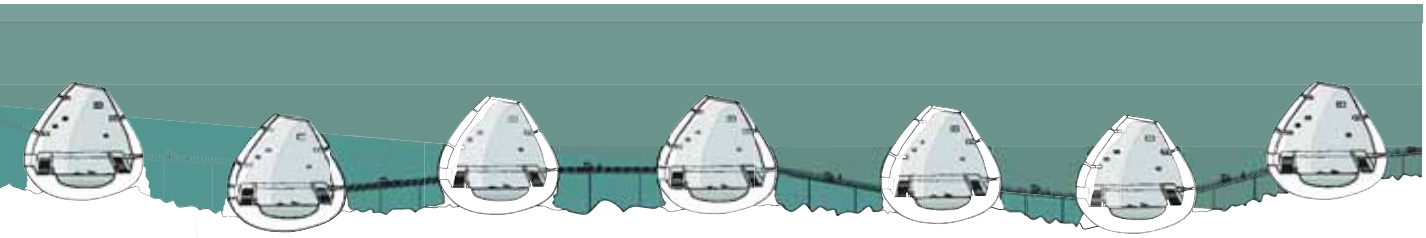


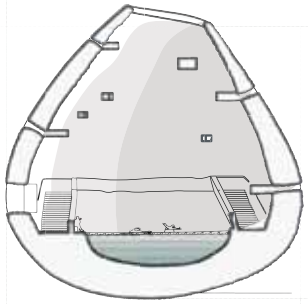
RED ARROWS SHOW PREVAILING WIND AND HIGH TEMPERATURE | HEIGHTS AND ALTITUDE OF THE GEOGRAPHY

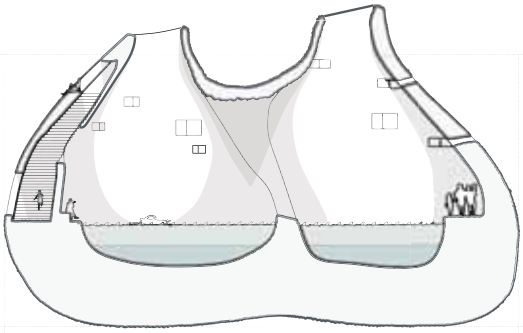
***2012**-SALT VESSELS BEFORE THE SEA EVAPORATES*

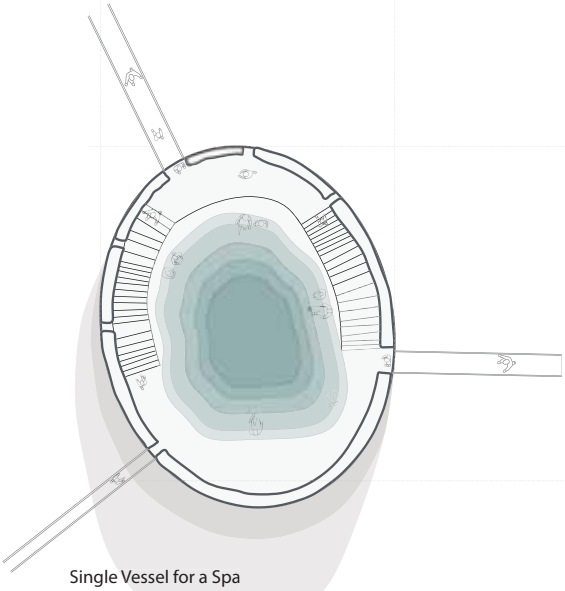

Event Stadium
Non-militarized Meeting space for peaceful events
A neutral City, without a military presence will serve as a friendly area to play sport, music and resolve cultural differences between Israel and Jordan.
Lodging
Sleeping area for Tourists and Workers
The area has little existing ammenities, before the hotels started developing the North zone. The new City will include a large strip of workers housing.
Factory of Salt Production
including a Tourist Exhibition
The production of Salt is transformed into an interactive tourist exhibition, to educate and amaze travellers.
ISRAEL WEST BANK

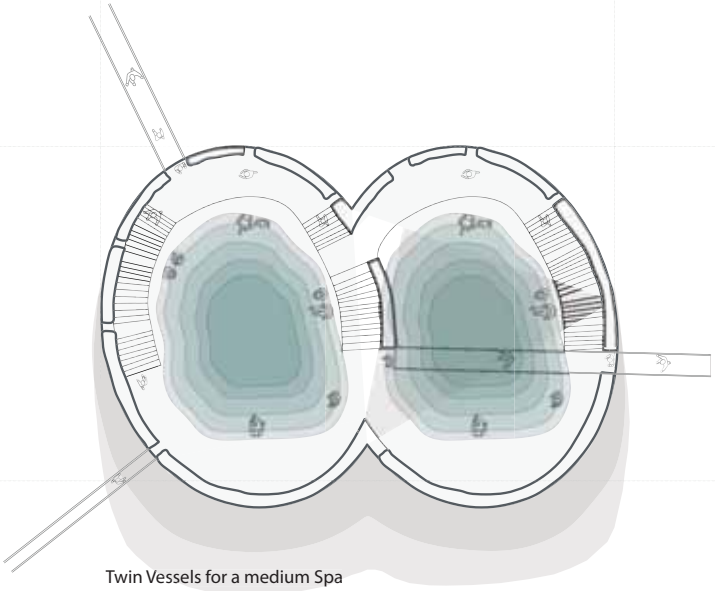






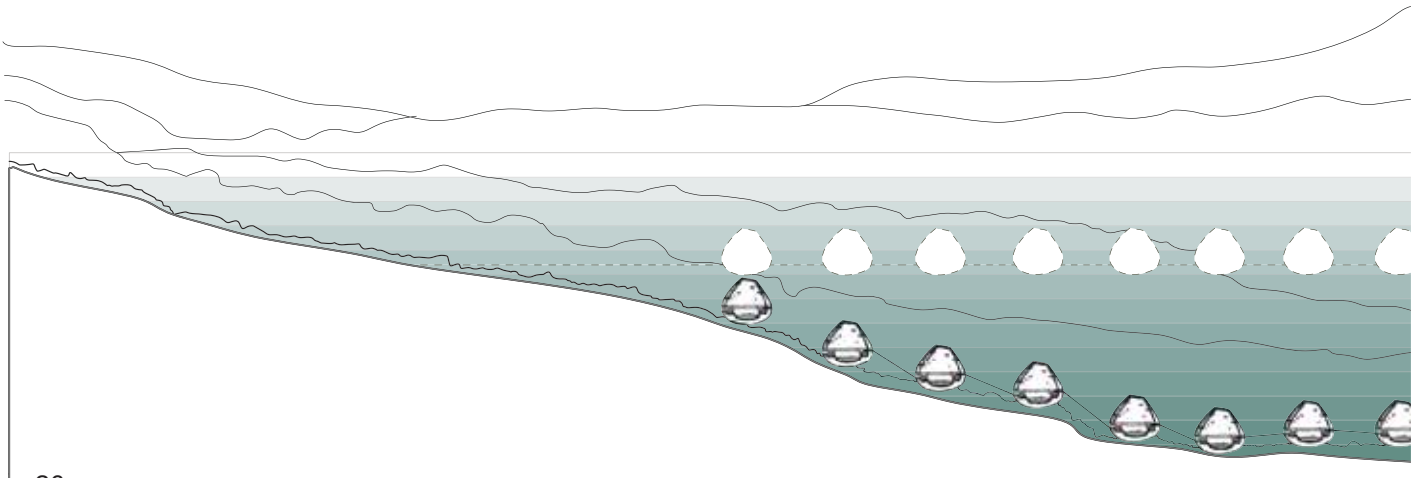


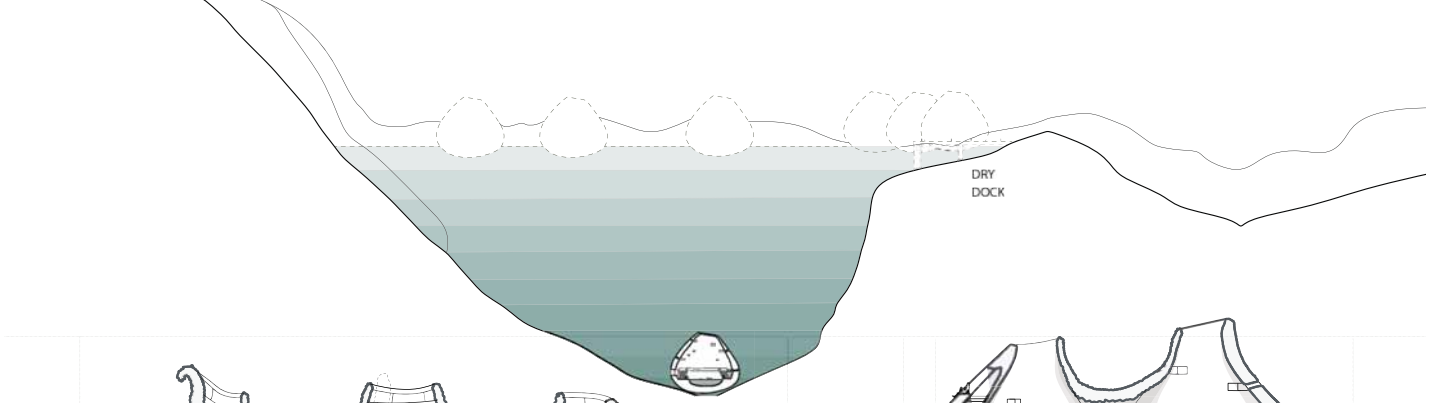


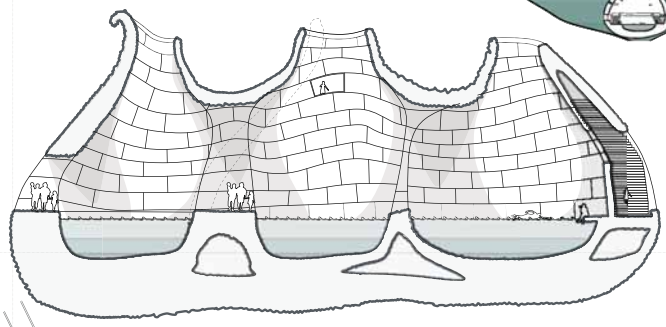


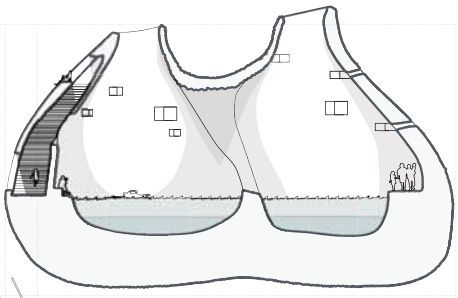
Single Vessel for a Spa
Dimensions 40'x55' base 45' height
2200 sf. per vessel

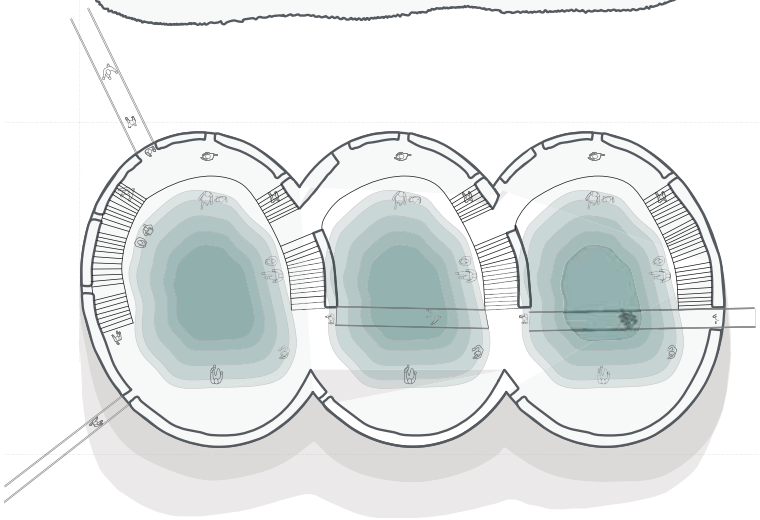
Twin Vessels for a medium Spa
Dimensions 40'x75' base 45' height
3000 sf. per vessel

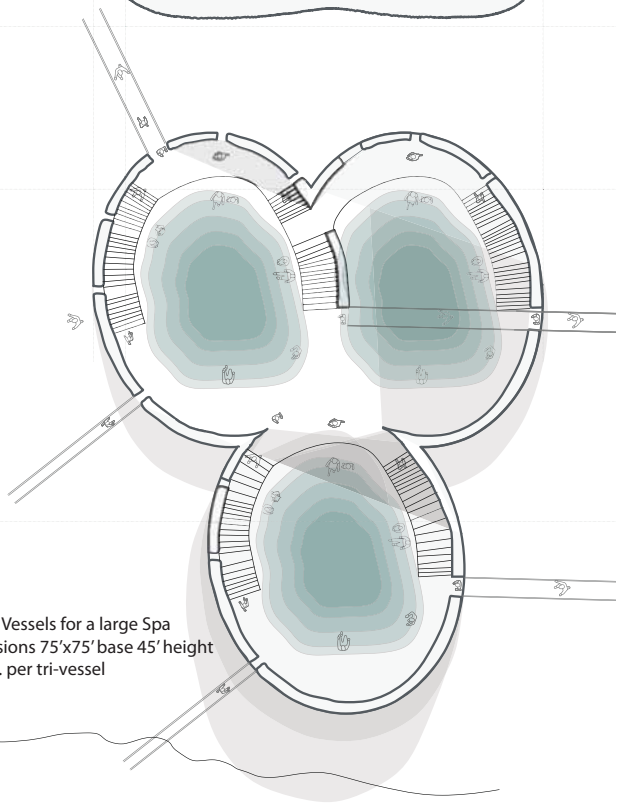






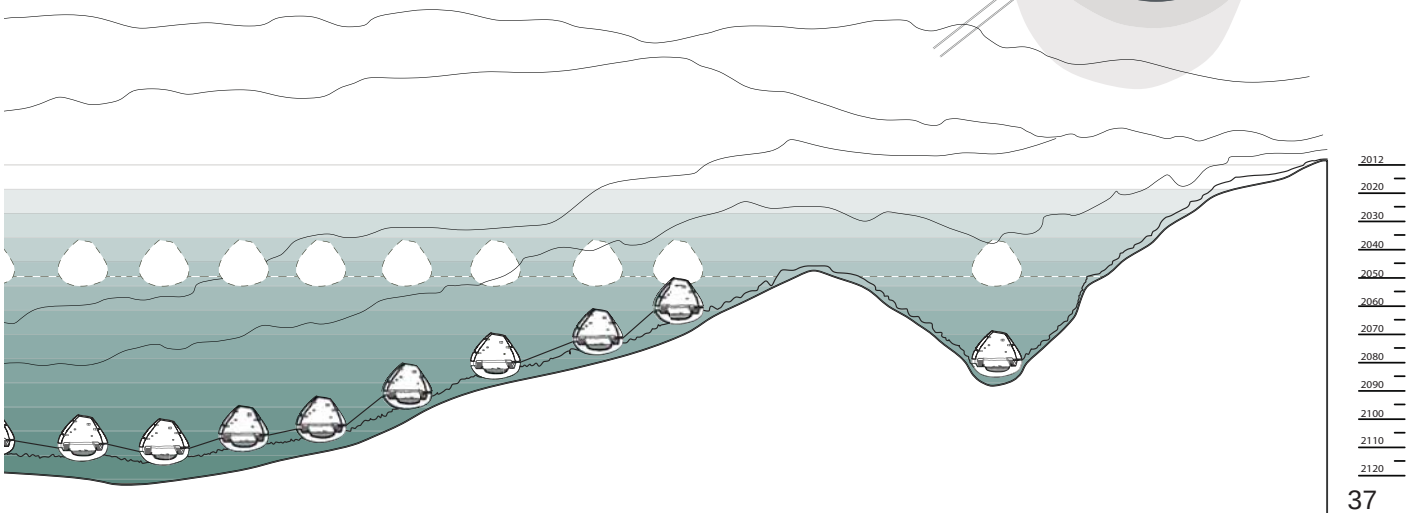






Tripple Vessels for a large Spa
Dimensions 40'x95' base 45' height
3800 sf. per tri-vessel

Tripple Vessels for a large Spa
Dimensions 75'x75' base 45' height
5625 sf. per tri-vessel



2012
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