

SUSTAINABLE DEVELOPMENT

GREEN BUILDINGS MOVEMENT IN INDIA



Presented By:

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Vice-Chairman IIA-Rajasthan

2017, Jaipur

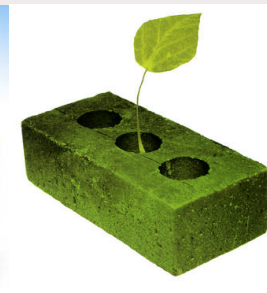
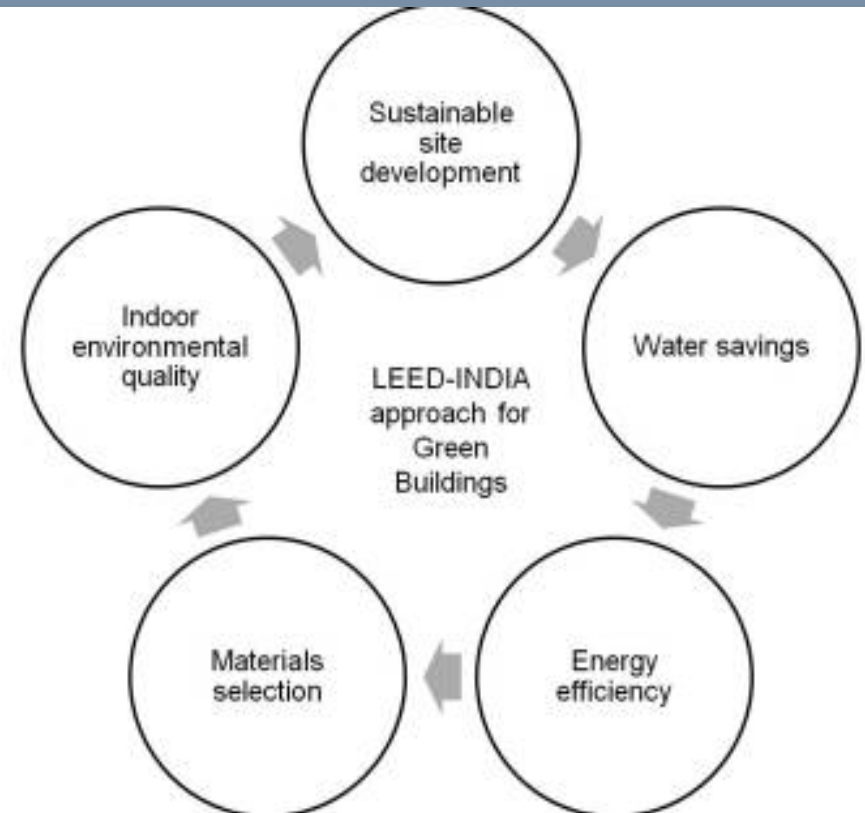
Our approach
to how we live
connects us to
the physical
world



GREEN BUILDINGS

FUNDAMENTAL PRINCIPLES

- **SUSTAINABLE SITE DEVELOPMENT**
- **INDOOR ENVIRONMENT QUALITY**
- **MATERIALS SELECTION**
- **ENERGY EFFICIENCY**
- **WATER EFFICIENCY**



!! ACHIEVEMENT !!

TOWARDS GREEN BUILDING



INDIAN GREEN BUILDING COUNCILS (IGBC) EFFORTS IN FACILITATING OVER 4.55* BILLION SQUARE FEET OF BUILT UP AREA, ADOPTING ITS RATING SYSTEMS HAS ENABLED INDIA BECOME THE SECOND COUNTRY IN THE WORLD TO HAVE THE LARGEST GREEN BUILDING FOOTPRINT WITH PROJECTS NATIONWIDE.

**ASPIRATION OF 10 BILLION SQFT OF REGISTERED GREEN BUILDING FOOTPRINT, IN 2022
(75 th year of Independent India).**



... TOWARDS GREEN BUILDINGS...

CERTIFICATIONS AND RATINGS FROM VARIOUS GOVERNMENT & NON-PROFIT ORGANISATIONS & AUTHORITIES.

SOME OF THE ORGANISATIONS INVOLVED AND ASSOCIATED IN ASSESEMENT, RATING & PROMOTING GREEN BUILDINGS ARE:

- **GRIHA**
Green Rating for Integrated Habitat Assessment
- **IGBC**
Indian Green Building Council
- **BEE**
Bureau of Energy Efficiency
- **ISHRAE**
The Indian Society of Heating, Refrigerating & Air Conditioning Engineers
- **GBCI**
Green Business Certification Inc.
- **ECBC**
Energy Conservation Building Code



IIA IS ACTIVELY ASSOCIATED WITH ALL OF THESE ORGANISATIONS



Indian Green Building Council (IGBC)



INDIAN GREEN BUILDING COUNCIL (IGBC)

IGBC is the **Non profit research institution** having its offices in CII-Sohrabji Godrej Green Business Centre., is India's first Green Building's Certification Body and is one of the founding members of World Green Building Council. The vision of the Council is 'To enable a sustainable built environment for all and facilitate India to be one of the global leaders in the sustainable built environment by 2025".

ACHIEVEMENTS OF IGBC

1,793 ORGANISATIONAL MEMBERS

3,958 REGISTERED PROJECTS

4.55 BILLION SQ.FT. GREEN BUILDING FOOTPRINT

1,41,898 ACRES OF LARGE DEVELOPMENTS

2,235 IGBC ACCREDITED PROFESSIONALS



WATER EFFICIENCY

WE HAVE ONLY LESS THAN 1% POTABLE WATER.

REJUVINATION OF TRADITIONAL WATER CONSERVATION

- TECHNIQUES WITH STEP WELLS (BAORI'S)
- RAINWATER STORAGE TANKS & RESERVIORS
- DUG WELLS

IIA HAS PARTNERED WITH GOVERNMENT MUNICIPAL BODY IN EXECUTING JAL SWABLAMBAN ABHIYAN.



मुख्यमंत्री
जल स्वावलम्बन
अभियान

**Chief Minister
Water self reliant Movement**



FACTORS IN PROMOTING GREEN BUILDINGS

GOVERNMENT

- TAX RELAXATIONS
- BUILDING NORMS RELAXATIONS
- ADDED CHAPTER ON SUSTAINABILITY IN NBC
- INTERNATIONAL AGREEMENTS & COMMITMENTS

CONSUMERS

- INCREASED DEMAND
- INCREASED AWARENESS
- WELL BUILT BUILDINGS, THUS A BETTER BUILT ENVIRONMENT

BUILDERS

- PROMOTIONAL FEATURE
- MARKET DEMAND
- BRAND VALUE
- TAX BENEFITS
- BUILDING NORMS BENEFITS

CONSULTANTS/ TECHNOCRATS

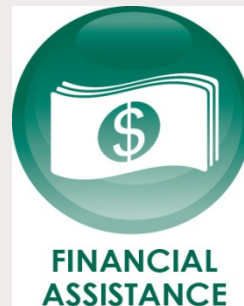
- ENCOURAGEMENT THROUGH AWARENESS
- BETTER DESIGNED & ENGINEERED BUILDINGS

GOVERNMENT MEASURES TOWARDS GREEN BUILDINGS

THE MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE (MOEFCC), GOVERNMENT OF INDIA, OFFERS FAST TRACK ENVIRONMENTAL CLEARANCE FOR GREEN BUILDING PROJECTS WHICH ARE PRECERTIFIED/ PROVISIONALLY CERTIFIED BY IGBC.

VARIOUS STATE GOVERNMENTS PROVIDE ADDITIONAL 5% TO 10% FAR FOR PROJECTS WHICH ARE CERTIFIED BY IGBC.

ALSO, STATE GOVERNMENTS FACILITATE FINANCIAL ASSISTANCE FROM SMALL INDUSTRIES DEVELOPMENT BANK OF INDIA (SIDBI), TO GREEN BUILDING PROJECTS IN THE MSME SECTOR.



POSITIVE ECONOMIC IMPACTS OF GREEN BUILDINGS

PROJECT OWNERS ACKNOWLEDGED A **SEVEN PERCENT INCREASE IN NET ASSET VALUE** WHEN SURVEYED.

ON AN AVERAGE, 18 PERCENT OF THE CLIENTS OF THE CONSTRUCTION INDUSTRY DEMANDED THAT THEIR PROJECTS BE ELIGIBLE FOR GREEN CERTIFICATION.



Green buildings make good business sense

IGBC within a short spell of time has clearly demonstrated that constructing green buildings are technically feasible and economically viable. At initial stages of green building movement (2003-2006), the incremental cost to incorporate green building features has been 12 to 18 %.

Today, the incremental cost of a commercial green building has come down to 3 to 5 %. The additional costs gets paid back in about 2 to 3 years with substantial reduction in operational costs.

SUSTAINABLE VERNACULAR BUILDINGS



HOTEL SURYAGARH
RAJASTHAN, INDIA



GOVARDHAN ECO VILLAGE
MAHARASHTRA, INDIA

HOTEL SURYAGARH

RAJASTHAN, INDIA



HOTEL SURYAGARH

RAJASTHAN, INDIA



- Hotel Suryagarh is situated midway between Jaisalmer city and SAM sand dunes about 20 km from the city.
- 40 acres of barren land with no vegetation.
- Client's brief was to create guest rooms in the existing hotel in vernacular style.
- In the later phase the main fort building was surrounded by smaller structures as was prevalent for the use of the ministers and the rich sahuikars.
- The style was borrowed from the "LUDHARVA", an abandoned village of the rich Paliwals of Jaisalmer dating about 200 years back.
- It gave the basic architectural design elements and technique, like post and lintel construction, Indirect lighting(we achieved through clear storey light).
- Stone slab roofing and courtyards.

HOTEL SURYAGARH

RAJASTHAN, INDIA

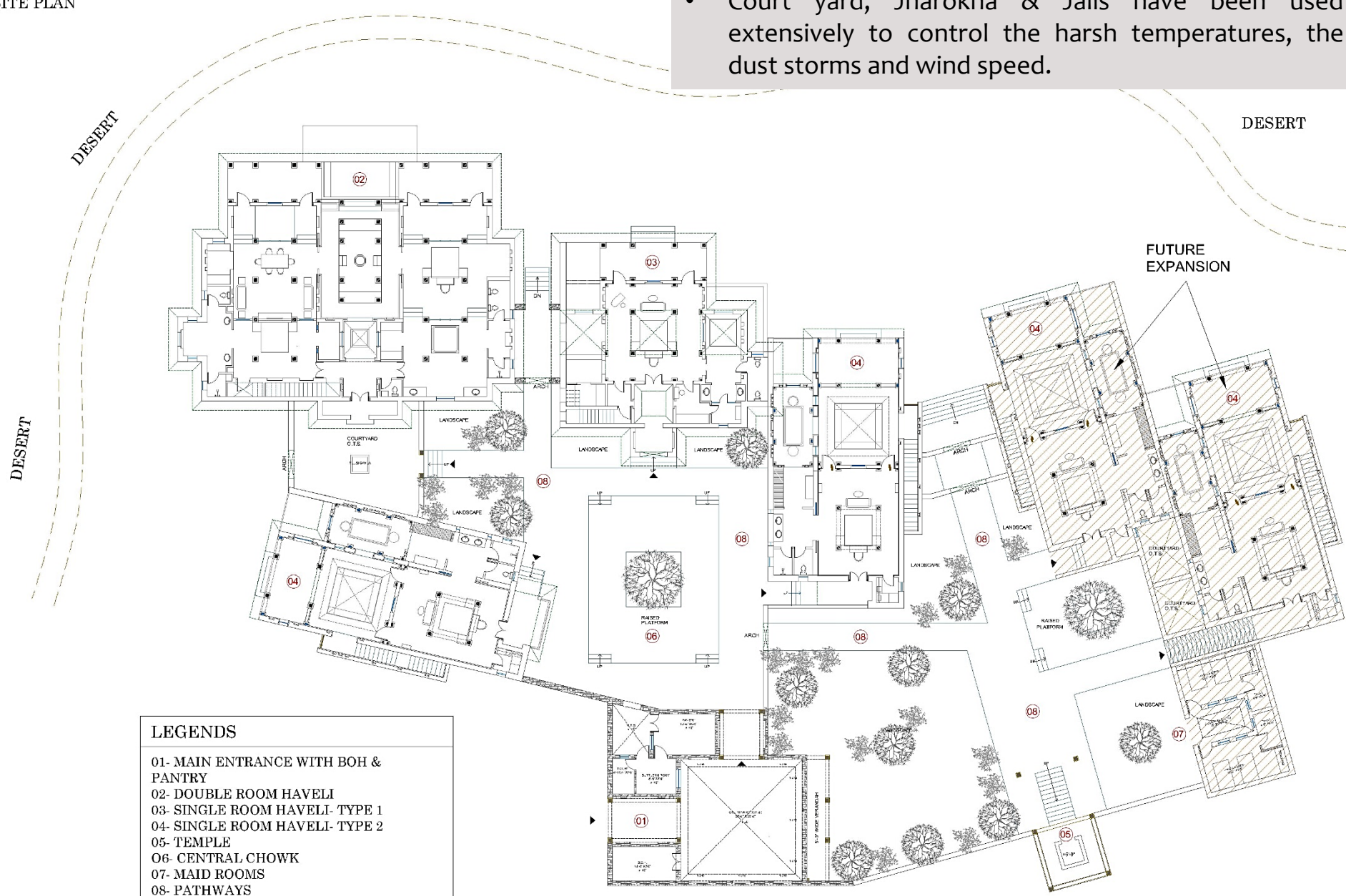
- No steel or RCC was used.
- Jaisalmer stone from within 50km was used for all construction by using different treatments/polish, texture, dressing.
- No other stone is used in the whole construction.
- Babool wood is used for covering the ceiling and minimal wood work.



SURYAGARH- HAVELIS

SITE PLAN

- Court yard, Jharokha & Jalis have been used extensively to control the harsh temperatures, the dust storms and wind speed.



- LEGENDS**
- 01- MAIN ENTRANCE WITH BOH & PANTRY
 - 02- DOUBLE ROOM HAVELI
 - 03- SINGLE ROOM HAVELI- TYPE 1
 - 04- SINGLE ROOM HAVELI- TYPE 2
 - 05- TEMPLE
 - 06- CENTRAL CHOWK
 - 07- MAID ROOMS
 - 08- PATHWAYS

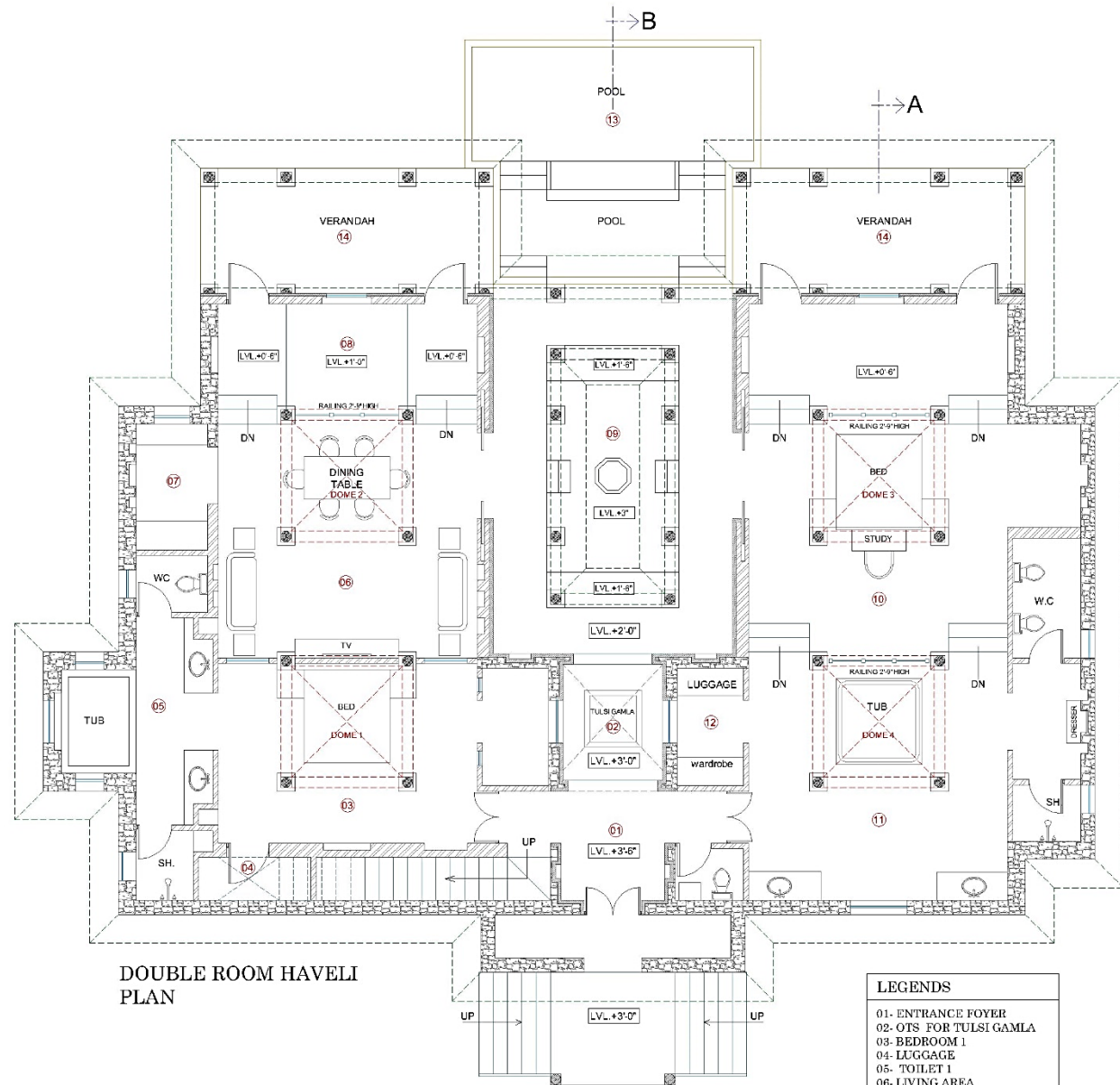
SURYAGARH- HAVELIS






EXPOSED RANDOM RUBBLE MASONRY IN EXTERIOR WALLS



INNER COURTYARD STONE WALLS CLADDED WITH DRESSED STONE (DAABDI)

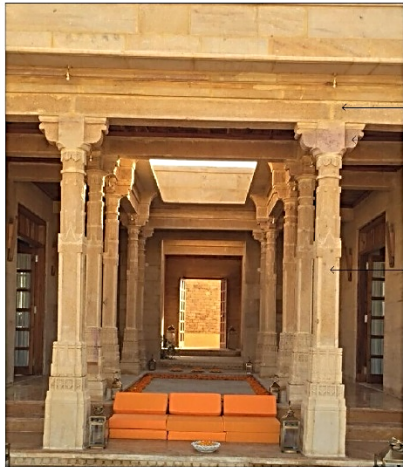


DOUBLE ROOM HAVELI PLAN

-  OUTER WALLS IN EXPOSED RANDOM RUBBLE JAISALMER STONE MASONRY
-  INNER WALLS IN BRICK MASONRY & LIME PLASTER
-  INNER COURTYARD STONE WALLS CLADDED WITH DRESSED STONE (DAABDI)

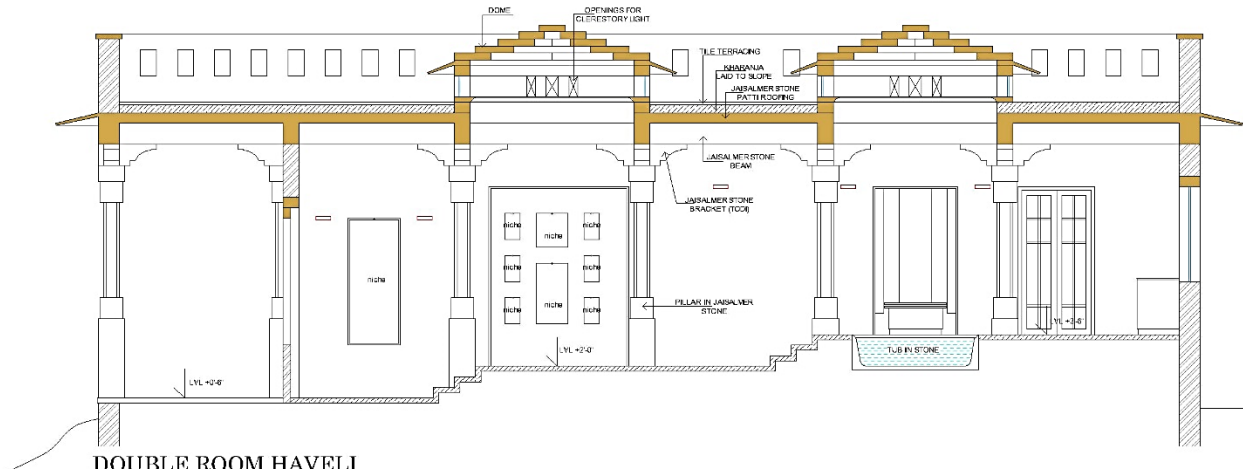
- LEGENDS**
- 01. ENTRANCE FOYER
 - 02. OTS FOR TULSI GAMLA
 - 03. BEDROOM 1
 - 04. LUGGAGE
 - 05. TOILET 1
 - 06. LIVING AREA
 - 07. KITCHENETTE
 - 08. DAY BED
 - 09. OTS COURTYARD WITH BONFIRE SEATING
 - 10. BEDROOM 2
 - 11. TOILET 2
 - 12. LUGGAGE
 - 13. POOL
 - 14. VERANDAH VIEWING THE DESERT

SURYAGARH- HAVELIS



JAISALMER STONE BEAM
 JAISALMER STONE BRACKET (TOD)
 PILLAR IN JAISALMER STONE

DOUBLE ROOM HAVELI COURTYARD

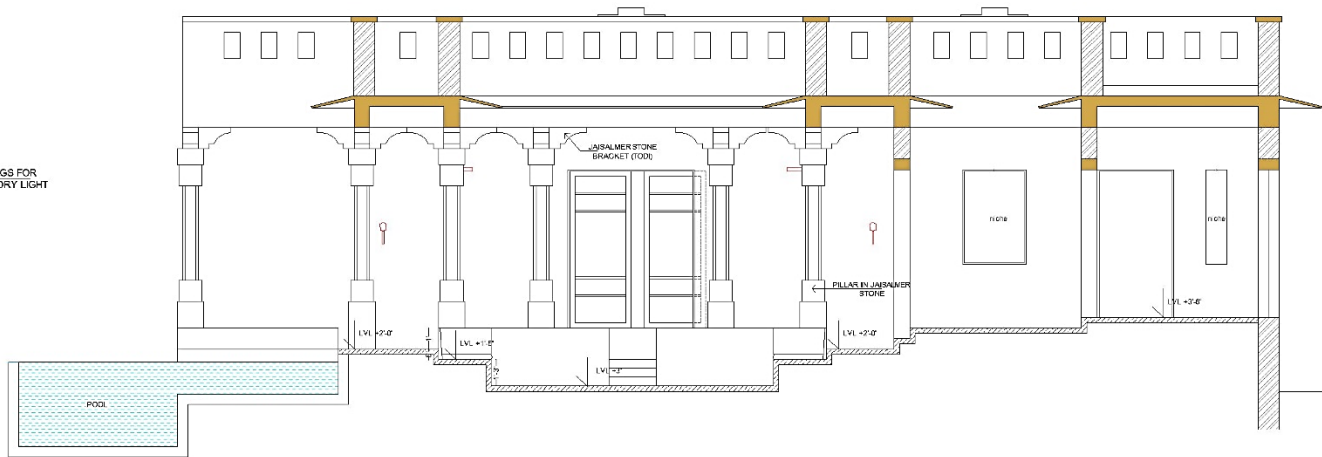


DOUBLE ROOM HAVELI SECTION A



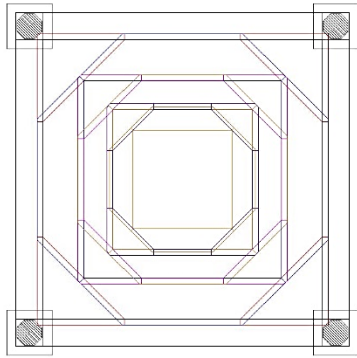
OPENINGS FOR CLERESTORY LIGHT

DOME DURING CONSTRUCTION

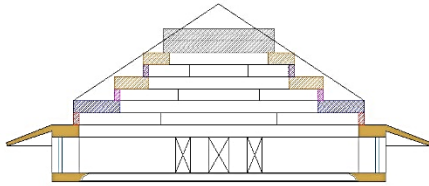


DOUBLE ROOM HAVELI SECTION B

SURYAGARH- HAVELIS



DOME PLAN

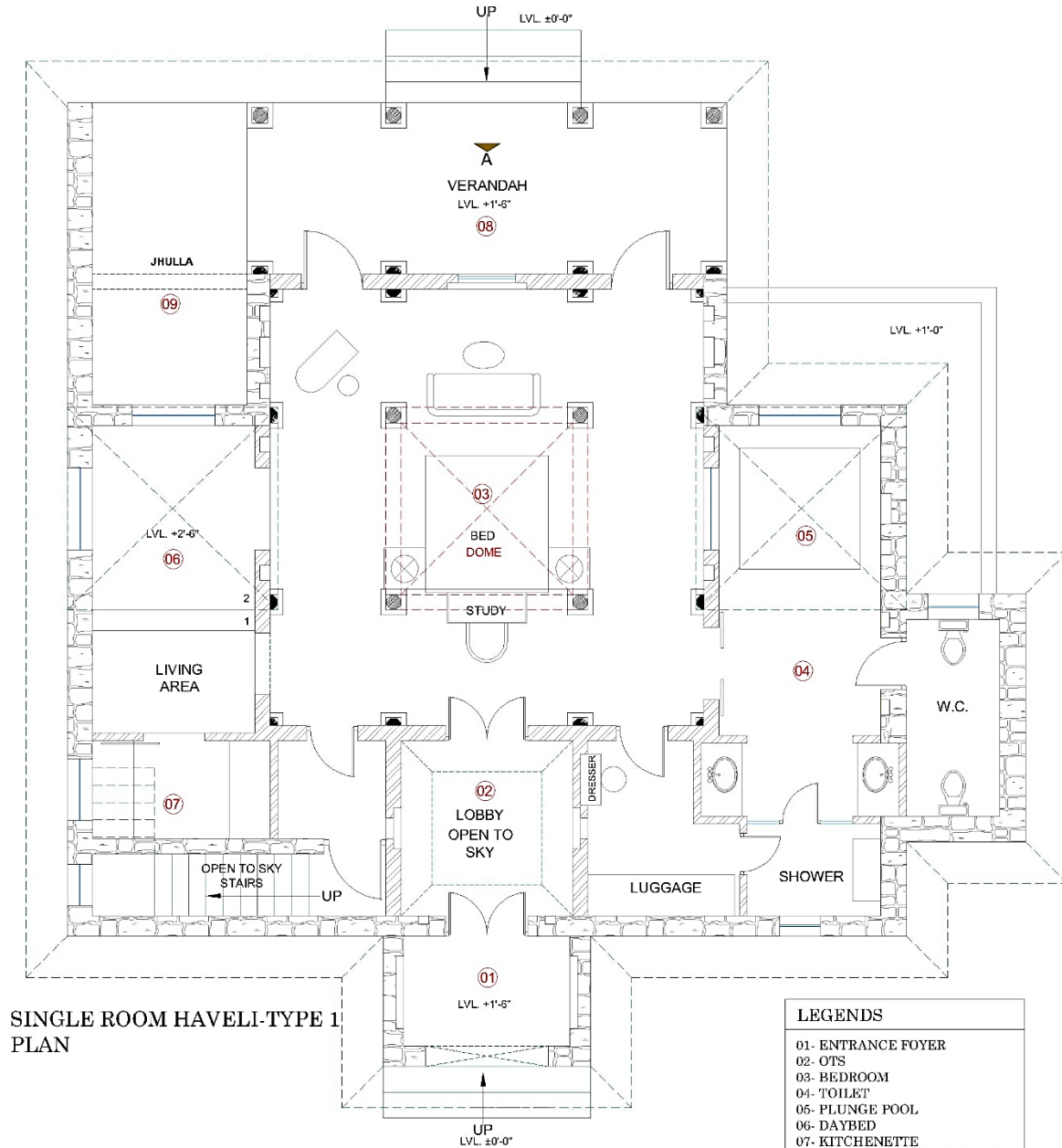


DOME CROSS SECTION

DIFFERENT COLOURS SHOWING STONE SLABS AT DIFFERENT LEVELS



DOME FROM INSIDE

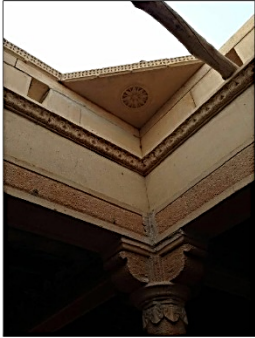


SINGLE ROOM HAVELI-TYPE 1 PLAN

| LEGENDS | |
|---------|---------------------------------|
| 01- | ENTRANCE FOYER |
| 02- | OTS |
| 03- | BEDROOM |
| 04- | TOILET |
| 05- | PLUNGE POOL |
| 06- | DAYBED |
| 07- | KITCHENETTE |
| 08- | VERANDAH VIEWING THE DESERT |
| 09- | OTS PLATFORM WITH JHULA (SWING) |

SURYAGARH- HAVELIS

VARIOUS APPLICATIONS OF SINGLE JAISALMER STONE



VARIOUS TEXTURES OF SINGLE JAISALMER STONE



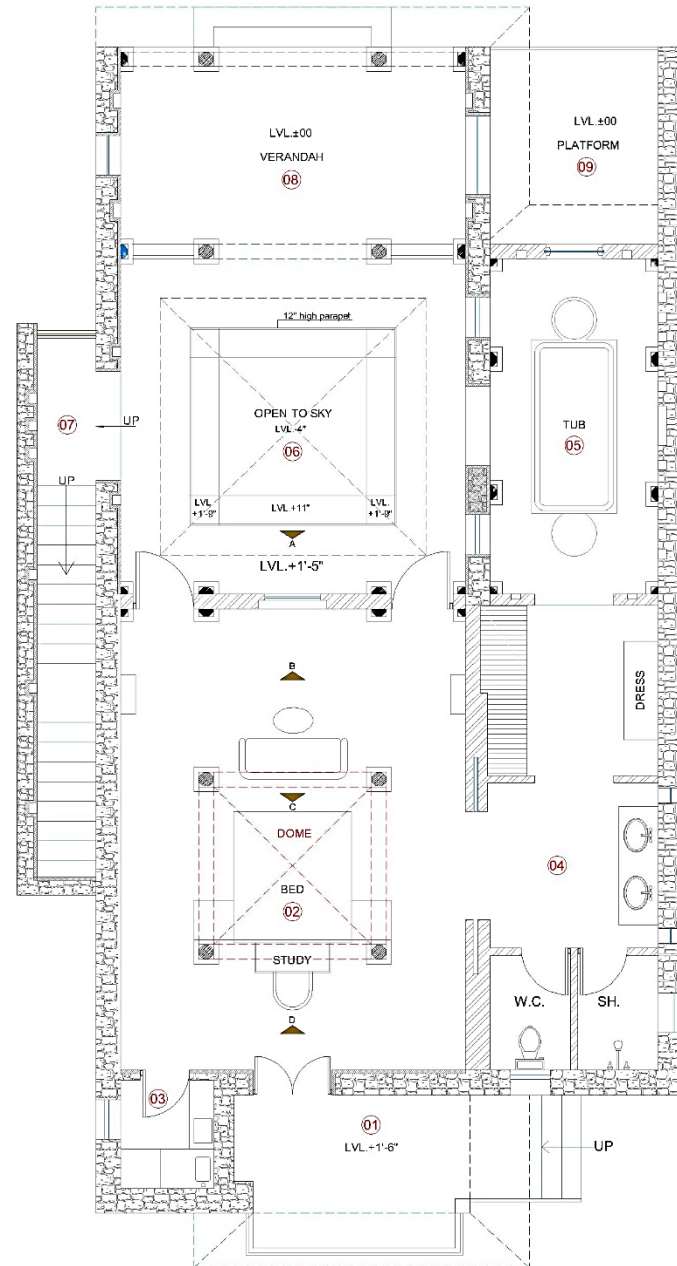
JAISALMER STONE IN PILLARS & JALIS



ROUGH JAISALMER STONE IN PATHWAYS FLOORING & POLISHED JAISALMER STONE IN INTERIORS



FIXING OF STONE PILLAR



SINGLE ROOM HAVELI-TYPE 2 PLAN

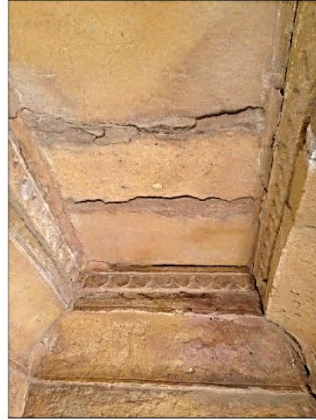
LEGENDS

- 01- ENTRANCE FOYER
- 02- BEDROOM
- 03- KITCHENETTE
- 04- TOILET
- 05- TUB
- 06- OTS COURTYARD SITTING
- 07- PLATFORM FOR ARTISTS PERFORMANCE
- 08- VERANDAH VIEWING THE DESERT
- 09- OTS PLATFORM

SURYAGARH- HAVELIS



DOME FROM OLD STRUCTURE



STONE SLABS IN ROOFING



BABOOL WOOD USED TO COVER THE STONE SLABS IN CEILINGS

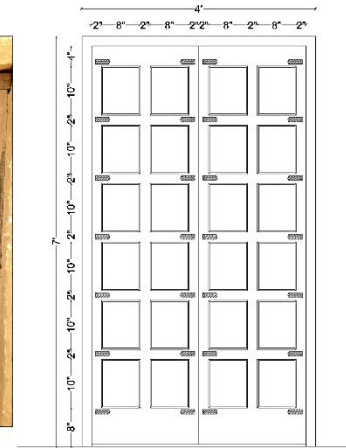


STONE POST & BRACKETS

INSPIRATION FROM LUDHARWA, JAISALMER



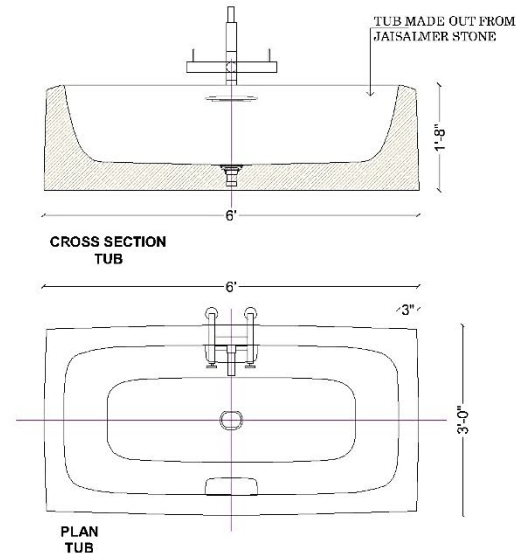
OLD WOODEN DOOR IN LUDHARWA



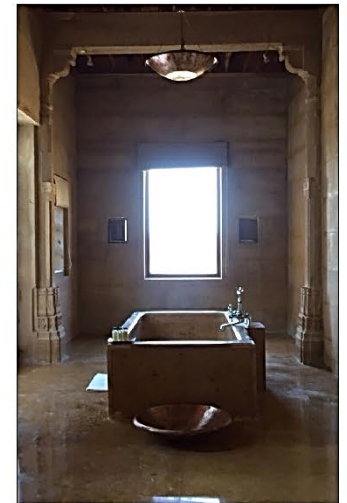
DOOR ELEVATION HAVELI



DOOR IN HAVELI



PLAN TUB
TUB DETAIL MADE OUT FROM JAISALMER STONE



TUB IN SINGLE ROOM HAVELI TYPE-2











GOVARDHAN ECO VILLAGE

MAHARASHTRA, INDIA

In the village Gatare 100 Kms from Mumbai

Land area: **63 Acres**

Built Area: **15,000 M²**

Completion: **2013**

Architects: **Biome Environmental Solutions**

CONSULTANTS:

Electrical: **Nagesh SV, MCDBERL Pvt.Ltd**

Plumbing: **MCDBERL Pvt.Ltd**

Structure: **Prof. M R Yogananda,
Ravindranath Bontadka,
Pramod A.V**

Contractor: **Ravi K**

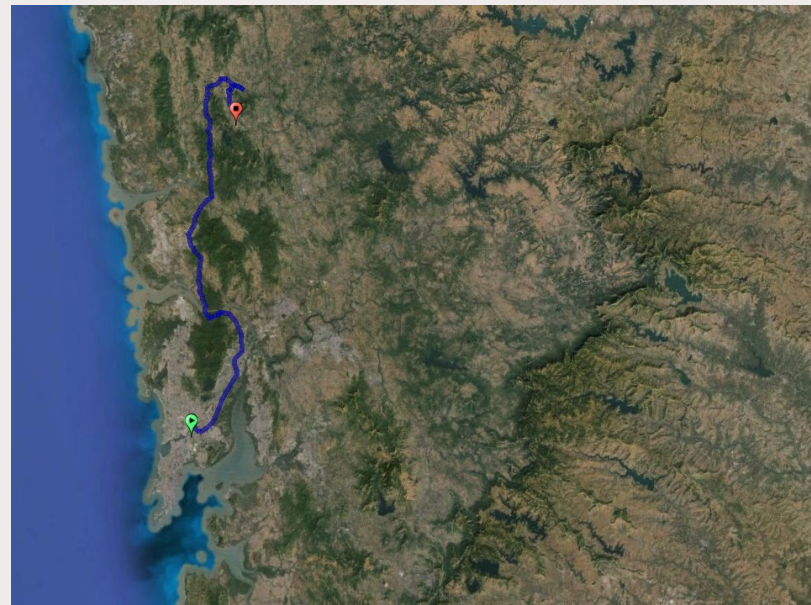
Project Cost: **US \$ 1,500,000**



GOVARDHAN ECO VILLAGE

MAHARASHTRA, INDIA

- The project is a retreat for the devotees of Iskcon.
- The project includes accommodation facility ,seminar halls, prayer and wellness spaces, dining facilities and a cowshed.
- The buildings are built on higher harder ground whereby the foundation is minimal.
- The buildings are built with locally sourced soil from nearby village and in the site.
- The concept was to create an ecological development which addressed resource and skill for building, responsible water use and energy.
- Earth is the medium for construction and the development is now is a Centre for technology transfer.
- Groundwater management is integrated into the planning. Rain is harvested and treated wastewater is used for agriculture. The waste water treatment is done through Soil Bio Technology.
- Solar systems are in place for electricity and water heating, Biomass and Biogas based systems for cooking.



GOVARDHAN ECO VILLAGE

MAHARASHTRA, INDIA



Legend

| | | | | | |
|-----|----------------------|-----|-----------------------|-----|---|
| No. | Building | No. | Building | No. | Building |
| A | Gurukul | K | Private cottages 3 | U | Yoga hall |
| B | Temple | L | Private cottage | V | Pool bath house |
| C | Kund(water body) | M | Dormitory | W | Bio Pool |
| D | Daity kitchen | N | Community cottage 1 | X | Staff dormitories and housekeeping |
| E | Pujari's quarters | O | Community cottage 2 | Y | Managers quarters |
| F | Admin and kitchen | P | Amenity block | Z | Parking, drivers dorms, Security, HT transformer, |
| G | Dining halls | Q | Ayurvedic block | A1 | Nursery and compost |
| H | CEO quarters | R | Brahmachari ashram | A2 | Transformer yard, bio-mass gasifier and engineering block |
| I | Private cottages 4&5 | S | Gaushala & Caretakers | A3 | STP |
| J | Private cottages 1&2 | T | Cow product manuf. | | |

Master Plan

GOVARDHAN ECO VILLAGE

MAHARASHTRA, INDIA



Water Management: Recharge & Recycle



Septic Tank for Farmers' Cottage

Recharge Zone

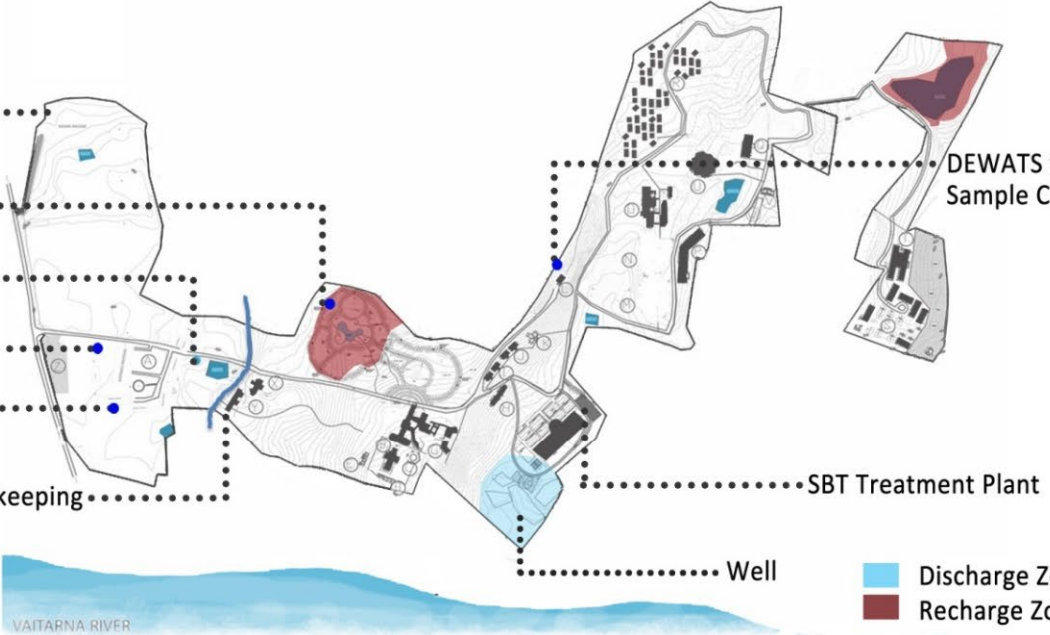
Well

SBT for Gurukul

Septic Tank in Small Cottage

DEWATS for Housekeeping and Quarters

VAITARNA RIVER



DEWATS for Sample Cottage

SBT Treatment Plant

Well

Discharge Zone
Recharge Zone

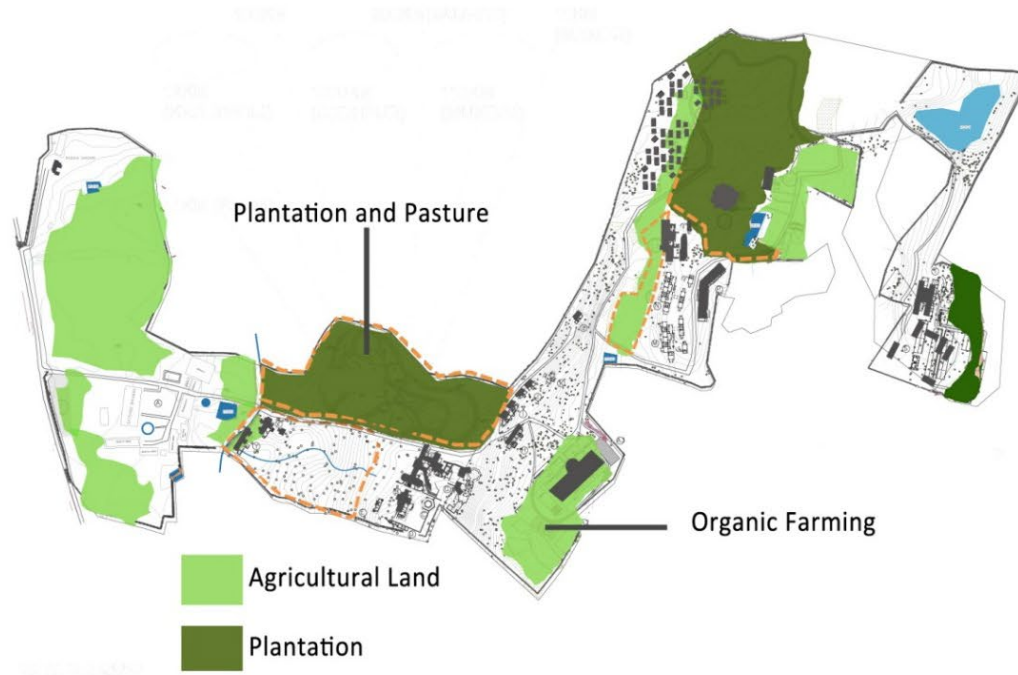


Water Management

GOVARDHAN ECO VILLAGE MAHARASHTRA, INDIA



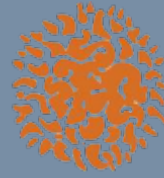
Land Management: Enhancement of Existing Land Use



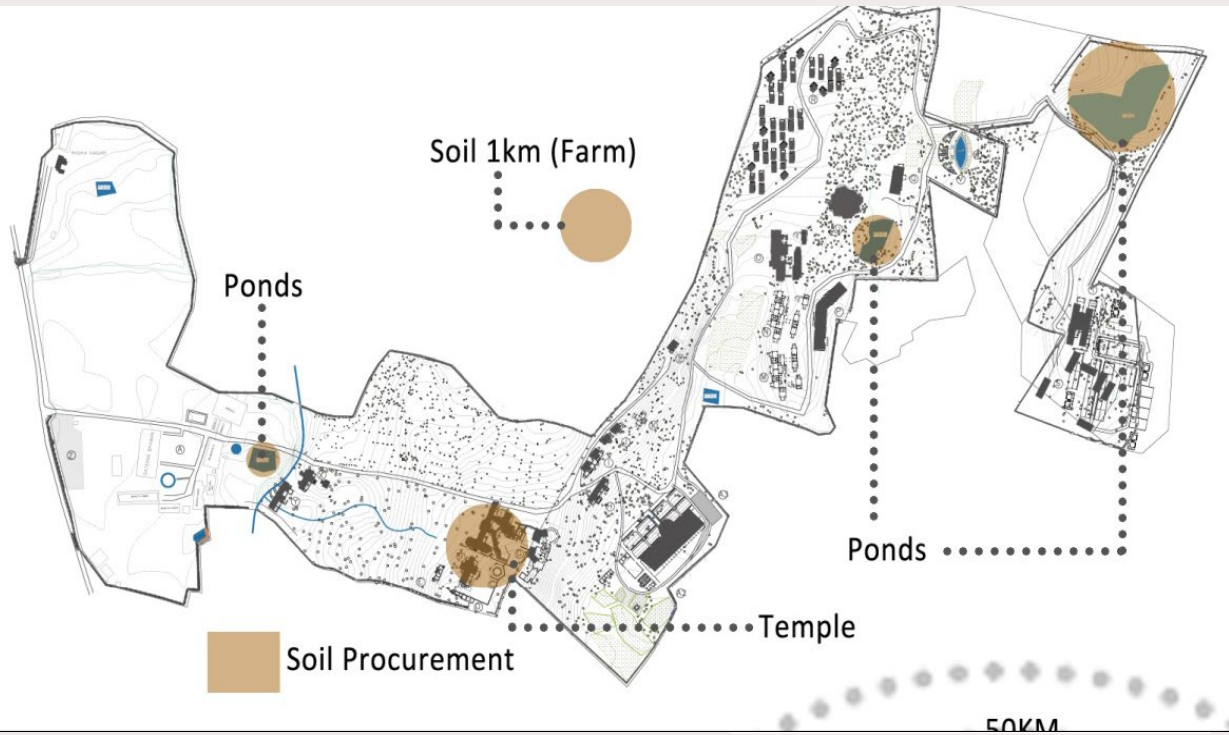
Land Management

GOVARDHAN ECO VILLAGE

MAHARASHTRA, INDIA



Resource Management: Site as a Quarry



Resource Management

GOVARDHAN ECO VILLAGE

MAHARASHTRA, INDIA



2009

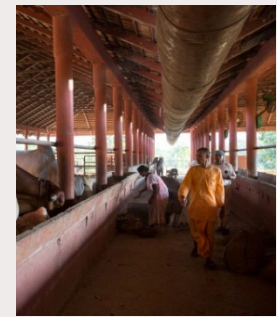
2010

2011

2012

2013

2014



Timeline

INVOLVEMENT & EFFORTS OF IIA

- **REGULAR KNOWLEDGE SHARING SEMINARS & CONFERENCES FROM EXPERTS DEDICATED FOR GREEN BUILDINGS ARE CONDUCTED COUNTRYWIDE THROUGH VARIOUS CHAPTERS OF IIA.**
- **CASE STUDIES OF EXISTING GREEN BUILDINGS ARE CONDUCTED & WIDELY ENCOURAGED BY IIA THROUGHOUT THE COUNTRY.**
- **IIA HAS PARTNERSHIPED WITH VARIOUS LOCAL BODIES AND MUNICIPALITIES IN DEVELOPING GREEN AND SUSTAINABLE CITIES.**



Workshops



Awards



Seminars



Conferences

INVOLVEMENT & EFFORTS OF IIA



REPRESENTING IIA IN ACGSA CONFERENCE IN BANGKOK



TREE PLANTATION WITH JAIPUR MAYOR DURING ARCASIA



DISCUSSION WITH CITY MAYOUR ON SMART & GREEN CITIES



TREE PLANTATION WITH JAIPUR MAYOR DURING ARCASIA



Confederation of Indian Industry



**Be part of the Green Movement !
Be a Green Champion !!**

15th Edition



*India's annual flagship event on
Green Buildings and Built Environment*

Green Building Congress 2017

4 - 7 October 2017

Jaipur, Rajasthan, India



World green building council is also having world council meet in jaipur for 3 days before green building congress, 2017.

Theme: **'Sustainable Built Environment for All'**



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