

**RECONNAISSANCE GEOLOGICAL REPORT OF PROPOSED SITE OF
VILLAGE-KANSI, TOK- SARI, TEHSIL- CHINYALISAUR, DIST.UTTARKASHI
PVT. LAND AREA: 1.795ha AND REVENUE LAND AREA: 0.101ha**

The Kanshi Village which is to be rehabilitated to Kanshi madhye Sari name Tok is 15km approximately from Tehsil Chinyali, District Uttarkashi, Uttarakhand by Kanshi-Manjket Road via Suakholi-Mussoorie Road and approximately 40m-50m on foot by bridle path. In the proposed area the reconnaissance geological investigation was carried out in the presence and co-operation of Shri Yashwant Singh Chauhan, Tehsildar. Mr. Vijai Kumar Sain, Consultant Geologist, and Ms Anupriya Shah, Consultant Associate Geologist collected field datasets during geological inspections of 'ODCH' nearby sites' on dated 9th January 2014.

During inspection rehabilitation of eleven families is expected in the proposed area. The main Kanshi village falls on coordinates – N 30°35'29.6" E 78°19'34.3" and elevation 1286m.

At Kanshi village various geological problems are observed in main village near the Panihar Nala and at Ghattukhal Nala which are responsible for making these parts of the village unsuitable and unsafe for affected villagers to live there. The village is situated on hill top with an overburden thickness of 7-8m. The overburden in this area is grey colour with low compactness. The downhill slope of the area is 34°-36° towards South direction while the uphill slope is 5°-6° towards South direction. There is Panihar Nala about 12-15m horizontally and 70-80m vertically in South direction from the site and is flowing towards SE direction. The Nala is affecting the toe of the hill and also contributing to the seepage in the area; which collectively are damaging this part of the village. Due to high saturation in the area, slight creeping is occurring shown by the tilted trees towards the slope. The area fall in Lesser Himalayan earthquake zone IV.

Some cracks are found in the affected houses of varying length from 3-3.5m and 0.5m wide. The damaged houses are tilted approximately 7°-8° in South direction towards Panihar Nala.



Tilted roof of an affected house.



Cracks observed on roof of the house.

Along the Kanshi-Manjket road, many small active landslides are seen. Also, at the toe of the Kanshi Village, all along the road, the overburden material of 15-18m vertical and 200-250m horizontal span is present which is sliding towards NE direction. Here the overburden is composed of angular to sub-angular fragments of phyllite and quartzite with quartz veins and some boulders of about 15-25cm size of phyllite and quartzite. The phyllite fragments are highly damaged due to water saturation. The road cutting is also affecting the entire area



Overburden sliding towards NE direction.



Tilted terraces showing creeping.

The perennial Ghattukhal Nala is flowing from SW to NE direction and falls on coordinate- N 30°33'16.4" E 78°17'32.0" and elevation 1150m. The Nala becomes very active during the monsoon as per the villagers and is adding to the water saturation in the area. There are 2-3 natural springs in the area and water seepage is very high.



Natural spring showing high seepage.



A far view of Ghattukhal Nala.

An extent of 10-15m the road is subsided lightly approximately 7-8cm with the downhill slope of the area, which is about 32°-34° towards East direction. In the nearby area almost 250-300m from Ghattukhal Nala, an old landslide is observed in which large boulders 20cm-1.5m size along with phyllite and quartzite fragments are present with the soil matrix.



Subsided part of the road near Ghattukhal Nala. Old landslide zone near Ghattukhal Nala.

1. REHABILITATION IN PROPOSED SARI TOK SITE:

The proposed area is situated on hill slope in Sari Tok, village Kansi and falls on co-ordinates- N 30°33'32.0" E 78°17'18.9" and elevation 1351m. The overburden thickness in the proposed area is 2-3m approximately. The overburden material includes grayish brown color soil with angular fragments of slate and phyllite approximately 1-7cm in size and is moderately compact without saturation. The downhill slope of the area is 10°-12° towards East direction and uphill slope about 48°-50° towards East direction. There is Paniharkhal Nala 70-80m approximately in Northern side of the proposed land area and is flowing towards NE direction.



Different views of the proposed Sari name Tok.

The rock type in the area is slate observed in the upslope of the area approximately 150m from the Kansi-Manjket Road. The size of the outcrop is 15mx7m. The foliation plane is dipping 21° towards N300° (NW) direction with N20° strike. The joint plane J1 is dipping 43° towards South with N280° strike and 1-3mm opening. The rocks are moderately weathered in nature. The area has low vegetation with light seepage.

2. RECOMMENDATIONS:

Based on above surface geological observations of the proposed area the following remedial measures for rehabilitation of the village are recommended:

1. The new houses must be constructed keeping a 50-55m distance from the Paniharkhal Nala and there must be appropriate distance between the newly constructed houses.
2. Westward inclined retaining wall of approximately 2.0-2.5m must be constructed on the Eastern boundaries of the terrace like plots with proper weep holes at a minimum 0.5m distance apart.
3. Some provisions must be adopted for keeping the weep-holes passage clear to discharge subsurface water to maintain stability of foundation of the house.
4. There must be minimum 0.5-1.0m gap between the back side slope or retaining and the back wall of the houses to avoid seepage into the house.
5. The depth of foundation of the houses in the village should be as per the compactness of the overburden material.
6. Proper channelized linear cemented drainage for natural water disposal with capacity of optimum volume of water should be constructed towards North direction for safety of houses from unwanted surface and subsurface water that may enhance vulnerability.
7. The back, sides and premises of the houses must be made cemented to prevent subsurface seepage and downward percolation of water.
8. Light weight structure with slanting light roof, framed structure should be constructed.
9. Columns must be at sufficient/appropriate depth or on in-situ rocks.
10. As per reconnaissance study single story house construction is preferable.

3. CONCLUSION:

Prima-facie, the proposed site of 'Sari Tok' is geologically feasible for rehabilitation of eleven families of village Kanshi. Therefore, detailed design must be prepared after comprehensive geotechnical site characterization of the area under 'Systematic and Comprehensive Integrated Planning' for the rehabilitation of affected families. The concern of above mentioned recommendations must be retained during implementation practices, otherwise, in their contravention; geological suitability will be deemed voided.



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