



2009

# Paper Tricks

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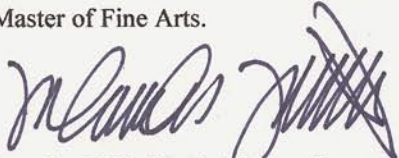
# Paper Tricks



E. Darrell Gardner III

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This is to certify that the thesis/creative project prepared by E. Darrell Gardner III entitled "Paper Tricks" has been approved by his committee as satisfactory completion of the thesis/creative project requirement for the degree of Master of Fine Arts.



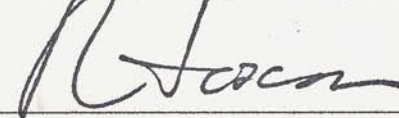
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APRIL 28, 2009

Date

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# Manifesto

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Design can improve every aspect of the way we live. I believe architecture can initiate positive changes through increased functionality and adaptability of the environments in which we live. A former employer explained her advocacy of modern architecture, “you don’t drive a Model T, why do you live in a Williamsburg colonial?” Having studied architecture and design in the years since, I understand her point. A home can and should be a machine for living which actively supports and adapts to the way we live. From the beginning, the automobile industry has embraced innovation and has a reputation for constant change.

In our society we expect constant innovation from some industries but in others we shy away from superior function, preferring antiquated principles to achieve a desired aesthetic. This can be attributed to placement of value. For some, the value of a BMW is based on its superior performance. This superiority has allowed BMW to become a symbol of economic status. To maintain this status, BMW must maintain its reputation for excellence. Unlike luxury automobiles, many architectural forms have value based not on function but historical form. A Doric column conjures images of Greek architecture and thus permanence, power and economic stability. Unlike the stone columns used by the Greeks to support a roof, Doric columns today are strictly ornamental and any structural load is born by an encased structural member. Beyond achieving an aesthetic end, the Doric column serves no function. Unlike in Ancient

Greece, a Doric column today is usually inexpensive and is produced for the masses. In many ways, it’s the same as a wax model of a BMW. The wax model achieves an aesthetic end but is of dubious function.

Consider the safety features employed by the 2009 BMW 7 Series Sedan in the moments just before, during and after a collision. Prior to the collision, the sedan begins to swerve. Electronic Stability Control (ESC) notices a discrepancy between the driver’s intended direction of travel and the vehicle’s actual movement by comparing vehicle rotation, lateral acceleration and individual tire speeds with the steering angle. Instantly, the car applies varying amounts of brake pressure to each wheel and reduces engine power to prevent skidding. The driver realizes this has happened because of a dashboard indicator light. Using sophisticated radar systems, the on-board computer concludes that an impact is inevitable and automatically tightens passenger safety belts, raises head rests, closes the sunroof and windows and confirms passenger weights to ensure safe air bag deployment speeds. During the moments of impact, the on board computer postpones all non-essential computer function, allowing the computer to calculate several thousand times per second the current and predicted angles, locations and forces of collision. Among other things, this information is used to identify and deploy appropriate air-bags as safely as possible. Until the vehicle comes to a stand still, computers are constantly recalculating and predicting direction and force variables to deploy

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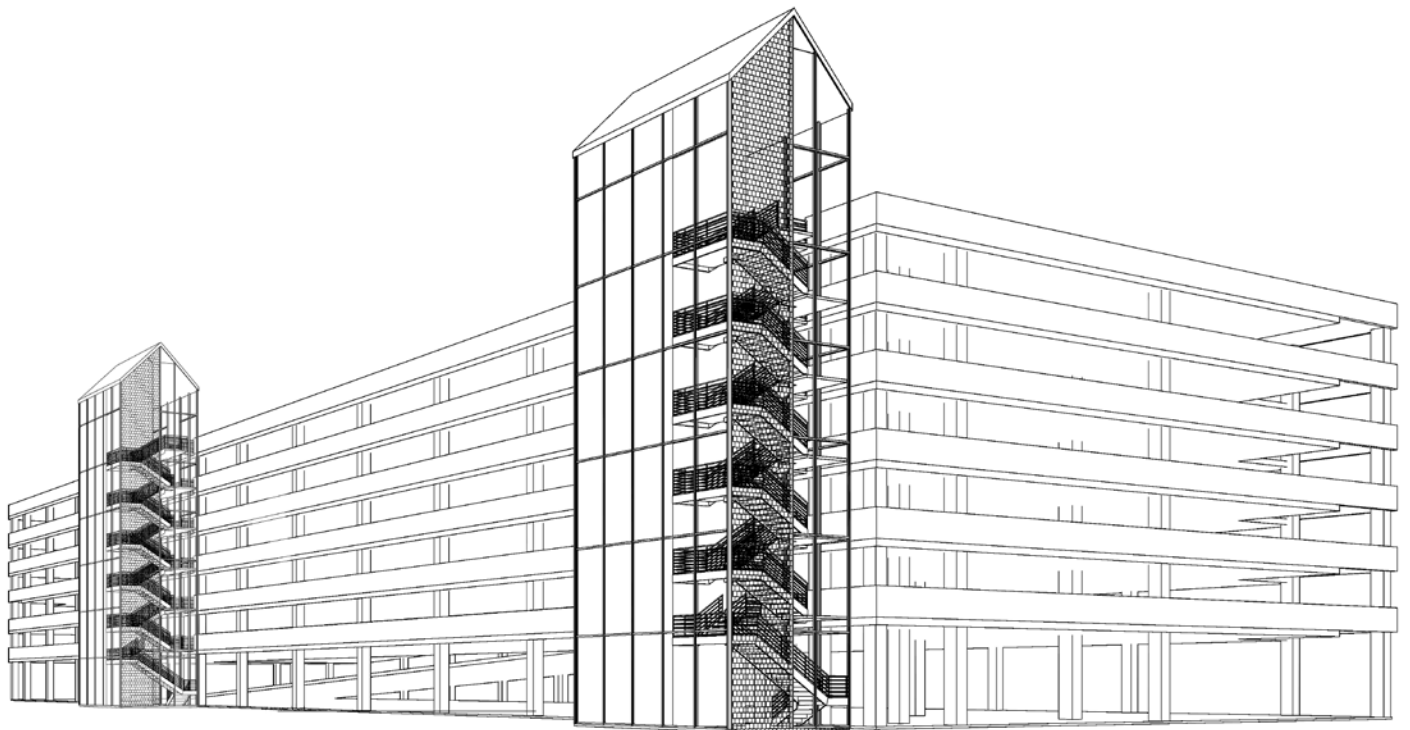
any further airbags. Immediately after the accident, on board computers contact BMW emergency assistance, report the accident and provide details about the extent of damage. Using GPS, proper authorities are notified of the car's location.

The original Benz Patent Motorwagen of 1885 could transport passengers from point A to point B without a horse. A current model BMW is fun to drive, exhibits industry-leading styling, comforts and accessories that satisfy even the most demanding consumer. When necessary, this same car can also react to extreme situations and protect the lives of its occupants. Despite the obvious benefits of thoughtful design and constant innovation many people prefer to spend their lives in the architectural equivalent of a Model T over a BMW. If architectural design followed the innovation trajectory set by the modern automobile, the positive influences on society would be endless.

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# MCV Campus Parking Deck

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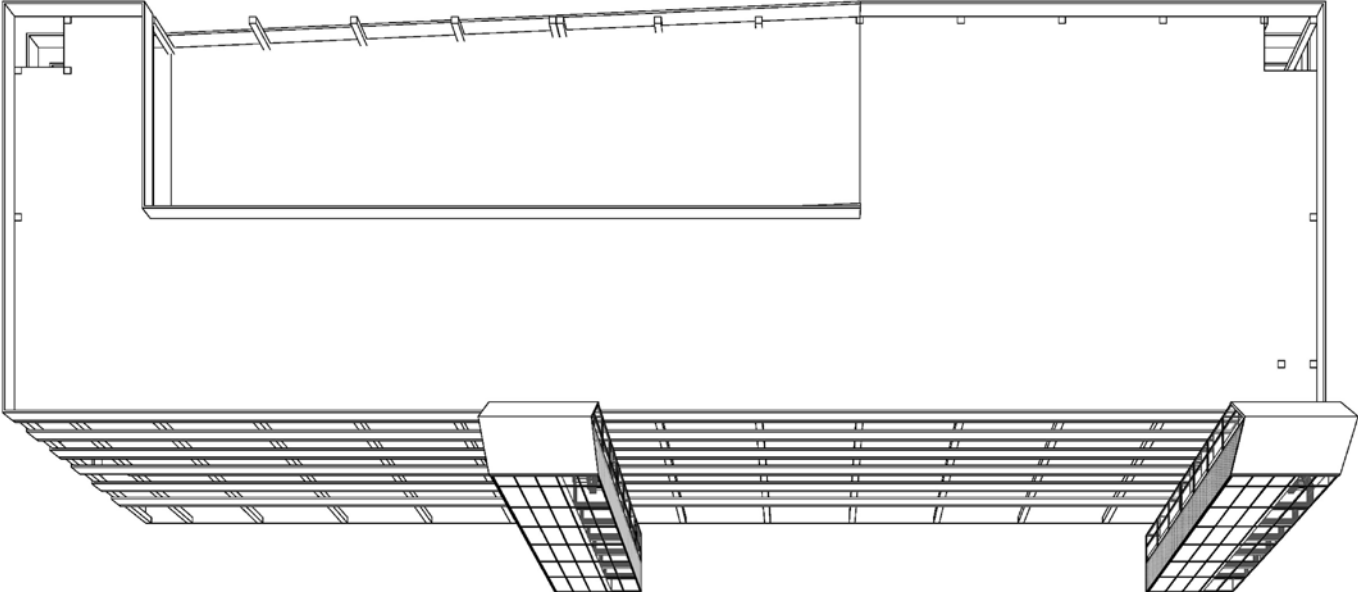
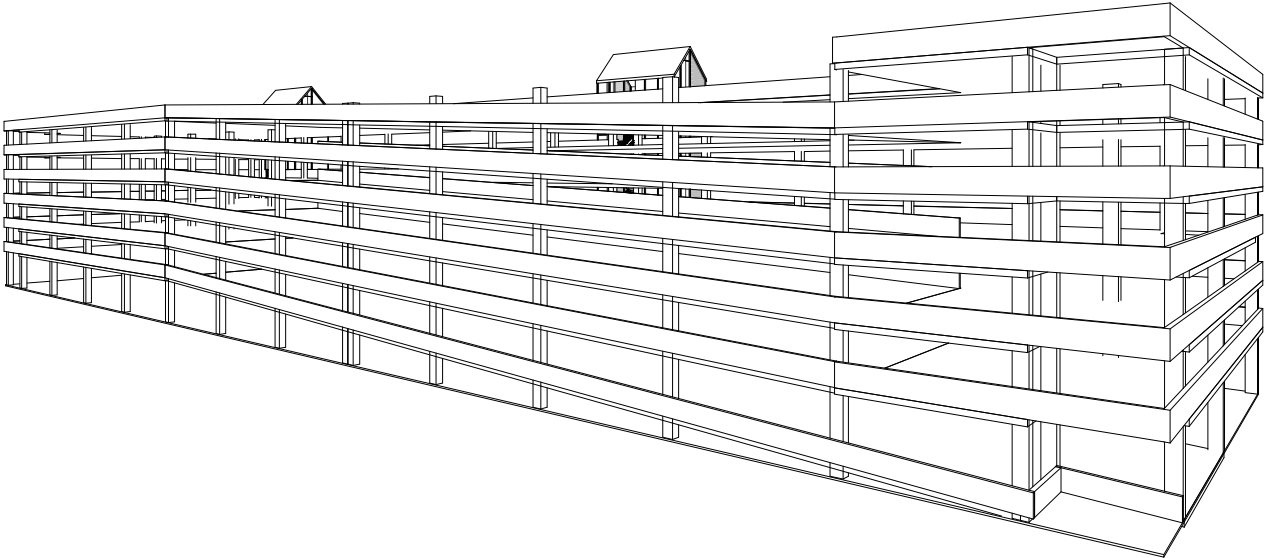
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south west perspective

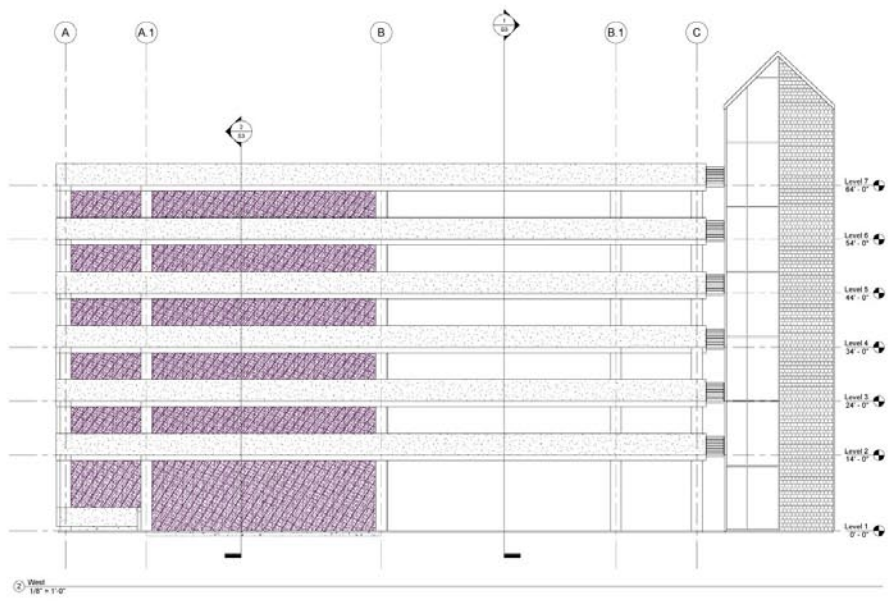
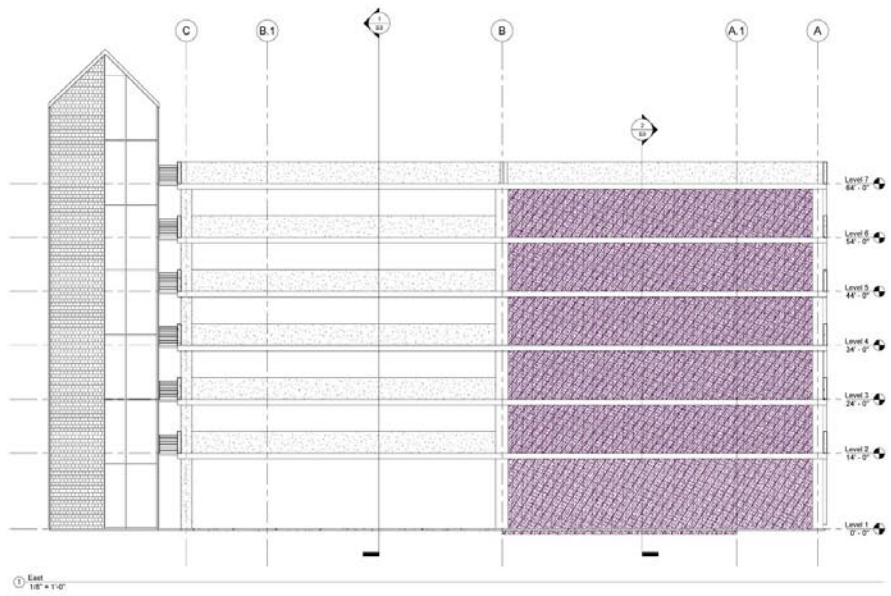


site location

# MCV Campus Parking Deck

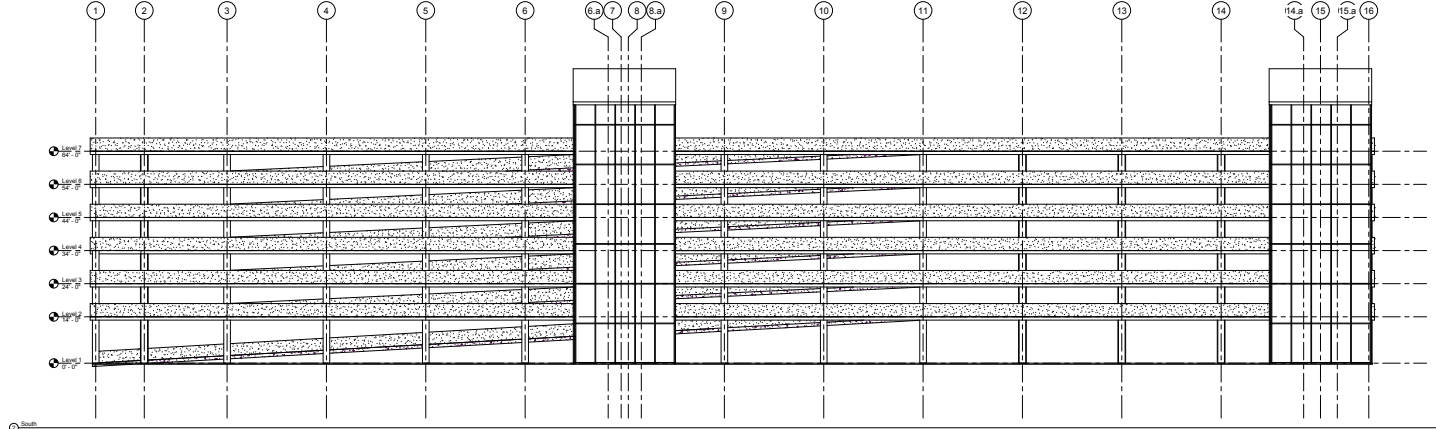
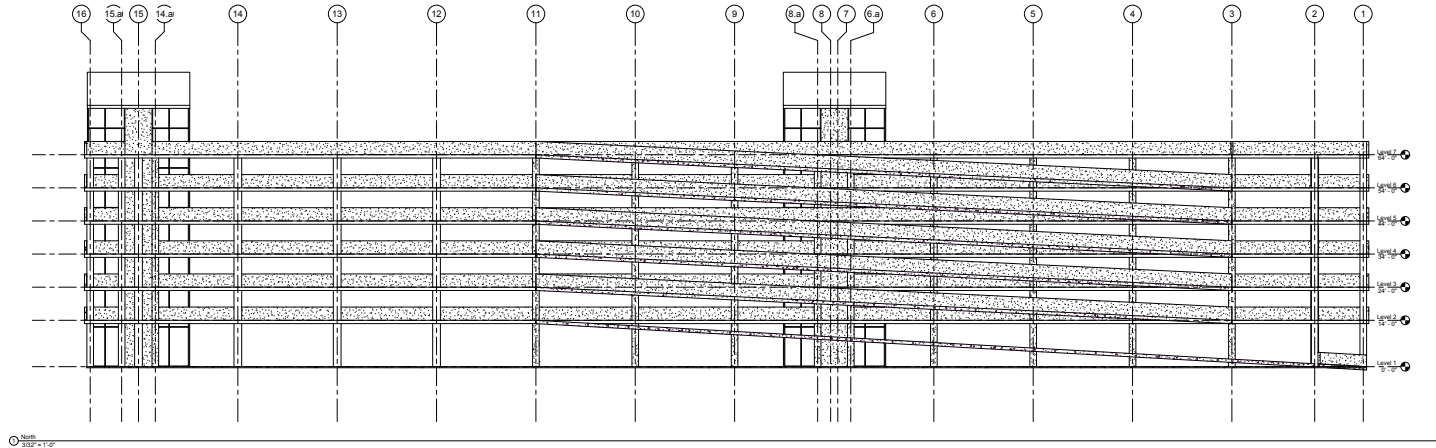


north east perspective (top)  
areal perspective (bottom)



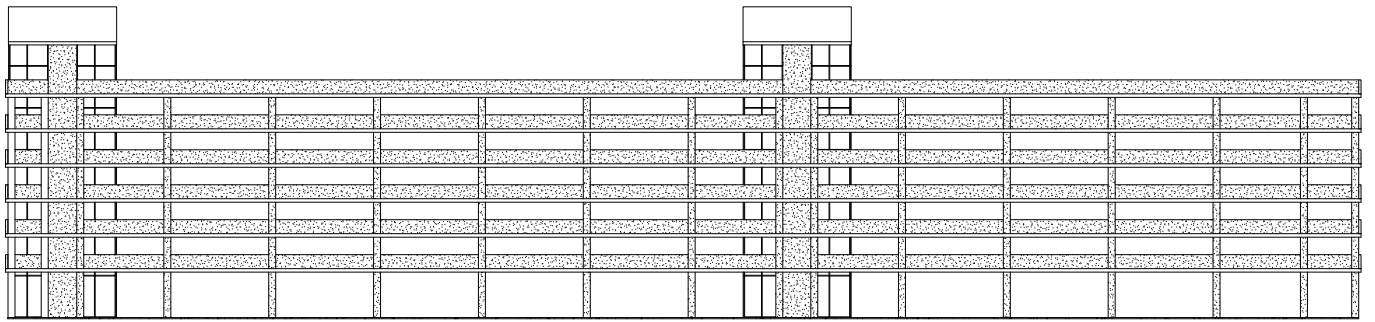
north and south elevations

# MCV Campus Parking Deck

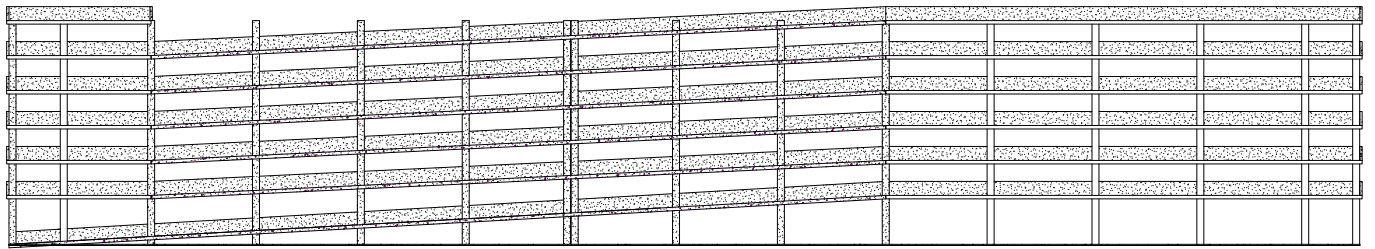


east and west elevations





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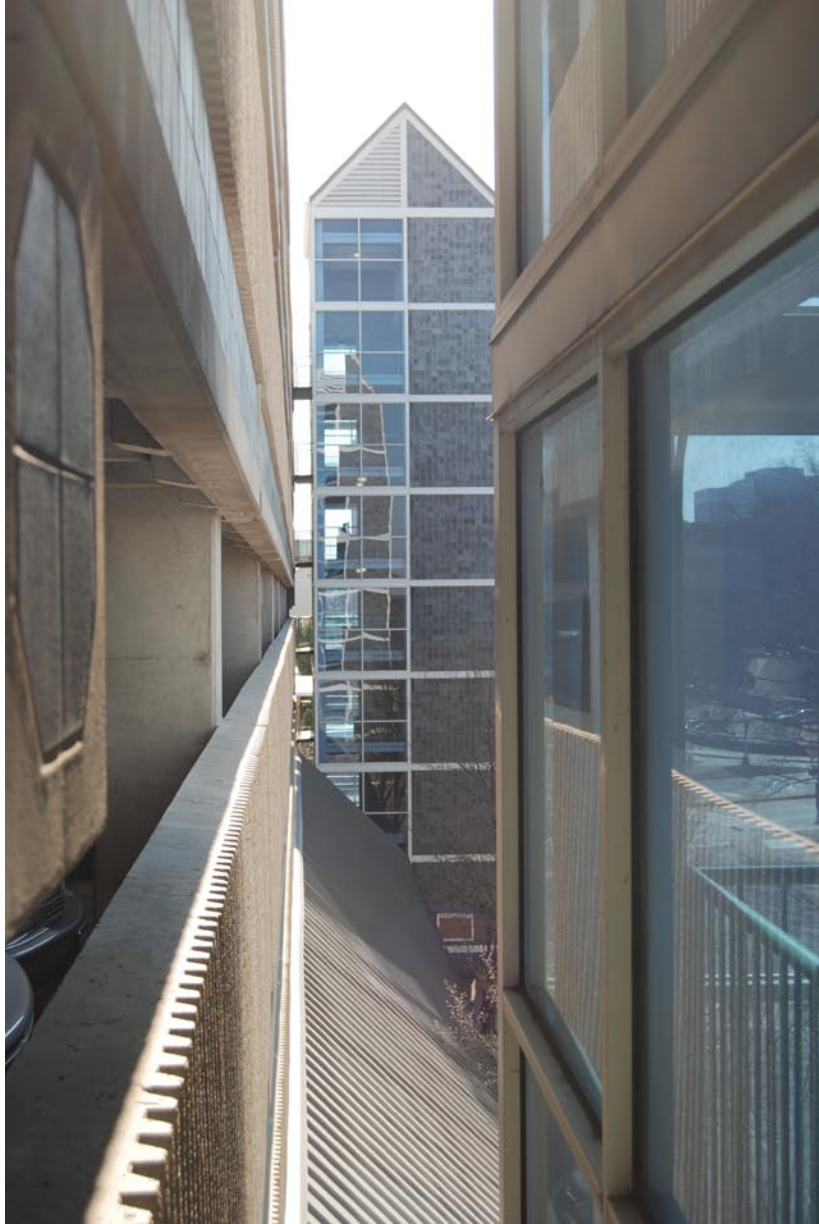
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sections

# MCV Campus Parking Deck





# MCV Campus Parking Deck



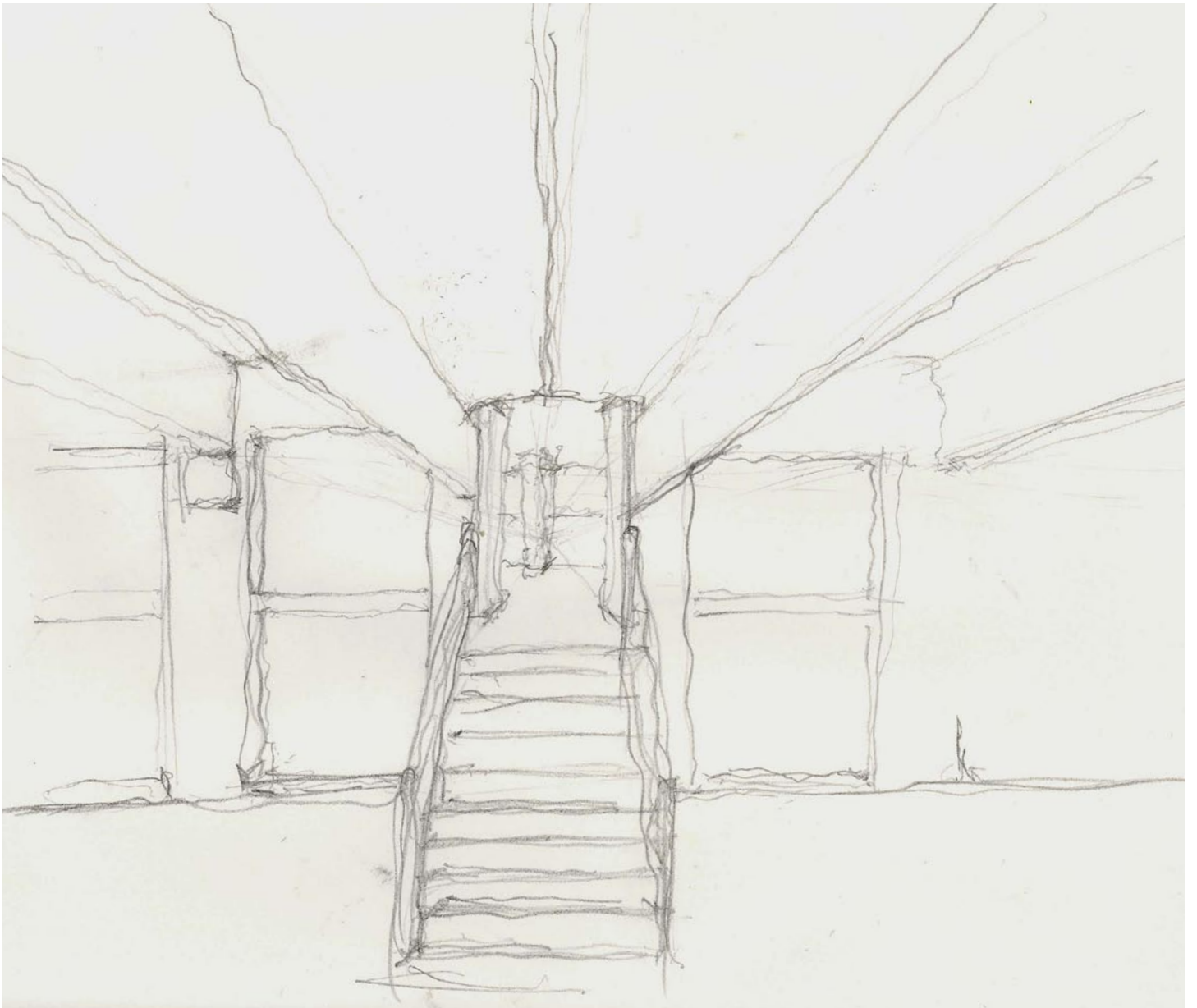
interior sketch



interior sketch



# MCV Campus Parking Deck



interior sketch



interior sketch

# Additional Parking Structure

2101 East Cary Street, Richmond, VA

Though not the primary structure under investigation, understanding the ways in which this structure com-

pares and contrasts provides valuable insight into universal application of a final design.



north east perspective





south west perspective

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# Research Case Studies

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# Chris Bangle

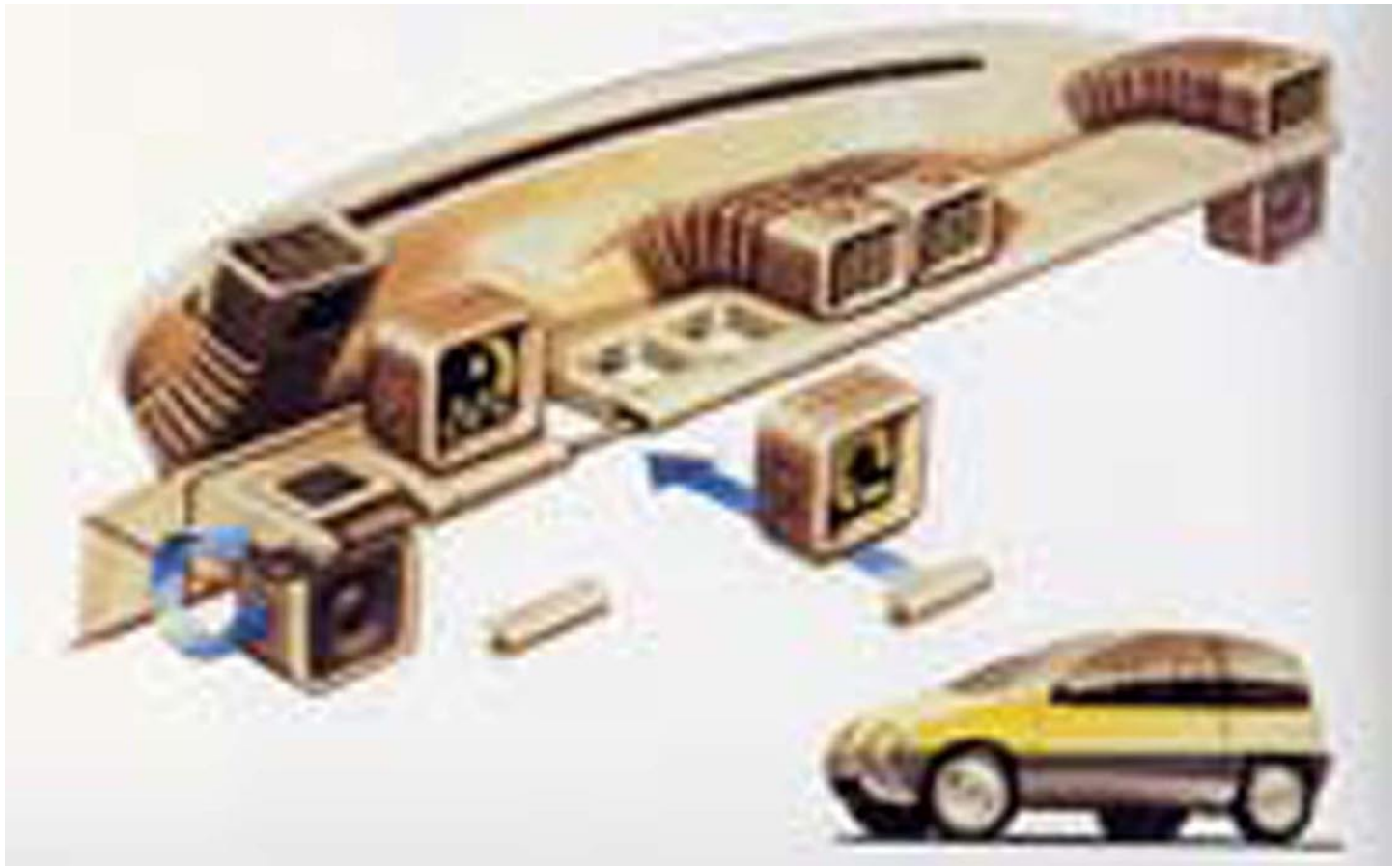
- create with your hands - to truly understand something, especially a concept or idea, one must have the sensory experience of creation
  - know all there is to know about something, and then redesign it from scratch
  - punctuated equilibrium is necessary in designing anything, especially when technology is part of the design process
- 



Chris Bangle working with other designers on a clay mock up

- “take notes on the world” - Chris Bangle
- look for cross segmental solutions
- the best designs create emotional connections with those who experience them

- customizing / personalization is the best way to create emotional connections



personalized dashboard designed by Chris Bangle for the 1983 Opel Junior concept car

# GINA Light Visionary Concept

- Geometry and Function in “N” Adaptations
  - acted as a liaison between designers at BMW and the outlandishly conceptual
  - attempts to redefine the traditional relationship between a car and the owner
  - car changes to meet the need of the driver and passenger
- 



- demonstrates the flexibility of a fabric exterior skin



- fabric exterior skin serves to point out the unnecessary metal skin found on all cars today
- fabric skin is lighter, can be customized easily, requires far fewer resources to produce
- can be installed in approximately 2 hours.



# F.A.T. - Fashion Architecture Taste

- bring architecture to the layman
- blur the line between art and architecture
- always include humor... everyone enjoys something funny
- communication guides architecture, not function
- design decisions can be common sense



Kessler Kramer office, London





Sint Lucas Art Academy at Boxtel, Netherlands

# Physiological vs. Psychological Environments

- brings to light the blurry line between physiological environments and psychological manipulation



- a space designed by Decosterd & Rahm in which inaudible frequencies cause the human body to produce melatonin and thus become relaxed and sleepy.



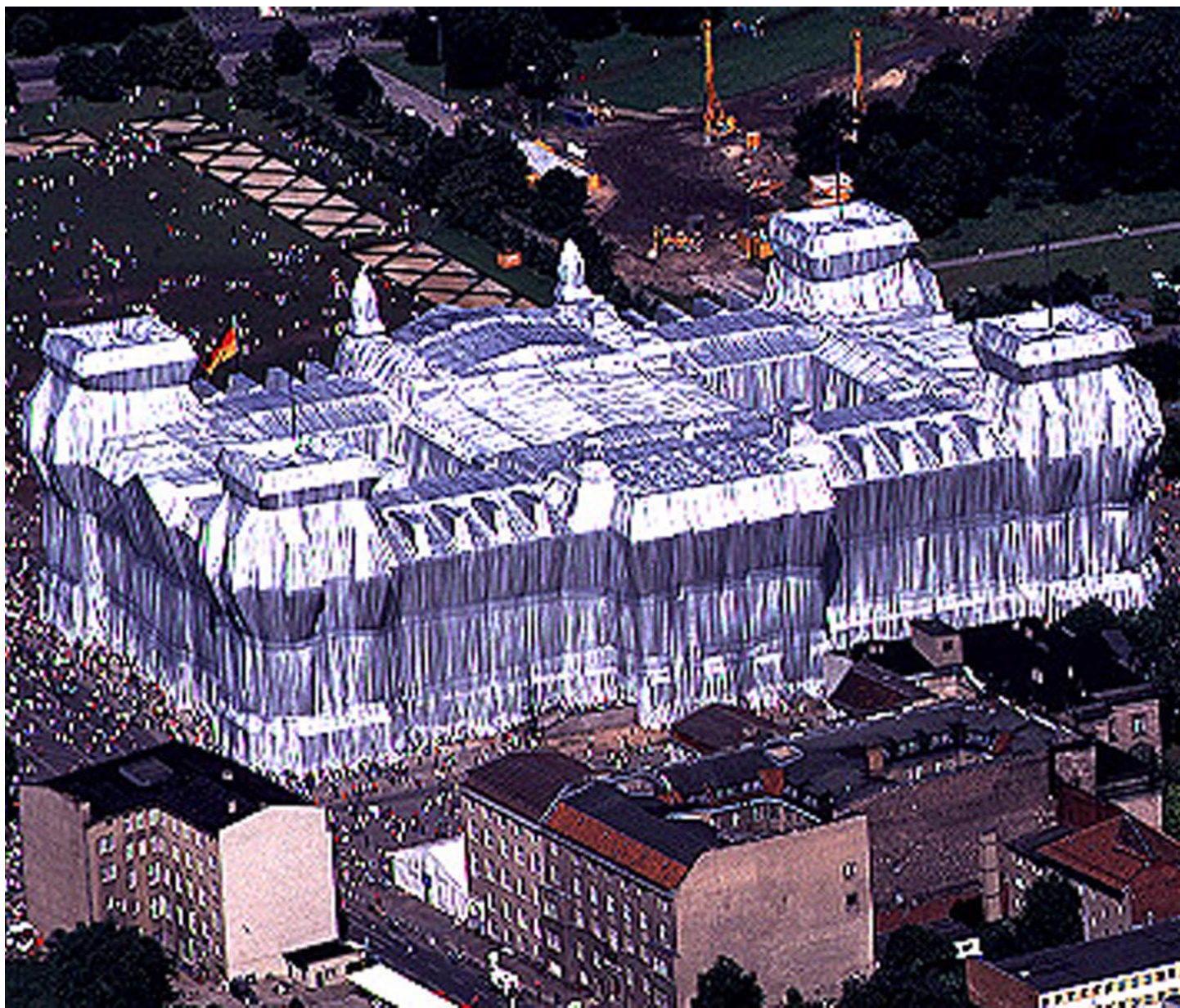


- the Venetian Hotel and Casino Las Vegas
- exemplifies the ways in which casinos use techniques such as environmental manipulation, inhabitant control and operant conditioning to direct guest actions and boost profits



# Christo & Jeanne-Claude

- artists deny importance of works beyond visual and emotional or otherwise situational impact, ie. no cultural or political undertones
- scale and presence of works commands a response,



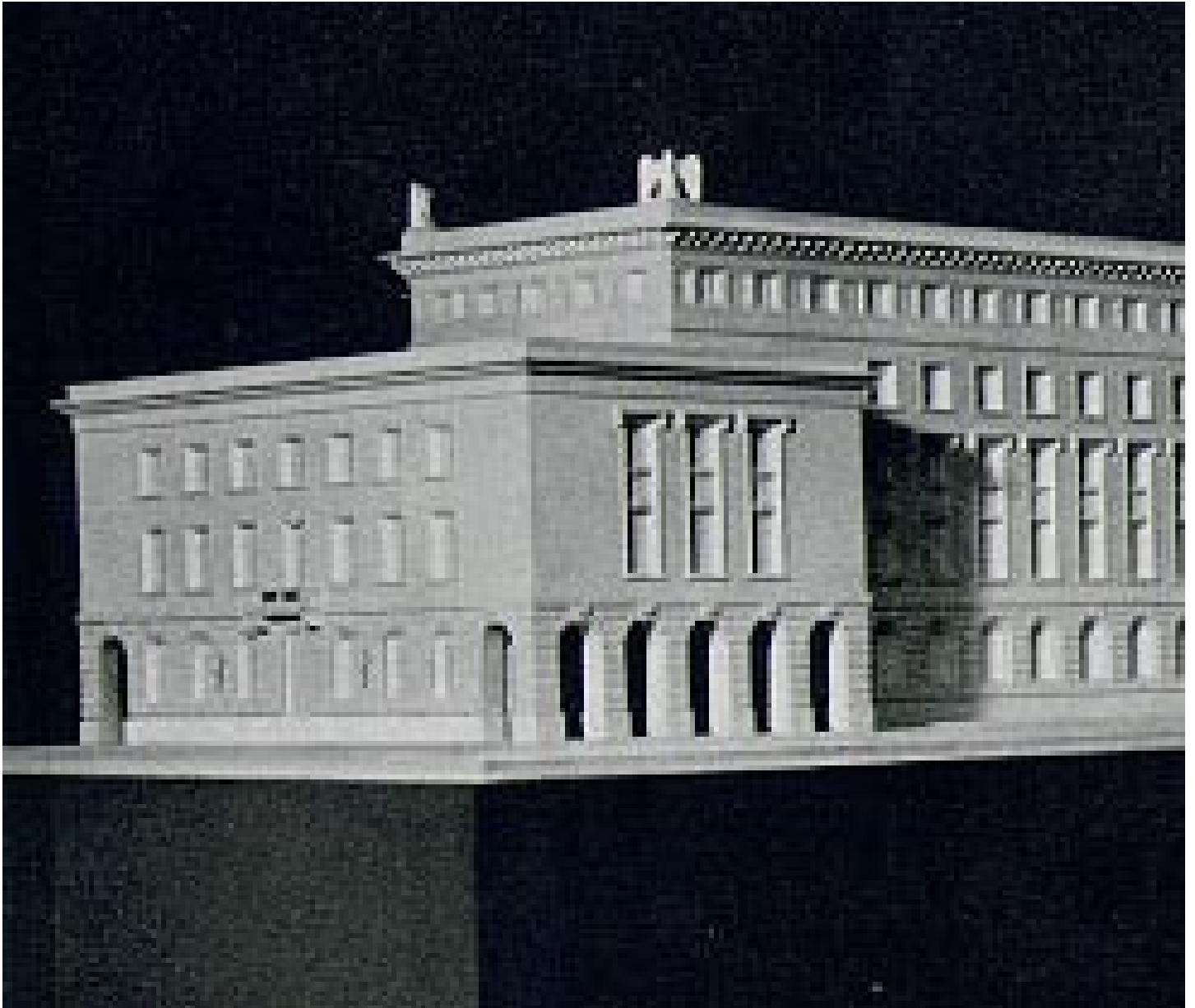
Reishtag, Berlin, Germany



Biscayne Bay Islands, Miami, Florida, USA

# Architecture of the Third Reich

- drastic changes imposed on some certain areas of life require a strong associations to the familiar in others
- Furer imposed moral and ideological changes are counter balanced by governmental facades alluding to classical architecture and thus strength, stability and permanence
- associations with classical architectural styles lends

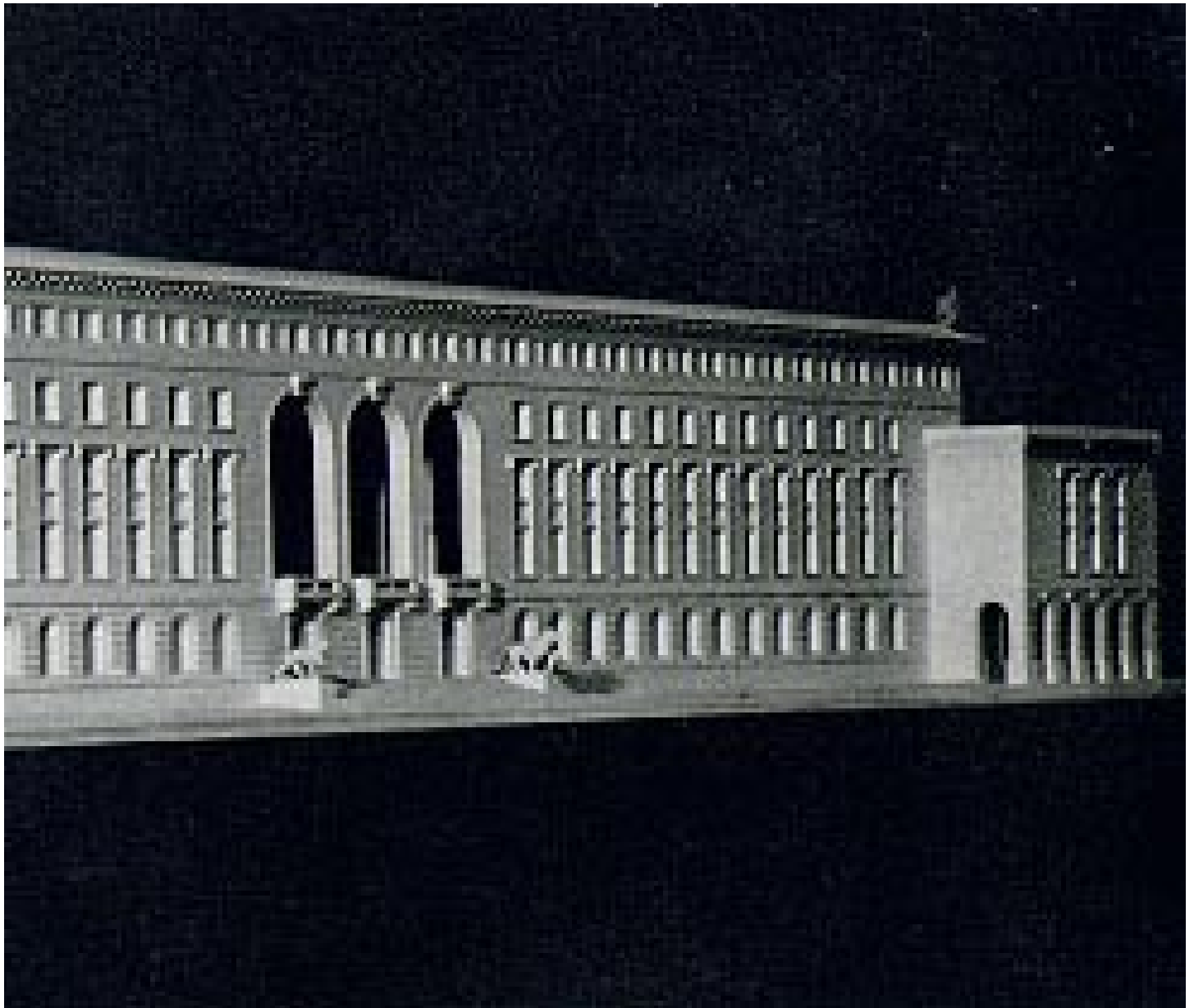


Nazi Chancellory, Berlin, Germany (destroyed)

an aura of rich history and ritual

- example of architecture as a tool for operant conditioning
- architecture can steer human responses because of

conscious and subconscious visual associations





# WRNS Studio Architects

- facade reflects surrounding area without mimicking historical precedent
- exterior stairs celebrate transition from motorist to pedestrian
- material, texture and shape to draw correlation to existing environment
- mask dominant size of structure without a faux facade



Petaluma, CA public parking garage



- structures serve as a backdrop for other important architectural elements
- inclusion of visual rest in sync with breaks with repetition
- importance of keeping a structure true to purpose ie. allow the bones of the parking structure to show



Lake Tahoe, CA public parking garage

# Compact Living Designs / Concepts

- radically rethinks ways people live, function and the space necessary to accomplish daily tasks
- forces reconsideration of that which actually provides comfort and function
- dispose of all elements present due to tradition or nostalgia
- consideration of space in cubic feet not square feet



- interior of the Micro-Compact Home.
- from the kitchen, vista includes living and dining areas with half of the bed folded up above the window



Matroshka, designed by Mid Sweden University industrial design students

# AIA 10 Principles for Livable Communities

The graphic features ten numbered principles arranged in a grid-like fashion. Each principle is represented by a large white number on a green background, with a small photograph and a text box. The numbers are: 1 (top left), 2 (top middle), 3 (middle left), 4 (top right), 5 (middle middle), 6 (middle right), 7 (bottom left), 8 (bottom middle), 9 (bottom middle), and 10 (bottom right). The photographs show various urban scenes: a pedestrian-friendly street, a market stall, a busy sidewalk with a bicycle, a brick building entrance, a street with a bicycle lane, a public square with people sitting on steps, a city square with a fountain, a park with a large tree, a hillside with a building, and a modern building with a large sculpture.

- 1 Design on a Human Scale**  
Compact, pedestrian-friendly communities allow residents to walk to shops, services, cultural resources, and jobs and can reduce traffic congestion and benefit people's health.
- 2 Provide Choices**  
People want variety in housing, shopping, recreation, transportation, and employment. Variety creates lively neighborhoods and accommodates residents in different stages of their lives.
- 3 Encourage Mixed-Use Development**  
Integrating different land uses and varied building types creates vibrant, pedestrian-friendly, and diverse communities.
- 4 Preserve Urban Centers**  
Restoring, revitalizing, and adding urban centers takes advantage of existing streets, services, and buildings and avoids the need for new infrastructure. This helps to curb sprawl and promotes stability for city neighborhoods.
- 5 Vary Transportation Options**  
Giving people the option of walking, biking, and using public transit in addition to driving reduces traffic congestion, protects the environment, and encourages crucial activity.
- 6 Build Vibrant Public Spaces**  
Citizens need welcoming, well-defined public places to stimulate face-to-face interaction, collectively celebrate and mourn, encourage civic participation, admire public art, and gather for public events.
- 7 Create a Neighborhood Identity**  
A "sense of place" gives neighborhoods a unique character, enhances the walking environment, and creates pride in the community.
- 8 Protect Environmental Resources**  
A well-designed balance of nature and development preserves natural systems, protects waterways from pollution, reduces air pollution, and protects property values.
- 9 Conserve Landscapes**  
Open space, farms, and wildlife habitat are essential for environmental, recreational, and cultural reasons.
- 10 Design Matters**  
Design excellence is the foundation of successful and healthy communities.

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# Prefabricated / Quick Fabrication Structures

- materials and technology allow fast and easy setup.
- structure has value through interpretation into more cost effective, mass produced structures
- structures force a reconsideration of what people really need from a shelter
- what are the actual physical and emotional needs met by current disaster housing



NASA developed ballute technology for lunar habitat module

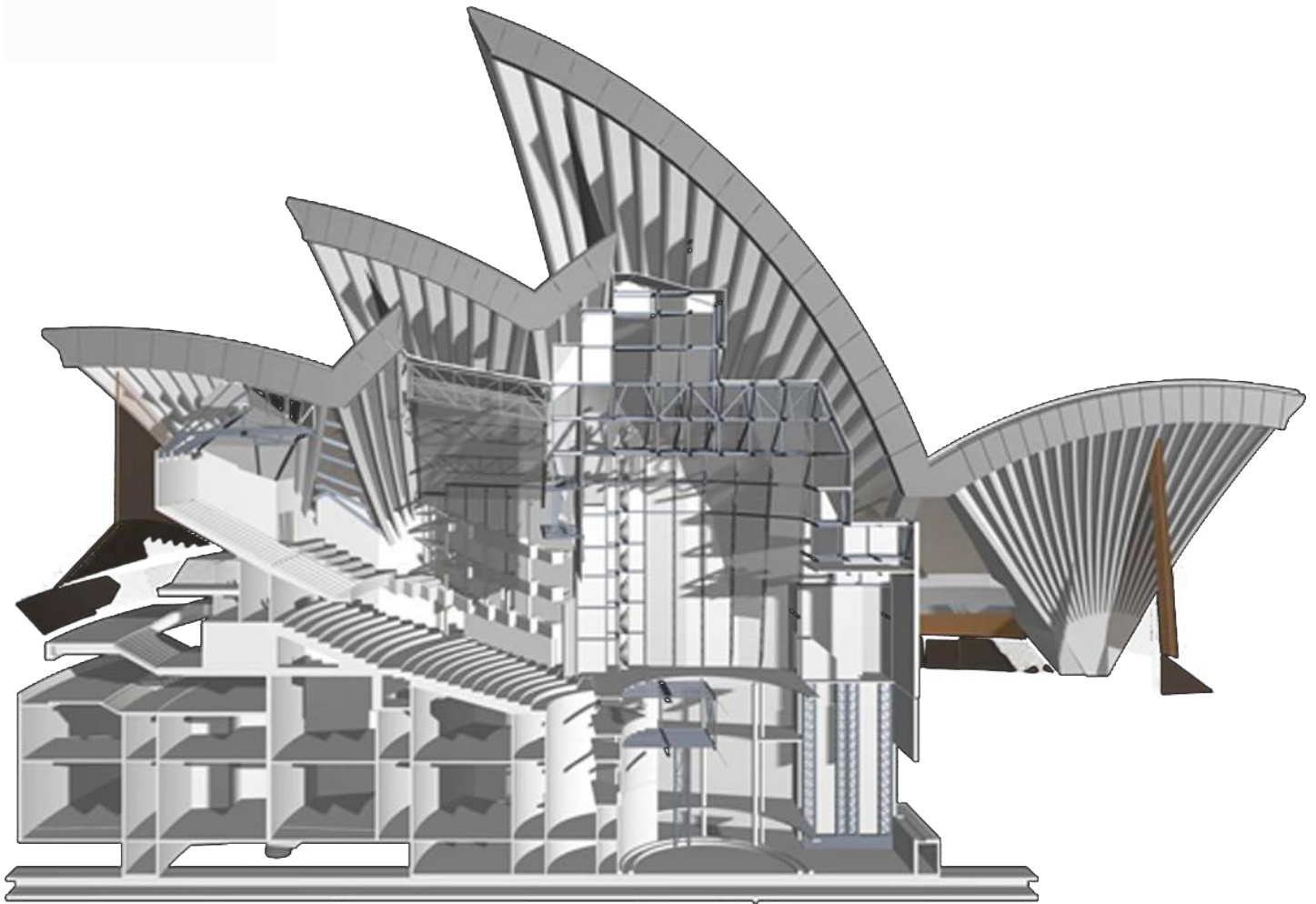




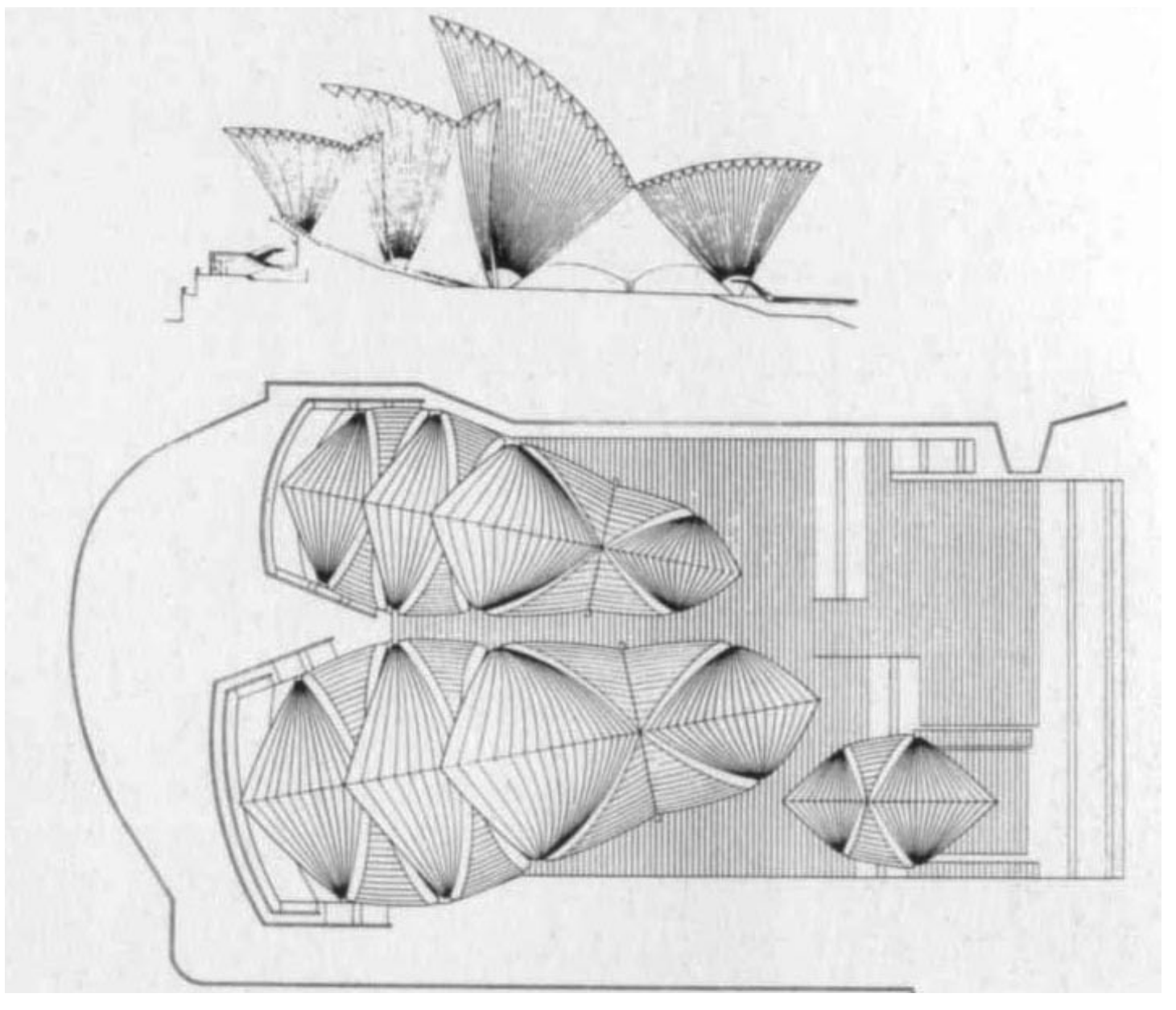
Katrina Cottage

# Jorn Utzon - Sydney Opera House

- prefabricated units
  - created from a single volumetric whole
  - development of architecture that indicates function
  - use of an orange peel to develop the final solution to
- engineering wing design
  - architecture that hides aspects dictated by function to reveal uninhibited sculptural forms
- 

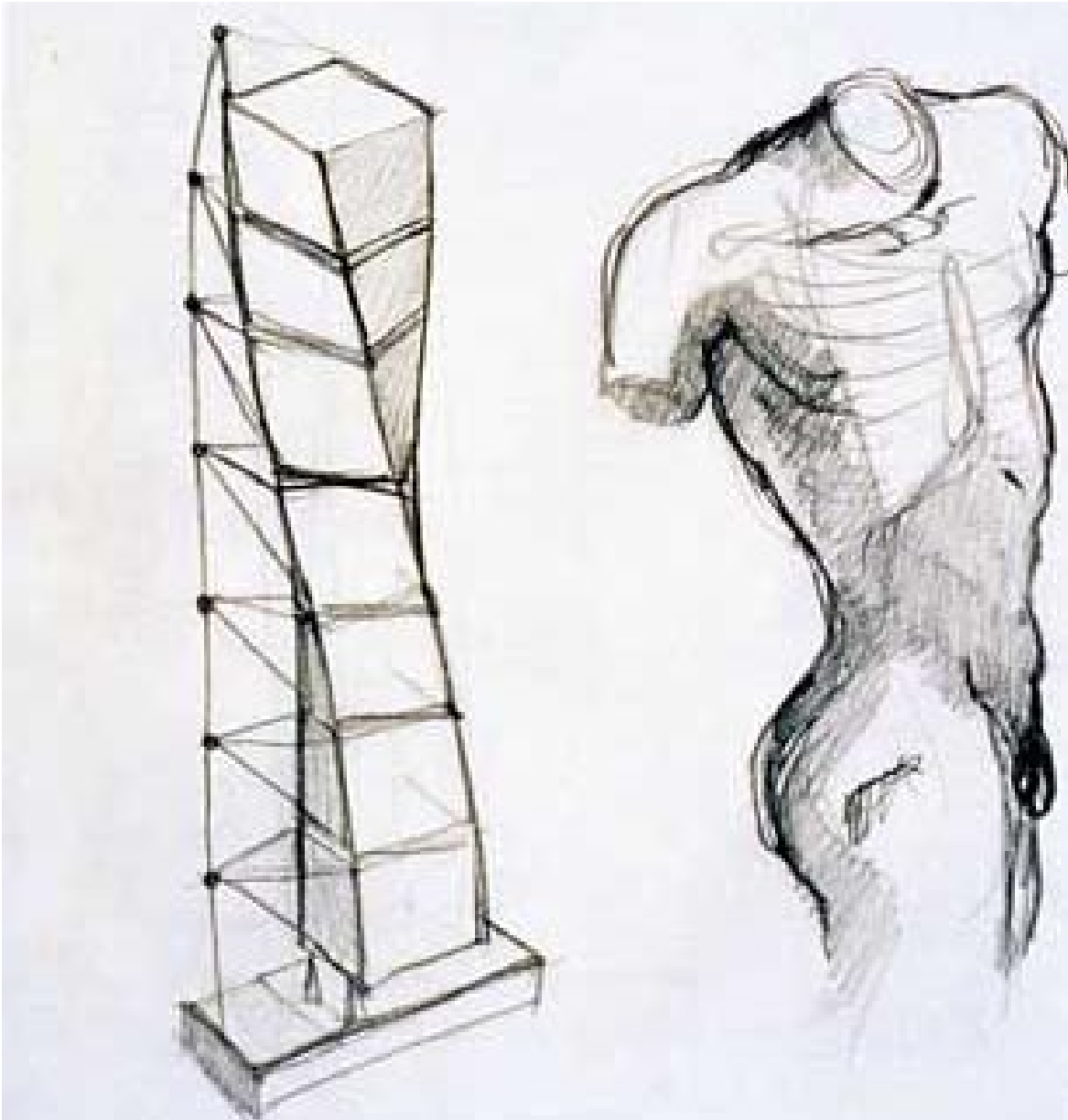






# Santiago Calatrava

- design inspired by nature
- forms in nature, especially the human figure, drives design
- dynamic architecture incorporates perceived and actual movement
- evolving patterns throughout works to create rhythm and harmony



Conceptual sketches and studies of human motion.



Turning Torso, Milau, Sweden

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# Research Conclusions

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# Pattern

- all people crave pattern and repetition
- we look for ways to connect everything to some part of our lives to repetition
- people places and things with the ability to morph to fit the wants and needs of an individual are universally more attractive
- pattern is recognized subconsciously like an infant finds comfort in the repetitious movement of rocking



## I. Conscious Patterns of Formal Identity

- Patterns of Inherent Formal Principle
- Formally Associative Patterns

- visual comfort in balance, symmetry and predictability
- predictably unpredictable
- people look for partial deviation from repetition



## II. Subconsciously Associative Form

- Formally Based Associations
- Formally Guided Perception



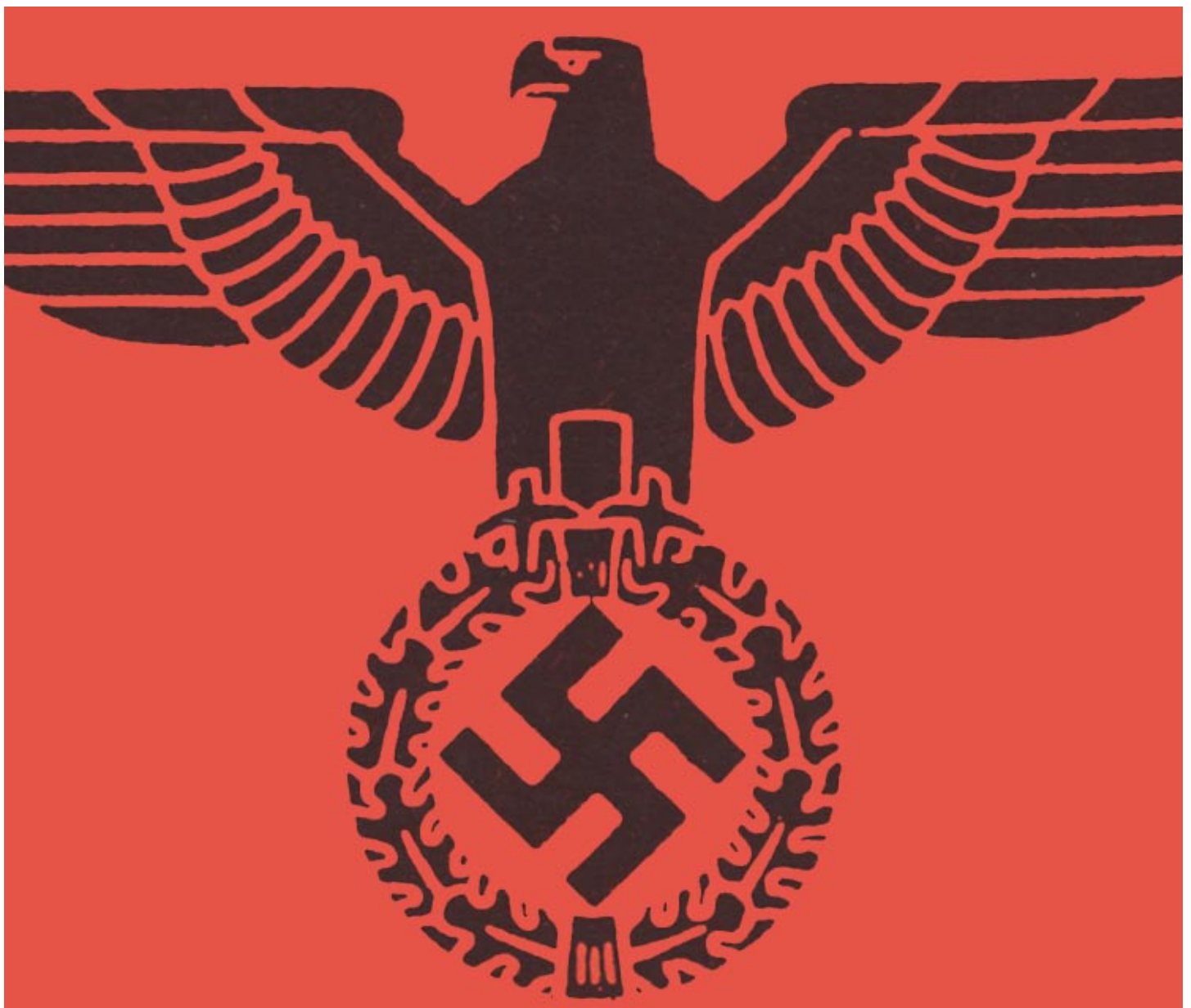
# Conscious Patterns of Formal Identity



- patterns that are experienced and understood consciously
- basic surface value elements creating pattern as well as elements that trigger distinct patterns of associations

## 1. Patterns of Inherent Formal Principle

- Balance
- Symmetry
- Rhythm
- Scale



## 2. Formally Associative Patterns

- elements evoking a predictable patterned response based on form
  - Product / corporate branding
  - Iconic forms - cross, pumpkin, etc.

# Subconsciously Associative Form

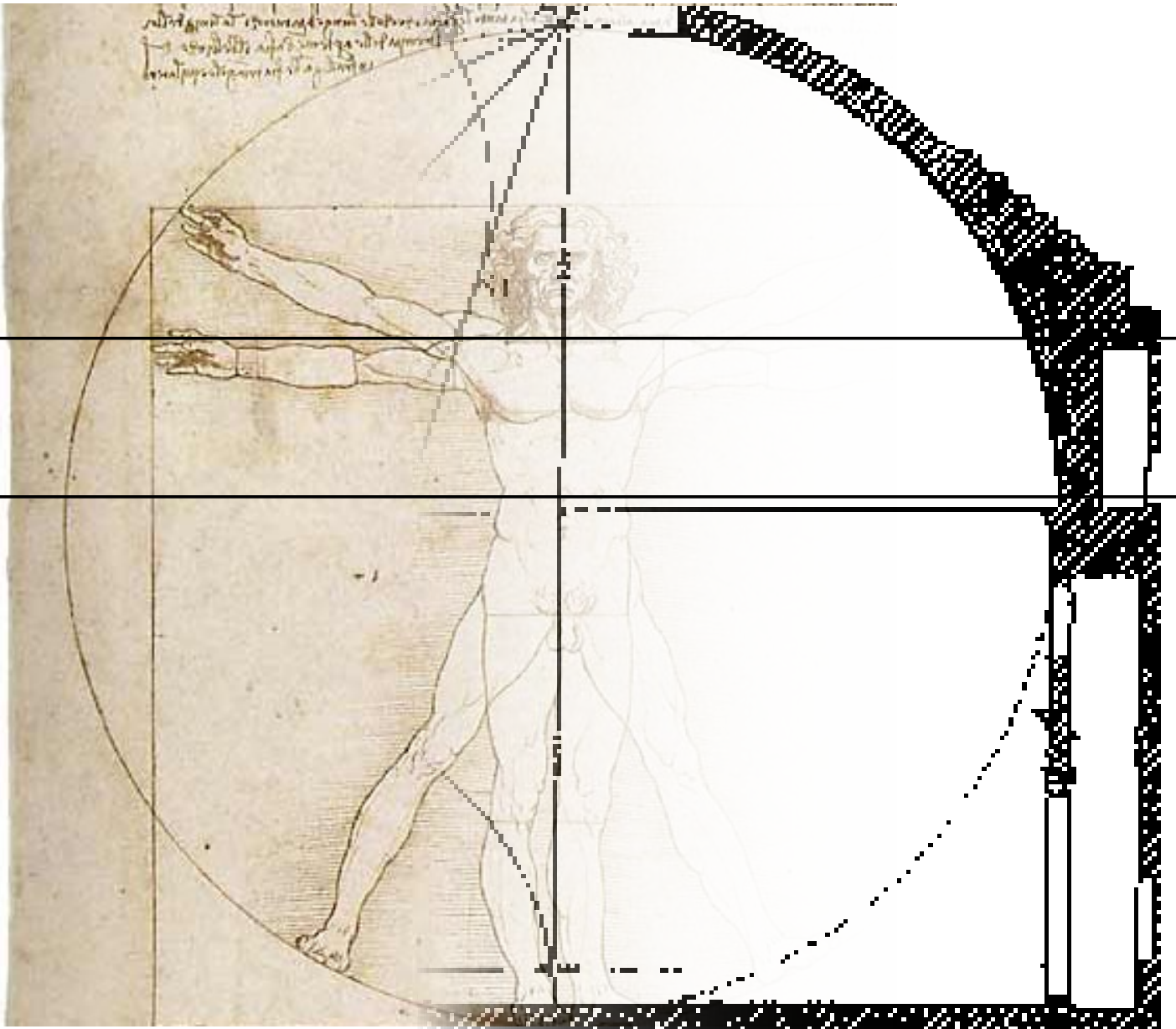
- patterns direct forms which evoke predictable responses typically without the conscious understanding of those who experience them

- ex. tendency of humans and animals to prefer forms similar to their own



- Bowerbirds collect trash, feathers, berries, flowers and anything similar to its color to attract a mate





- humans have long been obsessed with the Golden Proportion.
- most don't understand why some designs seem more appealing than others
- humans subconsciously and egocentrically are drawn to their own form

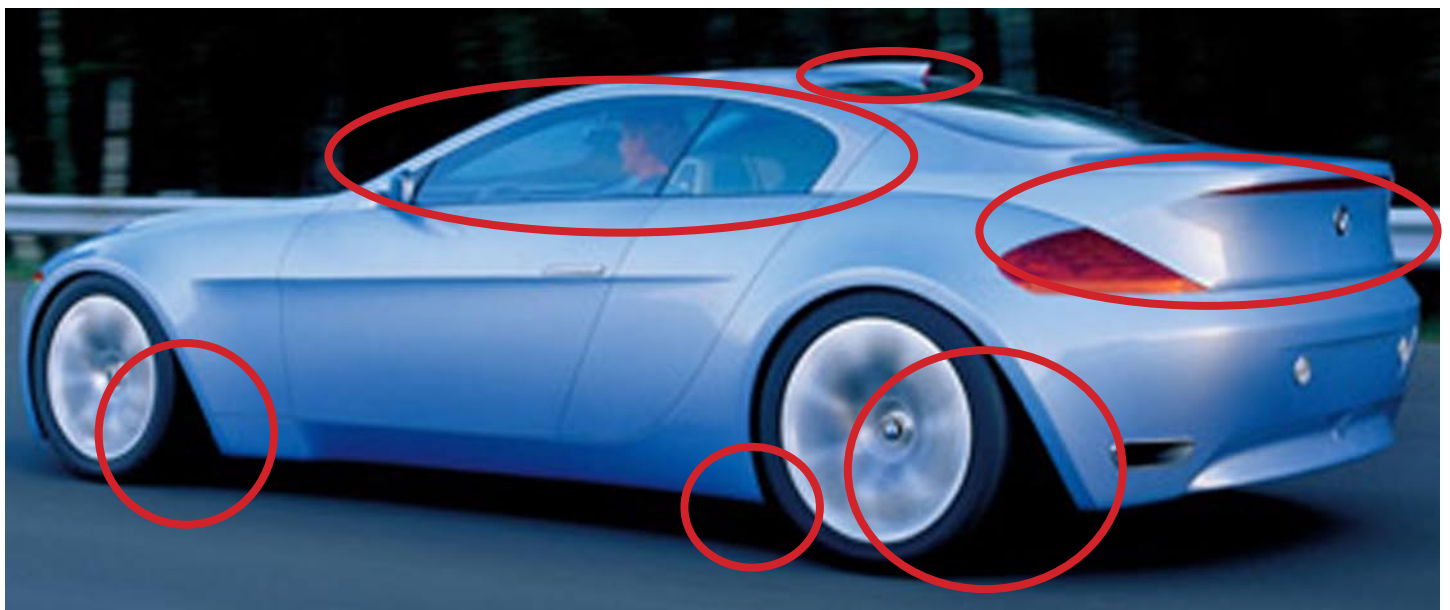
# Subconsciously Associative Form

- based on experiences, events and cultural influences of a society
- movement is associated with excitement and danger

- subconscious associations cause these forms to be visually stimulating.



Santiago Calatrava's Turning Torso alludes to instability and danger



- BMW achieve a feeling of motion with this 2001 concept car
- body styling gives a sense of the weight and body being thrown backwards due to extreme force



# Common Associations based on Form

- functions of daily life pass on underlying characteristics to structural form
- form is based on function so deviation from the standard is rare

- formal qualities of these structures have strong ties to the rituals performed inside them



- World Trade Center twin towers were symbolic of U.S. political and financial world dominance
- tall glass box represents big business and is associated with impersonal uniform office spaces

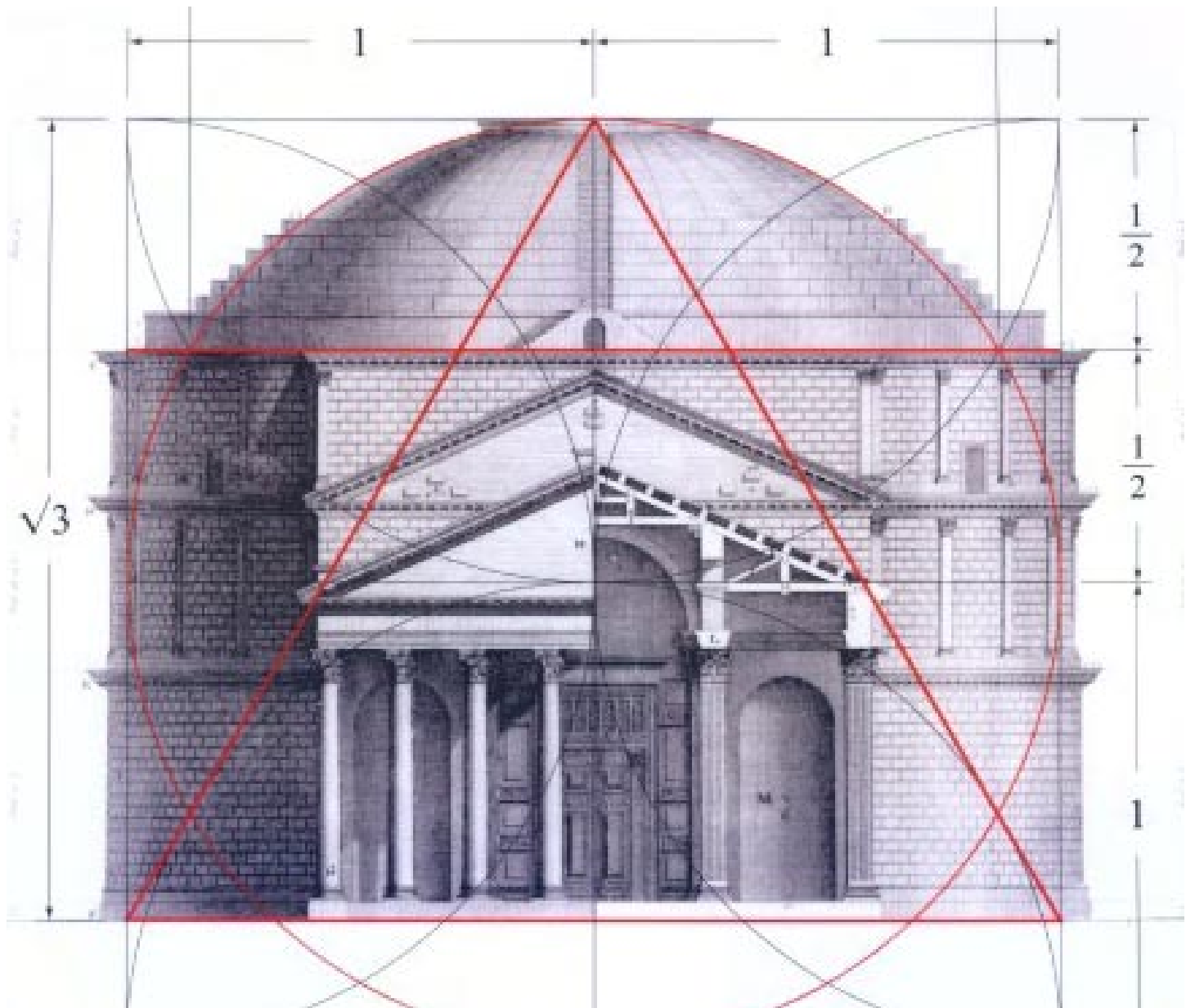


- residential structures respond to the glass box to present a sense of that which is customized
- designs try to create unique and sometimes dubious visual associations, ie. Aqua Tower in Chicago (left)

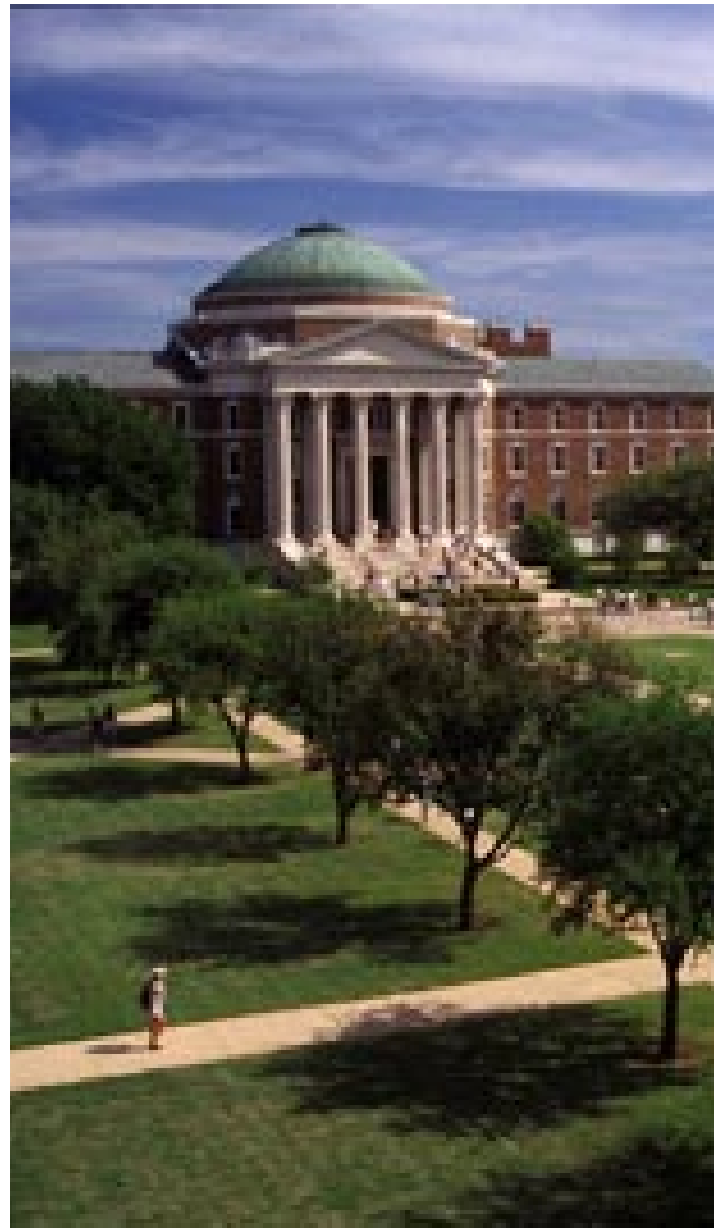
# Form that Guides Perception

• This concept can best be understood via the relationship between a spin-off of a television show and the original. The Spin off is legitimized for a time by the association with the original but eventually is

legitimized in it's own rite.



Pantheon Rome, Italy



University of Virginia Rotunda Charlottesville, VA  
Dallas Hall, Southern Methodist University, Dallas, TX

(left) [media-2.web.britannica.com](http://media-2.web.britannica.com) (right) [people.smu.edu](http://people.smu.edu)



# Architecture Guides Perception

- architecture is used universally to sway perception, display a point of view and ingrain a particular ideology
- Hitler, Stalin and Mussolini created facades of stability and normalcy with architecture
- Hitler's Chancellory only served to house a personal office and an entrance to that space
- in many instances architectural form is the primary



Burj Dubai, Dubai, United Arab Emirates



function

- cultural importance of an object is inherently conveyed to other objects of similar form
- 

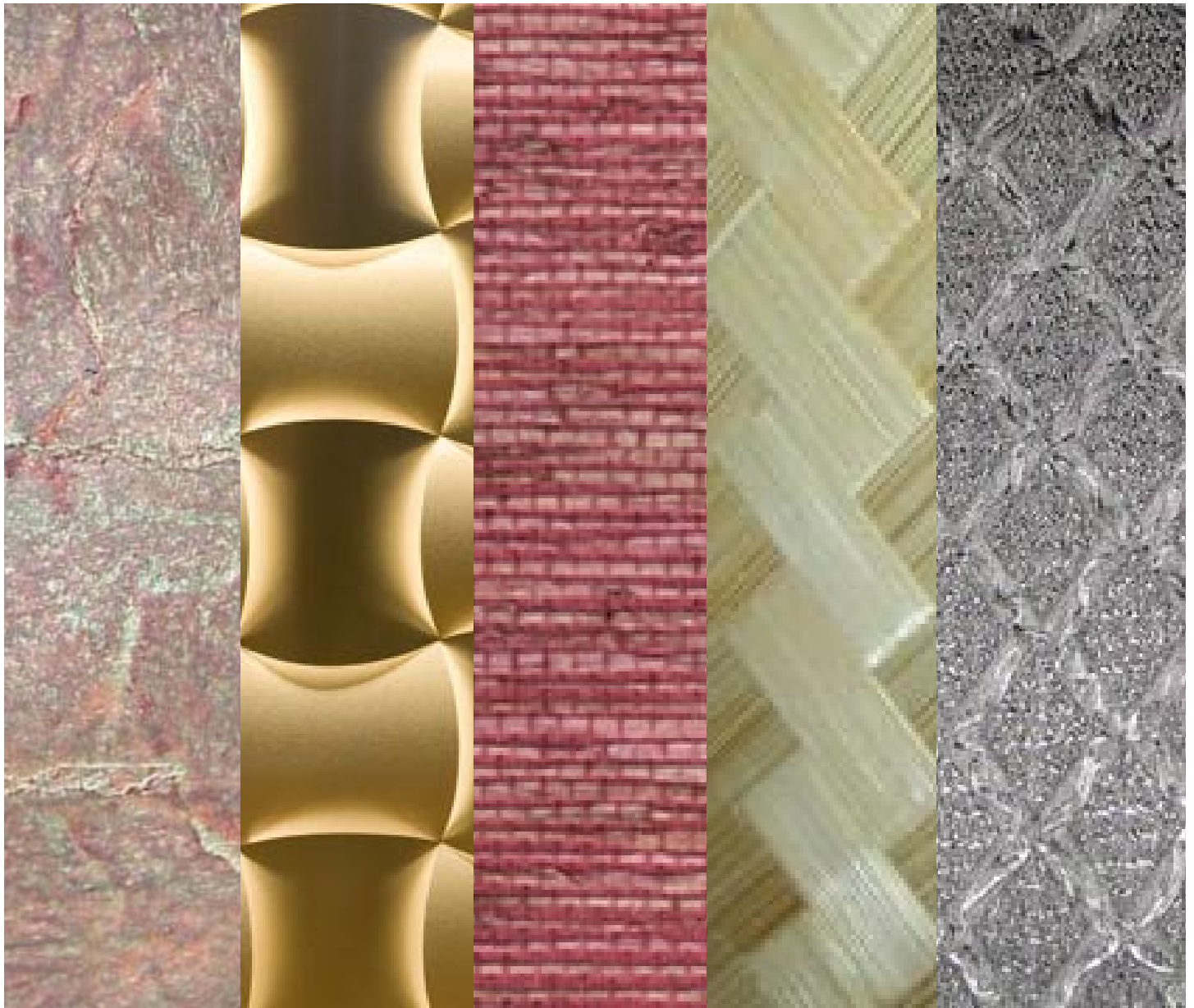


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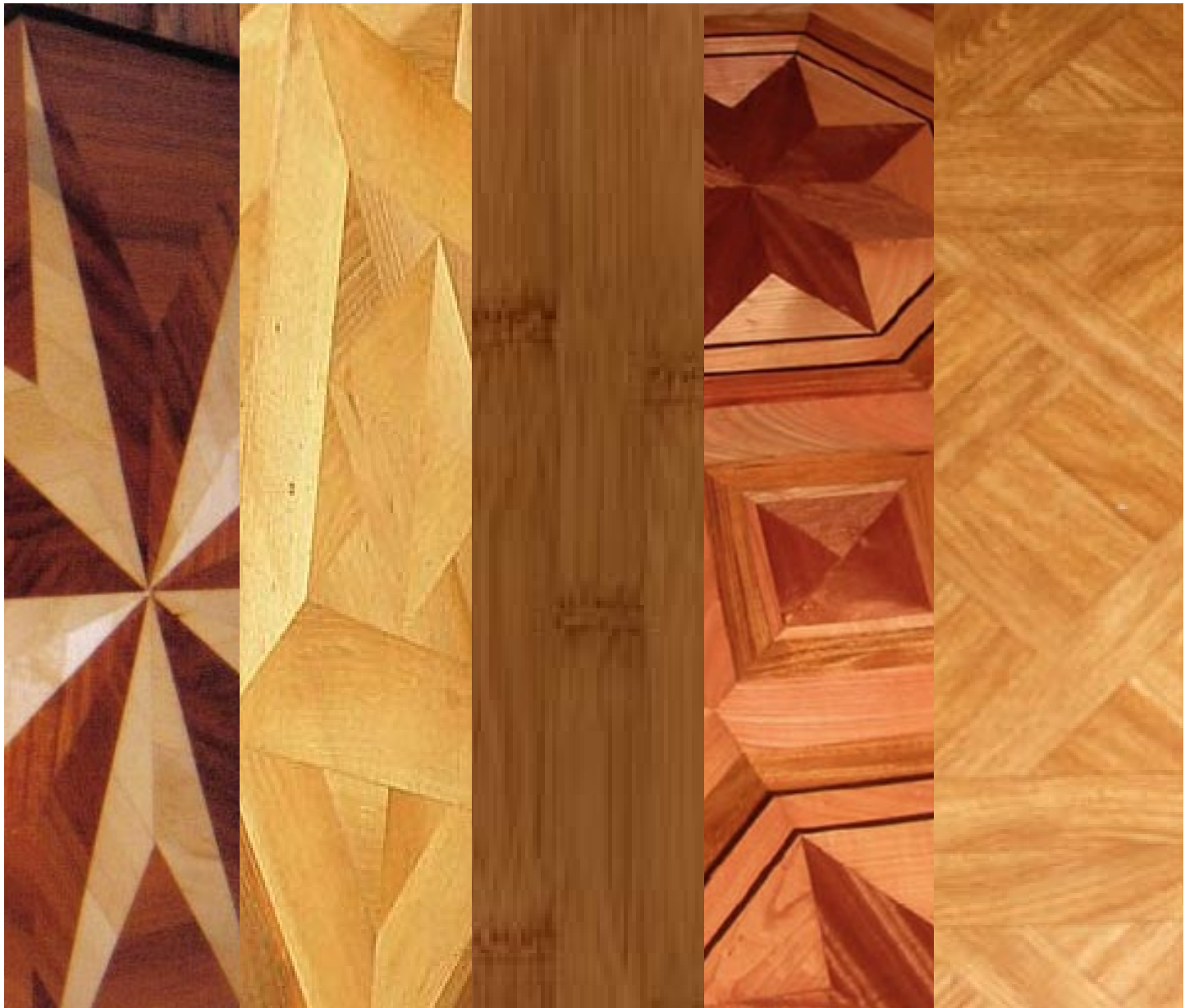
Empire State Building, New York City, USA

# Patterns and Creations with Emotional Connections

- patterns are recognition of the familiar.
- individual perspectives give feelings of ownership
- support of this concept is evident in the post-Katrina FEMA trailer's inability to be customized



- people thrive on the ability to manipulate their environment.
- children selecting a backpack for school
- paint Color
- increasing popularity of lifestyle branding
- importance of fashion in all aspects of life - Architecture for the body



# Art and Architecture Become One

- humans thrive on contact with other people
- contact = any connection / link with others
  - human fascination with history and ancestry
- art is an emotional expression of another being with

which others can relate on even a basic level to the human condition

- architecture as art triggers this universal connection of the human condition with the built



environment  
• humans emotionally connect with the built environment when that environment has a human connection

- architecture finds levels of merit in the human ability to be inspired





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# Design Development

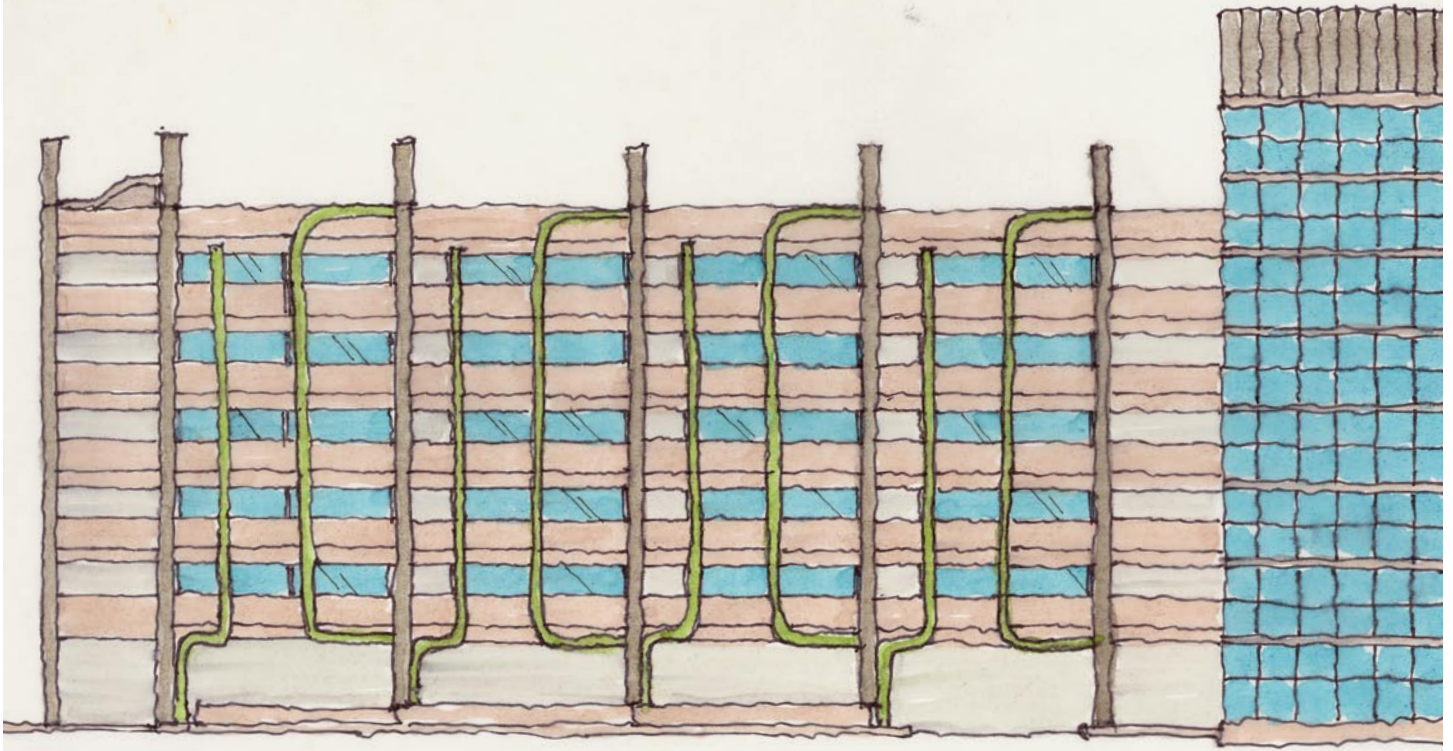
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# Long-Term Housing Concepts - Exterior

An effort was made to make the exterior look less like a parking structure as well as create a distinctive building identity. Keeping with the AIA 10 Principles for Livable Communities, the distinctive exterior helps

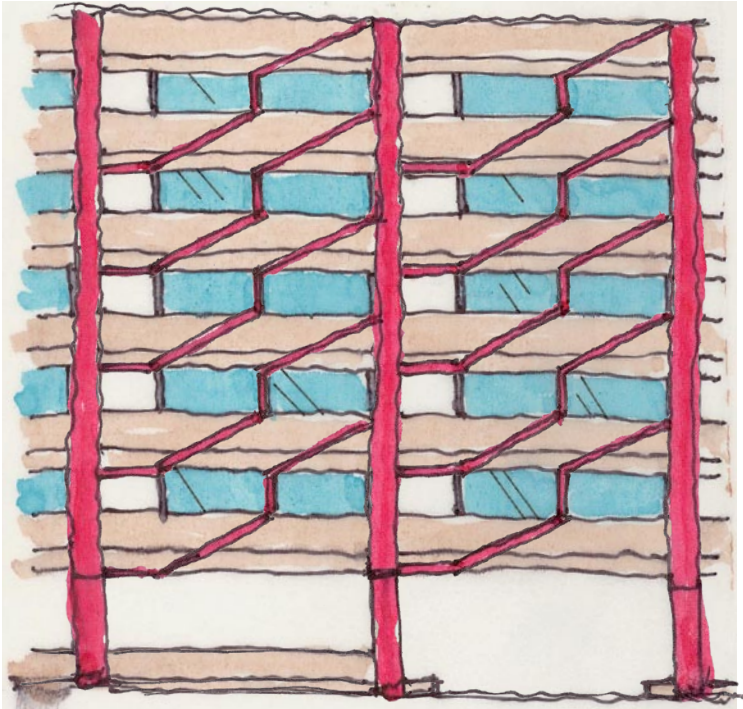
to create an identity for the temporary residents. High strength textiles encase plumbing and electrical lines between utility sources on the ground, roof and individual units. Gravity pushed clean water from



possible utilities distribution configurations (above and right)

containers on the roof to individual units as well as  
waste water to secure storage on the ground.

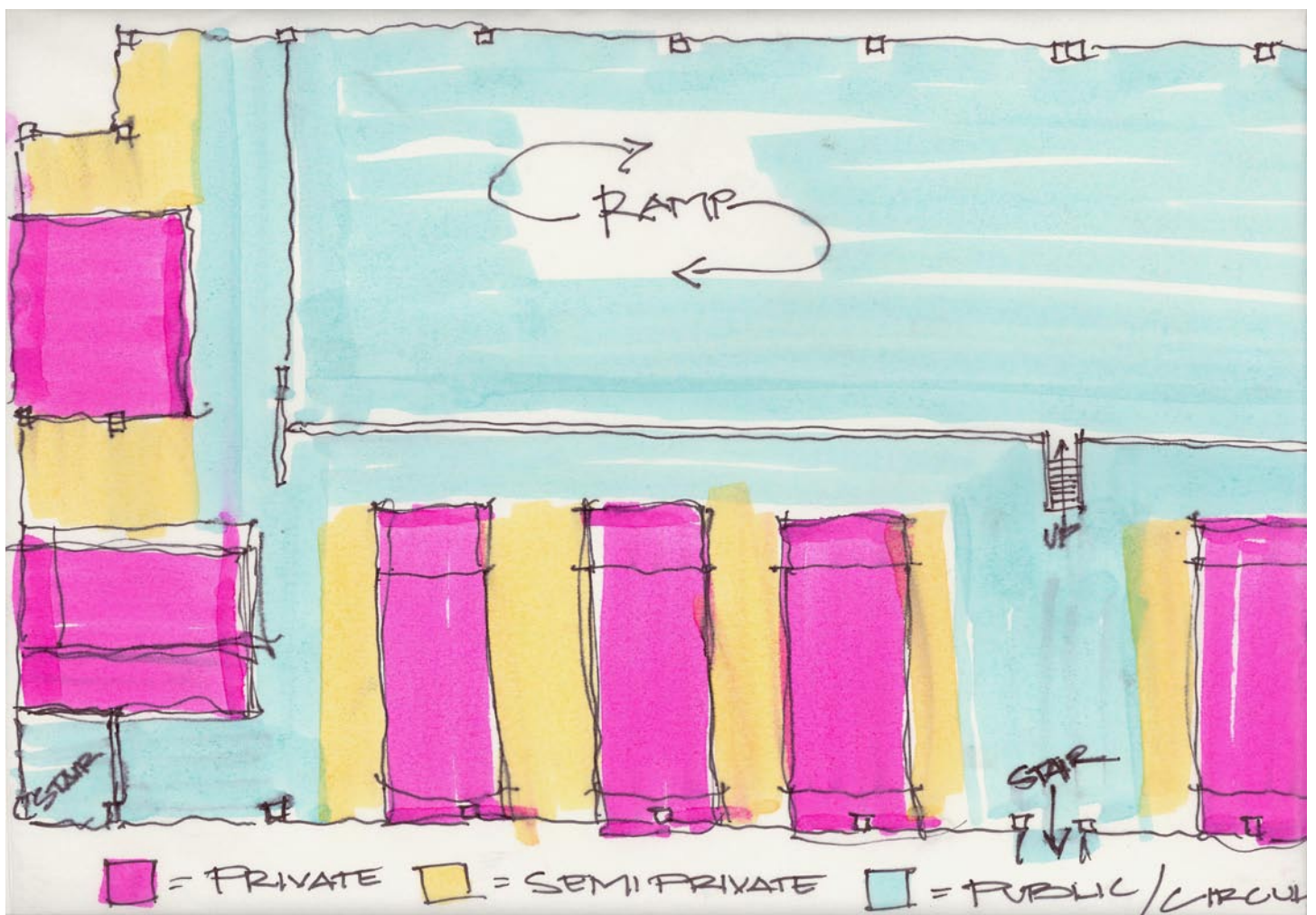
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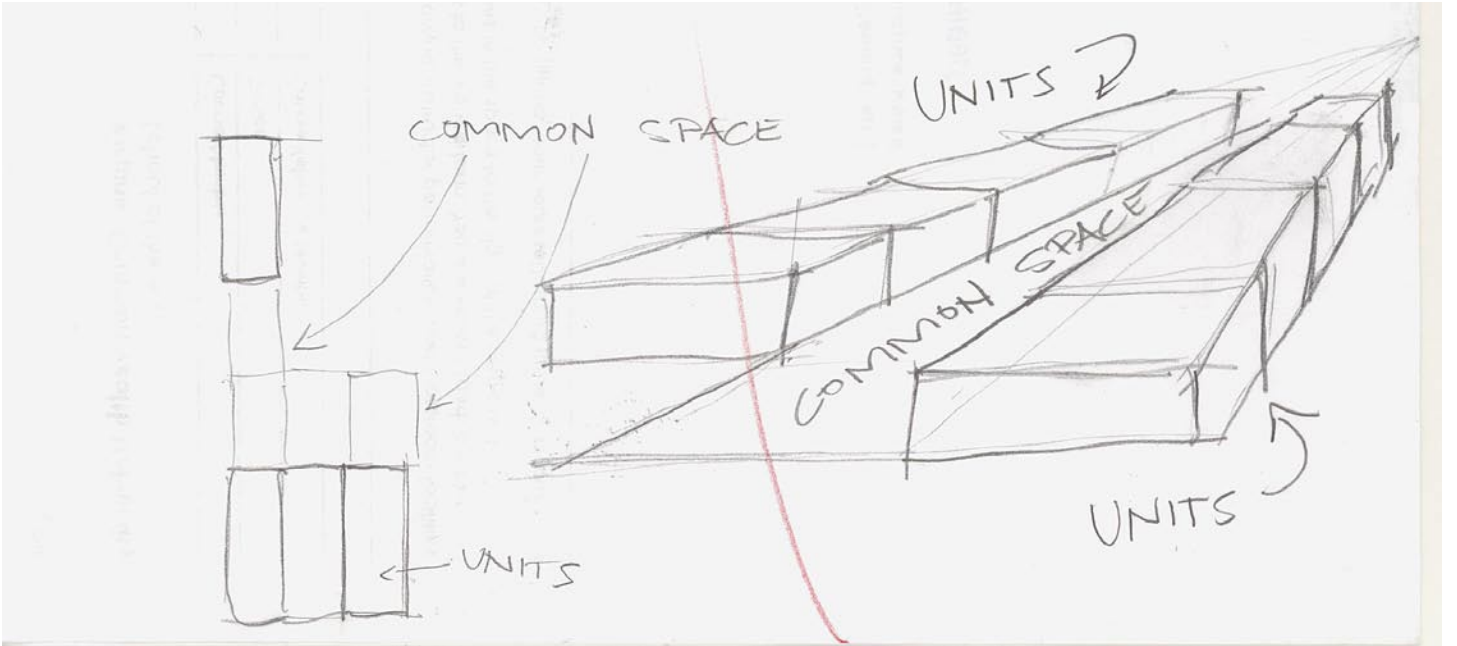
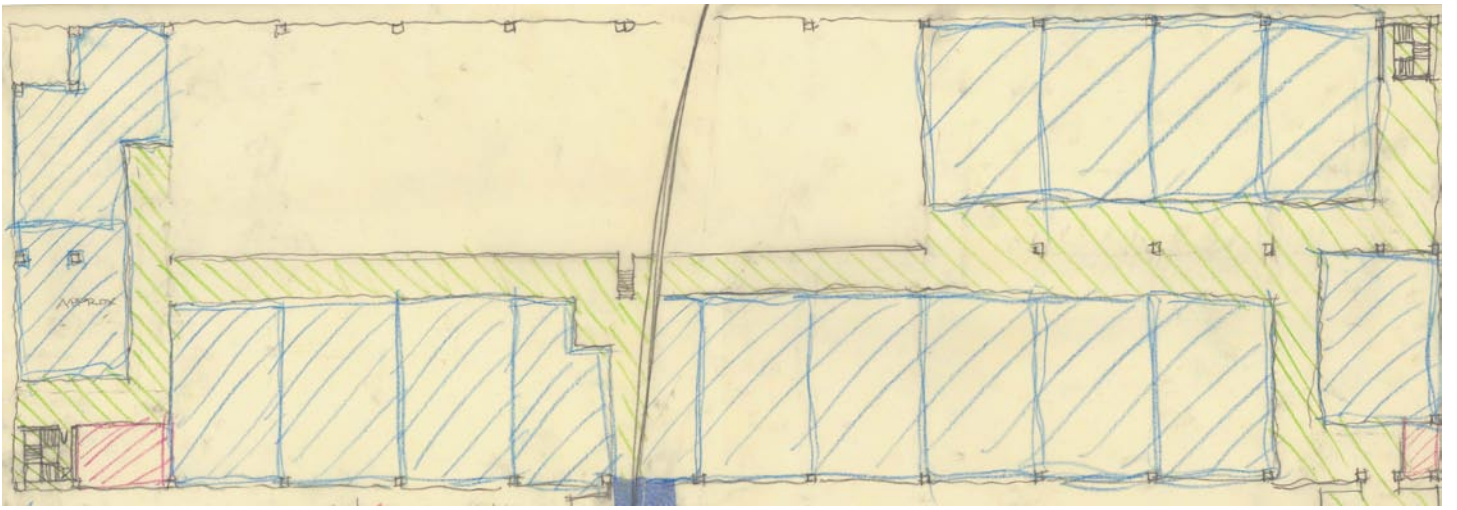
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# Long-Term Housing Concepts - Space Planning

Individual units have a lot similar to a neighborhood.  
Spread out, the community has space to interact  
outside of individual homes.





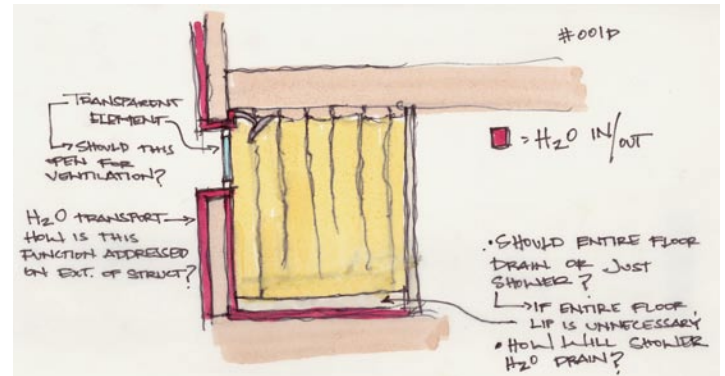
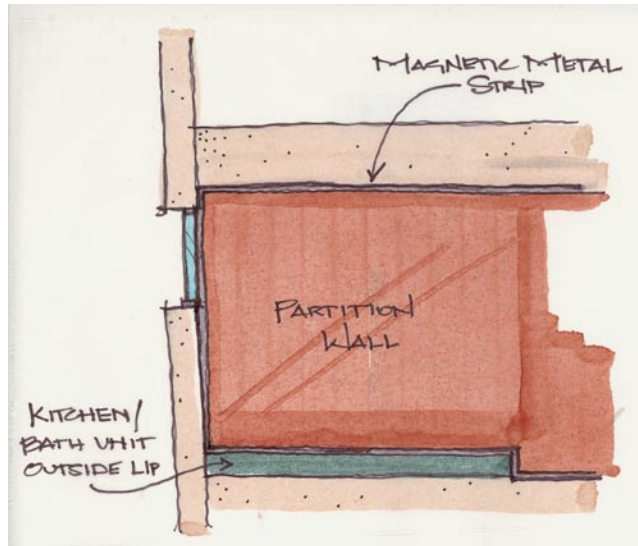
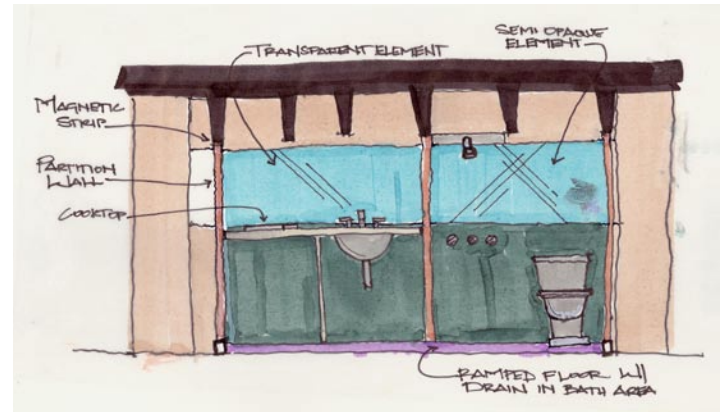
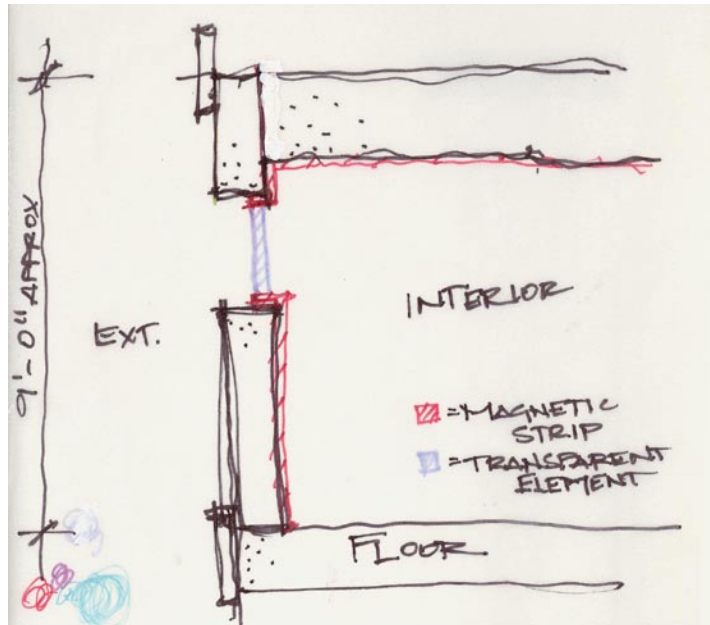


# Long-Term Housing Concepts - Bathroom / Kitchen

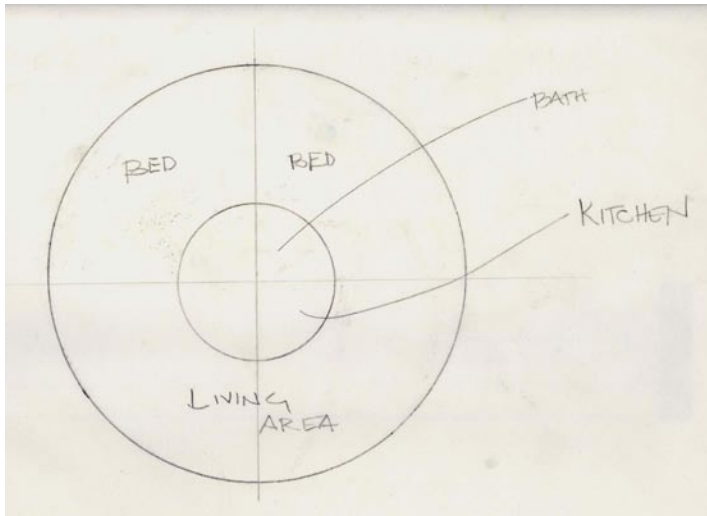
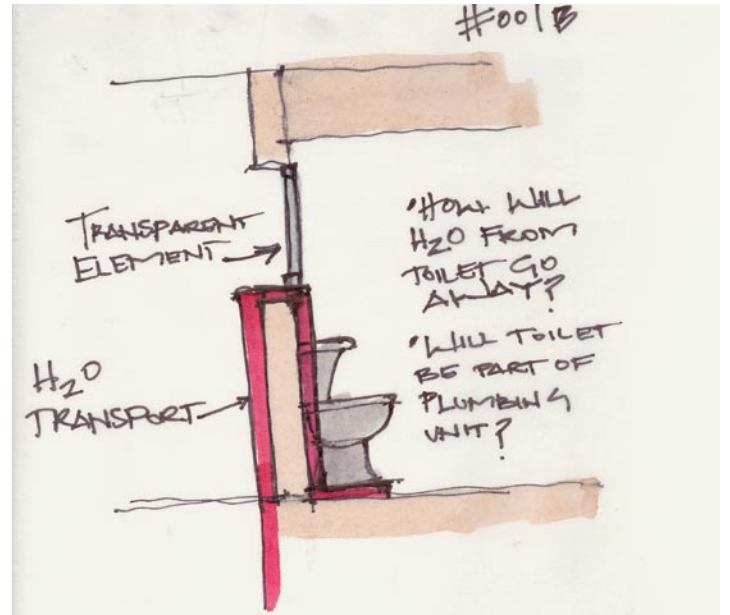
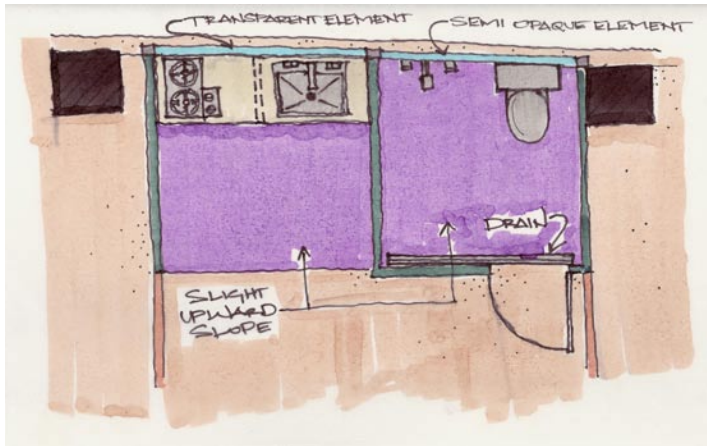
Bathroom units front the exterior with translucent and semi opaque elements for natural light. Easy access to plumbing and electrical reduces the use of non-prefabricated materials. The unit includes a two

burner stove, a sink, a toilet and a showering space. The entire bathroom / Kitchen unit can be towed into the structure by car.

Private bathrooms and kitchens were eliminated



because they are financially impractical and almost impossible to produce on short notice.





# Prefabricated Interchangeable Units

This concept was conceived very early in the design process and provided the foundation on which the entire project is based. Various combination of approximately 7 or 8 different prefabricated pieces

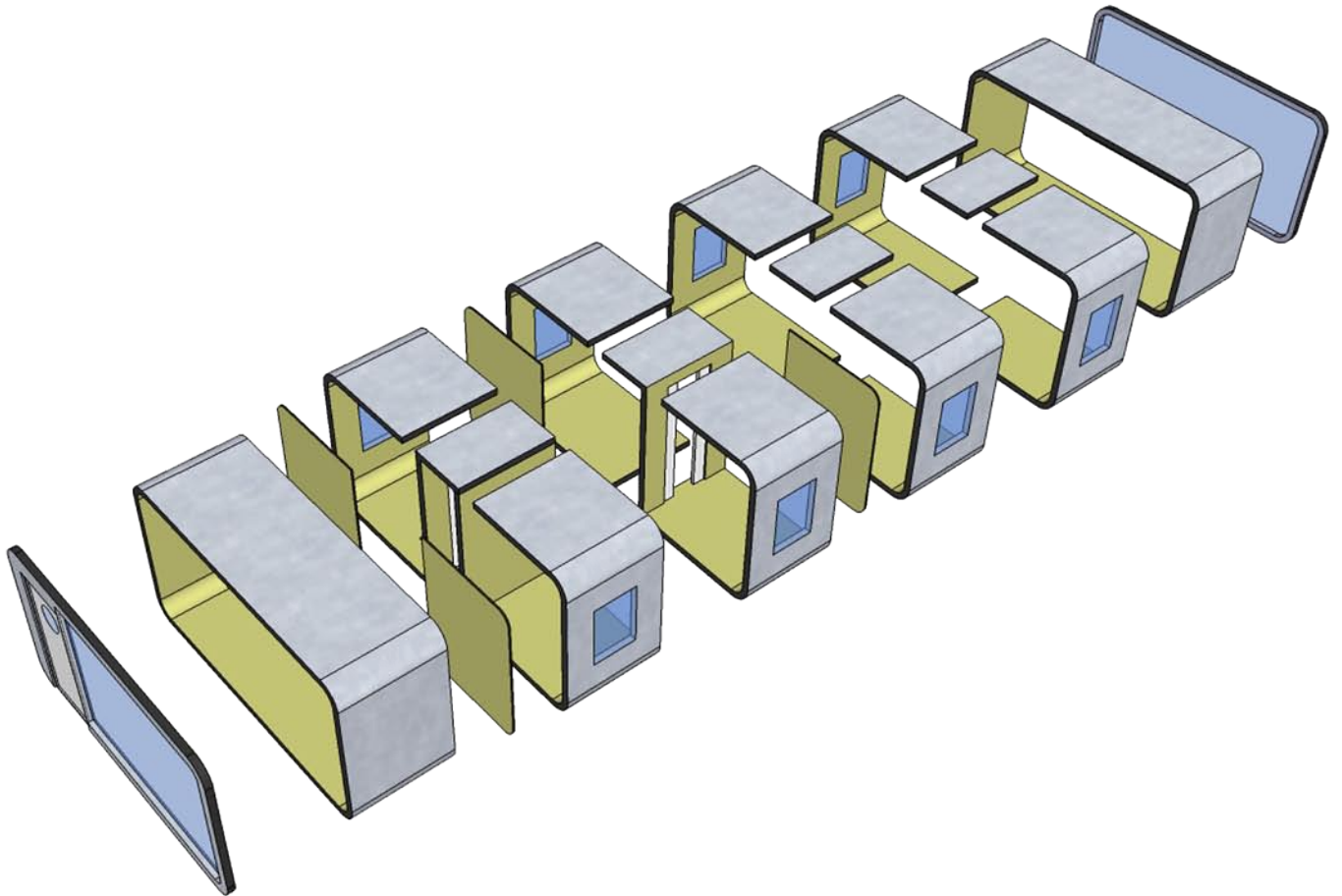
[opposite] are held together on a track system (p76) attached to the floor of the host structure to create housing units with interior spaces of almost unlimited size and flexibility. Tension belt attachment systems



modular sections of the housing unit being placed in a parking structure

were also explored.  
This idea was abandoned due to fabrication and construction costs.

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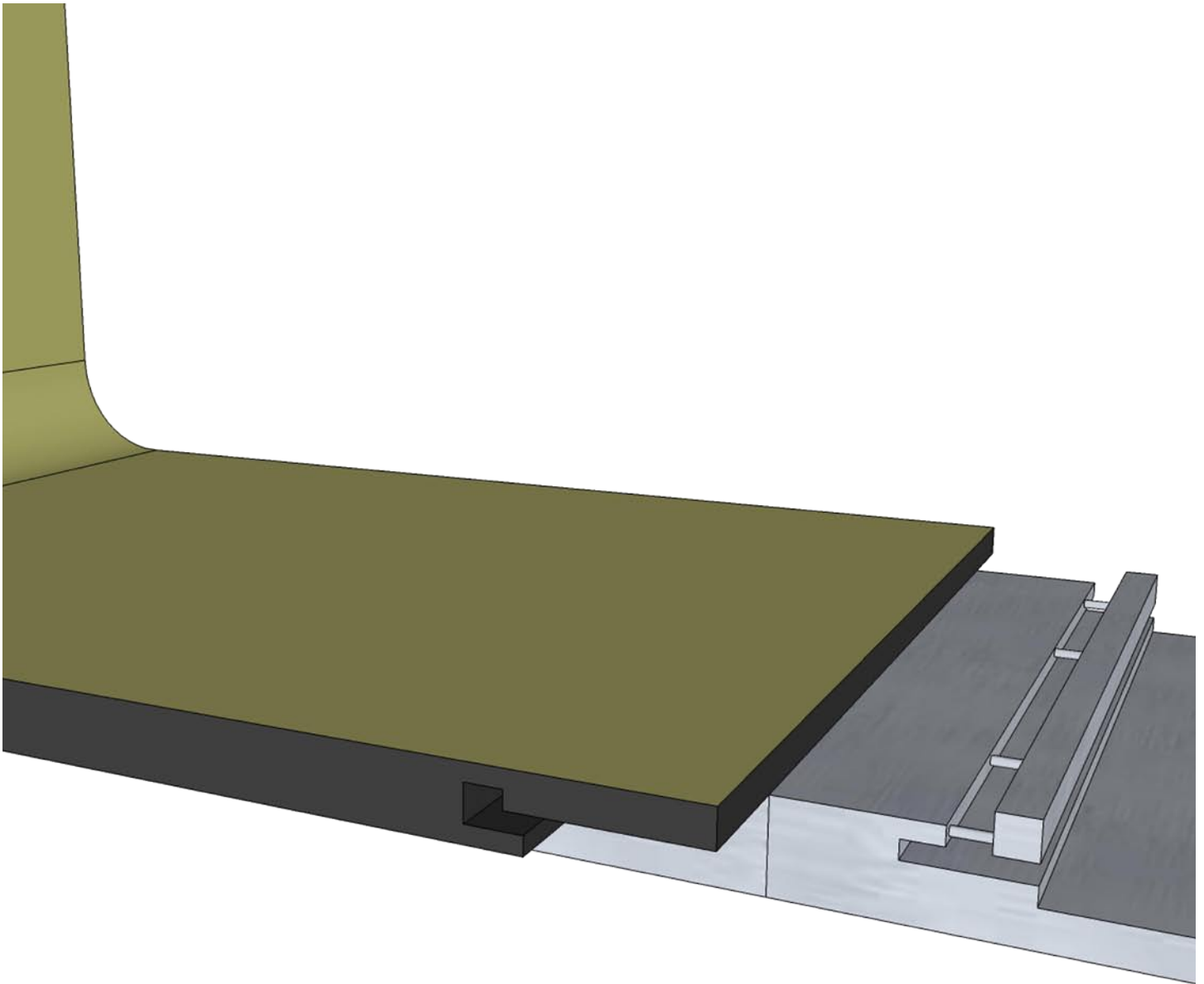


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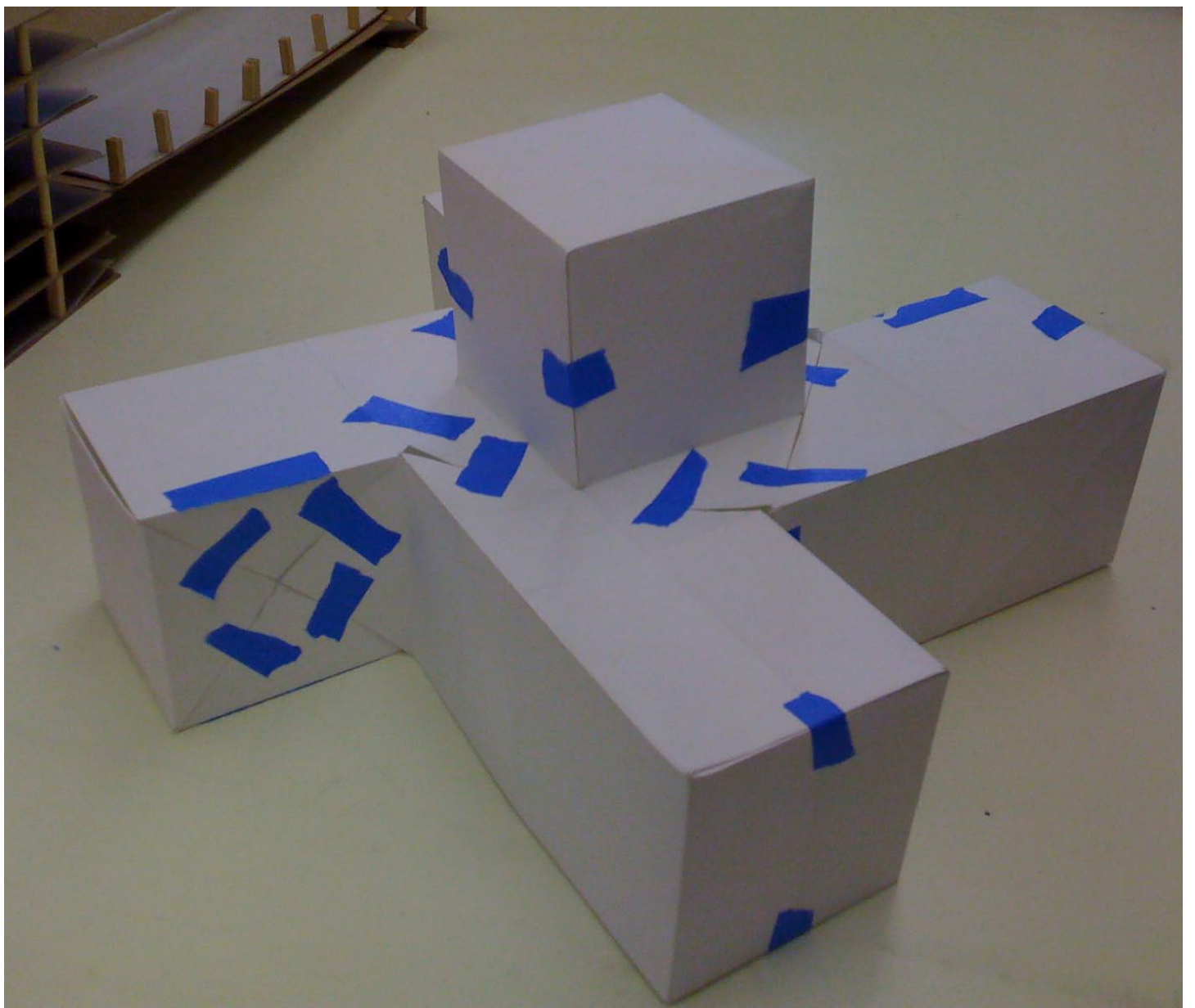
Exploded version of individual pieces of a generic unit.



# Prefabricated Interchangeable Units

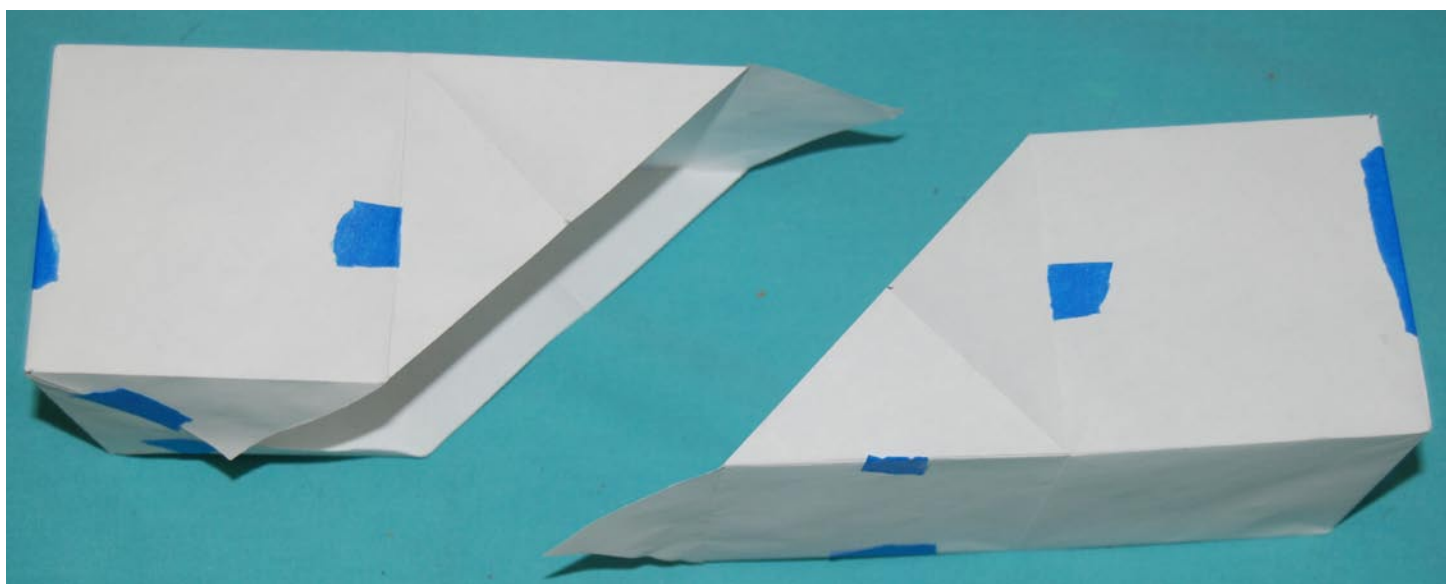


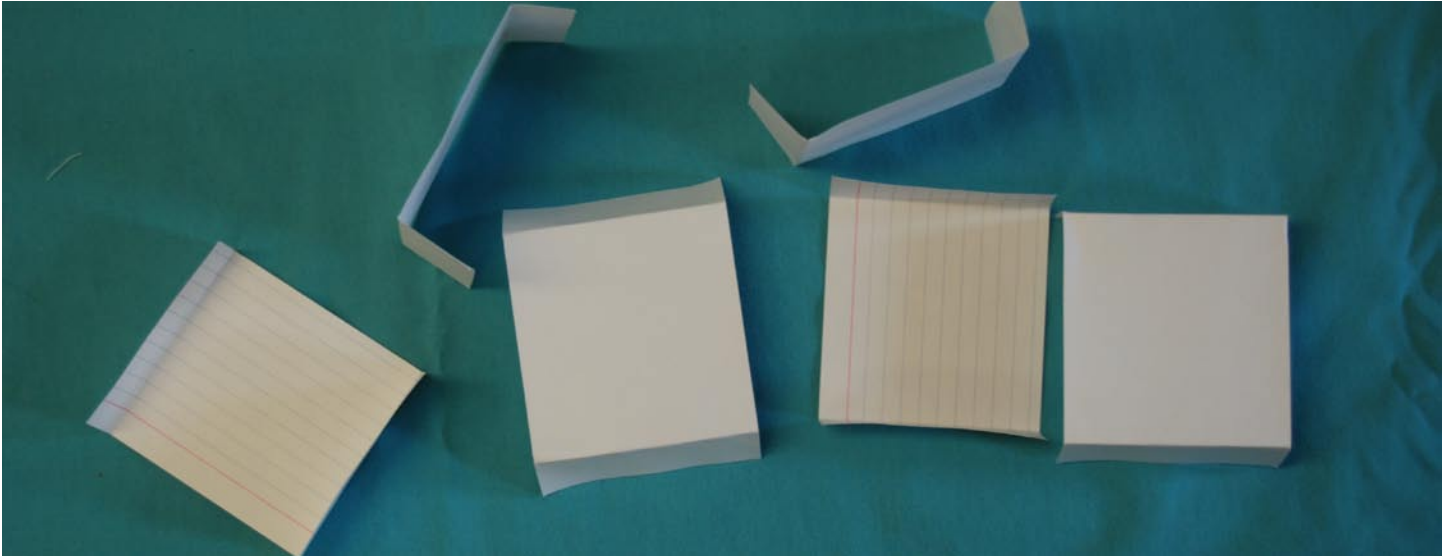
attachment track system



five paper cubes configured to create larger interior space

# Prefabricated Interchangeable Units



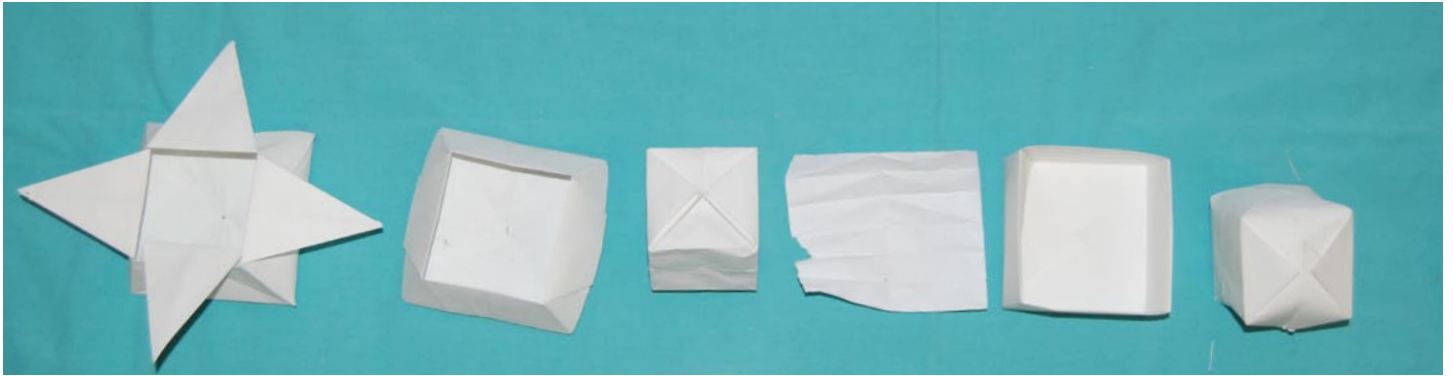


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six folded paper rectangles create a cube without adhesive

# Origami / Paper Folding

Origami pushed understanding the transformation of a flat surface into a volumetric entity.



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various origami creations





paper folding inspired geometric system 1 (shown folded and unfolded)

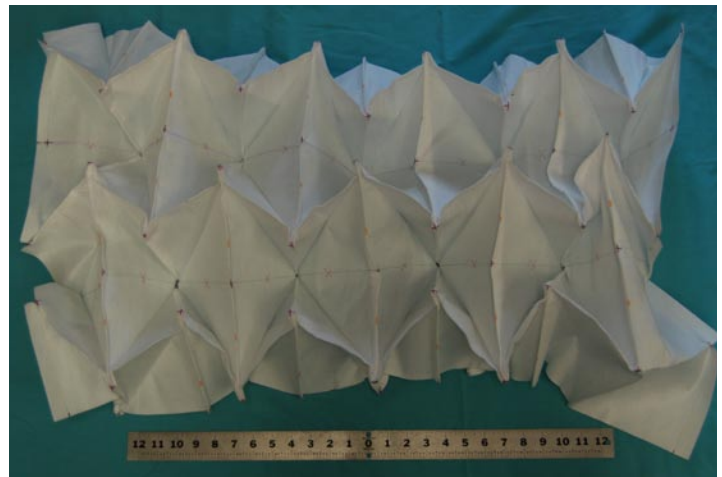
# Fabric Construction

Beyond origami, the volumetric geometries transferred from folded paper and cut cardboard with tape to textiles with printed lines. The textiles replaced the tape holding the shapes in order.

Cardboard shapes were sewn into pockets (left) that were sewn together (opposite top and bottom left). Eventually, the textiles acted as both tape and rigid geometric shape. Using folded seams,



the geometries are produced with only a single primary material (bottom right). This effect can be reproduced with any number of materials such as staples or alligator clips (top right).

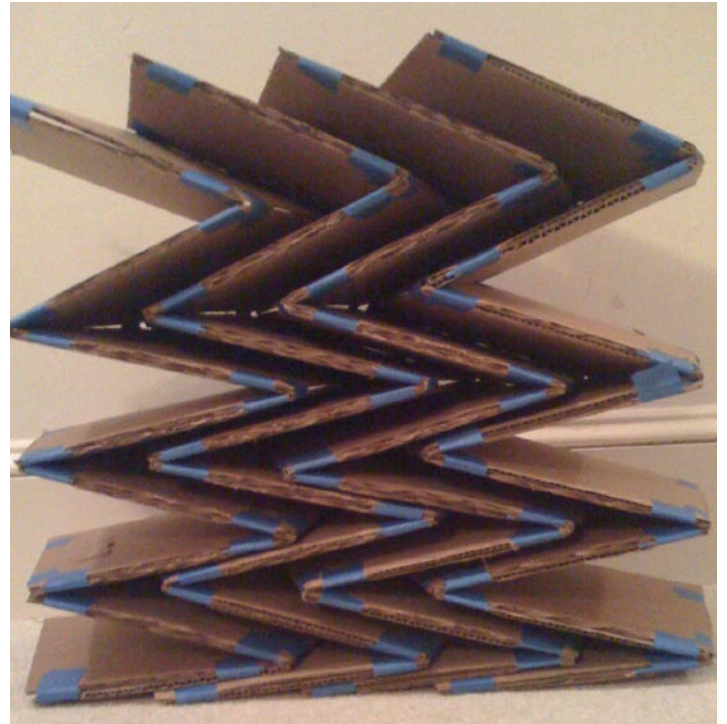
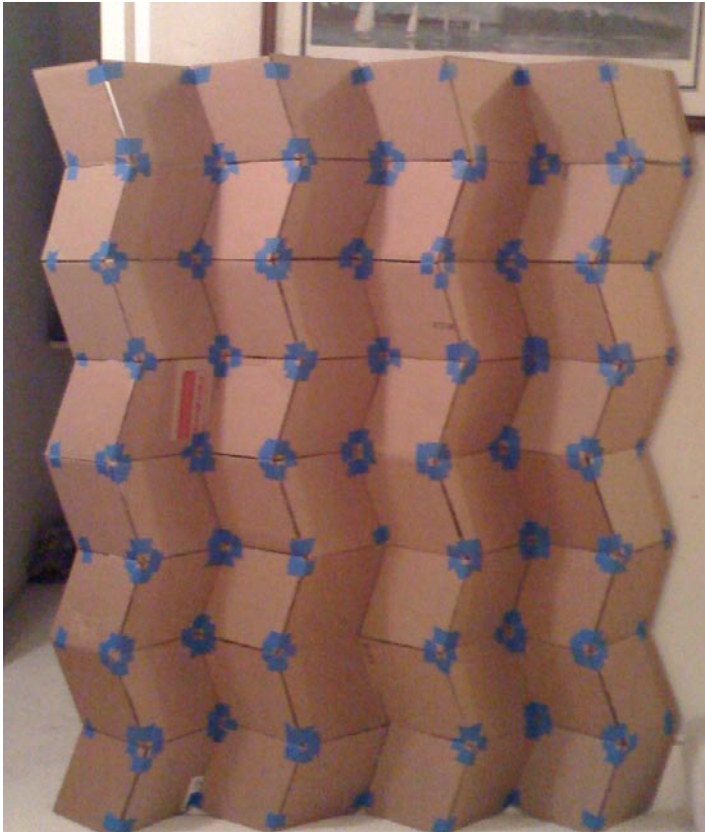


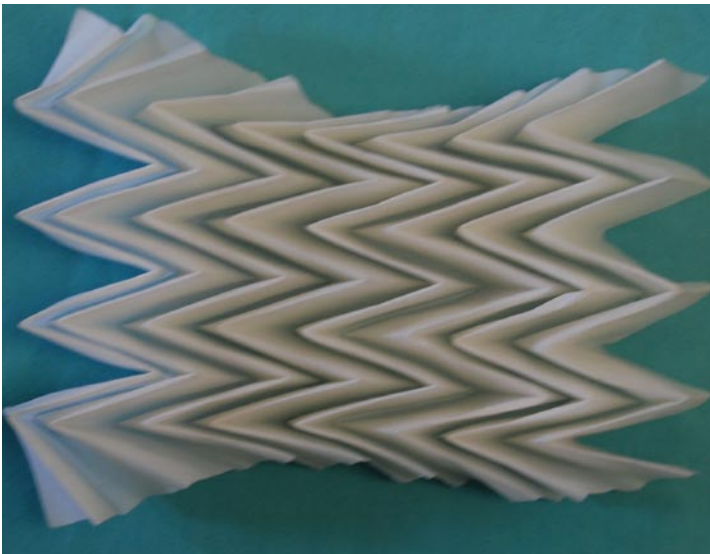
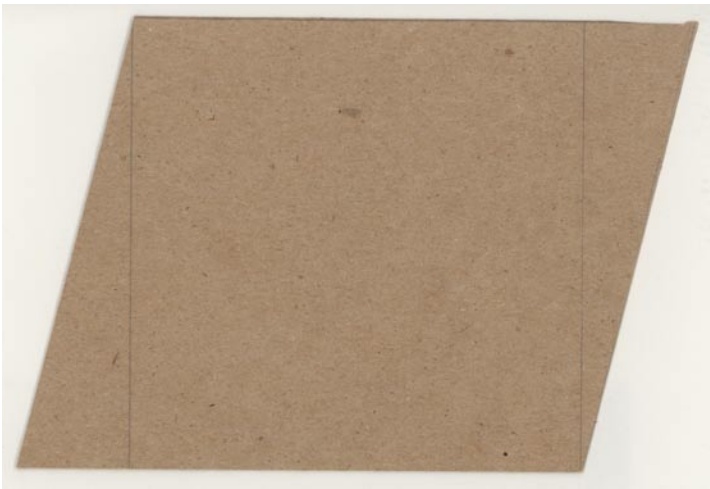


# Geometric System 1

The system is parallelograms (opposite top left) configured to pack flat, the ability to follow various and uneven ceiling heights and maintain stability with only two anchor points. The collapsibility (right) of

the partition system allows for easy installation with almost any ceiling height.







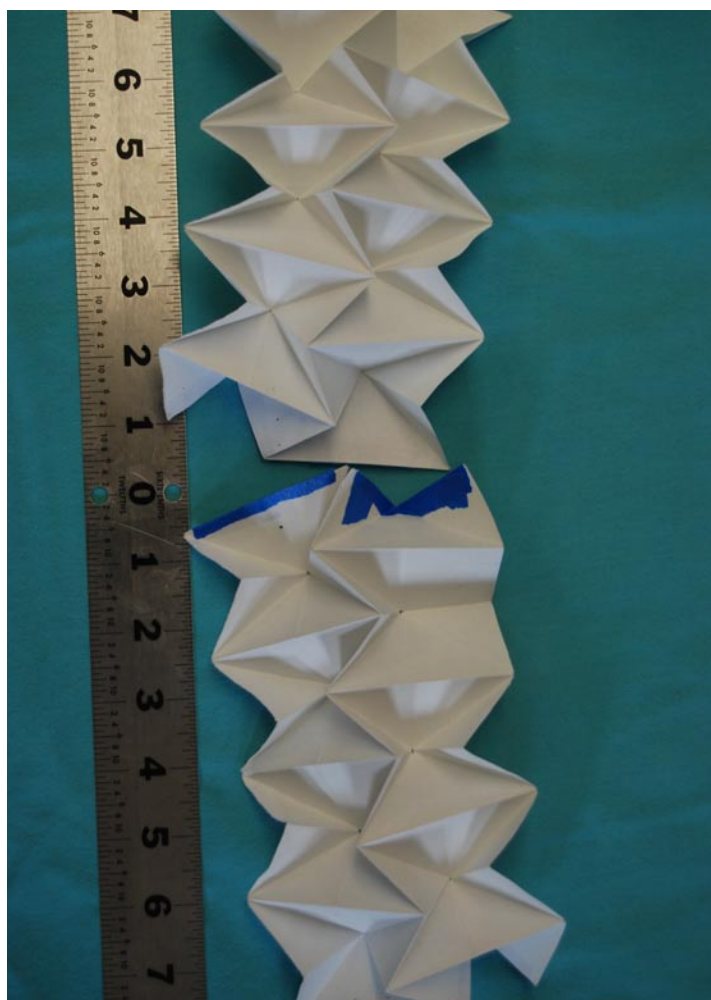
# Geometric System 2

The system is organized by the repetition of two right triangles; one is twice the size of the other. Shown below folded (left) and unfolded (right). Much like Geometric System 1, this system is configured to

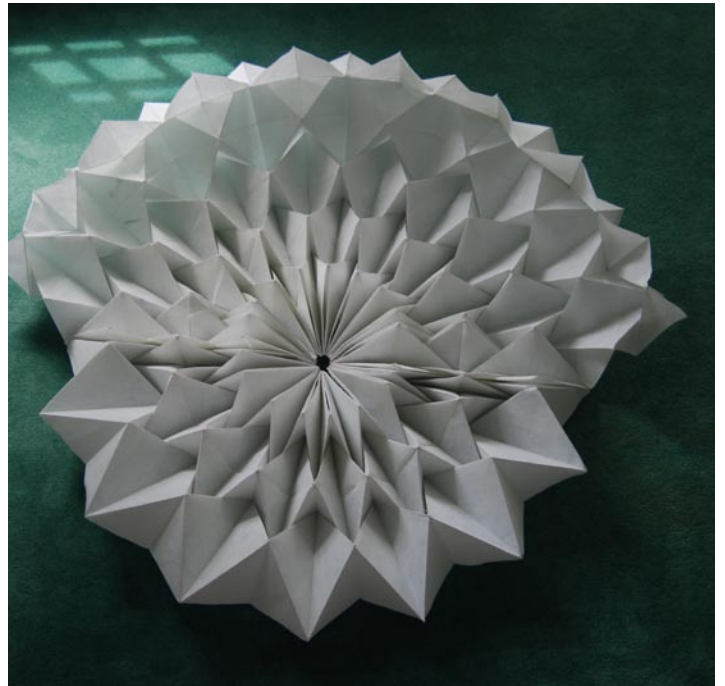
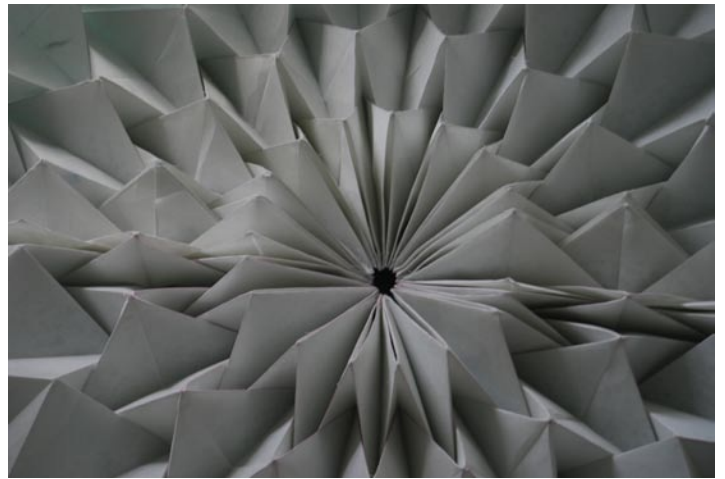
allow flat packing and shipping, however it lacks the flexibility to match various ceiling heights without the addition or subtraction of units. When using textiles, the stitching lines are printed with a textile printer or



drawn using a template (right).



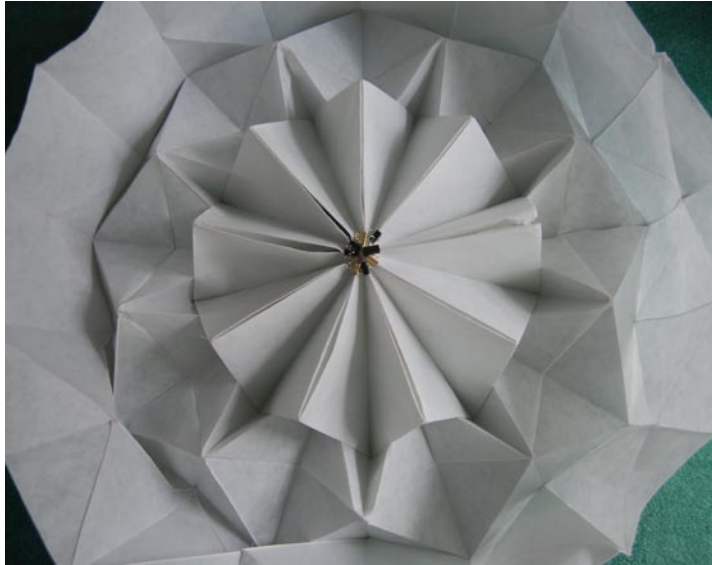
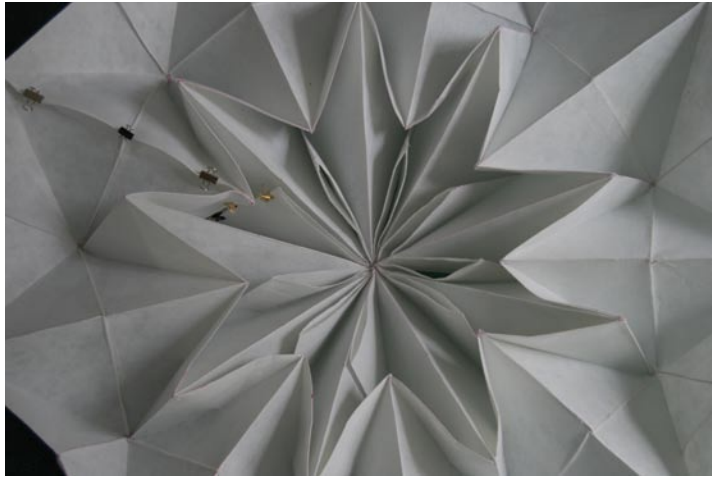
# Geometric System 2



hand drawn stitch pattern (top)  
printed stitch pattern (bottom)

naturally the geometry curves and eventually creates a sphere





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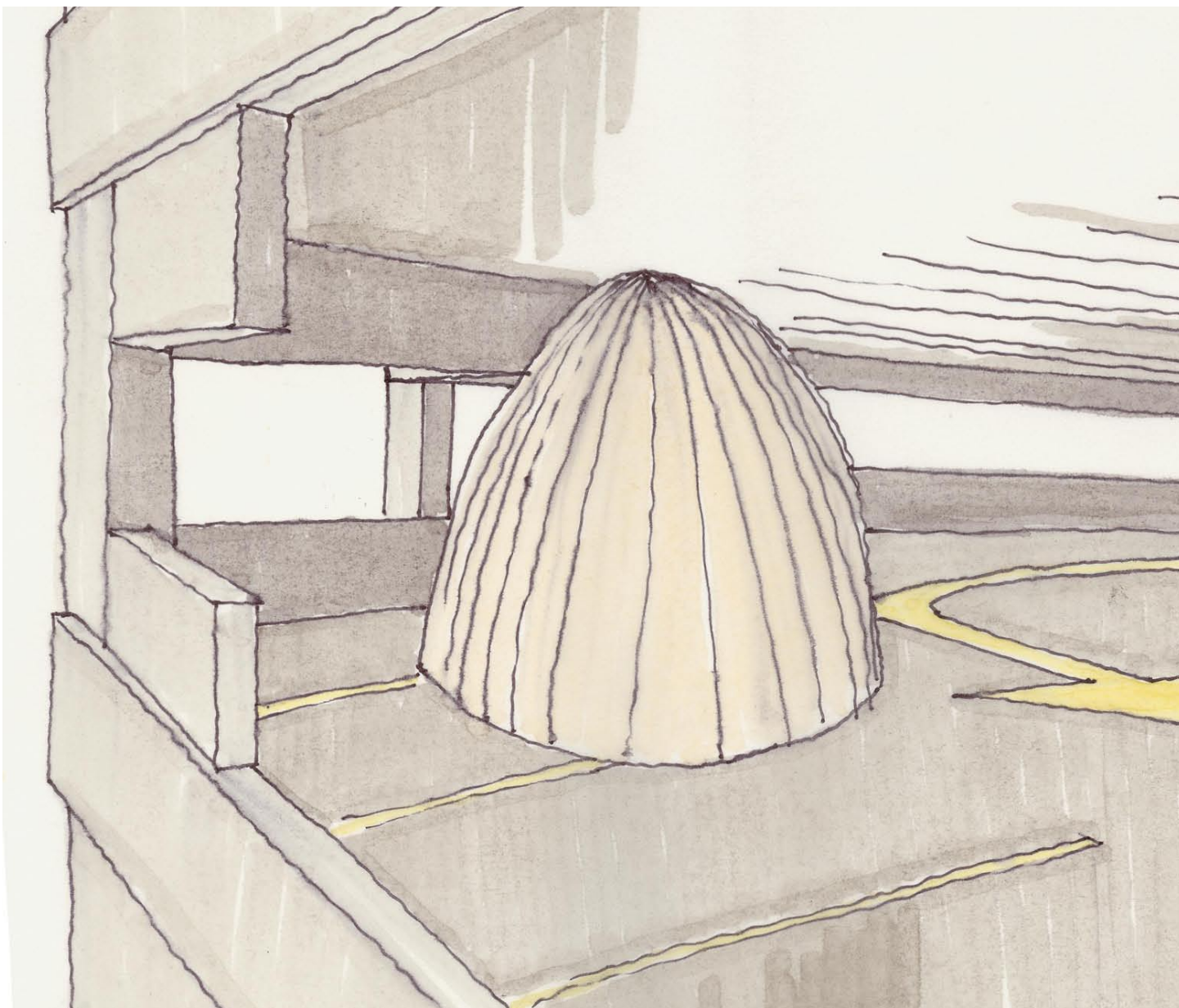


# Final Design Solution

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# Primary Site Specific Design



dome homes shown in the MCV parking deck

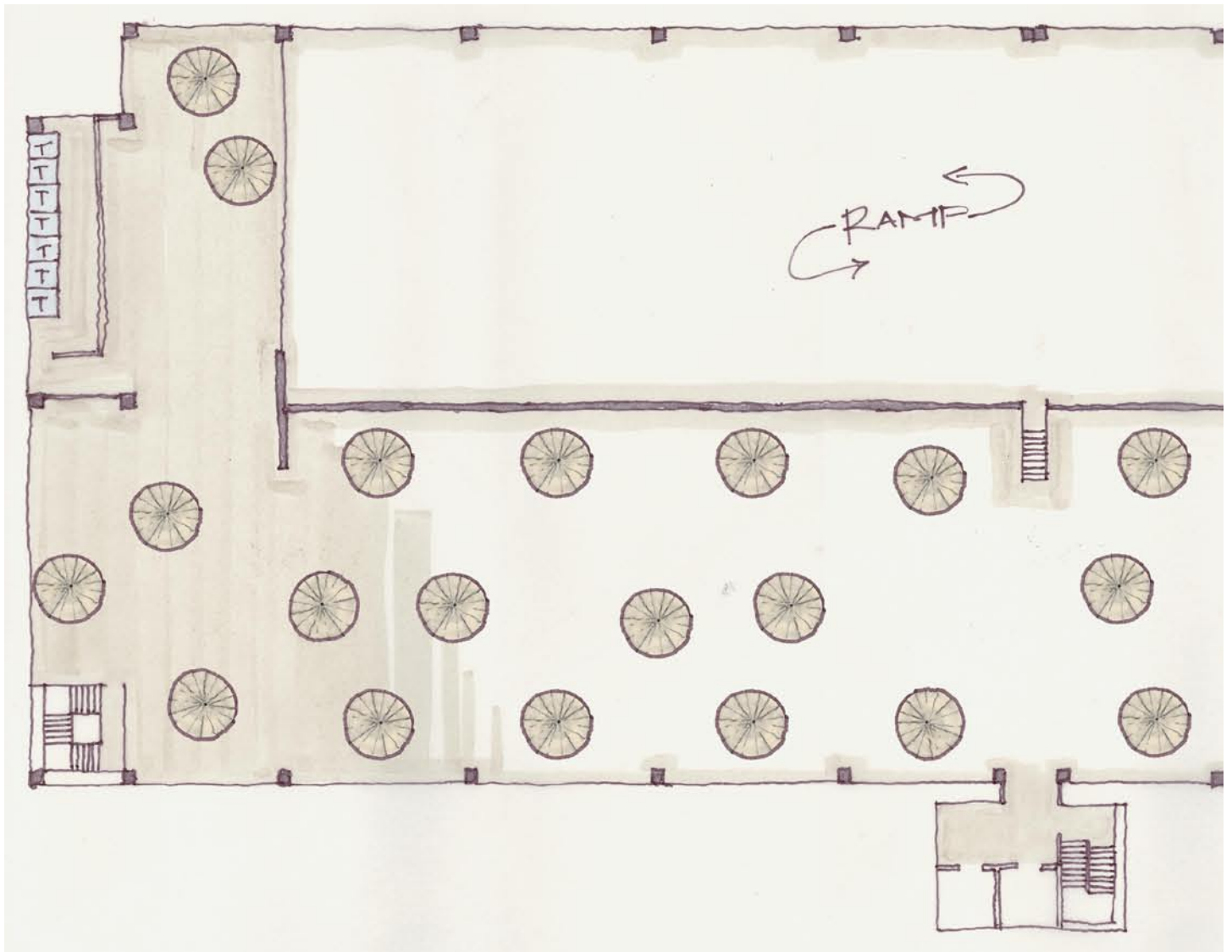


# Primary Site Specific Design

Space Layout

given situation. The configurations are limitless.

The spacial layout out of the Dome Homes and the bathroom blocks depends on the specific needs of a







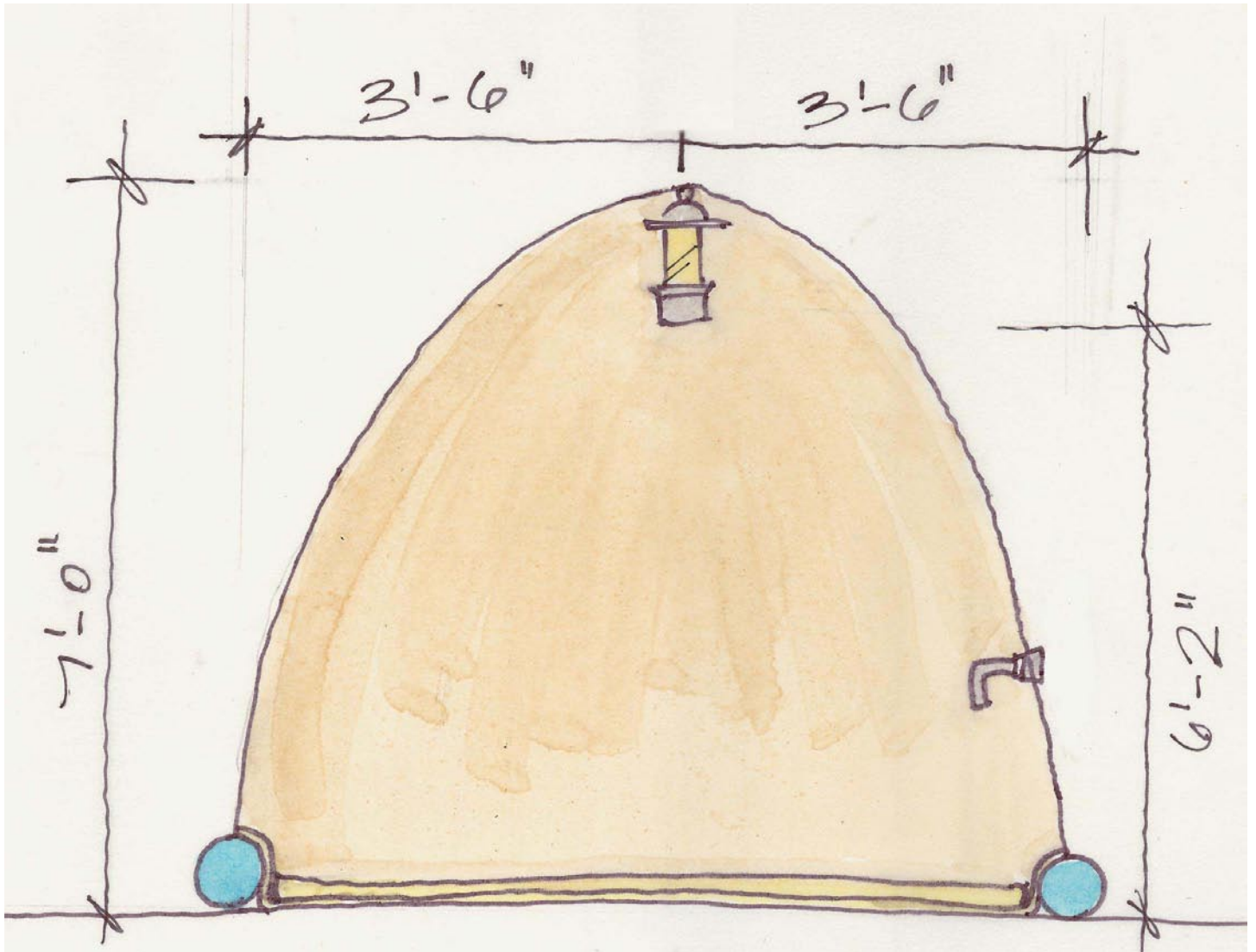


# Primary Site Specific Design

## Dome Home

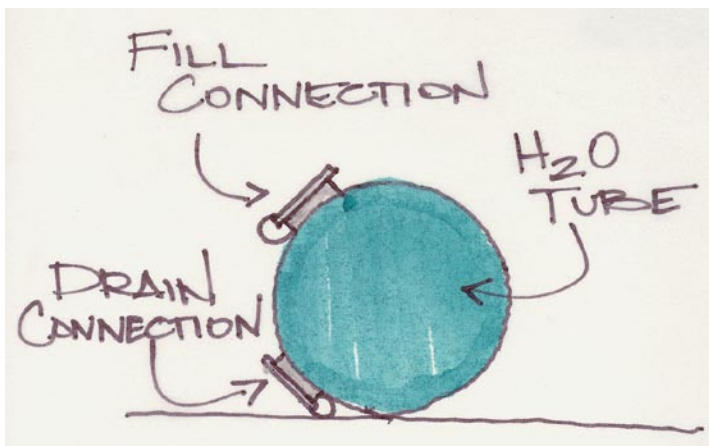
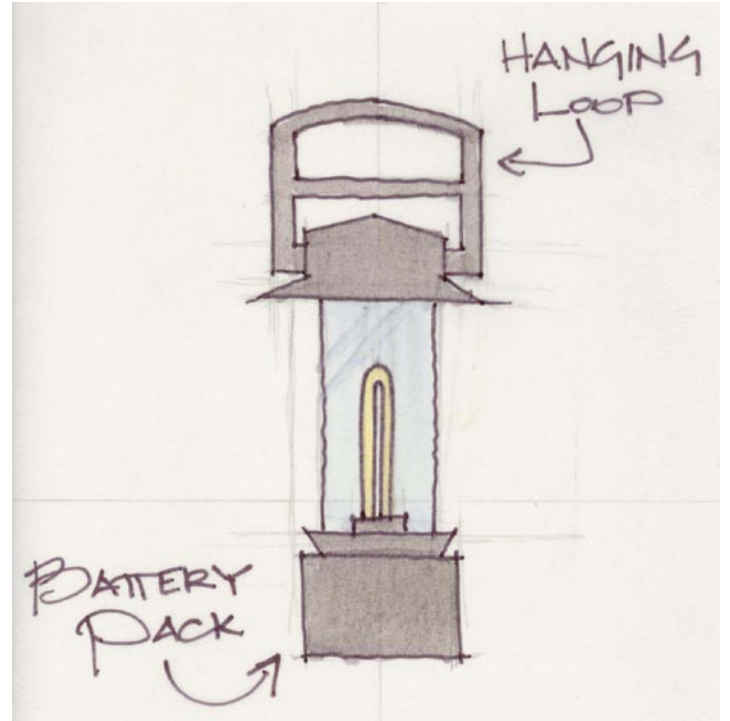
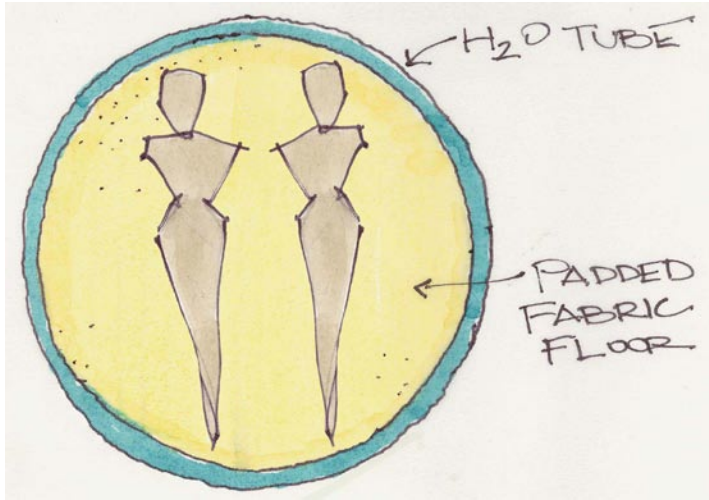
The Dome Home allows people in post-disaster situations a small amount of private space in which

they are able to get away from the chaotic reality of their situation. In most instances, those using these temporary structures are in the midst of traumatic events, suffering from great loss and feeling



vulnerable. Having a personal space for reflection, rest or simply to cry privately will be invaluable during the process of coming to terms with their situation.

The lantern is powered by a rechargeable battery pack. It can hang from a hook in the top of the Dome Home or can be taken down for task lighting.



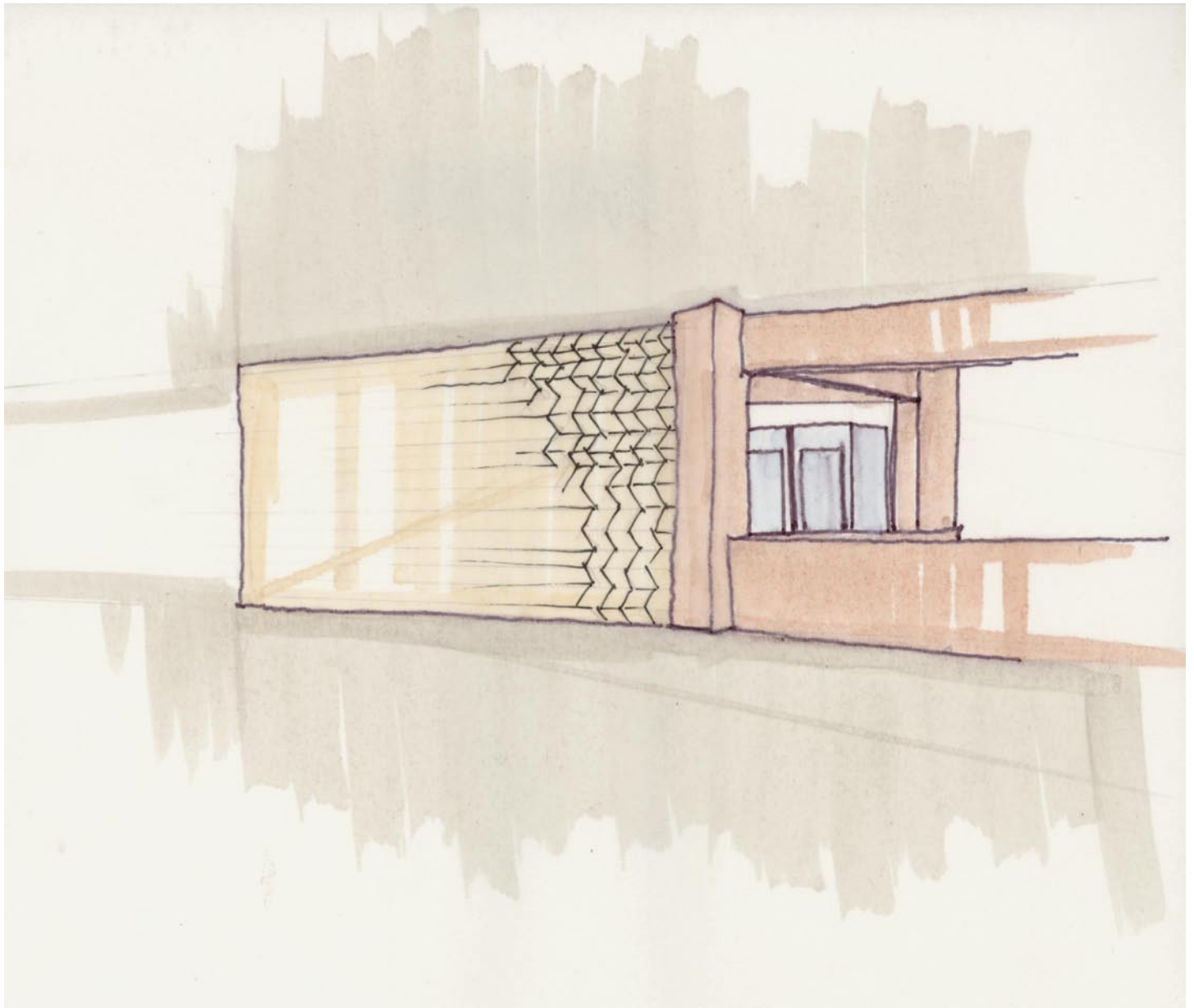
The Dome Home can sleep two 6'-0" plus adults comfortably. The circular anchor tube is filled with water and rests on the floor. A waterproof floor material is attached to the inner walls of tube to provide a barrier against the concrete floor and a padded fabric layer rests above that for comfort. The dome structure is attached to the anchor tube with rare-earth magnets. The water weight stabilizes the attached dome.

# Primary Site Specific Design

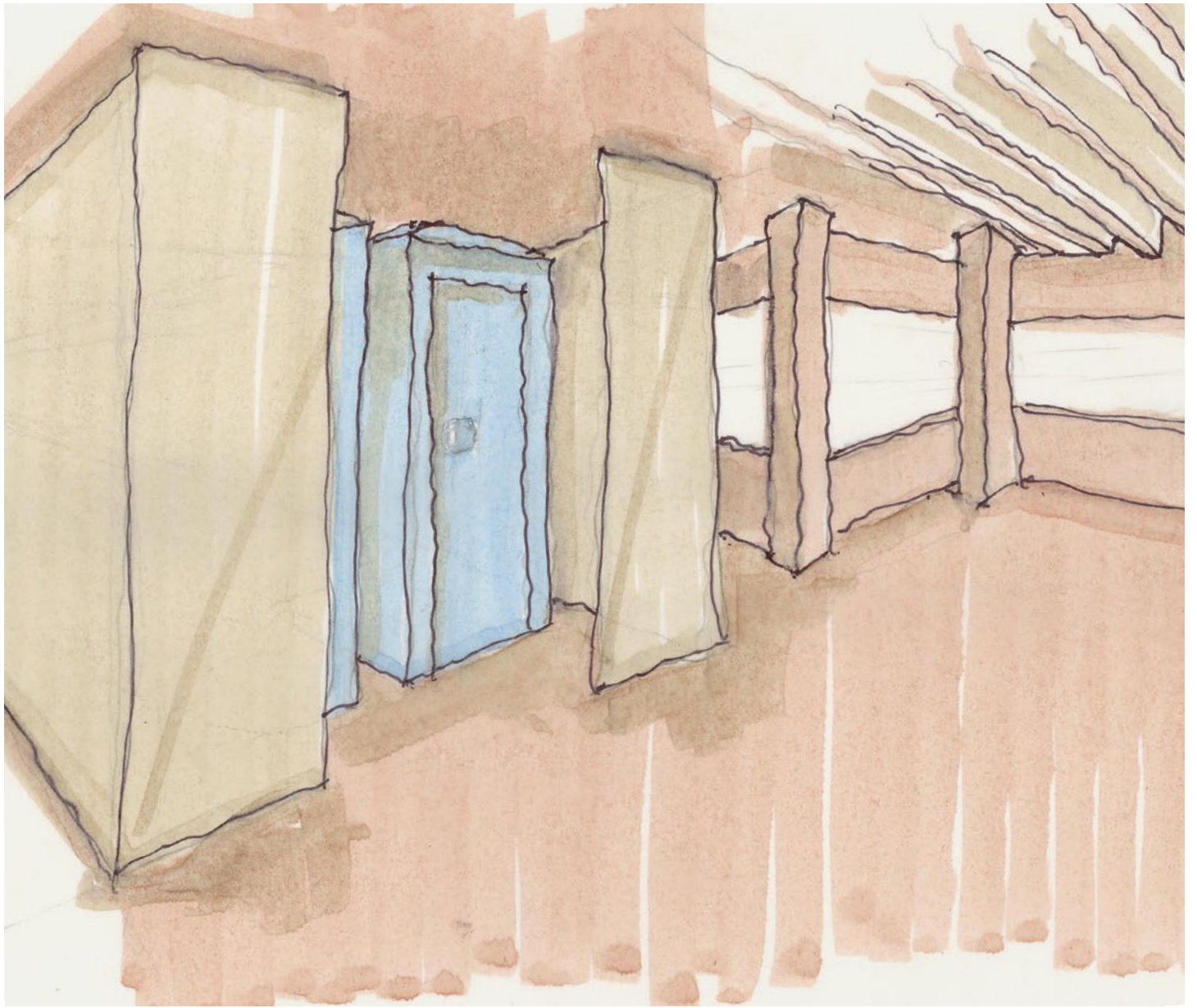
## Bathroom Facilities

At least two blocks of portable toilets will be located on each level of the structure. Geometric System 1

will create walls around these facilities for privacy and to shield nearby inhabitants from unpleasant odors.





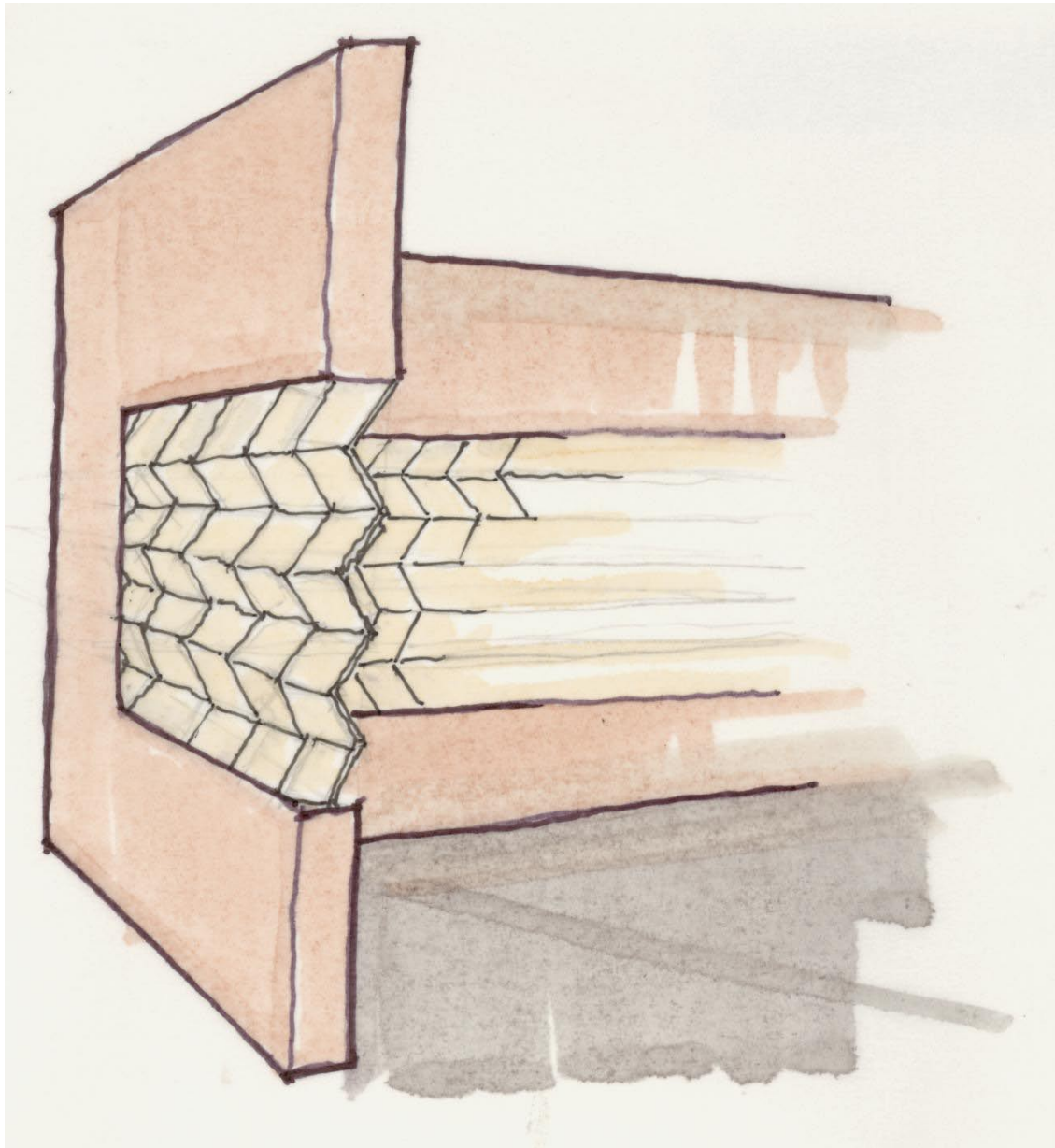


# Primary Site Specific Design

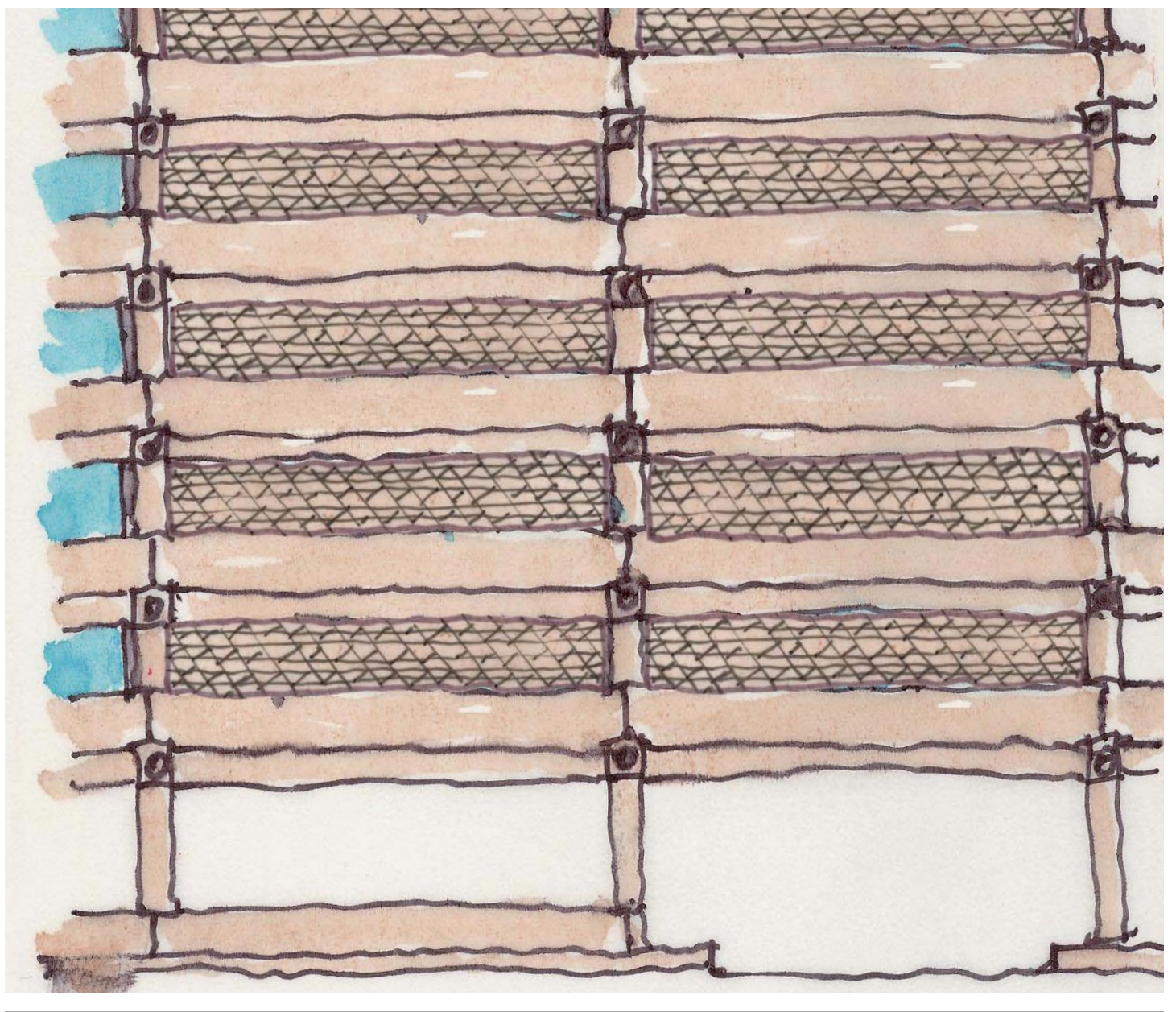
Additional Interior Protection

defined interior space protected from the elements.

Rectangular sections of Geometric System 1 fit into the exterior openings (below and opposite) creating a





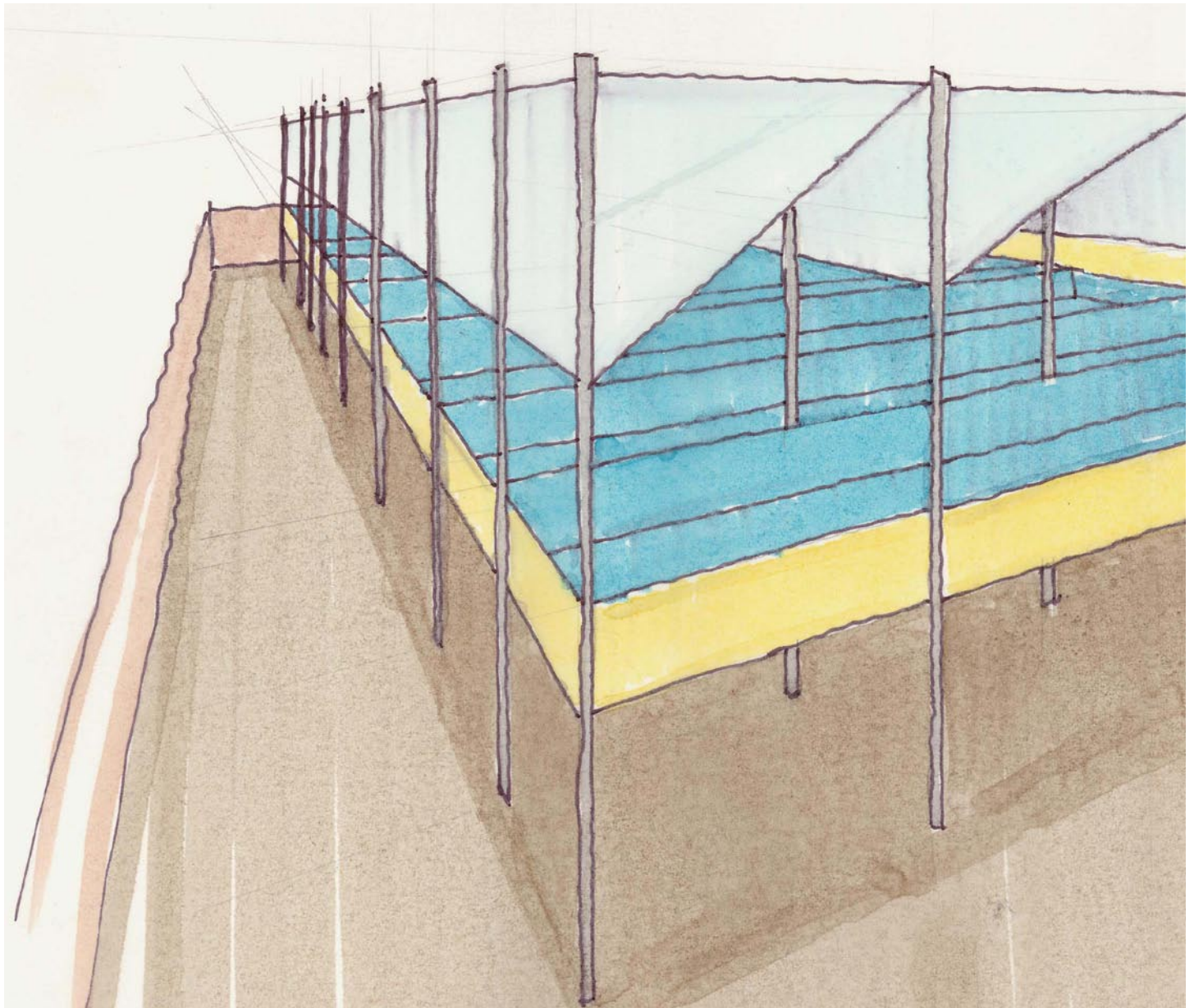


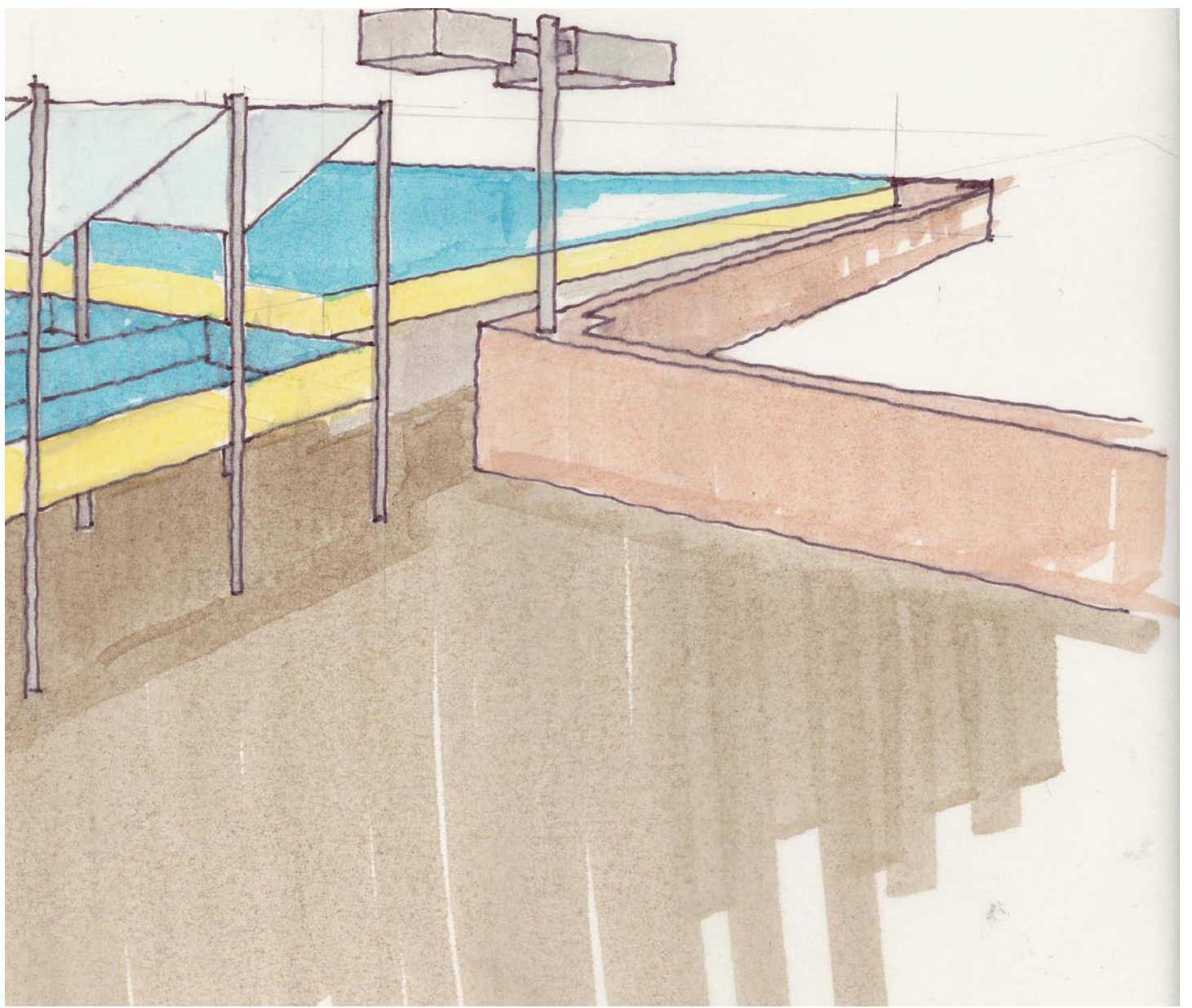


# Further Application of Design ideas

## Water Systems

Light pervious rain collectors mounted above hydroponic growing basins maximize valuable roof top real estate.





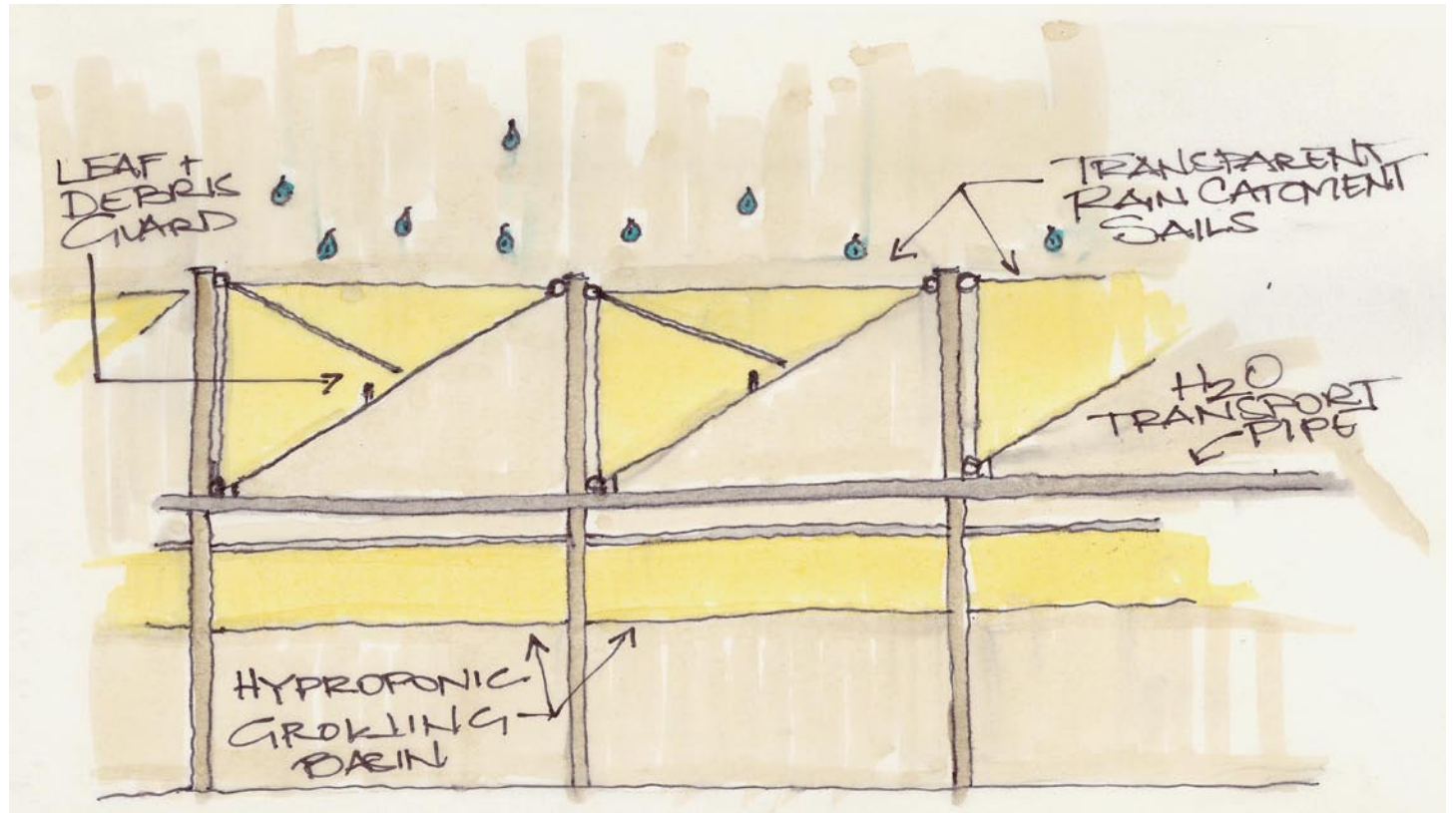


# Further Application of Design ideas

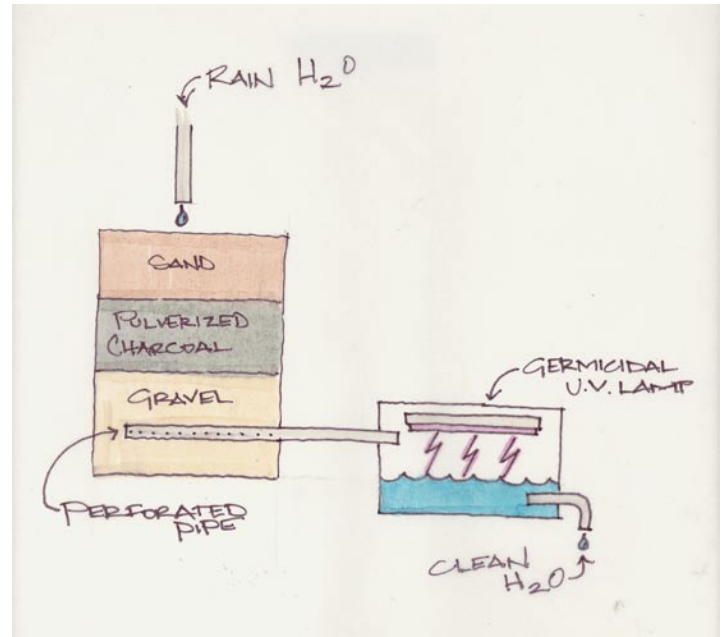
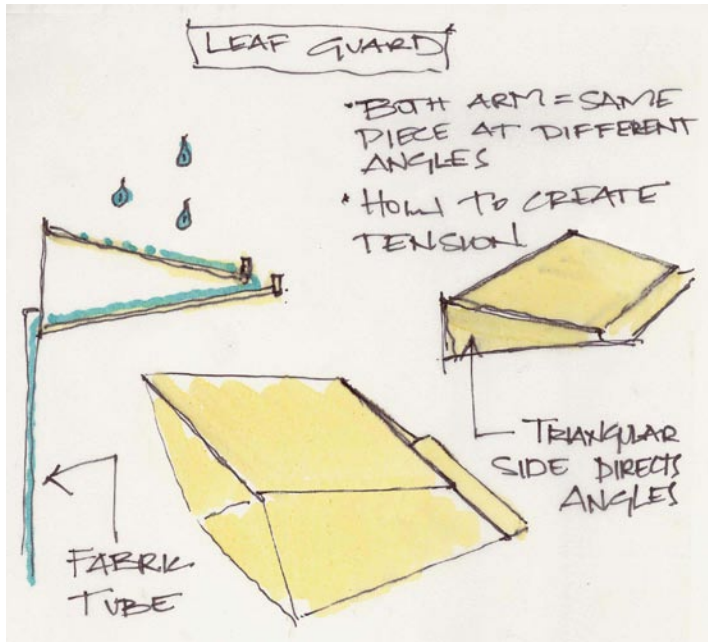
## Water Collection

Usually in disaster situations water is scarce and must be transported from other locations. These

water systems can be implemented easily and reduce dependence on imported basic necessities. Communities at high risk for disaster can have these systems ready to install when necessary.



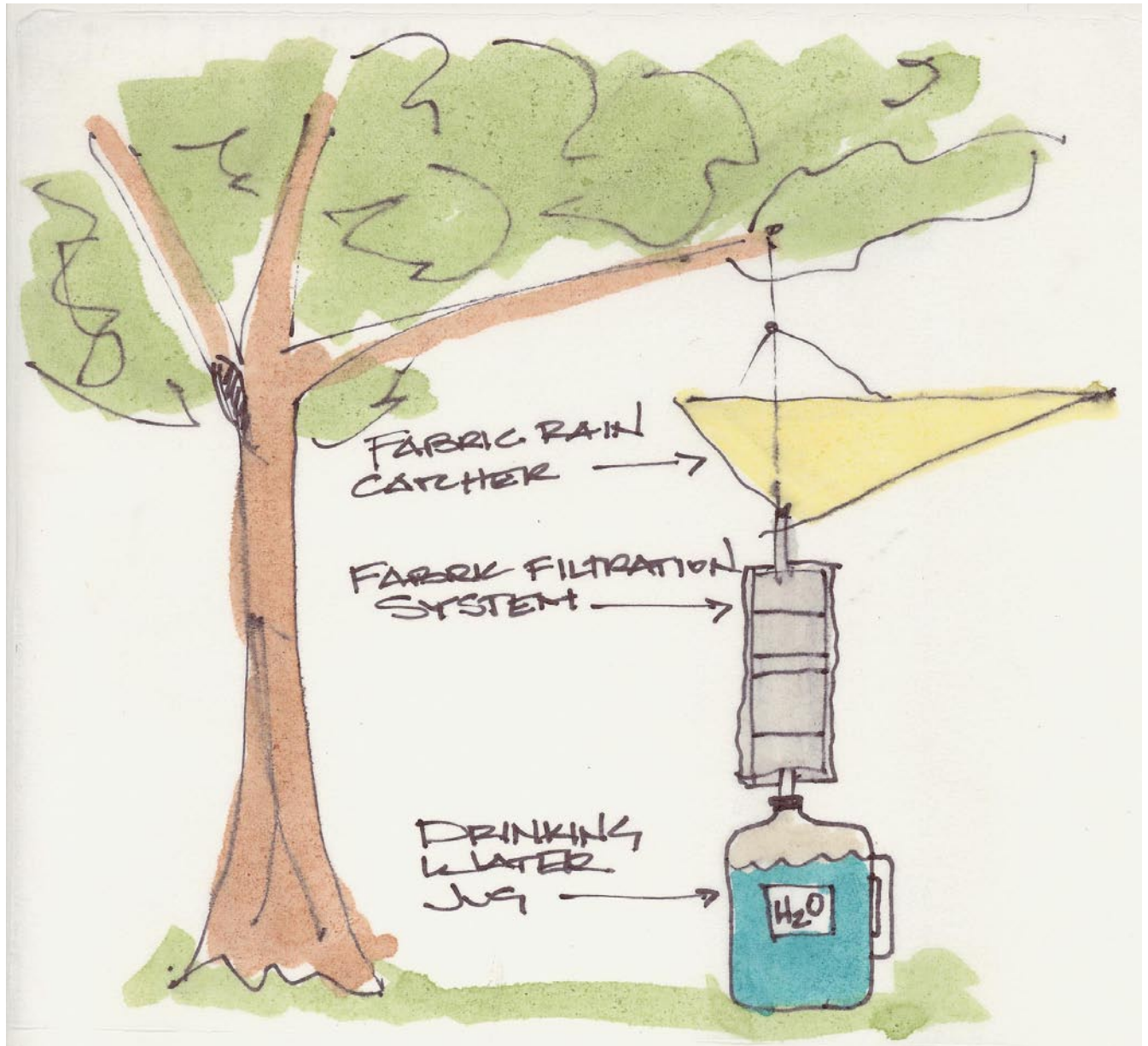


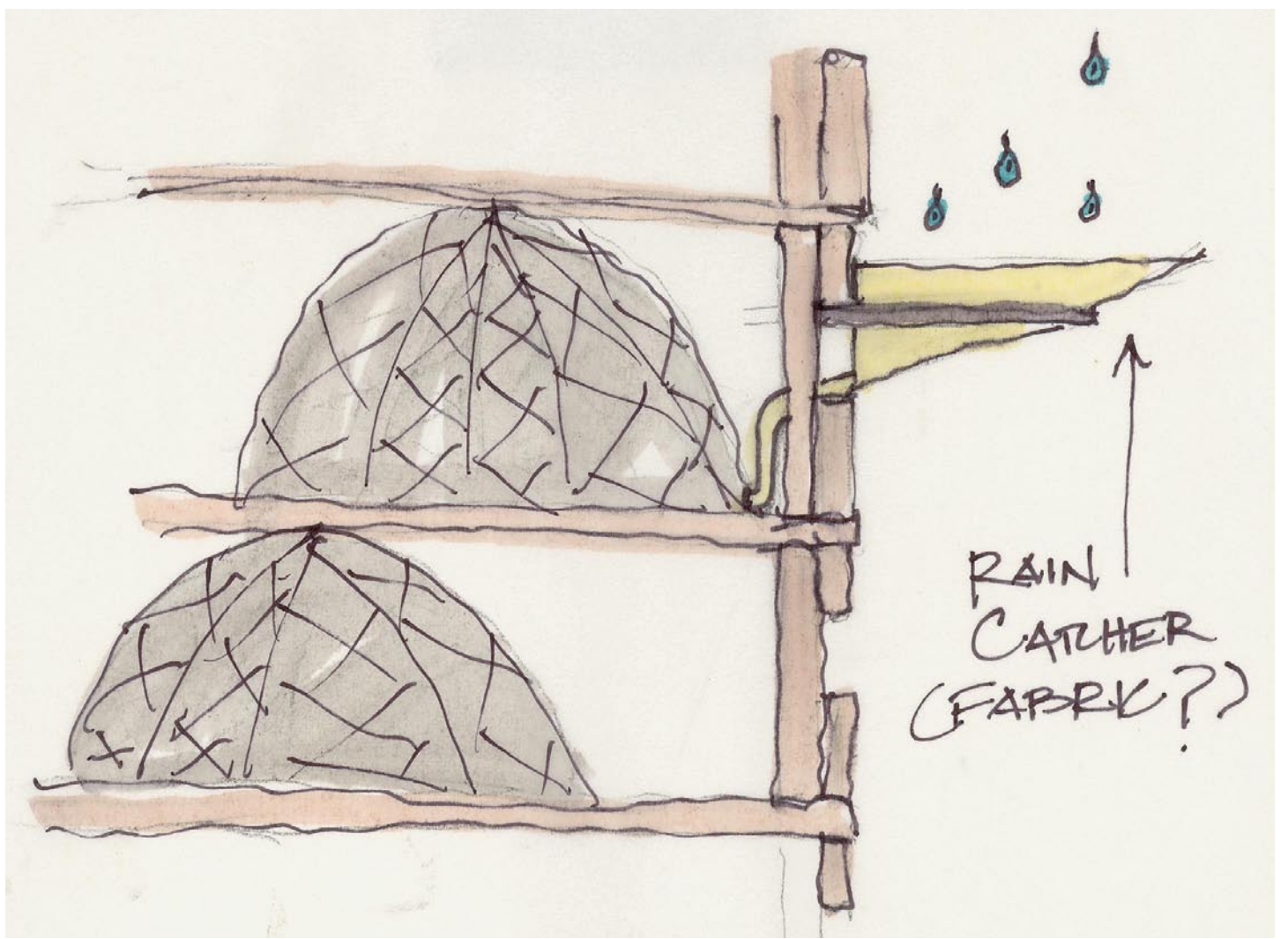


Water Filtration system

# Further Application of Design ideas

## Alternative Rain Collection Concepts





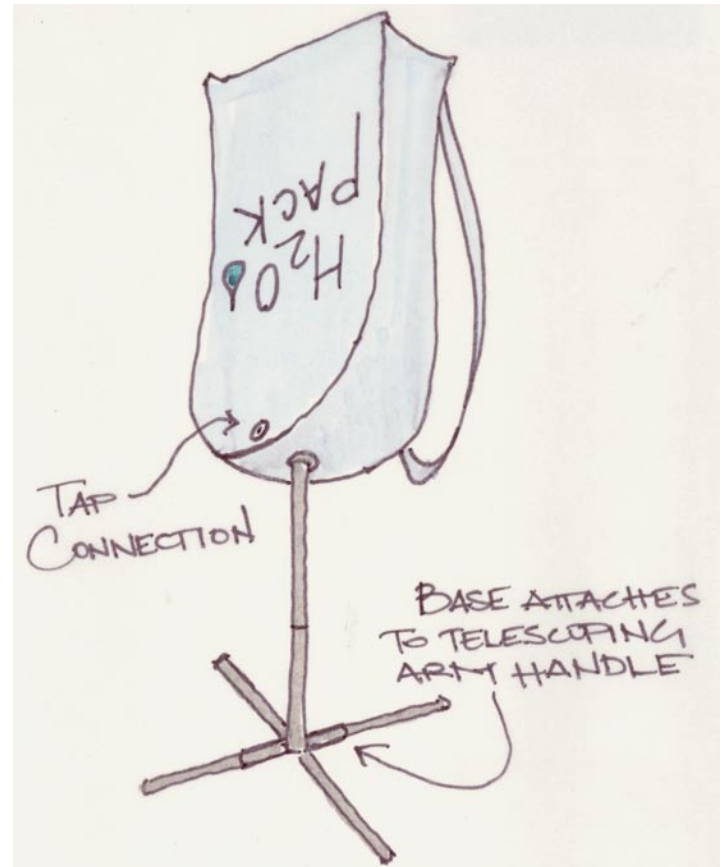
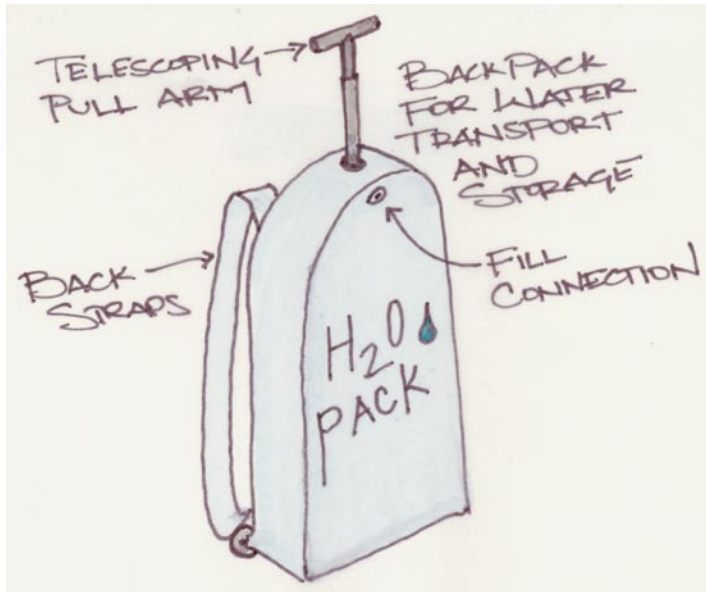
RAIN  
CATCHER  
(FABRIC?)

# Further Application of Design ideas

## H2O Pack

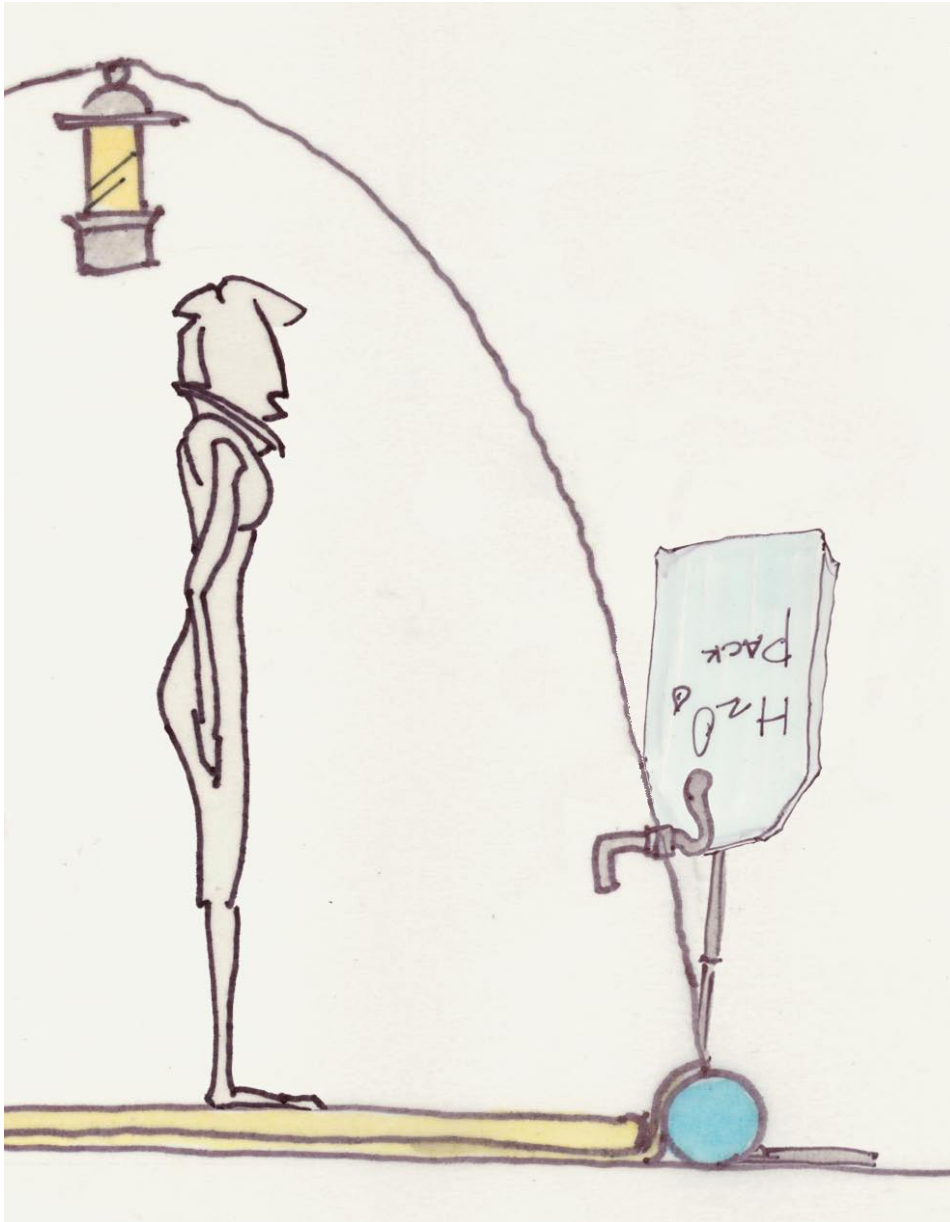
The H2O Pack makes transporting and storing water easy and convenient. The pack is similar to a

backpack with luggage wheels that can be carried or pulled. A single tap connection on the front is used for filling and draining. The telescoping pull handle doubles as a stand to elevate the pack and





create water pressure when draining. The pack also connects via small hose to a tap inside the Dome homes. Keeping the pack outside saves valuable interior space.



# Further Application of Design Ideas

## Clothing

Geometric system 2 is reinterpreted to create something wearable. Though conceptual, this

garment intends to show it is possible to design clothing that can be printed, shipped and then fabricated on site. The final garment is made from a single rectangular piece of cotton with the seaming

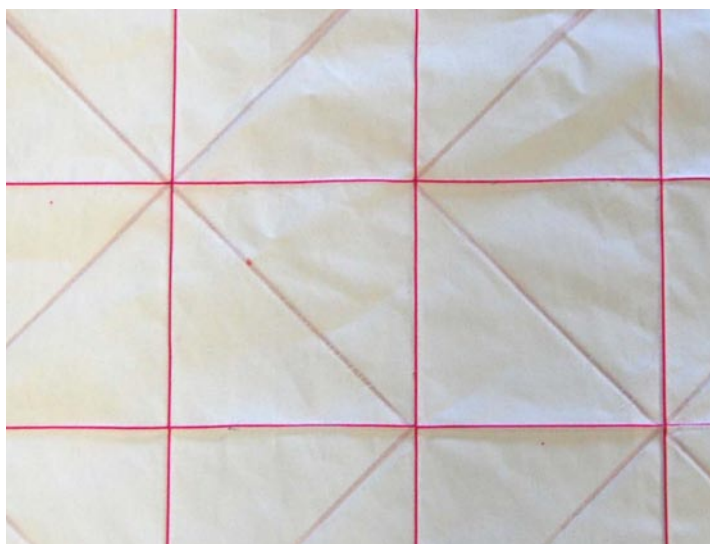


Original concept

patterns printed on the front and back.



partial dress mock up



pattern front  
pattern back

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  26. [http://www.youtube.com/watch?v=g\\_PrLoZBEbM](http://www.youtube.com/watch?v=g_PrLoZBEbM)
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