

BUILDING RESILIENCY:

A HIMALAYAN SCHOOL DEVELOPMENT PROJECT

01

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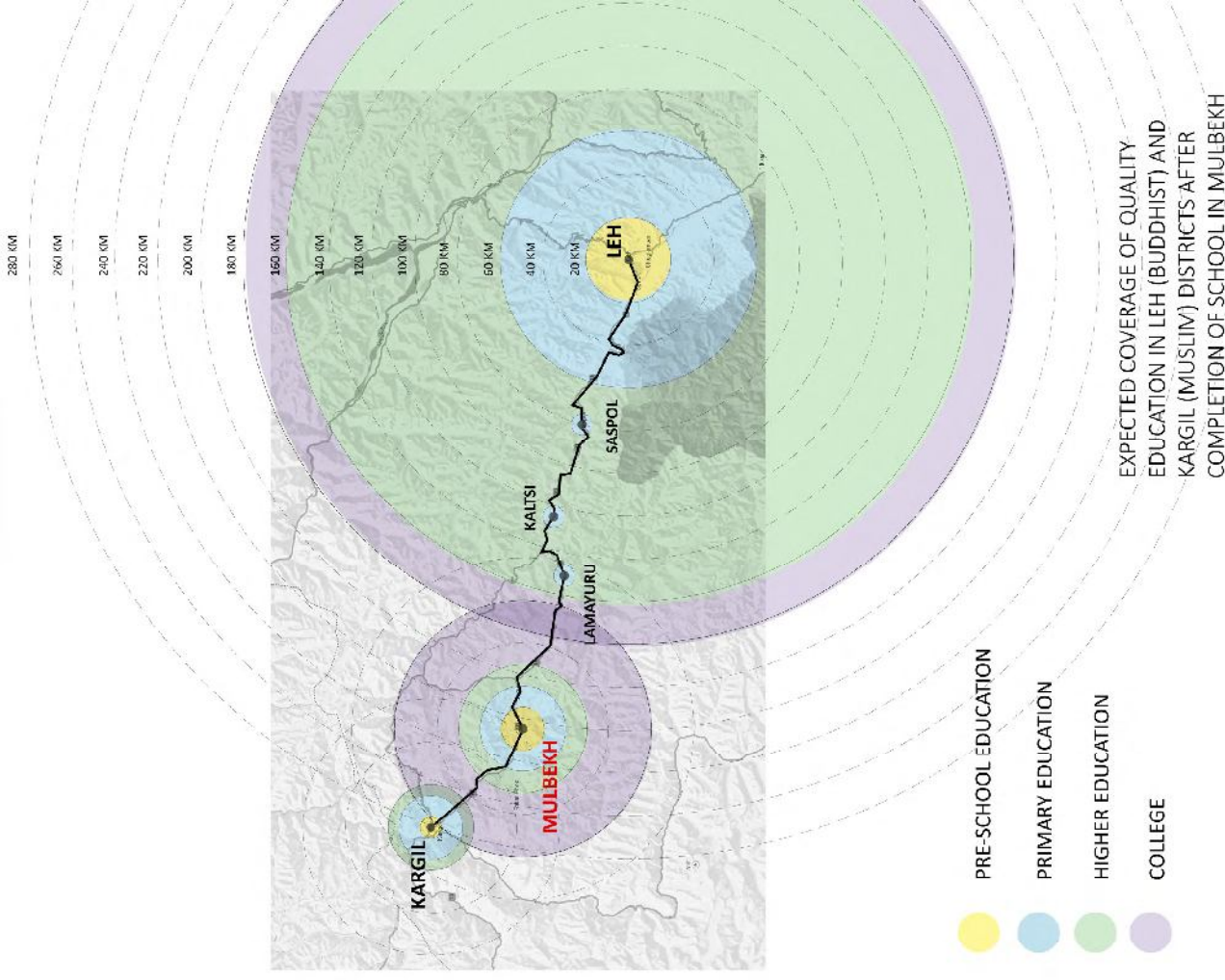
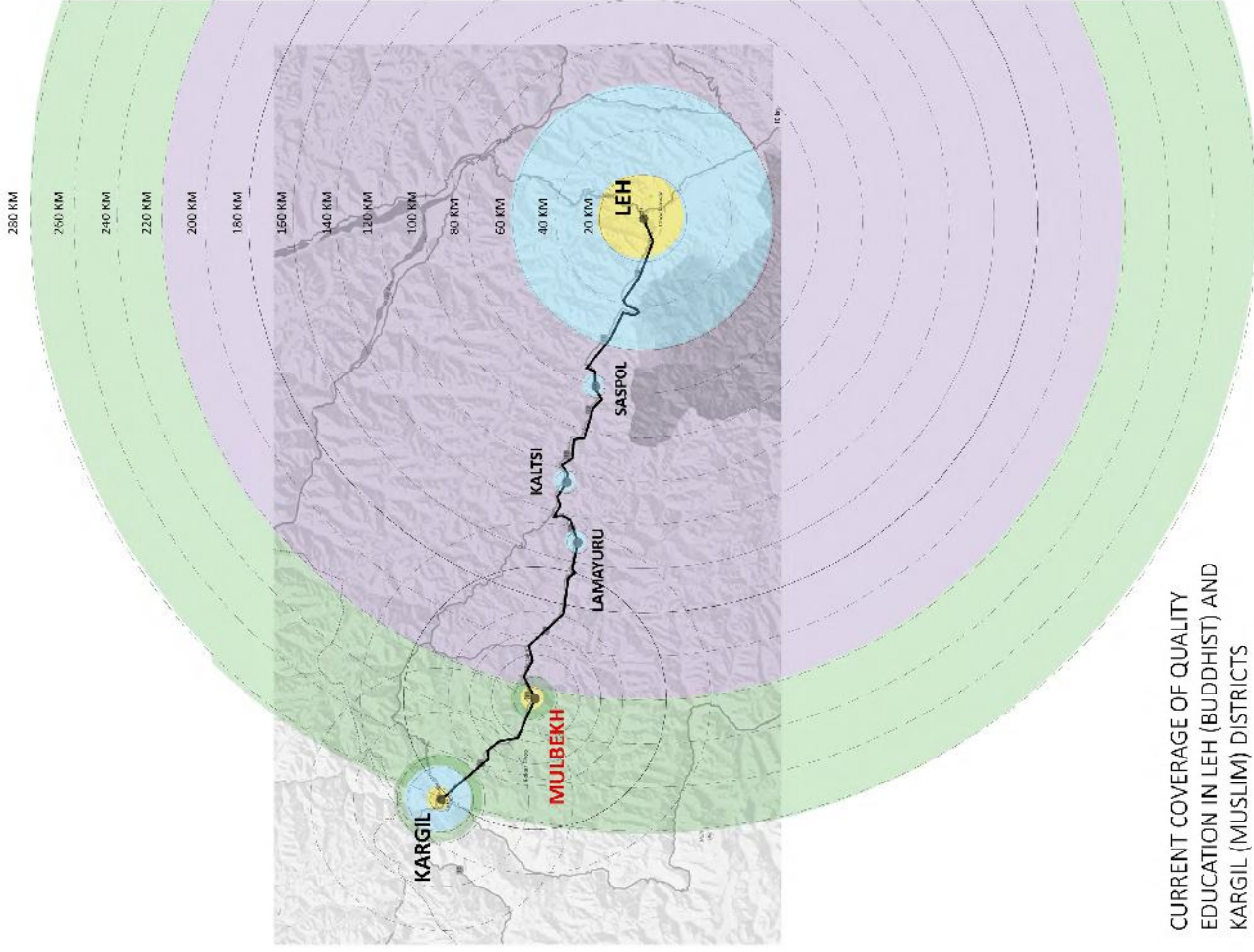
LADAKH "LAND OF HIGH PASSES" LIES IN THE MAIN GREAT HIMALAYAS, INHABITED BY PEOPLE OF INDO-ARYAN AND TIBETAN DESCENT. IT IS ONE OF THE MOST SPARSELY POPULATED REGIONS IN JAMMU AND KASHMIR AND ITS CULTURE AND HISTORY ARE CLOSELY RELATED TO THAT OF TIBET.

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SPRING DALES PUBLIC SCHOOL, MULBEKH, LADAKH, INDIA - ENROLLMENT OUTLOOK 2011 - 2021

CLASS	2011		2012		2013		2014		2015		2016		2017		2018		2019		2020		2021	
	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G
UKG	21		24	27	28	31	30	20	25	27												
1 ST	21		58		24	27	28	31	30	20	25	27										
2 ND	16		41		58	41	58	41	24	27	28	31	30	20	25	27						
3 RD	13		16		41	58	41	58	24	27	28	31	30	20	25	27						
4 TH	8		13		16	41	58	41	58	24	27	28	31	30	20	25	27					
5 TH	4		13		8	13	16	41	16	41	58	41	58	24	27	28	31	30	20	25	27	
6 TH	17		4		13	8	13	16	13	16	41	58	41	58	24	27	28	31	30	20	25	27
7 TH	14		17		4	13	16	41	8	13	16	41	58	24	27	28	31	30	20	25	27	
8 TH	7		14		17	4	13	16	4	13	16	41	58	24	27	28	31	30	20	25	27	
9 TH	8		7		14	17	4	13	4	13	16	41	58	24	27	28	31	30	20	25	27	
10 TH	15		8		7	14	17	4	17	4	13	16	41	58	24	27	28	31	30	20	25	27
11 TH																						
12 TH																						
TOTAL	157		250		301		344		382		365		361		348		340		327		311	
Accommodat. required			33	35	48	46	69	55	79	69												
			68		94		124		148													

NUMBER OF CHILDREN EXPECTED TO BE ENROLLED AS OF ACADEMIC YEAR 2012
(BASED ON SURVEY DONE IN DECEMBER 2010)

21+ 20(B)+17(G) NUMBER OF CHILDREN ENROLLED IN ACADEMIC YEAR 2011 (LKG AND UKG) +
21+ 12(B)+8(G) NUMBER OF CHILDREN EXPECTED TO BE ENROLLED AS OF ACADEMIC YEAR 2012 (UKG AND 1ST CLASS)

NUMBER OF CHILDREN ENROLLED IN ACADEMIC YEAR 2011

UNBORN CHILDREN

CONSIDERED SCHOOL UPGRADE FROM GRADE 10 TO GRADE 12

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CURRENT CONDITIONS



OVERALL VIEW OF THE CURRENT SCHOOL



CURRENT SCHOOL KITCHEN



STUDENTS STUDY OUTSIDE IN WINTER AS IT IS WARMER THAN INSIDE



CURRENT CONDITION OF CLASSROOMS



CURRENT STAFF DINING ROOM



STUDENTS STUDY OUTSIDE IN WINTER AS IT IS WARMER THAN INSIDE

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FACTS AND CHALLENGES OF THE PROJECT SITE

- STRONG AND UNIQUE CULTURE AND TRADITIONS
- RICH TRADITIONAL LADAKHI ARCHITECTURE HISTORY
- TRADITIONAL SUSTAINABLE WAY OF LIVING OFF THE LAND
- VERY INTENSIVE SOLAR RADIATION WITH 300 DAYS OF SUN A YEAR
- TEMPERATURE VARIES BETWEEN +30°C IN THE SUMMER TO -30°C (SOME PLACES -40°C) IN THE WINTER
- SITE ALTITUDE 3.500 METRES ABOVE SEA LEVEL
- VERY DRY CLIMATE - MOUNTAIN DESERT
- AVERAGE ANNUAL SNOWFALL BETWEEN 15 CM TO 1 M
- AVERAGE ANNUAL RAINFALL 10 CM
- COMPLICATED TERRAIN CONDITIONS AND ACCESSIBILITY
- LIMITED CONSTRUCTION SEASON BETWEEN 4-6 MONTHS
- LIMITED BUILDING MATERIAL SOURCE AND ACCESSIBILITY
- UNPREDICTABLE BUILDING MATERIAL AND WORK QUALITY
- SHORTAGE OF SKILLED WORKERS



TYPICAL LANDSCAPE



TYPICAL LADAKHI ARCHITECTURE

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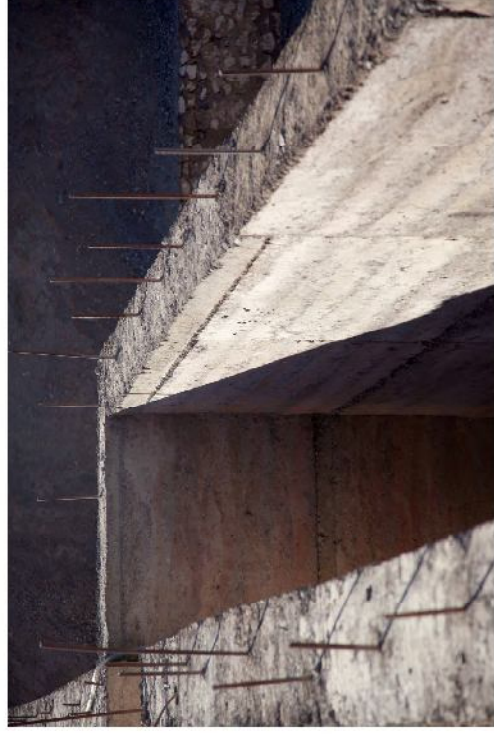
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MAIN DESIGN CONCEPTS

- **FULLY BASED ON PASSIVE SOLAR ENERGY**
 - HEATING
 - ELEKTRICITY
 - VENTILATION
 - HOT WATER
- **USE OF ENHANCED TRADITIONAL LADAKHI BUILDING MATERIAL, PRINCIPALS AND TECHNIQUES TO MEET REQUIREMENTS FOR PASSIVE SOLAR CONSTRUCTION**
 - RAMMED EARTH INSULATED WALLS
 - WINDOW DECORATION
 - CLAY ROOF (MARKALAK)
 - DOUBLE GLAZING
- **USE OF ENHANCED TRADITIONAL LADAKHI CONCEPTS**
 - WATER SUPPLY FROM MOUNTAINS AND DISTRIBUTION IN THE CAMPUS
 - IRRIGATION SYSTEM FOR CAMPUS GREENARY
 - COMPOSTING TOILETS
- **INTRODUCED “NEW” CONCEPTS AND ADAPTED TO THE LOCAL CONDITIONS**
 - PASSIVE SOLAR CONSTRUCTION DETAILS
 - WATER TREATMENT
 - WASTE MANAGEMENT



ENHANCED TRADITIONAL LADAKHI WINDOW DECORATION



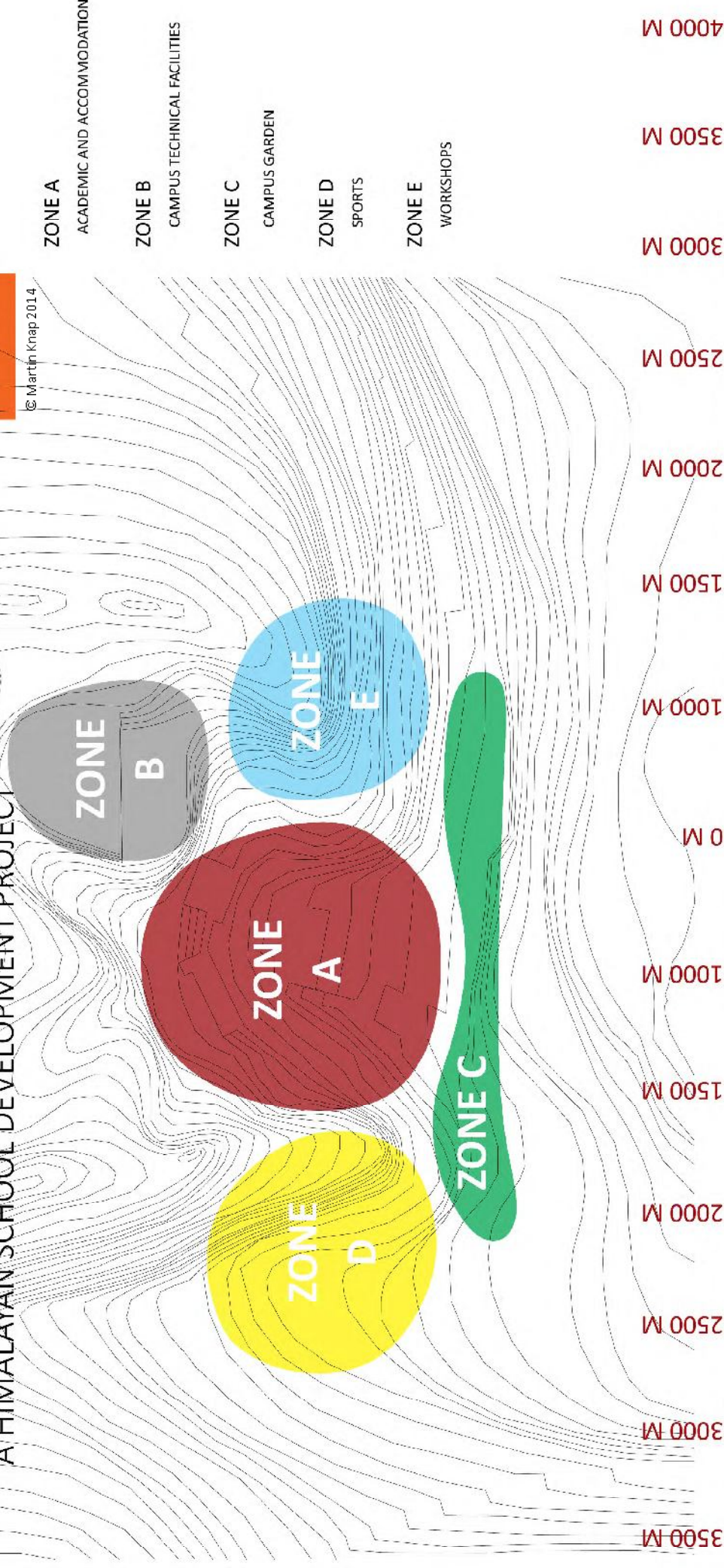
ENHANCED TRADITIONAL LADAKHI MUD WALLS

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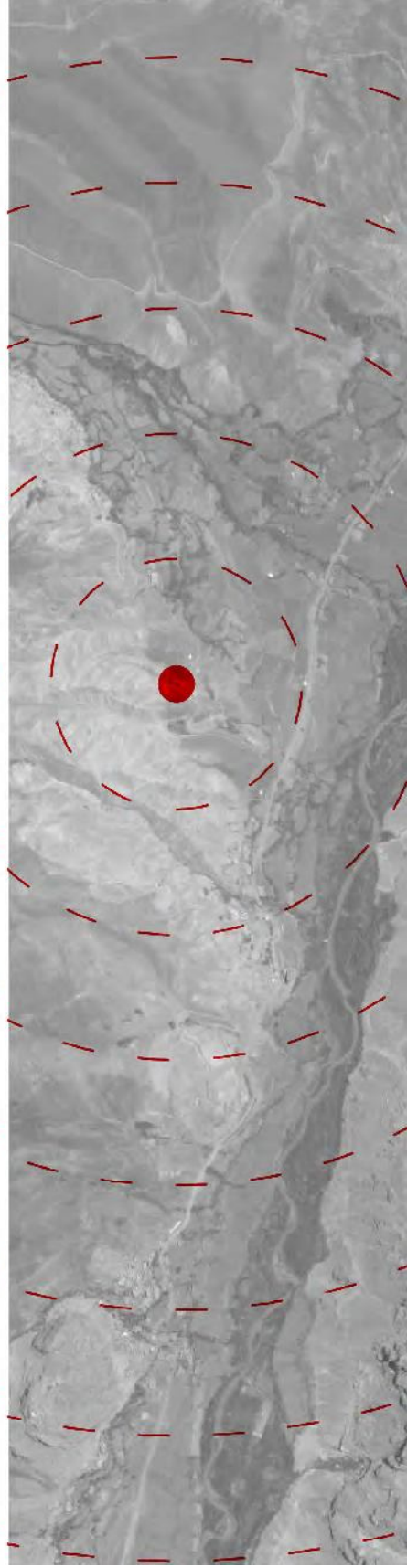
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3000 M
3500 M
4000 M

2500 M
2000 M
1500 M
1000 M
0 M

1000 M
1500 M
2000 M
2500 M
3000 M
3500 M



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- 1 ... MAIN ENTRANCE / DROP OFF
- 2 ... INFORMATION
- 3 ... ADMINISTRATION
- 4 ... LIBRARY, LKG, UKG
- 5 ... ACCOMMODATION - TEACHERS
- 6 ... PRAYER HALL, ART/DANCE/ THEATRE CLASSROOM
- 7 ... LABS AND COMPUTERS
- 8 ... STUDENT CENTRE
- 9 ... CLASSROOMS
- 10 ... CLASSROOMS
- 11 ... ACCOMMODATION - GIRLS
- 12 ... ACCOMMODATION - BOYS
- 13 ... KITCHEN, DINING HALL, LAUNDRY, CAMPUS MAINTENANCE
- 14 ... PHOTOVOLTAIC PANELS
- 15 ... COMPOSTING TOILETS
- 16 ... CAMPUS GARDEN & ORCHID
- 17 ... STAFF CARPARK
- 18 ... WATER TANK
- 19 ... RAIN & SNOW COLLECTOR



PHOTOVOLTAIC PANELS

WATER TANK

RAIN & SNOW BARRIER

RAIN & SNOW COLLECTOR

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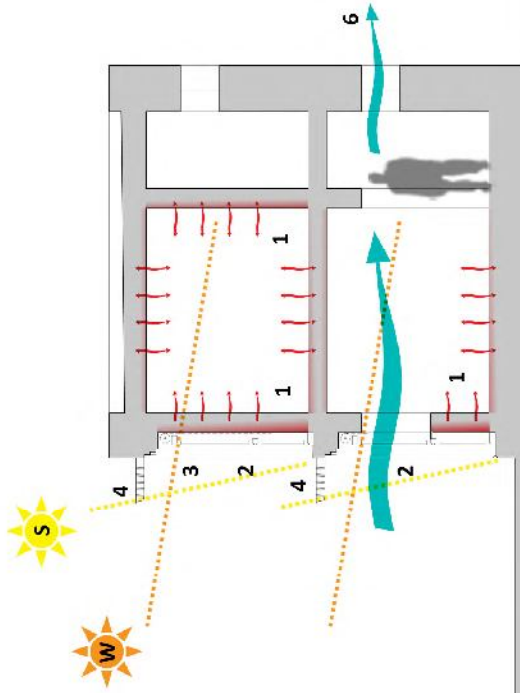


DIAGRAM OF PASSIVE SOLAR HEATING
SYSTEM NIGHT USE BUILDINGS- HEAT
ACCUMULATION

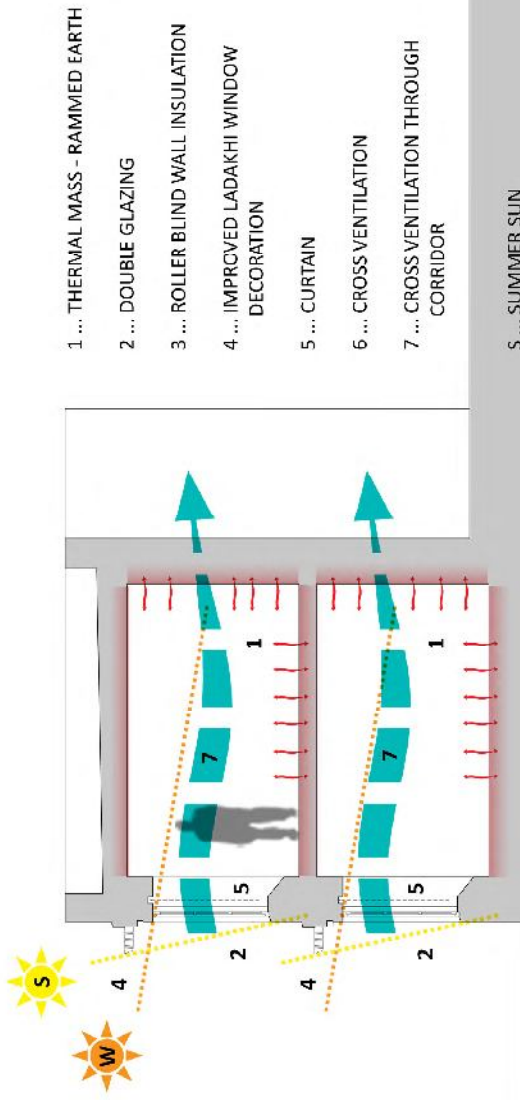


DIAGRAM OF PASSIVE SOLAR HEATING
SYSTEM DAY USE BUILDINGS- DIRECT
HEAT GAIN

- 1 ... THERMAL MASS - RAMMED EARTH
- 2 ... DOUBLE GLAZING
- 3 ... ROLLER BLIND WALL INSULATION
- 4 ... IMPROVED LADAKHI WINDOW DECORATION
- 5 ... CURTAIN
- 6 ... CROSS VENTILATION
- 7 ... CROSS VENTILATION THROUGH CORRIDOR

S ... SUMMER SUN

W ... WINTER SUN



TRADITIONAL LADAKHI WINDOW DECORATION



IMPROVED TRADITIONAL LADAKHI WINDOW DECORATION TO WORK FOR PASSIVE SOLAR BUILDINGS PROTECTING AGAINST OVERHEATING



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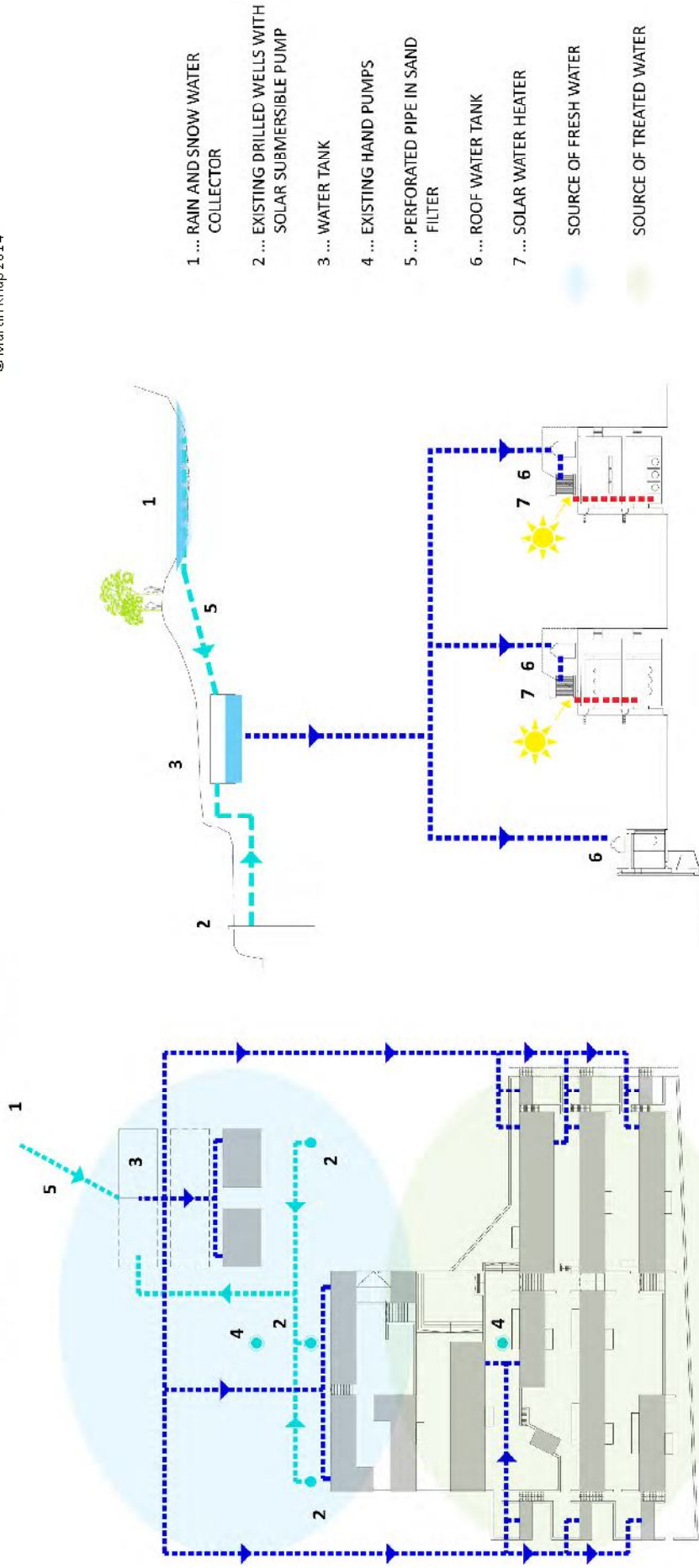
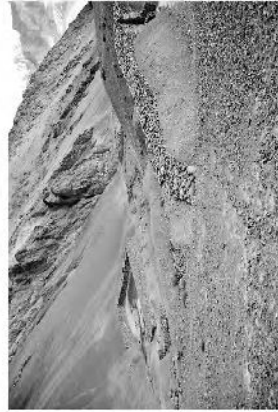


DIAGRAM OF PROPOSED WATER SUPPLY AND WATER DISTRIBUTION STRATEGY



TRADITIONAL LADAKHI WATER COLLECTOR



TRADITIONAL LADAKHI WATER DISTRIBUTION



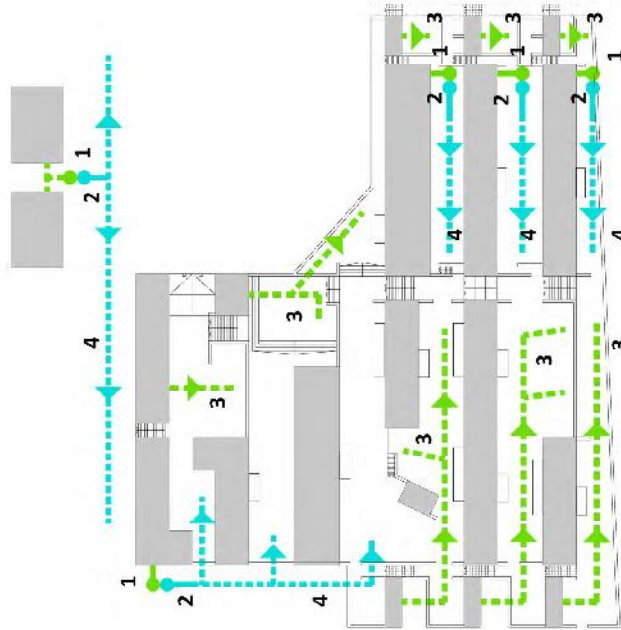
TRADITIONAL LADAKHI WATER DISTRIBUTION

BUILDING RESILIENCY:

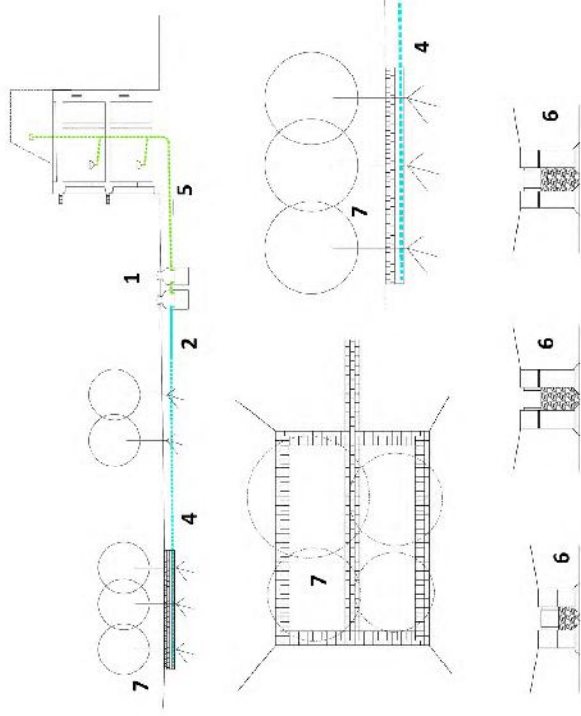
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PROPOSED WATER TREATMENT AND IRRIGATION SYSTEMS BASED ON TRADITIONAL LADAKHI CHANNEL SYSTEM



- 1 ... THREE CHAMBER SEPTIC TANK MADE OF TWO WATER TANK BARRELS
- 2 ... HORIZONTAL SAND FILTER MADE OF PERFORATED PIPE FILLED WITH VARIOUS SIZE OF GRAVEL AND SAND
- 3 ... GREY WATER
- 4 ... FILTERED WATER
- 5 ... SEWAGE INSPECTION CHAMBER
- 6 ... SECTION THROUGH IMPROVED LADAKHI IRRIGATION CHANEL SHAPED BY CONCRETE BRICKS FILLED WITH GRAVEL
- 7 ... SEATING AREA WHICH WORKS AS RAIN AND SNOW WATER COLLECTOR



TRADITIONAL LADAKHI IRRIGATION CHANNEL SYSTEM



TRADITIONAL LADAKHI IRRIGATION CHANNEL SYSTEM



TRADITIONAL LADAKHI IRRIGATION CHANNEL SYSTEM

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1 ... HUMAN WASTE (SOLID & LIQUID PARTS)

2 ... SEPARATION OF LIQUID WASTE,
PERFORATED PIPE FOR VENTILATION

3 ... SLOPED COMPOST BED,
PERFORATED PIPE FOR VENTILATION

4 ... COMPOST

5 ... LIQUID WASTE EXCESS
COLLECTION / EVAPORATION - STONES

6 ... AIR INTAKE

7 ... ACCESS - CORRUGATED SHEET PAINTED
BLACK

8 ... CORRUGATED SHEET PAINTED BLACK -
CHIMNEY EFFECT - HOT AIR IS RAISING
BETWEEN CORRUGATED SHEET AND WALL

9 ... CROSS VENTILATION

10 ... HOT AIR EXHAUST

11 ... BASIN DRAINED TO GREENERY

12 ... PERFORATED PIPE

13 ... SEWAGE VENTILATION

S ... SUN

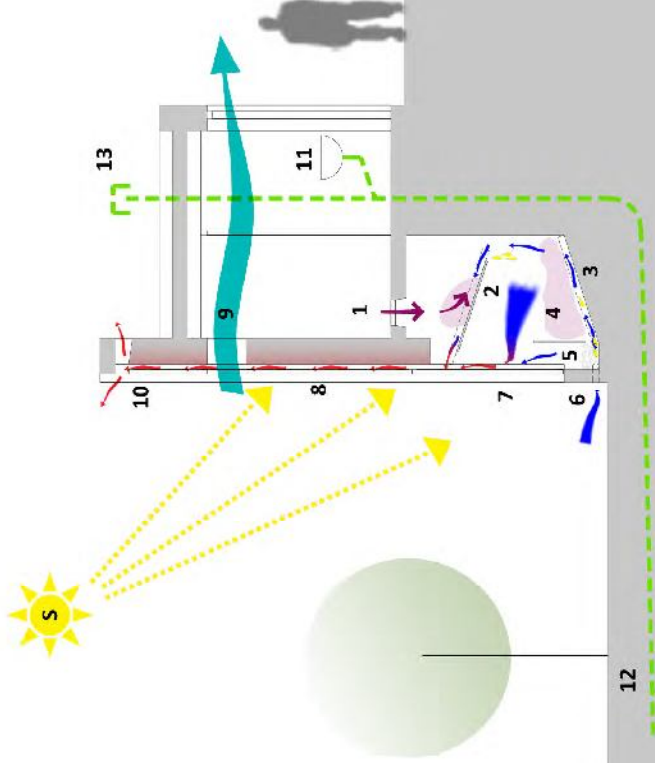


DIAGRAM OF TRADITIONAL LADAKHI COMPOSTING TOILET IMPROVED TO SOLAR VENTED BASED ON CLIVUS MULTITRUM COMPOSTING TOILET PRINCIPLES



TRADITIONAL LADAKHI COMPOSTING TOILET



TRADITIONAL LADAKHI IRRIGATION CHANNEL SYSTEM



TRADITIONAL LADAKHI RAMMED EARTH WALL

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OVERALL VIEW OF THE NEW ECOLOGICAL CAMPUS



STUDENT ACCOMMODATION BLOCK - PASSIVE SOLAR HEATING



CLASSROOM BLOCK



STUDENT ACCOMMODATION BLOCK - BEDROOM



STUDENT ACCOMMODATION BLOCK - ACTIVITY HALL



3D MODEL - PLAN



3D MODEL - SOUTH EAST VIEW



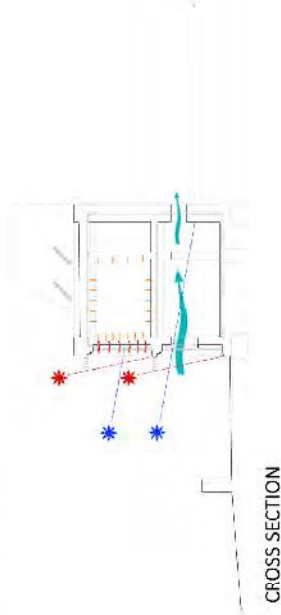
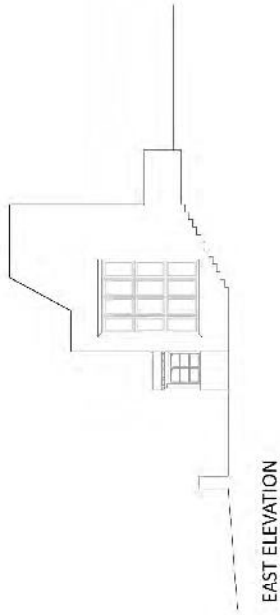
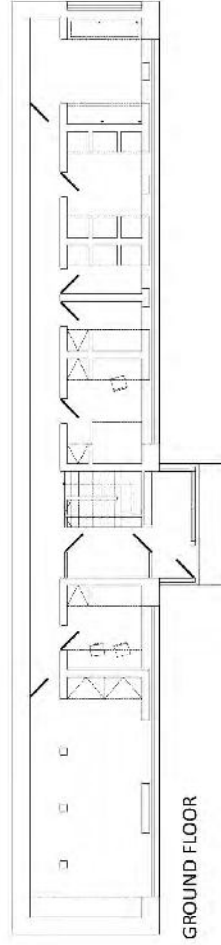
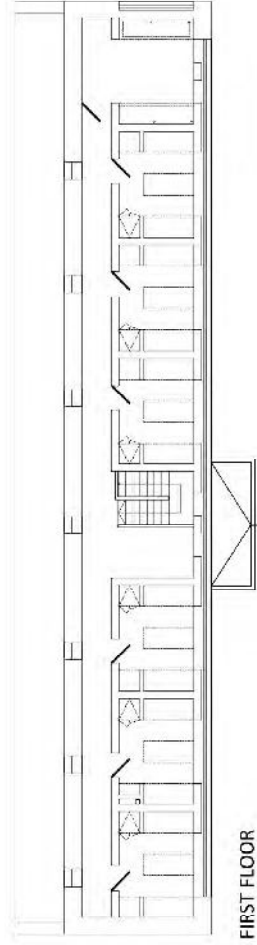
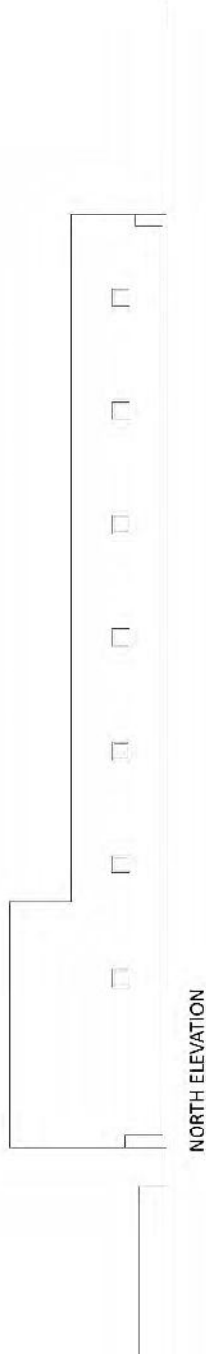
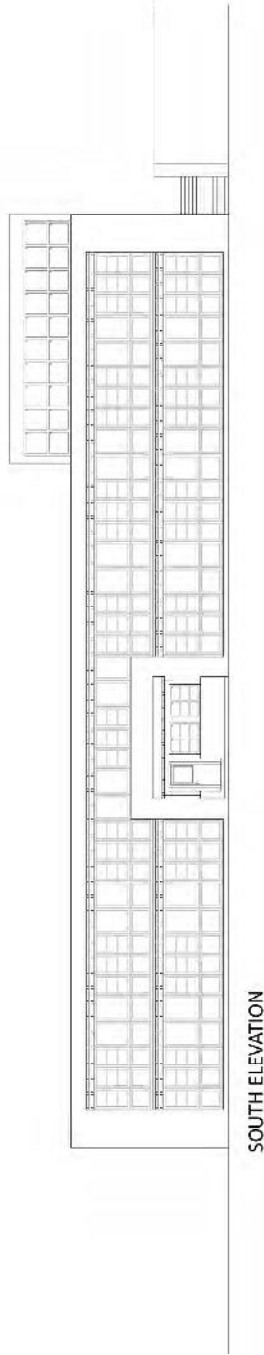
3D MODEL - SOUTH WEST VIEW

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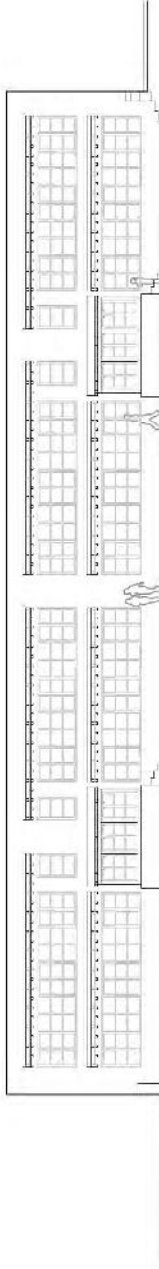
PROPOSED DESIGN OF THE STUDENT
ACCOMMODATION BUILDING FOR
FORTY STUDENTS

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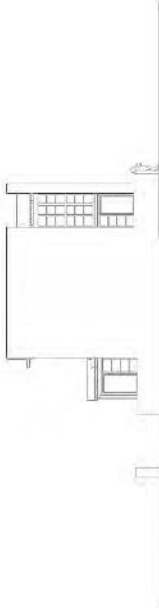
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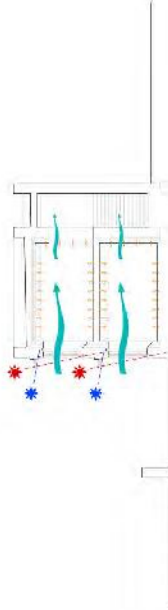
SOUTH ELEVATION



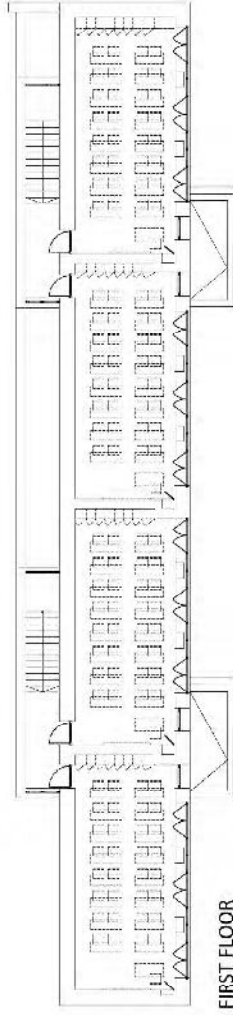
NORTH ELEVATION



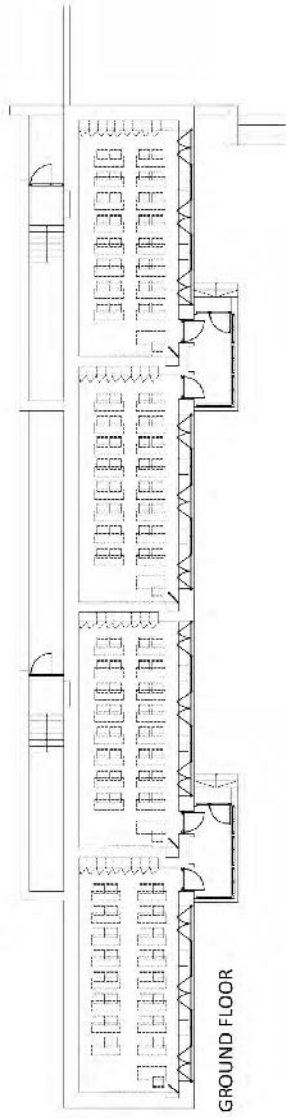
EAST ELEVATION



CROSS SECTION



FIRST FLOOR



GROUND FLOOR

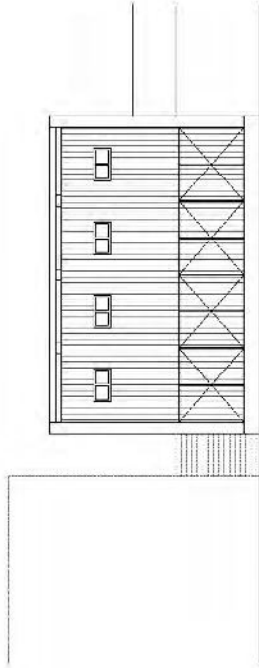
PROPOSED DESIGN OF THE CLASS-
ROOM BUILDING WITH EIGHT NEW
CLASSROOMS

BUILDING RESILIENCY:

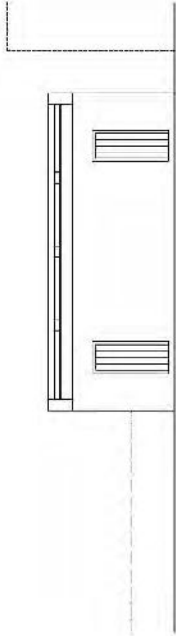
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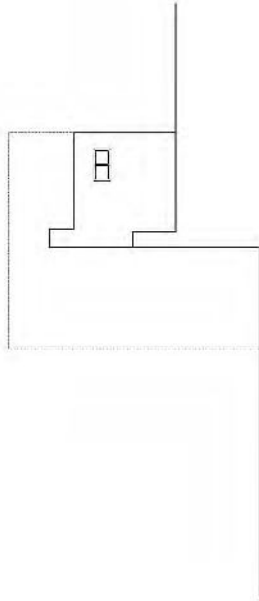
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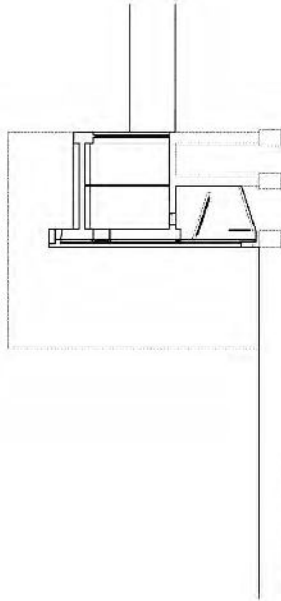
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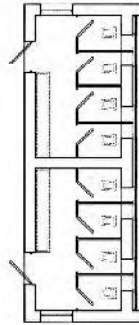
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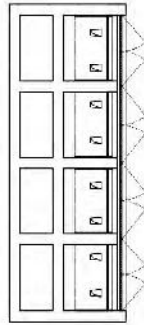
EAST ELEVATION



CROSS SECTION



FIRST FLOOR



GROUND FLOOR

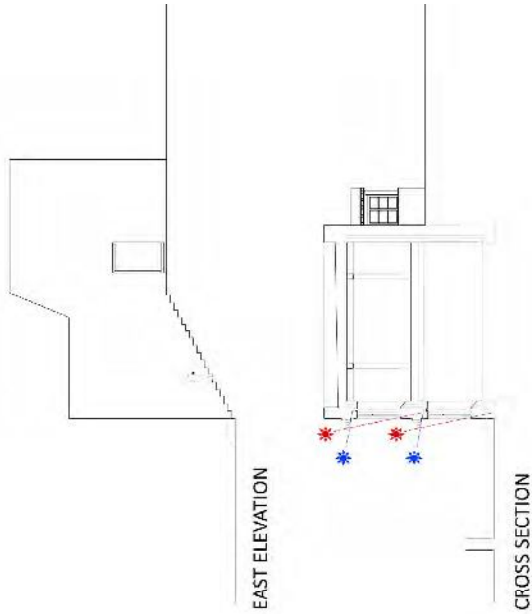
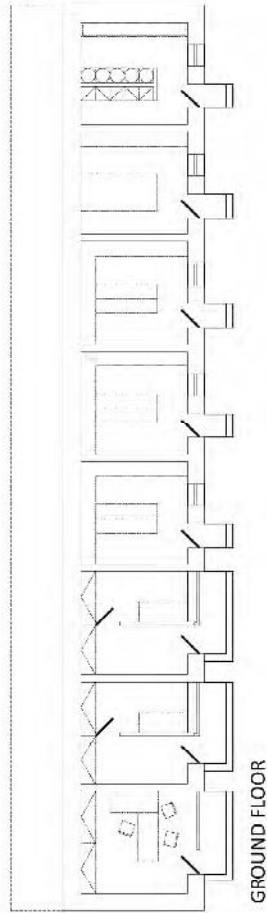
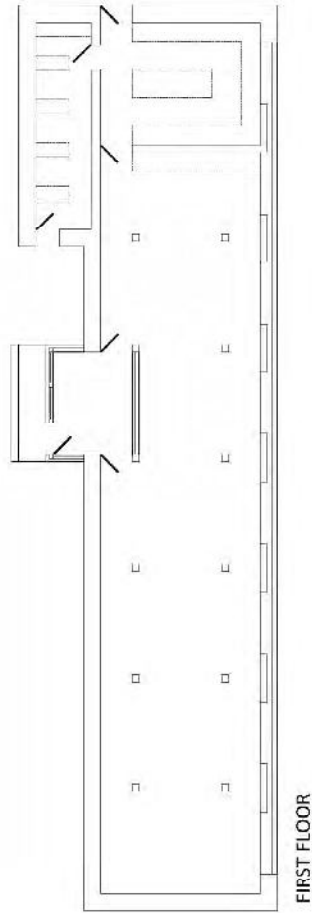
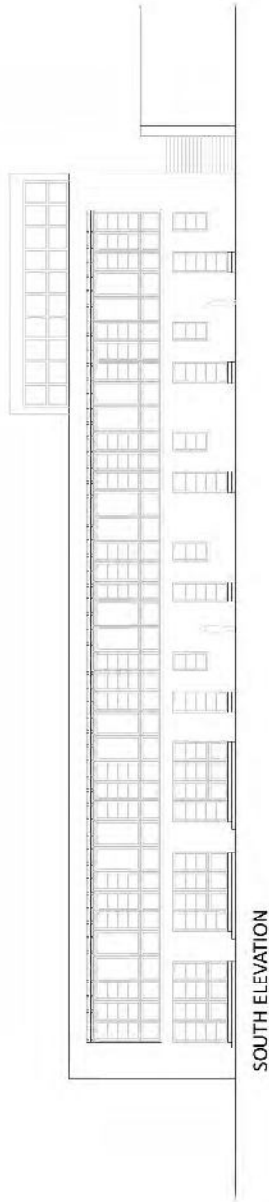
PROPOSED DESIGN OF THE COMPOST-
ING TOILET BUILDING WITH EIGHT
TOILETS

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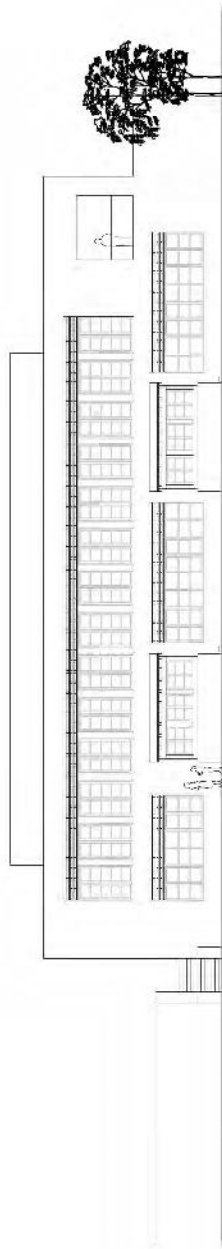
PROPOSED DESIGN OF THE DINING
HALL AND CAMPUS FACILITY BUILDING
INCLUDING KITCHEN, STORAGE
ROOMS, LAUNDRY

BUILDING RESILIENCY:

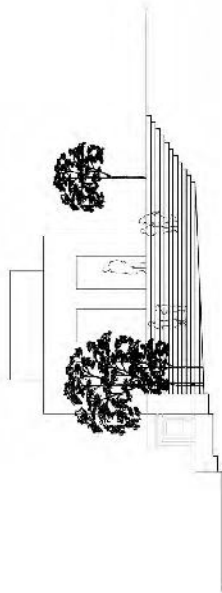
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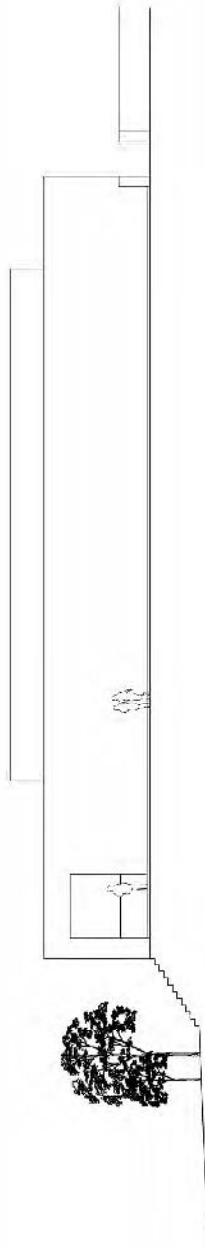
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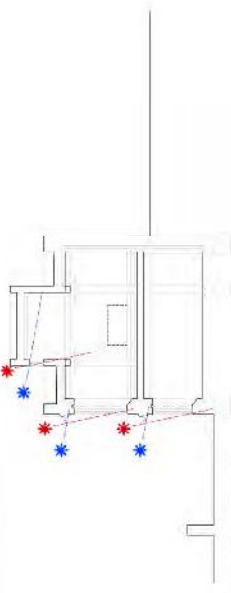
SOUTH ELEVATION



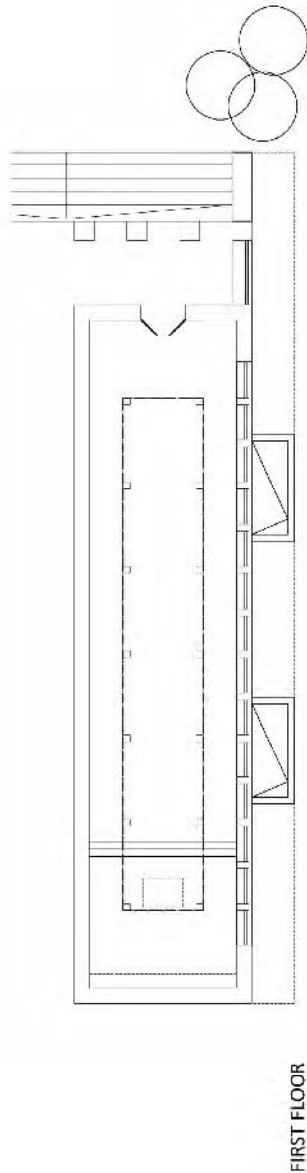
EAST ELEVATION



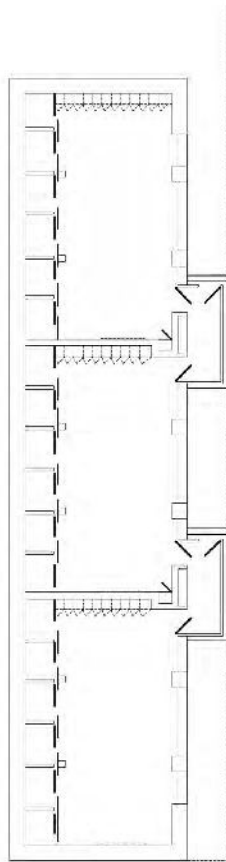
NORTH ELEVATION



CROSS SECTION



FIRST FLOOR



GROUND FLOOR

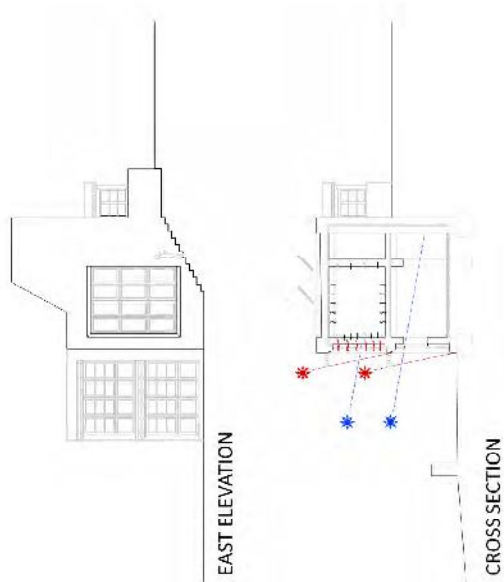
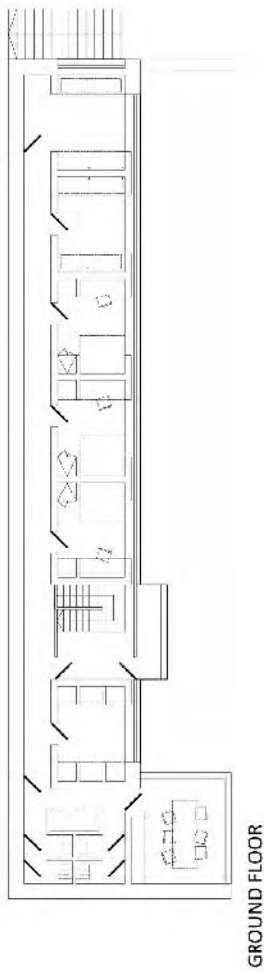
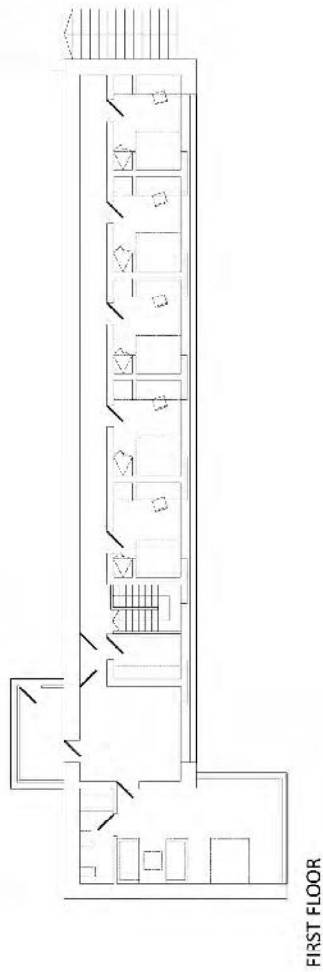
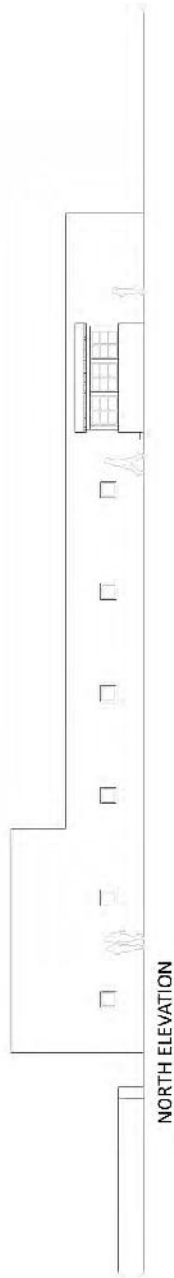
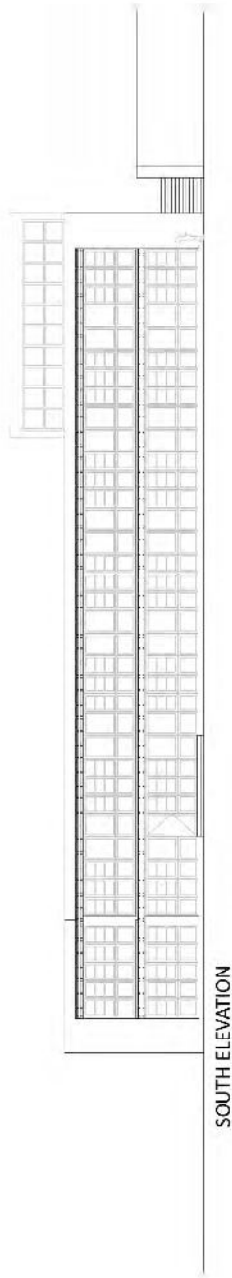
PROPOSED DESIGN OF THE PRAYER
HALL, ARTS, THEATRE AND DANCE
CLASSROOMS

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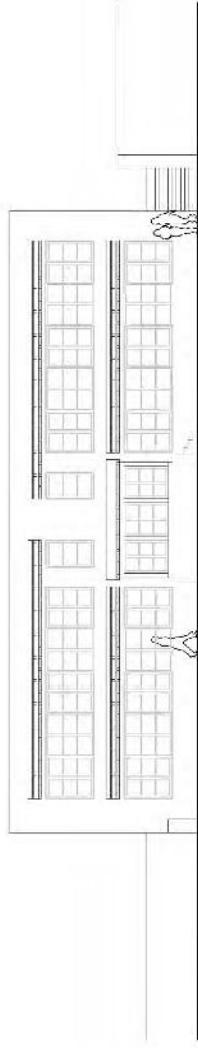
PROPOSED DESIGN CONCEPT OF THE
STAFF ACCOMMODATION BUILDING
FOR SINGLES, FAMILIES AND VIP

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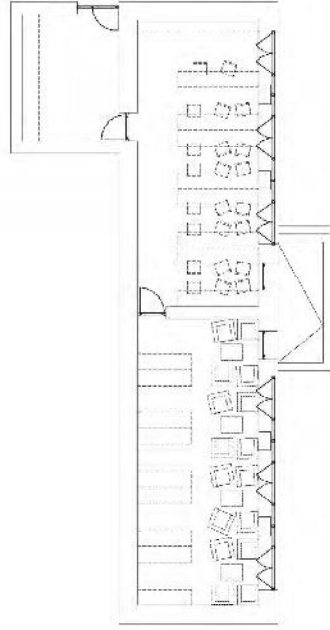
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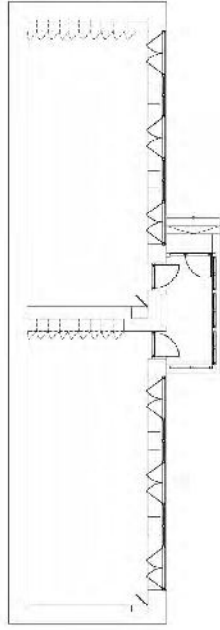
SOUTH ELEVATION



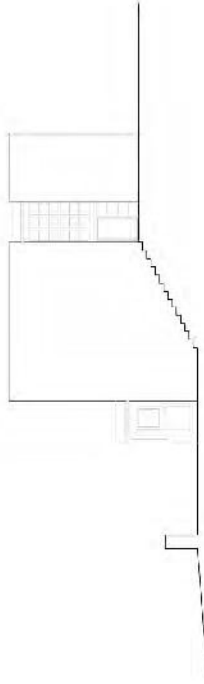
NORTH ELEVATION



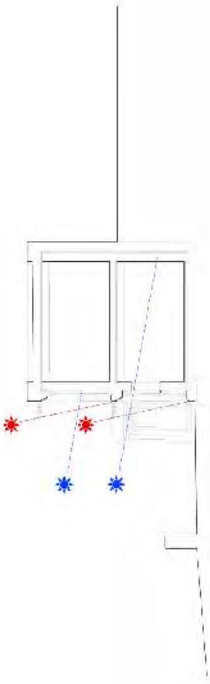
FIRST FLOOR



GROUND FLOOR



EAST ELEVATION



CROSS SECTION

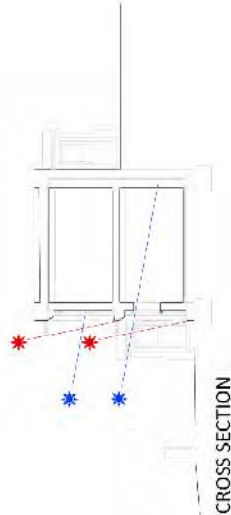
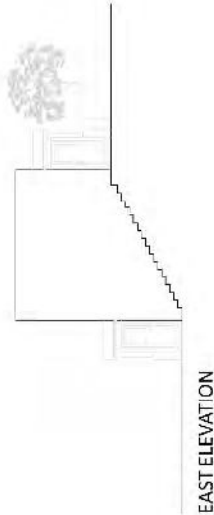
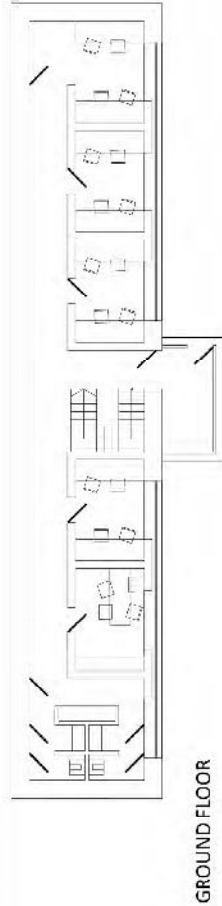
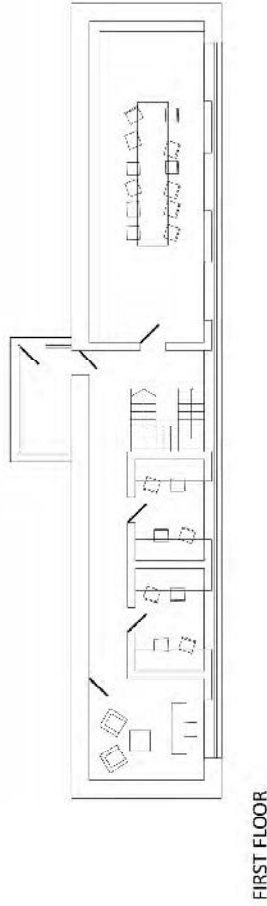
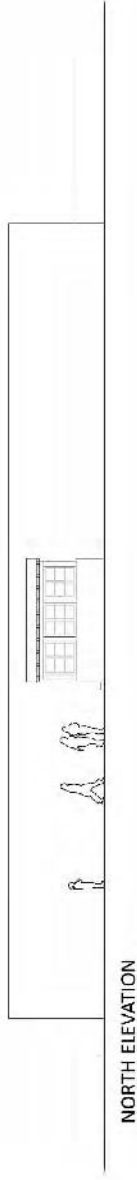
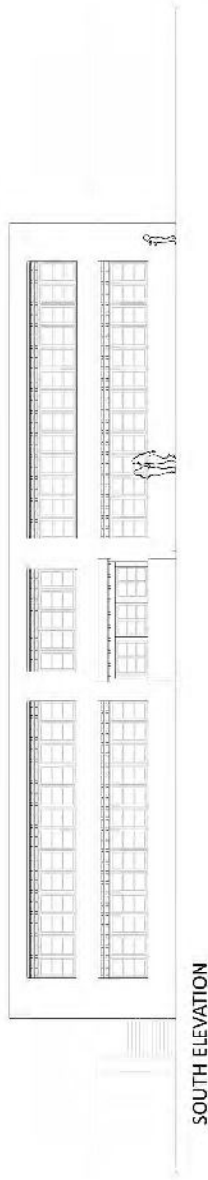
PROPOSED DESIGN CONCEPT OF THE
NEW LIBRARY LOWER KINDERGARTEN
AND UPPER KINDERGARTEN

BUILDING RESILIENCY:

A HIMALAYAN SCHOOL DEVELOPMENT PROJECT

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PROPOSED DESIGN CONCEPT OF THE
NEW OFFICE AND STAFF BUILDING

BUILDING RESILIENCY:

A HIMALAYAN SCHOOL DEVELOPMENT PROJECT

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IMPROVED TRADITIONAL LADAKHI
RAMMED EARTH WALL



IMPROVED TRADITIONAL LADAKHI FORMWORK



RAMMED EARTH PILLARS



WORK IN PROGRESS



IMPROVED TRADITIONAL LADAKHI RAMMED EARTH WALL



QUALITY OF WORKMANSHIP IMPROVEMENT



LOCAL COMMUNITY ENGAGED IN THE PROCESS



LOCAL COMMUNITY ENGAGED IN THE PROCESS



IMPROVED TRADITIONAL LADAKHI WINDOW DECORATION
PASSIVE SOLAR BUILDINGS