

Lighting systems design for temples using new technologies

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Cause

where the pain is felt and the need is triggered



Bhavani temple, Pratapgad



Bhavani temple, Pratapgad



Khidrapur Temple





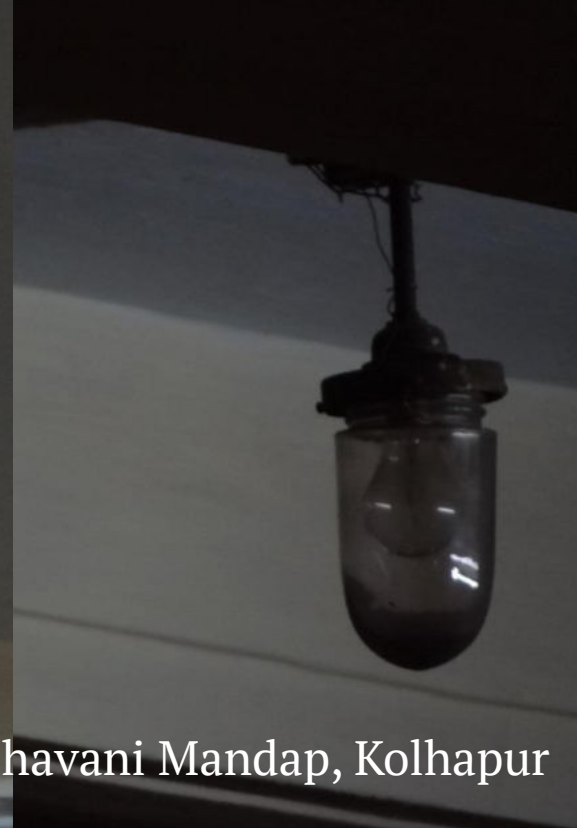
Amruteshwar Temple



Amruteshwar Temple



Bhavani Mandap, Kolhapur

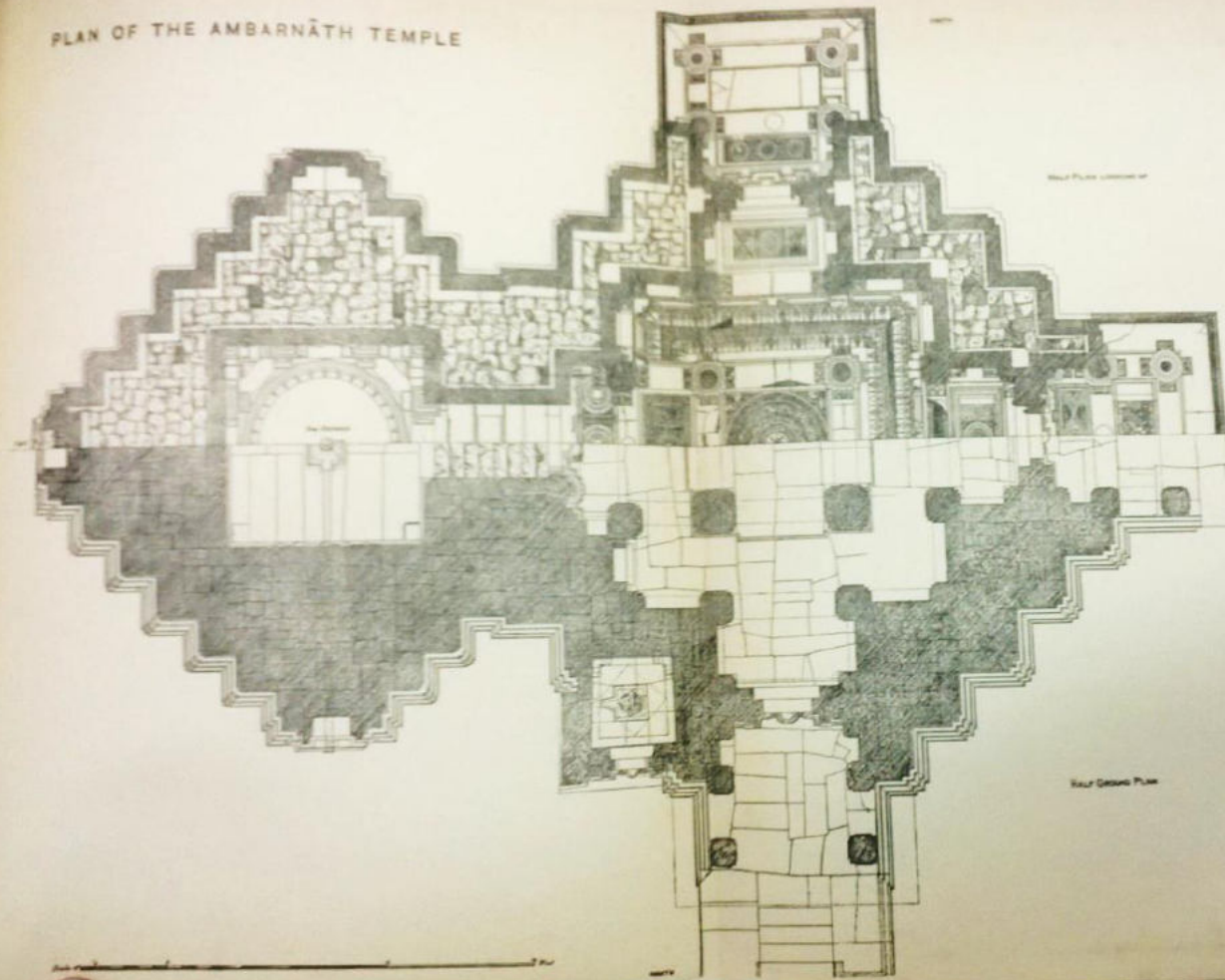


Bhavani Mandap, Kolhapur

Context

*where the product scenario is envisaged through
interaction with users and stakeholders*

PLAN OF THE AMBARNATH TEMPLE

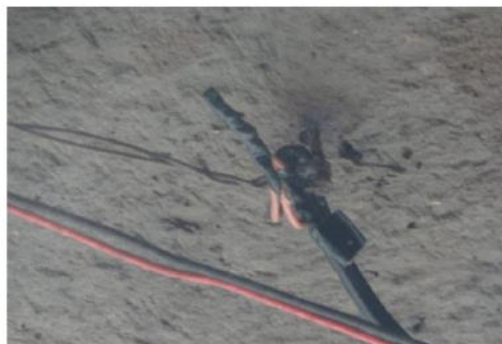
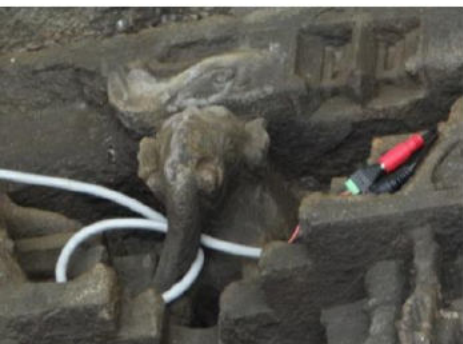


Ambarnath Temple
plans
(*'The Hindu Temple'* by
Stella Kramrisch)











४ प्राचीन स्मारक १९५८ च्या २४ व्या प्राचीन स्मारके आणि पुरातत्वीय स्थळे व अवशेष अधिनियमान्वये राष्ट्रीय महत्त्वाचे म्हणून जाहीर करण्यात आलेले आहे. जर कोणी या त्याला धोक्यात आणेल ती व्यक्ती तीन महिन्यांपर्यंत कारावास किंवा ५०००/- स्वयंपादकीय नो किमान, निर्यात ३२ अन्वये, प्राचीन स्मारक, पुरातत्वीय स्थळे आणि अवशेष अधिनियम १९५८ अन्वये विरक्षित सामान्यतः या सीट लव १०० मीटर पर्यंत आणि १०० मीटर पर्यंत आणित

Comprehension

*where the observations, perceptions of issues and causes
lead to what forms a basis for design intervention*

- Lack of knowledge
- Neglect
sheer number of files on the ASI desk
lighting aspect 'taken for granted'
fast food culture
- Conventional systems
established
fail-safe perceptions
- Lack of collaboration

Check

*where the essential requirements that the product caters to
and the problems it proposes to solve are 'checked'*

Light sources

Conventional light sources

- Incandescent bulbs, tubelights, halogen lamps, CFLS
- Easily available
- Replaceable
- Inaccurate color temperatures

Light sources

Reflectors

- Could be programmed to direct sunlight into the temple throughout the day
- requires backup at night
- Visually obstructive

Light sources

Fiber optics

- Silent light transmission
- Prone to attenuation

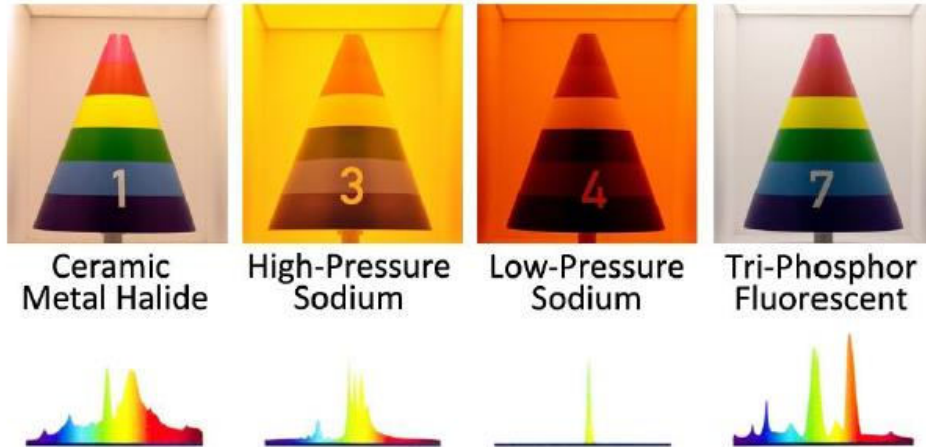
Light sources

Light emitting diodes (LEDs)

- Efficient
- Longlife
- High intensities of light possible
- Requires proper heat dissipation
- Special driver circuits needed
- High initial costs

Light sources

Light emitting diodes (LEDs)



Source: http://sustainabilityworkshop.autodesk.com/sites/default/files/styles/large/public/core-page-inserted-images/rainbow_cones_n_spectra_labeled.jpg

Color Rendering Index (CRI) quantitative measure of the ability of a light source to reproduce the colors of various objects faithfully in comparison with an ideal or natural light source.



Source: en.wikipedia.org/wiki/File:Incand-3500-5500-color-temp-comparison.png

Correlated Color Temperature (CCT)
apparent color temperature

Fixtures

Form:

- Non obtrusive
- Minimalistic
- Preferably neutral
- functional

Fixtures

Materials:

- Die cast aluminium
- Copper
- Bronze
- Brass

Fixtures

Type:

- Gel
- Adhesive
- Clamp-ons
- Suspended
- floating

Power supply systems

Possible wireless technologies:

- Induction
- Radio waves
- Light (Power beaming)
- Conduction through air
- Evanescent wave coupling (resonant)- Witricity

Solar powered LED arrays

Efficient use of AC mains

Wiring

- Carefully designed and well routed electrical connections
- Sensitive use of space
- Proposed splitting up space into zones for wiring

Design Brief

Design Brief:

“Temples are in themselves special structures. No detail that is seen on the temple is arbitrary or superfluous. Each has a definite place and is a part of the whole.”

-Stella Kramrisch

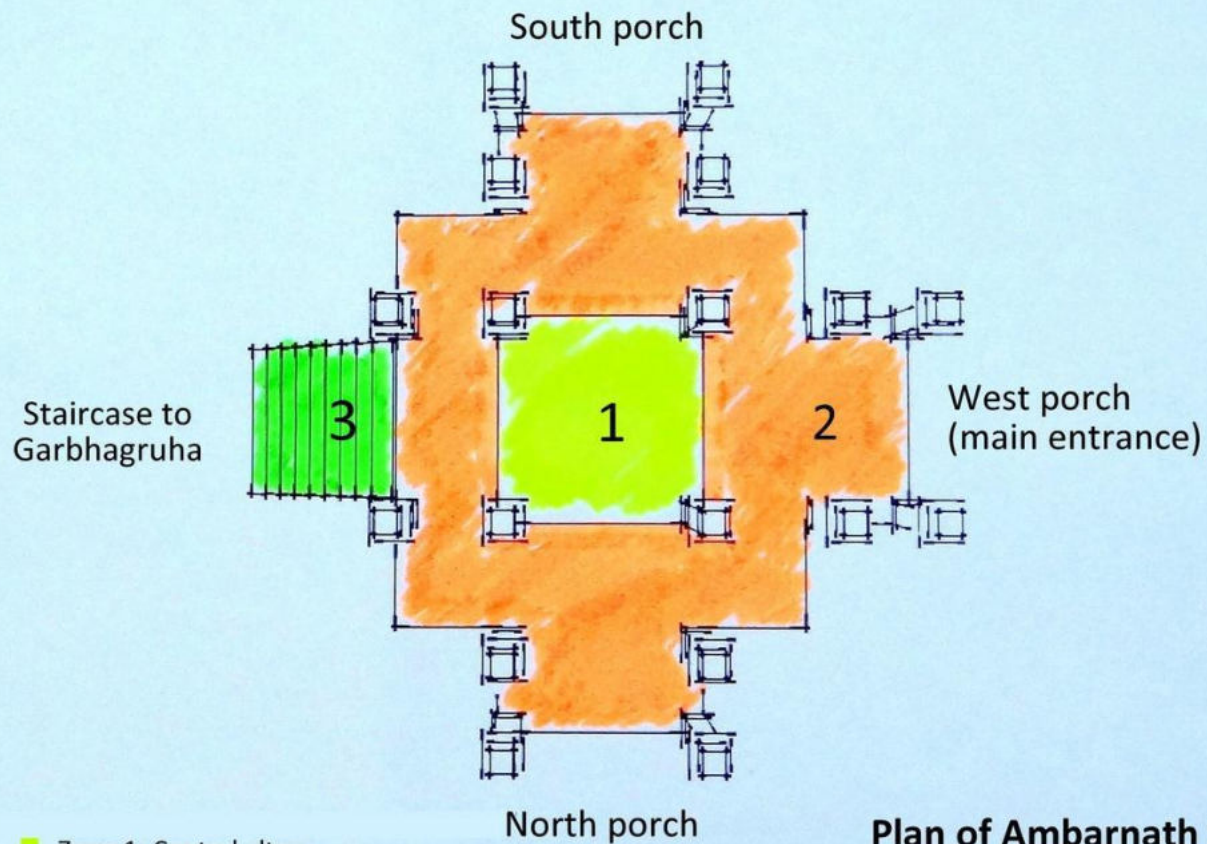
It hurts then to see an insensitive approach to the way temples across the country are lit up. The proposed lighting system should not compete with but complement the beauty of the temple. The wiring and fixtures should be unobtrusive and minimalistic. With context of ancient temples at least, the lighting systems should primarily accomplish basic task lighting and then venture to showcase the beauty of the temple. Also, the traditional way of lighting is a spiritual endeavour in itself, hence enough attention had to be paid to the process of creation of light. All this has to be achieved within Indian cultural context, and keeping in mind international standards of heritage conservation.

Conception

*where ideas are conceived, clustered
and one all-encompassing concept is searched for*

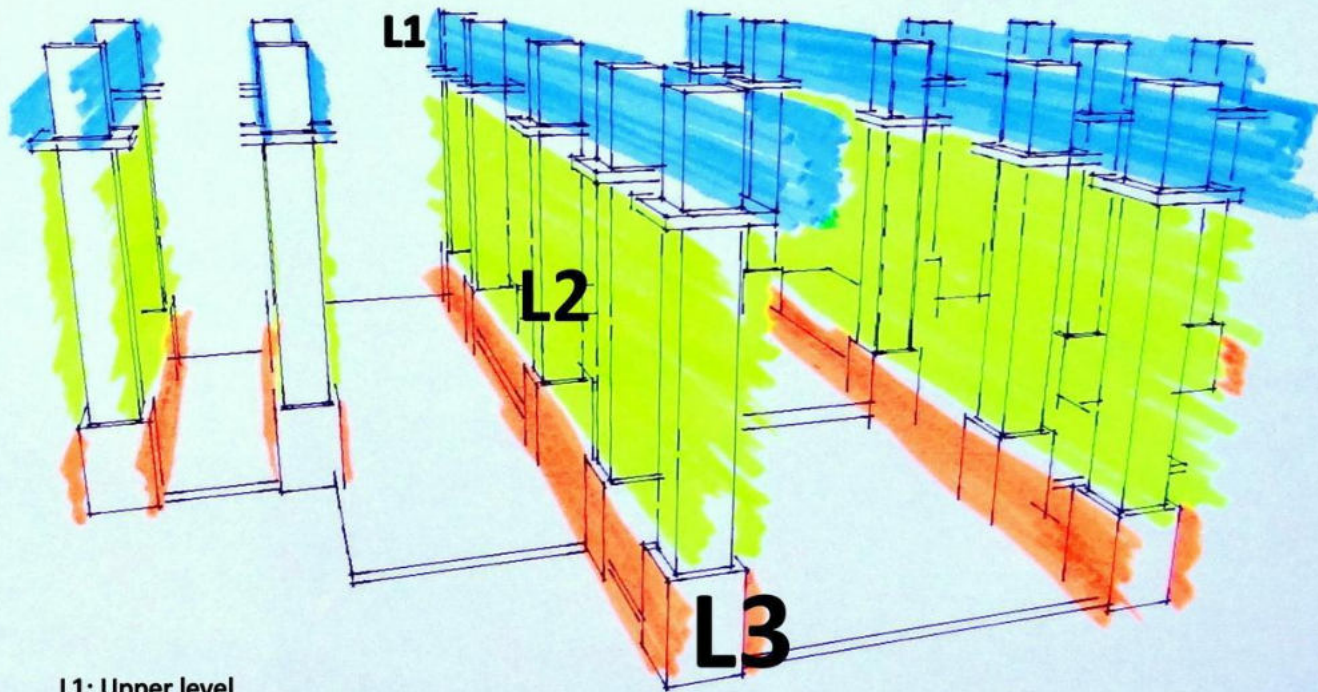
Light planning:

- Splitting into three zones
- Both vertical and horizontal spaces included
- Movement of human traffic through the space

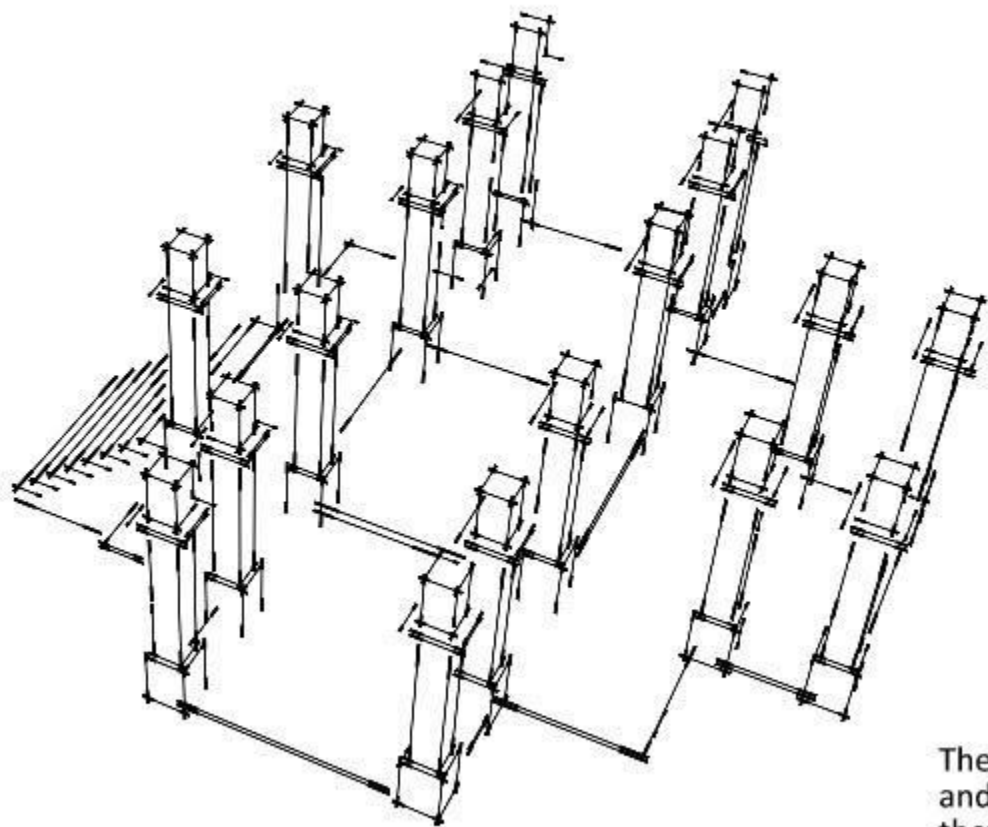


- Zone 1: Central altar
- Zone 2: Sabhagruha
- Zone 3: Stairs descending into Garbhagruha

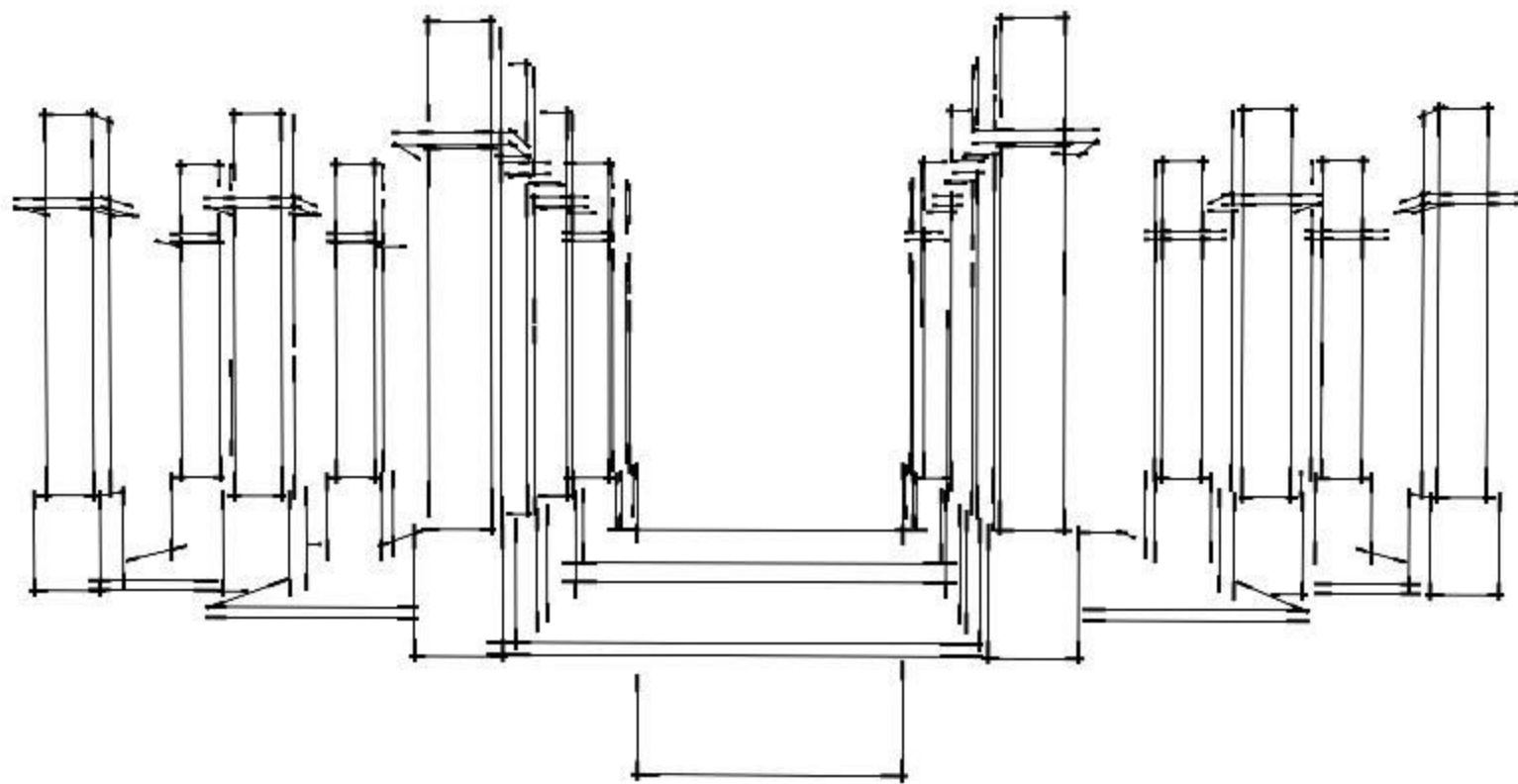
**Plan of Ambarnath temple
(not to scale)**



L1: Upper level
L2: Central level
L3: Lower level

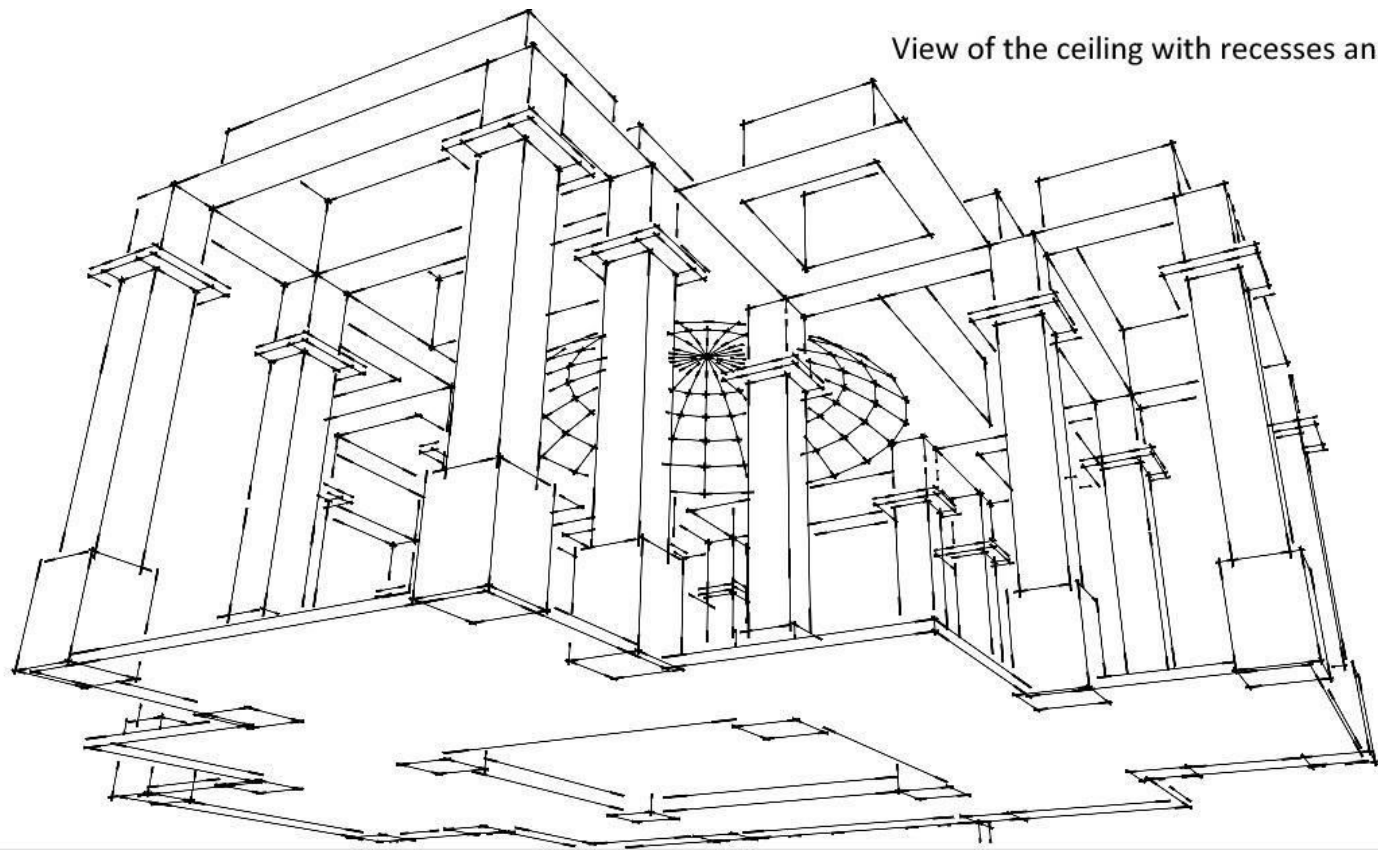


The cluster of 18 pillars
and the scope of space
they provide for lighting

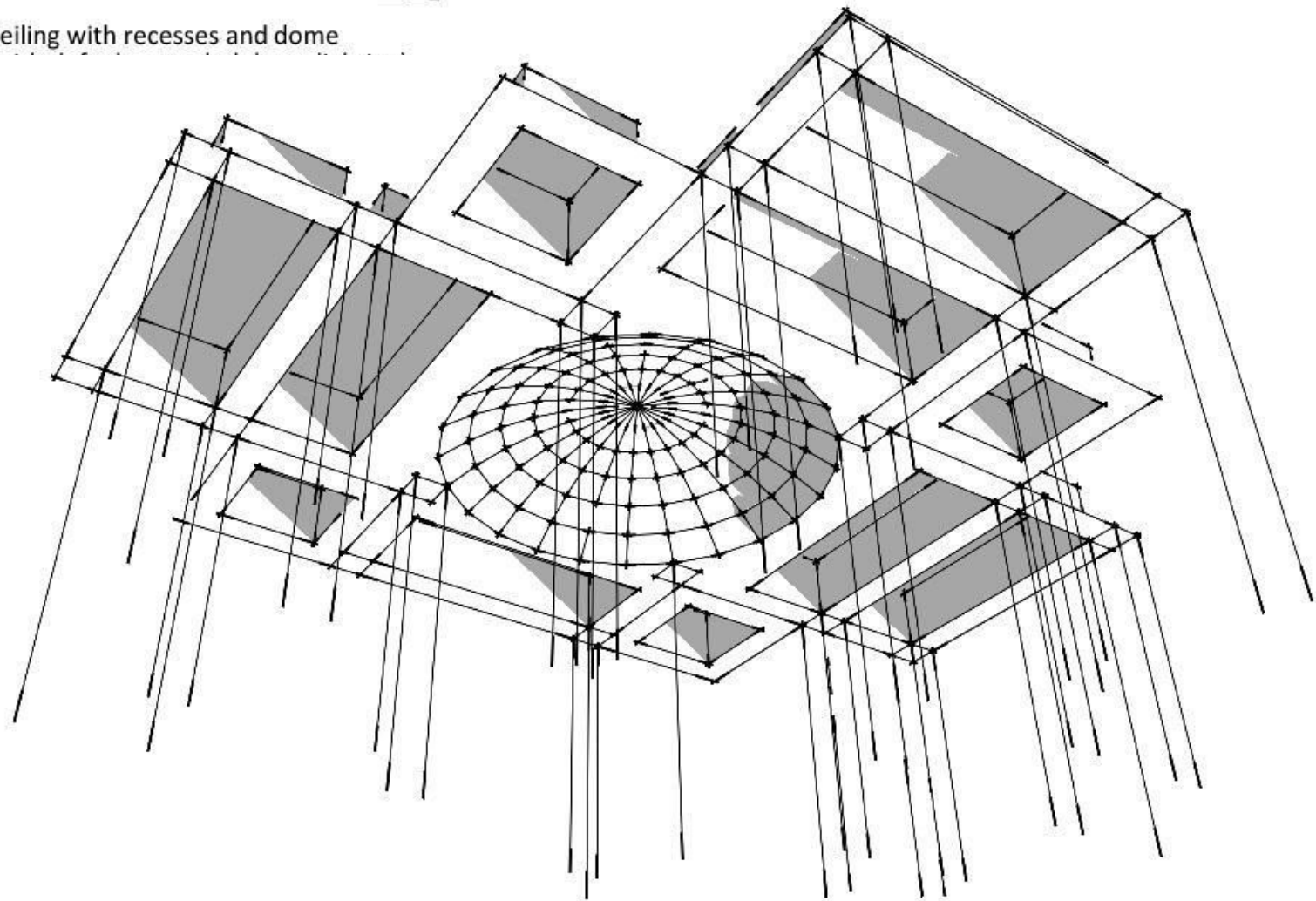


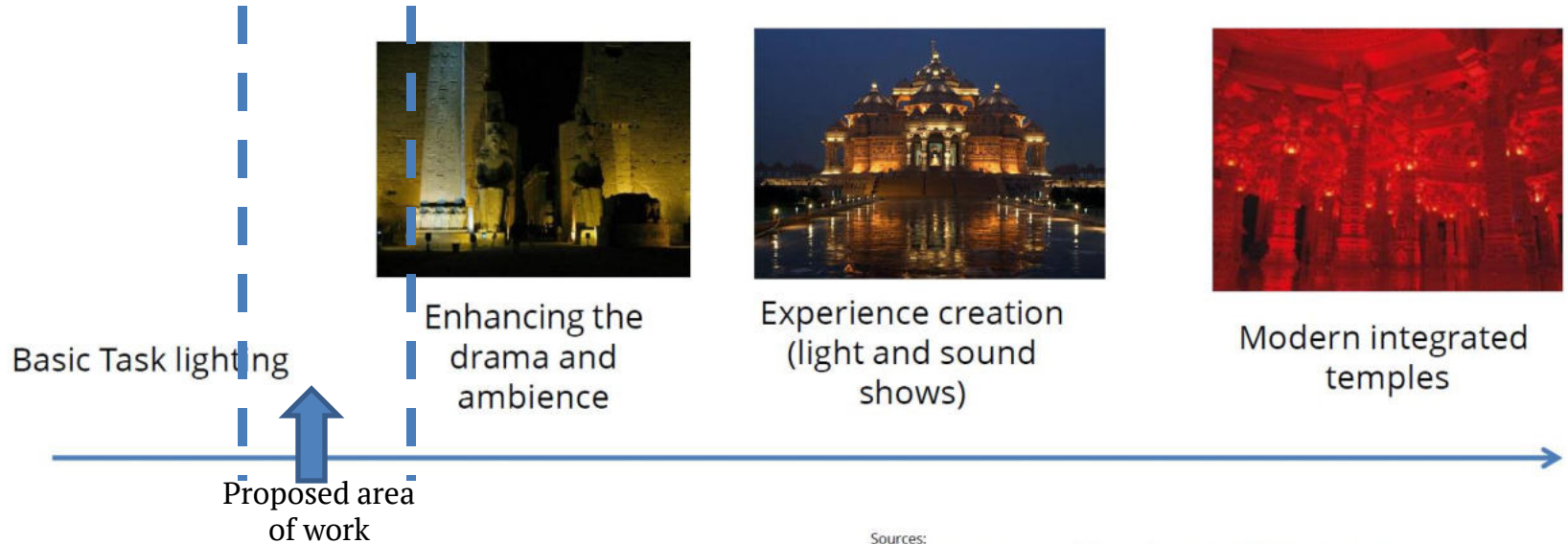
Typical view on entry from the west porch

View of the ceiling with recesses and the dome



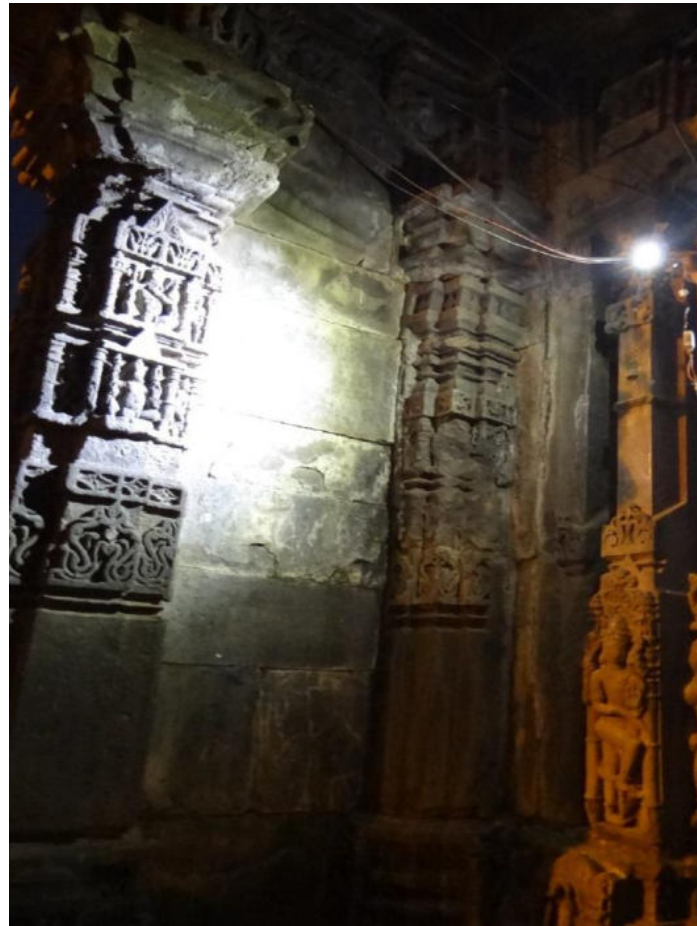
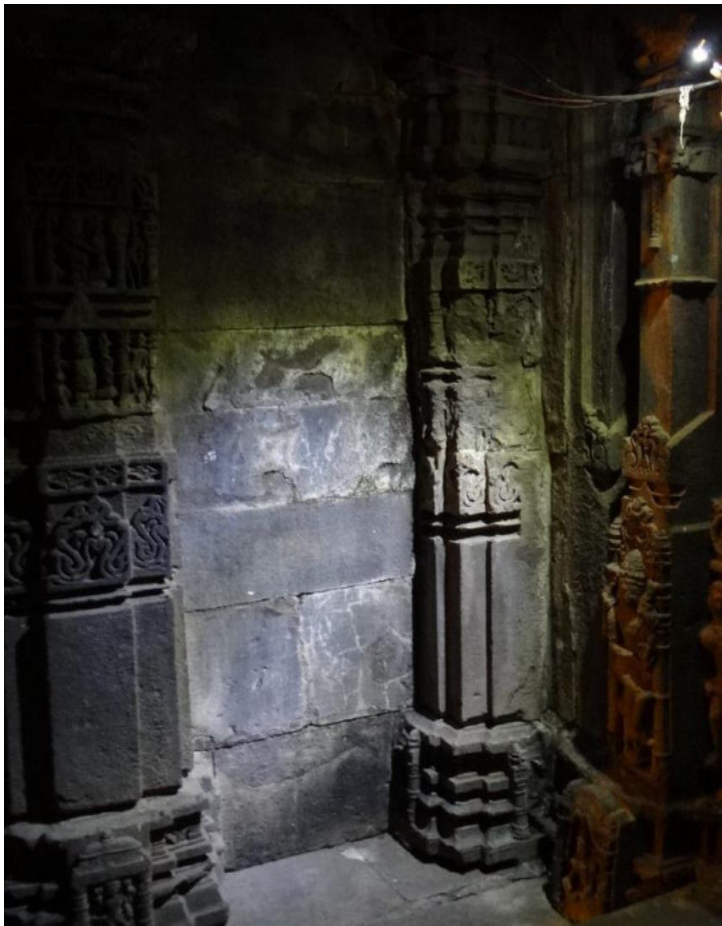
Ceiling with recesses and dome





Sources:

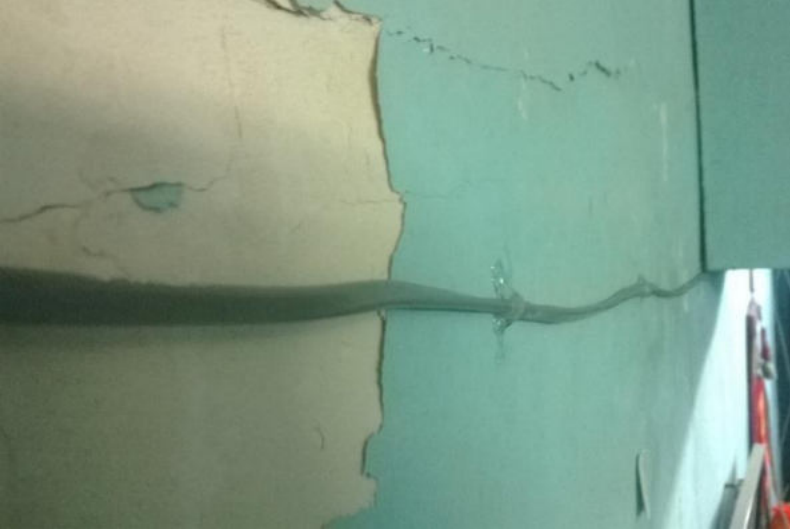
1. <https://www.buildings.com/article-details/articleid/5609/title/template-of-light.aspx>
2. http://siliconindia.com:81/travelcity/images/special_images/lu907E630egyAUC.jpeg
3. http://3.bp.blogspot.com/-EspjZKWdwNk/Tcb0xanx4tl/AAAAAAAAACps/Diz9qA7Jao8/s1600/Night_Luxor_Entrance.JPG



Spot lighting demos on-site



Diffused lighting demos on-site



Wiring demos:

- Wire routed using hot glue gun
- Light fixtures mounted by 3M tape

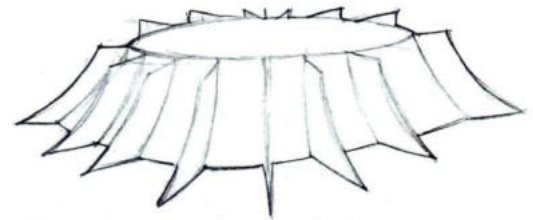
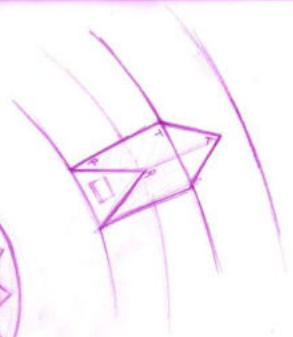
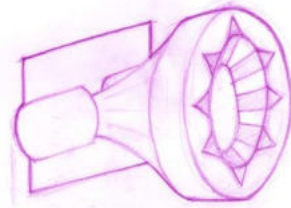
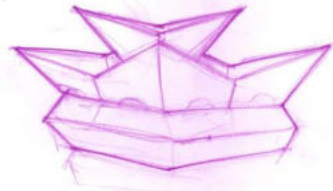
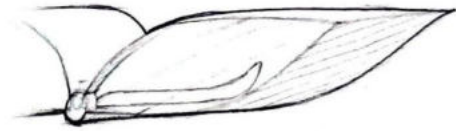


Design directions:

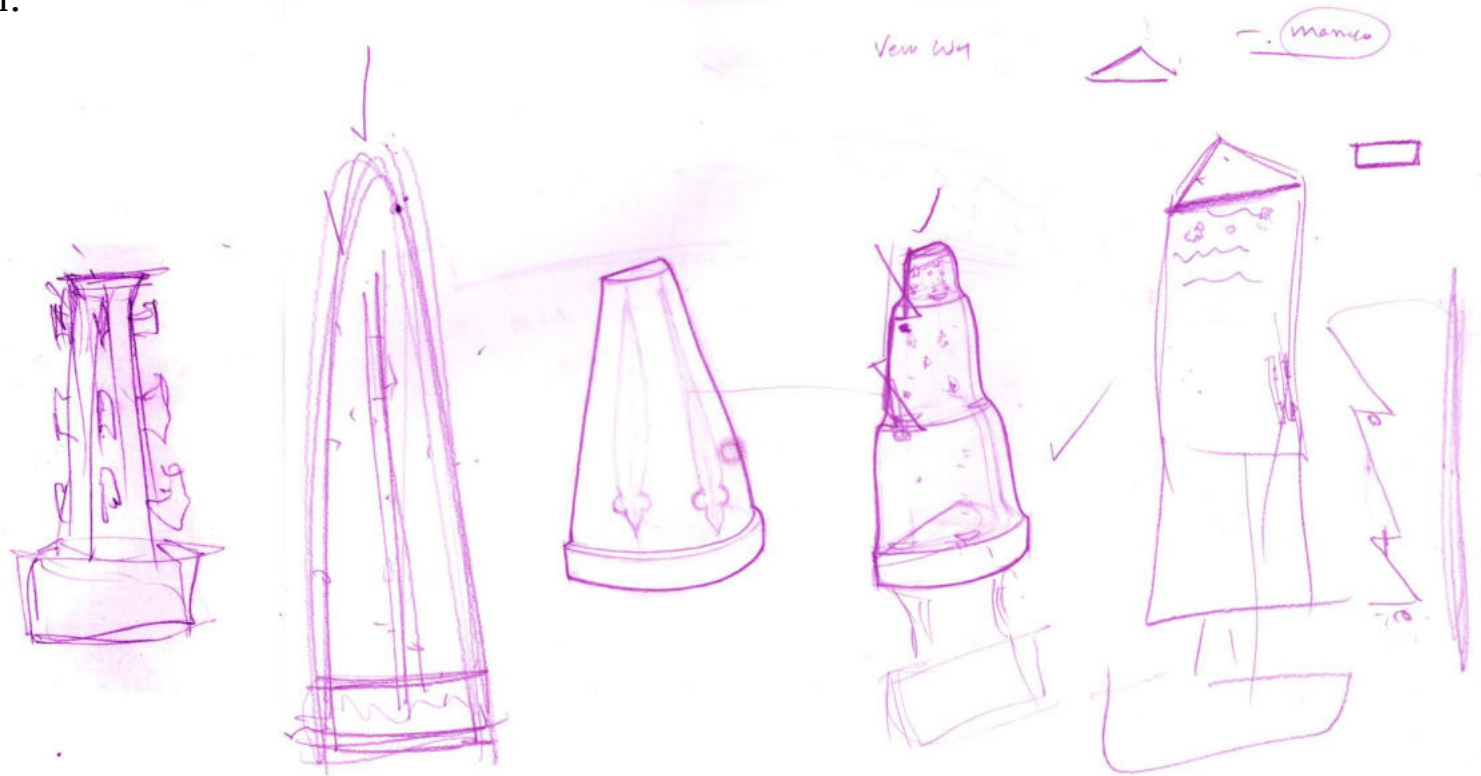
- Traditional diya
- Deepstambh
- Neutral fixtures



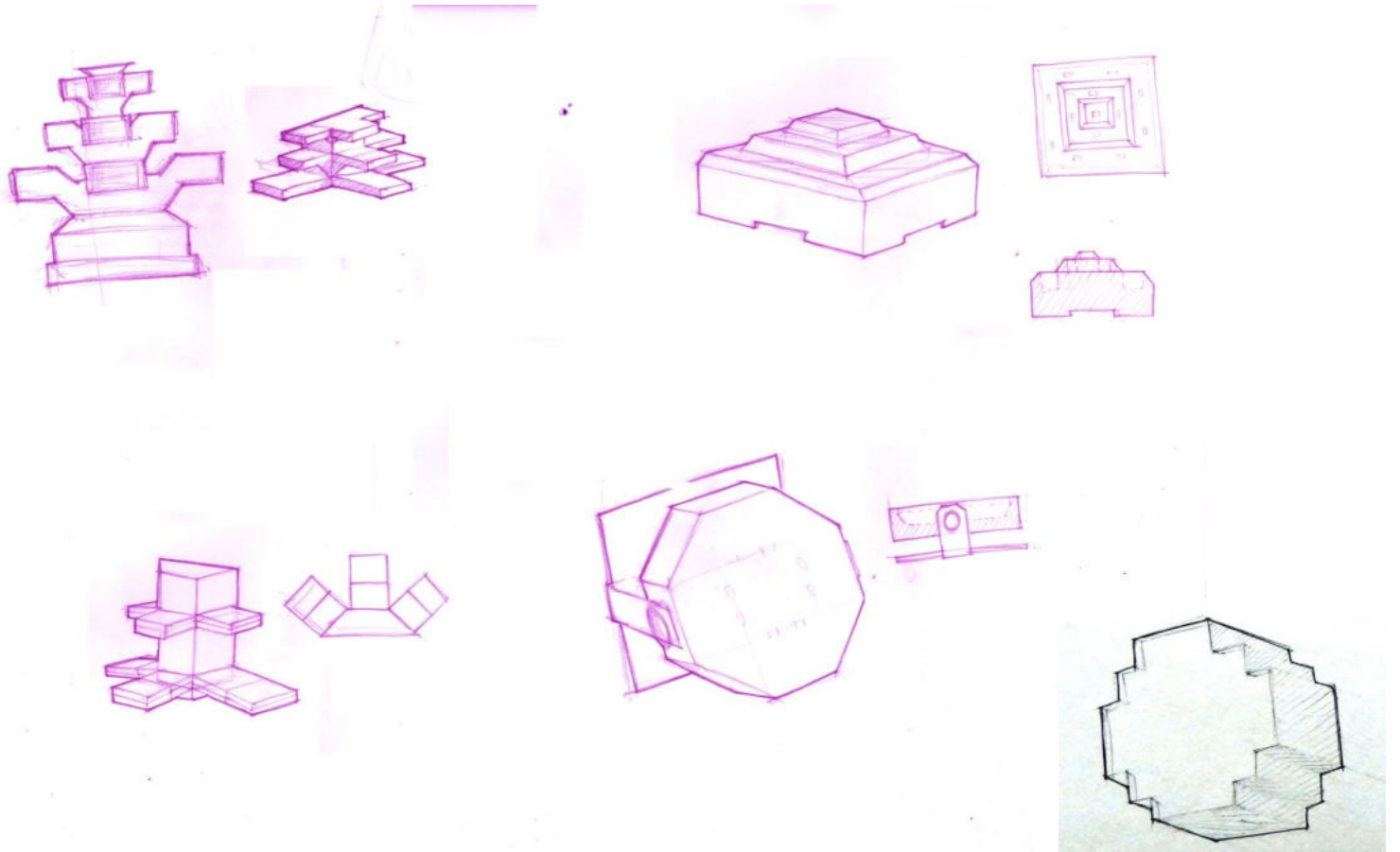
Traditional Diya:



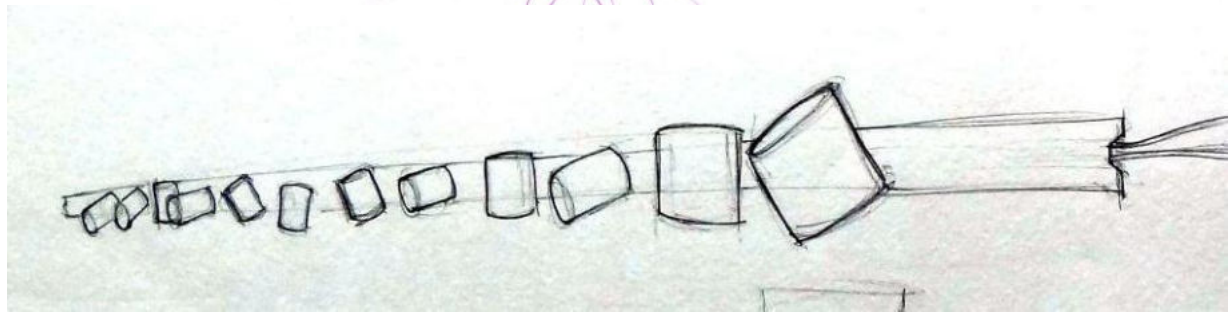
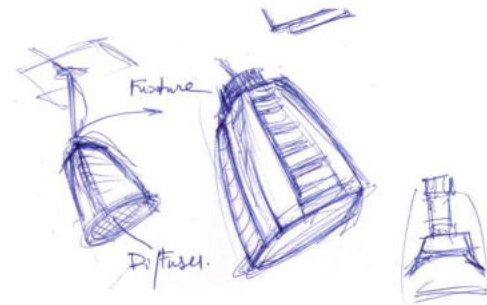
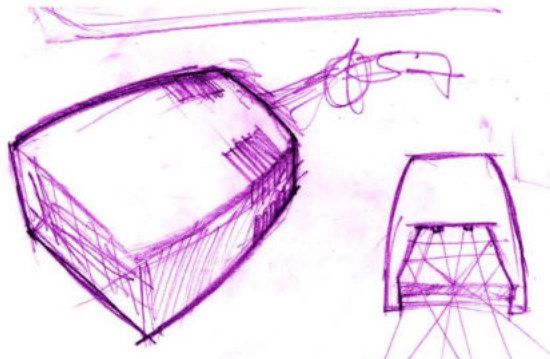
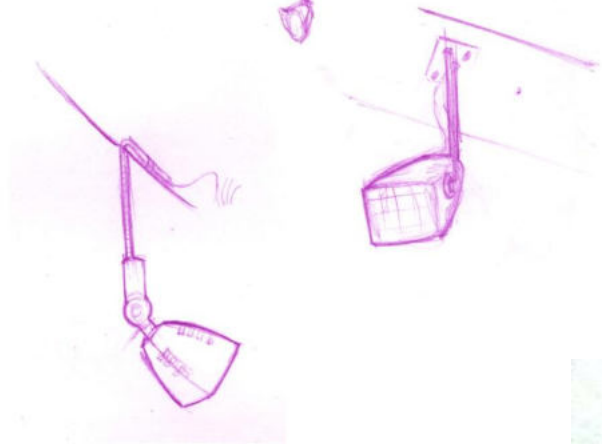
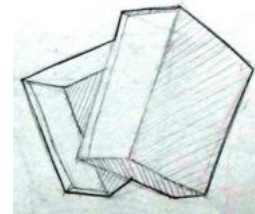
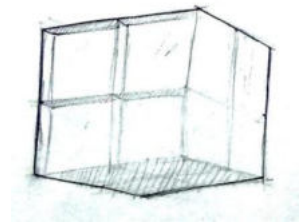
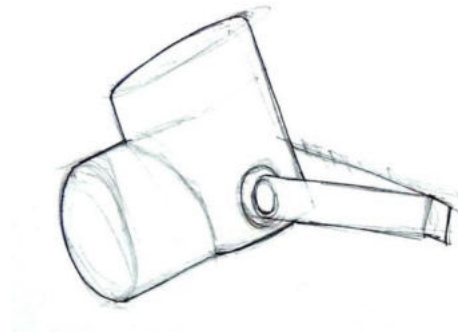
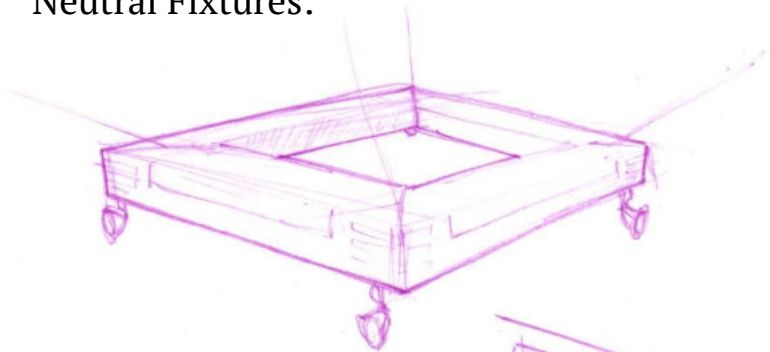
Deepstambh:



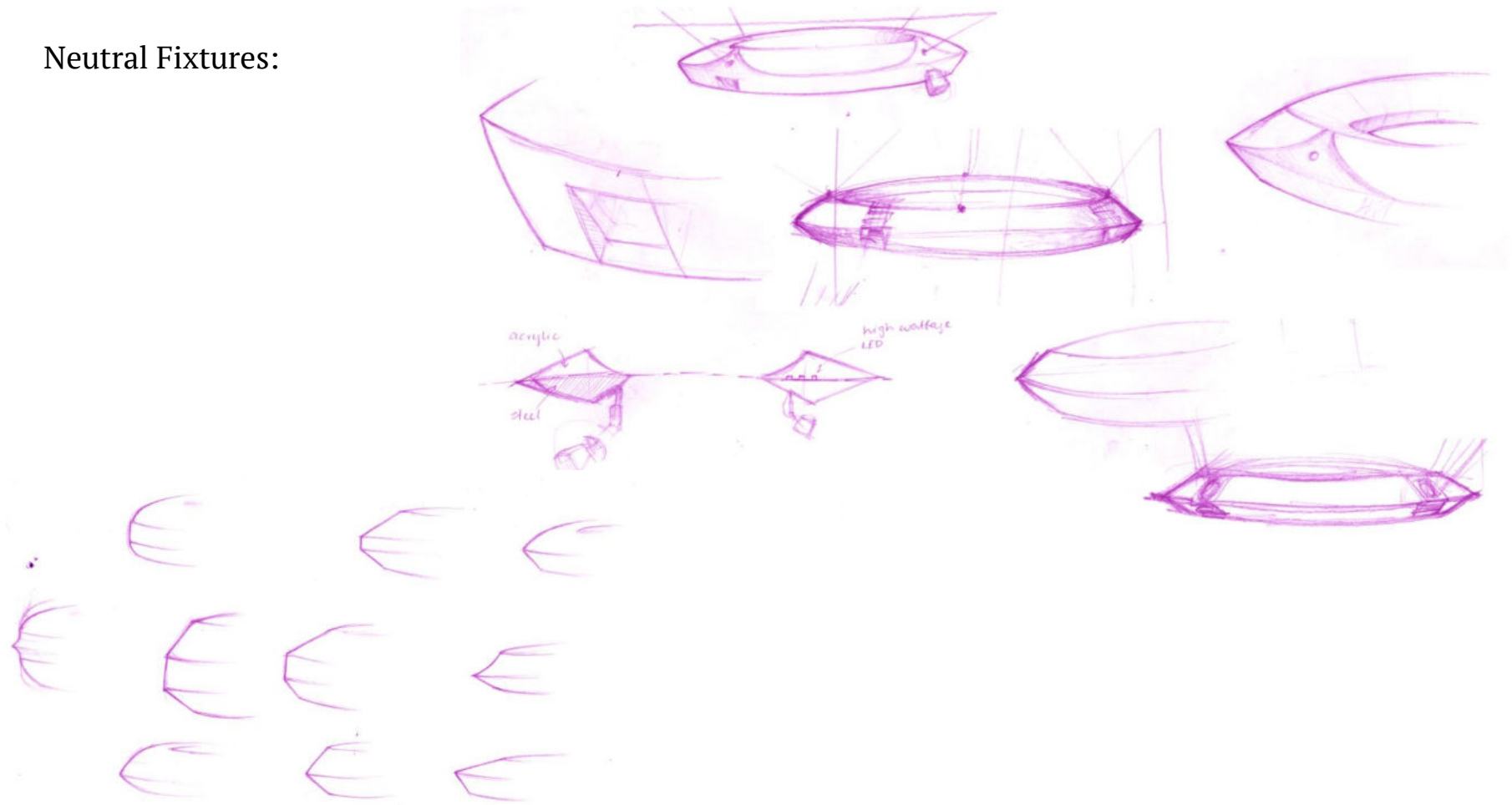
Deepstambh:



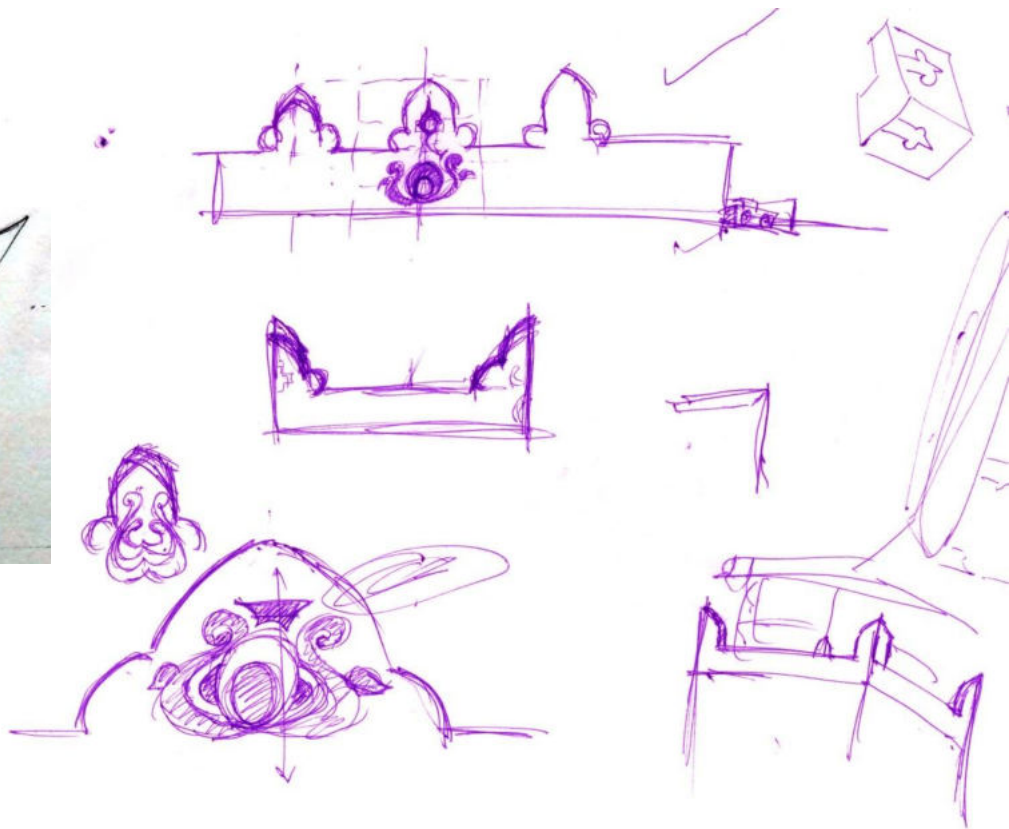
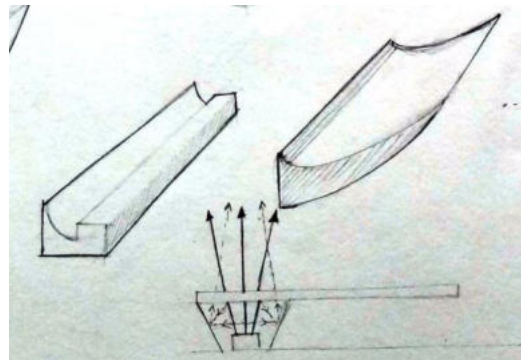
Neutral Fixtures:



Neutral Fixtures:

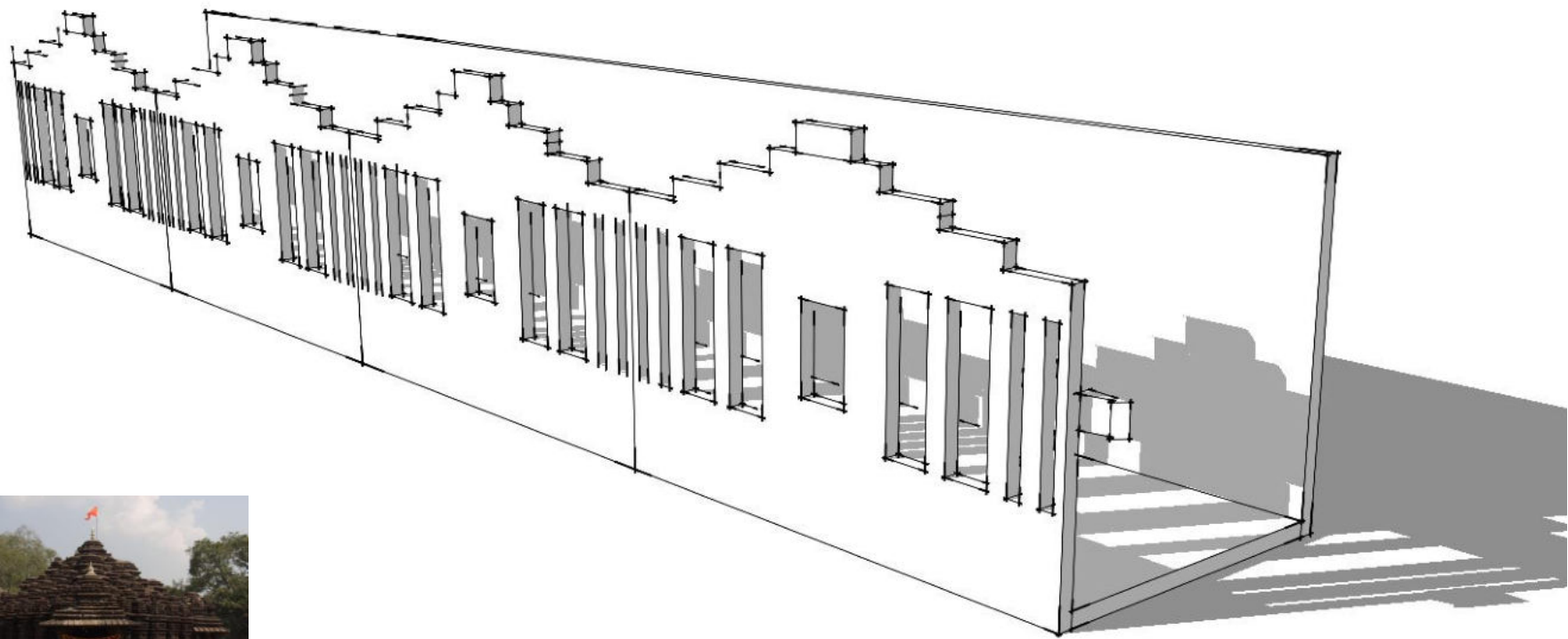


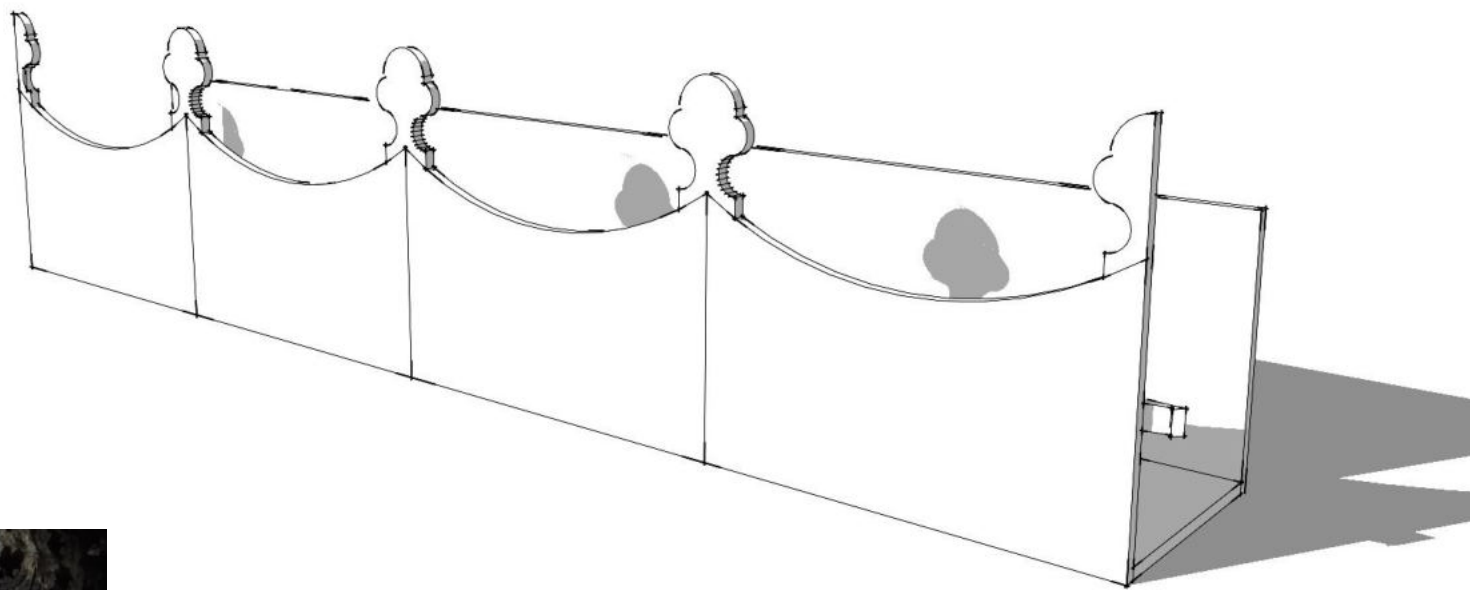
Neutral Fixtures:

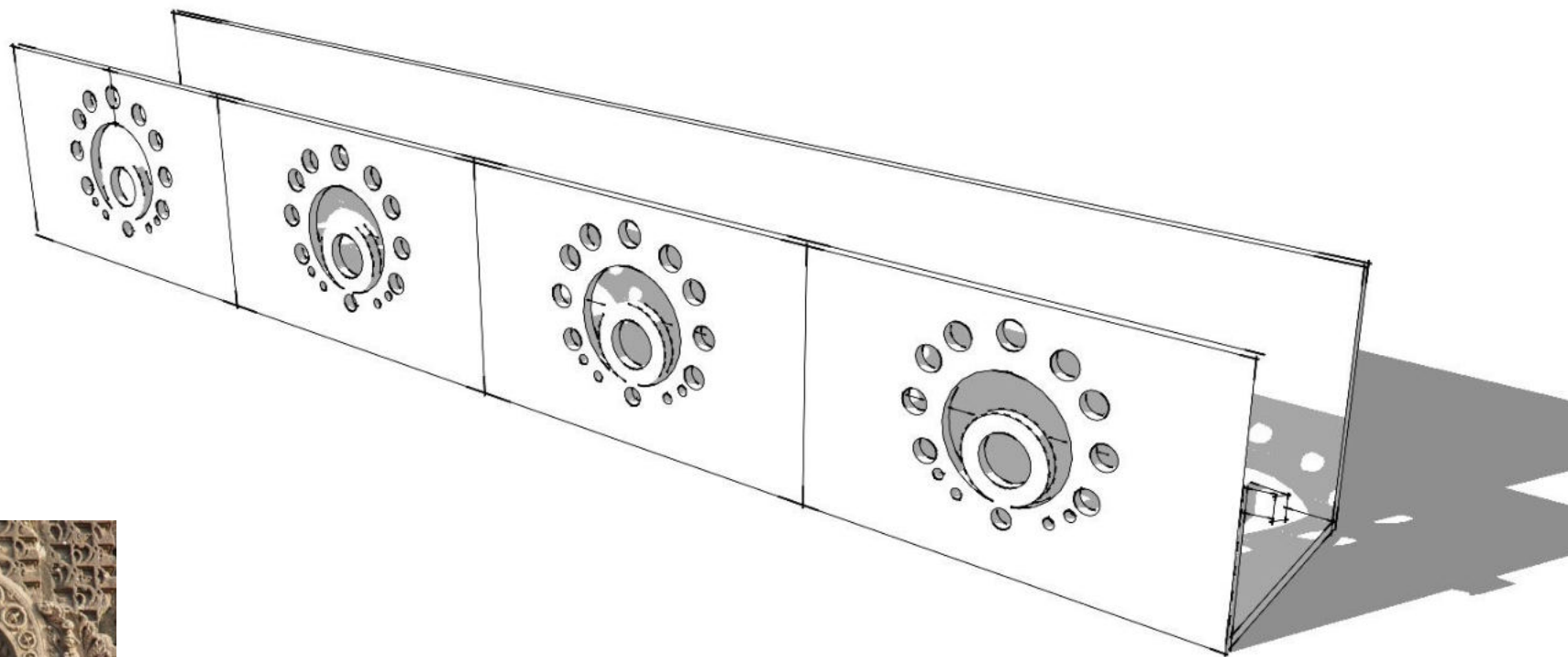


Concept Evaluation

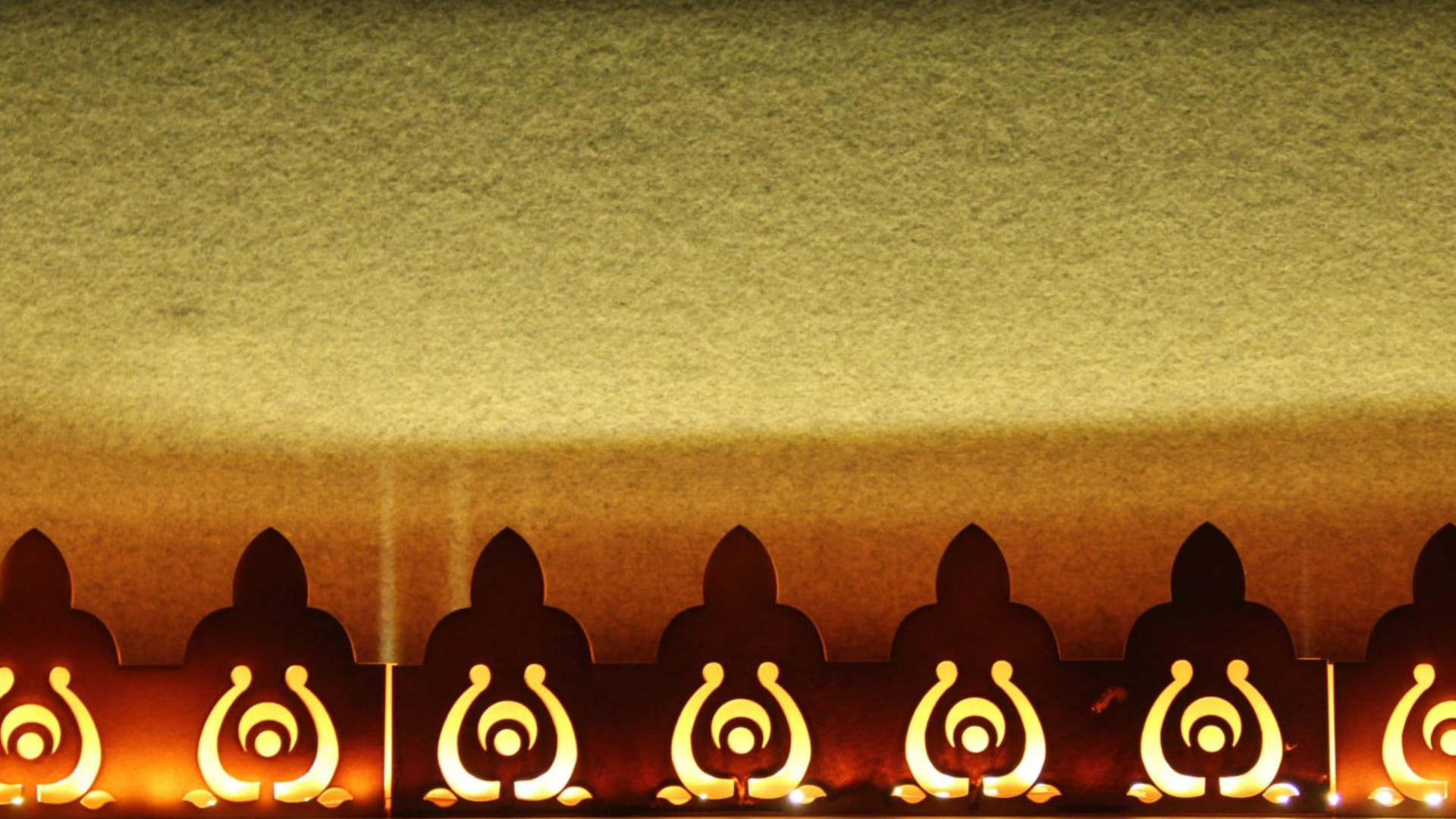
Concept	Traditionalism	Minimalistic	Unobtrusive	Light Quality	Mounting	Ease Of Crafting
Diya	9	2	3	6	6	4
Deepstambh	7	3	3	6	4	5
Neutral Fixtures	2	7	7	7	6	5











Details of lighting

Pillar height:

Zone 1- 3m

Zone 2:-2.5m

Dome height: 5m

Height of installation: between 2.5-3m



Crafting

where final concept is further refined against various criteria like use of material and manufacturing limitations based on various factors

- Copper sheet details: 22mil (anything above 10 mil) gauge 16 ounce sheet
- Could utilise synergy of small scale copper workshops located across the country
- Tie-up with LED manufacturers
- Adjustable length of modules as per site

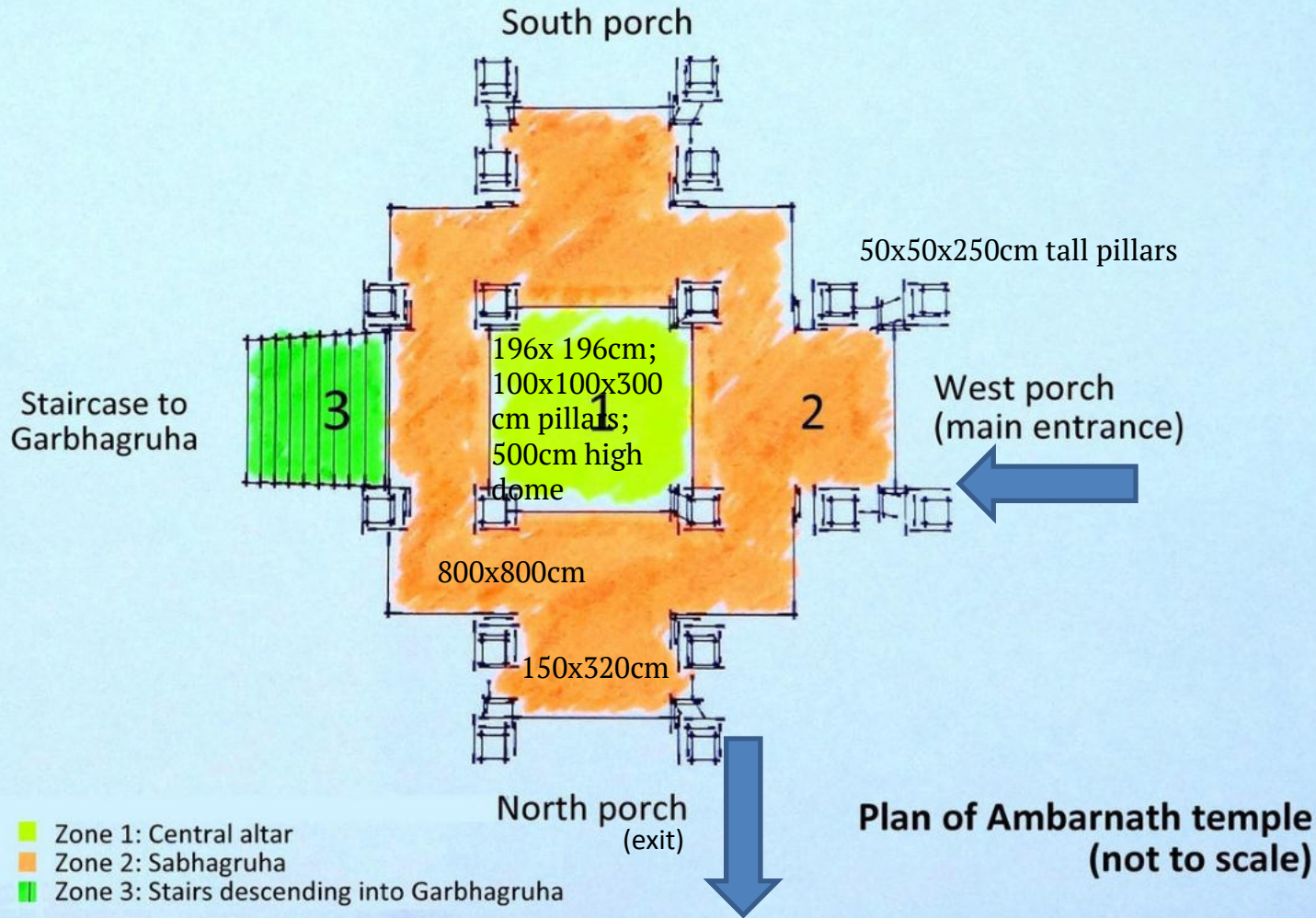
Thank you

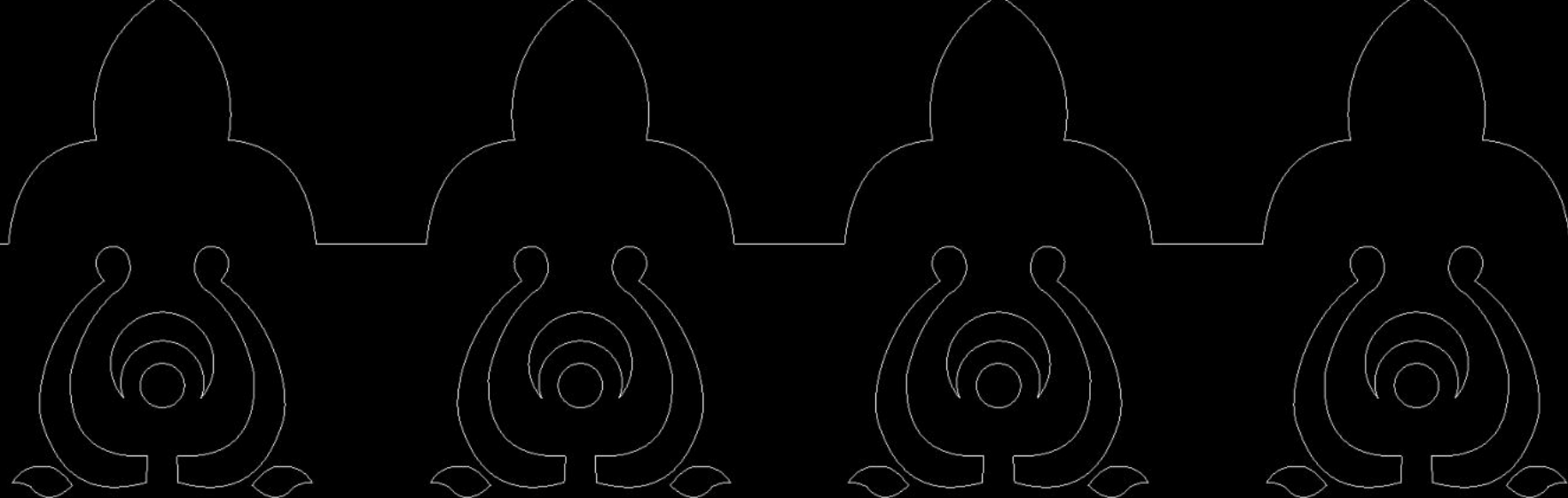
Adhesive Removal



Source:
<http://www.audipages.com/upgrades/>

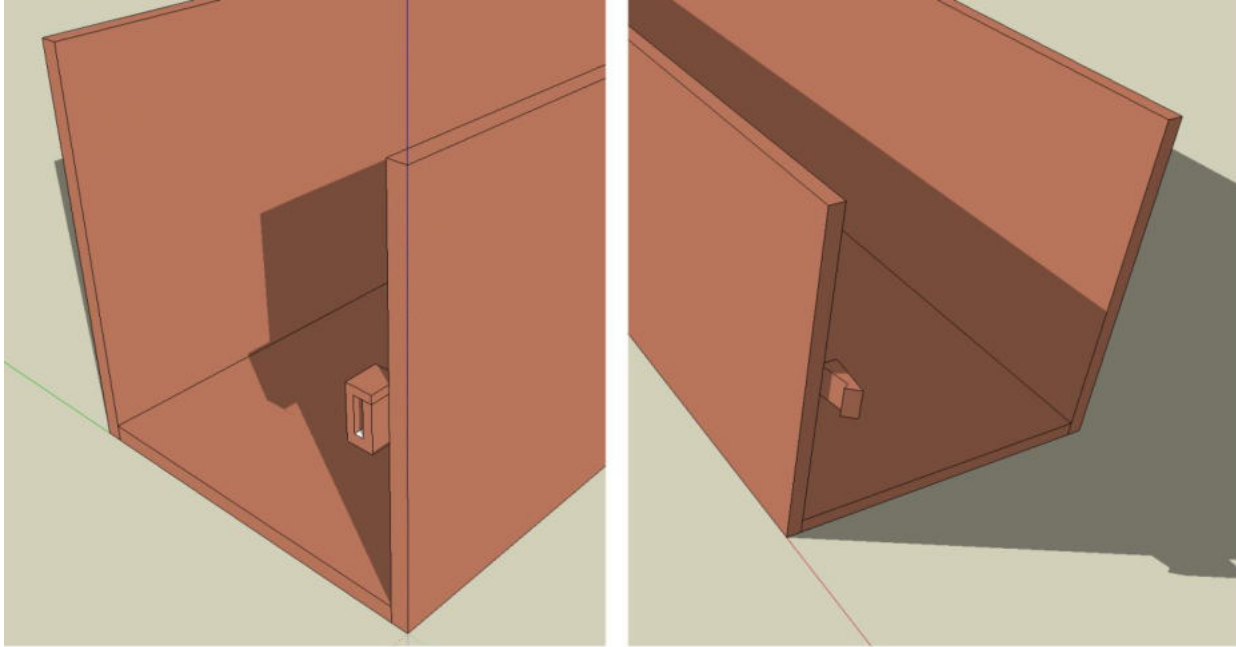
Temple dimensions





CAD drawing

Metal snap fit



LED details:

- 18 W total power consumption
- 7 lumens per LED
- 180 LEDs
- 25mA per LED