Field Report
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Report No. 1

Project No.

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Notes: Solukhumbu District Nepal

PURPOSE FOR VISIT:

1. To document existing post-earthquake conditions of structures in the rural area of the Solukhumbu District.
2. To conduct an investigation of available local building materials and supplies (both natural and man-made) within the Solukhumbu District.
3. To engage in dialogue with the local community members to assess their housing needs, to document their post-earthquake rebuilding efforts, and inquire about the level of internal and external support they are receiving.
4. To engage in dialogue with local builders to discuss current methods of reconstruction practices.

BACK GROUND INFORMATION-Solukhumbu District:

Solukhumbu: is one of the Eastern-most areas of Nepal and features high altitude mountains. It is well known by trekkers as it is home to Mount Everest and its famous trails. The two major earthquakes which struck Nepal on the 25th of April and on the 12th of May were strongly felt in Solukhumbu, and thousands of people were affected, unfortunately Solukhumbu was not put on the list of priority districts for reconstruction aid. In terms of casualties, the people living in this district were thankfully more spared than in other areas. However, in terms of destruction, Solukhumbu was affected as much as other priority districts or “Affected Areas”. In the 24 villages I assessed, approximately 30% of the homes were fully destroyed and 50% partially destroyed. Many families are still forced to live in temporary structures. It was noted that almost half of the schools that were visited in the Solukhumbu had been destroyed.

The areas visited for the purpose of this report reached southerly to Phaphlu and northerly to the village
of Namche. Elevations through this area range between 8100’ and 12,500’ in elevation.

Indigenous ethnic Rai and hill Caste Chhetri are the main groups living in the mid-hills, while Sherpas occupy high mountains the Rai and Chherti are typically found throughout the south. The economy of the local community has traditionally been agriculture, livestock herding, and trade with Tibet. Since the 1950s, mountaineering expeditions have attracted tourism in the region. The local economy is becoming increasingly dependent on tourism.

*Climate*: The southern and lower elevation areas of the Solukhumbu is temperate and hosts small pockets of rain forests while the northerly region is subalpine, drier, less vegetated. The rainfall in this area is significant (averages 1110 mm), with precipitation even during the driest month. The average temperature is 6.1 °C and the variation in annual temperature is around 12.5 °C. During the autumn months of October and November, the weather is pleasant but colder at night. During the winter months of December through February the weather is cold. Daytime temperatures do not exceed 5° Celsius. During this time, the area receives occasional heavy snowfall. From June to September monsoon rains make travel, farming and building difficult.

*Other*: Many of the villages are micro-hydro powered. Clean drinking water is available through boiling. Wood is the primary source of fuel for cooking and when available and affordable, gas is preferred.

**COMMUNITY CONTEXT**: In order of elevation (lowest to highest)

![Phaphlu](image1.png)  ![Benighat](image2.png)
Junbesi                  Thubten Choling

Bupsa                   Kharikhola

Namche
SOLUKHUMBU ARCHITECTURE:
POST EARTHQUAKE DAMAGE
RECONSTRUCTION-ARCHITECTURAL STYLES:

Lower elevations; Simple one and two storey construction. Primarily drystack stone with some reinforced confined/bond beam style. Some facades and interiors receive a cementitious plaster while others do not. Custom wood framed window bucks with single pane glass and solid wood doors with metal hardware. Wood rafters, purlins and CGI roofing.
The more affordable lower elevation construction style consists of wood bond beams and drystack or mud/mortar laid stone.

At higher elevations; One and two storey construction. Primarily drystack stone foundation and first floor with/without some reinforced confined/bond beam style. Second floor is typically light wood frame with aluminum composite siding or light gauge aluminum sheet on the exterior and ¼" wood paneling for the interior walls and ceiling. Most homes have custom wood framed window bucks with single pane glass however, some install premanufactured aluminum framed-insulated glass units and solid wood doors with metal hardware. Wood rafters, purlins and CGI roofing.
NATURAL CONSTRUCTION MATERIALS FOUND WITHIN SOLUKHUMBU:

Preliminary findings are as follows:

1. Small quantities of Rye. Application: possible use for plaster reinforcement or use as a typical light clay straw wall system. Note: It is clear that Solukhumbu currently does not produce large enough quantities of straw to warrant strawbale construction.

2. Stone; angular, flat and round of varying sizes and river sand. Application: concrete foundation material, plaster, stable fill.

3. Pine and spruce rough milled wood of varying dimensions. Wood is typically placed on a drying rack for a couple of months before use.

4. Clay soil. Samples taken throughout the trek suggests it to contain more silt than clay.
Bamboo (lower elevations only) of varying sizes ranging from ½” diameter to 3”. Bambusa species not identified. Locals claim to have success with treating it for building use. Application: structural building members, light bamboo weave for wall reinforcement (mesh). Photo shown below is of heavier bamboo mesh.

Cow manure. Application: plaster stabilization and strength. Since the fuel crisis people are now utilizing manure as fuel.

**CONSTRUCTION COST:**

$8.35/SF. One storey/single person home approx. 12’x15’ (this quote reflects the following labor rates; $7/day laborer,$10/day skilled, includes lodging and food. Work day is 7am-5pm. Quoted labor costs by the Building Committee at the Monastery in Thubten Choling.

$18-20/ hr. Skilled carpenter in Caurikharka. Includes meals and free camping on-site.

$25/hr. for a general contractor

$4000 for building a 580 SF house labor only. Materials are typically provided by the owner.

$10-12k For a 37.5’x21’ (2) storey house with aluminum sheet siding in the higher elevations of the Solukhumbu District.

Owners will typically pay a between 13-28% on a construction loan (with good credit) or slightly more if money is loaned by a friend.
Many of the skilled contractors I spoke with indicated that their rates have doubled since the earthquake and that there aren’t enough skilled workers available given all of the work to be completed. Also, India’s imposed fuel embargo has generally increased most construction materials by 50%.

Misc. Material costs (I have photos of all of these items-prices were gathered in Nunthala)

- Alum sheet 4’x3’ = $14
- 6’x3’ (12 pieces) = $140 or $11 sheet
- Galv. Sheet 4’x3’ = $18
- .60 per rice bag
- 3x6 1/4” plywood = $14.50
- 4x8 sheet of aluminum delivered = $24 in rural community near transport.
- 4x8x3/4” ply sanded = $36.50 in Lukla
- 3’ x ¾” or 1” light gauge chicken wire = $.85/3.3’