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NAN JIANG

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CAMPUS INTERACTIVE INTERCHANGEABLE LIVING LABORATORY DESIGN FOR STUDENT SUSTAINABLE INNOVATION AT THE UNIVERSITY OF TEXAS AT AUSTIN

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SPRING 2013

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Universities are places where advanced education be taught, and also where pinner thoughts be conceived. Explorations and innovations in every field are spontaneous and highly encouraged, so does in field of Sustainable Architecture. Correspondingly, campus buildings should be considered as a carrier of knowledge, which can enlighten occupants in certain extents. Can the design of a Living Laboratory on Campus of the University of Texas at Austin facilitate student architectural sustainable explorations and innovations and contribute to campus sustainability socially and environmentally through the operation of interactive interchangeable building system? Specifically focusing on the University of Texas at Austin, this Master Design Study attempts to utilize a design process of a campus living laboratory to answer the questions above. It considered the lab as a platform for students to public their sustainable ideas and works, and get initial feedback from the occupants thereby. It would be especially benefit for university education and also for professional practice of students.

1. PROTOTYPE STUDY

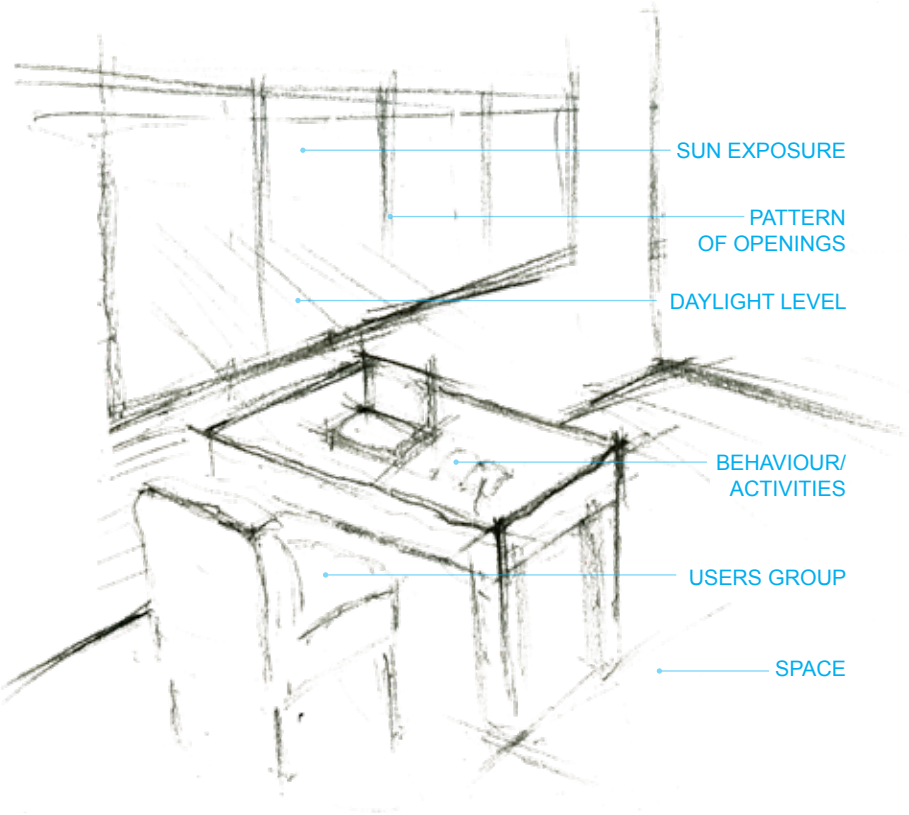
1.1 PURPOSE STATEMENT

NEW WAY TO DEAL WITH UNIVERSITY STUDENT INNOVATION AS A PROTOTYPE. THE LIVING LABORATORY CONCEPT INCLUDING INNOVATION EXHIBITION, KNOWLEDGE SHARING, EXPERIMENTING, AND COMPLETE A FEEDBACK LOOP IN OPEN ENVIRONMENTS.

IN ORDER TO ACHIEVE IT, AN OPEN RESEARCH AND EXHIBIT SUPPORT SYSTEM IS NEEDED, WHICH IS FACILITATED IN THE LIVING LABORATORY ENVIRONMENT.

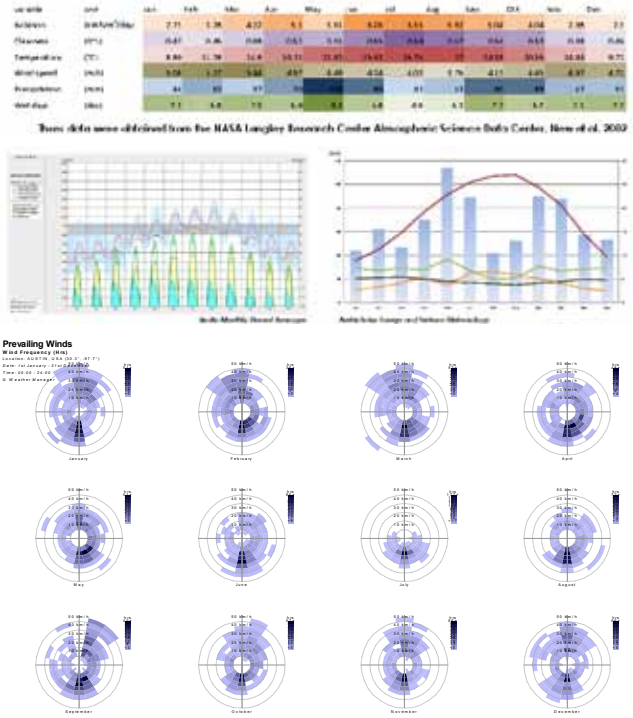
THE LIVING LABORATORY CONCEPT IS GETTING ACCEPTANCE AS A WAY TO DEAL WITH INNOVATION AND TO GET INSIGHT INTO THESE INNOVATION PROCESS.

THIS PROCESS PROVIDES USER GROUP AN OPPORTUNITY TO EXPERIENCE AND OBTAIN MORE THOROUGH UNDERSTANDING OF HOW VARIOUS ELEMENTS WITHIN THE FUNCTIONAL SPACE OPERATE AND INTERRELATE.



1.2 PRELIMINARY STUDY

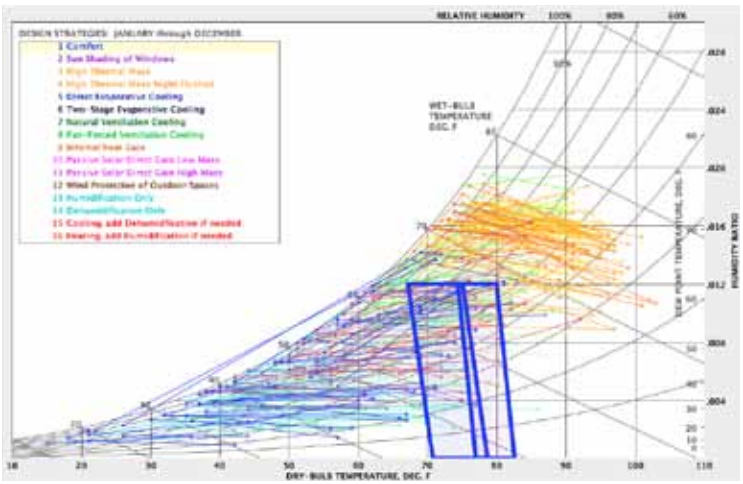
CLIMATE DATA



PSYCHROMETRIC CHART

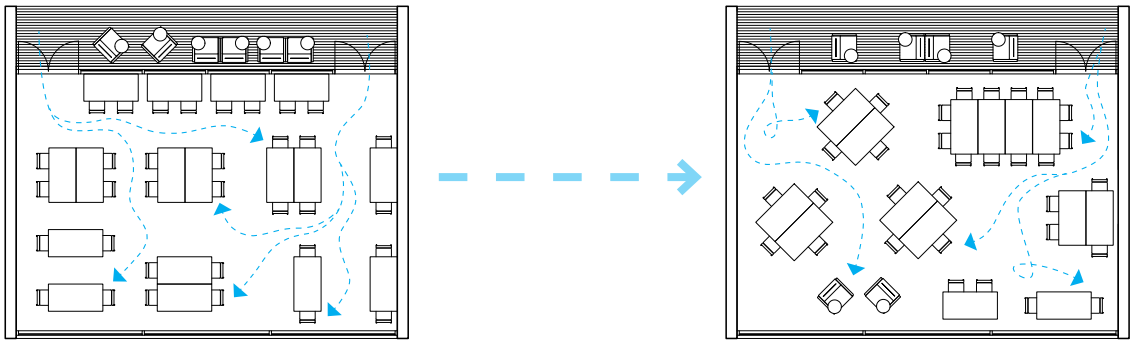
PROTOTYPE LOCATION: AUSTIN, TX, US
LATITUDE/LONGITUDE: 30.32 N, 97.77 W
TIME ZONE: -6 (FROM GREENWICH)
DATA: ASHRAE STANDARD 55
DATA SOURCE: TMY3 722544 WMO STATION NUMBER, ELEVATION 649 FT.

LEGEND



1.3 PROTOTYPE LAYOUT

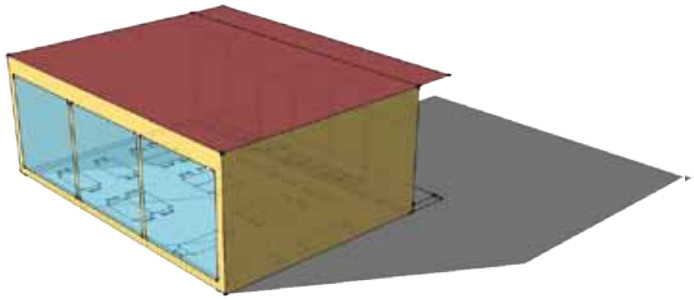
INTERIOR ARRANGEMENT + FURNISHING

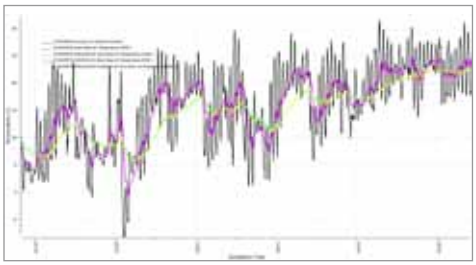


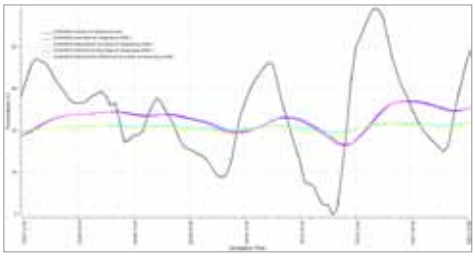
1.4 ENERGY MODELING

EXPERIMENT SETTING
1. SOFTWARE:
Design: SketchUp
Simulation: EnergyPlus
Analysis: OpenStudio Results-Viewer

2. MODEL
Location: Austin, TX
A ordinary study-type free-running space under ambient weather conditions, with window(s) toward the outside, south facing in this experiment, which can have an opportunity to obtain natural day lighting.





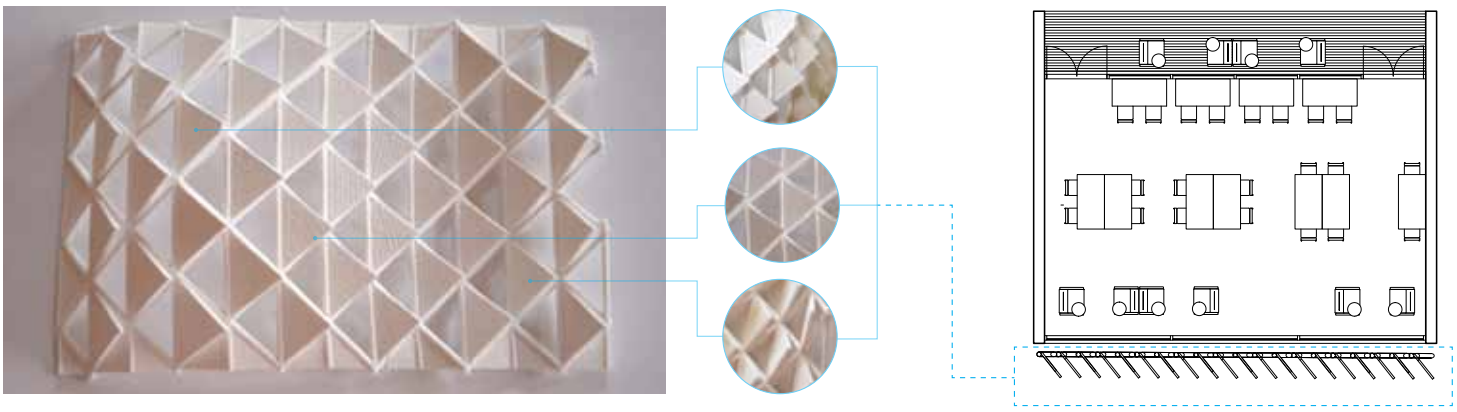


METHODS:
1. Using EnergyPlus, experiment with the response due to conduction of a free-running space under ambient weather conditions. Isolating the impact of heat flow due to conduction by idealizing other factors in order to neutralize their impact on performance.

2. Using ResultsViewer, to analyze the simulation outcomes in time series.
Time Series: January 21st to April 27th (the comfort-data collecting period of part 1)
March 9th: typical spring/autumn outdoor temperature relatively small diurnal temperature difference
March18th: typical wintertime outdoor temperature with with huge diurnal temperature difference

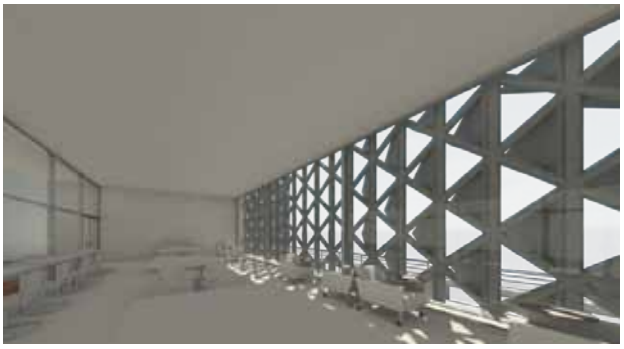
1.5 MOCKING UP

SAMPLE SHADING DEVICE

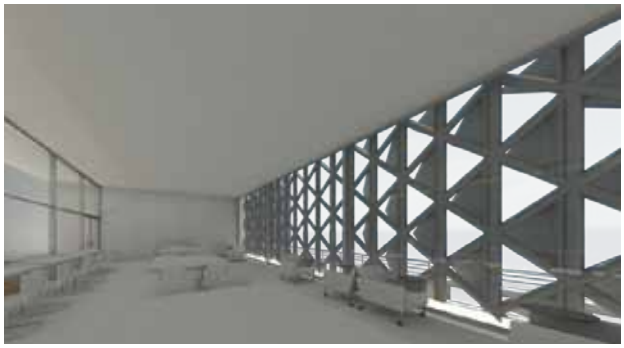


SHADING DEVICE PERFORMANCE

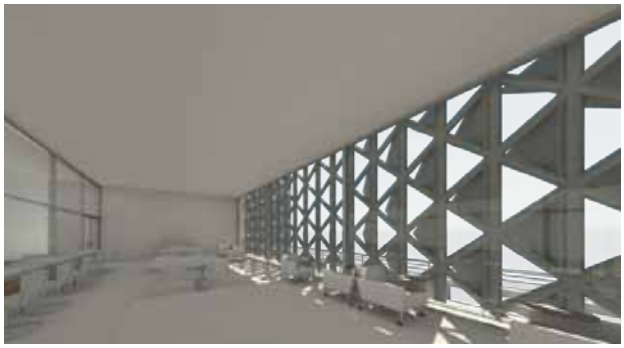
EXPERIMENT LAB



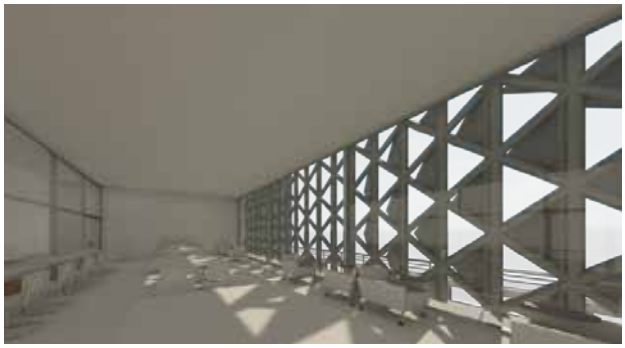
MARCH 21ST [12:00 PM]



JUNE 21ST [12:00 PM]

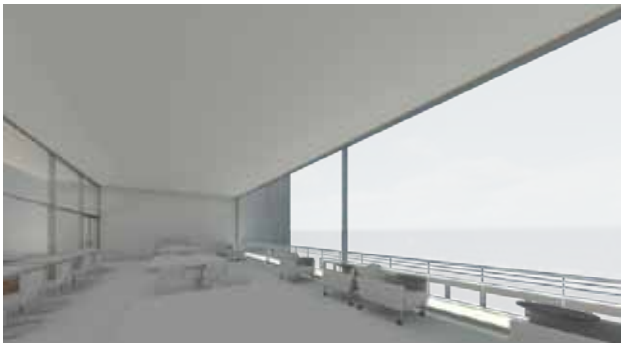


SEPTEMBER 21ST [12:00 PM]



DECEMBER 21ST [12:00 PM]

CONTROL LAB



2. APPLICATION

2.1 SOCIAL SUSTAINABILITY

SITE LOCATION

"WHAT STARTS HERE CHANGES THE WORLD"

CHARACTERISTICS

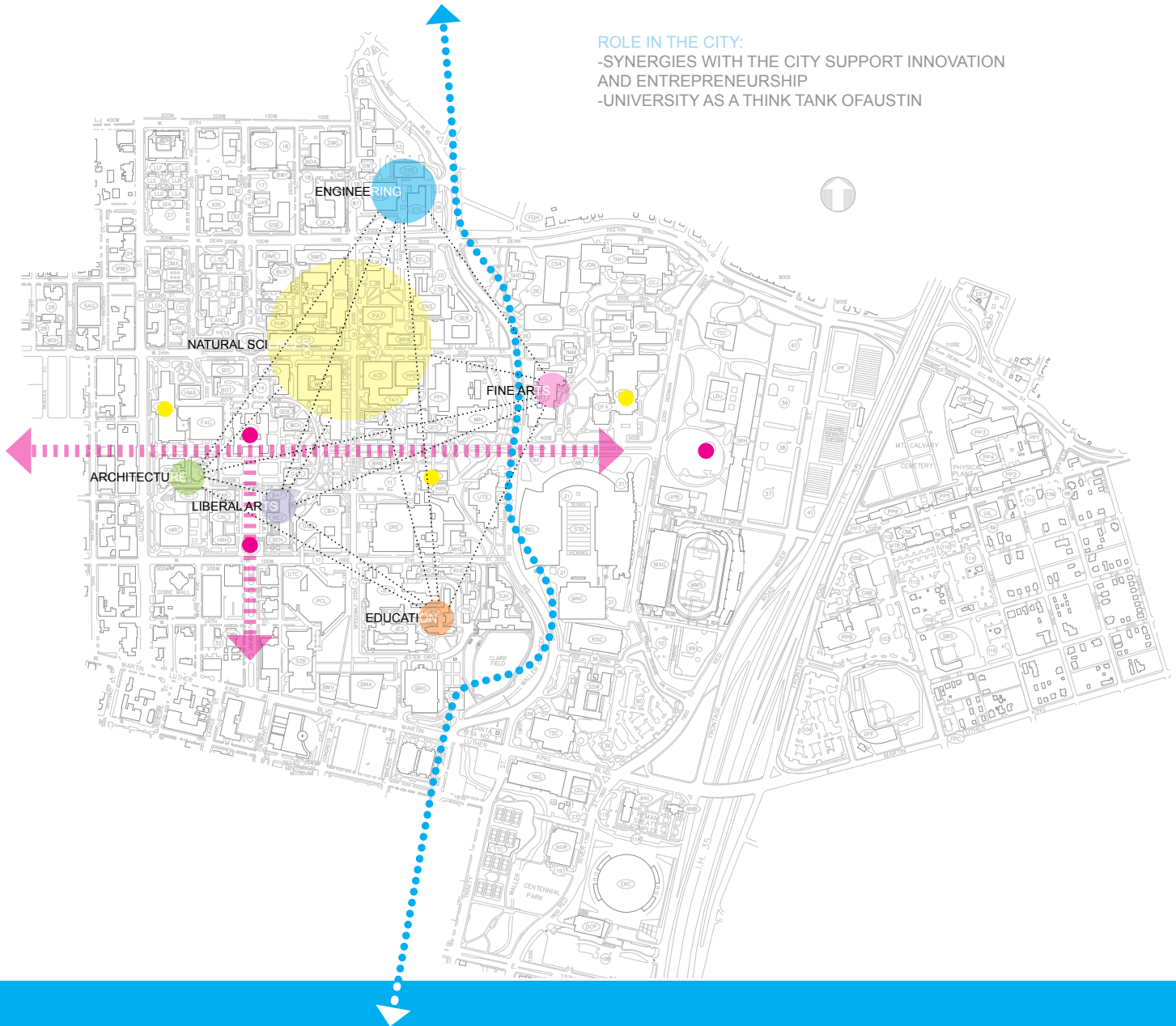
ACADEMIC ENVIRONMENT:
-CENTRAL TO ATTRACTIVENESS OF THE CAMPUS TO STUDENTS AND SCHOLARS

STUDENT EXPERIENCE:
-LARGEST CAMPUS IN US
-CENTRAL TO ASPIRATION

-BEST RESEARCH & TEACHING ENVIRONMENT
-MOST ATTRACTIVE TO FACULTY AND GRADUATE STU DENTS
-BEST SUPPORT FOR COLLABORATION

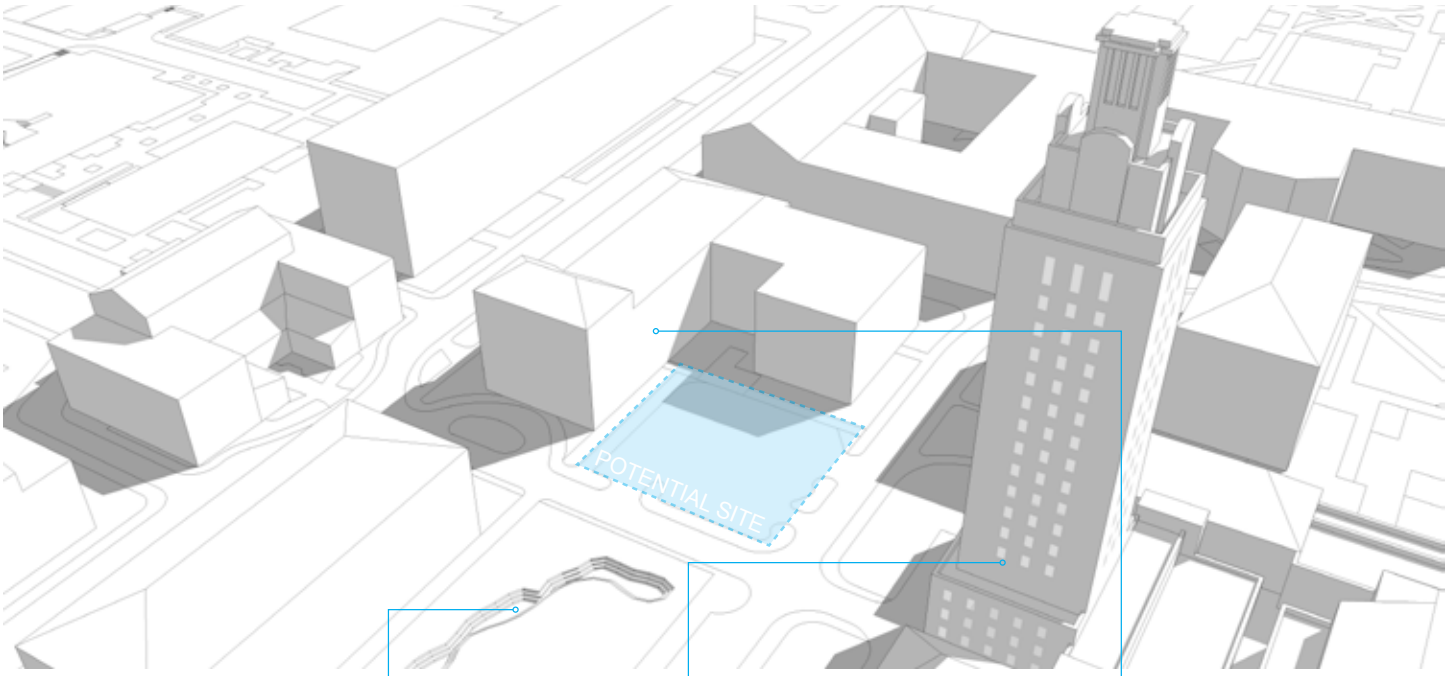
-SUPPORTIVE LEARNING ENVIRONMENT IN AND OUT OF THE CLASSROOM
-OUTSTANDING ACADEMIC FACILITIES
-SENSE OF COMMUNITY
-COHERENT CAMPUS

ROLE IN THE CITY:
-SYNERGIES WITH THE CITY SUPPORT INNOVATION AND ENTREPRENEURSHIP
-UNIVERSITY AS A THINK TANK OFAUSTIN



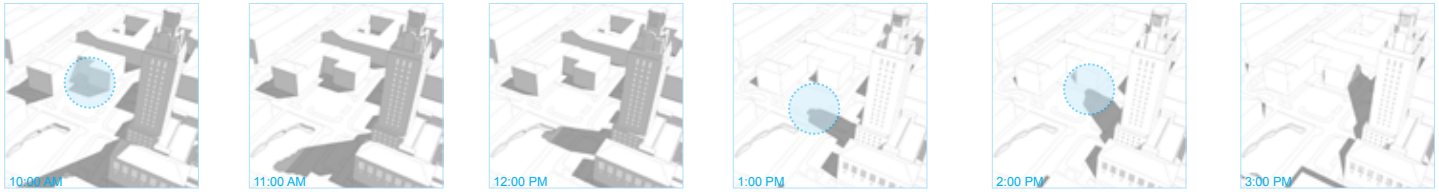
2.2 SITE ANALYSIS

SITE CURRENT SITUATION



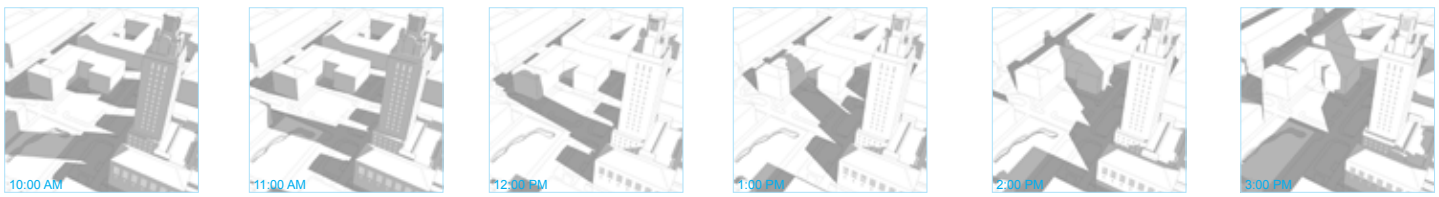
ON SITE DAYLIGHT ANALYSIS

03.21 / 09.21



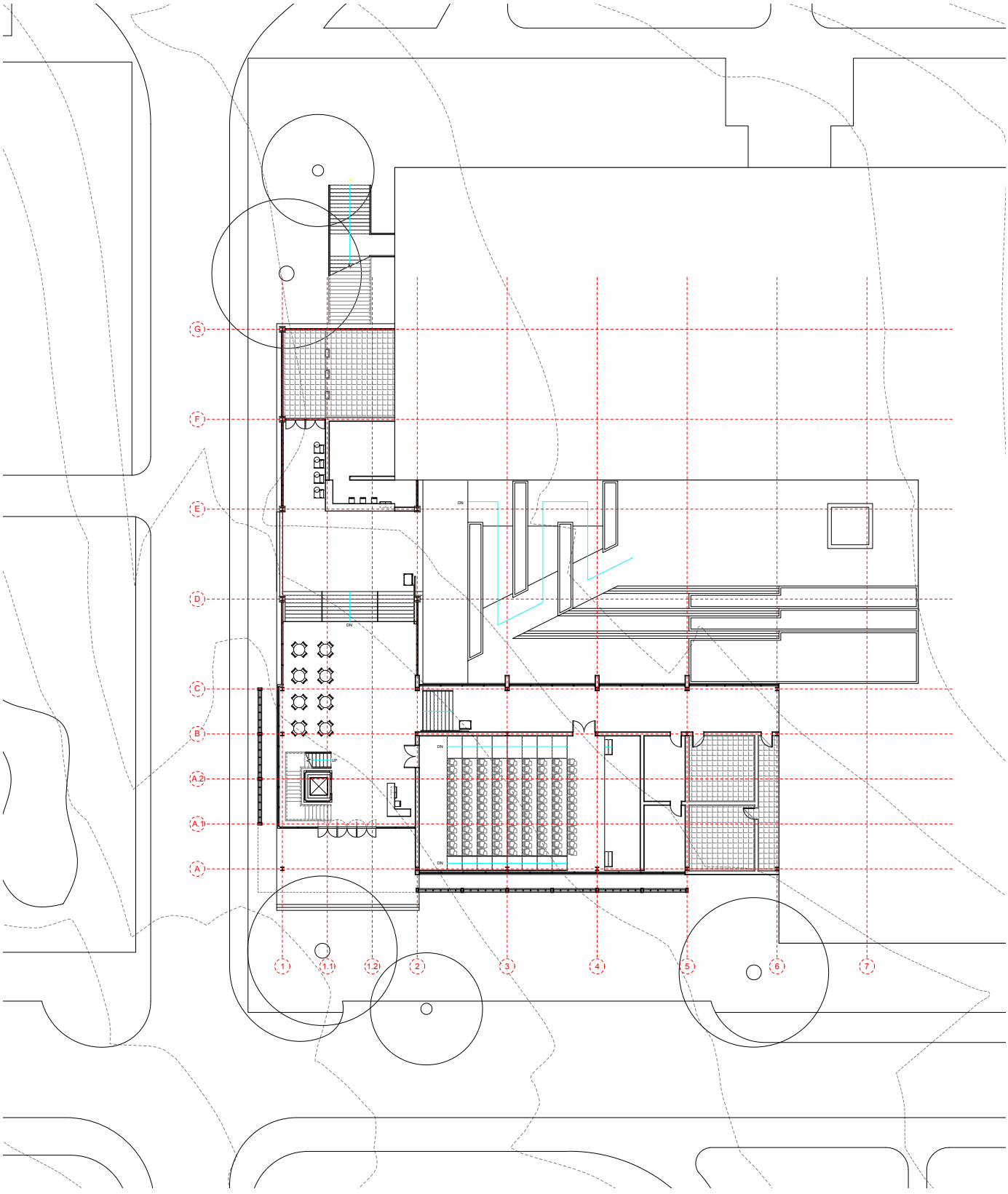
06.21

12.21

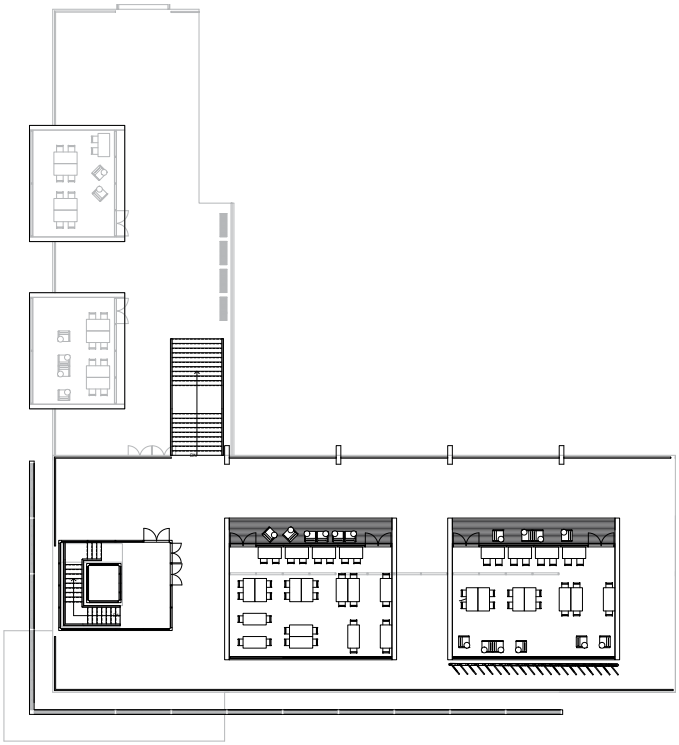


2.3 DESIGN PROCESS

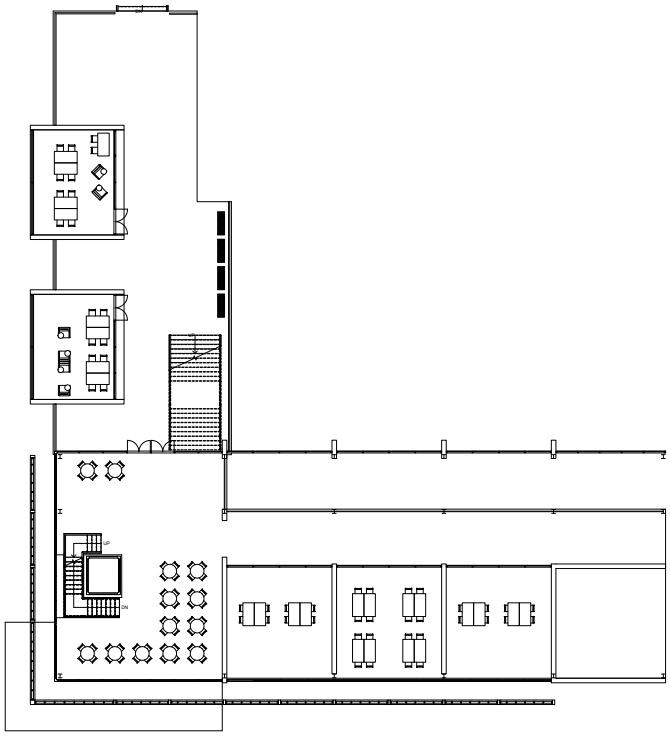
GROUND LEVEL PLAN



UPPER LEVEL PLANS



THIRD LEVEL FLOOR PLAN



SECOND LEVEL FLOOR PLAN

2.4 OPERATIONAL CONTINUITY

ORGANIZING THE WHOLE PROCESS FROM MOCKING UP THE ORIGINAL DESIGN, EXHIBITING TO PUBLIC, TILL THE FINAL SENARIO GET PRODUCED. MULTI-DISCIPLINES FROM UT AND OUT SIDERS ARE ALL INVOLVED WITHIN THIS PROCESS.

LEGEND
- DESIGNERS
- LIVING LAB
- USERS

1. RESERVING / SUPPORTING
   - DESIGNERS + LIVING LAB
   - A. ONLINE
     - RESERVE ON OUR WEBSITE www.utlivinglab.com
     - DOWNLOAD THE INSTALLATION GUILDLINE
   - B. ON SITE
     - WALK-IN RESERVE + FILL IN THE APPLICATION FILE
     - TAKE THE GUILDLINE HANDBOOK

2. ADVERTISING
   - LIVING LAB + USERS
   - A. ONLINE
     - VISIT OUR WEBSITE www.utlivinglab.com
     - FIND US ON
   - B. ON SITE
     - ADVERTISING BOARDS
     - FLYERS ON CAMPUS

3. BEHAVING & REACTING
   - USERS
   - A. IN THE LAB
     - USING THE LAB AS NORMAL SPACES
     - OBSERVATING THE MOCK-UP IN YOUR WAY
   - B. ONLINE
     - LIKE THE DESIGN YOU PREFER
     - TELL US YOUR OPINIONS

4. FEEDBACKING & PUBLISHING
   - LIVING LAB + DESIGNERS
   - FEEDBACK GATHERING .A
     - RECORDING ON SITE
     - GATHERING ONLINE DATA
   - PUBLISHING .B
     - REPORTING TO DESIGNERS
     - PUBLISHING / EXHIBITING AT THE LAB

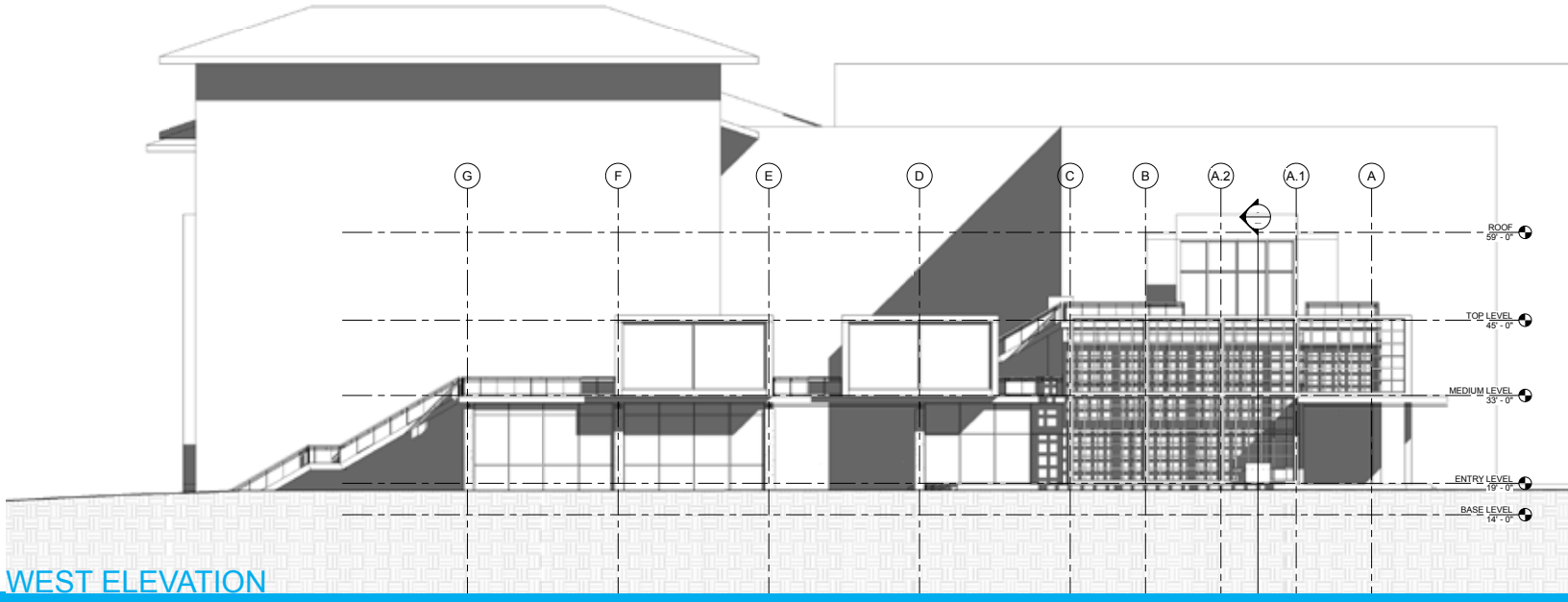
5. REVISING / PRODUCTION
   - DESIGNERS
   - MOCKING-UP .A
     - APPLYING TO LIVING LAB
     - MOCKING-UP YOUR IDEAS
   - FABRICATION .B
     - REVISING BASE ON FEEDBACK
     - PRODUING THE FINAL DESIGN

0. INNOVATION PROPOSING

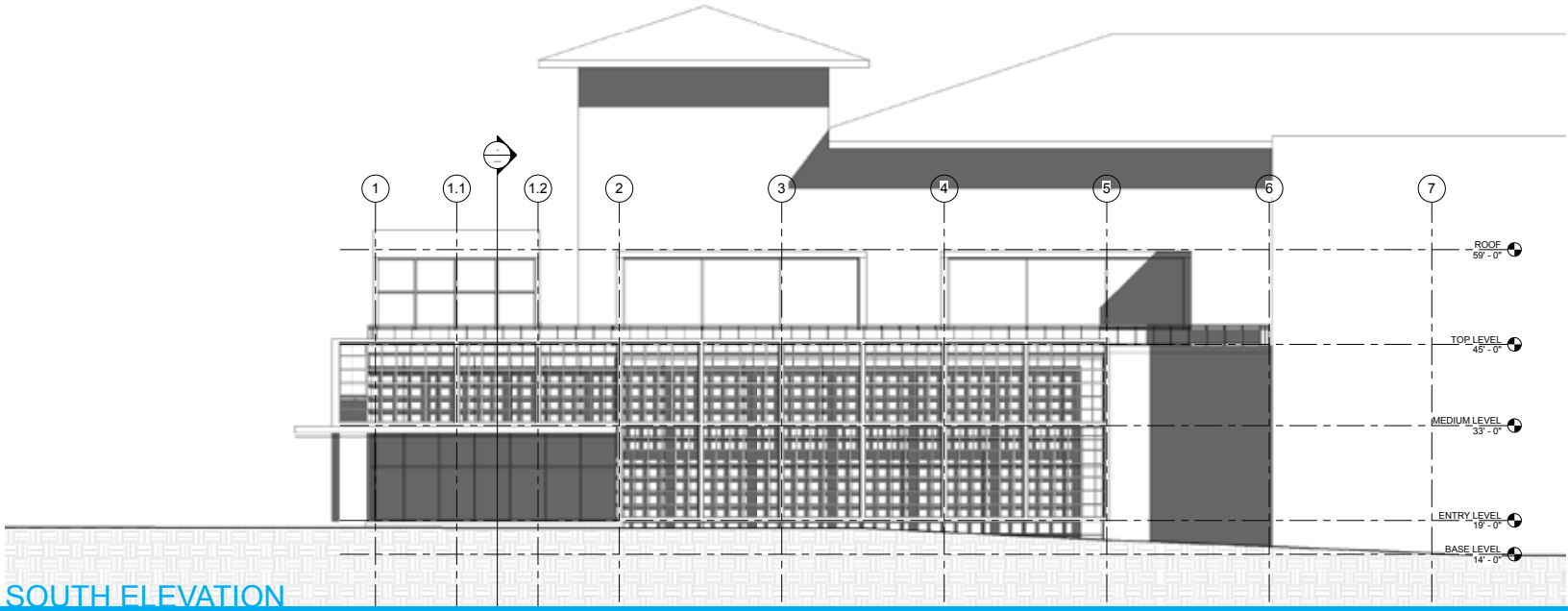
OPERATIONAL CONTINUITY

2.5 APPLICATION REPRESENTATION

ELEVATIONS

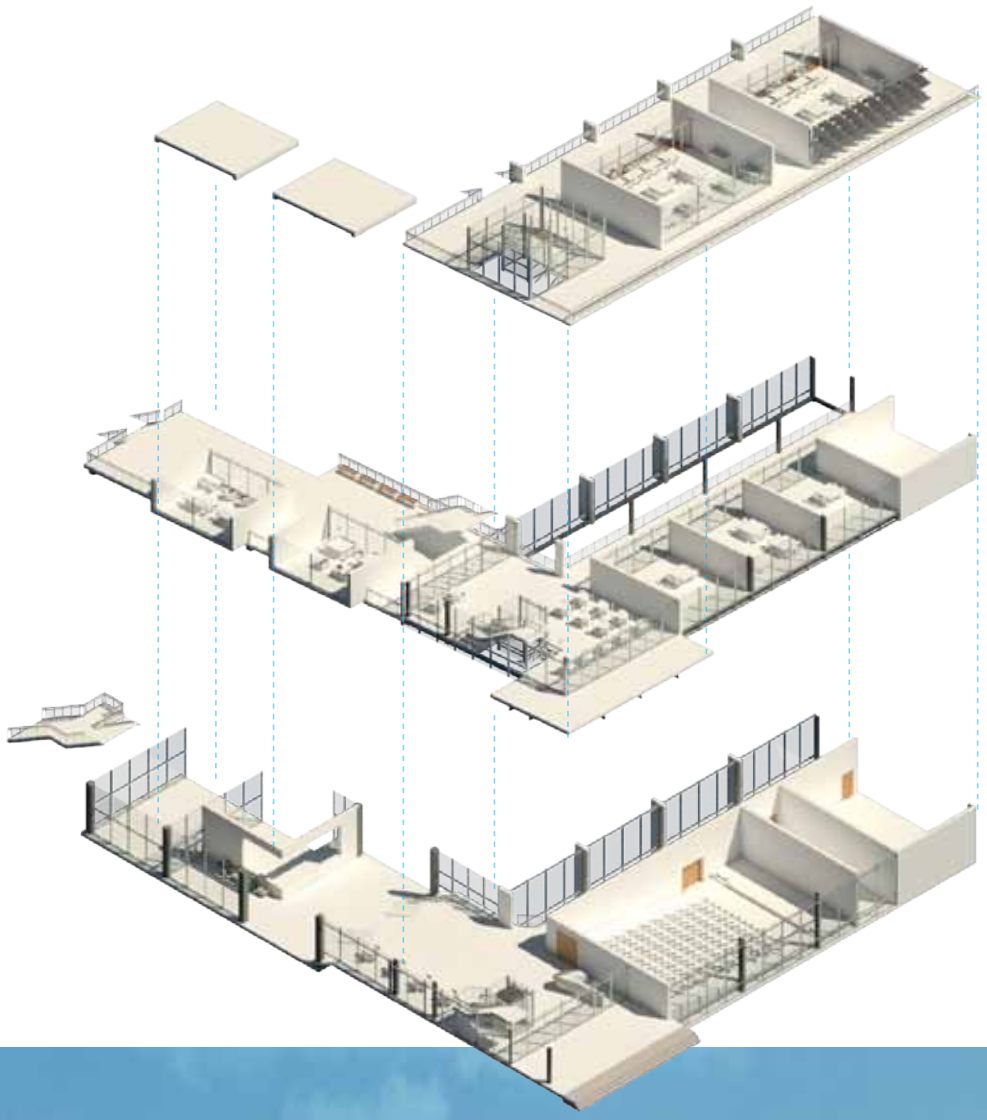


WEST ELEVATION



SOUTH ELEVATION

CIRCULATION



SECTIONAL PERSPECTIVE

UPPER LEVEL PERSPECTIVE

SECOND LEVEL PERSPECTIVE