Methodology for Monitoring Developmental Works

For carrying out monitoring and evaluation exercise in the state of Himachal Pradesh, the state has been divided into two circles-**North and South**. The North Circle has jurisdiction over Bilaspur, Chamba, Dharamsala and Hamirpur territorial Circles while the jurisdiction of South Circle is spread over Kullu, Mandi, Nahan, Rampur and Shimla territorial Circles.

Method: **Multi stage random sampling method** (also called as cluster sampling) will be used for carrying out sampling. In this method random samples are drawn from primary, intermediate and final units (Range, Block and field activity in this case). Selected units will be monitored for 6 months after which fresh samples will be selected.

• Entire population is divided into clusters **(Ranges)** and a random sample of clusters is selected using computer generated random numbers

• Each cluster is mutually exclusive and together the cluster includes the entire population. No unit from non selected clusters is included in the sample.

• Once the clusters are selected then all units within the clusters **(Blocks)** are considered for second stage random selection.

• In final stage, atleast 15% of works from among the selected Blocks are actually monitored in field.

Formula used for deciding size of sample

$$n = (Z\sigma/d)^2$$

Where, **n**= Sample Size

Z= value at a specified level of confidence   **(1.65 at 90% confidence)**

σ = Standard Deviation of the population   **(number of administrative units taken as variable)**

d= Difference between population mean & sample mean

There are three stages in which the sampling process has been carried out. In total the state has 161 Ranges in nine territorial circles. Each **Range** has been considered as a **primary unit** and sample size has been drawn based on the standard deviation of the population which is 2.9.Thus the sample size at 90% confidence interval is 35.08 or say 36 (for sake of simplicity as incidentally there are 36 Divisions in the state).This amounts to a sampling intensity of 22%. Computer generated random numbers have been used for selecting Ranges

In the second stage, further sample size has been drawn based on the standard deviation of the population (i.e. 108 Blocks falling in these selected 36 Ranges) which is 0.63. Thus the sample size at 90% confidence interval is 38 . This amounts to a sampling intensity of 35%. Thus atleast one Block per Range was selected following the random selection method. For this again computer generated random numbers have been used.

Further in third stage, all the works carried out in current financial year were listed and 15% of the works were selected randomly from each Block for actual field inspection and monitoring.

Criteria for selecting Sample Size at each Level

Sampling Level	Sampling Unit	Population Size	Std. Deviation	Sample Size	Sampling Intensity
Primary	Range	161	2.9	36	22%
Secondary	Block	108	0.63	38	35%
Final	Field Work				15% *
* To achieve overall sampling intensity of approx. 1.7% which falls in range of 0.1-4% accepted for such landscape level monitoring					

The results of the monitoring will be presented on GIS maps (those available with GIS Cell of the department) and an evaluation exercise will then be undertaken.