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VOLUME 4 CASE HISTORY, ANALYSIS AND FINDINGS

Bridges Studied in Far Western Development Region

FINAL REPORT

JUNE 1978

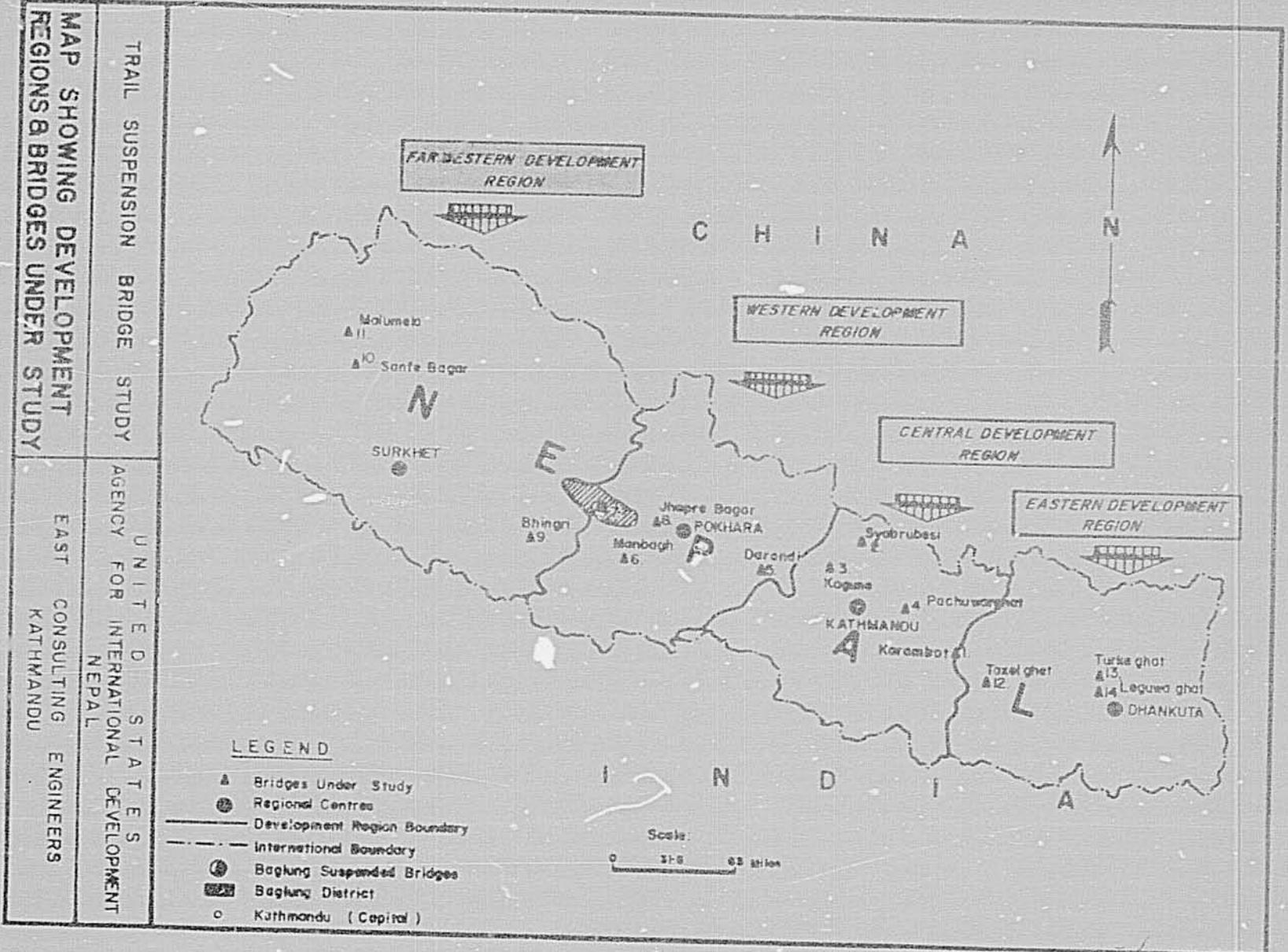
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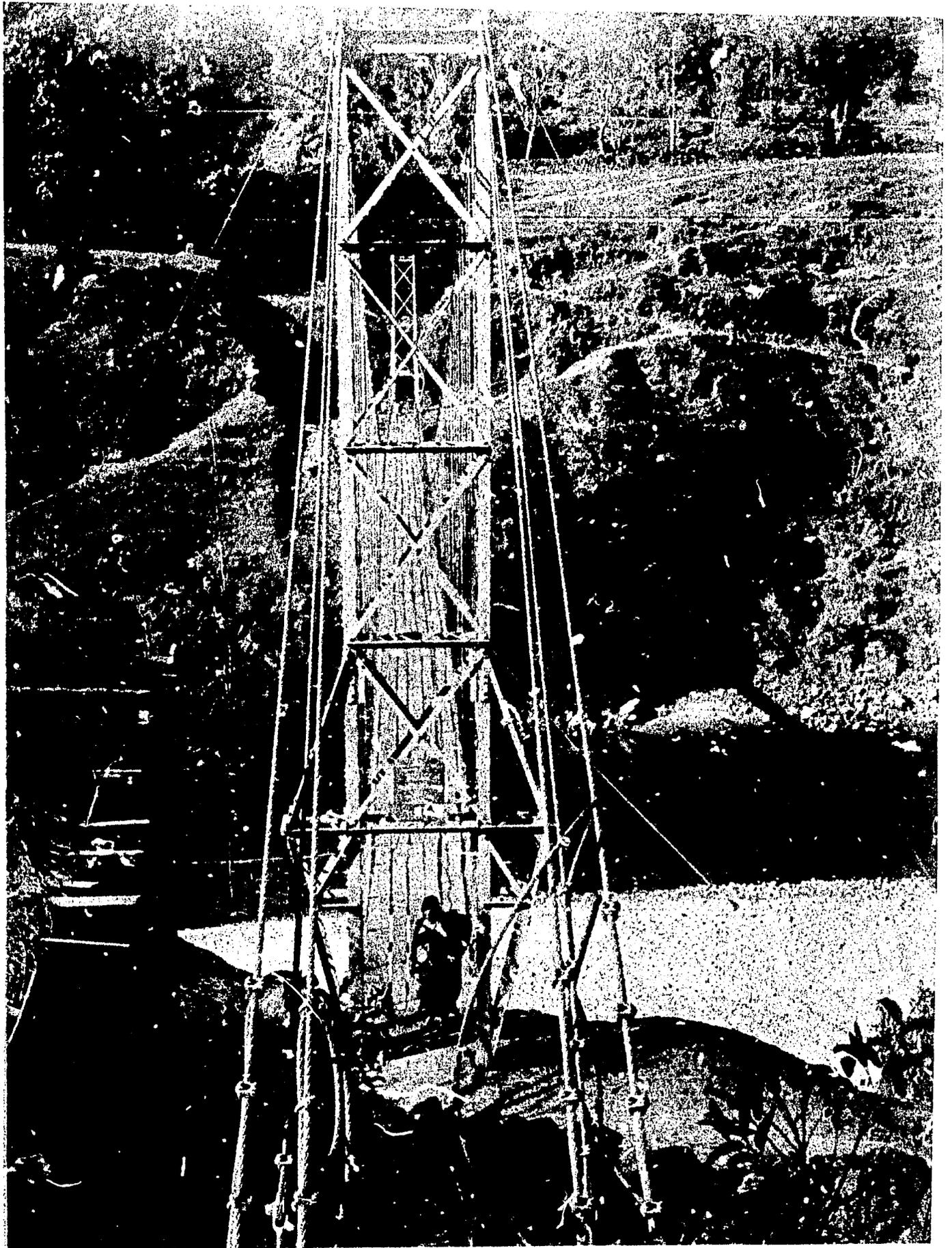
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9. BHINGRI BRIDGE

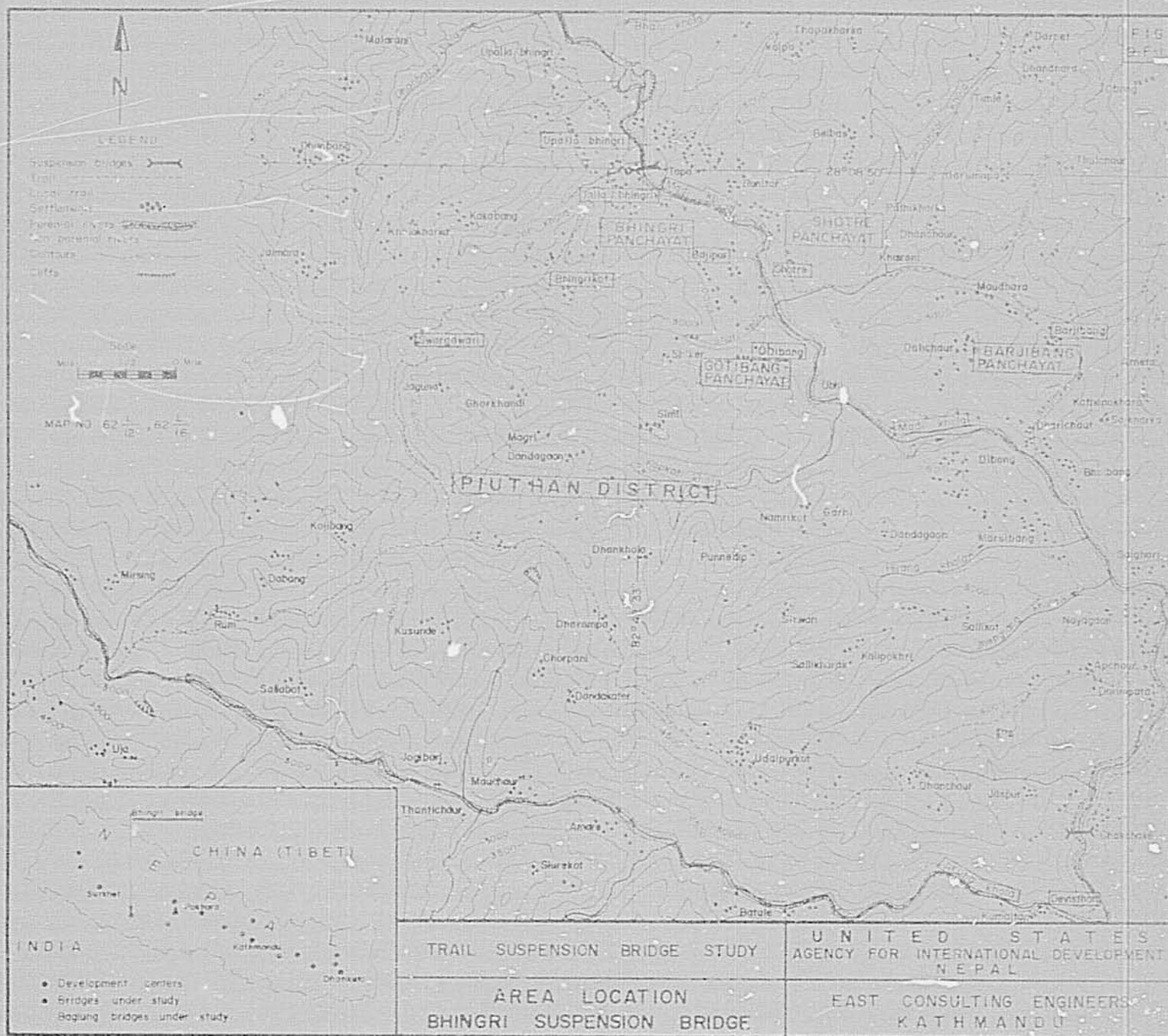


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9.1.1 AREA DESCRIPTION AND HISTORY- Geographic Setting

Situated in the mid-hill District of Piuthan, Rapti Zone, in the Far Western Development Region of Nepal, the Bhingri Bridge spans the Madi Khola. Flowing from the northwest towards the southeast, the Madi Khola is a medium size river and fordable near the bridge site during the dry season. However, like all hill rivers it swells greatly and becomes turbulent during the monsoon season.

The river as it flows along its course, serves as the geographic boundary for many village panchayats of Piuthan District. The bridge connects Bhingri panchayat lying on the right bank to Shotre panchayat, on the left bank of the river.

The landscape of the area is characterized by unequal surface configuration rising successively from the river bank. The altitude variation ranges from 2,000 ft. around the river basin to above 7,000 ft. along the ridge. The hills, however, are not as rugged as in other areas. The fertile land, along with the settlement pattern, is scattered around the bridge site. There are terraces of cultivated fields on the lower slopes of the hills but in high altitudes the slopes are barren, with only a few trees and shrubs being present.

- Bridge Site Description

The river near the bridge generally flows along a deep gorge. On local people enquiry, indicate that the river is gradually deepening its bed in these areas. On either side of the river, about 100 to 200 ft. above the existing river bed, flat, Tar, lands extend parallel to the river. These Tar lands consist of old river bed material and indicates that, once upon a time, the river used to flow over these Tars.

The flat terraces on both banks of the river have obviously contributed to the growth of the settlements. Fairly large villages such as Gotibang, Talla Bhingri, Uppala Bhingri and Ghoragaon exist on the right side; Dahchaur, Shotre, Talla Sari, Uppala Sari and Khungrichaur villages are on the left side of the river.

The trails, connecting all these large villages, cross the Madi Khola over the bridge which is about 10 minute's walk from Talla Bhingri.

The bridge is very high (Photo 9-P-8), and the local people say that the river is cutting its gorge deeper every year. This was confirmed by an observation made during the field visit, it was measured that the bridge soffit is now 10 ft. higher above the low water level than when it was constructed 12 years ago. It can be deduced that the river is cutting into its gorge, approximately, at an average rate of 10 in. per year.

The approach trails to the bridge on both banks run over the Tar lands parallel to the river and are in excellent condition.

Both banks, at Bhingri Bridge, consist of medium to soft rock. A little downstream, the banks consist of earth-mix-boulder on both banks, but are stabilized since they are well cemented.

- Relationship with Regional Transportation System

The nearest road approach to this bridge site is at Ghorahi, the District Headquarters of Dang Valley which is in the southwest of Piuthan District. Recently, a narrow jeep track was constructed up from Ghorahi to Khalanga, the District Headquarter of Piuthan. Local free labor was extensively utilised to construct this road and these people are presently excavating a 6 ft. to 8 ft. wide jeep road from Devasthan (a place 30 miles from Ghorahi towards Khalanga) to Rolpa District (west of Piuthan District) along the right bank of the Madi Khola.

The Bhingri Bridge site is about 5 hours continuous walk, for a man without any load, upstream from Devasthan along the Madi Khola. Another trail which starts at Ghorahi takes about 1½ days to reach Bhingri via Swargadwari. Swargadwari is situated on the top of a high mountain ridge south of Bhingri at an altitude of about 7,000 ft. This is a famous place for Hindu pilgrimages and takes about 3 to 4 hours straight climbing to reach Swargadwari from Bhingri. From Swargadwari the trail descends to Aurung Khola and climbs up a steep hill to cross the Mahabharat Range. It then descends to the Dang Valley at Ghorahi.

Upstream from the bridge a trail on the right side follows the Madi Khola and crosses the Dhar Khola, finally it enters Rolpa District. This same trail eventually leads to Libang, the District Headquarters of Rolpa. As mentioned above a jeep road is presently being constructed, under local initiative, along this trail to join Khalanga with Libang.

On the left bank of the Madi, the trail follows the river upto Shotre village and takes an uphill route to cross a ridge and finally comes down to Khalanga. The trail joins the large settlements of Talla Sari and Uppalla Sari, and after crossing Lungri Khola enters Rolpa District. Local people are presently constructing a local type suspended bridge over the Lungri Khola, several hundred feet upstream from the Lungri-Madi confluence.

No airfields exist near the bridge area. However, we were informed by the local people that two air fields are going to be constructed in the future, one at Rolpa District and the other at Piuthan. After the construction of these air fields, some changes in the bridge use are likely to occur.

As the bridge is primarily used by local people, its importance will not decrease even after the construction of the Dang-Piuthan-Rolpa road which will run along the right bank of the Madi Khola near the bridge

site (Photo 9-P-7). This photo shows the edge of this jeep road. This road if made properly in future, will attract more traffic to the bridge from the settlements to the left of the river. Bhangri, in that case, can act as a supply point to most of the northeast areas across the river, thus increasing the use of the bridge.

- General Cultural Setting

Like other parts of the hill districts in Far Western Nepal, the inhabitants of this district are composed of high caste Hindu groups (Brahmins, Thakuris and Chhetris), the liquor consuming caste called the Matwali groups (Newar, Gurung and Magar) and untouchables (Kami, Damai, Sarki, Bote or Majhi, and Gaine).

- Services Available in the Area

Due to the importance of the place as a traditional crossing point in the area, both Bhangri and Shotre have continued to enjoy the presence of a few services for a long time. Even before the present bridge was constructed, there was a small bazaar in Shotre and an Ayurvedic dispensary and a police post in Bhangri. Following the construction of the bridge, the number and kind of government as well as other services have increased, thus making the area an important service center in the District. In Shotre today, there is one rice and oil mill, a Health Post, a Family Planning Clinic, a few tea shops and an increased number of households. In Bhangri, there is a Post Office, a High School, a local restaurant and bar, or Bhatti, with facilities for sleeping, a tea stall, and a small bazaar.

In Bhangri and Shotre panchayats, one will find a cluster of small stores. There are altogether 12 retail stores selling a variety of manufactured consumer goods like cloths.

- Bridge Location History and Decision Process

The Madi Khola has always been a problem for the people in the Bhangri and Shotre areas. In the early 1900's they had built a wooden

bridge which spanned the river at about 1500 ft. down stream from the present bridge. Then, in 1918 this bridge was washed away. After this the people used to construct a temporary bridge or a dhulo pul every year during the dry season. But, during the monsoon season they would make use of the ferries operated by the ferryman called Botes.

The Botes, as the local people call them, operated a ferry consisting of several dugout canoes. The Botes had a monopoly on the ferry and would charge people, not from the immediate area, a toll, the amount being dependent on the condition of the river. People from the villages of Bhingri, Shotre, Bajipur, Gotibang, Soda and Madanpur were charged a fixed amount in Bali. Each household would give 11 lbs or two Pathis of rice, per year to the Botes for the use of the ferry.

Even with the ferry it was at times impossible to cross the Madi Khola. This was especially true during the rainy season. One specific instance where this proved to be as serious inconvenience was during Dasain, the most important Nepalese festival. At this time daughters and sisters who had married on the other side of the river came down to the river bank where they waved and shouted greetings to their parents and relatives on the other side.

The river had also, in the past, claimed the lives of people who had attempted to cross during times of flood. One of the more notable cases involved two men from Shotre panchayat. They had crossed the river to Bhingri to bring their donation of Rs. 500/- each to the Bhingri Bridge Construction Committee. While crossing the river, on their return home, they were swept away and killed.

The daily problem of fuel-wood and fodder collection for the people on the left side of the river was compounded by the difficulty of crossing the Madi Khola. Since the major source for these essential items is on the right side of the river the people from Shotre panchayat were constantly plagued by the lack of a bridge.

There was also an imbalance in the services rendered by the various Government agencies in the area, to the people they served on both sides of the river. People who lived on the side of the river, opposite any government agency, were at times unable to make use of its services.

The people in both Bhingri and Shetre panchayats had, for a long time, been trying to get a permanent bridge built over the Madi Khola. One of the earliest recorded efforts made along this line was by a man who claimed to be the representative of the people of Piuthan. He, in 1956, wrote His late Majesty, King Mahendra, petitioning him for a bridge. The translated petition reads as follows:

The river has caused the deaths of 30 to 40 persons every year...It is not that the need of the bridge has not come to Your Majesty's attention earlier. But, so far the Government has not paid any attention to development projects in our district...Even during the Rana regime there was a survey from Mochi to Mahakali and 127 spots were reported to have been identified for the construction of bridges. The Madi Khola of Piuthan was included as one of those spots... We petition Your Majesty for the issuance of a command to the office concerned to depute an engineer to construct a cable bridge at a site, jointly decided upon by the people of the area and the government... Free labor is available from the people for the construction of the bridge. If the construction were to be undertaken this year the people would also be willing to make any financial contributions that they are possible of. Beyond this what can the local people do, who are destitute and illiterate and who, after a full year's work on their farms do not even have enough food for 6 months and are forced to supplement their diet with nettle grass and roots? We are not only hopeful but also confident that the beloved father of our nation will redress the torture in our hearts which has been with us for the last 4 to 5 generations.

1/ Suspension Bridge Division Files, Kathmandu, 1956. It is not known what, if any, effect this had on the eventual construction of the bridge, but it is a good example of the desire that the people had for a bridge.

The effort made by the people did not stop here, their desire was strong and their spirit undying. In 1961 they were again afforded a chance to put-ferth their wish for a bridge. The Assistant Minister for Education, Mr. Kirtinidhi Bista, who is now the Prime Minister of Nepal, was on an inspection tour of the area at this time, his attention was drawn to the hardship caused due to the lack of a bridge. He assured the local people of his full support in getting a bridge built. He also asked the local people to be prepared to make any contributions they could.

At this time the District Governor or Bada Hakim, helped to organise a Bhingri Bridge Construction Committee, and was appointed chairman of it. The Committee decided on a goal of Rs. 25,000/- to 50,000/- to be collected for the construction of the bridge. They also appointed a delegation whose job it was to go to Kathmandu to press-home their request for the bridge design which had been accepted by the DOR, with a span of 260 ft. They were unsuccessful, but they continued to try.

In 1964 the Committee again sent a delegation to Kathmandu. This time they carried with them a detailed report describing the history of their plea. The report also wanted clear information about, if and when, the bridge parts were to be delivered and when the delivery was to be made. Mr. Kirtinidhi Bista was drafted, in his absence, as the head of the delegation. The Pradhan Pancha of Bhingri village and the treasurer of the committee were the local members of the delegation. Copies of the report were sent to the then Minister and Assistant Minister for Transport and Communication, and the Chief Engineer of the DOR.

Finally their effort was rewarded; their request for a bridge was placed on the priority list of the USAID aided package of suspension bridges, and a survey was conducted early in 1965 by a USAID engineer, Mr. Koski. This was soon followed by actual construction work, and the bridge was completed in 1966.

9.2 ANALYSIS

9.2.1 SOCIO-ANTHROPOLOGICAL ANALYSIS

-- Land and People

Two panchayats Bhingri and Shotre have been used as a sample for the study. There are at present about 389 and 418 households in Bhingri and Shotre panchayats, respectively. The ethnic composition of the panchayats with the estimated number of households is given in the following table:

Table 9-T-1: Estimated number and percentage of Households by Ethnic Groups (Bhingri and Shotre Panchayats)

Ethnic Group	Bhingri Panchayat		Shotre Panchayat	
	Households	Percentage	Households	Percentage
Brahmin	110	29%	105	25%
Thakuri	5	1%	0	0%
Chhetri	110	29%	60	14%
Nowar	18	5%	5	1%
Magar	70	18%	120	29%
Gurung	2	1%	10	2%
Kami	20	5%	40	10%
Damai	25	6%	55	13%
Sarki	10	2%	20	5%
Gaine	12	3%	0	0%
Bote	7	1%	2	below 0.5%
Badi	0	0%	1	below 0.5%
Total	389	100%	418	100%

Source: ECE Field Survey

The ethnic composition of these panchayats is basically similar to Piuthan District as a whole. Brahmins, Chhetris and Magars are dominant

in both panchayats. However, if the untouchable groups are put together their number is quite significant in both panchayats. They represent 17% and 29% of the total number of households in Bhingri and Shotre panchayats respectively. Brahmins, Thakuris and Chhetris are the elite groups of the district and are commonly found in the government service, teaching profession and in the political structure of the village panchayat, District Panchayat and Rastriya Panchayat. The Brahmins, Thakuris as well as the Chhetris all basically, practise agriculture. Many of them have farms in the Dang and Deokhuri valleys, the most fertile valleys of the Rapti Zone. A few of these groups go to Madras and Kerala in India to seek employment as watchmen.

There is a significant number of Newars in the Piuthan District and they are mostly found in the market centers such as Khalanga (the Headquarters of Piuthan District), Bhingri and Bijuwar bazaar where they hold business. Newars originally migrated from Kathmandu, Patan and Bhaktapur to this area, at the time of the Gorkha invasion in 1775. They speak a Newari dialect which is slightly different from that spoken in the Kathmandu valley. The Newars of this area have preserved their traditional rites and rituals and celebrate the festivals like Ghode Jatra, Gai Jatra and Bhoto Jatra, etc. in the similar fashion as it is celebrated in the Kathmandu valley.

Magars have two sub groups in the area called Thapa Magar and Gharti Magar. A few of them are enlisted in the Indian as well as the Nepalese armies. A significant number of them also go to India, mostly to Kerala and Madras, to work as watchman, Darban and Chewkidar. They are also the source of seasonal laborers who go to Kalapahar (Himalchal Pradesh), Nainital and other places in India to work in the potato and horticultural farms. Magars are basically simple farming people. Their women are open and frank, and they are the strongest Hindu practicing ethnic group. They completely follow the Brahmins' rites and rituals and employ only Brahmins to perform their religious activities.

Both Char Jate (four castes) and Sora Jate (sixteen castes) Gurungs are found in the area. The Char Jate Gurungs consider themselves superior to the Sora Jate Gurungs and marry only within their group. In every day life, however, this difference is not noticed. Gurungs are also farmers and like Magars, they are also employed in the Indian and Nepalese armies and at times work as laborers during the winter season. The village youth dormitory, Rodhi Ghar, system is prevalent among the Gurungs where the young boys and girls of the Gurung society mix freely, sing and share liquor. The Rodhi Ghar is highly institutionalized in their society and is still an acceptable social custom, where a boy can find a girl to marry.

The untouchables (Kami, Damai, Sarki, Bote and Gaino) practise their traditional caste occupation as well as agriculture. The Gainos are singers who sing songs about the local heroes, the story of the certain Maharaja (the King) or of the amorous love affairs of two lovers. They go from house to house, sing songs and ask for money, grain and clothes and if they are pleased, they bless the family.

Botes are traditionally the boatmen in the area. Their numbers are not very significant. Along with their caste occupation they also practise agriculture. They constitute the ethnic group which has suffered most after the construction of the Bhingri bridge. They lost their jobs and many were compelled to go to Kerala and Madras, in India, to seek employment. A few of them still work as boatmen on the Madi Khola, about four miles downstream from the present bridge site.

Almost all the people of Piuthan District (except a few Muslims and Buddhists) are Hindus. During Desain, the Hindus of the Bhingri Bridge area go to Bhingrikot to worship and offer animal sacrifices to the Goddess Durga. The deities are all Hindu gods and goddesses and, the local gods of note are Kaile Barah, Masto Barah and Gora Barah.

Fairs take place at different time in different places throughout Piuthan District. Two of the most important fairs of the district are: Baisakopurnima and Kartikopurnima which take place at Swargadwari.

The people of these panchayats speak basically the Nepali language. However, Newars, Magars, Gurungs also speak their own dialects.

Each group is endogamous, and intercaste marriages are not prevalent. However, cases of elopement and amorous love affairs between young boys and girls of different castes, are most common. Even married women are often involved in such affairs. This is facilitated by the socially approved custom called, Chotta Chotti Kholna.^{2/}

The majority of the population live around the Bongsi Kholna which lies at an altitude of about 1,200 ft. Bhingri and Bhingrikot panchayats are situated about 100 ft. above the river. The settlement pattern of the various ethnic groups closely follows that of other parts of western Nepal. Most of the high caste groups like Brahmins, Thakuris and Chhetris have occupied the low lying river valleys, Bongsi, where wet lands are available while Newars mostly occupy the bazaar areas. Gurungs and Magars live on the peripheral areas of the higher caste Hindus or in many cases their settlements lie just above the Bongsi area or sometimes on the slopping mountains. The untouchables live in scattered settlements, often found in the vicinity of the higher caste groups as well as that of the liquor consuming castes. Fig 9-F-2 presents a transect of Bhingri and Bhingrikot villages which will show the settlement pattern of the area.

- Structure of the Family

The estimated average family size in the study area is 8 to 10 persons. This is high compared with the 1971 CBS Census average family size of 5 to 6. The above family size indicates that most of the families living in the area maintain the joint family system. This tendency is higher among the high caste Hindu groups than in the lower castes. While examining the basic social, economic and religious life of the area, the

^{2/} This is a situation when boys and girls of the same age group, from any caste, are allowed to mix freely. This is most common during festivals and fairs.

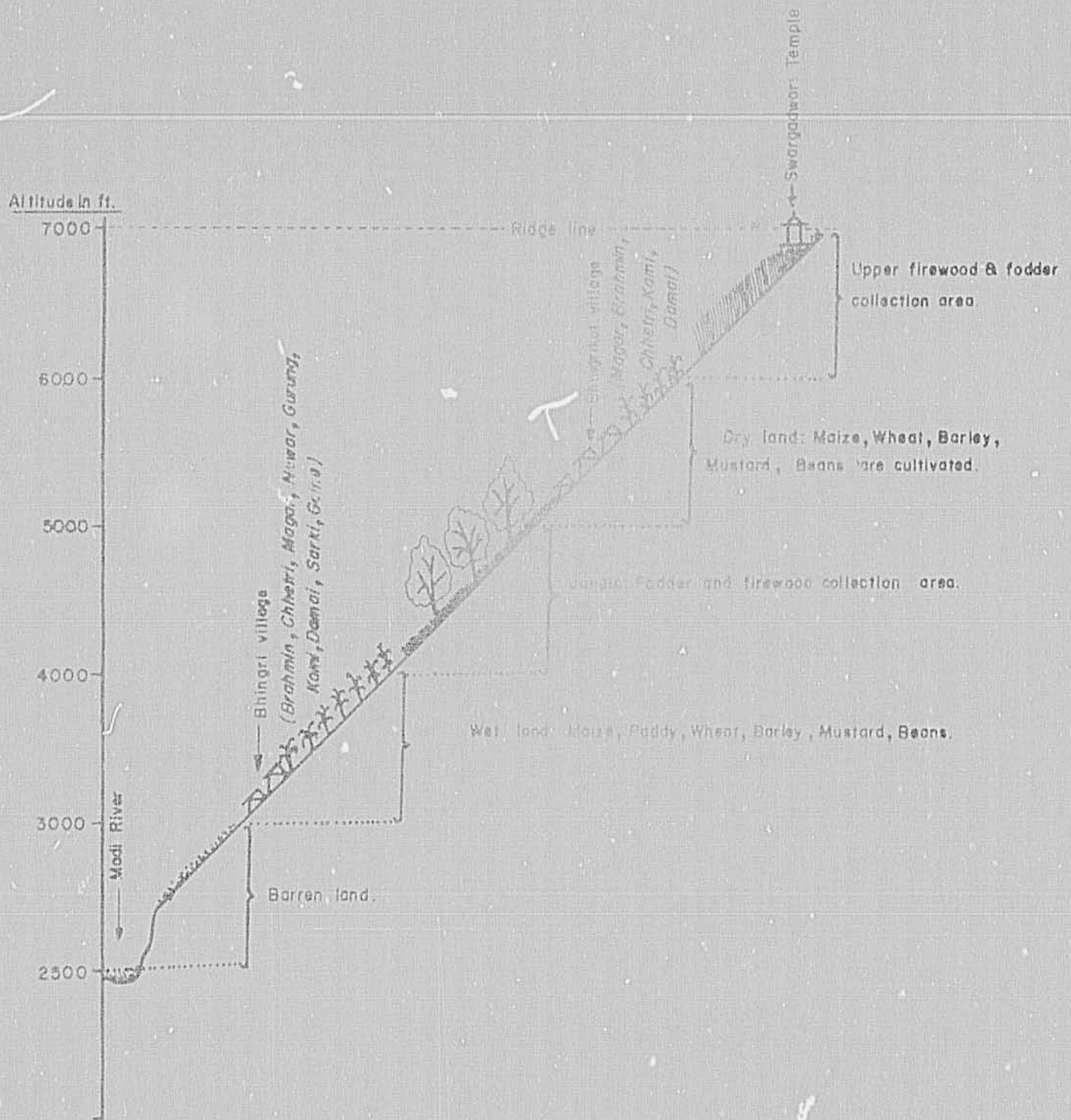


Fig. 9-F-2 : Bhingrikot and Bhingari Transect (Schematic)

Source: ECE Field Survey

joint family system seems to be definitely more advantageous than the nuclear family system as this will allow some of the male members of the family to stay back home to look after the welfare of the family while other male members leave home and for longterm employment in India. The smaller nuclear family, on the otherhand suffers when the male members of the family leave for longterm employment in India thus leaving no one at home to look after the affairs of the family. The presence of the Bhingri Bridge, as indicated by the local people, has not caused the breaking of the traditional joint family structure. Of a total of 50 respondents, only 13 pointed out that their consanguinal relatives (about 60 households) live on either side of the river, and these households were separated from their traditional joint families before the construction of the bridge and no family mobility or separation has occurred since the construction of the bridge.

- Marriage Practices

The Madi Khola is fordable during the winter and the marriage season for Nepalese Hindu falls mostly during the winter season, and therefore marriages occurred across the Khola even before the construction of the bridge. However, when questions were asked to 50 people in the area, as to whether they were ready to marry their daughters or sisters to families on the opposite side without the bridge, 47% gave a negative reply. In other words, though marriages occurred between people from both sides of the river without the bridge, it was not done willingly and was only conducted under pressing situations. This lack of willingness for cross-river marriages was due to difficulty that the married daughters and sisters had in returning to their natal homes for festivals and fairs and especially for Dasain and Tihar, the most important festivals for Nepalese Hindu and, when the question was asked about the increased number of marriages per year in the area, only 68% of the respondents gave an affirmative reply, while the other 32% stated that the number of cross-river marriages has remained as it was before the construction of the bridge.

Among the respondents, who stated that there was an increase in the number of cross-river marriages, 6% replied that there was a 100% increase, 15% stated a 50% increase, and the rest stated a 20% increase. But, since there is only 5 to 8 marriages which take place each year in the area as we were told, the increased number of cross-river marriages after the construction of bridge is not very pertinent. However, the 50 people questioned, said that they had more than 300 affinal relatives living on either side of the river. This leads us to believe that the movement of these relatives has been largely facilitated by the bridge.

- Funeral Practices

When 50 people in the area were asked whether the bridge has changed any funeral practices or funeral rites, only 44% gave affirmative responses. The following table shows the opinions of the local people in regard to change in funeral rites.

Table 9-T-2: Percentage of Respondents Indicating a Helpful Change in Funeral Rites Since the Construction of the Bridge

Activities	Affirmative responses
Cremation area	0%
Buying shrouds, <u>Katru</u> , etc.	81%
Collection of firewood	54%
Other (assembling of relatives at the funeral place, etc.)	50%

Source: ECE Field Survey

These local responses show that the bridge has helped the people most by making it easier to buy shrouds. The number of clothing shops have also increased from three to five. Along with this, most of the firewood collecting areas lie on the Bhingri side, hence the people living on the Shotre side, now have easier access to firewood collecting areas, even if

the person died during the monsoon. Further when a person dies on the other side of the river, it is now possible for all of his relatives to assemble quickly to help in performing the funeral rites.

- Education and Health Practices

The only high school in the area, located at Uppalla Bhingri, in Bhingri panchayat, was established in 1971 after the construction of the bridge. It was a primary school upto 1966 and remained as a middle school until 1970. There is no other high school within a 5 mile radius. Thus the students from Khungri panchayat (3 miles north from the Bhingri bridge in Rolpa District), Shotre panchayat (left side of the bridge) Sari panchayat (3 miles west from the Bhingri bridge, Piuthan District) and Barjibang (2 miles west of the Bhingri bridge, Piuthan District) come to Bhingri to attend the high school. There are 64 students (26% of total) from Shotre panchayat who regularly cross the bridge to attend the high school in Bhingri (See photo 9-P-9). In other words, the Bhingri bridge has helped the students from the eastern side of the river to attend the high school. In addition, the movement of teachers and students to either side of the river has been largely facilitated by the bridge.

Most of the government offices organize social functions, especially the National Day, which are usually celebrated in the high school building. People living on the eastern side of the river were in the past unable to attend these social functions, but now have no problems.

There is one health post as well as a Family planning office in Shotre panchayat. Both of them were opened after the construction of the bridge. There is also a Zonal Ayurvedic Hospital in Bhingri panchayat. One private medical store has recently been opened in Bhingri bazaar. Though most of the people still believe in the local healers, Dhamis or Jhakris for curing the sick, the newly established health post and Family planning clinic have had their effects. If the Dhani fails to cure a sick

person, he will be immediately taken to the health post located in Shtro. Cases needing surgery are also reported to this health post and even with the local Dhamis the people living on the western side of the river make great use of the bridge to get their sick to the health post. In case of a lack of medicine at the health post, the people living on the eastern side of the river cross the bridge to purchase the necessary medicine at the private medical store. Those people who cannot afford the western medicine, go to the Ayurvedic Hospital which is located on the western side of the river. Family planning supplies are used extensively by people on both sides of the river and the bridge has helped in their disposal. In other words, the movement of health aids, family planning workers and the distribution of both Ayurvedic as well as western medicine to people on both sides of the river has been largely facilitated by the bridge. This is supported by statements made by the 92% of the people questioned; who mentioned that the bridge has made it easier for people of the area, to make use of the health facilities.

- Festivals, Fairs and Religious Activities

Though the Bhingri Bridge has not effected the development of any new festivals or fairs in the area, all respondents mentioned that it has become much easier, due to the bridge, for a larger number of people to assemble on both sides of the river to participate in festivals, fairs or religious activities. However, the Bhingri Bridge has made it easier to organize three different fairs so that they are able to occur at one place. These fairs: Dasai Purno Mela (held in Bhingri bazaar), Tihar Chouthi Mela (held at Bhingri pouwa) and Kartikpurno Mela (held at Bhingri bazaar), taking place at three different times and are now held in the Molsi area, which is close to Bhingri Bridge. By this change, we can easily see that the bridge has facilitated the people to assemble at one fixed place for celebrations, this was not always possible before the construction of the bridge. There is no shrine or temple (except at Dowali where new shamans

are initiated by the senior shaman every year) in the sample panchayats of study. Most of the people living on either side of the river go to Svargadvari to worship Lord Mahadeva and Mahaprabhu as well as to perform Hindu religious rites and rituals. Sometimes the local people also go on long distance pilgrimages to Ridi in Gulmi Districts about four days trek from the Bhingri Bridge area.

- Changes in the Roles of Women

As most of the active male population of this area move out of their villages for long term labor employment it is the women who perform almost all of the domestic and agricultural work (except ploughing and thatching the roofs of the house). They also participate in group dances and songs and never miss a chance to attend festivals, fairs and religious activities. In the table below we have categorised the activities of women and also noted how these activities have been facilitated since the construction of the bridge. For this purpose 16 women, from the study area, were interviewed in detail.

Table 9-T-3: Percentage of Female Respondents Indicating an Increase in Women's Activities Because of the Bridge

Activities	Affirmative Responses
Extension of ritual friendships	31%
Communal dances	43%
Marriages, festivals, fairs and religious activities	100%
Domestic work and agriculture	62%
Portering	12%
Others	0%

Source: ECE Field Survey

Like the findings for other bridges in Far Western Nepal, the women of this area have also made the maximum use of the bridge during

marriages, festivals, fairs and religious activities. The young boys and girls go to either side of the river quite frequently to participate in Chotta Chotti Khelno. Similarly, during Dasain and Tihar married daughters and sisters now have no difficulty in returning to their natal homes. They also now participate more frequently in the Swargadwari fairs held in Kartikopurnima and Baisakopurnima.

After the construction of the bridge there is more mobility of women to either side of the river and more ritual friendships or Saini Miteri relationships are observed. At the same time, the firewood and fodder collection area which lies mostly in Bhingri panchayat, is more easily reached by the women living in the Shotre panchayat. In addition, women can now go to either side of the river to do agricultural work, even during the rainy season and along with this, short term labor employment for women on either side of the river has increased.

In addition, when women were asked whether the bridge had saved them time, all of the women responded positively. But, it is important to note that the time concept is very vague among the Nepalese women and it is very hard to calculate the exact time saved. But without any hesitation, they stated that the bridge has saved them some time which they utilise in different activities. The following table shows their opinions on the utilisation of saved time.

Table 9-T-4: Percentage of Female Responses on the Utilization of Surplus Time Saved due to the Presence of the Bridge

Activities	Affirmative responses
Taking more care of the children	75%
Working on the farm	100%
Cooking better food than before	62%
Taking rests	0%
Socializing with other women	100%
Recreation	0%
Collection of firewood and fodder	94%
Grazing cattle across the bridge	0%
Others	0%

Source: ECE Field Survey

These answers show clearly that the women of this area have made use of their surplus time in basically the same way as the women in other study areas.

- Changes in Beliefs and Habits

Only 30% of the respondents pointed out that more people have started speaking proper Nepali than before. This has occurred due to the government offices, like the Police Check Post, the Post Office, the Health Post, the Family Planning Office, the Zonal Ayurvedic Hospital and the High School, being opened in the immediate vicinity of the Bhingri Bridge. The employees of those offices encourage the use of the official Nepali language and therefore local people have had a better chance of learning proper Nepali.

Of the people questioned, 40% mentioned that the bridge has facilitated a change in the clothing patterns of the area by allowing the local people to now have a greater choice of cloth to buy. Similarly, two more tailoring shops have been opened since the construction of **the bridge** and new styles of garments are being made.

There were 28% of the respondents who mentioned that the bridge has provided facilities to bring improved varieties of seed and chemical fertilizer into the area from Khalanga and Gorahi. This low percentage of people who commented on the use of improved varieties of seed is a result of their limited use, and only rich farmers try to use those new seeds. Though there are two Junior Technical Assistants (JTAs) stationed in the Bhingri Bridge area, whose job it is to help farmers with improved methods of farming, the local people complain that their services are not available to them on regular basis.

In general, the bridge has not by itself done much to improve the standard of living. However, it has certainly made the life of the people a little easier, more secure and helped them to have greater mobility.

9.2.2 INSTITUTIONAL ANALYSIS

-- Local Participation

There was little contribution of material, labor or cash made by the local people for the construction of this bridge, but this was not because there existed no potential for it. As stated earlier, the local people had planned to collect a cash contribution of around, Rs. 25,000 to 50,000/-. Some cash was collected, and this went to meet the expenses of the local leaders who travelled to different places because of the bridge. When the government decided to undertake the construction of the bridge as a full-scale operation, contribution in kind or cash were not expected from the local people.

In this case, however, people rendered necessary support whenever it was needed towards the smooth execution of the project. The materials for the bridge needed to be transported from a distance of five to seven days walk from the south. In order to achieve quicker transportation USAID decided to use the STOL airfield to transport the materials needed for the construction; this though, excluded the cables. In order to make this possible, a rich man in the area refrained from growing crops on his land and permitted it to be used as an airfield for two years. Much of the transportation of material and supervision of work was carried out using the airfield.

There were also other form of local support for the construction of the bridge. The local government and people were providing the necessary administrative cooperation and created enough pressure in Kathmandu so that problems received quick action. For instance, when the JED finally drew up a schedule for the construction and informed the local panchayat of the arrival of the construction technician at Keilabas, the entry point to the area at Indo-Nepal border, on the first of September 1965, the Pradhan Pancha of Bhingri village panchayat went and waited for him. When he did not show up

on the scheduled date, the Pradhan Pancha wired the SBD the very next day, and complaining about the technician's absence. When he was notified of a new date, the District Governor or Bada Hakim, enquired on his own about the technician's arrival and was informed that the technician would arrive on a day different from the one given to the Pradhan Pancha. It indicated that the SBD in Kathmandu was itself facing its own share of difficulties ^{3/} in deputing the staff to the site. Despite such difficulties in deputing the staff, it was apparent that the SBD was taking all possible actions in order to start the construction of the bridge and thus satisfy the desires of the people.

The local officials and representatives were also involved in organizing a labor force for the transport of the materials, not flown in, from Koilabas to the bridge site. The District Panchayat Presidents of Piuthan and Dang Districts met at the beginning of the construction work and worked out a scale of new wage rates for the transporting of such unconventional and difficult loads as the cables from Koilabas to Bhingri. They also worked out a system to coordinate the deployment of a limited labor force from both of the Districts. This involvement of the local leadership in the management of this part of the bridge construction immensely facilitated the early shipment of the cables to the bridge site.

While the local administration, people and leadership were very deeply involved in the construction phase of the bridge, they have not shown an equivalent performance in the maintenance of the bridge. Now, eleven years after the construction of the bridge, there are quite a few signs of disrepair. The common ones being; the presence of rust, ill-maintained bridge entrances, loose cables and broken and worn out planks. While some of them are obviously beyond the technical competence of the local people,

^{3/} The cause of difficulties later surfaced when all the overseers deputed to different sites returned to Katmardu and filed a joint petition demanding full daily allowances for the entire period of their stay at a bridge site. They further added that if their demand was not approved, they would like to be posted to a place on a more permanent basis rather than having to move from one site to another. Source: SBD files.

items such as broken planks or the maintenance of the bridge entrances, are certainly within the technical and organizational capability of the locals. But, as it stands today, such work is needed for the proper maintenance and upkeep of this hard-earned-bridge.

In 1973, Bhingri panchayat received Rs. 500 from the District Panchayat for the maintenance of the bridge, but the local people claim that only two planks were replaced--and oddly enough the people have reservations about the proper use of the money. In the current fiscal year, Rs. 2,500/- have been earmarked by the District Panchayat for the change of planks on the bridge (as reported locally) but the money is not likely to be used on the grounds that the task calls for a larger allocation. Thus, no end seems to be in sight, and the deterioration of the bridge continues. Even in such situations as the keeping of the bridge entrances clear of earth (photo 9-P-1) no steps have been taken by the panchayats at the two ends of the bridge.

One of the reasons for the lack of a common effort in this regard may be due to the lack of mutual trust between the local panchayats leadership and because of this lack of mutual trust and the corresponding lack of cooperation between them, the bridge, which is their common property, suffers for want of maintenance.

At one point in 1970-71, the District Panchayat levied a toll on the use of the bridge; but this did not last long. There were unpleasant scenes, with people fighting over the toll. Many travellers avoided the bridge and forced the river, thus rendering the toll collected so insufficient that it did not even meet the salary of the person appointed to do the collecting. Besides, this is essentially a local access bridge and does not have a large number of long-distance travelers using it, and it is therefore incapable of generating much money.

- Institutional Impact of the Bridge

As stated above, this bridge site in the western part of Pithoragarh District, was centrally located and had the potential to become a service center for the area. That was why there were such institutions as the Ayurvedic Dispensary and the Police Check Post established before the construction of the bridge. After the construction, in 1966, this potential has been developed and additional services have started coming to this place. Today, in addition to the services mentioned above, the place also has a mustard oil mill, a health post, a Post Office, a high school and several primary schools. Of late, this place has also been the station for two JTA's of the Agriculture Extension Program for the District.

Such positive impacts notwithstanding, there are some people in the area who have experienced an adverse effect on their lives. They are the ferrymen, locally called as Botes (called Majhis in eastern Nepal). Before the construction of the bridge, these were the people who ferried people back and forth during the monsoon in their dugout canoes. This was their traditional occupation and they were paid in food grains, at the rate of 11 pounds or 2 mathis per household in the villages in Shotre and Bhingri. For people beyond this area, they charged a toll, in cash, or between Rs. 0.50 to Rs. 1.00 per person, depending upon the condition of the river. With the bridge in place, these people now find themselves suddenly deprived of their age-old means of livelihood and have either migrated to the Terai area in the south, or to India in search of employment. (See Volume 2, of this report on Pacluwarghat Bridge, where the boatmen (Majhis) also have been adversely affected by the bridge).

9.2.3 ECONOMIC ANALYSIS

- Geographic Area and Population Served

In terms of its locational relationship with the area's trail network system, the service area of the Bhingri bridge can be considered

as relatively small. Apart from this, the dry season benefit of the bridge is comparatively low; this is due to the existence of ferry crossing points within 5 miles distance upstream and downstream from the bridge, and also because the river is fordable at many points.

The village panchayats that lie within the effective service area of the bridge are Bhingri, Shetre, Sari, Gotibang and Barjibang. Shetre, Sari and Barjibang panchayats are situated on the left bank, other two are situated on the right bank of the river. The size of population directly benefitted by the bridge can be estimated at around 25,000. Apart from directly servicing these panchayats, the bridge also services a few panchayats lying to the north, by providing access to different destinations in the southeast and northwest. In addition to this, some of the village panchayats of the Rolpa District, lying in the south appear to use this bridge to a small extent.

Considering the location of the bridge from a broader perspective; the bridge serves the people residing in the northeastern part of Piuthan. For example, Swargdarai is an important place of Hindu pilgrimage. Two big fairs in a year are held here. The bridge also serves this portion of the population, and enables them to reach Ghorahi which is an important market center in the area as being a road head. Similarly, for people living in the northwest panchayats, across the river, the bridge provides access to Khalanga, the District Headquarters of Piuthan.

- Estimated Traffic Flow

The volume of traffic flow over the bridge could not be ascertained in precise terms from local opinion. However, on the whole, the local people put the estimate somewhere around 100 to 150 persons during the wet season and 400 to 500 during the dry season. The high traffic density during the dry season is attributable to the higher mobility of the local people as a result of not having to work in agricultural activities.

A traffic count was made at the bridge head for 4 consecutive days (see Table: 9-T-5) during late January 1978. The average flow of non-porter traffic was 518 persons per day, and porter traffic, 18 persons per day. There is no animal traffic because animals are not allowed to be taken over the bridge for fear of damaging the walkway planks, as in the case of the Manbagh Bridge. As indicated by the local people, as much as 80% of the traffic flow is contributed by people residing in the immediate vicinity of the bridge. To this extent, the traffic flow can be regarded essentially as local traffic.

Some interesting results have been generated from the traffic questionnaire administered to about 50 bridge users. On the locational aspect of the bridge; all the bridge users agreed that the bridge is at the right location. As much as 90% responded that the trail connected by the bridge was the normal route. The frequency of bridge use seemed to vary in terms of area and purpose; 14% used it daily; 10%, once a week; 44%, used it once a month; 30%, once a year, and 2% reported using the bridge rarely.

Table 9-T-5: Traffic Counts Across the Bridge

Days	Non-Porter	Porter
First	534	21
Second	620	32
Third	454	11
Fourth	465	8
Average/day	518	18

Source: ECE Field Survey (Dry Season).

As far as purposes of bridge use is concerned; as much as 52% of the users were involved in domestic work; 22%, social visits; 10% for buying; 10% for schooling, and 6% for employment (see Table 9-T-6). In terms of origin and destination of traffic, the highest flow of traffic, as much as

Table 9-T-6: Percentage Traffic Indicating Origin, Destination and Purpose of Travels in the Study Areas

Place of Origin and Destination Purpose of Travel	Shotro		Bhingri		Sari		Khalanga		Rest of Piuthan		Palpa		Rolpa		Baglung		Gulmi		Total	
	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D
Buying	6	2	2	6	-	-	-	-	-	-	2	-	-	2	-	-	-	-	10%	10%
Seeking employment	-	-	-	-	-	-	-	6	6	-	-	-	-	-	-	-	-	-	6%	6%
Domestic Work	8	14	4	10	2	8	-	6	24	8	-	-	14	-	-	2	-	4	52%	52%
Schooling	6	6	4	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	10%	10%
Social	6	8	8	14	-	-	2	-	4	-	-	-	2	-	-	-	-	-	22%	22%
Total	26	30	18	30	2	12	2	12	34	8	2	-	16	2	-	2	-	4	100%	100%

Source: ECE Field Survey

34%, originated from many neighboring villages, referred to as 'rest of the Piuthan District', followed by Shotre with 26%; Bhingri with 18%; Rolpa with 16%, and Sari, Khalanga and Palpa for 2% each. With reference to destination, Shotre and Bhingri accounted for 30% each, Sari and Khalanga with 12% each, the rest of Piuthan with 8%, Gulmi with 4%, and Rolpa and Baglung represented by 2% each.

- Agriculture

The observations in this study are limited to the three village panchayats Bhingri, Shotre and Sari, all of which lie in the immediate vicinity of the bridge site. However these panchayats serve fairly well as representative of all other panchayats, which lie within the service area of the bridge.

Agriculture is the major occupation of all the people in the study area, and shows the predominant characteristic of being marginal farm land irrigated by a grossly inadequate system. Agricultural production depends primarily on the monsoon rain. A major proportion of the land area consists of dry land or Pakho, and there is small proportion of wet land, or Khet. The Khet lies mostly around the river banks where there is a rural irrigation canal network system. But these canals dry up during the dry season, and therefore, the possibility of growing winter crops on most of this land is limited.

The major crops grown on Pakho are maize, millet and legumes, and on the Khet, there are basically paddy crops, wheat and mustard grown. Potatoes are the most important vegetable farmed in the area. Like other hilly regions, the farming activity is closely accompanied by animal husbandry. Each household on an average owns 1 to 3 cows and/or buffaloes, 2 to 3 goats, and some households raise poultry and pigs. The interrelationship between farming and animal husbandry is important, since livestock manure forms the major source of traditional fertilizer, apart from this use, it serves a wide variety of other purposes.

It has emerged from local interviews that the agricultural production of the area has remained more or less static over the year. Regarding the productivity trend, 71% of the people questioned, reported that it has been declining while 21% replied that it has remained constant over the years, and 8% said that it has been increasing. It was also indicated by the local people that the agricultural production cannot meet the food requirements of the area. Therefore, a significant amount of food grains from the food surplus areas of the Tarai, must be imported to sustain the area's economy.

The agricultural technology is essentially traditional. The application of modern farm inputs such as chemical fertilizer is not widely prevalent although some farmers have responded to the introduction of modern ways of farming. However, the application of improved varieties of seed is gradually gaining more acceptance among the farmers. There is, of course, total absence of the use of modern farm implements. Although the JTA's visit the area occasionally, there have not been any notable changes in farming techniques.

The impact of the bridge on the agricultural pattern appears to be insignificant. At the most, the bridge has only benefited some people by allowing them to reach their farm land across the river, and to collect fodder for their livestock. More generally, the bridge appears to facilitate access, to a small extent, to cooperative stores to purchase modern farm inputs. Apart from this the bridge's effect on bringing about notable changes in terms of shifts in the cultivation pattern in the area is negligible.

- Rural and Cottage Industries

Rural and cottage industries are mainly concentrated in the areas of making bamboo goods and baskets, ropes, and variety of other things for household and farm use. A few households still weave cotton cloth, but the cotton cultivation has long been abandoned due to the increasing need of food crop cultivation.

There is one small diesel-operated mill in Shotre panchayat which was established after the construction of the bridge. Its operation is popular due to the increased mobility of the people brought about by the bridge.

Viewing the cottage industrial situation from a broader area perspective, it can be seen that the impact of the bridge has remained marginal. It has not brought about any distinct changes in the pattern and growth of the cottage industries. If anything, its contribution has been one of facilitating access to imported raw materials such as cotton yarn, and in general, providing access to the mill.

- Labor Force Situation and Employment

It has been estimated that the total population of the three panchayats in the study area is 10,267, of which the males constitute 4,825 and the females 5,442. The size of population in the age group of 10 years and over, is estimated at 7,341, with 3,560 males and 3,781 females. Since all are not economically active in this potential labor force age group, the size of the total labor force, therefore, is estimated to be 3,955, of which the males comprise 2,922 and the females 1,033. The total activity rate works out at 38%, and sex specific activity rate appears to be 60% for males and 19% for the females. The lower female activity rate is perhaps due to the tightening of the labor market for the female labor force, outside of agriculture. (See Table .9-T-7).

Of the three panchayats, Shotre registers the highest population with 3,980, this is followed by Bhingri with 3,566 and Sari with 2,721. Similarly, the size of labor force follows the same order, that is; the highest is registered in Shotre, with 1,533; this is followed by Bhingri with 1,374 and Sari with 1,048.

Apart from agriculture, the pattern of the labor force distribution in wage earning secondary occupations, appears to be as follows; paid

Table 9-T-7: Estimated Population and Labor Force

Village Panchayat	Total			Population - 10 years and above			Economically active ^{4/}		
	Male	Female		Both Sex	Male	Female	Both Sex	Male	Female
Bhingri	1,688	1,878	3,566	2,549	1,236	1,313	1,374	972	402
Shotro	1,900	2,080	3,980	2,846	1,380	1,466	1,533	1,207	326
Sari	1,237	1,484	2,721	1,946	944	1,002	1,048	743	305
Total	4,825	5,442	10,267	7,341	3,560	3,781	3,955	2,922	1,033

Source: ECE Estimate based on 1971 CES Census.

^{4/} The economically active population may be defined as the number of persons in the age group 10 years and over who are engaged in activities contributing to the production of goods and services.

agriculture labor, 45%; service, 10%; construction labor, 20%; porter, 15%; business 5%, and others 5%.

It is reported that the seasonal migration of workers from the area, seeking work elsewhere, is significant. The important labor market center for manual labor is Ghorai and to some extent Khalanga. But, this migration of the manual labor force has mostly journeyed to places outside the country, like the Indian cities of Kerala, Madras and Calcutta. This is primarily to work in low wage occupations such as watchmen or cheap unskilled labor. To this extent, the seasonal mobility of labor is quite remarkable, and is understandable due to evidence of underemployment in the agricultural sector. However, migration of a permanent nature occurs only occasionally.

The direct effect of the bridge in generating employment is insignificant. However, it appears to be instrumental in facilitating the mobility of surplus labor in seeking employment outside the area.

- Trade Flow Pattern

The major commodities which flow into the study area are, in descending order; salt, sugar, kerosene, clothes, food grains, spices, and cigarettes. The major commodities which flow out appear to be Ghow accompanied occasionally by marginal agricultural products like raw spices. The area does not import mustard oil as the local people grow mustard seed and grind it in the local mill.

The local markets, situated in Bhingri and across the river in Sotro, mostly cater to the day to day immediate needs of the local people. But, for large scale commercial purchases, the local people go to Ghorai which has developed into a sizable market for the area. following the construction of the fair-weather noticable road from Koilabas (a small town adjacent to the Indian border) to Ghorai. The prices are **relatively less** in Ghorai than in the local market.

To a certain degree the bridge has indirectly stabilized the local market prices due to the continual inflow of commodities throughout the year. However, the bridge has not brought about any significant changes in the area trade flow structure. It has not been useful, much less instrumental, in opening up new avenues for trade relationships based on factor endowment.

- Environmental Effects

Since the bridge is essentially servicing the local area its immediate effect on the environment has been through allowing people access to the area across the river for collecting fuel wood and fodder. As much as 85% of the local people said that the bridge is extensively used for this purpose. Local people indicate that at least 7 to 8 persons with loads of fuel wood and 9 to 10 persons with loads of fodder cross the river every day. This indiscriminate use of forest resources has had, and will continue to have, far-reaching effects on the environment, in terms of soil erosion and a progressively declining agricultural productivity, already distinctly visible in the study area. The protection of the forests and the afforestation program has not yet been seriously undertaken.

9.2.4 ENGINEERING ANALYSIS

- Site Selection, Design and Construction Methods

No possible or better site, when compared to the present site, has been found within 1500 ft. upstream or downstream from the bridge. The site selection is excellent and has fitted perfectly the standard 300 ft. span of the BRC bridge. It has also satisfied the local people.

Local people said that two alternative sites were shown to an American engineer, Mr. Koski (a USAID Project Engineer) when he came in 1965 to survey the bridge site. One was about 900-1200 ft. upstream, and the other was where an old washed out wooden bridge had been located. The

engineer examined the sites carefully and objected to both because of the unstable soil conditions. Local people pointed out that landslides later occurred at both of these alternative sites; this was observed during the field visit.

The bridge has stable banks on both sides, the smallest span length around the bridge location area, good approach trails, and a maximum free board clearance (60 ft.).

Some minor modifications on the placements of wind anchor blocks have been made. The levels of the wind anchor blocks are placed in such a way as to follow the contour of the ground; this has resulted in the saving of cement. Also, the deck planks are not of the BRC type; their widths are different. This may have been done to match the widths of planking locally available (see Photo 9-14-3). Cross beams have also not been spaced as required by the BRC design, and are spaced at irregular intervals. Apart from these minor modifications, no other major changes in the original design were made or needed.

A field construction crew started work on this bridge around October 1965 and completed it in April 1966. Mr. Mukunda Upadhyaya was the engineer in charge of the construction team, and Mr. E. Johnson, a PCV engineer, assisted him as a technical advisor. Mr. S. M. Shrestha, the SBD Chief, and Mr. Koski, the USAID Project Engineer, occasionally visited the site to give technical guidance as well as administrative support from Kathmandu.

Most of the construction methods used were the same as described in detail in the Darondi Bridge report (see Vol. 3 of this report). Erection drawings supplied by BRC were used as a guide but needed modifications to suit site conditions.

The transportation of bridge parts by STOL aircraft was successfully tried on this project, and through volunteer labor, local villagers were also fully utilized, mainly for transporting the cables and more difficult parts not suitable for airlifting.

We were informed by the local people that the construction was done by employing direct labor on a daily wage basis, and that no contracts were awarded.

-Present Bridge and Approach Trails: Condition and Recommended Improvements

Bridge Name: BHINGRI	Zone: RAPTI	District: PIUTHAN	Village Panchayats: Left: SHOTRE Right: BHINGRI
SPAN	301 ft.		
TYPE	Suspension		
MAP 1"=1 mile	62-L/12, 62-L/16		
COORDINATES	28°08'50" 82°42'33"		
TRAIL	north-east Dang to north- west Piuthan		
TRAIL TYPE	Class C		
RIVER	Madi		
RIVER TYPE	Minor		
COMPLETION YEAR	1966		

Refer to
Photograph No.

Overall condition of this bridge can be rated from good to fair. The bridge is structurally safe but very poorly maintained. Camber, as measured, was found to be within acceptable limits. The local opinion was that the camber dropped about 10 to 12 in. and the bridge started to swing around 1972 or 1973.

Physical observation shows that the bridge is depressed down because of earth cover over the decking on the right bank entrance to a length of 10 to 12 ft. This also covered

Above Photo

9-P-1

the tower base to a depth of 1 to 1½ ft. The left bank is also covered with deposits but not as high as on right bank.

The deck planks are in very poor condition. It is believed that no attention has been given to these deck planks since the construction was completed 12 years ago. Nearly all the planks in middle three rows are rotting at the edges. The BRC design drawing shows 6 panels of planks, each 8 in. wide, but the widths of the planks used, varies from 10 to 12 in. for end planks, and 7 to 9 in. for the middle three rows. It is not clear why the design widths were changed.

Many coach bolts are also loose and a few of them are lost. The crossbeams are not spaced at equal intervals but are in good condition.

A few suspender rods are disconnected or loose and one rod near the entrance of the right bank, on the upstream side, has been lost.

The wind cable profile is good but the anchor parts are, again, buried in debris. One wind cable anchor nut of the left bank on the upstream side has been lost.

The main anchor on the right side is likewise covered with debris, which was negligently thrown over the anchor block during the construction of the Piuthan-Roopa Panchayat Road. The fencing is loose at the ends and needs re-tightening.

This bridge is placed in the technically most ideal site, rarely found in the hills of Nepal. Both

Refer
Photograph No.

9-P-2

9-P-2

9-P-3

9-P-3

9-P-4

9-P-5

9-P-6

9-P-7

Refer to
Photograph No.

banks rest on solid foundations, well above the high flood level. Apart from its anchorage blocks, no extra structures were needed because of the ideal site location. In order to give a longer life to this bridge, immediate attention should be given to correct the following:

9-P-8

- Removal of earth covering the tower bases at both banks.
- Replacement of about 3/5th of the deck planks, and adjustments in the spacing of the crossbeams, and the replacement of 3 of them.
- Removal of debris from all the anchorages, and should the maintenance fund allow; catch drains around the tower bases and near the anchors should be constructed to check future problems.
- Re-tightening of the suspender rods, connectors, nuts and bolts, and replacement of lost nuts and bolts and connectors should be done.

The approach trails on both sides are in excellent condition and need no attention at all. Both sides, on the flat lands, or Tar, of Bhingri and Shotro panchayats and beyond the reach of Madi River, are stable in their natural condition.

9-P-9

- Past Maintenance Work

Major: No major maintenance work has ever been done on the bridge.

Minor: Also no minor maintenance work has been done on this bridge since its completion in 1966.

Bridges which are not on the verge of collapse or have not suffered any major damages are generally neglected, and a slow deterioration in the condition of the bridge does not call for immediate attention. This is evident in the case of this bridge.

Local people told us that about Rs. 2,500/- has been allocated this fiscal year for the replacement of planks and other necessary repairs, but nobody exactly knows when the repairs will take place, or whether they will take place at all.

Even though the bridge has been completely neglected as far as maintenance is concerned, the bridge is not in as a bad condition as could be expected and the main reason for this is the excellent site conditions of this bridge.

9.3

FINDINGS

SOCIO-ANTHROPOLOGICAL

- The Bhingri Bridge trail is the shortest trail to Libang, the District Headquarters of Rolpa District, and takes less than one day to walk there from the Bhingri Bridge. It is also easier to go to Ghorai from Bhingri via Swargadwari, about a one and half day walk. The people of Arghakhanchi, Baglung, Gulmi and Palpa districts go to Swargadwari via the Bhingri bridge to worship Lord Mahadewa and Mahaprabhu, and to perform Hindu rites and rituals. In fact the religious attraction of Swargadwari has increased the use of the Bhingri Bridge for those people residing on the left side of the Madi River.
- The Bhingri bridge has had a great sociological impact on the people of the area. First, the bridge has made it unnecessary for the people to cross the river by boat or on foot and therefore, it has substantially reduced the number of deaths caused by the river. Secondly, the social interaction of the people living on either side of the river has increased since the construction of the bridge. Today, people on both sides of the river have more mobility during all seasons, which is important for occasions such as, marriages, festivals, fairs, religious activities and funeral rituals. Institutions such as schools, the health post, the Family Planning Office, etc., located across the river, are now easily reached because of the bridge.

INSTITUTIONAL

- In the face of increasing pressure from the local people, the local administration and their top level supporters in Kathmandu, the SBD went to work finding resources, both money and manpower, to meet the demands of these people, and to build the bridge. The Department had to promise incentives, which were not in the general rules to its field staff to

motivate them to go to the bridge sites. From this we can see that local pressure is conducive to initiating development projects and getting help from the central government.

- In order to legitimize and provide necessary impetus to any popular project, articulation of the needs of the local people must be supported by the local administrative machinery of the government. This lends the necessary credibility to the project; not only in the eyes of the central government but also in those of the common man in the villages.
- The history of the Bhingri Bridge has demonstrated that substantial potential existed for generating local resources for the construction of the bridge, although government policy does not require much.
- While the people of Bhingri did make a very serious effort to get the bridge built, its poorly maintained state strongly suggests that a local development project, although based on local needs, cannot depend on local initiative for its maintenance. A specific policy, designed for the locality must be developed to ensure that the required maintenance work be carried out.

ECONOMIC

- The service area of the bridge does not extend to far distant places, but is extremely localised. The bridge serves the local area's access trails.
- In view of the fact that the river is fordable at certain points during the dry season, and that there are alternative river crossing facilities within 5 miles of the bridge, the dry season benefit of the bridge is low.
- Besides facilitating the mobility of the people and trade flow on a continual basis, the bridge has been important in providing access to markets, schools, the police checkpost, the mill, the health center, etc. The bridge has, to some extent, also contributed to the growth of the small market centers in the area.

- The bridge cannot be regarded as instrumental in generating further development in the area; it has not substantially changed the traditional pattern of agriculture and cottage industries, nor has it affected the trade pattern in terms of new inter-area trade relationship, based on commodity diversification.
- The bridge has stimulated the local traffic to such an extent as to negatively affect the environment. The progressive depletion of forest resources has been brought about by people crossing the bridge to collect fire wood. Local people indicate that the bridge has been very helpful in reaching the other side of the river to collect fuel wood and fodder which, of course, has led to a deteriorating environmental situation.

ENGINEERING

- Few bridge sites were as well suited to the BRC standard span bridges than the Bhingri site.
- Bridges which are not on the point of collapse or have not suffered major damages are generally neglected and given very poor maintenance; Bhingri Bridge is a glaring example of this.
- Bhingri Bridge is an extreme example of negligence, as far as periodic maintenance is concerned. Neither the panchayats nor the central government have given any attention to this bridge after its construction. Thanks to its excellent construction site, the bridge is still in satisfactory condition.
- Tower bases have been covered with debris to a depth of 2 ft. and no one has ever thought it necessary to remove this debris. This has also been observed at other bridges. To remedy this, it is proposed that for future bridges, the tower base be elevated by providing 12 to 15 in. high concrete pedestals.

- Deck planks are in poor condition and need immediate repairs. There are large holes which may cause serious accidents.
- The general condition of the bridge is good to fair. The bridge needs maintenance with particular attention paid to lost and bent suspenders, and the replacement of planks.

9.4. ILLUSTRATIVE PHOTOGRAPHS



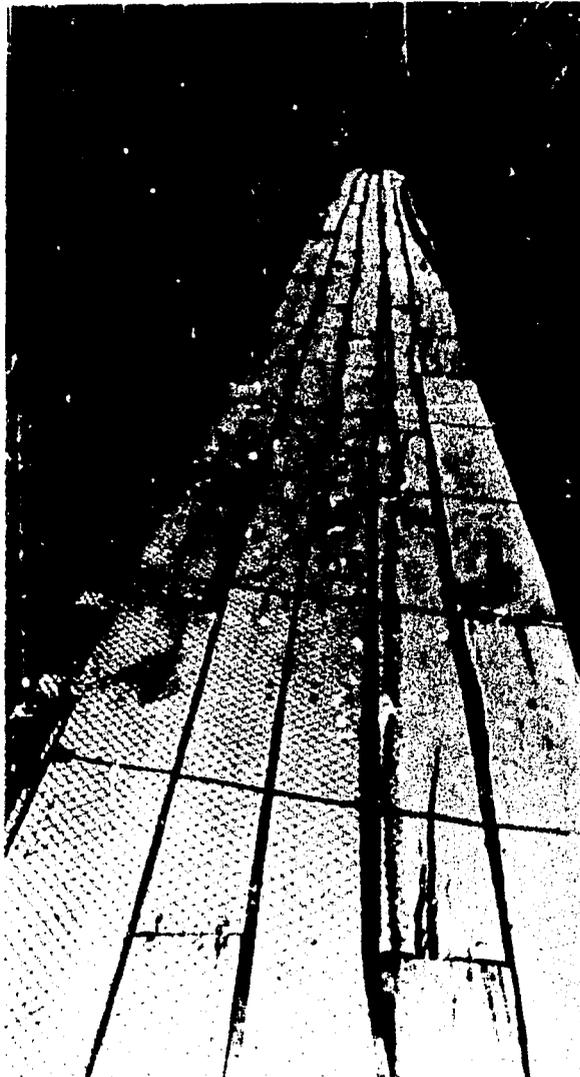
9-P-1: Right bank entrance. About 12 to 14 in. of debris has covered the tower base and extends up into the deck. This reflects a complete negligence on the part of the local people. The deck is pressed down, and it is quite likely that the buried parts have started to rust even though they are galvanized.

This condition is also observed in other bridges. This is due to the lack of proper check-drains around the tower base. The best way to avoid this is to elevate the tower base by 12 to 18 in. from the natural ground level. An example of this provided by the Malumela bridge (see photo 11-P-4 in this volume).



9-P-2: A big boulder fell (see arrow A) and luckily missed the tower. Note the deck planks in their worst condition. Crossbeams though not so bad, are spaced irregularly. Note the earth cover at the entrance (see arrow B).

Date: Feb. 13, 1978



9-P-3: Plank widths are not equal and are not according to the BRC drawing. End planks are not in bad conditions but the most used planks, those in the middle 3 rows are rotted along the edges. Coach bolts are loose and some are also missing.

Date: Feb. 13, 1978



9-P-4: A disconnected suspender rod. It can be reasoned that the slipping of the nut from the connector is due to the repeated oscillation of the suspension bridge.

Date: Feb. 13, 1978



9-P-5: This shows the left bank downstream side, wind cable anchorage. Debris from the cut face has buried the anchor parts.

Date: Feb. 13, 1978



9-F-6: Ganga Bahadur Chhetri, a local resident of Bhingrikot, shows the lost nut of the wind guy anchor; left upstream side. He boasts considerably about his local technical know-how. He was the headman during the construction of the bridge.

Date: Feb. 13, 1976



9-F-7: Showing the earth-mix-boulder coverage over the main anchorage right side. Local people informed us that the excavated materials were thrown from above (when local people were voluntarily constructing a jeepable road from Pinthan to Rolpa) and covering the main anchorage block. The edge of the road is seen in the front of the photograph. This is obviously an irresponsible and unwarranted act.

Date: Feb. 13, 1976



9-P-8: It is interesting to see how high the bridge is. This is one of the most ideal suspension bridge sites; and is rarely found in the hills of Nepal. The height above the low water level was measured at was 60 ft. Also note the irregular spacings of cross beams A.

Date: Feb. 13, 1978



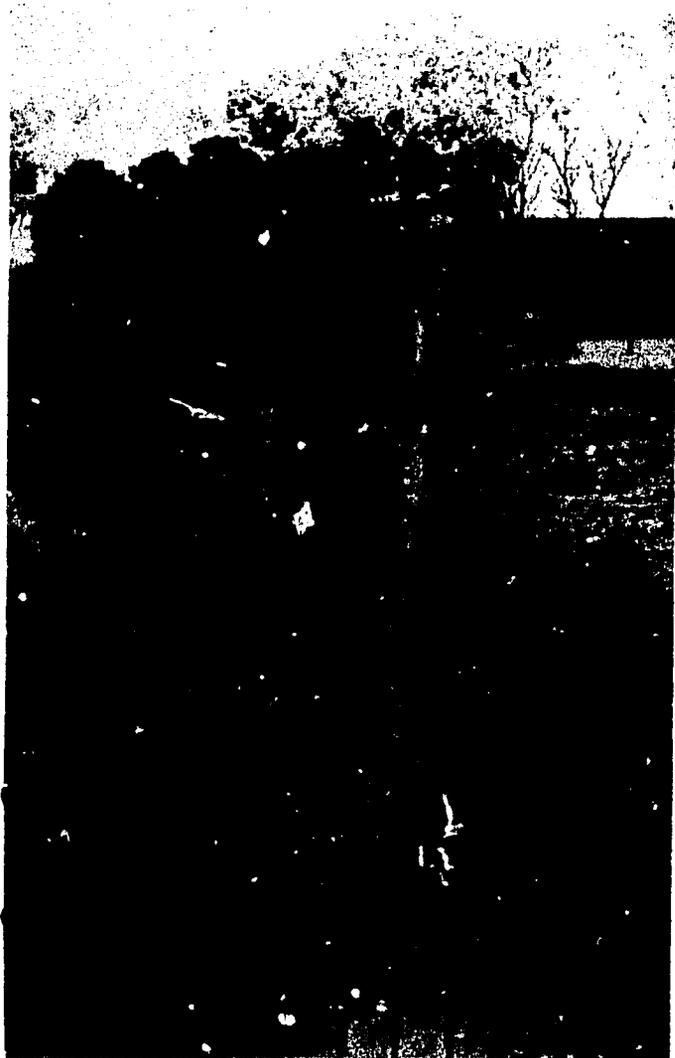
9-P-9: The bridge in use. High school boys from Shotre Panchayat crossing the bridge in the early hours of the day on their way to the school on the other side. The approach trail on the right side is visible and leads to Uppala Bhingri, where the high school is located.

Date: Feb. 13, 1978



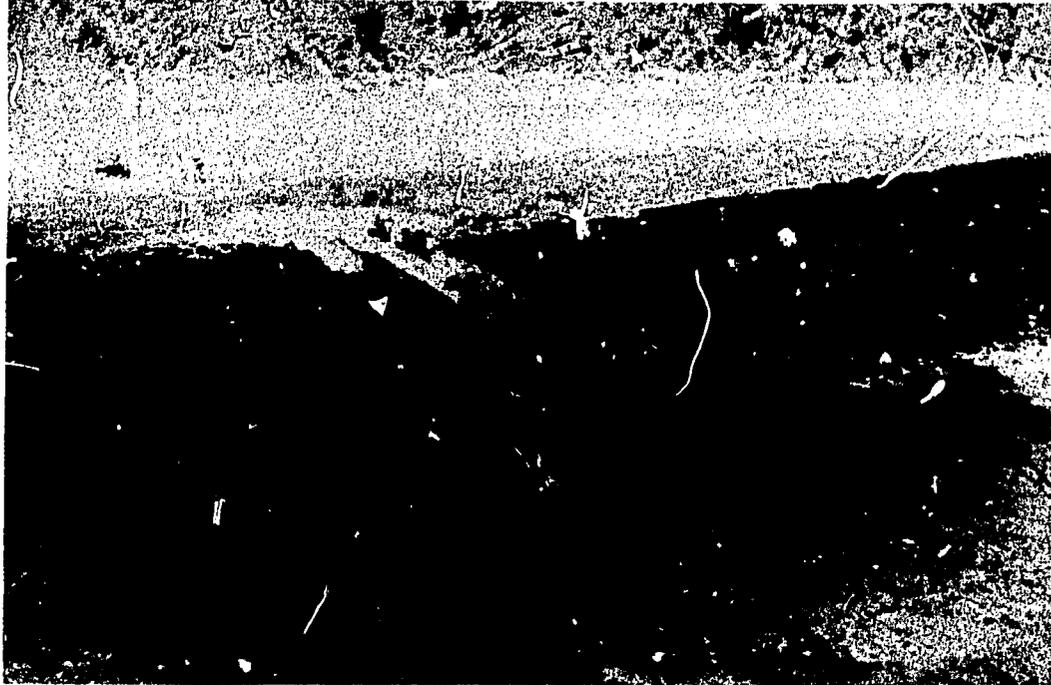
9-P-10: A notice board showing at the Chakchake local suspended bridge (photo below) toll-rates (District Panchayat imposed) for loaded horse, loaded horse with cloths for trading, loaded horse with consumable goods and porters carrying materials for trade. The rates are Rs. 3/-, Rs.4/-, Rs. 2/- and Rs.1/- respectively. The toll rates are obviously very high.

Date: Feb. 12, 1978



9-P-11: A Baglung type bridge over the Madi river at Chakchake. The span is 280 ft. The place is about 4 hours downstream from the Bhingri bridge. Note the excellent suspender connection as contrast to most of the Baglung bridges which are crude. Planking work is excellent, and the joints are staggered. This bridge does not sway much. It connects the south-west part of Piuthan District with Piuthan proper.

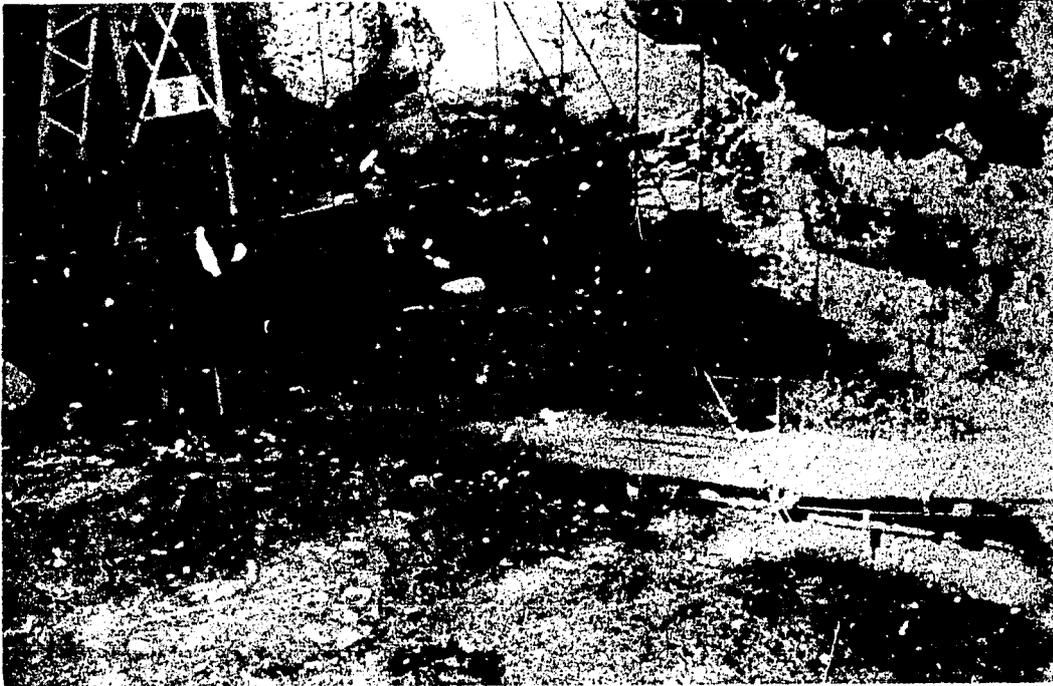
Date: Feb. 12, 1978



9-P-12: The bridge was recently constructed using free local labor and local skill from Piuthan District. It is locally called Dhule Pul; a temporary bridge. Constructed for the use of light motor vehicles. The river is Madi Khola near Devasthan. The mule traffic seen on the bridge is from Dang to Piuthan.

Date: Feb. 12, 1978

9.4. ILLUSTRATIVE PHOTOGRAPHS



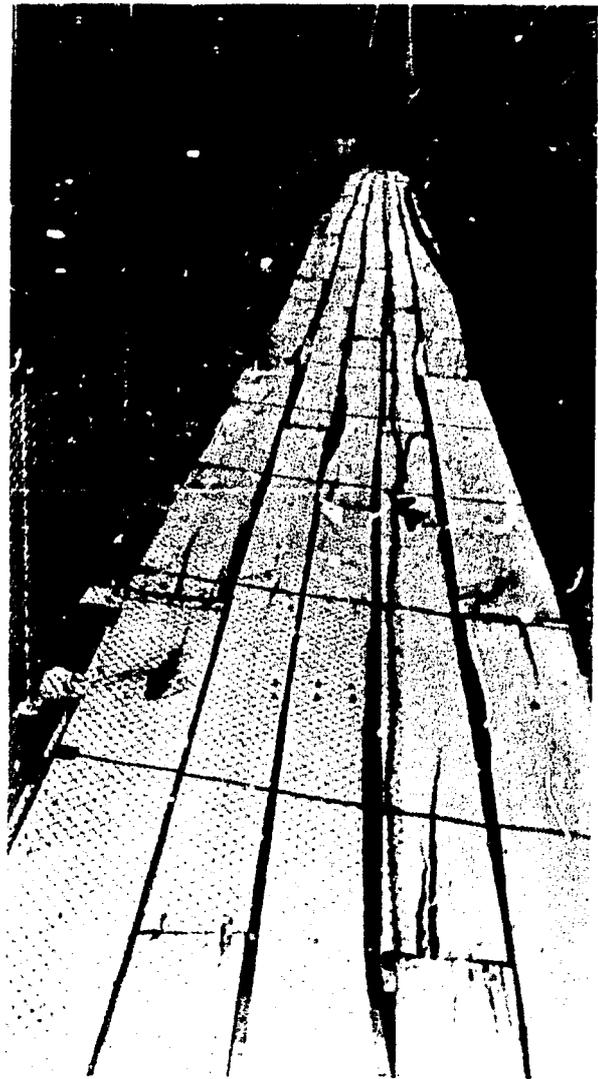
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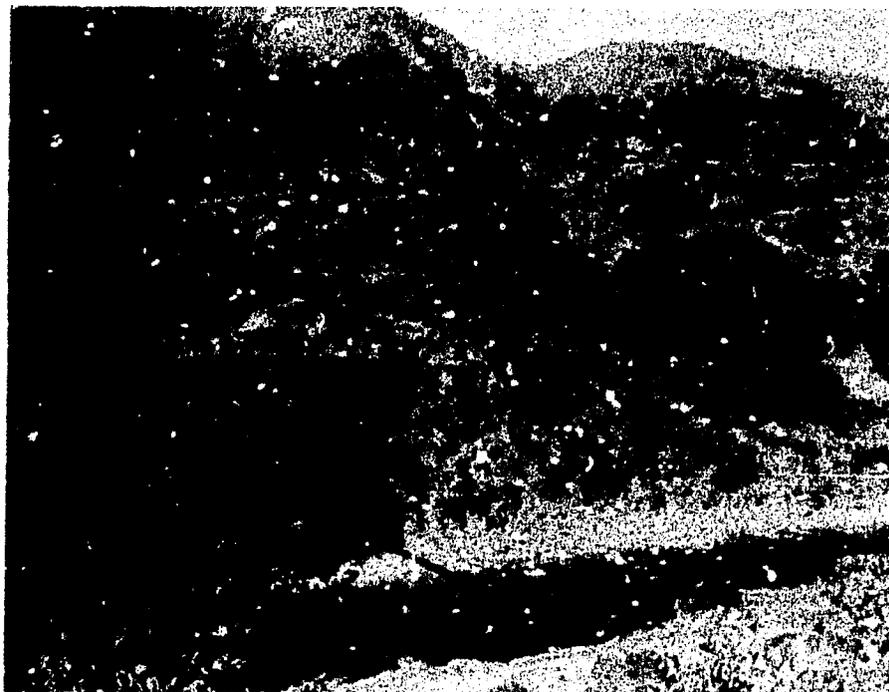
9-P-7: Showing the earth-mix-boulder coverage over the main anchorage right side. Local people informed us that the excavated materials were thrown from above (when local people were voluntarily constructing a jeepable road from Piuthan to Rolpa) and covering the main anchorage block. The edge of the road is seen in the front of the photograph. This is obviously an irresponsible and unwarranted act.

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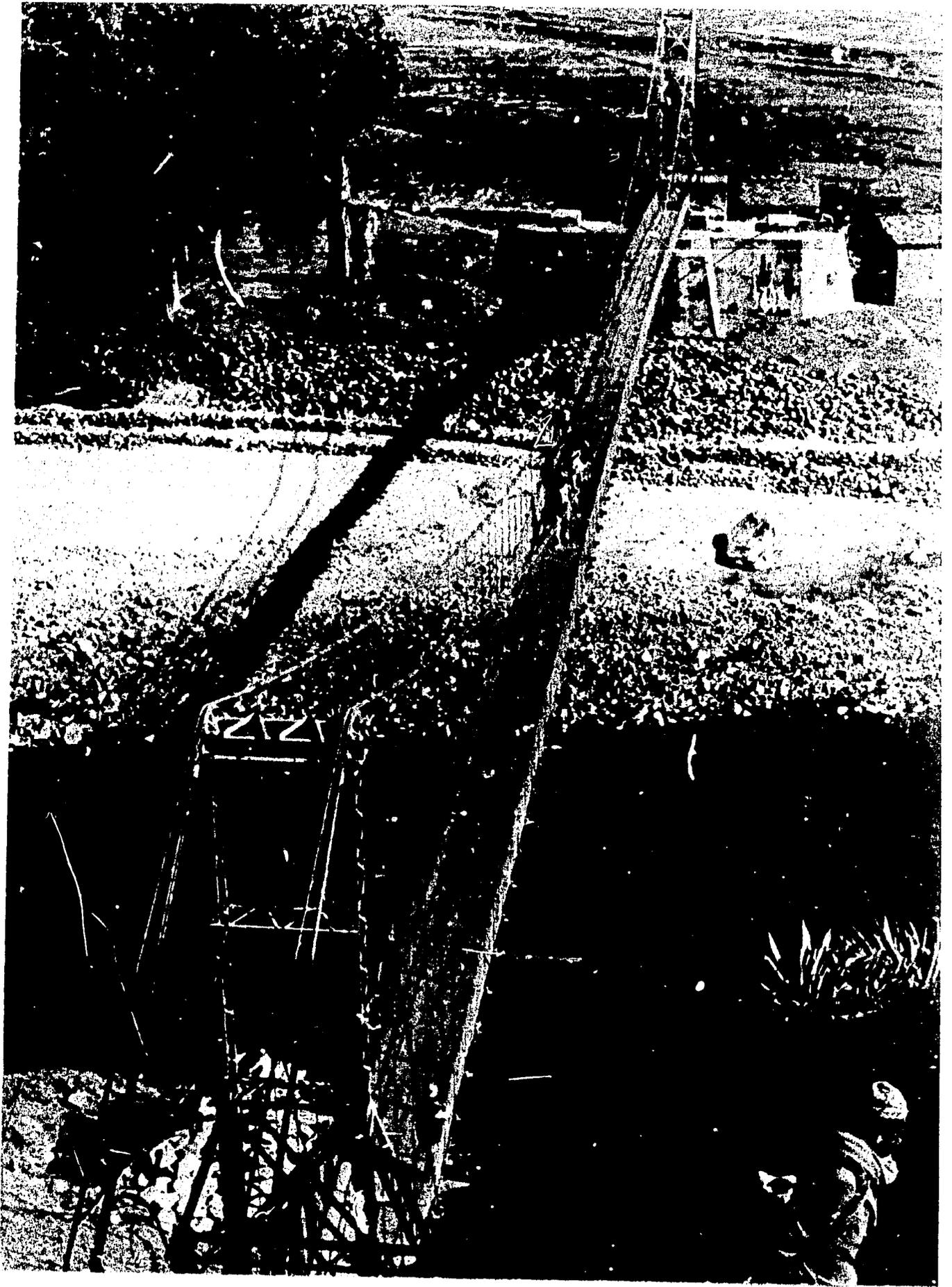
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10. SANFEBAGAR BRIDGE

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10.1.1 AREA DESCRIPTION AND HISTORY-Geographic Setting

Situated in the District of Achham, the Sanfobagar Bridge lies in the Far Western Development Region of Nepal, in the Seti Zone. The Sanfobagar Bridge spans the Buriganga River, an important river in the Achham District. The river originates at the southern side of the Saipal Mountain and flows south through the Bajura District which lies north of the Achham District. This river serves as a boundary line between the Achham and Bajura Districts, and as it flows south it also serves as the border between the Doti and Achham Districts. It merges with the Seti River, one of the main tributaries of the Karnali River, on the west side of Kunti Danda, or Kunti Hill. The major portion of irrigated land lies on the eastern bank of the river and in the basin of Kailash Khola, a tributary of the Buriganga (see Fig 10-F-1). The settlement pattern has concentrated in the river basin areas mainly due to the eradication of malaria.

-Bridge Site Description

The Buriganga is a medium river at the Sanfobagar Bridge site. The Buriganga flows through a broad, low-gradient flood plain for about 1 miles upstream and several miles downstream from the bridge. The river is not fordable during the monsoon, but is fordable in some places during the dry season. Although the fording places may be difficult to ford for the very old or young, such crossings are usually not difficult for most travellers.

About 600 ft. downstream from the bridge, a minor river, the Parpali Gad joins the Buriganga from the right and the Chhipiya Khola, another minor river, joins the Buriganga from the left. Both these streams flow in very wide stream beds at a somewhat steeper gradient than the Buriganga. Both can be forded easily even during the monsoons except during flash floods.

The right bank foundation of the Sarfobagar Bridge is set on solid, medium-angle cliff rock. The left bank foundation of the bridge is on the low-lying flood plain. However, the flood waters have not reached the small cluster of shops near the left bank since the bridge was built. Villagers do say that in the 1930's, flood waters did damage the settlement located on this bank. Upstream there are many fields in the flood plain to the left of the river.

This site is vulnerable since there is a possibility that the river might change its course, flowing behind the left foundation and leaving the bridge spanning a dry river bed. Such a change in the river's course would probably occur about 2/3 of a mile upstream of the bridge site. Even now, there is a branch of the main river which flows along the side of the left bank, threatening the rice fields there. In 1971 unusually high waters flowed behind the left foundation of the bridge and left the foundation on an island for 1 or 2 days.

-Relationship with Regional Transportation System

Achham District, as a whole, seriously lacks transportation facilities. Many important trails run along the main river system of the District. Due to a lack of bridges over the rivers, the trail network is neither convenient nor easy to follow. However the trails to Mangalsain, (the Achham District Headquarters), from Rajapur in the Bardia District; from Choumala and Dhangarhi in the Kailali District; from Martadi (District Headquarters of Bajura); and from Doti and Dandeldhura, are said to be generally safe since a trail improvement program was launched under the Small Area Development Program (SADP) in the area.

The total travel time involved in using any of these trails from the bridge to reach different major locales is given in the following table (10-T-1).

Table 12-T-1 Important Places and Travel Time from the Bridge

Name of Important Places Around the Area	Travel Time in Days on Foot from the Bridge
Mangalsain	1/2
Kailali	4
Rajapur	5/6
Doti	1
Bajura	2
Juzla	7/8
Humla	10/11

The bridge has a particularly important relationship with the area transportation network because of the airstrip at Sanfebagar. There is a weekly flight to Sanfebagar, from Kathmandu via Nepalgunj, Dhangarhi and Mahendranagar. This airstrip, which is about a five-minute walk from the bridge, was constructed in 1966 with voluntary labor. Most of the village panchayats of the District are a day's trek from the airstrip. The airstrip was constructed just prior to the construction of the bridge as a companion program, in order to facilitate the transportation of bridge parts to the site.

-General Cultural Setting

Achham District has in total 54 village panchayats covering an area of 536 square miles.^{1/} The total population of the district is 132,212; 63,623 are males and 68,589 are females.^{2/} The density of population is 246 persons per square mile which is much higher than is usually found in most of the hilly areas of the Far Western Development Region.^{3/} The ethnic groups settled in this District are Brahmans, Thakuris, Chhetris, Matwali Chhetris, Newars and untouchables.

^{1/} Janch Bujh Kendra, Mechi to Mahakali, Vol. 4 p. 840, Department of Information, HMG-Nepal, 1974.

^{2/} Ibid. p. 838

^{3/} The average population density in the Hilly Regions of the Far Western Development Region of Nepal is 118 persons per square mile. Ibid. p. 838.

-Services Available in the Area

The District Headquarters of Achham, are in Mangalsain, located about a five-hour walk southeast of the bridge. Most of the government services available in the District are located there. There is however, another important town, Ririkot in Bayalpata panchayat, a two-hour walk from the bridge. Until recently Ririkot was the Headquarters of the District, and there are still a few government services; the Rasriya Banijya Bank, the District Post Office, and the Forest Office, there, though they now await transfer to the newly designated Headquarters at Mangalsain.

There is also a small nucleus of services available in the immediate vicinity of the bridge. It consists of institutions such as the police office, a few schools, the Food Corporation Depot and the airstrip serviced by RNAC Twin-Otter Aircraft. RNAC maintains a booking office in the small bazaar that has sprung up beside the airstrip since its construction eleven years ago. However, the original bazaar, called Sanje Bazaar, is situated beside the bridge on its right-hand bank. There are over thirty-five shops including a privately-owned drug store.

-Bridge Location History and Decision Process

The people of the area used to construct a temporary wooden bridge during the winter months and supplement this system with a grass ropeway, Tanglo, during the monsoons. These traditional temporary bridges were dangerous and unreliable particularly during the rains, and there was a pressing need to build a consistently safe and permanent bridge.

The yearly rains made communication between relatives difficult. Also, at this time, it was extremely hard for animals to cross the river. The normal procedure for animal crossings during the monsoon was to tie them together with ropes, and haul them to the other bank. This, as can be imagined, was a complicated and cumbersome procedure; usually several animals were swept away. In addition, the primary firewood and fodder collection

areas lie on the right side of the Buriganga, and people living on the left side found the collection of these materials difficult. There is no other place to cross the river within a three-hour walk either upstream or downstream from the present bridge site.

For the people living west of the river, the need to cross the river is compelling. Much of the marketing and employment opportunities exist only in areas south of Achham; Doti, Dandeldhura, Dhangarhi, Mahendranagar, and Tanakpur in India. Sanfobagar, originally a much smaller place with only five shops, has always been a traditional crossing-point and way-station for the people of the District on their journeys south and back.

While the need for a permanent bridge has long been locally recognized, the demands by people of such a remote area frequently go unheeded. The local people were quick to seize the opportunity to speak out when it presented itself in 1956, when His Majesty, the late King Mahendra visited the District. The people of the District, led by local dignitaries, petitioned His Majesty to command a bridge be built in the District. This was quickly granted, but the project did not materialize for some time. However, when the USAID funded package of suspension bridge projects was ready for implementation, this bridge was given priority status. The survey for the construction of the bridge began in 1966, and the bridge itself, completed in 1967.

At the time of the construction of the bridge, the District Headquarters of Achham was in Ririkot. Apparently, one of the main purposes of this bridge, at the time of its construction, was to facilitate safe access to the District Headquarters. It was assumed that the construction of the bridge would be the first of a series of economically stimulating local programs. The bridge would help people to travel to the District Headquarters to buy fertilizers and improved seed, and to take out agricultural loans from the Agricultural Development Bank. Secondly, the bridge would facilitate the buying of consumer goods such as salt, cloth, kerosene and food grains, from the market at Ririkot. Finally, it would help people to sell their home

produced items (such as vegetables) to the numbers of officials which would automatically increase as a result of the influx of a variety of institutions.

Local people stated that prior to the construction of the bridge, many more rice fields were under cultivation on the upstream left bank. As mentioned earlier in the section on Geographic Setting, the left bank is a flood plain and it can be presumed that the gradual erosion, due to typical monsoon flooding, is the source of this problem. The site must have initially appeared safer than it does now. Nevertheless, the vulnerability of the low-lying left bank flood plain must have been noted at the time of site selection. At the bridge itself, however, the site is quite satisfactory. The left bank is of sufficient height and the foundation was raised to give satisfactory free board clearance. In the immediate vicinity of the bridge, the left bank has not suffered any damage from river scour. The main danger is the possibility of a change in the river's course.

There are other feasible sites about a mile upstream, and about 2 miles downstream from the current site. Though these sites are technically superior, they are not as centrally located as the Sanfobagar site. The central location and the traditional use of this crossing point dictated, to a large degree, the final selection of Sanfobagar as the proper site.

10.2

A N A L Y S I S

10.2.1

SOCIO-ANTHROPOLOGICAL ANALYSIS

-Land and People

The bridge is located on the border of two village panchayats, Mastamandu and Sidhoswar. The other three village panchayats, Khaparmandu, Baijmath and Bayalpata, are also linked with the bridge. The average distance of these three panchayats from the bridge site is between one and three miles.

The majority of the population live at an altitude of 3,000 ft. or more. The highest altitude in the settlement area is 5500 ft. The altitude of the Buriganga River near Sanfe Village is about 2,800 ft. Just above the river level, there is primarily, irrigated land, Khet, where paddy, wheat, barley, lentils, mustard and maize are cultivated. Also, at this level, are settlements such as Sanfe and Khalsain, where Chhetris, Thakuris, Brahmins and a few untouchable caste groups live. This settlement area extends up to 3500 ft. After this the first firewood and fodder collection area begins.

The first hill settlement begins at an altitude of about 4,000 ft. There are mostly Brahmins, Chhetris, Thakuris and untouchable caste groups in this settlement which is inhabited upto 5500 ft. The land consists of some Khet as well as some dry land, Pakho, however there is no Khet on the upper slopes. After 5500 feet, the upper firewood and fodder collection area and pasture land area begin. A transect of Sidhoswar panchayat, the primary influence area of study, is presented in Fig. 10-F-2.

There are about 555 households in Mastamandu panchayat, of which the Chhetris comprise 300 households. The other dominant ethnic group in this panchayat is the blacksmith or Kami caste, who have nearly 100 households. The other groups, Brahmins, Damai, Sarki, Giri, Thakuri and Badi

have respectively 80, 50, 13, 10, 1 and 1 households. In Bayalpata there are about 1,198 households, 48% of which are of Chhetris and the untouchable groups (Kami, Damai, Sarki and Badi) 43%. In Khaparrandu, Sidheswar and Baijanath panchayats there are about 625, 655 and 279 households, respectively. In all of these panchayats the Chhetris are in the majority, followed by the untouchable groups.

The Brahmins, Thakuris and Chhetris (locally called Khas) migrated to this area from India after the 10th century A.D. The untouchable groups accompanied the Khas people and resemble them physically. They have maintained the patron-client relationship with the Khas from the beginning of their settlement and still follow the same tradition.

The Newars migrated from Katmandu, Banepa and Bhaktapur, about a century ago.

These ethnic groups are basically farmers. However, some Newars, Thakuris, Chhetris and Brahmins sell clothes, stationery, tea, rice and other grains, and assorted commodities, or Kirana. It is also noteworthy that one or two members from each family go to Bombay to seek low-waged employment as watchmen, Chowkidar, etc. Not only is some cash income earned through such foreign employment, but the social status of the worker and his family are enhanced.

According to the 1971 CBS census 99% of population of Achham District speaks Nepali. However, the local dialect differs greatly from the official Nepalese language prevalent in Kathmandu. Though there are a few Newars, the Newari language is virtually nonexistent. One also barely notices the linguistic influence of the permanent population Indo-Mongoloid living in this District.

The people of this District are Hindu, however, the Hindu Vedic rites are not observed exactly as tradition dictates. Animal sacrifice is

very common during many socio-religious festivals. Masto, Malika and Bardadevi are the most commonly worshipped deities and are usually prayed to when there are difficulties, or simply for the general prosperity and happiness of the family. These deities are also sometimes worshipped collectively by the whole community, during a festival. The other deities worshipped in the area are Shiva, Baijanath, Sidheswar and Bhagwati.

The biggest festival and fair, Ram, is the fair of Bardadevi. This festival is celebrated on the day of the full moon in October or November. The people vow that if their wishes are fulfilled or troubles are alleviated, they will offer an animal sacrifice, particularly a buffalo, to the goddess. If their wishes are fulfilled, they leave buffaloes in the open field near the temple of Bardadevi. The buffaloes are then slaughtered with a sword or a curved knife, Khukuri.

It is interesting to note that, in this area, each full and new moon is marked by a fair or a festival. On these days the young boys and girls who are not consanguineal relatives, Chotta and Chotti, sing songs and dance the Doudya, throughout the night. Although the caste system is rigid and orthodox and does not allow such free mixing of different caste groups, during Ram, high caste groups mix freely with low caste groups.

Few intercaste marriages are observed, or accepted by the community. Because of the migration of lower-caste male workers to India, often the lower caste women are left without husbands for lengthy periods. Re-marriages with these still-married women are very common in this District. However, most of these re-marriages are illegal.

-Structure of the Family

The average family size in the study area is 5 to 7 persons. The Brahmins, Thakuris and Chhotris (Khas) of this District have the tendency to live in a joint family structure. Almost all untouchable caste groups

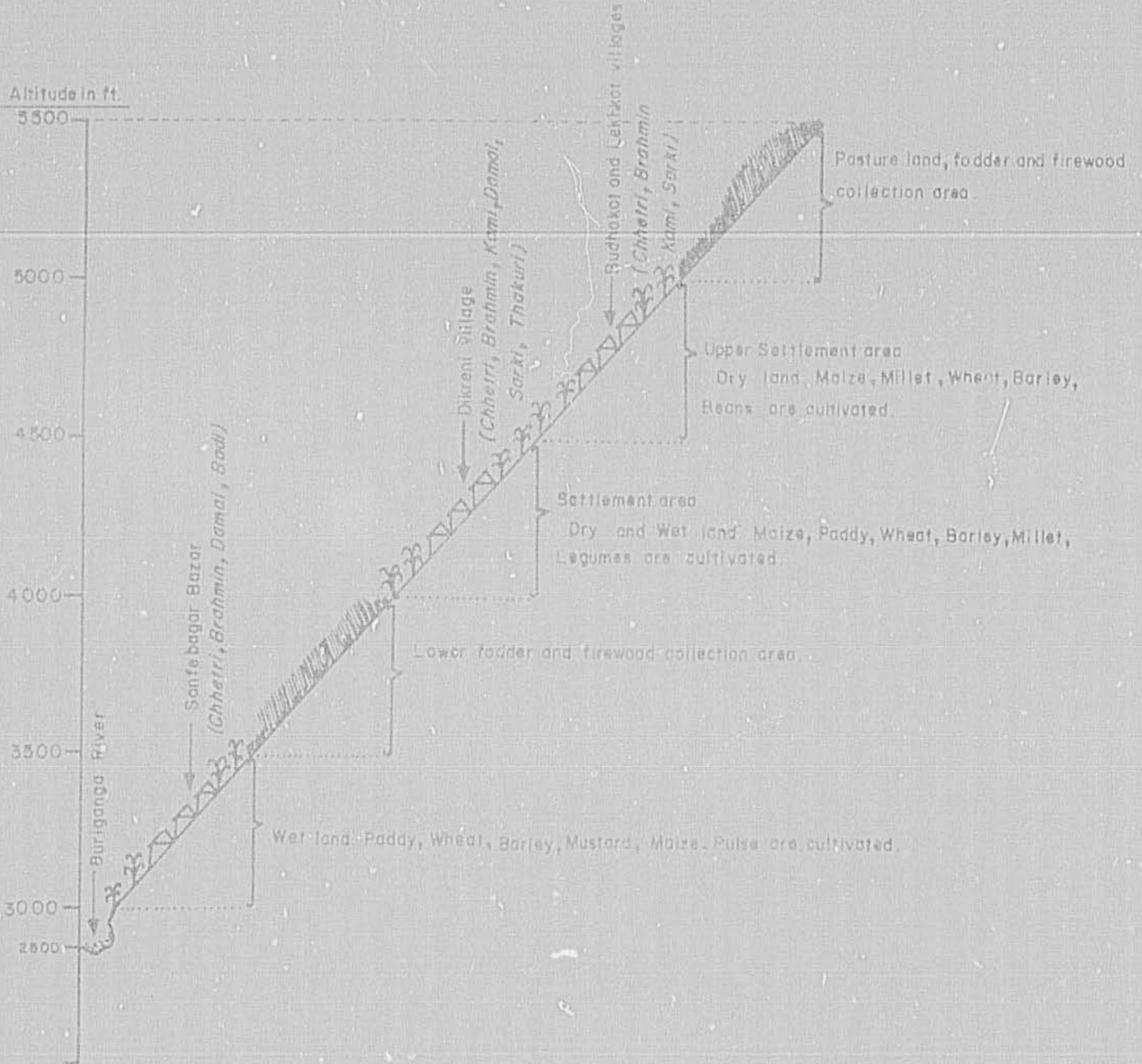


Fig. 10-F-2 Siddheswar Transect (Schematic)

Source: ECE Field Survey

maintain basically a nuclear-family pattern. The families who maintain a joint family system hold more land and also keep a larger number of livestock. In addition, they have a surplus working male population. Many of these men go to India to earn money to support their families who remain in Nepal. Thus, the economic condition of the Thakuris, Chhetris and Brahmin families is better than that of other groups living in this District. These people also are involved in business at different market places of the area.

Like Bhingri and Malumela Bridges, the Sanfobagar Bridge has also not contributed to the splitting of the traditional joint family system; not a single family from the traditional joint family structure, has broken down and settled to the other side of the river since the construction of the bridge. Nor has the construction of the bridge generated any interest in the reunion of already separated families. These two situations may also be due to the contemporary lack of land available for settlement.

Of 50 respondents interviewed, 35 said that their consanguineal relatives live on both sides of the bridge and that they comprise more than 200 households. These relatives, who are patrilineally descended from the same male, were separated more than a generation ago. Today, these descendants have formed separate families living permanently on either side of the bridge. However, since the construction of the bridge, communication among members of these families have increased; they can now visit their relatives at any time of the year. Today among these families an increase in mutual help and cooperation can be observed. Previously, the Buriganga River was a potential barrier, preventing these people from communicating with each other, especially during the rainy season. The women of these separated family groups have particularly benefitted. Now they are able to participate in any socio-religious events which takes place on either side of the bridge. And now, they are able to cross the river to simply socialize as well as sharing the sorrow and happiness of their consanguineal families.

- Marriage Practices

Marriages usually take place during the dry season (December-May) for the Hindus of the area, excepting only the Nepalese month of Poush (Dec.-Jan.) and Chaitra (March-April). The Burliganga River is fordable during these dry months and marriages across the river can take place without much difficulty.

Local people do claim that the bridge has made possible an increasing number of cross-river marriages. All 50 respondents said that before the construction of the bridge, they did not like arranging a daughter's or sister's marriage with a man who lived on the other side of the river and that these marriages were not arranged willingly. When the respondents were asked about the increased number of marriages per year, informants could not give an exact estimate; estimates varied from a 20% to 50% yearly increase. In the course of the study, it became clear that since the building of the bridge, the numbers of cross-river marriages had not increased significantly, though the unwillingness mentioned had decreased.

44 respondents out of a sample of 50 replied that they have affinal relatives on either side of the river. Their affinal relatives comprise more than 400 households. This means that marriages were taking place on either side of the river before the erection of the bridge. However, from conversations, it is evident that cross-river marriages have increased in recent years.

- Funeral Practices

The construction of the Sanjehagar Bridge has not changed the traditional funeral rites. When the question was asked of 50 respondents, whether the bridge has changed their burial and funeral rituals, the response was as follows:

Table 10-T-2: Percentage of Respondents Indicating a Helpful Change in Funeral Rites since the Construction of the Bridge

Activities	Affirmative Responses
Cremation area	0%
Buying shrouds, <u>Katro</u> , etc.	60%
Collection of firewood	18%
Others (assembling of relatives at the burial place etc.)	40%

Source: BCE Field Survey

In this area, during the funeral procession, it is customary for all of the neighbours, Malami, to bring at least one piece of firewood from their homes. It is considered an act of spiritual merit to extend assistance and sympathy to the relatives of the deceased. The dead body is carried in procession to the cremation grounds accompanied by music and gunfire.

During the rainy season, before the construction of the bridge, it was difficult for the people to assemble when a relative died on the other side of the river. It was not at all possible for women, the elderly or young people to assemble quickly. Today, if anyone dies on either side of the river, all of his or her relatives including the very old and very young can participate in the funeral.

- Education and Health Practices

There are one or two primary schools and one middle school in every panchayat in the study, except in Bayalpata, where there is a high school. Except for one or two middle schools, which were originally primary schools, these educational facilities existed prior to the construction of the bridge. There was a problem for the people living in the western and northern areas, however. They were unable to send their children to the

high school located on the left side of the river. Up until 1975, the only high school in Achham District was at Bayalpata, but in 1975 another high school was opened in Mangalsain. Students from Sidhevar, Baijanath, Ghungarkot, Pabla and Khaparmandu panchayats, all located to the right side of the Buriganga River can now attend the high school in Bayalpata because the bridge provided them with an easy and safe access to Bayalpata. Though many of these students board at the school until their winter vacation starts, their freedom of movement from school to home, and back has largely been made possible by the bridge.

There is no health post in the immediate vicinity of the Sanfobagar Bridge. There is one in Khaparmandu (Shrikot) an hour's walk from the bridge. There is also one health center and hospital in Mangalsain a four or five-hour walk from the Sanfobagar Bridge. Recently the people of Sanfo made a serious effort to have a health center built in the Sanfobagar Bridge area, but they were unsuccessful, and the center was constructed at Mangalsain. Other health posts, which opened after the construction of the Sanfobagar Bridge, (in Netakot, Jayagadha and Mellekh) are located far from the bridge. However, with the bridge at Sanfobagar, people now have access to the health post in Shrikot and to the health center at Mangalsain. The medical skills offered by these two services can handle both medium and minor health problems. A small drug store was opened on the right side of the river after the construction of the bridge. The bridge has made possible a potentially continuous supply of pharmaceutical goods and also facilitated the movement of health workers to either side of the river.

Because of their exposure to the western medical facilities while working in India, most people of the area are conscious and aware of the benefits of western medicines, and 92% of respondents stated that the Sanfobagar Bridge has facilitated access to the modern health facilities.

- Festivals, Fairs and Religious Activities

Because the bridge provides easier access to the places of fairs, festivals and religious activities people now assemble in larger numbers. All informants said that previously it was difficult for them to attend these gatherings because of the danger involved in crossing the Duriganga River especially during the monsoon, and women and children were rarely able to participate. The Sansebagar Bridge has also increased the number of devotees worshipping at the local village shrines and temples.

- Changes in the Roles of Women

The women of Achham District usually wear a sari and blouse or Cholo. They also cover their heads with a white shawl locally called Mamyato and wear a long, plain cloth tied on the shoulder which falls to the knee, a Gado. The Achham females talk freely with males and even with outsiders. This is notable since in many other parts of Nepal, the women are much more reserved in their relations with those outside their families. In the Achham District, women traders can be seen, selling fruits, green vegetables or tea in the market areas. Below we have categorised the general activities of the women in the study area and attempted to assess how these activities have changed since the construction of the bridge. For this purpose sixteen women of the study area were interviewed and the results are tabulated below:

Table 10-T-3: Percentage of Female Responses Indicating an Increase in Women's Activities Because of the Bridge

Activities	Affirmative Responses
Extension of ritual friendship	81%
Communal dances, etc.	31%
Marriages, festivals, fairs, and religious activities	100%
Domestic work and agriculture	50%
Portering	0%
Others (marketing, etc.)	25%

Source: ECE Field Survey

The above result show that the maximum increased usage of the bridge has been made by women during marriages, festivals, fairs or religious activities. Since the construction of the bridge they can now participate in all festivals and fairs even if they are celebrated during the rainy season. The ritual friendships, Balsori Mitori, have increased due to the increased mobility of women on either side of the river. The women from the eastern and southern areas of the river now have access to different firewood and fodder collection areas and they can also easily get to either side of the river to work the land. The women can now sell their surplus produce and domestic products at the weekly market, the Hait Bazaar, near the Sanfobagar airfield where many people, most of them women gather to take a look at the aircraft. To summarize, the productivity of the women has increased since the erection of the bridge.

We asked about the time-saving resulting from bridge use. Nearly all women responded positively. This is interesting when compared with the Malumola Bridge area, where only 44% women responded positively. The women of Sanfobagar area, when asked about how they utilize the time-savings, replied as follows:

Table 10-T-4: Percentages of Female Responses on the Utilization of Surplus Time Saved Due to the Presence of the Bridge

Activities	Affirmative Responses
Taking more care of the children	81%
Working on the farms	100%
Cooking better food	68%
Resting	0%
Socializing with other women	81%
Recreation	0%
Collection of firewood and fodder	100%
Grazing cattle	81%

Source: ECE Field Survey

- Changes in Beliefs and Habits

The Sanfobagar Bridge has not affected the traditional language pattern of the area. However, 84% of informants pointed out that after the construction of the bridge more government servants have come to the area who encourage them to speak the official Nepalese language prevalent in Kathmandu rather than the local dialects. This process is particularly beneficial for developing a lingua franca.

90% of the informants pointed out that the construction of the bridge has partly helped to develop business activities in the area. Several new cloth shops have been opened providing a wider selection of fabric. A few tailoring shops have recently been opened in Sanfobagar. These two factors, when combined with an increased traffic volume have introduced new clothing styles to the area.

The bridge has facilitated the importation of certain consumer goods not available locally such as tea, spices, green vegetables and rice. Several new teashops have opened and they not only serve the local people, but also provide meals for travellers. Another recent addition to the community is the new government-authorized liquor shop.

In general, in the vicinity of the bridge, there are better communications, a potentially improved health standard, and a comparable boom in commercial establishments. A Drinking Water Project is also going to be introduced to the area under the SADP program in the near future.

10.2.2 INSTITUTIONAL ANALYSIS

- Local Participation

When the construction of the bridge was undertaken, it was carried out as a full-scale Government Project. However, whoever worked on the bridge contributed his first day's labor free as a gesture of local support. Beyond this, the workers were paid on a daily basis.

Most of the construction materials like cement, blasting material, etc. were transported by porters from Mahendranagar in the south west. The bridge parts such as cables were planned to be transported by a Royal Nepal Army aircraft. Thus, the construction of the STOL airstrip in Sauranagar was a prerequisite for the construction of the bridge. As the construction of the bridge proceeded, the need for quickly completing the airstrip was felt by both the District level and Kathmandu authorities. Starting in the early stages of construction, the Achham District Panchayat had been assisting the construction crew by looking for porters for transporting cement, etc. Now, it summoned the eight panchayats surrounding the airstrip site at Sauranagar and requested that an able-bodied person from each household should volunteer his or her labor. This proposal was accepted and the remaining levelling work on the airstrip finished quickly. The bridge parts were successfully transported by air, and transportation costs were held to a minimum.

The responsibility of repairs and maintenance is rather divided. In 1970 the District Panchayat of Achham decided to levy a bridge toll, and a contractor from Mastanadu village panchayat, an adjoining panchayat to the east, was employed to collect toll and pay a fixed sum of Rs. 300/- per year to the District Panchayat. However, squabbles ensued and the toll was discontinued for two years, only to be resumed in 1974. This time, another contractor offered Rs. 405/- per year which he voluntarily increased to Rs. 415/- the following year. In the third year 1978, there was a rival bidder and the bid was decided in favor of the incumbent at a bid of Rs. 555/-. This was later increased to Rs. 600/- per year.

While the toll provides only a small income for the District Panchayat as well as for the contractor, the latter's profit is about Rs. 200/- per year. This is because his income as toll collector only supplements his income from a store he runs in the vicinity of the bridge. He also acts as the caretaker of the bridge. This involves sending reports to the District Panchayat concerning any necessary repairs.

Major repairs are undertaken by the Central Government, and in 1974, the SBD deputed an engineer to build river training works at a reported expense of Rs. 60,000/-. This included the cost of fourteen planks which were changed on the walkway of the bridge. While there was much debate as to whether the money was properly spent, there exists no question in the minds of the local people and the panchayats that much of the major repair work should be the responsibility of the Central Government.

- Institutional Impact of the Bridge

In the Soti Zone, the Sanfobagar market is fairly important. It attracts not only customers from the panchayats in the surrounding area but also from distant places of the District of Bajura to the north. The construction of both the airfield and the bridge contributed to this. While the growth of the small bazaar to the east of the airstrip is due to the existence of the airstrip and the regular RNAC flights, the Sanfobagar market has grown up as a result of the increased traffic from the bridge and the airstrip. The Sanfobagar market originally had only five small stores, but now it has over 35 stores. Much of this development took place after 1965 when it became certain that a bridge would be built in the area. The influx of offices to the area (the Police Office, Airlines Office, Food Corporation Dept., etc.) was due more to the facilities of the airstrip than those of the bridge.

10.2.3 ECONOMIC ANALYSIS

- Geographic Area and Population Served

The bridge, by virtue of its being located on the main trail, services a fairly wide geographic area and many population settlements. A number of panchayats lying along the Dhangarhi-Humla axis are presently being served by the bridge. The bridge has an effective locational relationship with the area trail systems because it is centrally located. Apart from

the many neighboring villages in Achham District, in the vicinity of the bridge site, the bridge directly serves such villages as; Siddheswar, Baijnath, Mastamandu, Bayalpata and Rajapur of Achham District, and some villages of the Bardiya, Baitadi, Bajura, Doti and Kanchanpur Districts. Judging from the direction and magnitude of traffic flow over the bridge, it can be stated that the service area of the bridge is immense.

- Estimated Traffic Flow

According to the local people, the traffic flow in both seasons dry and wet ranged from 500 to 600 persons per day on an average. The traffic is fairly high due to the fact that the bridge links the District Headquarters to the other parts of the District.

The traffic flow was observed for five days at the bridge side. The total traffic for porter averaged 662 and non-porter 9 per day and the draft animal traffic averaged 345 (Table 10-T-5). The stated purpose of travel breaks down to 42% for social activities, 34% for buying, 6% for service, 16% for employment and 2% for selling (Table 10-T-6).

Table 10-T-5: Traffic Counts Across the Bridge

Days	Non-porter	Porter	Draft Animal
First	778	6	1
Second	605	11	953
Third	492	5	111
Fourth	530	2	144
Fifth	904	19	514
Average/day	662	9	345

Source: ECE Field Survey (Dry Season)

Table 10-T-6: Percentage Traffic Indicating Origin, Destination and Purpose of Travel in the Study Areas

Places of Origin and Destination Purpose of Travel	Sideshwar in Achham District		Baijanath in Achham District		Mastmaudu in Achham District		Bayalpata in Achham District		Rest of Achham District		Rajapur in Bardiya District		Bajura		Doti		Mahendranagar in Kanchenpur District		Jhulaghat in Baitadi District		Bombay (India)		Total			
	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D
Buying	10	4	-	2	8	12	8	4	8	10	-	-	-	2	-	-	-	-	-	-	-	-	-	-	34%	34%
Selling	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2%	2%
Seeking employment	6	2	2	-	4	4	4	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	6	-	16%	16%
Social	4	6	-	4	10	8	4	6	20	10	2	-	2	4	-	2	-	2	-	-	-	-	-	-	42%	42%
Service	-	-	-	-	2	-	-	2	2	-	-	-	-	4	2	-	-	-	-	-	-	-	-	-	6%	6%
Total	20	12	2	6	24	26	16	14	30	22	2	-	2	10	2	2	-	2	2	-	-	-	6	-	100%	100%

Source: ECE Field Survey

Out of the total flow, 12% of the travellers were destined to Sidheswar panchayat, 6% to Baijanath, 26% to Mastandu, 14% to Bayalpatha, 22% to other parts of Achham, 10% to Bajura, 2% to Doti, 2% to Mahendranagar and 6% to the Indian city of Bombay.

The origin of journeys, in percentages, are as follows: 20% of total traffic originated from Sidheswar panchayat, 2% from Baijanath, 24% from Mastandu, 16% from Bayalpatha, 30% from the rest of Achham and 2% each from Rajapur, Bajura, Doti and Jhulaghat.

- Agriculture:

The study areas are limited to the six panchayats irrigated by the Buriganga River and Kailash Khola. The six panchayats include, Khaparmandu, Bayalpatha, Baijanath, Mastandu, Mangalsain and Waligaun. The S.A.D.P. survey^{4/} reported that the total population of these panchayats is 29,005, or 15% of the total District population. These panchayats are fairly representative of the whole district.

Agriculture is the main source of livelihood in the area, but there is only subsistence farming. Farmable land is very limited due to the very rugged topographical condition of the area. The agricultural production of the area is not able to meet the requirement of the people.

It is probably due to the poor economic state of the area that a scheme under the S.A.D.P. has been launched. The objectives being to increase production, employment, infrastructural facilities and social services in the area.

Mangalsain, Waligaun, Bayalpatha, Mastandu, Khaparmandu, Baijanath village panchayats have been chosen for a package program under

^{4/} Small Area Development Program Survey Report of Bajura, Achham and Taplejung. Local Development Department, Pulchowk, Kathmandu 1977.

the SADP. The performance of SADP has been well-received by the local people of these panchayats, since they have produced some tangible results. In the six panchayats, 22 irrigation projects are currently being planned and/or built and will be completed by the end of the current year. After completion, these projects will undoubtedly stimulate significant changes in the agricultural pattern of the surrounding areas.

Since the area suffers from a serious food shortage, a substantial amount of food grains are imported from the Terai district. Paddy, maize, wheat and millet are the main crops grown in the area. Paddy and wheat are cultivated in the wet lowlands or Khet and maize and millet are cultivated in the dry uplands or Pakht. The method of cultivation is very primitive. In agriculture, a reciprocal labor system called Paras is a common agricultural practice. The rural farmers traditionally use cowdung as fertilizer, but under the SADP program, people are now beginning to use chemical pesticides, fertilizers, compost manure and improved varieties of seed. The farmers of Mangalsain and Mastamandu reported that they have recently started application of fertilizer and improved varieties of seed.

The area is also noted for its horticulture, and the environment is suitable for fruit-farming. Mangalsain panchayat is famous for its oranges; Bayalpata and Waligaun panchayats are for their mangoes. Unfortunately, due to the absence of a good transport system, the cultivation of fruits and the marketing of this produce has not gained much momentum.

While most of the positive changes in the agricultural pattern can be attributable to the SADP program, the bridge has also played a significant role in promoting changes in farming methods by providing safe and easy access for the purchase of fertilizers, pesticides, improved seed and access to the Agricultural Development Bank. Also the people can now sell their surplus produce at the various neighboring bazaars, which they were not able to do prior to the construction of the bridge.

- Rural and Cottage Industries

The bridge as such, has had a negligible effect on the rural and cottage industries. Though they are considered one of the secondary sources of income in the area, they are confined to the production of bamboo goods, basketry wooden pots and other vessels. People also are dependent on animal husbandry which enable them to produce ghee, wool and hides. These products are normally exported either to the Terai area or to India.

Local people said there used to be a cotton weaving industry of a sizable nature but this activity has been totally abandoned. Some households particularly in Mangalsain and Waligaun still own handlooms and possess the required skill and knowledge to weave cotton cloth.

- Labor Force Situation and Employment

The total population of the six panchayats under study is estimated to be 25,003 of which 11,444 (46%) are males and 13,559 (54%) are females. The percentage of females is higher due to the males' short-term migration in the area and is the result of the very poor economic condition created by the minimal amount of land suitable for cultivation.

The economically active population (10 years of age or older) is estimated to be 11,501; of which 7,089 are the males and 4,412 are females (See Table 10-T-7).

Besides agriculture, people are involved in secondary occupations such as animal husbandry, business, tailoring, salt-trade, black-smithing, portering and service occupations.

According to the local people, the seasonal migration is fairly high in these areas. At least one member of every household migrates to India to seek employment as a manual worker. They are employed as porters, watchmen, etc. The main labor market center for the people of Achham is in

Table 10-T-7: Estimated Population and Labor Force

Village Panchayat	Total Population (1977)	Male	Female	Population 10 years and above			Economically Active ^{5/}		
				Total	Male	Female	Total	Male	Female
Khaparmandu	3,259	1,552	1,707	2,340	1,117	1,223	1,499	751	548
Bayalpatha	5,748	2,538	3,210	4,139	1,827	2,312	2,644	1,538	1,056
Jaijanath	3,656	1,743	1,913	2,632	1,255	1,377	1,662	1,067	615
Mastamandu	5,381	1,737	2,144	2,795	1,251	1,544	1,785	1,083	702
Mangalsain	5,572	2,581	2,991	4,012	1,858	2,154	2,565	1,594	696
Waligaun	2,887	1,293	1,594	2,079	931	1,148	1,328	806	522
Total	25,003	11,444	13,559	18,003	8,239	9,764	11,501	7,089	4,412

Source: ECE Estimate based on 1971 CBS Census

^{5/} The economically active population can be defined as the number of persons in the age group 10 years and above who are engaged in activities contributing to the production of goods and services.

India, particularly Bombay. Though the short-term migration is high the permanent migration from the area is negligible.

- Trade Flow Patterns

The flow of goods has been noted on the basis of actual commodities carried across the bridge during the field observation. The major export items were Grew, black pulse or Mas, and locally made cloth, Bhangra. The main commodity inflow consists of food grains, cloth, salt and edible oils.

The bridge has been instrumental in opening up the trade sector. The flow of trade goes uninterrupted throughout the year. Indeed, one of the important benefits of the bridge that has occurred to the people within the service area is related to trade relationships with the rest of the areas. The bridge has been particularly helpful in importing foodgrains which are not adequately grown in the area vis-a-vis the local requirements.

- Environmental Effects

In general the impact on the environment can be related to activities associated with the preservation or destruction of the local natural resources. In the villages close to the bridge, the indiscriminate felling of trees has reached tremendous proportions. This is because of the numbers of settlements which have expanded as a result of the facilities now available in the area. The rapid growth of these settlements, therefore, has inevitably led to the indiscriminate destruction of the forest resources. There is no afforestation program in the area and only recently has the SADE given new emphasis to the afforestation program.

10.2.4 ENGINEERING ANALYSIS

- Site Selection, Design and Construction Methods

Technically more desirable sites upstream and downstream were deemed less suitable when considering the existing trail system. Site selection at Sanfobagar was dictated more by its central location, than by purely technical reasons. The sanfobagar site is more vulnerable to a change of river course than the other possible sites. The possibility of this course change and the magnitude of protective works that might be required to prevent it were probably underestimated at the time of the site selection.

There is evidence that the Sanfobagar site has been deteriorating over the years. It was said that about 50 years ago the Buriganga was bridged at Sanfobagar by a log of 12 ft. long. An upstream landslide created disturbances resulting in the widening of the area between the banks. Even at the time of bridge construction, there were considerably more fields on the upstream left bank serving as protection against a possible change of river course. The flood in 1971 that flowed behind the left foundation and left it an island for 1 or 2 days, also did considerable damage to the left bank rice fields. Fortunately the gradient of the river at Sanfobagar is relatively small otherwise the problem of river scour upstream would be worse than it is.

The Sanfobagar Bridge is of BRC standard design for a 260 ft. span. A special feature of this bridge is the massive left bank foundation similar to the foundation of the bridge at Pachuarhat, also included in this study. The foundation was carried down to an ample depth of about 10 ft. and is placed at a safe distance from the river bank. There is a large tree just upstream from the bridge that provides some protection for the left foundation (see front photo). The left bank is further protected by stones that were piled along the bank, approximately at high water level,

at time of construction. There is no damage from river scour to this protective stone work. The span length of Sanfobagar Bridge is well suited to the site.

Construction of the bridge started in 1966-67 and was completed within a year. The bridge was inaugurated in March of 1968.

Mr. Hari Prasad Sharma from the SBD was in-charge of the construction team. He was assisted by Peter Coyne, a PCV, who was said to be an excellent field worker. Several other skilled workers came from Kathmandu, but all other workers, including those for concrete work and carpentry, were local persons. Local skilled workers were said to have done an excellent work.

Construction of a STOL air field was completed at about the same time construction of the bridge began. The landing field was built largely through voluntary labor. Some cement and all other bridge construction materials, including cables, were transported to the Sanfobagar airstrip, by a Royal Nepal Army aircraft, within 3 days. Most of the cement was transported by mules from Mahendranagar in the Toral, a journey of 5 or 6 days.

The construction work was done on a daily wage basis. It was said that whoever worked on the bridge gave his first day of labor free as a token of local goodwill. Otherwise no free labor was given, nor was it asked for.

Concrete mixing was done by hand, as were the drilling of blast holes. Cable pulling was facilitated by the use of a small chain pulley, which could pull only a short length before needing to be reset, rather than a Tirfor pulling machine, which is more suitable for cables.

Setting of sag in the road-ropes before the hanging of the suspenders was complicated by the fact that the cable did not hang free between the road-rope anchors but partially rested on the ground between the anchor points. To hang the suspenders, the middle suspender pair was attached first. Then, because it was not feasible to pass construction materials up to workmen on the middle of the bridge over the river, the suspender hanging proceeded from one side, working towards the middle. After reaching the middle suspender, the hanging was continued from the middle until the second side was reached. Mr. H. F. Sharma said that using this procedure it was more difficult to get residual slack out of the road-ropes than if the suspender hanging had started from the midpoint and proceeded towards both sides simultaneously. Slack road-ropes are one major cause of bridge sway.

-Present Bridge and Approach Trails: Condition and Recommended Improvements

Bridge Name: SANFEBAGAR	Zone SETI	District: ACHHAM	Village Panchayats: Left: MASTAMANDU Right: SIDHYASWARI
SPAN	260 ft.		
TYPE	Suspension		
MAP 1"=1 mile	62-G/3,4,7,8		
COORDINATES	29°14'15" 81°12'49"		
TRAIL	Bajura and Doti to Achham		
TRAIL TYPE	Class A		
RIVER	Buriganga		
RIVER TYPE	Medium		
COMPLETION YEAR	1967		

Refer to
Photographs No.

The present condition of the bridge is good to fair. This is excluding the condition of the planking, which is in fair to poor condition.

All bridge parts including cables are galvanized so there is almost no rusting. Galvanizing is in good condition except in a very few spots.

Loose or missing nuts and bolts, though not a general problem on the Sanfebagar Bridge, should be tightened or replaced in several places. For example, one suspender has become disconnected from the road rope due to missing nuts. Also one **connector** of a suspender to the main cable has lost one of its

10-P-5

10-P-4

Refer to
Photograph No. 1

two nuts and the other one is finger tight only. There is a contractor at the bridge site who collects toll on animals crossing the bridge, but he has no tools on site for making these minor repairs. Providing bridge contractors throughout the Kingdom with a minimum amount of tools and requiring them by law to keep nuts and bolts tight as well as performing other minor maintenance work would be a step towards keeping the bridges in good condition.

Soil and rocks have covered the main cables and auxiliary backstay cables, as well as the connectors on the right anchorage and the base of the right tower as far up as the level of the hinge pin. Dirt should be kept off the metal bridge parts, even though they are galvanized.

10-P-6

Bulldog grips should be added to the main cables at the left anchor in order to bring the number up to specifications. There are at present only 3 or 4 grips on each $\frac{1}{4}$ in. main cable at the left anchor. Specifications^{6/} call for 6 grips.

10-P-7

The upstream left bank protective gabion works that were damaged during last monsoon should be repaired. These works are further discussed in the section of this report on past maintenance.

10-P-1

10-P-2

The old wood planking of the bridge needs replacing and/or repair. Except for a few planks, the bridge planks are original. In many spots plank edges have rotted so that the gap between adjoining planks is unacceptably

10-P-3

^{6/} Tiroler Brand Wire Rope Handbook US Steel, USA, 1973 p.76.

Refer to
Photograph No.

large. Skilled carpenters are required to make a good walkway, the existing, neatly laid-out planking done by the local carpenters is evidence that the necessary skill is locally available. Wood should be conserved by reusing the old planks as far as possible. Some of the nuts and coach bolts fastening the planks to the cross-beams are missing and should be replaced. Often the nuts and bolts have come loose and the ends are not securely fastened down.

Local people feel the bridge is a good solid engineering structure. However, there were complaints about bridge sway and, in fact, the sway is sometimes enough for the people crossing, to stop momentarily or grasp the handcable for support. The sway was not as bad when the bridge was first constructed. Undoubtedly the loosening of planking bolts due to rotting planks is largely responsible for the increased sway. However, tight road ropes and wind cables are primarily important for controlling bridge sway. The road ropes are not as tight as they should be and an attempt to tighten them at the time of planking repair would be desirable. To tighten the road ropes it would be necessary to open the bulldog grips, shorten the road ropes and refix the grips. Refixing the grips may be difficult because of the bend in the ropes at the thimble where the ropes are presently fixed.

10-P-3

Approach trails are in as good condition as could be expected considering the surrounding terrain.

Refer to
Photograph No.

In the immediate vicinity of the bridge, on the left side, the approach trail is merely a track on the sandy, flat flood plain. On the right side the approach trail leads directly up into the bazaar and is in good to fair condition. Going east, towards the District Headquarters, from the left side of the bridge, the trail must cross the Chhipiya Khola at about a 5-minute walk from the bridge. This stream flows in a broad, medium gradient flood plain and sometimes stops traffic during monsoon. The trail's condition is good after crossing this stream. Heading west from the right side of the bridge toward Doti, the Parpali Gad must be crossed, again a 5-minute walk from the bridge. This stream likewise flows in a broad, medium gradient flood plain and can also stop traffic during monsoon. On the right side of the bridge, upstream along the Buriganga, is the main trail to Bajura, which is in fair to good condition now, and is currently being improved under a SADB program at a cost of Rs. 160,000/- with no free labor involved. This cost is exclusive of bridges planned or under construction at Jiteri Gad and Ikadi Khola.

10-P-9

- Past Maintenance Work

Major: Within the last two or three years, the SBD has built several protective works for the left bank. They are located about 1500 to 1800 ft. upstream from the bridge (see photo 10-P-1). The first maintenance work, about 2 to 3 years ago, consisted of a retaining wall made of piled stones and the most recent one during the last monsoon was of gabion works. The gabion works were built under the supervision of Mr. Mohan Ratna Tamrakar of the SBD. The work was done under contract. Even at the time of field visit for this study during the dry season, there was a flow of water along part of the gabion works and they were badly damaged at one place; the result of one monsoon season of river scour. The left bank of the Buriganga must be protected to prevent the river from changing its course. If the main flow of the river were to shift left towards the gabions, then much more damage to the left bank could be expected in the future. Periodic attention to upstream protective works at Sanfobagar will be required in the future. The worst possible result of failure to control river scour would be a change in the course of the river leaving the bridge spanning dry land.

Piled stones and gabion protective works have been attempted on the Chhipiya Khola in order to prevent damage to the airstrip. These works have also suffered damage during the monsoon. The Chhipiya Khola joins the Buriganga downstream from Sanfobagar Bridge and therefore does not affect the bridge.

Minor: Last year some planks were changed on the bridge at the same time the gabion works were built along the Buriganga. Otherwise no other maintenance has ever been done on this bridge.

To initiate the gabion works and plank repair the bridge contractor made a report to the District and the District made a report to the SBD, which in turn deputed personnel. Speed of response to the original report from the

contractor was good. No free labor was involved in either the gabion works or plank repair.

The toll contractor feels it is his responsibility to make a report to the District requiring maintenance, but he does not feel responsible himself for such minor maintenance as the tightening of loose nuts and bolts or occasional plank repair.

10.3

FINDINGS

SOCIO-ANTHROPOLOGICAL

- Like the Bhingri and Malunola bridges, the Sanfobagar bridge has had an effect on the social life of the villagers. After the construction of the bridge, family communication and marriages on either side of the river have been largely facilitated or increased. A greater number of people can now participate in marriages, festivals and fairs in the area. Women can participate in any of the socio-religious occasions which take place on both sides of the river with greater ease. The students from the western and northern side of the Buriganga River can now attend the high school located in Bayalpata. Furthermore, it has been easy to launch family planning program and the SADP program in the immediate vicinity of the bridge.
- The Sanfobagar bridge has contributed to the social welfare of the local people. It has been instrumental in the saving of lives and the easing of travel difficulties.

INSTITUTIONAL

- While the need for a bridge at the present site had long been recognized by the local people, it was not until the visit by His late Majesty, King Mahendra, that the people could receive any redress on their grievance. A petition to His Majesty immediately put the bridge in the priority list and made it one of a small package of thirteen bridges funded by USAID.
- The institution of a contracted toll collector/watchman by the District Panchayat has demonstrated that bridges can generate enough income to sustain the continued upkeep and maintenance of a bridge. Secondly, the panchayat and its on-site personnel have acted indirectly as representatives of the central agency in Kathmandu, an arrangement which is not

only convenient, but economical, when one considers the number of bridges the central agency is responsible for maintenance.

- Finally, there is a need for mutual aid and cooperation between the local District Panchayat and the central agency responsible for the maintenance and repair needs of the bridges. While the District Panchayat can continue to take care of the bridge and generate income for this purpose, they have to be given necessary technical assistance by the central agency concerned, in Kathmandu. A regular system of this nature could be profitably worked out, not only for the needs of the Sanfobagar Bridge, but for all the bridges in the country.

ECONOMIC

- The service area of the Sanfobagar bridge is reasonably large because it is located on the main trail. Currently the bridge services many panchayats lying along Dhungarhi-Humla axis.
- The impact of the bridge on agriculture could not be distinctly separated because of the various agricultural development schemes launched under the SADP. Still, the use of the bridge has played a positive role in the development of agriculture. People can now travel as the need arises to the District Agricultural Development Bank to get agricultural loans to purchase fertilizers, pesticides, and improved varieties of seed.
- The bridge has not been instrumental in the growth of cottage and rural industries. However, the bridge has helped the local people to take a small amount of their local products to the weekly fair at the Sanfobagar airstrip for sale.
- Bridge use is not seasonal.
- The retail businesses and tea shops at the bridge site can be said to have benefitted from the increased bridge use, as well as their proximity to the airfield.

ENGINEERING

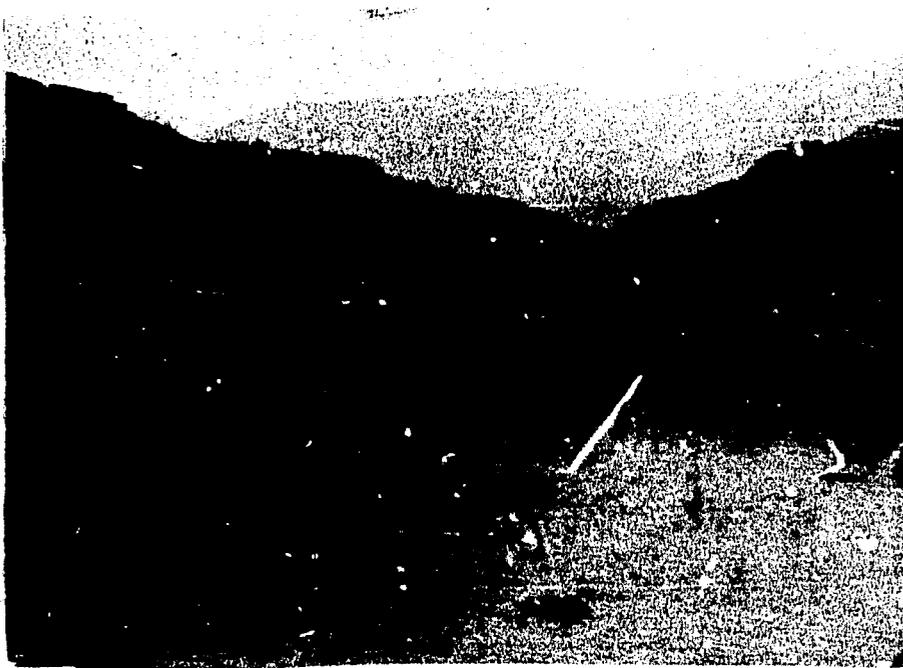
- The site is vulnerable to a potential change of river course which would leave the bridge on dry land. Other technically more desirable sites were not chosen because they did not lie in the traditional crossing point and were far from the main trail system.
- Span length and height of foundations are well suited to the site.
- Available air transport facilitated speedy construction of the bridge.
- The bridge toll collector/watchman should be made responsible for minor repairs. He should be provided with the necessary tools and training for minor maintenance and emergency planking repair.
- Most of the planks still have some use value and in view of the need for Nepal to conserve forest resources. The old planks should be reused during planking repair for all bridges in the kingdom.
- Periodic attention to upstream protective works will be required throughout the life of the bridge.

10.4. ILLUSTRATIVE PHOTOGRAPHS



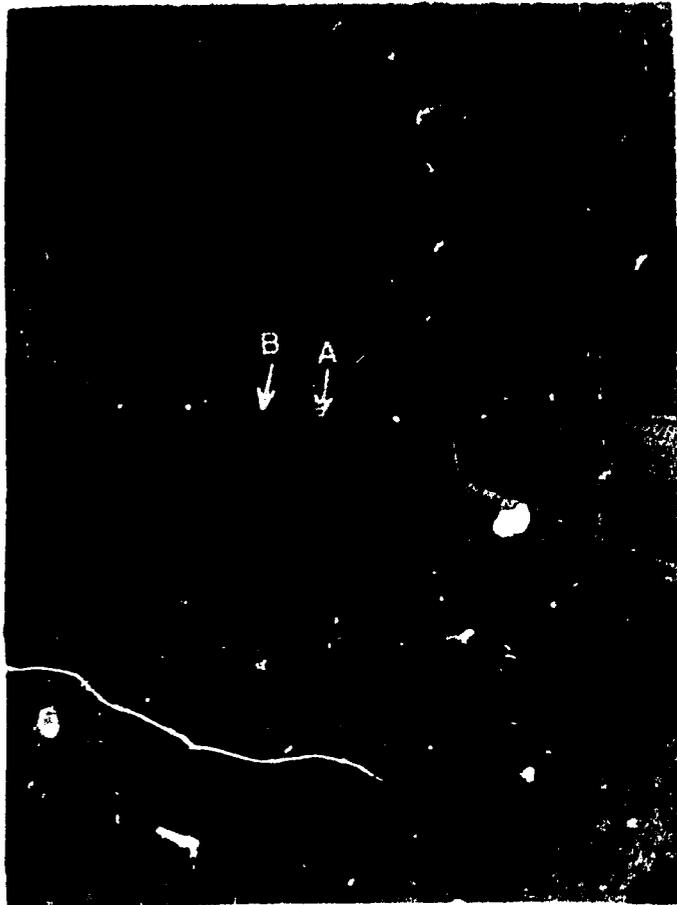
10-P-1: Looking downstream on the flood plain of the Burhiganga at Sanfebagar. The bridge is located at A and the left foundation is just downstream of the large tree to the left of A. At B, about 2/3 of a mile upstream from A, the main flow of the river continues to the right but a branch of the flow also goes toward the left. The left branch, also visible at C, is directed against the low lying rice fields of the left bank. Gabion protective works visible at D were built last year before the monsoon to protect against river scour but suffered damage during the monsoon. Sanfebagar Bridge is threatened by the possibility that the Burhiganga might shift course and flow about halfway between points A and D leaving the bridge spanning a dry river bed. If the main flow shifts from right to left at B, considerable maintenance work would be required to control river flow.

Date: Jan. 5, 1978



10-P-2: Part of
the damage
suffered by gabion
works located
upstream from
Sanfebagar bridge
at D of photo
10-P-1.

Date: Jan. 5, 1978



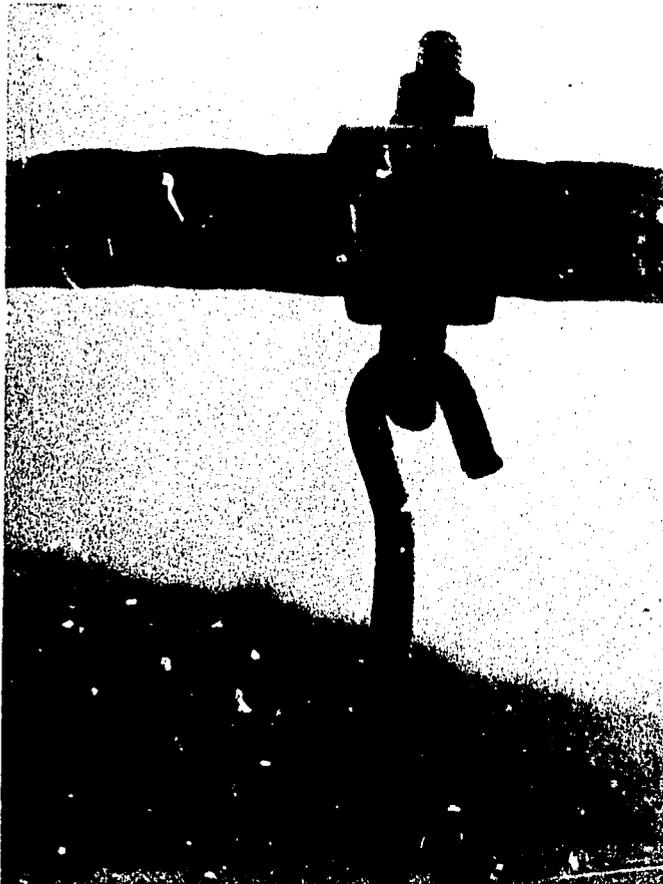
10-P-3: The fact that the road rope is not in a smooth curve (road rope is higher at A than at B) indicates that it is not fully tensioned and therefore not fully effective for dampening bridge sway.

Date: Jan. 5, 1978



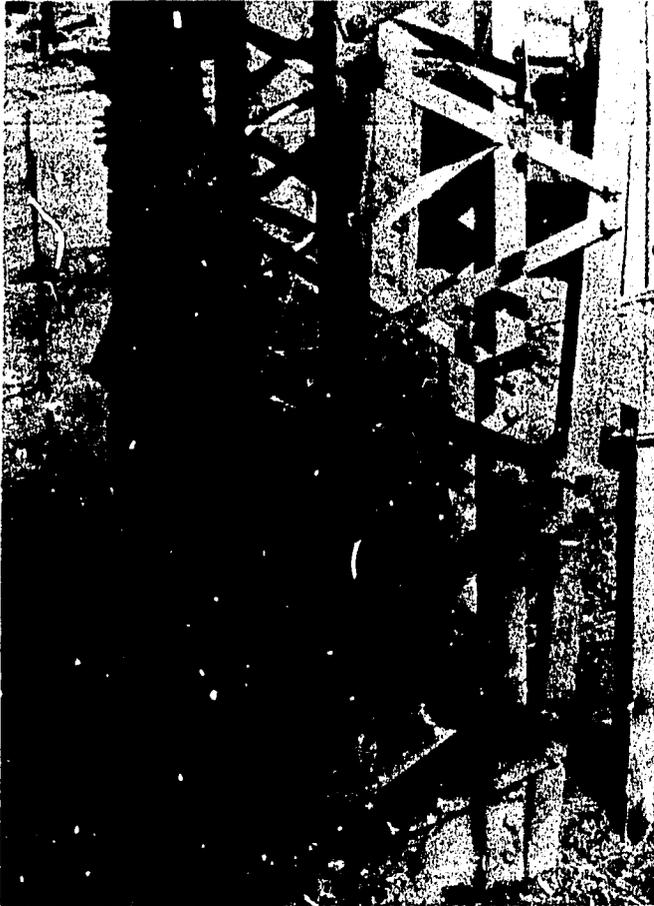
10-P-4: Loose suspender
nut at A and a
missing nut at B. The
suspender is disconnected
from the road rope and
carries no load. Timely
tightening of the nuts
with a wrench kept by the
bridge contractor who
collects the tolls could
prevent such problems.

Date: Jan. 5, 1978



10-P-5: Galvanizing of
bridge parts
is in good condition
except for a few spots
such as this one where
galvanizing has flaked
off due to a slight
bend in the suspender
rod.

Date: Jan. 5, 1978



10-P-6: Soil and rocks at the base of the right tower covered up to a depth past the level of the pinned hinge of the tower.

Date: Jan. 5, 1978



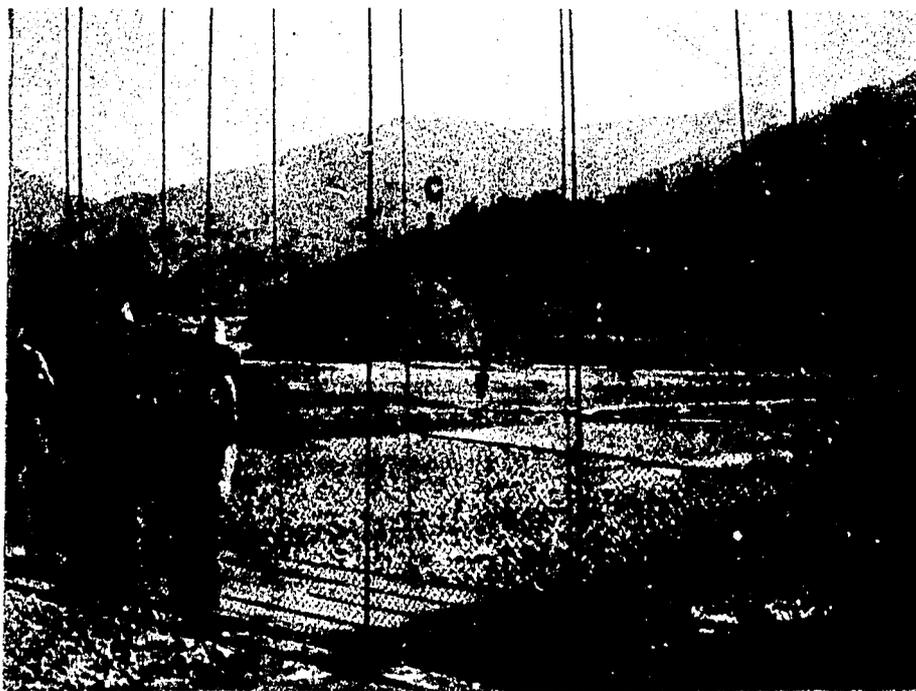
10-P-7: Left main anchor with $4 \times 1\frac{1}{2}$ in. main cables toward rear of block and 2×1 in. auxiliary backstay cables toward front of block. Number of bulldog grips is below that required in the specifications.

Date: Jan. 5, 1978



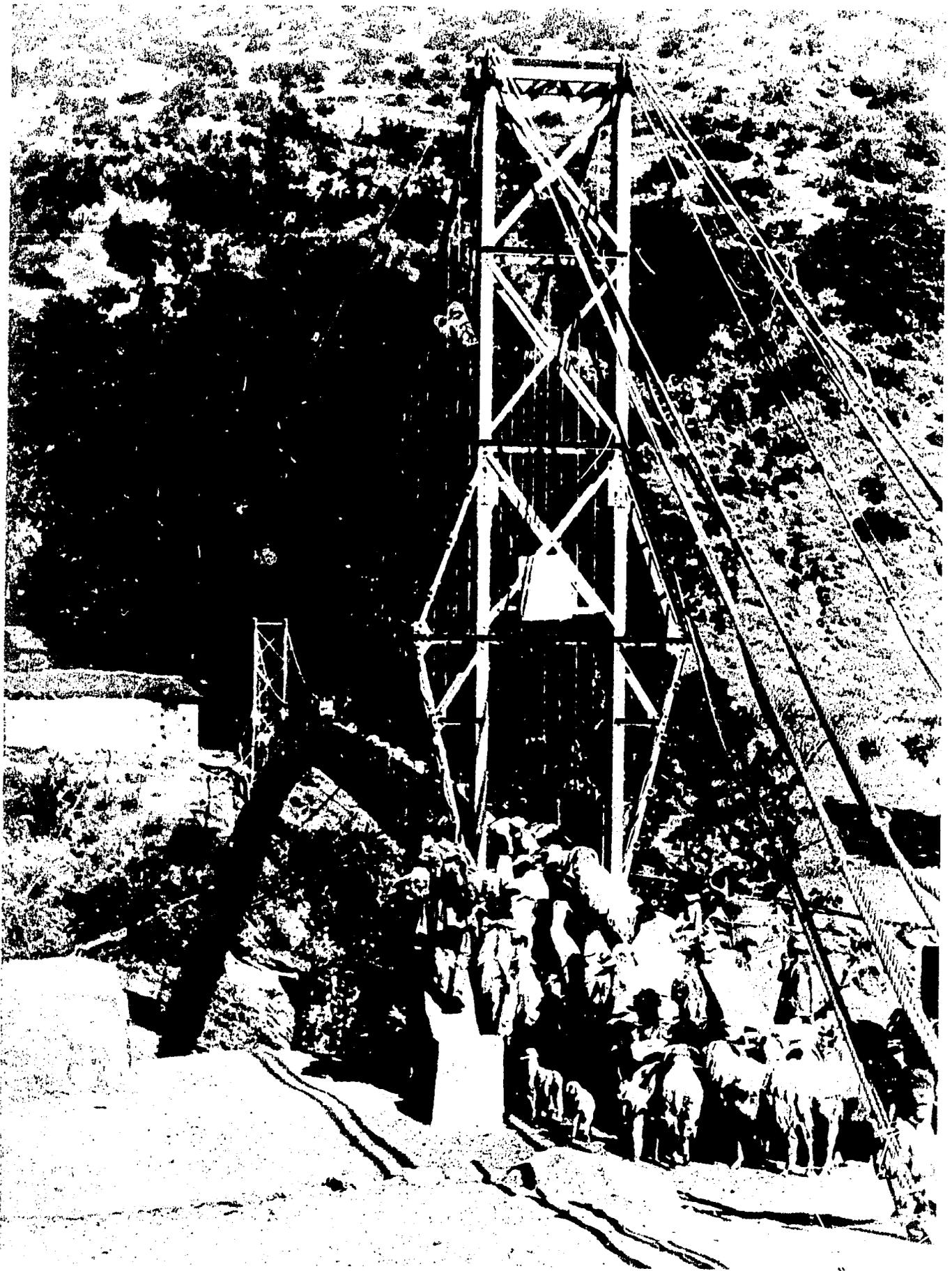
10-P-8: Rotted plank ends have resulted in loose plank bolts in many places. Most planks are original but the plank shown to left of center with nails across the crack is among planks changed last year.

Date: Jan. 5, 1978



10-P-9: View from the bridge toward the left bank showing, airstrip, A, Chhipiya Khola, B, and trail to District Headquarters C.

Date: Jan. 5, 1978



II. MALUMELA BRIDGE

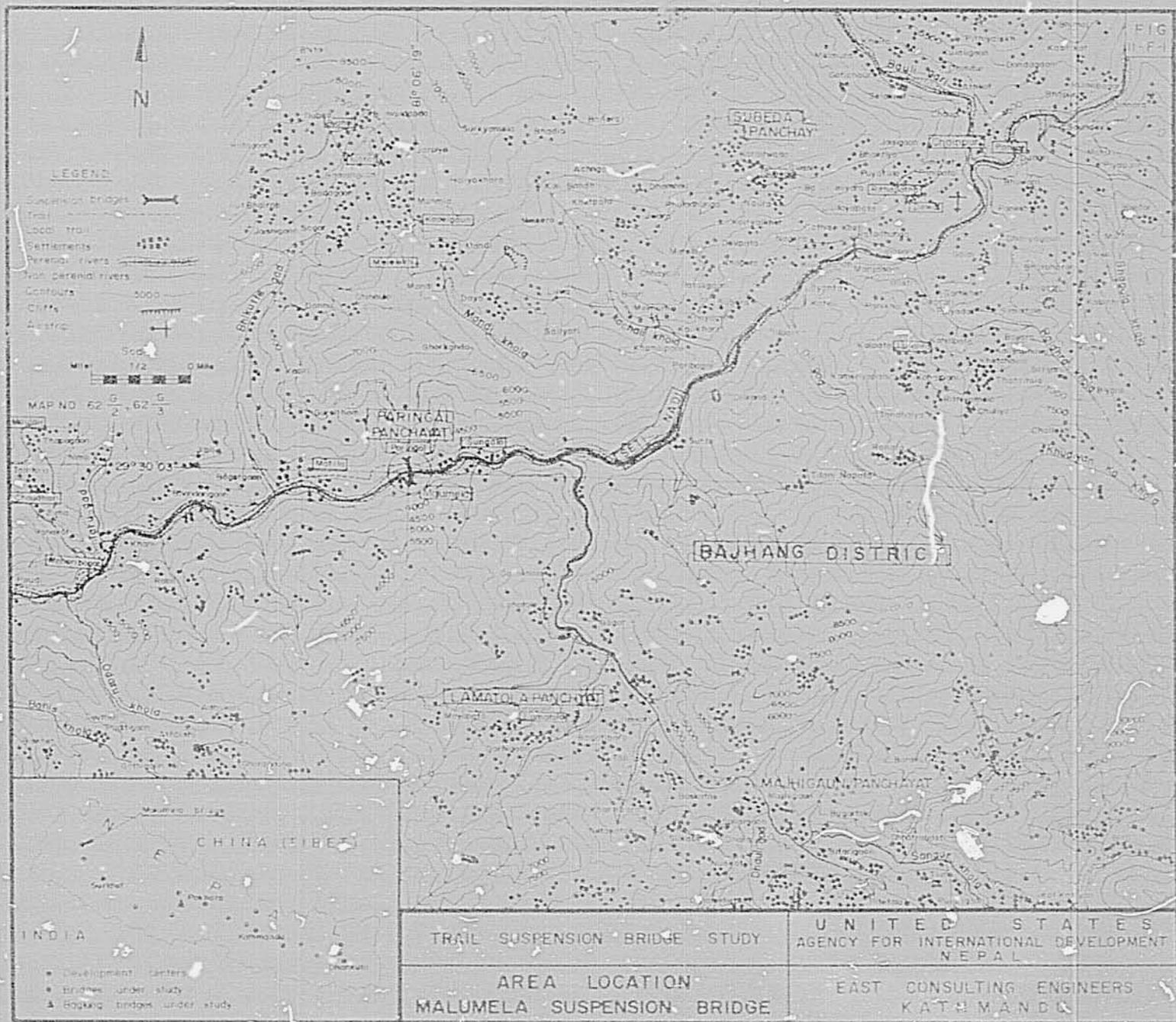


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11.1

C A S E H I S T O R Y

11.1.1 AREA DESCRIPTION AND HISTORY

-Geographic Setting

Situated in the Far Western Development Region of Nepal, Bajhang District is considered as one of the most remote and backward districts of the Seti Zone. The Setinadi River is one of the main tributaries of the Karnali River System, and originates at the Byasa Rishi Hindal Peak, located in the northern part of the Bajhang District. The river flows through the middle of Bajhang District and later downstream serves as the border between Baitadi and Doti Districts. Because the river has changed its course over the years, there are many fertile fields on both of its banks.

The Malunola Bridge site is located about 3½-hour walk downstream from Chainpur, the District Headquarters of Bajhang District. The bridge is located along the main trail of the District.

-Bridge Site Description

The Setinadi River is the major river of Bajhang District. It is, for practical purposes, unfordable throughout the year, though, it can be forded, with difficulty, during the dry season at a few places. Around the first week of April every year, because of glacial run-off, the river turns white and swells. Setinadi means 'white river' in the Nepalese language. The river flows into a valley several hundred feet wide. There is low-lying cultivatable land on either side of the river.

The bridge site at Malunola, in strictly technical terms, is good to excellent. There is solid rock on both banks of the river at approximately equal elevation. The bridge is very high and safe from any conceivable flood as the deck level is about 40 ft. above high flood level. The possibility that the river can damage the bridge through course change or through scour, is almost non-existent. There are no

sidestreams joining the Setinadi, either up or downstream from the bridge site, that affect the site. The Malumola is an ideal example in this study; the traditionally popular crossing point coincides with the technically best construction site.

-Relationship with Regional Transportation System

The Malumola Bridge lies on the trail which passes through Bajura District. The trail begins in the northeast and terminates in Dandoldhura in the southwest. The trail can be considered the main artery for Bajhang District as a whole. It also serves some parts of Bajura, Humla and Jumla Districts.

The trails passing through the traditional crossing point at Malumola, and originating in Bajura District go to Khalanga,

Darchula District; to Julaghat of Baitadi District; and to Dandoldhura in the south. There is also a trail from Bajhang to Silgadi Doti to Dandoldhura in the south.

Besides these trails, there is an airstrip a 20-minute walk south of Chainpur on the right bank of the Setinadi. (See Fig 11-F-1). This is serviced by a weekly flight operated by RNAC.

-General Cultural Setting

Bajhang District has 35 village panchayats covering an area of 1347 square miles. According to the 1971 CBS census, the population of the district is 108,623. The northern sector of this District is thinly populated. Most of the settlements are located in the south of the District, particularly in the low-lying river valleys, Bensi. The people settled in this District are Brahmans, Thakuris, Chhetris, Matwali-Chhetris, Newars, Giris and untouchables.

-Services Available in the Area

Even before the construction of the present suspension bridge, Malumola was a main crossing point for traffic that moved between Humla and Bajhang to the north, and Darchula, Baitadi, Dandeldhura, Mahendra-nagar, and Doti to the south, as well as for the border areas in India. Because of this, the site has always been serviced by a few small shops.

The area surrounding the bridge has increased in importance, and is now the site of several government services, seven stores and a few tailor shops. The government services available are a Forest Office, a health post, a Post Office, a primary school and a lower secondary school.

-Bridge Location History and Decision Process

The need for a permanent bridge at Malumola has long been recognized by the people of the area. As early as 1929, the princeling of Bhajang, then a principality under the suzerainty of the King of Nepal, made application to the King on behalf of his subjects. (This system of feudal principalities, which governed most of the rural areas of Nepal, was abolished in 1960 when the present Panchayat system was established.)

While these efforts were being made, the people continued to cross the river using a locally-made wooden cantilever bridge in the winter, or a bridge made of locally woven ropes, Babiyo. The princeling had assigned the responsibility for the upkeep of these bridges to the people of Sungala, a village in the vicinity of the crossing site. These people constructed the grass rope bridge by braiding together four pieces of thick grass, Babiyo for each main cable, and a series of smaller ropes which held in place the narrow wooden planks which formed the bridge's walkway. In exchange for the labor expended in the construction and maintenance of these temporary bridges, the villagers were exempted from land taxes.

While this was a great technological achievement for the people, the bridges were, nonetheless, extremely dangerous and many lives were lost each year. Often the grass ropes snapped and the bridge collapsed, or people simply fell from the bridge, so great was their fear.

Despite these hardships, existence in this region was impossible without yearly journeys to the south or west. People needed to buy or sell goods, or seek employment. During the winter, the people of the Byas region of Darchula District, Byansis, came to Bhajang with their flocks of sheep and goats to sell sugar, salt and rice. The construction of a bridge was of utmost necessity. It was only after the visit of His Majesty, the late King Mahendra, that the decision to build the bridge was made. However, there was a long lapse between the initial approval and the actual construction. As soon as the USAID-funded suspension bridge program was activated, the bridge was given priority status.

The construction of the bridge first began in 1965, but was halted while investigations were made by the Anti-Corruption Department of HMG concerning reported misappropriation of funds. Three years later, construction was resumed, and the bridge was completed in 1969.

The importance of the Malumola Bridge for both the local people and travelling traders can not be underestimated. (There is a suspended bridge at Pankot, six miles east of Malumola). There are other temporary rope bridges at Ratohunga in Subeda panchayat, at Mahoribagar in Paringal panchayat, and at Poudi, in Bhairavnath panchayat. These rope bridges are still used in the winter by local people. In addition, a ferry used to cross the Setinadi at Bhandargaun in Paringal panchayat, about 4 miles west of Malumola. The local boatmen were Chhotris (Bhandaris) and were not traditionally of the boatmen caste as are the Botes of the Bhingri Bridge area and Majhis of Pachuwarghat Bridge area. These boatmen collected a toll which varied from person to person. The rate of toll ranged from 1 to 2 lb of rice, or two or three rupees per person. Still

neither the ferry, nor the rope bridges were consistently safe to use. The need for a permanent bridge over the Setinadi was imperative. This, in combination with the Malumola's importance as a part of the trail system, made the construction of the bridge essential.

Both the Districts of Bajhang and Bajura are food-deficient areas and a significant amount of food grains and other consumer goods have to be imported. The men of the area commonly migrate to the Indian cities of Bangalore and Delhi to seek employment as low paid, unskilled workers. The main route runs through Malumola. The construction of the bridge serves to facilitate both the trade and income flows of the area.

Since the traditional crossing point at Malumola coincided with the technically best site for bridge construction, there was no need for any lengthy deliberation over the technical merits of the site. A span length of 260 ft., for which there were prefabricated parts of IRC standard design were available, fit the site perfectly. When the Malumola bridge was built, it was the first bridge in Bajhang to have steel cables.

11.2

ANALYSIS

11.2.1 SOCIO-ANTHROPOLOGICAL ANALYSIS

-Land and People

The bridge is located in Bajhang District, and directly serves about 24% of its population.

Studies were done in five village panchayats; Paringal, Chaudhari, Lamatola, Majhigaun and Maulali, in order to analyze the sociological impact of the bridge upon the area.

There are about 520 households in Paringal panchayat; Chhetris comprise 38%, Girls 19%, Brahmins 14%, Thakuris 5%, and the untouchables, 24% of the households. In Lamatola, there are about 500 households; Chhetris represent 48%, untouchables 24%, Brahmins and Thakuris total 20%, and Girls 8%. In Chaudhari, Majhigaun and Maulali panchayat there are about 434, 659 and 527 households respectively; the Chhetri households are in the majority, followed by the untouchable groups.

There is a high degree of ethnic diversity in this District. The dominant ethnic groups are; Brahmins, Thakuris, Chhetris, Matwali Chhetris (liquor-drinking Chhetris), Newars, Girls and the untouchable groups.

The high-caste Hindu groups, particularly Brahmins, Thakuris and Chhetris, are called Khas. They migrated from India after the Muslim invasion of India in about the 10th century.

The Brahmins are primarily farmers, though they sometimes do portering. These days, even young Brahmin men migrate to India to seek employment, as watchmen or Choukidar; this is due to the influence of other caste groups. It is interesting to note that working in India gives a higher social status and greater prestige to a man when he returns to his village in Nepal. He is called Lahure by the villager; a man who works in India.

It is said that the Thakuri people are the original inhabitants of Bajhang. They are one of the dominant groups in the District, and consider themselves socially and politically superior to the other groups. Among this group child marriage is uncommon, but the practice of paying money to have a beautiful young bride is prevalent, and marriage between a beautiful young woman and a rich old man is a practice of a long standing. Since the future husband must pay a bride-price to the father of the girl; the local people commented that Thakuri girls are sold like animals. This may be one of the reasons why the married Thakuri women run away with younger men.

The Chhetris represent more than 50% of the population in the District. Chhetris are divided into two sub-castes; Chhetris and Matwali-Chhetris. Chhetris wear the sacred thread as do Brahmans, and do not drink liquor. Matwali Chhetris on the other hand, do not wear the sacred thread and do drink liquor. Both Chhetris and Matwali-Chhetris are mainly farmers. However, they also work as porters or laborers during the winter. Many of them go to Jhulaghat, Pithauragarh and Nainital, all Indian border towns, to work as seasonal laborers. Also, they go to Bangalore area in southern India to work as Chaukidar.

Before the construction of the bridge, the Bhandari Chhetris of Bhandari village, farmed, and operated the ferry as well. Inevitably, after the bridge was built, they were forced to rely exclusively on farming but, they have not been economically affected.

The Newars have settled, primarily in the market areas of the District; Chainpur and Jaya-Prithivinagar. They originally migrated from Kathmandu, Banepa and Bhaktapur. Some of them came to this area with the Gorkhas when they invaded the region. The Newars farm and also engage in small-scale trading. Though many of them do not speak the Newari language, they still follow Newar traditions.

Giris, called Sanyasis, locally, farm but also work as masons or carpenters. During the construction of the Malumela Bridge, some

Giris worked as fitters. Many Giri men also go to the India to work in order to support their families back home. Some of them also work as laborers and porters during the winter season.

The lowest caste groups in the District are the untouchables. These caste groups are: blacksmith, Lohar musicians and tailors, Darji bamboo and reed workers, Parki, bamboo and woodworkers, Chunara, masons, Udha and dancers, singers and musicians Badi. These groups own a small percentage of the land in the area. In the winter season, many of them move to the Terai to work as skilled laborers. Some of them also work as porters. Among the untouchable groups, Badis are considered the lowest in the caste hierarchy, though legends say that they are the descendants of Gandharva Rishi the divine personification of dance and music. Their traditional caste occupation is to sing and dance at marriages, festivals and fairs. But because of the introduction of transistor radios and new musical instruments to the villages, to some extent the Badis have had to change their traditional occupation. Out of the desperate need to support their families, young Badi girls, although entertainers by profession, often work as prostitutes.

During winter, the Badi move to the Terai, erect small huts and perform their traditional caste jobs as well as other work.

The majority of the population live at an altitude above 3699 ft. The highest settlement area is located at 6500 ft. A transect of Paringal panchayat is given in Fig. 11-F-2.

All the ethnic groups mentioned are predominantly Hindu, and follow the local Hindu culture and traditions. Masto and Malika are the traditional deities of the area and are worshipped on many different socio-religious occasions. In most villages there is a shrine of Masto, distinctively ornamented with only bells and pennants of different colors. Masto is closely associated with the traditional healers, the Dhanis of the area. It is believed that they can be possessed by the Masto divinity

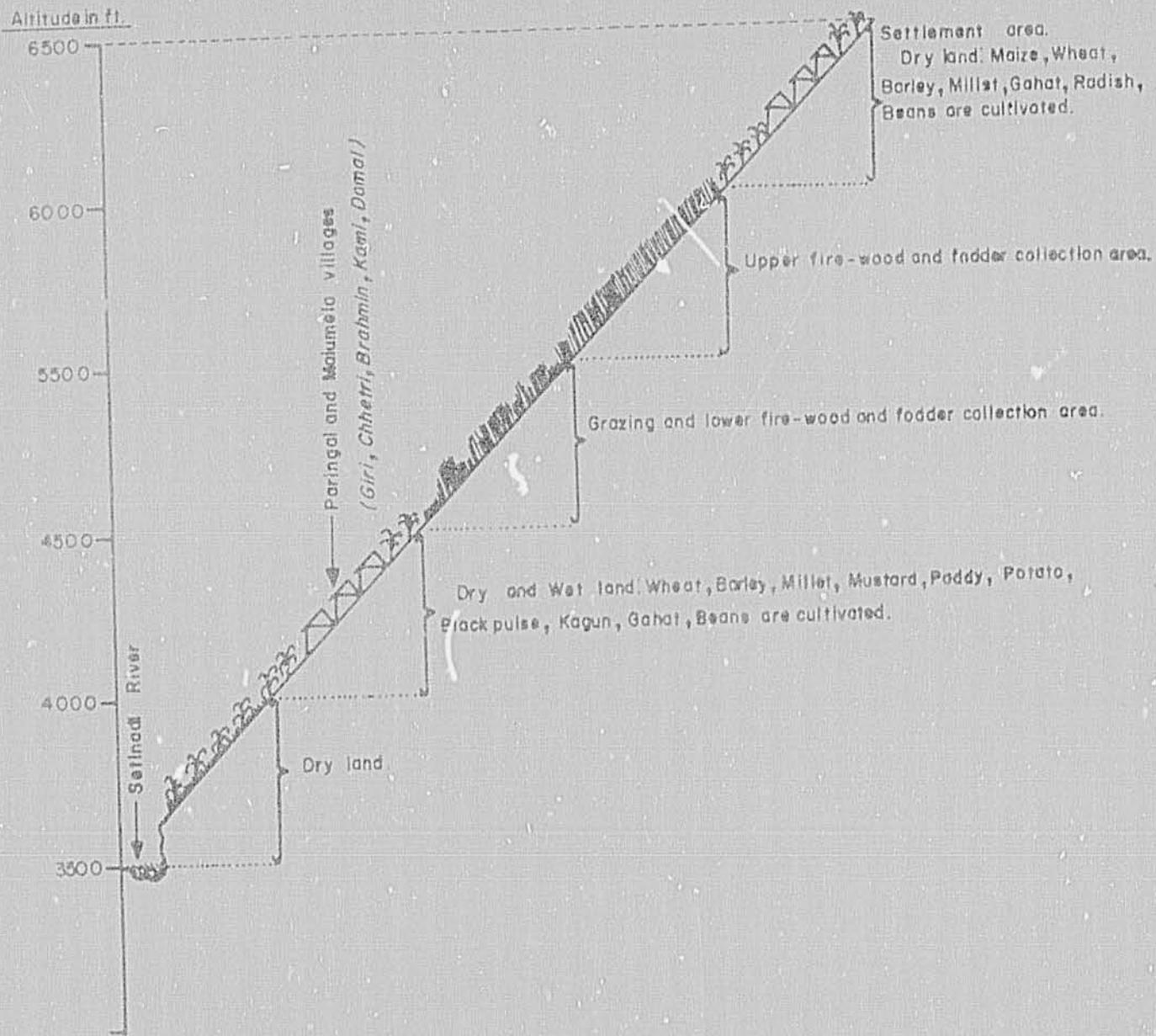


Fig. II-F-2: Paringal Transect (Schematic)

Source: ECE Field Survey

who enters their body and speaks through them, solving the devotees' problems. It is also said that there are nine sisters of Masti who are locally called Bhavanis. Other popular deities worshipped in the area are; Langadeva, Bathapala, Surma Devi, Kalasain and Thalidevi.

The houses or huts of the area primarily have one or two stories. The bedroom is in the lower story of the house. Most of the houses have slate roofs though a few are thatched. The slate roofed houses indicate the higher economic status of the family. The house as a whole is compact and badly ventilated.

-Structure of the Family

The average family size in the study area is about five to eight persons per family. Brahmins, Thakuris and Chhetris tend to live as a joint family. Except for the Badis, who also live as a joint family, all other untouchable groups maintain a nuclear family structure. This is because the Badis need a large number of females to ply their traditional caste-occupation. The economic role of the males is minimal. In the other untouchable caste-groups, the skills of the males are more marketable than those of the females, and a single adult male is able to support his family. Unlike the case of the Badi caste, a nuclear family structure is better suited to the economic needs of the other untouchable caste groups.

The Malunola Bridge, has not played any significant role in the break up of the traditional family structure. Neither has it helped to reunite family members who were separated prior to the advent of the bridge. 50 people were asked whether they had relatives (defined as consanguineal and/or affinal, and ritually established friendships, Miteri) on the opposite bank; 47% have affinal relatives only; 25%, affinal relatives and ritual friends Miteri, 10% listed consanguineal as well as affinal relatives, 4% affinal, consanguineal and Miteri relations and 14% had no relatives of any kind living on the other bank.

-Marriage Practices

Though marriages between two people who lived on opposite sides of the Setinadi River were performed before the construction of the bridge, they were often solemnized unwillingly. The difficulty in fording the river meant that once a girl left her natal home, it would be physically difficult, or in some seasons, impossible, to return home, or to maintain communications with her family.

When questioned as to whether they were ready to marry their daughters or sisters to men on the other side of the Setinadi River without a bridge, all 50 respondent replied negatively. However, when they were asked whether there had been any increase in cross-river marriages after the construction of the bridge, 60% replied that there was a 50% increase; 24% had noted a 25% increase and 16%, a 10% increase. The fact that 47% of those questioned have affinal relatives on either side of the constructed bridge, indicates that cross-river marriages, though known in the past, are becoming more common.

-Funeral Practices

The Malunola Bridge has not changed the traditional funeral and cremation rites. When 50 respondents were asked whether the bridge has changed funeral practices, the response was as follows:

Table 11-T-1: Percentage of Respondents Indicating a Helpful Change in Funeral Activities Since the Construction of the Bridge

Activities	Affirmative Responses
a. Cremation area	0%
b. Buying shrouds, <u>Katso</u> , etc.	48%
c. Collection of fire wood	44%
d. Others (assembling of relatives at the cremation grounds etc.)	48%

Source: ECE Field Survey

After the construction of the bridge, one cloth shop opened in Paringal village and four other cloth shops opened in Malumola village. These shops have enabled the local people to buy cloth for shrouds immediately. Prior to the opening of these shops, they had to travel quite a distance. The firewood collection area lies mostly in the Paringal village area and the people living in Malumola village had a difficult time collecting firewood to cremate their dead. Today, the people living in the Malumola Bridge area have easier access to the collection area. In addition, the bridge has facilitated in the immediate assemblage of relatives of the dead, even during the rainy season. Married sisters and daughters from either side of the river can now easily join the funeral and purification rites.

-Education and Health Practices

There are three schools in Paringal panchayat, two are primary schools and one is a middle school. Both primary schools are located on the northern side of the bridge and were established prior to the construction of the bridge. One primary school was upgraded to a middle school in 1975, after the bridge was built. There are 15 students, between the ages of 11 to 18 years, from Malumola village who regularly cross the bridge to attend the middle school located on the other side of the river. There are also about 40 students from 6 to 10 years of age, from Paringal village who regularly use the Malumola Bridge in order to attend the primary school located across the river. The number of female students is quite low, only 27 out of 327 students. The bridge has also provided easier access to the high schools in Chainpur and Thalhara, especially for the students living on the southern side of the bridge. In the sample panchayats, 4 students from Maulali, 15 students from Majhigaun, 4 students from Chaudhari and 11 students from Lamatola use the bridge to attend high schools in Chainpur and Thalhara.

Since the advent of the bridge, the students of the various panchayats have become closer, and a healthy spirit of mutual help and

cooperation is observed among teachers as they discuss common school problems and solutions. The school supervisor also visits the schools more frequently now. This is possible because of the easier mobility the bridge provides.

There is one health post in the immediate vicinity of the Malumela Bridge, located in Malumela village. It was established in 1977. There is one senior health-aide and four junior health-aides working at the health post. The junior health-aides go into the surrounding villages in order to maintain a record of the villagers' health. The movement of these health-aides has been greatly facilitated by construction of the bridge.

Western medicine has been introduced to the people. The people from the northern and western area of the bridge, particularly from Paringal, Parakathe, Byana, Kadegaun, Chaudhari, Lamatola, and Kot Bhairav panchayats have benefitted from the comparatively modern medical facilities provided by the Malumela health post. Before the establishment of this health post, villagers had depended almost exclusively on the traditional herbal medicines and on the services of the shamans, or Dhami, of the area. If the patient became seriously ill he or she was taken to the Channa Health Center located 8 to 15 miles away from the panchayats mentioned above. Many people still use the services of the Dhami.

Since the construction of the bridge, the concept of family planning has been introduced and is slowly gaining acceptance among villagers. A sub-branch of the Family Planning Office was opened in Malumela in 1977. During our field work we met social workers discussing family planning and distributing birthcontrol devices to the villagers. As in the case of the other health workers, the bridge has facilitated the movement of these family planning workers.

88% of people we spoke with stated that Malumela bridge has facilitated the health and curing practices in the area.

-Festivals, Fairs and Religious Activities

Though no new fairs or festivals have been established since the construction of the bridge, larger numbers of people are now able to assemble during festivals, fairs and religious activities. Local respondents pointed out that increased numbers of people gather during the festivals since the construction of the bridge. Fairs are a primary source of recreation for villagers, and after the construction of the bridge more people, men and women, young boys and girls, as well as the elderly, have started to attend both the fairs and festivals.

Similarly there has been an increased number of devotees visiting the local shrines as well as the more distant temples. When the question was asked of 50 respondents, whether the present bridge has increased attendance at the local village shrine or temples, 100% replied positively. Also, all the respondents pointed out that they could now go on long-distance pilgrimages in any season since the construction of the bridge.

-Changes in the Roles of Women

In the table below, we have categorized the different activities of women, and tried to find out how these activities have changed since the construction of the bridge. 16 women of the study area were interviewed in detail.

Table 11-T-2: Percentages of Female Respondents Indicating an Increase in Women's Activities Because of the Bridge

Activities	Affirmative Responses
Extension of ritual friendship, <u>Miteri</u> .	38%
Communal dances etc.	31%
Marriages, festivals, fairs and religious activities.	100%
Domestic work and agriculture	38%
Portering	9%

Source: ECE Field Survey

Our findings show that maximum use of the bridge has been made during marriages, festivals, fairs or religious activities. Recreational facilities for the women of the area are non-existent with the exception of the fairs and festivals. During these occasions, they sing and dance the Doudya, a circle dance common to the region. The rainy season festivals are: Krishnasthani, Janai Purnima, Tij, Panchani (Gaura); and the fairs are: Dahara and Surnadevi Jatra. Other important festivals and fairs where women have become more involved are Haribodhani Ekadasi, Dasain, Tihar, Swasthani Puja, Maghe Sankranti, Chaitali and Baisakhi Purnima. During Janai Purnima, the husband and wife jointly worship the goddess Surnadevi. In Maghe Sankranti, married daughters and sisters go to their natal homes where they receive presents from their parents. Married women also journey to their natal homes during Dasai and Tihar. In all socio-religious occasions, the bridge has greatly assisted the women in widening the area of social exchange and in fulfilling their social obligations.

To a certain extent, the bridge has also facilitated the extension of ritual friendship or Miteri. The ritual friendship has increased in the area as women now have more mobility due to easier access provided by the bridge.

The collection of firewood and fodder is one of the major domestic tasks of the women. The firewood and fodder collection areas generally lie on the northern side of the Setinadi River and everyday they use the bridge to cross the river to collect these supplies. Also many of the farmers have land on either side of the river and women can now help with the terracing of fields, weeding and harvesting. Before the construction of the bridge, women normally participated less frequently in the agricultural activities.

When we asked about how much time they now saved in their work since the construction of bridge, nine women responded that they did not save time, while the other seven stated that they did save some time. The women who answered negatively feel that their work load has not been lessened since the construction of bridge and that there is no change in their day-to-day activities. The seven women who said they did save time utilized it in performing the following activities:

Table 11-T-3: Percentages of Female Responses on the Utilization of Surplus Time, Saved Due to the Presence of the Bridge

Activities	Affirmative Responses
a) Taking more care of the children	85%
b) Working on the farm land	100%
c) Cooking better food	57%
d) Resting	0%
e) Socializing with other women	85%
f) Recreation	0%
g) Collection of firewood and fodder	100%
h) Grazing cattle	57%
i) Others	14%

Source: ECE Field Survey

These findings show that the women of this sample utilize their surplus time, in primarily productive activities such as farming or the collection of firewood and fodder. They have also been able to devote more time to socially necessary activities such as cooking or child-raising. The above table also shows that these women rarely rest and do not spend their spare time on recreation. However, there are so few recreational activities available in the area that socializing with other women is generally considered a form of recreation by the women.

-Changes in Beliefs and Habits

The Malumela Bridge has not affected the traditional language patterns of the area. In fact, all the groups living in the area can speak Nepalese. But 70% of respondents pointed out that there is less frequent use of the local dialect and more of the national Nepalese language. This change has not occurred only due to the presence of the bridge, but to the overall changes occurring in Nepalese society in recent years. In the Malumela Bridge area only, there are six government offices which were

opened since the construction of bridge. With the establishment of these government institutions, more government servants came to the area, and under their influence, the local people have increased their use of the Nepalese language rather than the local dialect.

74% of respondents pointed out that the clothing patterns in the area have changed. These days, people can buy many different varieties of cloth in the local market. Due to the increased movement of people in the area, new clothing styles have been introduced into the area. After the construction of bridge, five new cloth shops were opened on either side of the river. A new tailor shop has also been opened in Malunela village.

Though there has been no change in major food items consumed in the area since the construction of bridge, 92% of the respondents stated that the construction of the bridge has facilitated the steady import of new food items such as tea, spices and cigarettes. Before the construction of the bridge, rice was not generally available in the area. The use of rice in the daily diet has increased.

11.2.3 INSTITUTIONAL ANALYSIS

-Local Participation

The construction of the bridge was a full-scale government operation. A separate office, originally under an overseer, and later under an engineer, was opened with administrative liaison maintained through the Assistant Zonal Commissioner's office in Doti. All materials were purchased and all labor was paid for. There was no voluntary contribution of labor or materials by the local people. While there was adequate local participation the initial demand for a bridge, their participation in its actual construction was extremely limited.

As stated earlier, the construction of the bridge was suspended for three years due to charges of corruption and the subsequent investigation.

However, the SBD pushed for the early resumption of construction. The Pradhan Pancha of the neighboring panchayat, and the, then, Acting President of the District Panchayat, along with other local panchayat officials, extended the co-operation necessary in order to enable SBD to resume construction, although the investigation had not reached its conclusion.

As with other bridges, there were two kinds of participation; participation in actuating the construction of the bridge and contribution in kind. With the Malumola Bridge, the latter type of participation was absent, as none was required and the former was present from the inception of the project to its completion.

While there exists no document authenticating the handing over of the bridge to the local District or village panchayat, their interest in the maintenance of the bridge has continued. Soon after the completion of the bridge, Bajhang District Panchayat decided to levy a toll at the rate of Rs. 0.10 per person and Rs 0.05 per sheep, goat or head of cattle. After three months however, it was discovered that the toll collected was insufficient to cover even the salary of the toll-collector. The authority to collect the tolls was then passed to the local village panchayat, and the Pradhan Pancha assigned his brother, who ran a store at the bridge site, to collect the toll. This arrangement lasted only fourteen months, until the local people protested the toll, saying that the panchayat did not have the right to levy tolls on a bridge built by the government. The District Assembly of Bajhang, of which the District Panchayat is the executive, was finally forced to discontinue the toll.

However, in the 14-month period during which the toll was collected, the panchayat collected Rs. 900/-. About Rs. 500/- were taken by the District Panchayat and the remainder of the money was used by the village panchayat to purchase coal tar to apply to the planks of the walkway. This was the first instance of maintenance work done on the bridge. The second was undertaken two years later when the local panchayat obtained a

grant of Rs. 1,100/- from the District Panchayat. This money was also spent on coal-tarring the walkway.

Because the planks used were all Chann wood, which is subject to quick decay, frequent maintenance work on the walk way was necessary. Despite the sincere efforts of the local panchayat, the majority of the planks require replacing. The village panchayat has once again been successful in obtaining a grant of Rs 10,000/- from the District Panchayat for this purpose. Unfortunately, since only Chann wood, is locally available the local village panchayat decided to import the more durable Sal wood from Baitadi, a three-day walk from the bridge site. In order to prolong the life span of the deck, it was decided to opt for the more expensive deck planks. Already a group of six contractors from the area have been employed to cut and finish 400 planks and other wooden parts, and transport them to the bridge site. If the money is insufficient, the panchayat plans to use voluntary labor to transport the planks part of the way.

The panchayat also has access to fairly skilled craftsmen for repair work on the bridge. The technicians who were initially involved in the construction of the bridge had taught a few local people some of their skills, and they can now do the repair work on their own. Some of these workers have further augmented their experience and skills by installing bridges elsewhere, either alone or under the guidance of a foreign engineer.

To summarize, the panchayat has not only an interest in the maintenance of the bridge but also the resources to perform minor repairs. Only for the more complicated technical problems does the panchayat stand in need of a technical backstop.

-Institutional Impact of the Bridge

As stated above, the Malunela Bridge site in Bajhang District is an important point in the trail system of the region. Trails leading to the northern parts of Bajhang; parts of Bajura district, Achham and Doti

Districts; and to the important market centers at Joljibi, Jhulaghat and Mahendra Nagar meet at this point. The construction of the bridge has made this crossing point continually open and safe. This has helped to transform the area from a small crossing point and way station, to an important place in the District. As a local inhabitant put it, "The bridge has made a town out of the jungle that this place used to be."

Today there are seven shops here, two on one side of the bridge and five on the other. This includes three tea shops which are attached to other stores selling cloth and other consumer goods. The shops were established between 1965 and 1971.

Of the government institutions, only one primary school existed before the construction of the bridge. A secondary Post Office, Atirikta Hulak, was established in 1974; a lower secondary school in 1974, and a health post and a Forest Office in 1977. The Forest Office was originally to be situated in another locale, Mal Lekh, a 2½-hour walk west. Accordingly, the office was named the Mal Lekh Forest Office, but because of the lack of conveniences of the trail and food supply the head of the office, a ranger, decided to relocate the office at Malumela. This office is also contemplating the construction of a nursery in order to introduce new horticultural concepts, and to provide seedlings for afforestation programs.

Other benefits have also come to the people of the area. Before the construction of the bridge people were able to travel less frequently to the District Headquarters, the only place where government services are available. Similarly, the officials stationed there were only able to make very limited visits to the villages. Today, this has changed for the better because of facilities provided by the bridge.

There has also been some rearrangement of panchayat boundaries. Because of the comparative ease of travel, the two panchayats of Matila and Malumela, located on either side of the bridge, have been combined and now form one panchayat, Paringal village panchayat.

The construction of the bridge has opened the area to more trade, and has provided access to a wider variety of government services.

11.2.3 ECONOMIC ANALYSIS

-Geographic Area and Population Served

As mentioned earlier, the Malunola Bridge was constructed on the main trail. Since it happens to coincide with the traditional crossing point, the bridge use is very high. Therefore, due to its favorable locational relationship with the area trail network, the geographic area and population settlements serviced by the bridge is enormous. It primarily serves the people of the north and northeastern districts of Bajhang, Bajura, Jumla and Humla, in their travels to the centers of economic transactions. It has emerged from the local interviews as well as field observations, that the bridge serves approximately 25% of the people from Humla, 50% from Jumla, 80% from Bajura and 75% from Bajhang.

-Estimated Traffic Flow

In order to ascertain the magnitude and direction of traffic flow over the bridge, traffic was counted for five days. The traffic was classified into three groups - porter, non-porter, and animal traffic. The porter traffic averaged 93 persons per day, non-porter traffic, 287 per day, and animal traffic, 966 per day. (Table 11-T-4).

Table 11-T-4: Traffic Counts Across the Bridge

Day	Non-porter	Porter	Animal
First	285	98	1036
Second	321	62	415
Third	211	135	1331
Fourth	409	41	1227
Fifth	209	129	821
Average/day	287	93	966

Source: ECE Field Survey (Dry Season).

The stated purpose of travel can be broken down into the following categories: 42%, social purposes; 10%, service, 10%, buying; 9%, selling; 21%, salt trade; 4% were seeking employment; and 4% travelled for unspecified reasons. The origin and destination analysis of the traffic survey (Table 11-T-5) shows that 58% of the bridge users came from Bajhang; 21% from India; 13% from Darchula, and 2% each from Fajura, Baitadi, Kanchanpur and Junla.

59% were destined for Bajhang; 10% for Fajura; 3% for Junla and Doti each; 4% each for Aashan and India; 3% for Kanchanpur; and 2% each for Baitadi and Dandoldhura.

Bajhang District is the primary point of origin and destination for travellers in the area.

-Agriculture

Ten village panchayats; Kadelgaun, Chaudari, Byansi, Matila, Subeda, Rithapatha, Luyanta, Kotdeval, Chainpur, and Hemantwada were studied.

Most of the people in the area depend on either agriculture or on agricultural labor for their livelihood. The farming is at a subsistence level due to the marginal nature of the cultivatable land. The wet land, Khet, is concentrated only in the valley of the Setinadi, it comprises 20% of the total land area; 21%, is dry land, or Palho; 26%, forest area; and 33%, barren land. The average agricultural land holdings are estimated to be 1.5 hectare/household for 68% of the households; 1.25 hectare/household, for 28% of the households; and 0.75 hectare/household, for 4% of the households.

The summer crops are potatoes, radish, maize, millet and paddy. Paddy and millet are the major summer crops. The winter crops are barley and wheat. The productivity of the land is very low due to the lack of irrigation facilities and the unsophisticated nature of local agricultural technology.

Table 11-T-5: Percentage Traffic Indicating Origin, Destination and Purpose of Travel in the Study Areas

Purpose of travel	Bajhang		Bajura		Achham		Darchula		Baitadi		Dandel-dhura		Kanchan-pur		Doti		Junla		India		Total		
	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	O	D	
Buying	10	8	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	10%	10%	
Selling	-	3	-	-	-	-	6	-	-	-	-	-	-	-	-	-	2	6	1	-	9%	9%	
Salt trade	4	8	-	-	-	4	5	-	2	-	-	2	3	-	4	-	-	-	10	-	21%	21%	
Seeking employment	2	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	4%	4%
Service	10	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10%	10%	
Social	28	28	2	8	-	-	2	-	-	-	-	-	2	-	2	-	2	8	2	-	42%	42%	
Other	4	2	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	4%	4%	
Total	58	59	2	10	-	4	13	-	2	2	-	2	2	3	-	8	2	8	21	4	100%	100%	

Source: ECE Field Survey

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A portion of the cultivated land is serviced by locally-made irrigation facilities. However, since the stream which feeds the irrigation canals is dependent upon the rains, during the dry season the canals dry up. Generally the Far Western Region of Nepal has very little rainfall even during the monsoons.

In order to change this situation, the SADP was introduced into the area during the fiscal year 1977-78. Under this program 20 small irrigation projects will be completed by the end of the fiscal year. These projects, upon completion will, hopefully, increase the agricultural productivity of the area.

Besides farming, people raise livestock. As in most areas of Nepal, animal husbandry is a complement to agriculture; the animals supply the only source of natural fertilizer. The major livestock raised are cows, buffaloes, goats and sheep. On the average, each household, owns 7 animals.

In this area, the use of synthetic fertilizers and improved varieties of seed have been introduced only since the advent of SADP programs. In this respect, the effect of the bridge in promoting use of modern agri-inputs appears to be minimal, but its contribution in facilitating access to the cooperative stores which sell farm inputs is significant.

-Rural and Cottage Industries

The rural and cottage industries do not exist as organized units, and the production of goods is primarily geared to household needs. There are some water powered mills, Ghattas, as well as caste determined occupations such as shoe-making or black-smithy.

The commodities produced by the local cottage industries are: woven baskets, wooden pots or vessels, bamboo goods, and handloomed cloth,

or Bhangra. Bhangra is woven from the yarn spun from hemp fibers. Most households own looms and most of the cloth is used locally.

At one time, according to the local people, handloom cotton weaving flourished in the area. But production gradually declined after the substantial import of cheap textiles from India. Also, the land originally used for cotton cultivation is now required for the cultivation of cereal crops. This is due to the greater food needs resulting from an increased population.

Chainpur, the Headquarters of Bajhang District is famous for its bamboo goods, primarily mats and carrying baskets of various sizes.

Bee keeping can be considered the most important cottage industry in the area. Most of the households keep hives and use honey rather than sugar or molasses for sweetening.

-Labor force Situation and Employment

The total population of the ten village panchayats is estimated to be 27,816. of which 13,949 are males and 13,867 females. The population, 10 years or older, is estimated to be 20,488 of which 10,273 are male and 10,215 female; the active income earners are estimated to be 15,535, of which 8,710 are males and 6,825 are females (Table 11-T-6).

The primary occupation of the area is farming. There are several types of secondary income sources, such as portering, paid farm labor or retail trade. However, the majority of the secondary income is earned by working outside the Bajhang District. The male labor force generally migrates to India to work as porters, watchmen or construction workers. Bangalore, in India, is where people of Bajhang generally seem to migrate to. Permanent migration has not been observed.

Table 11-1-6: Estimated Population and Labor Force

Panchayat	Total	Male	Female	Population 10 years and above			Economically active ^{1/} population		
				Both Sexes	Male	Female	Both Sexes	Male	Female
Kadelgaun	3408	1693	1715	2510	1247	1263	1907	1057	850
Byansi	2803	1411	1392	2064	1059	1025	1571	881	690
Chaudhari	3300	1643	1657	2431	1210	1221	1843	1026	822
Matila	1823	918	905	1343	676	667	1022	573	449
Subeda	3301	1678	1623	2431	1236	1195	1852	1048	804
Rithapatha	2358	1190	1168	1737	876	861	1322	743	579
Luyanta	2368	1195	1173	1744	880	864	1327	746	581
Chainpur	2514	1264	1250	1852	931	921	1409	789	620
Herantvada	2426	1198	1228	1787	882	905	1357	748	609
Kot Deval	3515	1759	1756	2589	1296	1293	1970	1099	871
Total	27816	13949	13867	20488	10273	10215	15585	8710	6875

Source: ECE Estimate based on 1971 CBS Census

^{1/} The economically active population may be defined as the number of persons in the age group 10 years and over who are engaged in activities contributing to the production of goods and services.

-Trade Flow Pattern

The impact of the bridge on the flow of trade appears to be significant. It has been instrumental in facilitating the export and import of commodities. Because the area is food deficient, most of the food grain requirements must be imported from other areas, primarily the Terai. It is only since the construction of the bridge that a steady flow of these goods has been possible.

The area exports Grew and to a limited extent Bhangra. The trade deficit is met largely by earnings from India.

-Environmental Effects

The construction of the bridge has had a direct effect on the local environment. The people are now able to collect fuel and fodder on either side of the bridge. Unless the area resources are assessed and properly managed, there are a potential problems of soil erosion, landslides and a lack of fuel in the future. However, it appears that attempts have been made by both the Government and the local agencies, to develop a coherent conservation program in the area. Near the bridge site there is a Forest Office whose major concern is the preservation of forest. This office is trying to establish a nursery but has been unsuccessful due to the unavailability of land.

11.2.4 ENGINEERING ANALYSIS

-Site Selection, Design and Construction Methods

No special problems were encountered in selecting the construction site. Solid rock was found on either side of the river and the elevation was nearly equal and well above high flood level. The span was perfectly suited for the 260 ft. prefabricated standard BRG bridge that was built there. No special design of either the foundation or anchor blocks was required.

Construction of the Malunela Bridge began in early 1965, but initial progress was slow. Mr. Devi Prasad Sharma was in charge of the project, but he was later replaced by Mr. Hari Prasad Sharma, who began work at Malunela after the completion of the Sanjebagar Bridge in 1967. Mr. Prem Narayan Premi acted as the overseer. Eventually the bridge was completed in the spring of 1969.

The bridge parts were transported from Jhulaghat, and the cement from Mahendranagar. Mr. D. P. Sharma had first arranged for the cement to be transported by sheep. Plans were altered by Mr. H. P. Sharma, and the cement was transported by porters at a cost of Rs. 110/- per bag. Although it was cheaper to use sheep than porters to carry the cement, the cement bags had to be opened and the cement repackaged in small sacks which the sheep could carry. This proved both troublesome and time-consuming, and a decision was made to use porters instead. Periodic site inspections were made by personnel and advisors from the SBD in Kathmandu during the course of construction.

Except for the staff from Kathmandu, local labor was used for the entire bridge construction. The skilled and semi-skilled work was done by local craftsmen who were instructed by the Kathmandu staff. No contractors were involved in the construction. All work was done on daily wage basis. No free labor contribution was given for the construction.

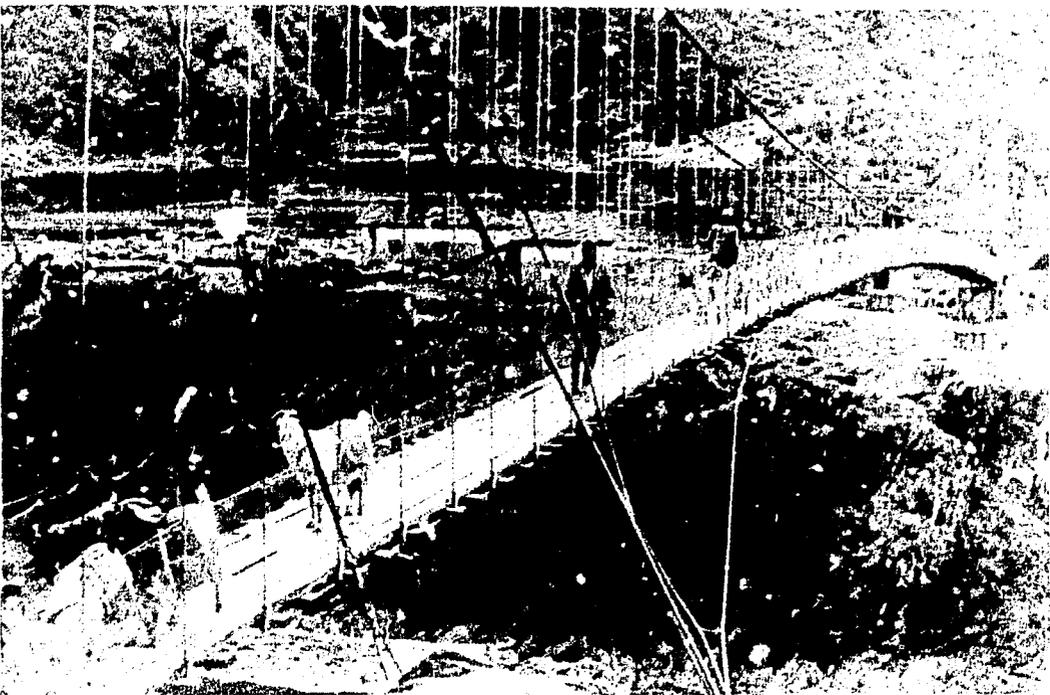
In order to make the necessary excavations at Malunela, some blasting was required and blast holes were drilled, by hand, to a depth of about $1\frac{1}{2}$ ft. Mr. H. P. Sharma the supervisor who replaced Mr. D. P. Sharma, had to re-do this part of the construction. Due to a scarcity of cement, the anchor pit in which the anchor steel was set was only partially concreted resulting in a potentially unsafe anchorage. Under the supervision of Mr. H. P. Sharma the concreted anchorage was blasted out and the anchor steel was reset properly, and concreted again.

No machines were used during construction except for a cable puller. The puller was of the chain pulley type, which can pull only a short distance before being reset, rather than of the Tiffin cable puller type, which is more suitable. Bamboo scaffolding was used for erection of the towers.

The setting of sag in the road ropes was complicated by the fact that the cable did not hang freely between the road rope anchor points but partially rested on the ground between the anchor points. The same procedure for hanging suspenders was used at Malumola as was used at Sanfobagar. (see Sanfobagar Bridge Report of this volume). The road ropes at Malumola seem to have been tightened better than those at Sanfobagar and consequently the bridge sway is much less. In both cases the sway involved is mostly lateral. Vertical swinging cause no particular problem.

Wood planking was added to the bridge deck after all of the suspenders had been hung and attached to the road ropes. Locally available Tuni and Chane woods were used for the crossbeams and planking. These woods are not as strong or durable as Sal wood, and therefore, two crossbeams per panel were used rather than the single crossbeam called for by the standard BRC design. The crossbeams were fully treated with cold tar but only the top surface the planking was treated. The original wood is still in use, though the planking now is in poor condition, and needs replacing. However, many of the crossbeams are still in good condition.

-Present Bridge and Approach Trails: Condition and Recommended Improvements

Bridge Name: MALUMELA	Zone: SETI	District: BAJHANG	Village Panchayat: Left: PARINGAL Right: PARINGAL
SPAN	260 ft.		
TYPE	Suspension		
MAP 1"=1 mile	62-G/2,3		
COORDINATES	29° 30' 2" 31° 6' 15"		
TRAIL	Jhulaghat and Mahendranagar to Eastern Bajhang, Bajura and Humla		
TRAIL TYPE	Class A		
RIVER	Seti		
RIVER TYPE	Major		
COMPLETION YEAR	1969		

Refer to
Photographs No.

Malumela Bridge is in generally good condition except for the planking, which is in poor condition.

No bent or missing parts were observed except for 2 slightly bent wind ties and 1 missing nut with and bolts cable clamp used in its place. No loose nuts and bolts were observed.

11-P-5

Cables are in good condition. Several wind tie rods could use tightening.

The fencing needs to be wired to the hand cable. Originally the fencing was wired but now the wire is almost completely missing, having been removed by passers-by.

11-P-7

Refer to
Photograph No.

At many other bridges in this study, such as Sanfobagar, Karambot and Bhingri, dirt has accumulated around tower bases, cable anchorages and fittings. Such dirt is potentially harmful to the cables and fittings even though they are galvanized. It also interferes with the hinge action of the pinned hinge towers. At Malunola, however, the cables and fittings are comparatively free from the accumulation of dirt. Some dirt has accumulated around the base of the right tower. The main reason there is little accumulation elsewhere, is that the left bank tower foundation, and most of the anchorages are raised above ground level.

11-P-4

The planking is in poor condition though the condition of many of the crossbeams is still good. Bajhang District has currently budgeted Rs. 10,000/- for woodwork replacement. It is planned to replace the original Tuni and Cham woods with sal wood, which is more durable. They also planned to use coal tar as preservative for the new sal wood.

11-P-7

People in the Malunola area think the bridge is a very good one since it is well constructed and located at a technically good site. However, they say that the bridge sways enough to make it difficult for some people to cross it. The bridge does tend to sway laterally, though not as much as the Sanfobagar Bridge. During the woodwork replacement, it would be desirable to check the tension in the road ropes. This would help to dampen lateral sway. Additional tensioning may prove difficult as it requires a slight shortening of the length of the road ropes.

11-P-3

	Refer to Photograph No.
Approach trails in the immediate vicinity of the bridge are in excellent condition. The approach trails, and also the present trail network in the area around the bridge, existed before the bridge was built. The trails are suitable for and much used by animals, particularly sheep and goats.	11-P-3 11-P-6

-Past Maintenance Work

Major: No major damage has ever occurred to this bridge and no major maintenance work has ever been required.

Minor: No minor maintenance work has been performed since construction of the bridge, except for the painting of coal tar on the walkway. This was done by the local panchayat. Planking replacement is required and plans are underway for the replacement of all **woodwork** by the local panchayat.

The local village panchayat looks after the bridge and sends reports to the District Panchayat if there is any problems requiring attention. Of course, the village panchayat cannot undertake any major repair. The current woodwork replacement project is an example of the maintenance procedures. The matter of replacing the woodwork was first brought up at a District Assembly in September 1976. The actual request by the village to the District for approval was made in January - February 1977, and the project was accepted by the District in May - June 1977. A permit to cut the required sal wood has now been obtained, but it took 3 trips to the Forest Department Office in Baitadi. A fee of Rs. 8 per cubic foot was required for the permit. A small amount of free labor will probably be given for the project, but most labor will be paid for.

SOCIO-ANTHROPOLOGICAL

- The Setinadi is a major river in Bajhang District. Since there was no convenient ferry service or permanent bridge in the area, the life of the people living on either side of the river was difficult. Crossing the river was risky for both people and livestock. Every year cases have been reported of animals and human beings being swept away while trying to ford the Setinadi.
- The construction of the Malumela bridge has affected significant changes in the social life of the local people. Now there are an increased number of cross-river marriages. More people are able to participate in the areas, festivals, fairs and religious activities. There is now no risk in crossing the river, even in the dead of night. Some of the women who were able to complete their tasks more quickly since the construction of the bridge, utilized this time for more productive activities. A number of students have benefitted, in that they can now attend schools on either side of the river.
- There are no ethnic groups who suffered economically because of the construction of bridge. The effects on the Bhandurik, who operated the ferry before, are minimal because it was their secondary occupation, their primary occupation being farming.

INSTITUTIONAL

- Although the need for a bridge at this site had long been recognized by the people of the area, it took a royal command to give this idea the priority it deserved.
- While there was no local contribution of labor or materials towards the construction of the bridge, local participation in the maintenance of the

bridge is nonetheless noticeable. The grants made by the Bajhang District Panchayat, and the initiative and involvement that the local village panchayat displayed in undertaking the repair work are indicative of the level of community participation.

- Income can be generated by establishing a toll in exchange for use of the bridge. The District or village panchayats, are the appropriate institutions to be entrusted to make these decisions, reflecting the needs and interests of the people.
- The construction of a bridge can contribute to the growth of service centers in a District. While this is not the case in all places, it is true in the Malumola area. Considerations of this nature should constitute one of criteria employed in the selection of bridge sites.

ECONOMIC

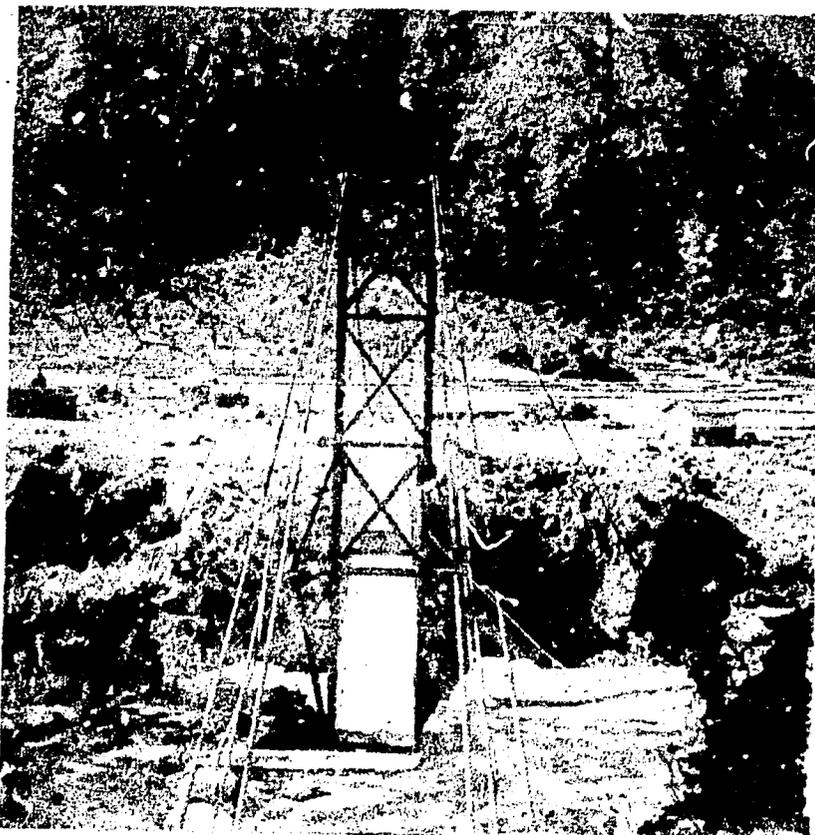
- The bridge serves both the local people and the long-distance travellers. The addition of a bridge to the trail system has significantly opened up the area.
- Despite the fact that farming is the primary occupation of the populace, the area is food-deficient. Land under cultivation is marginal and production depends upon the monsoon rains and undeveloped agricultural methods. There has been no tangible change noted in the agricultural patterns of the area since the construction of the bridge.
- The rural and cottage industries in the area are confined to some water-mills, six traditional industries; shoe-making, black-smithy, basket-weaving, pottery, bamboo work and handloomed fabric Bhangra. The presence of the bridge has not affected the rural and cottage industries.
- Many of the active income earners from the area temporarily migrate to India in order to seek employment.

- The construction of the bridge has had some significant impact on the trade flow in the area. Because the area is food-deficient, large quantities of grains and other foods must be imported. The bridge construction has made possible a steady inflow of these products.

ENGINEERING

- From the technical point of view the bridge site is good to excellent. There is solid rock on either side, of more than sufficient height above high flood level. The span length is suitable for the 260 ft. BRC standard design. The traditional crossing favored by the local people coincided exactly with the technically best-suited site.
- The bridge is in good condition except for the deck planks. A local project for the replacement of these deck planks is in process.
- The tower base parts as well as the cables and fittings at the anchorages were found to be comparatively free of dirt and debris since the foundation or anchorage was raised a bit above ground level. It is recommended for future construction, that, where the site profile permits, foundations and anchorages be raised about 12" to 18" above ground level.
- At least one of the skilled local workmen employed on the bridge construction was later involved in building other bridges in the District. Thus, the training received by at least one local person and probably others, has proved to be of long range value.
- Coal tar application to the original crossbeams, construction of local woods, helped to lengthen the life span of the wooden deck.

II .4 ILLUSTRATIVE PHOTOGRAPHS



11-P-1: View toward the left bank of Malumela Bridge
just after its completion in 1969.

Date: Year 1969

Source: H. P. Sharma, Asst. Engineer, DOR



11-P-2: View toward the left bank of Malumela Bridge now, about 8 years after completion of construction. Note the increase in size of the left bank settlement since the time of construction.

Date: Jan. 1, 1978



11-P-3: Looking downstream toward Malumela Bridge. Both sides of the river are solid rock at approximately equal elevation and the bridge is very high and safe from any conceivable flood. The arrow indicates the monsoon trail to Jhulaghat. The dry season trail runs through the fields below the arrow.

Date: Jan. 1, 1978



11-P-4: Pinned-hinge tower base and road-rope anchor arrangement of BRC standard design. Unlike some other bridges of this study where dirt and debris have covered the tower base, the left bank tower base shown above is free from dirt because the foundation is raised above ground level.

Date: Jan. 1, 1978



11-P-5: Left side road-rope anchor. Note the ingenious use of bulldog grip in place of missing nut. Note also, that there are no threads left on the anchor bolt for further tightening of the road-rope. Further tightening would be desirable as a means to dampen bridge sway but would require opening the bulldog grips, shortening the road ropes a small amount and replacing the grips. The present bend in the cable at the thimble could complicate replacing of the grips.

Date: Jan. 1, 1978



11-P-6: The local woods, Tuni and Champ were originally used for crossbeams and planking. These woods are not as strong or durable as sal wood and, therefore, two crossbeams per panel, as shown at A, were used rather than one crossbeam, as called for in the BRC standard design. The well-maintained trail, on the left bank at B, leads to the east of Bajhang District, and to Bajura District. There is much long-distance animal traffic, particularly of goats and sheep, at Malumela Bridge. Note that the goat in the photo is carrying saddle bags for the transportation of goods.

Date: Jan. 1, 1978



11-P-7: Poor condition of planking. Note that there is slack in the hand cable and that the fencing is not wired to the hand cable as it should be.

Date: Jan. 1, 1978

LIST OF ABBREVIATIONS

CEDA	Center for Economic Development and Administration
CEO	Chief District Officer
CDR	Central Development Region of Nepal
DOR	Department of Roads
DAP	District Administration Plan of 1975
DP	District Panchayat
EAST or ECE	East Consulting Engineers
EDR	Eastern Development Region of Nepal
FWDR	Far Western Development Region of Nepal
GON	Government of Nepal
HFL	High Flood Level
HMG	His Majesty's Government
IBRD	International Bank for Reconstruction & Development
IRR	Internal Rate of Return
JTA	Junior Technical Assistant of Department of Agriculture
LDD	Local Development Department
MWT	Ministry of Works and Transport
NCCN	National Construction Company of Nepal
NPC	National Planning Commission
PWD	Public Works Department
PCV	Peace Corps Volunteer
RNAC	Royal Nepal Airlines Corporation
SADP	Small Area Development Program
SATA	Swiss Association for Technical Assistance
SBD	Suspension Bridge Division
STOL	Short Take Off and Landing
USOM	United States Operation Mission
USAID/ Nepal or USAID	United States Agency for International Development, Nepal
UNDP	United Nations Development Program

LIST OF ABBREVIATIONS

WB	World Bank
WDR	Western Development Region of Nepal
3-A-1	Bridge Study Number - Appendix - Appendix Number
3-T-1	Bridge Study Number - Table - Table Number
3-F-1	Bridge Study Number - Figure - Figure Number
3-P-1	Bridge Study Number - Photograph - Photograph Number
0-A-1	Summary Volume - Appendix - Appendix Number
0-T-1	Summary Volume - Table - Table Number
0-F-1	Summary Volume - Figure - Figure Number
0-P-1	Summary Volume - Photograph - Photograph Number

GLOSSARY

- Akhar - very difficult, particularly used for a bad place or a trail.
- Asad - Nepalese month roughly corresponding to June/July.
- Ayurvedic - traditional natural remedies, specifically herbal.
- Babivo - a type of grass from which ropes are made.
- Bada Hakim - the district governor.
- Badi - the entertainment caste.
- Bajar - river bank.
- Bajar ko duun ha - stones from the river bank.
- Baisari Mitari - ritual friendship.
- Bal - a system in which the laborer of certain castes are paid in grains rather than in cash.
- Bakhoo - coarse, handloomed woolen material worn by men.
- Bana-Jhankri - shaman.
- Bensi - low-lying river valleys.
- Bhaili - group singing done during the festival of Idhar.
- Bhanra - rough handloomed cloth.
- Bhatia - small wayside lodge where liquor is served.
- Bhawani - a Goddess' name.
- Bhoto - a short man's shirt.
- Biri - a type of cigarette whose wrapping is made from leaves (also called Biri).
- Champ - a wood indigenous to certain areas of Nepal.
- Chor Jat - the four castes; Brahmin, Chhetri, Knyasa and Yadav.
- Chautra - a resting place along a hill trail.
- Chaudidar - see Snowkicker.
- Chour - side, flat area.
- Chhapro - hut.
- Chidura - beaten rice, usually eaten as a snack.
- Chokho Jat - the clean caste, upper caste Hindu.
- Cholo - short women's blouse, usually worn with a sari.
- Chota - a young man of marriageable age; specific to western Nepal.
- Chota Chotti
Khelno - a place young people meet to sing and dance; similar to the Rodighar.
- Chotti - a young woman of marriageable age, specific to western Nepal.

- Chaukidar - watchman, also Chaukidar
- Chaya ko Jholungo - a suspend bridge made by turned bamboo
- Chupar - bamboo or wood workers caste group
- Churoto - medicinal herb, 'cinchonha'
- Danda - hill
- Dalo - small basket
- Darban - Hindi word for watchman
- Darji - tailor
- Dasain - the most important festival of the Hindu Nepalese
- Daudaha - an inspection committee which periodically tours the district and is empowered to make on-the-spot decisions concerning issues such as land disputes, etc.
- Doula - a folk circle dance; specific to the far western districts.
- Dewali - a Nepalese festival celebrated in October/November
- Dewali - a place where shamans are initiated
- Dhara - spring water tap
- Dharna - approximately 5.28 pounds
- Dhiki - manually operated husking machine
- Dhoti - a single piece man's clothing usually of white cloth wrapped around the lower half of the body
- Dhol Pul - a temporary multi-span bridge made of wood, bamboo, logs etc.
- Doko - a large basket used by porters carried on the back, slung from a rope strap placed over the forehead.
- Doli - a wooden sedan chair used to carry a bride during the wedding procession
- Ekadasi - the eleventh day after the new or full moon, considered a holyday by Hindus
- Gado - a long plain garment tied at the shoulder, generally worn by women
- Gahat - a kind of bean or pulse
- Gau Panchayat - village legislative body
- Ghasar - a long fleck-like garment worn by women
- Ghaleke - a kind of local dress
- Chatra - water mill
- Ghow - ghee
- Goddhuva - a Hindu marriage ritual in which the bride's parents wash the feet of the groom and gave him a gift.

<u>Ghvang</u>	- shrine of the Tamang people
<u>Gunniya</u>	- women's clothing similar to a sari
<u>Gya</u>	- women's blouse
<u>Jat-bazaar</u>	- weekly market
<u>Hulaki</u>	- postion
<u>Jat</u>	- caste
<u>Janto</u>	- manually operated grinding machine
<u>Jansi</u>	- sacred white thread worn by the high caste Hindus
<u>Jatra</u>	- religious fair
<u>Jhankri</u>	- shaman
<u>Jholunge</u>	- suspended bridge
<u>Kaschad</u>	- sash
<u>Karmi</u>	- skilled laborer
<u>Kaun</u>	- kind of millet
<u>Khadder</u>	- handloomed cotton coarse cloth
<u>Khadi</u>	- handloomed cotton coarse cloth
<u>Khampa</u>	- people from Kham, a province in northeastern Tibet
<u>Khas</u>	- the Chhetri people, a term indigenous to the western areas
<u>Khet</u>	- wet farm land
<u>Khola</u>	- a stream or a small river
<u>Khosi</u>	- collective ownership of land, also a parcel of land bestowed by royal command.
<u>Kisana</u>	- miscellaneous retail goods
<u>Kot</u>	- hillock
<u>Kumain</u>	- a sub-group of the Brahmin caste
<u>Lohar</u>	- blacksmith
<u>Lahure</u>	- a person working outside Nepal and also one serving in the foreign armies
<u>Isl Mohar</u>	- royal decree; literally, the 'red seal'
<u>Lama</u>	- a priest or teacher of Tibetan or northern Buddhism
<u>Lekha</u>	- high land, usually ridge areas of a mountain.
<u>Maita</u>	- natal home
<u>Malami</u>	- one who participates in a funeral procession or a funeral procession
<u>Malla</u>	- the ruling family of the Kathmandu Valley between the 16th and 18th centuries.

<u>Mang</u>	- a volume measure roughly equivalent to half a kalogram
<u>Mandir</u>	- temple
<u>Mandro</u>	- bamboo mat
<u>Mang</u>	- Nepalese month corresponding to November/December
<u>Mas</u>	- black pulse
<u>Matwali</u>	- liquor-consuming; applied to certain castes or ethnic groups
<u>Mela</u>	- fair
<u>Mitari</u>	- ritual friendship
<u>Mistri</u>	- skilled laborer
<u>Muietro</u>	- woman's headscarf.
<u>Mura</u>	- a volume measure equal to 20 <u>Pathi</u> or 150 lb.
<u>Maika</u>	- foreman of labor crew
<u>Nali</u>	- tobacco pipe
<u>Naya</u>	- new
<u>Naya Pul</u>	- new bridge
<u>Neba Aba</u>	- social father
<u>Neba Ama</u>	- social mother
<u>Pakho</u>	- dry farm land
<u>Pan</u>	- sin
<u>Panchas</u>	- political workers of Panchayat system
<u>Parbate</u>	- a term primarily used by Kathmandu Valley Newars to refer to other Hindu caste groups
<u>Panna</u>	- system of labor exchange
<u>Pathi</u>	- volume measure roughly equivalent to $7\frac{1}{2}$ lb.
<u>Patwari</u>	- land revenue collector
<u>Pandri</u>	- local folk dance
<u>Phadko</u>	- temporary log bridge
<u>Pradhan Pancha</u>	- head of the village panchayat
<u>Punya</u>	- virtue
<u>Pujari</u>	- priest of a temple
<u>Rash Pakhi</u>	- coarse woolen mats and blankets
<u>Raksi</u>	- distilled locally made liquor
<u>Ram</u>	- fair; term used in the far western areas of Nepal
<u>Rodighar</u>	- community meeting place where people sing and dance.

<u>Roti</u>	- unleavened bread made of wheat or millet flour
<u>Rastriya</u>	- national, as in <u>Rastriya</u> Panchayat, the national legislative body
<u>Sabar</u>	- suede leather
<u>Sahi Sena</u>	- the Royal Army
<u>Saligram</u>	- black stone worshipped by Nepalese Hindus as a manifestation of the Divinity; found mostly in the Kaligandaki River in Nepal.
<u>Salsar</u>	-
<u>Sanskar</u>	- cultural values
<u>Sari</u>	- woman's garment
<u>Sanad</u>	- government decree
<u>Shora Jat</u>	- sixteen castes
<u>Taluk</u>	- tax collection area
<u>Tar</u>	- flat, low-altitude land in hilly areas
<u>Terai</u>	- the southern plains of Nepal; borders India
<u>Tika</u>	- red mark placed on the forehead as a sign of good women
<u>Tuni</u>	- a wood indigenous to certain areas of Nepal
<u>Upa Pradhan</u>	
<u>Pancha</u>	- deputy head of a village panchayat
<u>Varna</u>	- the four major classes of the Hindu caste system
<u>Veda</u>	- the oldest literature of the Hindu religion
<u>Zamidar</u>	- land revenue collector
<u>Zilla Karyalaya</u>	- district office
<u>Zilla Panchayat</u>	- district legislative body
<u>Zimawal</u>	- land revenue collector

2

TRAIL SUSPENSION BRIDGE STUDY

This report contains seven volumes in three different parts as follows :

PART A : Effects of Trail Bridges

Vol: 1 Introduction, Summary and Recommendations

Vol: 2 Case History, Analysis and Findings (Bridges Studied in CDR)

Vol: 3 Case History, Analysis and Findings (Bridges Studied in WDR)

Vol: 4 Case History, Analysis and Findings (Bridges Studied in FWDR)

Vol: 5 Case History, Analysis and Findings (Bridges Studied in EDR)

PART B : Baglung District Bridge Construction Study

PART C : Annotated Bibliography and General Informations on Trails and Trail Bridges in Nepal.

FINAL REPORT 1978

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