University of Dundee

REF 2013

Hutton, Graeme

Output 3 (Design) (*draft*)

Constructed Concepts - KAUST Pavilion

Hutton, Graeme
Constructed Concepts – Rain, *KAUST Pavilion*, Saudi Arabia 2009 – 2013 (under construction)

General Description:

Research Output 3 'Constructed Concepts – Rain' is a collaborative interdisciplinary work with internationally acclaimed artists Dalziel+Scullion which extends Hutton's design research narrative framework - 'Place, Programme & Presence' (ref. Outputs 1 & 2 & 4)- to establish an original artefact – a pavilion - at King Abdullah University of Science & Technology (KAUST) in Saudi Arabia.

KAUST ART is an extensive $25M program of artwork commissions that celebrate King Abdullah University's international platform of collaboration and exchange. The primary focus of the program is to interpret and present interdisciplinary art and design that stimulates creativity and interaction. Engaging prominent artists and designers from around the globe, the project unites East and West to create site-specific solutions exploring world-class practices.

Globally over 120 artists were longlisted for the project, including artists from the United Kingdom, Belgium, Tunisia, the United States, Cambodia, Spain, Iraq, Egypt, Germany and India. Dalziel & Scullion were among those longlisted and they then approached Hutton to collaborate and explore a shared dialogue around notions of place from an interdisciplinary art and architectural standpoint, toward the presentation of a stage 2 juried submission. The successful teams from stage 2 would be granted commissions and have their work constructed.

15 successful artists teams - the acclaimed Richard Deacon, Erwin Redl, Carsten Höller and Dennis Nona among them – and including Dalziel+Scullion & Hutton, were then briefed to develop concepts for specific sites. They were asked to draw inspiration from KAUST's unique geography, science and technology-based research, language, text, regional histories and traditions.

Briefed to create a pavilion, the design research engages with the anti-abstraction of Oldenburg, Rossi's ideas of analogy and the coexistence of both complete & incomplete (disintegrated) form, amongst other critical human, ecological and theoretical concerns. What emerges is an artefact as a form on new knowledge, one which gives new expression to the idea of a pavilion whilst referencing the fundamental properties of the Persian Gulf environment, its climate, culture and its heritage in the widest sense.

The pavilion site sits at the edge of the newly constructed campus overlooking the Red Sea near Thuwal **(image 1)**. The 36Km2 campus is located in two proximate zones, a research & Teaching facility and a residential area for 10,000 – 12,000 faculty members and researchers. This proximity reduces greatly the need for private car use and shaded walkways give students and faculty opportunities for biking and walking to the campus. Whilst this 'pedestrianisation' may seem obvious from a western perspective it is unusual in the extreme climate of the Gulf region.

The coastal desert site also includes two major sensitive marine habitats and it is this extreme location which forms the most significant research at KAUST in desert agriculture, Red Sea science and engineering, solar and alternative energy science and engineering, and water desalination and reuse.

Understanding the notion that a pavilion is both utilitarian and decorative the design presents as a play on the form of traditional water storage vessels to establish the briefed 'sheltered place to meet' **(image 2)**. At 5m high and clad in white porcelain 'penny' tiles the pavilion's augmented scale and intimate finish distort expected readings of scale of both the pavilion itself and its immediate context to lend it an identifiable presence within the campus.

Its incompleteness is registered by an entrance cut inviting entry to an intimate space where the focus shifts upward to the sky and the source of rain which can be heard within.

Whilst outwardly meeting the briefed requirements for the KAUST art programme the pavilion's subtext embraces more complex themes which both suggest the work as a foil to the institutional and corporate modernism of the campus architecture, and highlight cultural and environmental concerns regarding the modernisation and development of desert lands. Whilst clearly referencing the significant water conservation research being undertaken at KAUST, the pavilion form can also be read as signifying a cultural shift acknowledging the emancipation of women on campus (traditionally the water carriers) as equal to men.

Research Questions:

(1) How to reconcile the theoretical discourse and common design methodologies of artists and architects toward the creation of a meaningful artefact

(2) How to read and conceptually interpret the positive attributes and relative shortcomings of a modern campus architecture and urban development in a desert environment

(3) How to express institutional values in a designed and constructed object

Aims/Objectives:

(1) The primary aim of this research is to create an interdisciplinary conceptual framework for the design of a modern pavilion - an artefact which then gives meaningful expression to the values of an institution, within both its physical and cultural context.

Hutton's growing body of design work is conceptually and critically framed by a primary consideration of 'Place, Programme & Presence', (REF Output 1- Constructed Landform, REF Output 2 – Constructed Dialectic). This framework is further articulated by the interplay of five serial principles (Architecture + Seriality, 'Continuity & Invention' – REF Output 4)) which recur as objective inclusions: Dialectic, Analogy, Landform, Erosion and Material Association.

This narrative, and resulting serial designs, also acknowledge reference to Aldo Rossi's ideas of 'The architecture of analogy', as well as referencing the 'Specific Objects' of Donald Judd and

'Progressions' works of Sol Lewitt in arguing their presence in and relationship to a particular context. In that sense it deals with the concretisation of ideas into discussable form.
It is these latter references which first initiated a verbal discourse with Dalziel & Scullion about the qualities of KAUST as a 'place' in which to present a meaningful artefact – one which could represent and embody 'new knowledge'.

The nature of the KAUST campus as an instant and completely single-handed creation robs it of what Venturi observes as the necessity for "elements which are hybrid rather than 'pure' … messy vitality … richness … rather than clarity of meaning" (Ref. Complexity & Contradiction in Architecture….pp) **(image 3)**. As such it appears uniformly corporate and abstract in scale and language - placeless, with little opportunity for intimate exchange either with the architecture or between individuals – their exists no history, no familiar typological reference points **(image 4)**.

On concerns of type Aldo Rossi reminds us:

"*I would define the concept of type as something that is permanent and complex, a logical principle that is prior to form and that constitutes it*" (Rossi….ref)

These issues, it can be argued, were tacitly recognized by the initiation of the KAUST Arts programme and, although the requested 'pavilion' might infer a building of sorts, it was difficult to see how the addition of 'more' architecture, in an orthodox sense, could co-exist in such an environment **(image 5)**. As such, other typological cues were explored, cues which questioned the abstract context and engaged with recognizable 'deeply known' (Fretton) utilitarian every-day forms & types **(image 6)**. Allied to this exploration was an arts discourse which introduced the ecological and environmental concerns motivating Dalziel & Scullion. The nature of this art/architecture discourse as 'hybrid' in itself helped embed a richness and 'messy vitality' toward resisting orthodoxy both in process and outcome.

"*In order to be significant, architecture must be forgotten, or must present only an image for reverence which subsequently becomes confounded with memories*" (Rosssi…ref)

"*…these large coffee pots, which I liken to brick walls and think of as structures that can be entered*" (Aldo Rossi, *A Scientific Autobiography* 1981) **(image 7)**

Both departing from (forgetting) 'architecture' and engaging with familiar type bridles the ideas writings and drawings of Rossi to the contemporaneous views and works of artist Claes Oldenburg. It can be argued that Oldenburg is allied to Rossi in the use of the everyday as a point of reference; a signifier of permanence embedding refinement of type over time, of collective belonging and of common association. These are qualities we observe as presently lacking within the KAUST environment:

"*… I am for an art that embroils itself with everyday crap and still comes out on top*" (Oldenburg….ref 1961)

Indeed, it might be further argued that Oldenburg & Van Brugge physically realize some of Rossi's ideas. Oldenburg's 'Free Stamp' of 1982 was preceded a decade earlier by Rossi's 'Gauloises Caporal' drawing of 1971 which shows scale-indefinite stamps of similar form juxtaposed with an imagined city-scape **(image 8)**. Where Oldenburg differs is that there is no

desire for inhabitation – no architectural metaphor. Even his 'Bottle of Notes' of 1989 is to be read more as a narrative spectacle rather than enclosure **(image 9)**.

Closest in intent to the KAUST pavilion is a communion of Oldenburg & Van Brugge's 'Split Button' sculpture and Rossi's inhabited pot 'Il Ritorno dalla Scuolo 1984' **(image 10)**. 'Split Button' is situated in a (then) newly built campus for the University of Pennsylvania and serves as a meeting point and signifier about which the Argentinian writer Jorge Luis Borges, who was nearly blind when he encountered the *Split Button* on his travels and wrote of it afterwards:

"*I am quite sure that Mr. So-and-So, whose name I can no longer recall, saw something at a glance that no one had ever seen before the beginning of history. What he saw was a button. He saw that everyday artifact which so engages the fingers and he understood that in order to transmit this disclosure, the revelation of something so simple, he must augment its size and execute the vast and serene circle we see at the center of a square in Philadelphia.*"
(Atlas, 1985, "a personal geography of writings and photos from around the world")

Rossi's drawing likewise represents an *everyday artifact*, in this instance a coffee pot, and *augments its size*, by the introduction of inhabitation. Parents (one imagines) are drawn waving from 'windows' in another familiar representation of everyday life – the return of children from school. A further pot like object in the distance suggests a slightly sinister landscape of private beacons – a suburban lookout.

By basing the designed form on a common domestic object, albeit augmented in scale, we create a point of commonality **(image 11)**. This domesticity, juxtaposed against the corporate campus architecture is unexpected and introduces ambiguities of scale both in relation to the pavilion itself and the buildings and spaces surrounding it. Scale, form, colour, entrance configuration, seating material and oculus dimension were all tested with a variety of options for each **(image 12)**. The internal form resulting reinforces the collective – visitors are in one space, on one seat and sharing a new experience **(image 13)**.

(2) To create a place to encourage and stimulate creativity and interaction

The overriding spatial sense one gets of the KAUST campus is one of the vast and impersonal. In common with many modern institutions it has an extremely business-like and corporate vocabulary that is largely defined in terms of 'efficiencies' – cost, environmental, spatial and so on. Concerns for occupants at an intimate scale are less evident. What is interesting on campus is the relaxation of religious codes so that women may dress more informally and the sexes mix more freely. This, combined with a focus on 'pedestrianisation' gave an opportunity to explore the possibility of a genuine meeting place for exchange, either by design or by chance. Whilst it was important to us that the pavilion became a place for discussion or contemplation it should also have the capacity to simply be of itself as an artefact, capable of interpretations without use, interpretations which in themselves stimulate discussion and further creative ideas.

From the very beginnings of our dialogue an intention became clear to express within the concept of the pavilion ideas about water as a fundamental, common and scientific concern within the physical, cultural and institutional context of KAUST. Water conservation is critical in Saudi Arabia as well as in most of the Middle East. The average rain fall on the site of KAUST is a low 54mm annually, with much of this rainfall occurring in the winter season. This is, on

average, 21 times less than falls annually in our native Scotland. Most of potable water use in Saudi Arabia is desalinated sea water, with Saudi Arabia desalinating more sea water than any other country. Given the scarcity of water and the high energy use associated with desalination, water conservation is an equally pressing issue in Saudi Arabia as energy conservation is in the UK. Research to find new and more sustainable methods of desalination is central to much of KAUST's research activity.

To emphasize this within the pavilion Dalziel+Scullion made digital recordings of 21 days of rain falling in a Scottish forest. The forest, a phenomenon unknown in Gulf climates, captures the drop sounds as they hit leaves, branches and the forest floor. Each day sounds different depending on the nature of the rain – from light drizzle to pelting downpour. This soundscape is embedded via a flush speaker system cast into the pavilion construction and triggered by a movement sensor at the point of entry. Each entrant triggers a changing soundscape, in the hope of promoting spontaneous dialogue amongst the visitors. The point source being invisible will naturally focus attention upward to the outside and create a sense of the unreal, of unease even, at the manipulation of reality in relation to the environment of the Gulf region.

(3) To construct an artefact by adaptation local technologies and traditions at the macro and micro scale

At 5m high X 5m wide and with curvature in 2 directions methods of reinforced concrete construction were investigated which would provide the necessary structural competence whilst maintaining a thinness of skin appropriate to a large 'vessel' as opposed to 'building' construction. Initial experiments using traditional poured concrete onto formwork and a reinforcing mesh proved unworkable. The construction was heavy and had to be constructed in sections for portability to site. This method also introduced joints and subtle inaccuracies as the sections were fitted together. Additionally, this method required a finishing layer before the tile discs could be set in adhesive grout and was overall extremely labour intensive **(image 14)**.

Following further research and experimentation a system using lightweight Styrofoam as permanent formwork and Glass Fibre Reinforced Concrete in a 'sandwich' construction allowed the pavilion to be constructed as a single entity which was lighter by over 50% and ready finished to accept the finished tiles **(image 15)**. Labour and transport costs were also greatly reduced by this method.

The material expression of the finished pavilion is a unified surface of white porcelain 'penny' tiles. Colours were experimented with, notably a green which made allusion to a traditional glaze, however white prevailed as both aesthetically powerful in its negation of the vessels strong form and environmentally sensible in creating a cooler surface and interior. The grid pattern of the tiles itself proved complex in relation to the curvatures of the form **(image 16)**. Experiments investigated how to achieve the maximum tile to minimum grout ratio so that the whole form would appear seamless and unified – modern but acknowledging the traditions and heritage of the region in both concept and detail **(image 17)**. In this sense it achieves what Robert Venturi describes as 'The Difficult Whole' – A primary concern in the realised constructions of Hutton. The constructed artefact is by its very presence a hybrid which is neither solely art nor solely architecture. It is, in that sense 'impure' and expressive of these dialectic tensions. It invites interpretation of its meaning in a context largely devoid of such.

Context:

Graeme Hutton is a recognised award winning and principled designer of innovative domestic buildings for sensitive rural environments. Scotland is developing an international profile for distinctive and principled rural architecture through the work of Hutton, Dualchas, Rural Design, Oliver Chapman and others who situate themselves within an ethos of what Kenneth Frampton termed 'critical regionalism'. In keeping with this ethos, this research has contributed to a transcription of thought and sharpening and refinement of design practice in an international context. The research also tests Hutton's principles outwith conventional architectural practice and rural contexts and situates them in an art and design context as contributors to new work.

Research Methods:

Hutton's research methodology constitutes a form of 'model practice' which, by way of buildings, designs and texts, clearly articulates new ideas about how design may transcribe critical place observations to inform contemporary architecture and design thought and practice. Within the conceptual framework '*place, programme & presence*' projects are developed in a serial manner. Serial architectural & design practice infers a temporal dimension, and it is by recognizing this meta-pattern of action-reflection-reaction that individual designs give way to more continuous themes in this practice based research. The author has evolved a working method that resists the ubiquitous 'conceptual sketch ' or any form of hand drawing during the initial stage of the design process as it tends toward promoting organisation and function as the defining conceptual narrative. Projects are intensively 'thought through' using a critical approach to place and programme as an intellectual framework to stimulate and constrain thought, and promote dialogue with collaborators and the client. In this instance the primary working methods of Dalziel+Scullion paralleled that of Hutton where the aim is to consider the pavilion in all its dimensions simultaneously, and loosely determine its primary characteristics, it's formal and material expression, and, importantly, its 'presence' as a container for the programme.

As visits to the site were impracticable scale drawings and a computer model of the immediate location were initially prepared as orthodox 'architectural' conceptual cues. Significant here was the artist's disengagement from this process and result. Notions of 'working to scale' (they did not possess one!) or reading the space of the immediate site were an anathema – an inhibition even – to developing a meaningful narrative. Intense dialogue centred around governing theoretical principles, attitudes to tradition and concerns for the environment within a broad agreement that the site did not need 'more architecture'. Collage and montage were used as methods to juxtapose initial ideas; giant salt cubes, linear tents and translucent 'blobs' among them, all helped work out a way of articulating a process of thought and action which lay between arts and architectural design practices.

A simple proprietary computer drawing package then allowed development, manipulation and communication of these ideas simultaneously in plan, section, elevation and, to a degree, in detail. This requirement for simultaneity is a determining characteristic of what we term 'active reflection' in practice.

Once the direction of the project was established Photoshop was used as the fastest and most 'plastic' tool to enable changes of scale, colour and materials to be evaluated 'in-situ'. The overall form, profiles, cuts and internal space solid/void qualities were also tested and adjusted this way.

As the project was to be constructed at a distance with minimal dialogue, autocad template drawings and a detailed specification were prepared to test sample construction and finishing methods at 1:1 for accuracy, economy and transportability.

KAUST Specific Dissemination:

1. Publication

- http://www.wallpaper.com/architecture/letter-from-scotland/4115

2. Exhibition

- 184th RSA Annual Exhibition - Invited Designs and Salon lecture: '*Place, Programme & Presence'* – May 2010

3. Invited Speaker

- Royal Geographic Society '*Place, Programme & Presence*' April 2013
- RIAS Council '*Research by Design*' December 2012
- Royal Scottish Academy Salon '*Place, Programme & Presence*' May 2010
- University of Edinburgh '*Seriality*' symposium May 2009
- University of Edinburgh/College of Art – '*Place, Programme & Presence*' 2010 http://architecture.eca.ac.uk/?paged=2

4. CPD Lectures

- RTPI Conservation Lecture '*Place, Programme & Presence*' 2009
- RIAS Chapter DIA Lecture '*Place, Programme & Presence*' 2009

Wider Research Dissemination, Esteem & Impact:

1. Publication

- Architecture + 'Seriality', *'Continuity & Inventiveness'* 'The Shed' 'The Blackhouse' & 'The Longhouse' original designs and critical reflection pp. ?? Edinburgh University Press May 2011
- Prospect, '*Place, Programme and Presence*' – Research & Practice, autumn 2006 pp. 34-35.
- Landworkers International Exhibition and Symposium - Invited Designs and public lecture: '*Place, Programme & Presence'* –The Shed, The LongHouse. DCA Centrespace, May 2009

2. Exhibition
Hutton has had over 25 buildings/designs selected for peer reviewed exhibition at The Royal Scottish Academy. Designs have also been selected for exhibition at The Royal Academy and Venice Architecture Biennale.

Wider Esteem Indicators:

- RIBA Award 2009
- Scottish Design Awards 2009- Drummond House –'The Shed' Best Residence
- RIAS Chapter Awards 2009 - Drummond House –'The Shed' Best Residence
- RIAS Chapter Awards 2009 -Drummond House–'The Shed' Supreme Award, Best New Building in any category

Wider Impact:

The impact of Hutton's Design research has been fourfold:

1. To inform directions for professionals architectural design relating to designing for predominantly landscape contexts
2. To inform wider society of the critical debate surrounding appropriate architectural designs for sensetive contexts
3. To establish benchmark reference approaches guiding planning and design judgements for sensitive locations
4. To transcribe '*Landform*' ideas to a wider context

1. 'The Shed' has been internationally disseminated to a professional audience through; the presence of built work, traditional and web-based publication, symposia and talks, exhibition and invited CPD seminars. As a direct consequence of this exposure numerous co-professional enquiries have resulted, particularly in relation to the roof form and detail, from practices in the UK, Ireland and The USA. Evidence of '*Landform*' sub-themes can be seen in later architectural works such as those at Scotland's recent 'Highland Housing Expo' or an addition to a 181-year-old farmhouse in central Maine, a new piece by New York based Briggs Knowles Architecture + Design. The detail design of 'The Shed' roof/wall junction is also being employed by Platform4 in New York for a rooftop addition to a Brooklyn city block.

2. Following publication online, particularly 'Britain's Best New Buildings', and in the popular press under such banner headings as '*Q) Is this an award winning piece of architecture, or a shed? A) Both*' Scotsman 22nd May 2009 and '*Barnstorming – Industrial Unit or Modernist Masterpiece?*' Caroline Ednie, Homes & Interiors Scotland, October 2009 pp82-89, much follow up correspondence has been generated centering on the appropriateness or otherwise of the buildings vocabulary. From this exposure a complex observation relating to type emerges. That is, critique is positive and favourable if the viewer assumes 'The Shed' is in fact just that – a utilitarian agricultural building. Critique from the same readers is less favourable upon discovery that 'The Shed' is in fact a residence. Further research in how modern architecture is perceived and understood is warranted by these observations. What this exposure also elicits is popular discussion regarding appropriate models of new rural dwelling that might challenge the suburbanization of the countryside. The research suggests a new language and patterns of

dwelling as demanded by The Architecture Policy Unit through Architecture and Design Scotland. Commissions to the value of £2M for five further residences, in similarly sensitive sites across Scotland, have resulted in a maturing vocabulary to incorporate highly energy-efficient 'Passive House' technologies.

3. 'The Shed' is cited as an exemplar regarding appropriate design responses to rural landscapes in the RIAS Information booklet 'Why Choose an Architect' (Ref. RIAS). The planning authorities of two district councils also refer potential developers to the design as an exemplar of how to approach building in the countryside. As a result of the design principles inherent in 'The Shed' a grant of £15,000 was secured from the Scottish Government to research the optimum approach for articulating and embedding 'Design Coding' for the proposed new highland town of 'Tornagrain'. This is a pilot project to test mechanisms for ensuring design quality over time in lengthy and complex development programmes for several new sustainable communities being proposed in Scotland.

4. The benefits extending from the profile of 'The Shed' and its contribution to a new awareness of landscape formed architecture include my invitation as a juror informing the selection and procurement of Kengo Kuma's '*Landform*' design for the first outreach of the V&A's internationally significant collections, to wide critical and public acclaim. The '*landform*' ethos also sits as a key constituent part of the international '*Landworkers*' network (including artists Will McLean and Arthur Watson and architect Juhani Pallasmaa) sponsored by The Geddes Institute, RIAS and Dundee Contemporary Arts. Pallasmaa visited 'The Shed' in 2009 during the 'Landworkers International Symposium' exploring landscape, culture and heritage as conceptual drivers of contemporary ideas across a range of disciplines including art, literature and architecture. Further to this, internationally acclaimed artists Dalziel+Scullion invited collaboration on a competition to create a new pavilion within the King Abdullah University campus in Saudi Arabia. This is presently under construction as part of an arts programme of works by renowned contributors from around the world.

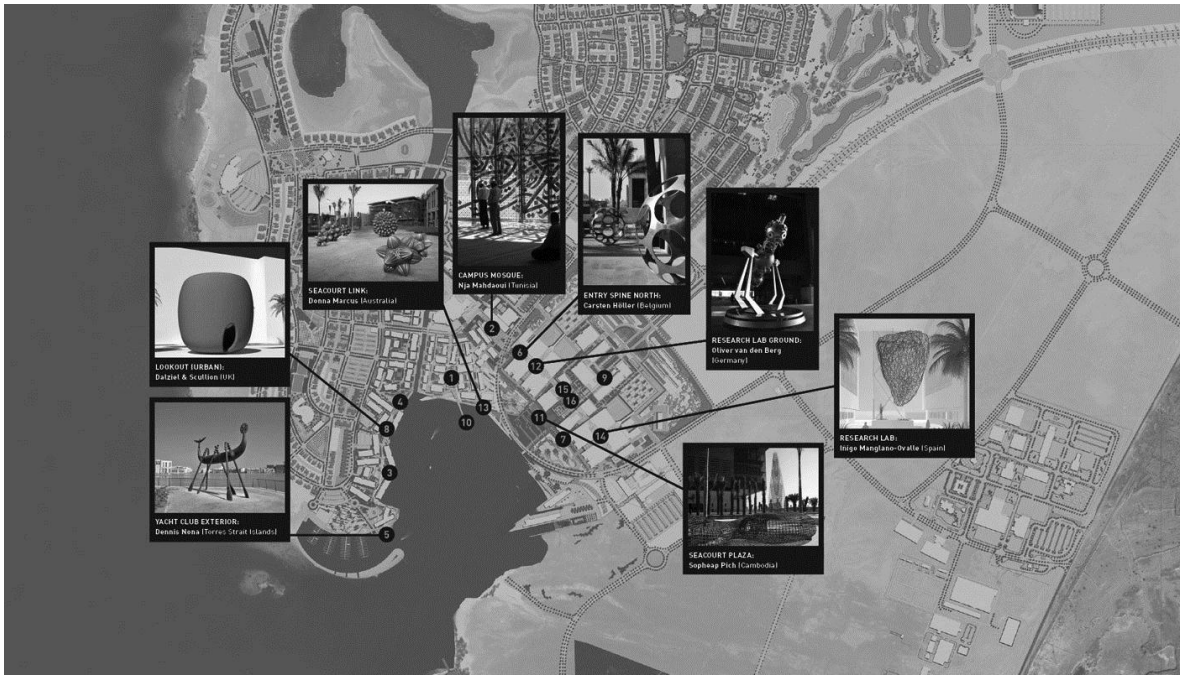

Image 1 - The pavilion site sits at the edge of the newly constructed campus overlooking the Red Sea near Thuwal

Image 2 - Understanding the notion that a pavilion is both utilitarian and decorative the design presents as a play on the form of traditional water storage vessels to establish the briefed 'sheltered place to meet'

Image 3 - An instant and completely single-handed creation robs it of what Venturi observes as the necessity for “elements which are hybrid rather than ‘pure’ … messy vitality … richness … rather than clarity of meaning”

image 4 - Uniformly corporate and abstract in scale and language - placeless, with little opportunity for intimate exchange either with the architecture or between individuals – their exists no history, no familiar typological reference points

image 5 - It was difficult to see how the addition of ‘more’ architecture, in an orthodox sense, could co-exist in such an environment



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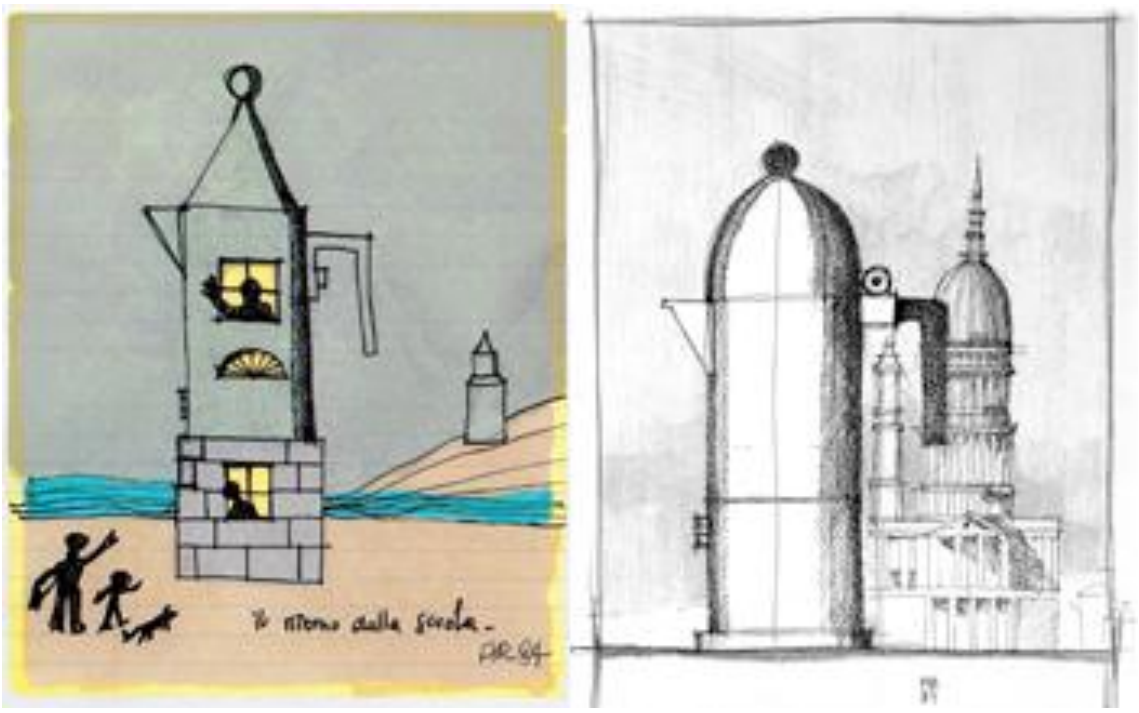
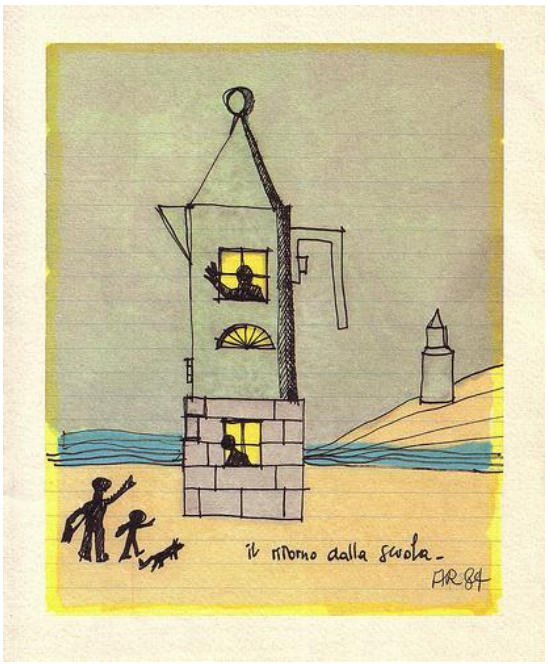


image 7 - "*…these large coffee pots, which I liken to brick walls and think of as structures that can be entered*" (Aldo Rossi, *A Scientific Autobiography* 1981)

Gauloises caporal, 1971 [10]

image 8 - Oldenburg's 'Free Stamp' of 1982 was preceded a decade earlier by Rossi's 'Gauloises Caporal' drawing of 1971 which shows scale-indefinite stamps of similar form juxtaposed with an imagined city-scape

image 9 - There is no desire for inhabitation – no architectural metaphor…… a narrative spectacle rather than enclosure



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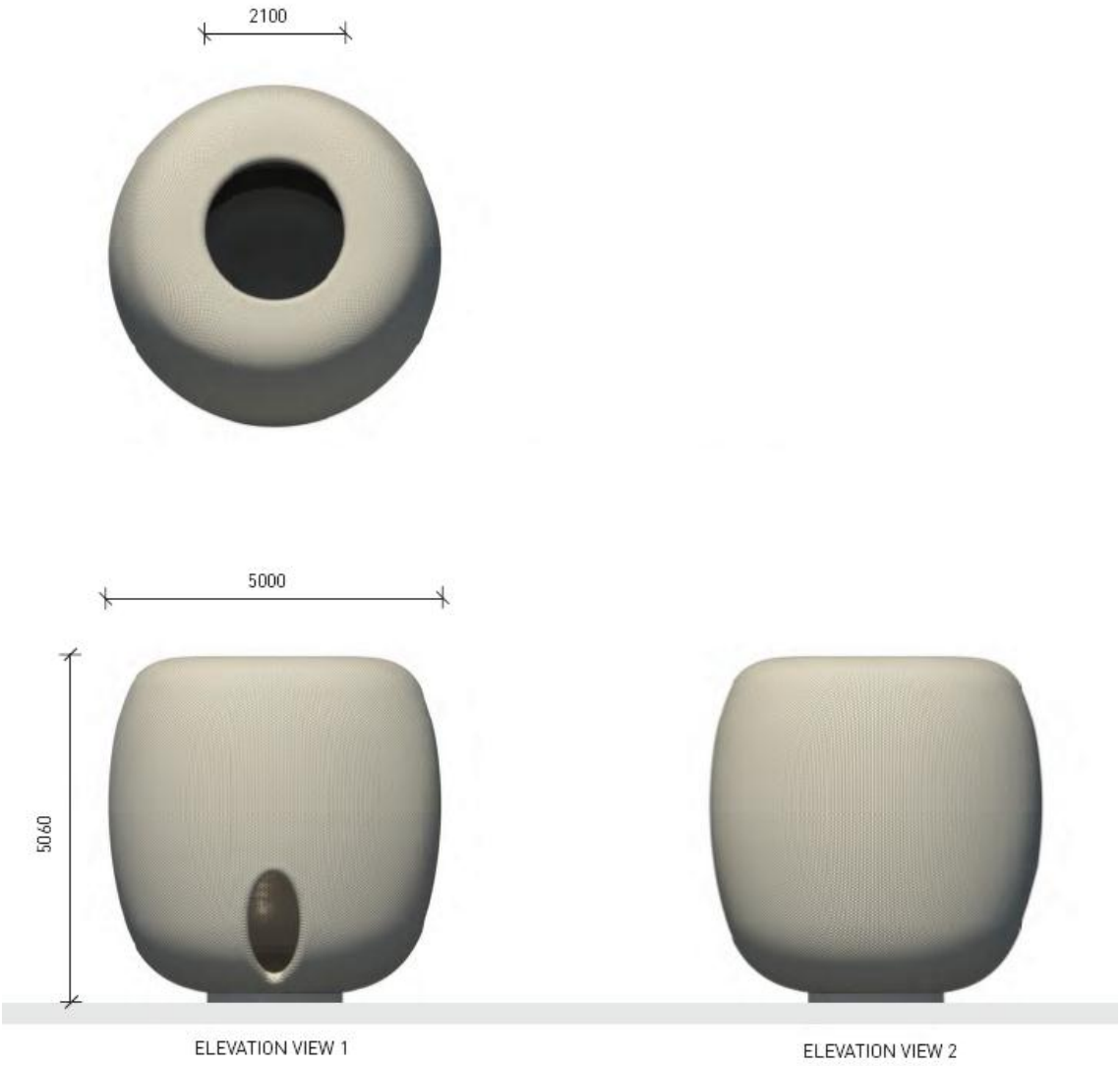

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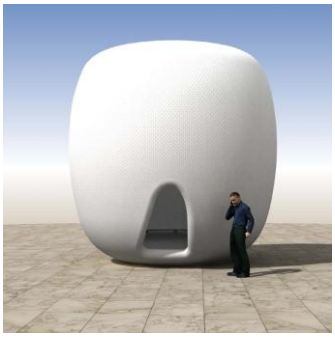
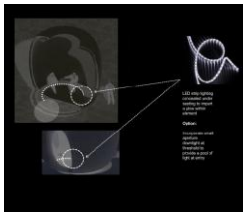
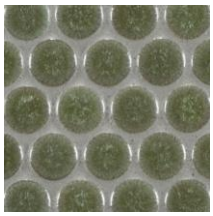




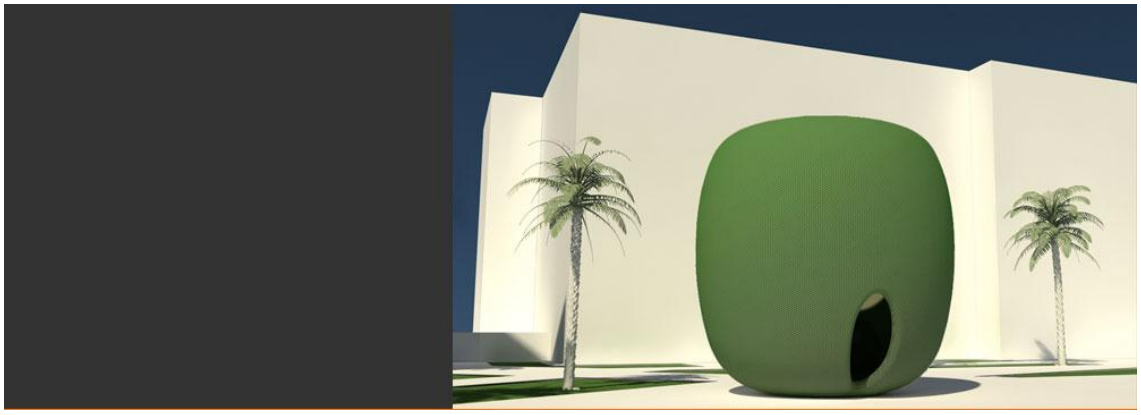


image 12 - Scale, form, colour, entrance configuration and oculus dimension were all tested with a variety of options for each

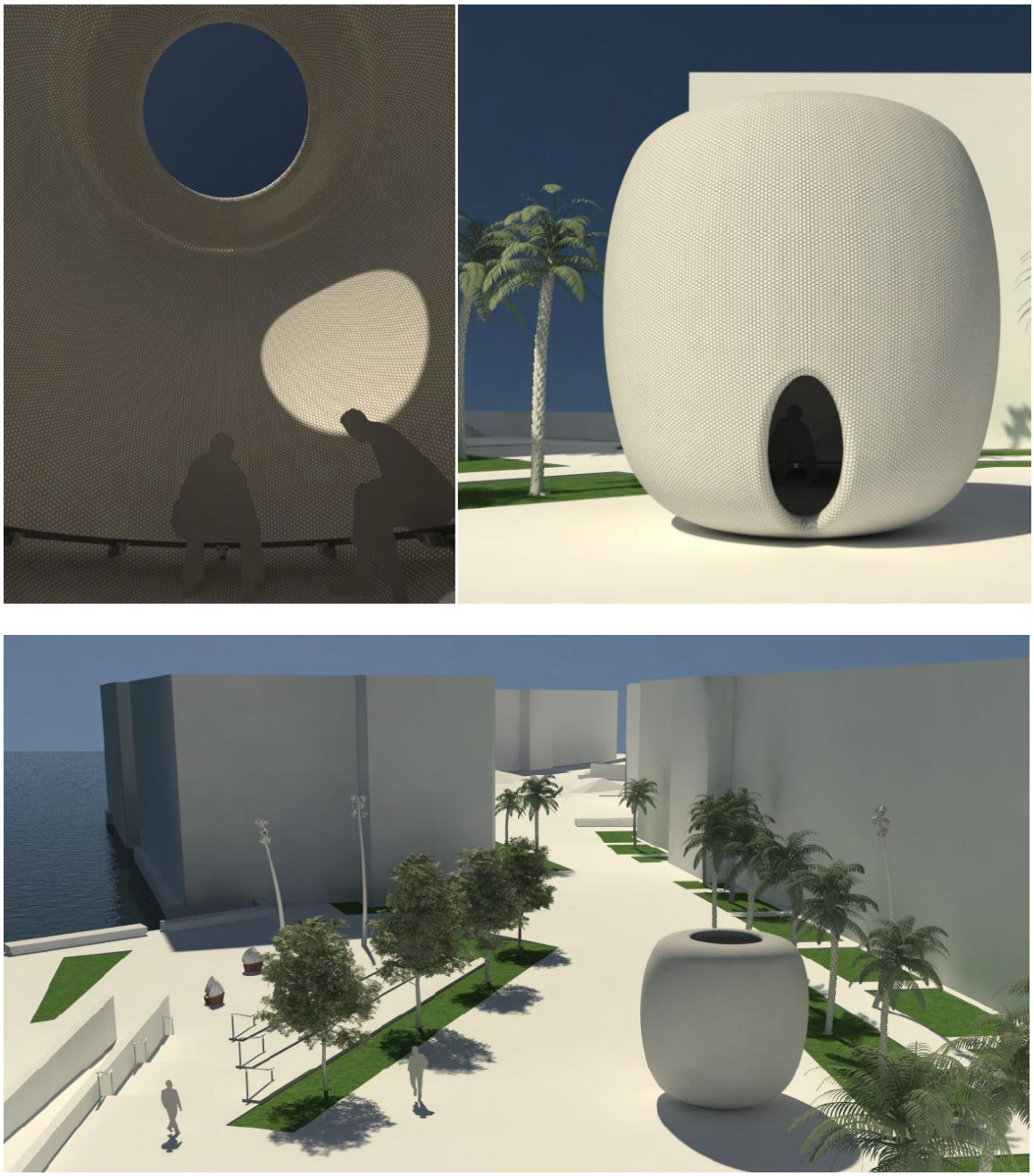


image 13 - The internal form resulting reinforces the collective – visitors are in one space, on one seat and sharing a new experience

Image 14 - Initial experiments using traditional poured concrete onto formwork and a reinforcing mesh proved unworkable

Image 15 - Glass Fibre Reinforced Concrete in a ‘sandwich’ construction allowed the pavilion to be constructed as a single entity

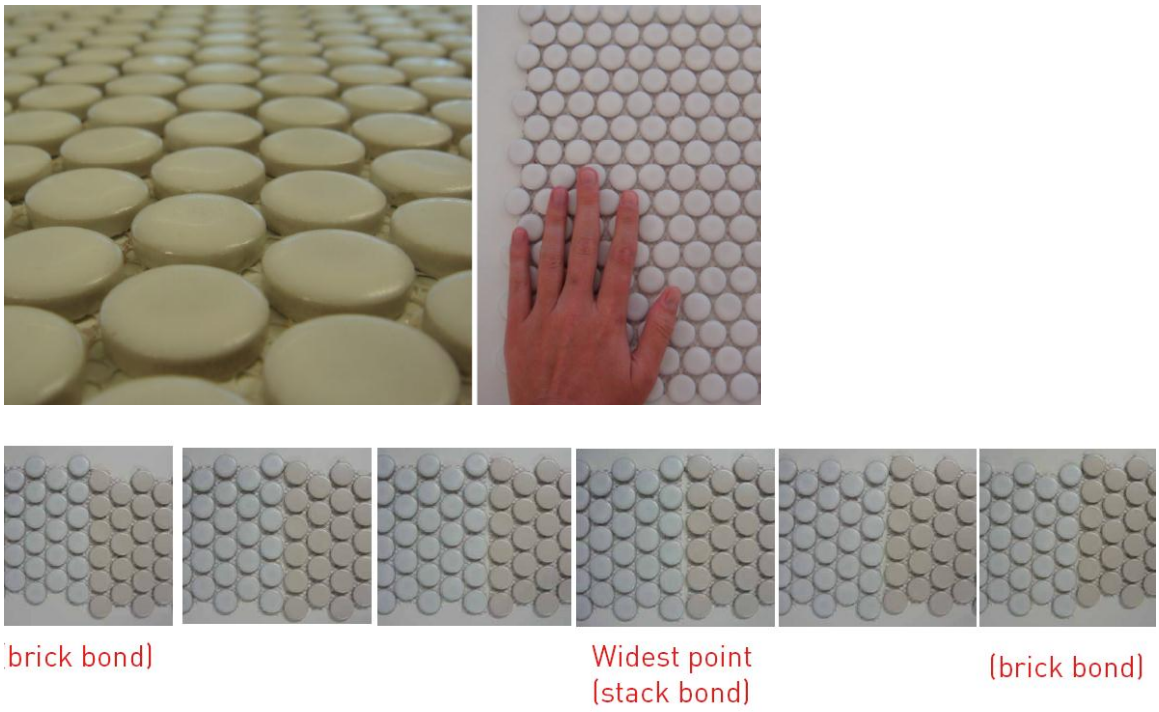


Image 16 - The grid pattern of the tiles itself proved complex in relation to the curvatures of the form

KAUST Rain Pavilion Specification

WALL & FLOOR FINISHES

Tiles: 170m2 'Honeycomb' glazed ceramic round tile :B-3140 Matt White

Adhesive: Ardex X77

Grout: Ardex Flex-FS Brilliant White

WALL & FLOOR CONSTRUCTION

Glass Fibre Reinforced Concrete
To fabricators specification but following absolutely the profiles and thickness described in Dalziel & Scullion supplied drawings and finished to a smooth and consistent surface suitable for the application of the finishes detailed above. Recesses provided for 'hidden' loudspeakers and concealed cabling as detailed and agreed by Dalziel & Scullion.

All opening edges to be rounded to a 'bullnose' finish as drawn.

2x drainage weep-holes to be provided as illustrated.

SEATING

Concealed Supporting Structure 100mmx50mm hollow steel box sections welded to form 'spider basket' with 11 cranked cantilever sections as shown. Curved steel 'C' channel welded to top to match pavilion radius as shown. 50mmx50mmx420mm extending hollow steel spigots welded to top of cantilevered sections as shown. 4x6mmx6mmx6mm steel spacers spot welded to spigots as seat surface supports.

Whole structure to be bolted to concrete circular pad foundation as illustrated and to engineers specification.

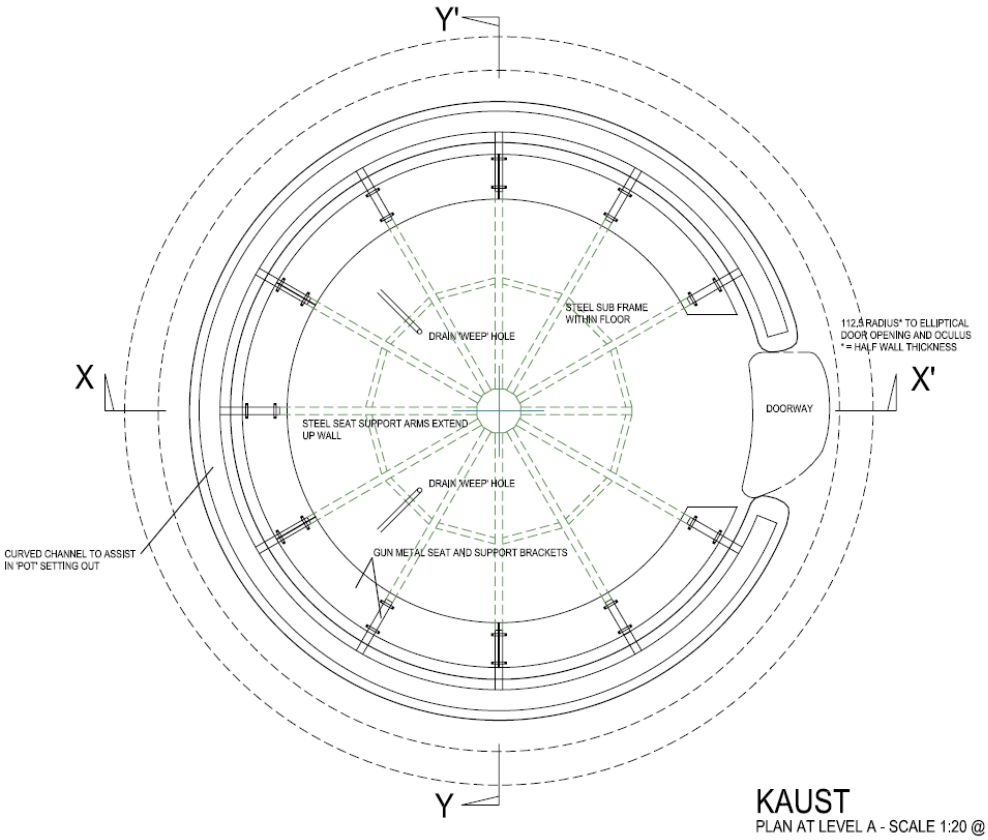
Seat Surface 10mm thick x 300mm deep plate mill finished steel spaced 102mm from pavilion internal wall and cut to follow the pavilion internal wall diameter as shown. Plate surface spot welded to surface supports on underside. Plate surface to extend beyond spigots by at least 30mm.

SUBSTRUCTURE

Circular concrete pad foundation to engineers specification.

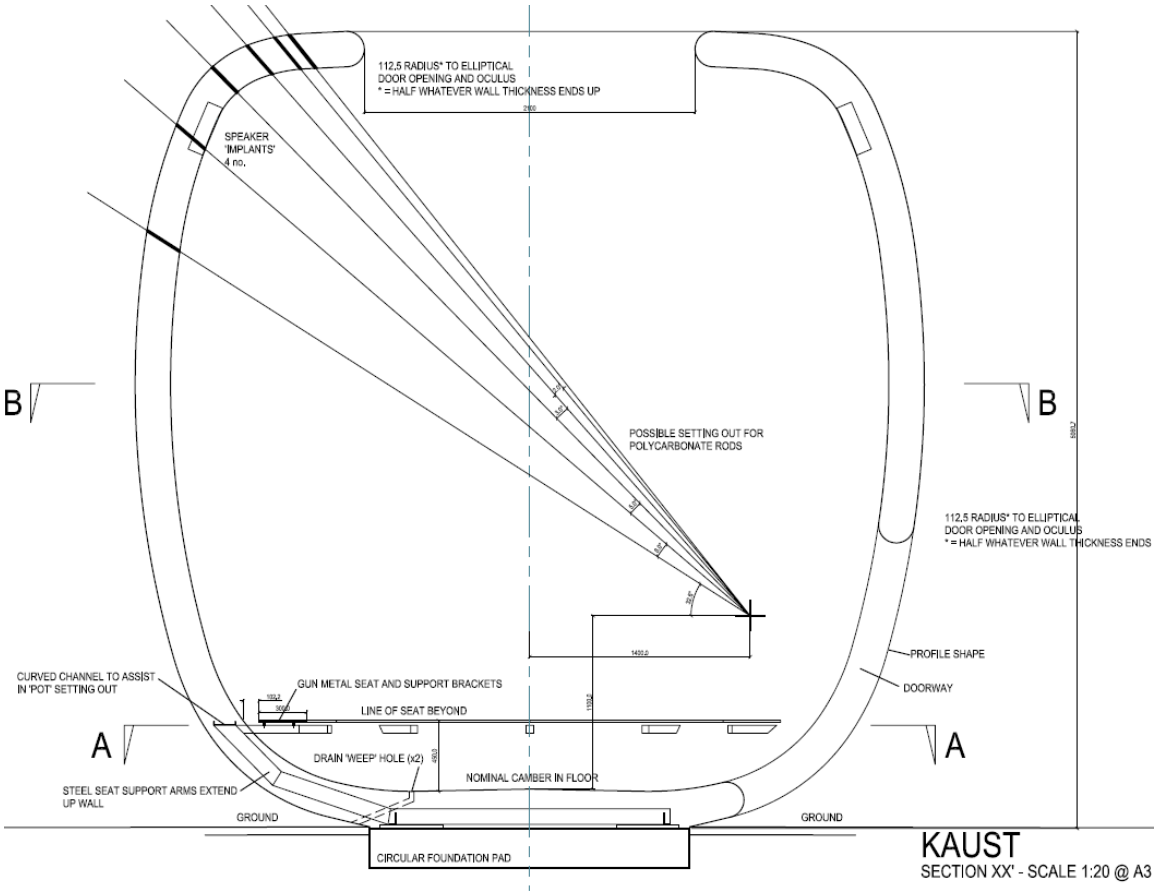
NOTES

All structural and constructional components to be approved by a certified structural engineer. The above specification is for cost guidance only.



KAUST
PLAN AT LEVEL A - SCALE 1:20 @ A3

Early Design



Early Design

KAUST Rain Pavilion Specification

WALL & FLOOR FINISHES

Tiles: 170m2 'Honeycomb' glazed ceramic round tile :B-3140 Matt White

Adhesive: Ardex X77

Grout: Ardex Flex-FS Brilliant White

WALL & FLOOR CONSTRUCTION

Glass Fibre Reinforced Concrete
To fabricators specification but following absolutely the profiles and thickness described in Dalziel & Scullion supplied drawings and finished to a smooth and consistent surface suitable for the application of the finishes detailed above. Recesses provided for 'hidden' loudspeakers and concealed cabling as detailed and agreed by Dalziel & Scullion.

All opening edges to be rounded to a 'bullnose' finish as drawn.

2x drainage weep-holes to be provided as illustrated.

SEATING

Concealed Supporting Structure 100mmx50mm hollow steel box sections welded to form 'spider basket' with 11 cranked cantilever sections as shown. Curved steel 'C' channel welded to top to match pavilion radius as shown. 50mmx50mmx420mm extending hollow steel spigots welded to top of cantilevered sections as shown. 4x6mmx6mmx6mm steel spacers spot welded to spigots as seat surface supports.

Whole structure to be bolted to concrete circular pad foundation as illustrated and to engineers specification.

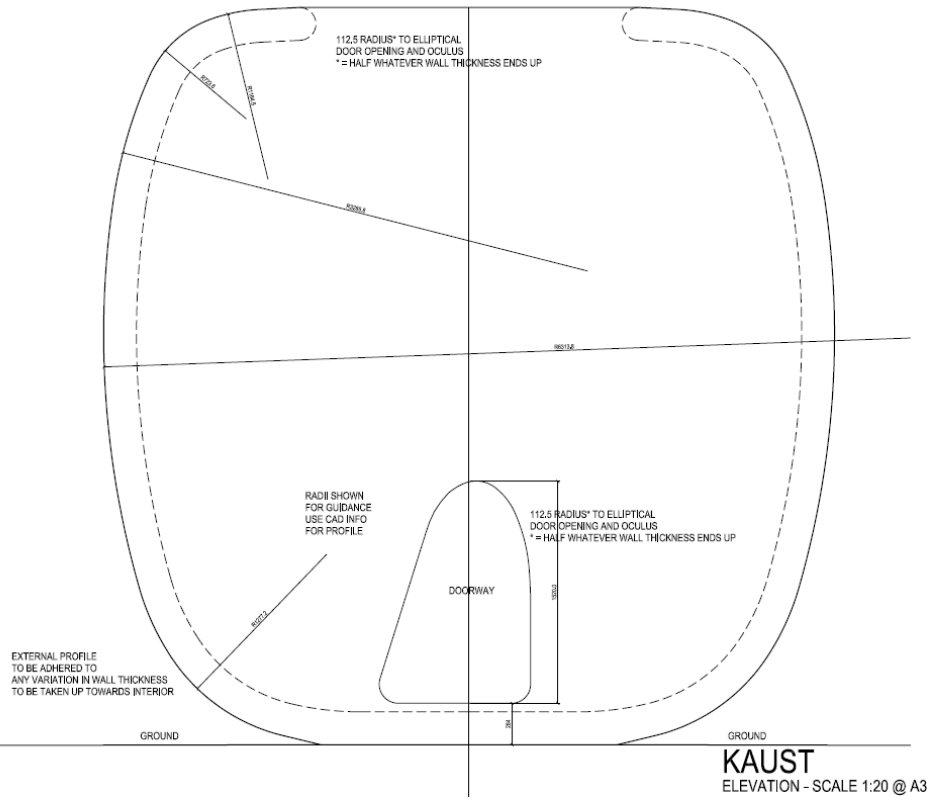
Seat Surface 10mm thick x 300mm deep plate mill finished steel spaced 102mm from pavilion internal wall and cut to follow the pavilion internal wall diameter as shown. Plate surface spot welded to surface supports on underside. Plate surface to extend beyond spigots by at least 30mm.

SUBSTRUCTURE

Circular concrete pad foundation to engineers specification.

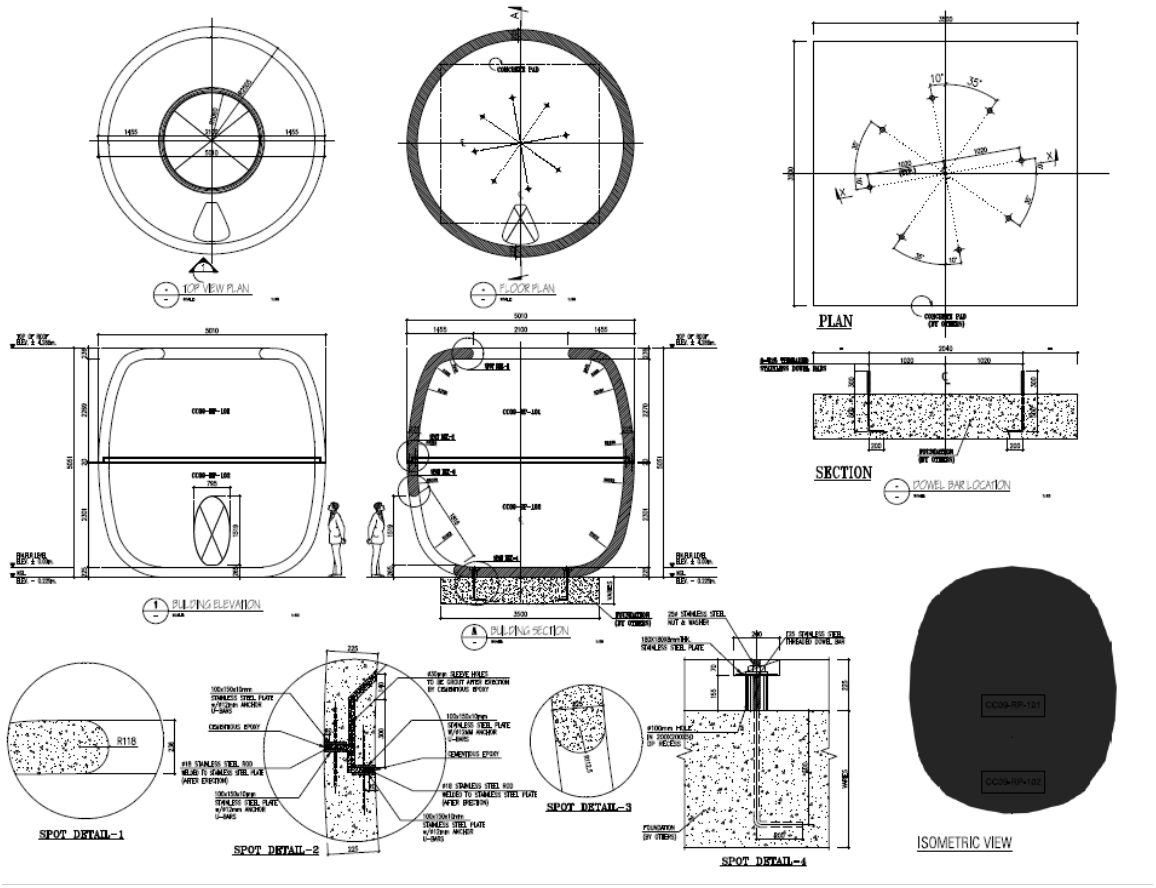
NOTES

All structural and constructional components to be approved by a certified structural engineer. The above specification is for cost guidance only.

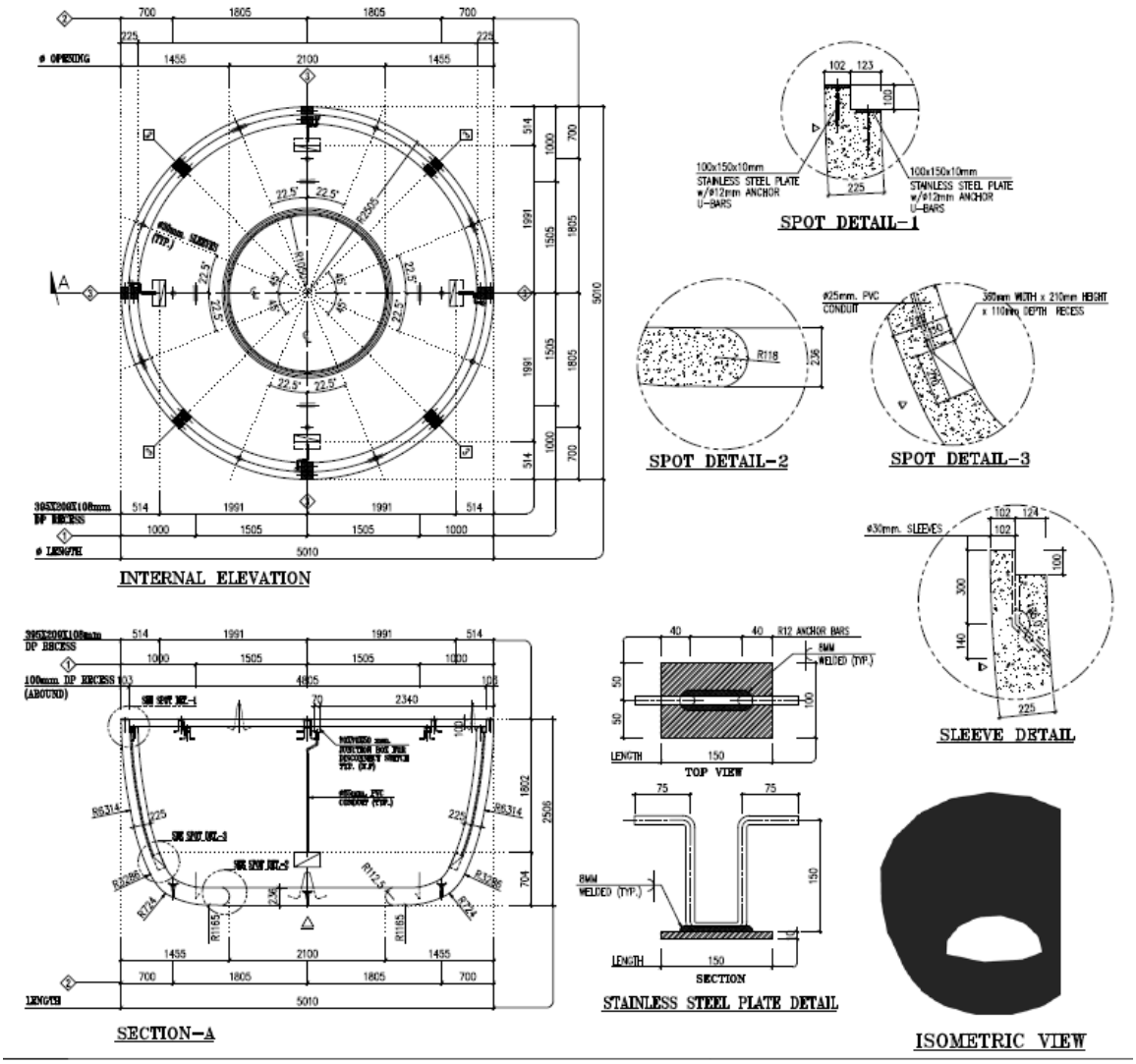


KAUST
ELEVATION - SCALE 1:20 @ A3

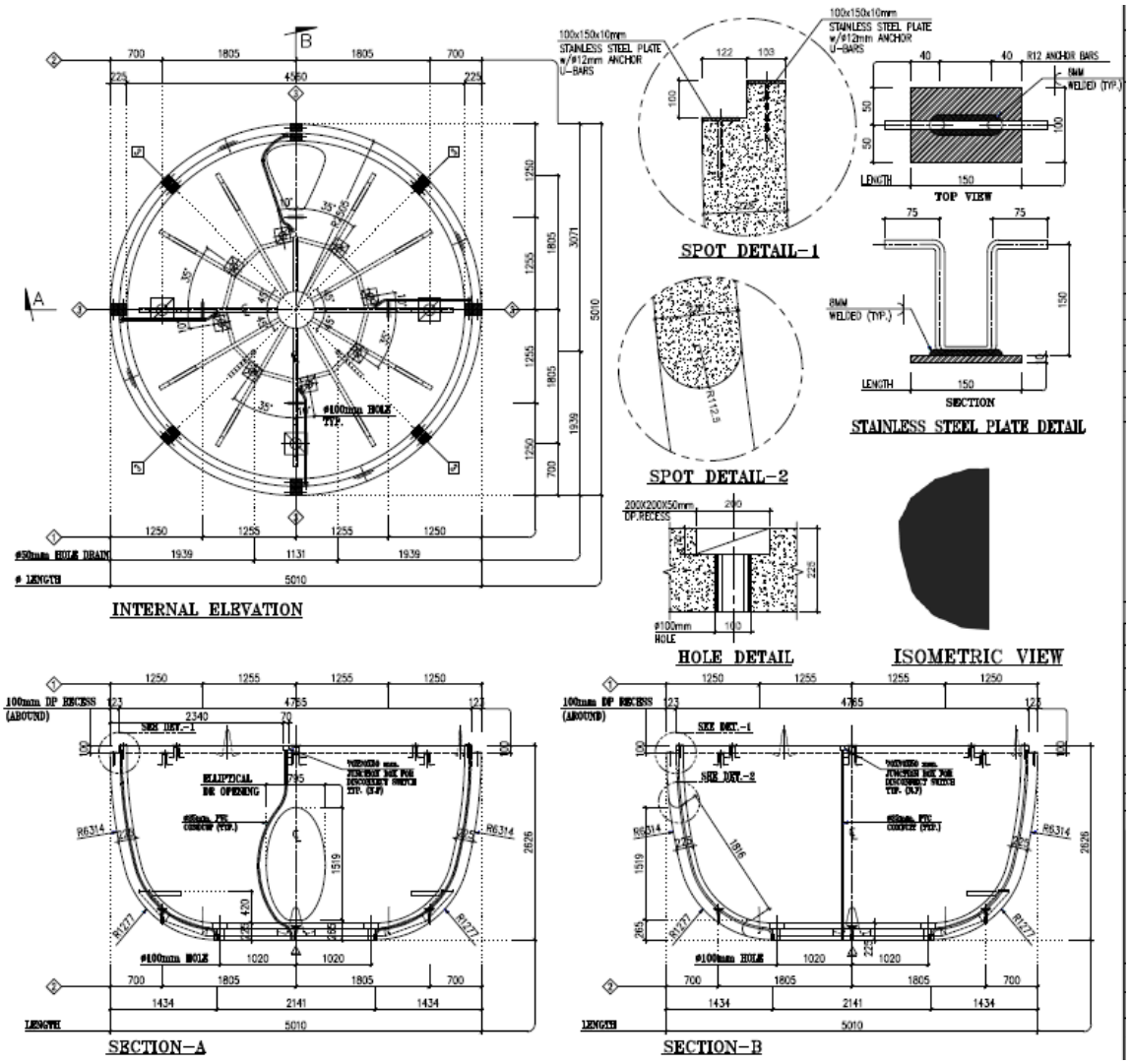
Early Design



Fabrication Drawing – General Arrangement



Fabrication Details 1



Fabrication Details 2

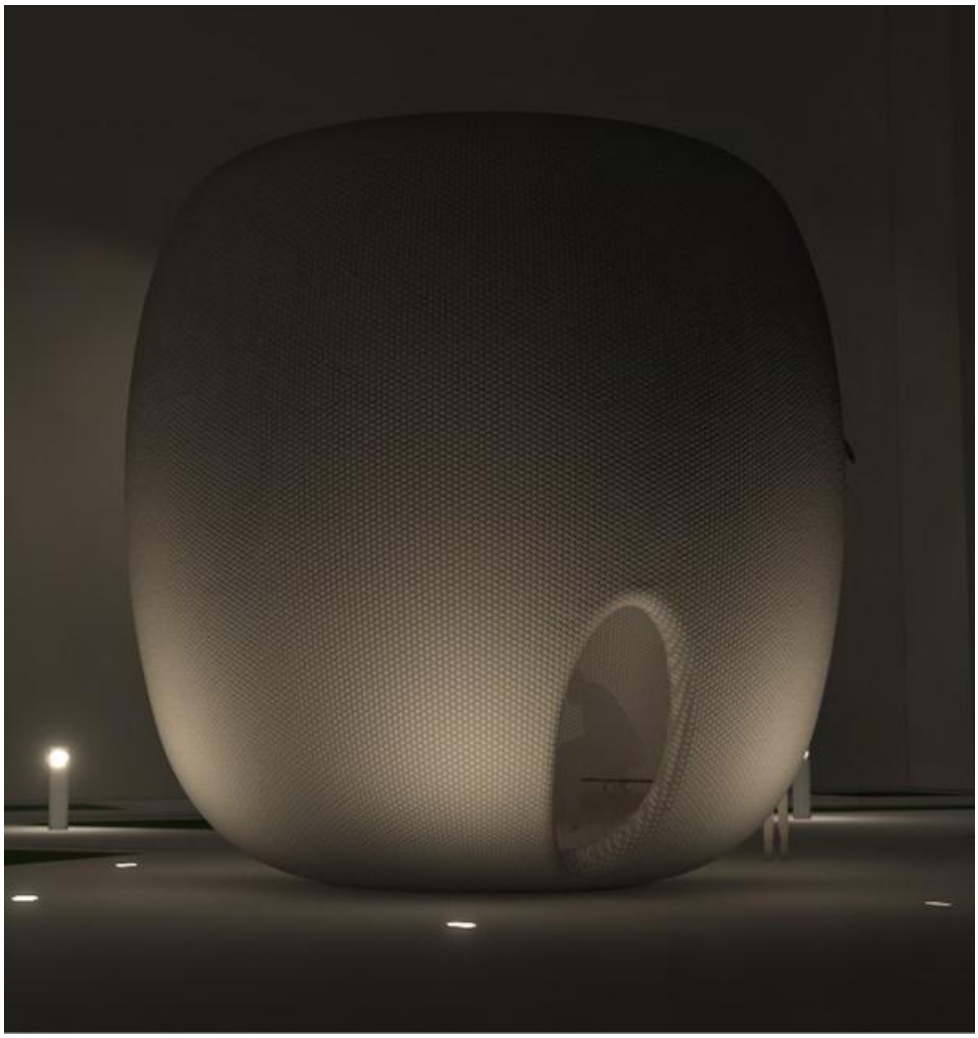


image 17 - modern but acknowledging the traditions and heritage of the region in both concept and detail