

Rainwater collection is done in two ways

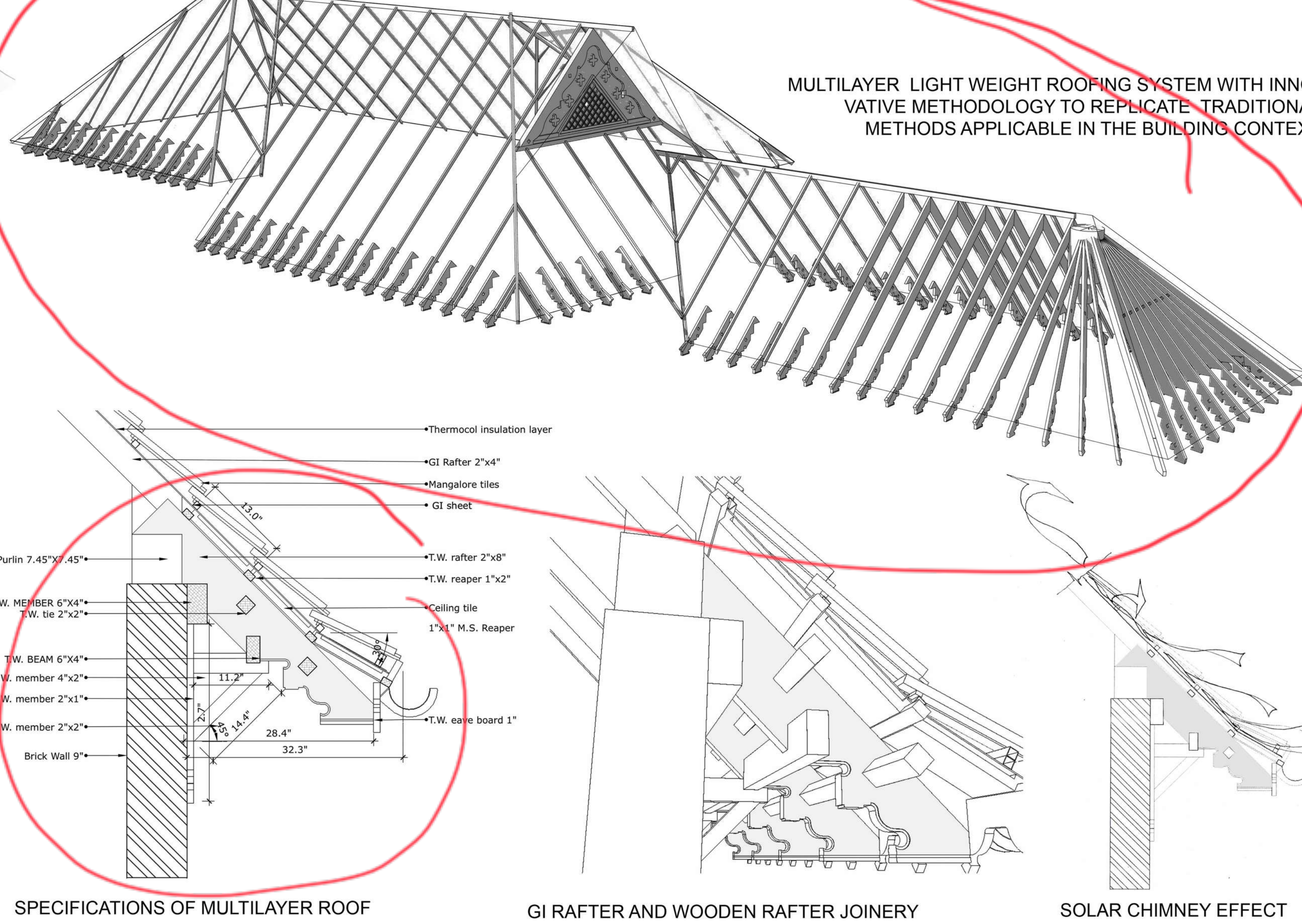
1. Ground water recharge
2. Rain water harvesting and storage.

Ground water recharge is done by allowing the water that falls on the surface to penetrate through the porous landscape pavings. The cobble stone is paved in the front yard with Mud mortar to ensure that the seepage of water happens thereby recharging the ground water.

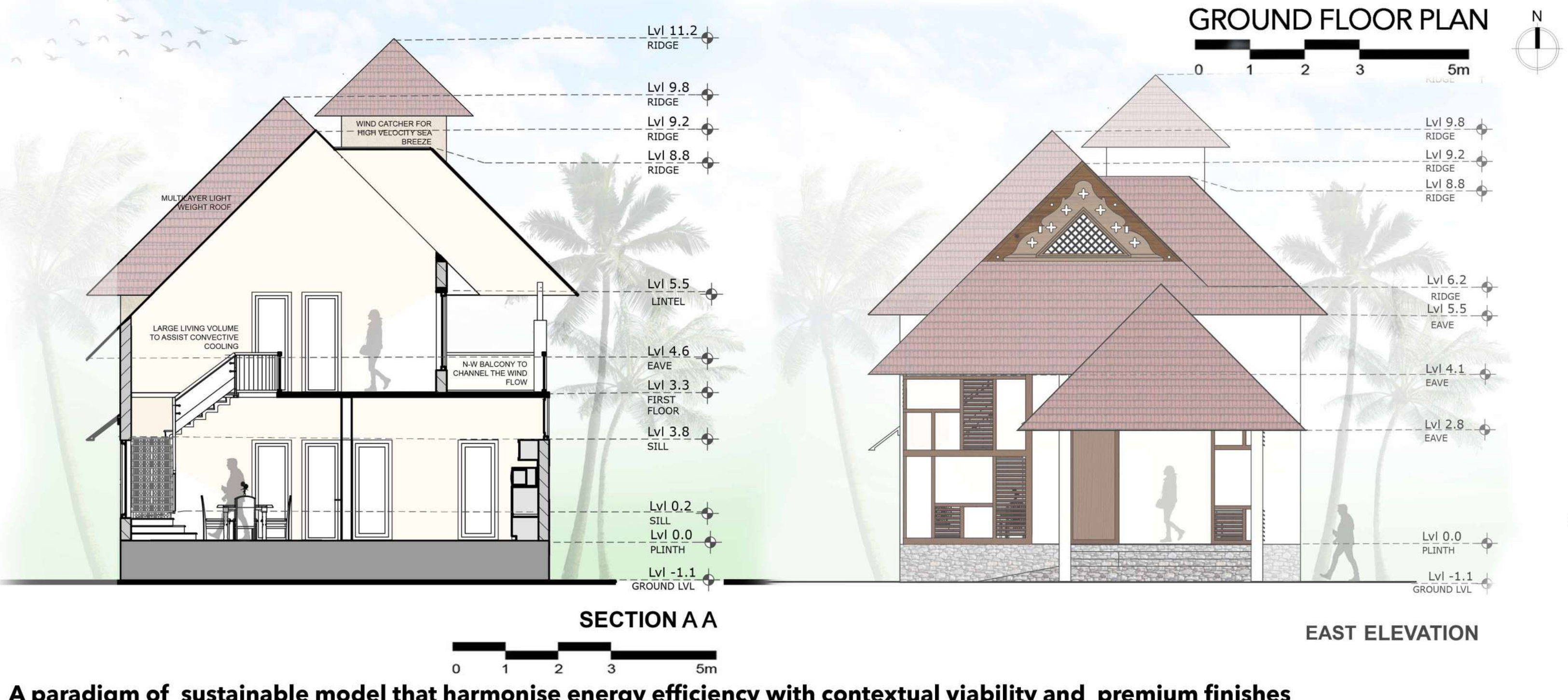
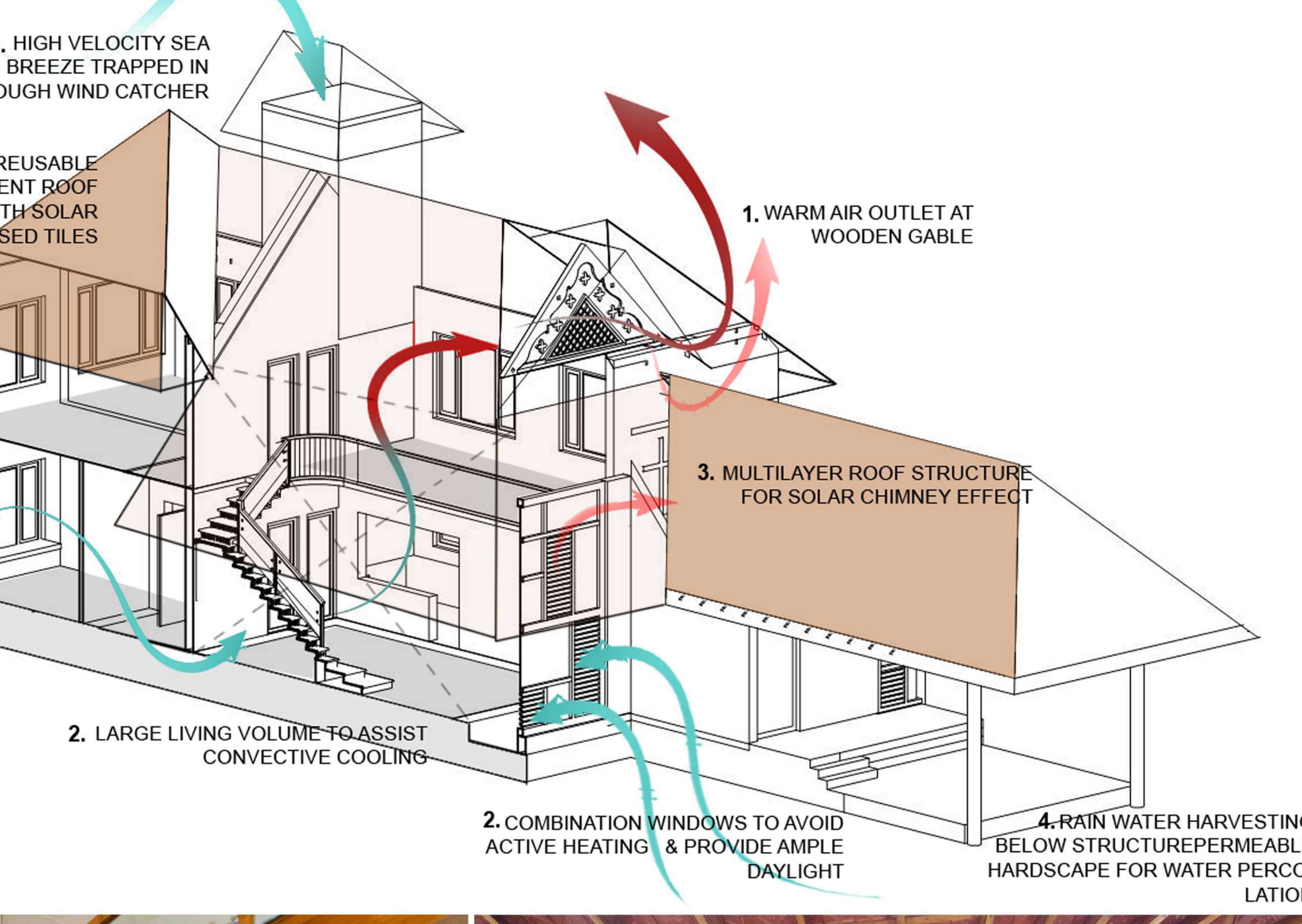
The underground cistern that is situated below the carporch is designed to store 20,000 litres of rainwater from the roof. The water from the roof is collected with the help of water gutters and then channelled to the underground sump after filtration.

The quality of runoff water is not compromised as the top layer of the roof is paved with Terracotta tiles which ensures potability.

DETAILS OF HARDSCAPE : Permeable landscape for ground water recharge.



SPECIFICATIONS OF MULTILAYER ROOF



EAST ELEVATION

A paradigm of sustainable model that harmonise energy efficiency with contextual viability and premium finishes

Located a few hundred metres from the shoreline of the Arabian sea, in the city of Kollam in Kerala, is the Antony's residence - A humble abode for a family of four. The Residence, an illustration of a premium sustainable - energy efficient project, accurately justifies the typology of a home - A place to Live, Pray and Cherish.

The overall plan allows flexibility and interlinking of spaces, encouraging cross interactions between spaces and amongst the inmates. Premium finishes with warm accent have been used to create a cosy yet lively atmosphere. Complementing these finishes, wooden frames and elements of hues of teak wood add warmth and elegance. Despite its small footprint, an approximate area of three thousand square feet in two floors, the house is a capacious play of varying volumes connected with one another.

Strategies to achieve energy efficiency

1.Space organisation that facilitate both Stack & Cross ventilation to avoid active cooling

The orientation of the house has been carefully decided to optimise passive thermal performance and convective cooling. Structural control of the opening sizes assist in channeling the wind through the smaller opening on the North facade to the large openings on east and south facades there by avoiding the need of any mechanical installations or energy supply to increase the wind speed to maintain human comfort in this humid environment. The stack effect is achieved by the positioning of air outlet gable on the main roof which lets the warm lighter indoor air to flow out. The cool denser sea breeze will enter through a number of stainless steel mesh configured glazed and louvered combination window wall facade on the lower side. The tallest roof gable of the overhead water tank will also act as a wind catcher which proved quite helpful in directing the North west sea breeze into the interiors. Since the velocity of wind is higher on the sea side the technique of wind catcher from the arid zones proved quite successful in tropical climate as well. Dynamic effect of high velocity wind is utilised to create sufficient air movement. As much of the available wind is captured through wind catcher and stainless steel mesh window windows. The wind incident at 45 deg on the North western side will provide a higher average wind velocity indoors and better air movement. To increase cross ventilation larger outlet openings are on the lee ward side and smaller inlet openings in the wind ward side on North west.

2. Large living volumes with combination windows provide ample daylight and insect free interior

The East facing house, is a cocoon of pristine nature - interwoven with serene sea breeze and ample sunlight. Large window wall facade on the East side welcomes diffused morning light through glazed, louvered and stainless steel mesh configured opening. Despite its small footprint, an approximate area of three thousand square feet, the house is a spacious play of varying volumes connected with one another with ample daylighting. All the bedroom windows are configured with large glazed opening at the centre pane for maximising the natural daylight and stainless steel mesh configured side panes for air movement while keeping insects out of the human abode.

3. Multilayer light weight roof as a sustainable energy efficient solution by reducing the total quantity of material and reusing old tiles.

Depleting building resources is a huge concern to all sustainability conscious designers. Mining of river sand for RCC construction, coarse and fine aggregate mined from the western ghats of India is certainly a huge environmental disaster and is known to sensitive architects. To reduce and mitigate the the disaster of mining these resources, A unique multi layered light weight roofing system was developed by us taking cues from the local traditional timber roofs of Kerala. This roof is innovative in the application of present era materials, structural rigidity and energy efficiency. The structural framework comprises of galvanised iron rectangular hollow sections covered with a layer GI sheet for weather proofing which could be reused after its life cycle. The roof tilting consists of used Mangalore tiles collected from the dismantled buildings from the surrounding area, acts as a skin atop the light weight structural system. A 20 mm layer of thermoc slabs acts as an insulating material between the mangalore pattern terracotta tiles and GI frame work. Besides providing thermal insulation, the roof is proof to heavy Kerala rains and also creates interesting volumes and covers larger spans at the expense of very little material as a very successful roofing system replacing the huge resource demanding concrete. Local work men were employed in the fabrication of roof as the technology involved was simpler and universally applicable. Since the entire roofing system is light weight, the economical and material savings has been distributed to the walls below and hugely on the foundation cost. A portion of the light weight roof is covered with Solar water heaters, and PV panels which generates sufficient energy for the heating needs and common area lighting. The electrical systems are configured to allow the house to incorporate net metering system in the near future while the facility has been offered by the local power authorities. A light weight roofing system efficiently transfers the economy and material savings into other structural components and there by imparting a large savings on the cost as well as reduction on the embodied energy of the Building. Solar chimney effect is applied to passively cool the roof, whereas the hot air that is present in between the layers of the roof which is heated by the Sun, escapes through the top (natural stack effect), and the cool air from the lower portion is naturally drawn in and dragged over the metal sheet thereby cooling the roof naturally during the day

4. Applying landscape ecological concept

The project relies deeply in the sustainable approach of landscape by selecting the native species and enhancing the potential of recreating the habitat for local flora and fauna. A subtle landscape treatment in the interiors achieved through abundance of natural light helps to connect the inside with outside through symbiosis of green and built environment. The permeable hardscape upholds the sustainability principles through harvesting of rainwater.

