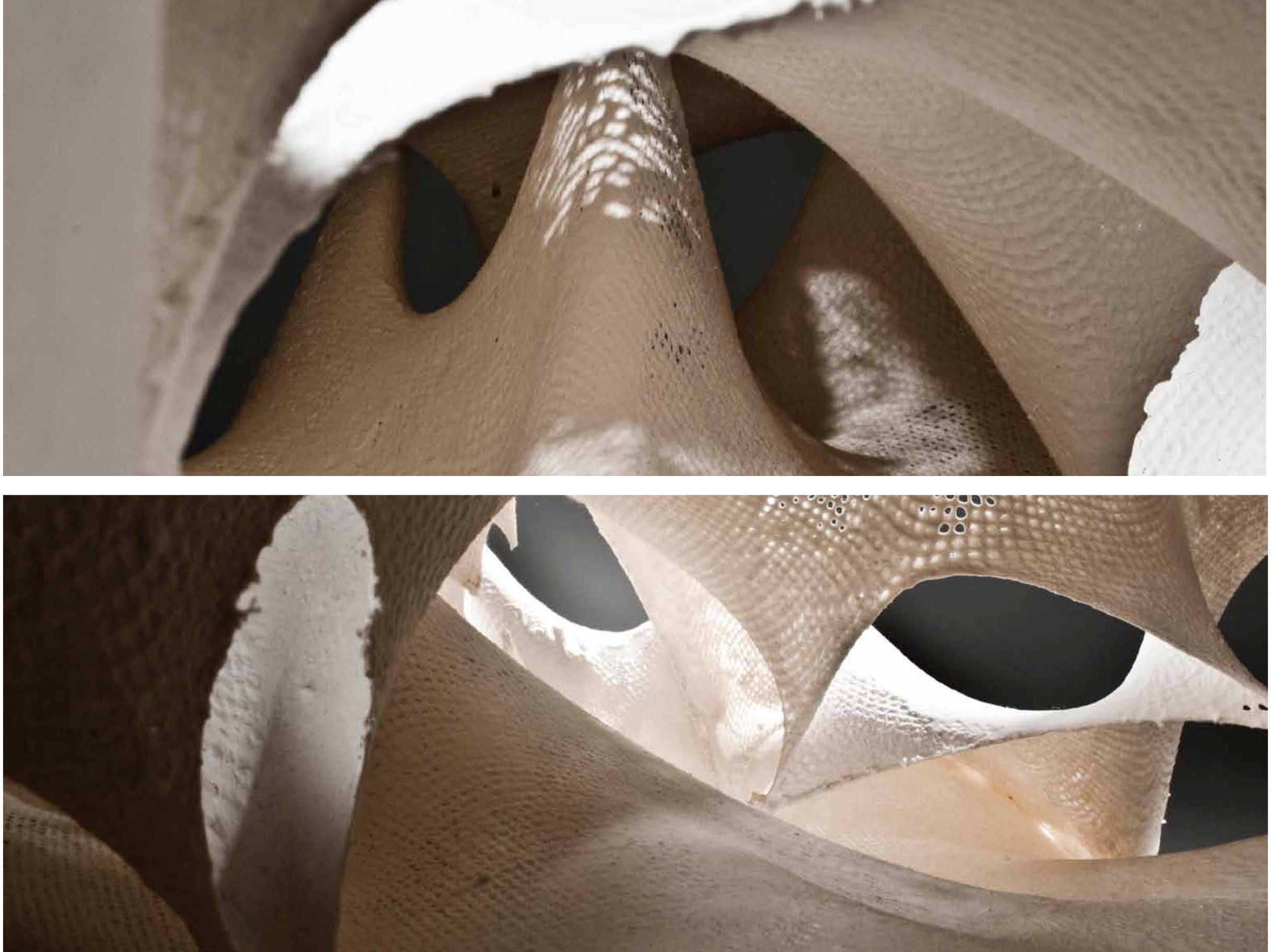
ABSTRACT

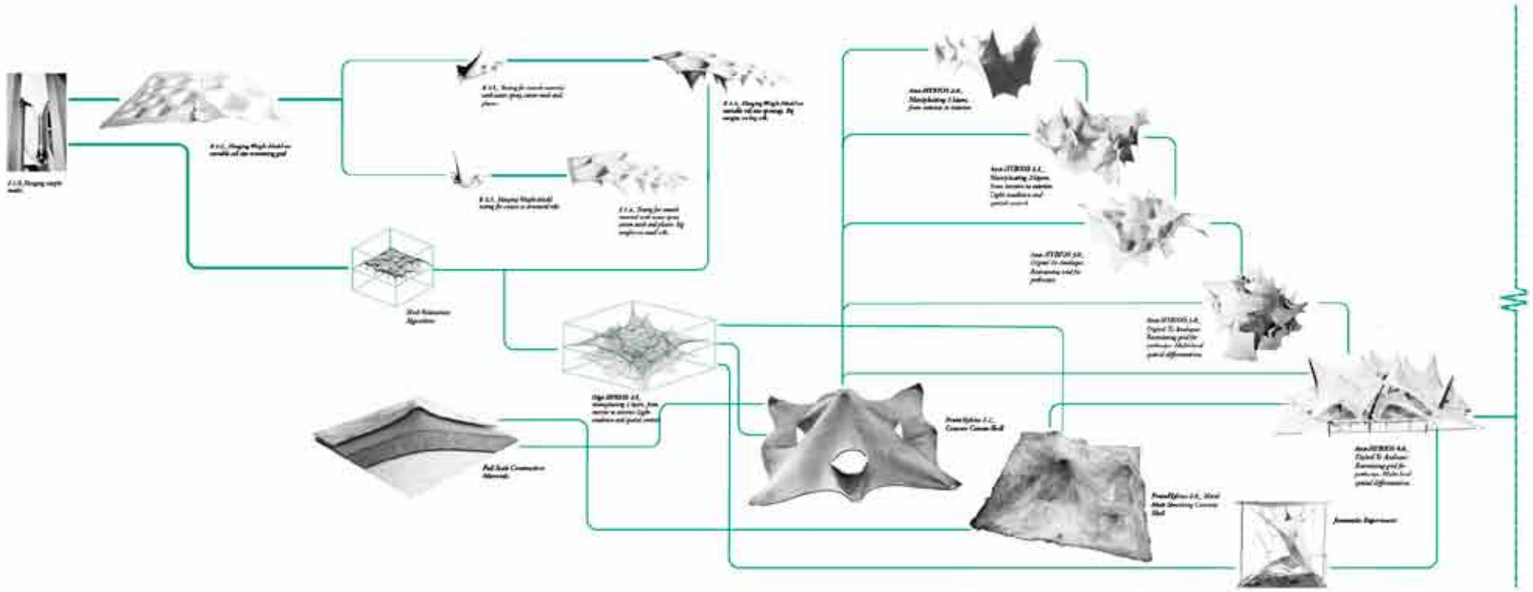
The fluidity of concrete as a material, coupled with the flexible workability of its forming process, has lead to innovations in the architectural discourse throughout history. The aim of this dissertation is to go beyond current practices of using concrete in the built environment, to enable the construction of complex geometries analogous to the coherence of structures found in nature. State of the art materials related to concrete construction, and cutting edge computer simulations are utilized in the research. Creating a constant feedback loop between qualitative analogue prototypes and information-rich computer models.

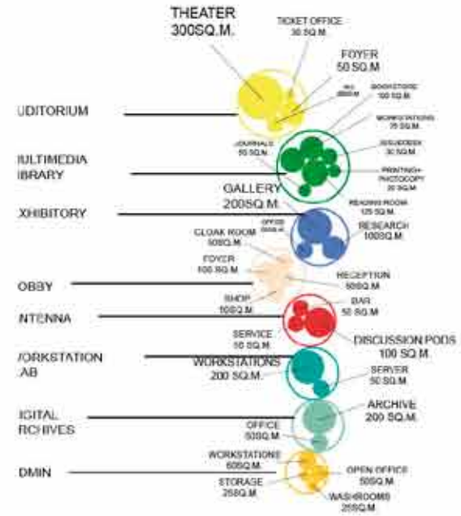
Many attempts have been made by previous scholars to generate architectural forms that mimics structures found in biological systems. Only few works have portrayed that the form finding methods utilized at the beginning of the design process have been carried through with enough rigor to the construction phase. Experiments done in casting concrete have been mainly focused on producing modular units that, when aggregated, achieve an envisioned spatial quality. The construction process is often regarded as an afterthought of the formal intent of the architect, resulting in unwanted abundance in the use of materials and complication in the process.

The program of a Cultural Centre was envisioned within the computational algorithm, which simulates the building form based on material qualities, forces and environmental conditions. Program and circulation are seen as main input parameters for the generation process. Design decisions that are based on pragmatic logic have been the result of the building process. Working in a bottom-up form generation process.

Our research is aimed towards the generation of novel spatial and architectural elements that have a allyding interior quality, using innovative fabrication systems pertaining to the structural domains of tensile membranes and concrete construction. The work is focused on experimenting with the notion of coupling digital and analogue form finding methods with construction aware thinking to generate innovative processes of constructing novel tectonics and spatial qualities. The intention of using hybrid materials and processes aims at simplifying the construction of smooth gradients of differentiation, one of the key characteristics of contemporary architecture today.







PROGRAM BY AREA

- AUDITORIUM_**480 SQM**
- MULTIMEDIA LIBRARY_**400 SQM**
- DIGITAL ARCHIVES_**325 SQM**
- EXHIBITORY_**350 SQM**
- LOBBY_**250 SQM**
- WORKSTATION LAB_**250 SQM**
- ANTENNA_**200 SQM**
- ADMIN_**160 SQM**

LIST PROGRAM BY LIGHTING NEEDS

- EXHIBITORY
- MULTIMEDIA LIBRARY
- LOBBY
- ANTENNA
- ADMIN
- WORKSTATION LAB
- DIGITAL ARCHIVES
- AUDITORIUM

FIRST RUN OF FINDING HEIGHT

10 m	5 m		
9.8 m	9.8 m		
7 m	7 m		
5 m	10 m		
4 m	4 m		200 SQM
3.5 m	3.5 m		250 SQM
3.5 m	2.2 m		160 SQM
2.2 m	3.5 m		250 SQM

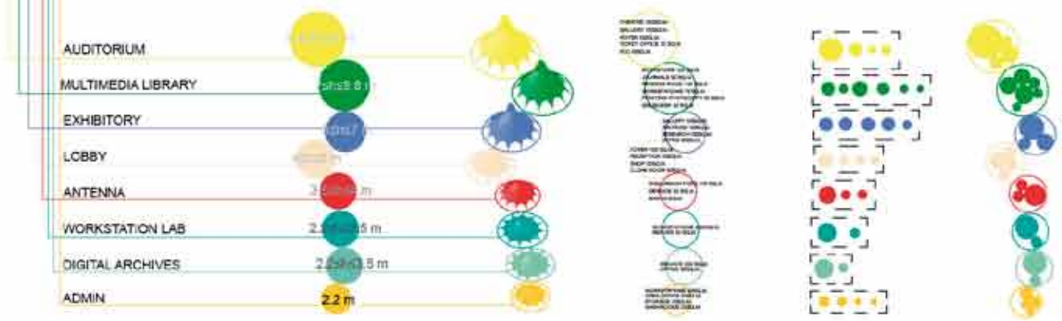
Public
h=Area/50

Private
h=Area/70

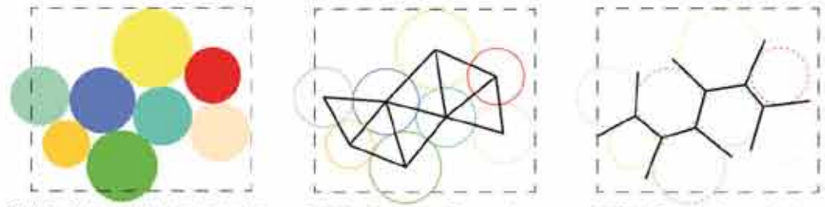
LIST PROGRAM BY PERMEABILITY

Public
- LOBBY
- MULTIMEDIA LIBRARY
- EXHIBITORY
- AUDITORIUM
- ANTENNA

Private
- WORKSTATION LAB
- ADMIN
- DIGITAL ARCHIVES



STEP 1 : Input a set of programmes as circles depending on area requiremen



STEP 2 : Packing the list of circles according to programme adjacencies using RGB values in a bounding box(the site)

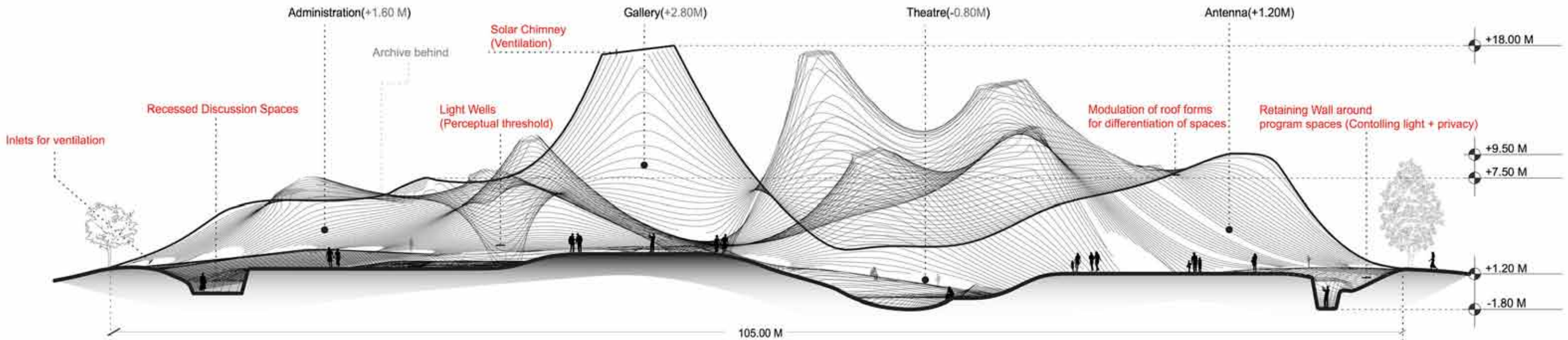
STEP 3 : Generation of Delaunay lines on the packed areas.

STEP 4 : Generation of perpendicular lines from intersection of delaunay lines and circles.

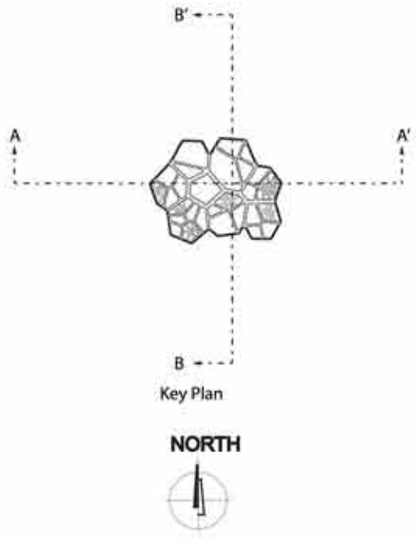
STEP 5 : Closing of open edges with a polygon by intersecting the circumscribed polygon and the lines generated in Step 4

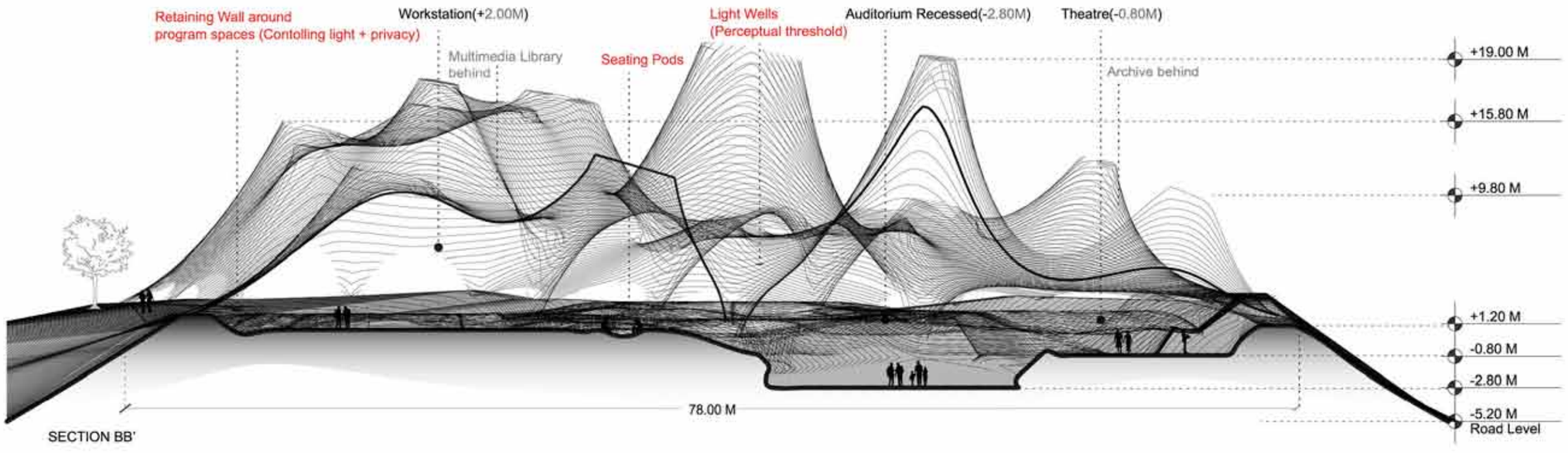
STEP 6 : Rerunning of packing of sub-programs inside the main programmes.

STEP 7 : Rerunning of packing of pods inside the sub-programmes.



SECTION AA'





SECTION BB'