



**GOVERNMENT OF HIMACHAL PRADESH
DEPTT. OF IRRIGATION AND PUBLIC HEALTH**



TRAINING MANUAL / PLAN

1. INTRODUCTION

The degree, to which the services of water Supply, Irrigation and Sanitation system fulfill their public health functions, varies almost directly with the efficiency and effectiveness of the personnel responsible for manning the systems. This statement is corroborated by experience everywhere. The planning, execution, operation, control and maintenance of these services must ensure:

- I. The protection of the capital investments made
- II. The optimum use of assets created, and
- III. The familiarity of engineers with new products and techniques and prevention of high expenditure on repair and maintenance.

Even if the development goals could be achieved through consultants, designer and contractors, it is only through continuing training that proper operation, maintenance and quality of services are ensured to the entire satisfaction of the consumers.

2. NEED FOR TRAINING

One of the essential prerequisite for efficient execution, operation and maintenance (O&M) of water supply and sanitation is the adequate availability of skilled and trained man-power. This aspect assumes greater importance in view of latest technological advancement and better delivery systems to cover increasing number of consumers in the field of water supply sanitation and irrigation. The need for a new orientation and thrust to improve performance is emphasized by the following important factors:

- I. An unprecedented growth of investment in these sectors to achieve the targets.
- II. To keep pace with the latest technological advancement and satisfaction level of delivery systems.
- III. Specific intricate Technical Problems relating to Public Health works in hilly areas and high altitudes confronted by engineers.

Adequate norms, standard practices, are available for technical problems relating to Public Health engineering Works in plains. Unfortunately for works of Water Supply, Irrigation and Sewerage in hills, particularly in high hills, neither adequate studies have been conducted nor are adequate norms available. HP I&PH Department do not have its own ***Codes and Specifications and Training Cell for training***, although these are the first and the very basic requirements for in-service engineers formulating Public Health Engineering projects, to keep them abreast with the latest advancement in technology and practices.

In hills very High-head, Multi-Stage Pumps and high pressure force Mains, are required unlike in plain areas.

In extreme cold temperature in high regions, problems are still more intricate. At extremely low temperatures behavior of materials become different. Materials tend to become brittle. With rise in elevation, efficiency of pumping machinery also reduces.

Also the soil classification of the region plays vital role in the life of pipes buried.

As for water resources, the natural topography has provided large resources of water through rains and snowfall but providing potable drinking water and irrigation facilities to entire population in the state is indeed difficult task due to:

- I. Rugged terrain.
- II. Scattered population living in the interiors having accessibility problems; and
- III. Limitation of working period owing to climatic conditions.

Because of these reasons, the cost of providing drinking water supply, irrigation facility and making waste disposal arrangements are generally high. In addition, the trainings break the monotony of official's repetitive routine.

The factors discussed above decidedly call for a modified approach for manpower with properly designed training policy program. Training program must be made an essential and integral part of the duty of Engineers and ministerial staff of various levels.

3. TRAINING CONCERNS

With the advent of latest technology, the social and political environment is undergoing rapid change and the Govt. machinery is required to continuously attune to this. Primary concern of the training policy is:

- a) Efficiency and high performance in technical and professional field is expected in addition to learning of cost effective methods of delivery of services.
- b) The employee is expected to be responsible towards the environment and to the challenging democratic needs and expectations of the citizens and organizational and technological developments.
- c) Technological knowhow and knowledge of economic and social developments taking place in the present scenario.
- d) Concept of partnership and participative decision making and commitment to democratic values.

4. OBJECTIVES OF TRAINING

The objectives of training employees primarily is to enhance his knowledge and sharpen the skills for improving efficiency and effectiveness of his working towards achievement of primary goal of his organization and ultimately of the state as a whole. The training should bring about the right

attitudinal orientation and improve efficiency of the official to deal professionally with the requirement of his job and help in creating healthy and cordial atmosphere for smooth conduct of daily business and service delivery. Various long term and short term objectives are elaborated below:-

i) Long Term Objectives

- a) To bring about a qualitative changes in the organizational skills at all levels to achieve the goals with greater emphasis on decentralized governance in rural water supply.
- b) To maintain quality.
- c) To introduce new technologies, management and administrative technique to meet the new challenges / goals.

ii) Short Term Objectives

- a) On induction, to enable the entrant engineers to know the organization as a whole, viz-a-viz their position in the department and their role.
- b) To acquaint them about general administration, financial procedures and their service conditions.
- c) To train the engineers in their respective assignments, both engineering and managerial, so that they are able to achieve the expected level of performance.
- d) To update the skills and knowledge of in-service engineers from time to time, to keep pace with the changing technologies, latest govt. policies & priorities. Continuous trainings/refresher courses would help the engineers to cope with changes and retain organizational viability as well.
- e) To build capacity of stakeholders especially members of PRI's to enable them to construct, operate and manage Rural Water Supply Schemes and distribution of irrigation water in participatory mode.

Training improves the general outlook & personality of the person as he views challenges with a wider perspective beyond departmental orientation.

5. TRAINING COVERAGE FOR ALL

The department has pyramidal structure with number of employees increasing going down the hierarchy. The officers do get opportunities to receive periodic training but the junior staff hardly gets any such opportunities. Even after rendering long services they never get to enter the training institute. Besides resulting in a situation where the employees do not get chance to improve, their skills resulting in poor performance. This also results in bringing about an element of boredom or routine in their working which cannot be considered conducive to their performance. Thus the

training to all employees at regular intervals during their career span shall be ensured on a regular and continuing basis.

6. TRAINING FRAME WORK

HP I&PH department is responsible for the execution and O&M of the following sectors of water resources.

1. Drinking water supply system
2. Irrigation systems.
3. Sewerage systems.
4. Flood Protection works.

In order to accomplish the above tasks, the department has a large infrastructure throughout the state from the foot hills to the lofty mountain heights performing duties under varied topographical and climatic conditions which require varied technical inputs, technologies and management techniques.

The Engineer at various levels of hierarchy in the Department broadly performs for three distinct functions in their sphere of activity.

- I. Administrative,
- II. Financial
- III. Technical

In order to update their knowledge and acquaint them with latest technological developments and management of work force efficiently with human angle in mind, refresher courses are to be designed to suit the requirements of the person and the department as a whole.

7. TRAINING MATERIALS

For in-service Engineers at various levels, the training shall lay special emphasis on practical aspects in addition to theoretical aspects in order to achieve the real goal of the training. Case Studies and Practical Problems need to be discussed and solutions found out. The State specific Technical Manual need to be provided to all participants during training to serve as useful tool for reference in the field. Further IPH Department envisages **development of its own Technical Specification and Codes** for the guidance of the Engineers at various levels, as has been done by many PHE Departments of other states.

8. PARTICIPATION AND SUCCESS OF TRAINING PROGRAMME

No training program will be successful if it does not evolve adequate response from the department to nominate the participants. Generally, it is seen that training had to be postponed or

even cancelled at the eleventh hour due to inadequate number of participants turning up. Such abrupt changes in the program understandably result in loss of energy, time and resources.

Thus the person sponsored for training is required to be spared by his superior and neither should he back out from it without valid reasons, failing which disciplinary action would be taken against him. The TA bill of the employee shall only be passed after receipt of written feedback from the trainee.

9. TRAINING SCHEDULE AND ACTION PLAN

On the basis of TNA, the department would formulate a training plan focusing on separate training needs for different categories of employees. The department would seek the assistance institutes having expertise in the area for conducting such an exercise. It will be ensured that learning outcomes are expressed in terms of specific, measurable, achievable and realistic performance goals. An inventory of all the officials/officers post wise and category wise would be prepared and regularly updated.

- Trainings received by each employee since the date of induction in service.
- Indicating and listing employees who have not received any training.
- Work/assignments handled by each employee without training on the subject.
- Details of number and category of employees trained/retrained.
- Tentative number of employees the department intends to send for training in the next financial year.

The organizational set up of the department and the various functions performed by each in order to implement the policies and programs of the Govt. are elaborated as under:-

9 (a) ORGANISATIONAL SET UP

The department has three distinct cadres viz:

- I. Engineering or technical cadre consisting of graduates, AMIE and diploma holder engineers.
- II. Para Technical cadre consisting of skilled and semi-skilled staff such as Fitters, Pump Operators, Work Inspectors etc. and draughtsman and other staff concerned with drawing and estimation.
- III. Ministerial cadre: to assist the engineering cadre in administrative and financial matters.
- IV. The department is headed by and Engineer-in-Chief supported by Five Chief Engineers.

<u>Detail of Sanctioned Strength of Regular Cadre in I&PH Department.</u>		
1	Engineer-in-Chief	1
2	Chief Engineer	5
3	Superintending Engineer.	21
4	Executive Engineer	82
5	Jt. Controller (F&A).	1
6	Sr. Hydro geologist.	2
7	Deputy Director (law)	1
8	Assistant Engineer	299
9	Registrar	1
10	Private Secretary	1
11	Agriculture Development Officer	2
12	Jr. Geologist	2
13	Jr. Geophysicist	1
14	Assistant Controller (F&A).	3
15	Superintendent Gr-I.	22
16	Planning Assistant	5
17	Jr. Hydro geologist.	2
18	Law Officer	16
19	Superintendent Gr-II.	82
20	Divisional Accountant.	51
21	Circle Head Draughtsman.	14
22	Head Draughtsman.	61
23	Draughtsman.	154
24	Jr. Draughtsman.	174
25	Personal Assistant.	4
26	Sr. Scale stenographer	26
27	Steno Typist	71
28	Senior Assistant	550
29	Clerk	593
30	Junior Engineer	794
31	Sr. Technical Assistant	20
32	Naib Tehsildar	1
33	Ziladar	2
34	Kanungo	2
35	Restorer	2
36	Driver	33
37	Daftri	14
38	Jamadar	15

39	G.M. Operator	1
40	Peon	476
41	Chowkidar	224
42	Sweeper	80
Total: -		3911
43	Pump Operator	
	Live Cadre	2870
	Dying Cadre	499
	Total :-	3369

There are 13 Circles, 50 Divisions, 181 Sub-Divisions and 800 Section (Civil & Mechanical) to carry-out the field work. The Circle is headed by a Superintending Engineer and a Division is headed by a Executive Engineer whereas Sub Divisional and Section Offices are headed by an Assistant Engineer and Junior Engineer respectively.

Head Office at Shimla is supported by SE(W) & CE(D&M) and design cells headed by SE(P&I-I & II), Zonal offices and Circle Offices have designed cells headed by Superintending Engineer(Design) at Zonal Office level & Executive Engineer (D) at Circle Level under overall control of respective head of offices.

Each post is associated with specific set of responsibilities for which slightly different set of traits are required to perform it efficiently. However, for practical purposes almost all the employees are divided into following groups keeping in view the functional aspects of their duties.

1. Senior Engineers : Engineer-in-Chief, Chief Engineer, Superintending Engineer
2. Middle Level Engineers : Executive Engineer, Assistant Engineer
3. Junior Level Engineers : Junior Engineer
4. Field Staff : Work Inspector, Pump Operator, Fitter, Mate, Mason, Carpenter, Electrician, Mechanic etc.
5. Drawing Cadre : Planning Assistant, CHD/HDM, Draughtsman, JDM.
6. Ministerial Cadre : Registrar, Superintendent, Senior Assistant, Clerk PS/PA, Stenographer/Steno etc.
7. Contractors : Not employee but part of the organization. Their Classes are A, B, C & D

9 (b) FUNCTIONS OF VARIOUS OFFICIALS

The nature of their specific functions at various levels is elaborated below:-

Engineer-in-Chief

- I. Overall administrative, financial and technical management and control of various activities of department.
- II. To implement the Govt. practices and to act as a liaison between the department and Govt.
- III. Policy, planning and decision making.

Chief Engineers

- I. Administrative, financial and technical management and control of activities of zone within powers delegated to them.
- II. Planning and supervision of works of the zone.

Superintending Engineers

- I. Administrative, financial and technical management and control of activities of circles within powers delegated to them.
- II. Planning and supervision of works of the circle. Vision for future needs.

Executive Engineers

- I. Administration, financial and technical management and control of activities of division within powers delegated to them.
- II. Project planning and scheduling, keeping in mind present and future social requirements.
- III. Project implementation.
- IV. Technical know-how.
- V. Personnel and human resources management.
- VI. Maintenance of projects.
- VII. Liaison and monitoring.
- VIII. Other miscellaneous functions.

Assistant Engineers

- I. Administration of sub-Divisions, Survey & Investigations.
- II. Project planning.
- III. Project Implementation.
- IV. Liaison and monitoring.
- V. Technical know-how.
- VI. Personnel and human resources management.
- VII. Administration and maintenance of project.
- VIII. Other miscellaneous functions.

Junior Engineer

- I. Survey & Investigations of Projects.
- II. Project planning.
- III. Project Implementation.
- IV. Technical know-how.
- V. Human resources management.
- VI. Other miscellaneous functions.

Ministerial cadre

- I. Registrar
- II. Superintendent Grade-I&II
- III. Senior Assistant/Jr. Assistant/ Clerk, PS/PA/Stenographers & Steno etc.
 - a. Office Procedure/ Service Matters
 - b. Conduct Rules.
 - c. Contractors
 - d. Stores- Acquisition & Maintenance
 - e. Cash and Cash Accounts
 - f. Reports and Returns
 - g. MIS activities
 - h. Other Misc. works

Drawing Cadre

- I. Preparation, checking of preliminary, special repair, annual repair, working, detailed and revised estimates.
- II. Preparation of structural design and standard plans.
- III. Preparation of schedule of quantities, comparative statement, justification for processing of tenders
- IV. Checking and approval/acceptance of tenders
- V. Preparation of Annual Plan, Master Plan.
- VI. Updating of inventory.
- VII. Compile, process, maintain and supply statistical data in desired form.
- VIII. Preparation of data on achievement under various activities
- IX. Preparation and revision of manuals, standing instructions, standards, codes specifications, schedule of rates, analysis of rates, yard sticks and cost indices
- X. Checking all types of claims of contractors

Pump Operators

- I. Running and Maintenance of Pumps as per pump operational Manual.
- II. Up Keep, functional and Mechanism of pumps, motors etc.
- III. Use of Gauges and Meters.
- IV. Starting and stopping systems of various types of pumps.
- V. Maintenance of Log Books for operation and performance of pumping machinery with details of repair whenever carried out.
- VI. Periodical check up of various types of pumps.
- VII. Periodical maintenance of various components of equipments and Suction and delivery pipes and valves.

9 (c) TRAINING SCHEDULE

The training schedule shall be spread and distributed among the various units/levels in such a way that maximum number of persons attends training /workshop/refresher/ course once in a year and at the same time the functioning of the Department is also not hampered. The critical periods like summer and assembly session shall be especially kept in view when officers need to be sponsored very judiciously.

Training schedule for refresher courses is bifurcated at two different levels.

I) Senior & Middle level

This level will cover Chief Engineers, Superintending Engineers and Executive Engineers. The training to these officials is proposed to be conducted through reputed Training Institutes recognized by the Ministry of Urban Development, CPHEEO, Govt. of India. In addition trainings at ESCI Hyderabad, NIRD Hyderabad, National Productivity Council, National Water Academy Pune and other similar Training Institutes needs to be arranged.

Opportunities for foreign training shall be provided to meritorious officers through objective selection criteria. Such trainings lead to exposure to latest technologies being adopted in other countries. Such trained persons should be posted at locations where they can utilize the training received and also act as mentor to others.

II) Middle and Junior Level

This level will cover Executive Engineers, Assistant Engineers, Junior Engineers and other technical operational staff like Pump operators etc. This training is proposed to be organized in House at HIPA, Shimla, State Training Centre, Mandi and other zonal and circle headquarters etc. All training for Ministerial staff will also be conducted in house.

Details of technical training courses for engineers and courses for ministerial staff are given in Annexure-I & II

9 (d) TRAINING CURRICULUMS

(I) For Engineer-in-Chief & Chief Engineers

- Governance of urban water supply, irrigation and sanitation system.
- Recent water treatment Technologies.
- Total water quality management.
- Maintenance management of water supply, irrigation and sewerage systems.
- Decentralized planning, development and governance in Rural water supply as per the guidelines of GOI in NRDWP.
- Decision making Decision Support System (DSS) and Management Information System(MIS).
- Project Monitoring and Management
- Quality Assurance
- E-procurement

(II) For Superintending Engineers

- Water supply Management.
- New development in Water Treatment Plants.
- Water Treatment Plant Design.
- Decentralized governance in rural water supply.
- Quality Assurance
- Project Monitoring and Management
- Disaster Management
- Construction and contract Management & Safety in Construction
- e-procurement

III) For Executive Engineers & Assistant Engineers

- RTI Act
- Water supply Management.
- New development in Water Treatment Plants.
- Water Treatment Plant Design.
- Design of Public Health engineering structures.
- Corrosion Control.
- Computer aided design for pipelines.
- Quality Assurance
- Project Monitoring and Management
- Disaster Management
- Construction and contract Management & Safety in Construction
- e-procurement
- Interpretation of various clauses of agreement
- Rules and Acts pertaining to the department
- Inventory Management
- Stress Management

IV) For Junior Engineers

- RTI Act
- Water supply & Distribution Management.
- Quality in construction
- Disaster Management
- Construction Management & Safety in Construction

- Rules and Acts pertaining to the department
- Inventory Management

V) For Ministerial Cadre :

**Superintendent Gr.-I&II, Senior Assistant
Junior Assistant, Clerk, PS/PA/Stenographers/Steno etc.**

- a) Office Procedure/ Service Matters.
- b) Conduct Rules.
- c) Contracts
- d) Stores-Acquisition & Maintenance.
- e) Cash and Cash Accounts
- f) Reports and Returns.
- g) Working in e-iph modules.
- h) RTI
- i) Stress Management
- j) Gender equalities
- k) Consumer Protection Act.
- l) Human rights/ citizen charter

VI) Drawing cadre

**Planning Assistant, Circle Head Draughtsman, Divisional
Head Draughtsman, Draughtsman & Junior Draughtsman**

Trainings regarding preparation and checking of preliminary, working, detailed and revised estimates, standard plans, IS codes and specifications, analysis, justification of rates, computer aided designs and drawings, AUTOCAD and drafting tools is proposed to be imparted.

VII) Field Staff

I) Work Inspector, Mortar Mate, Work Supervisor & Work Mistry

Training regarding supervision of the execution of pump house, sump wells, storage tanks and other structures. Maintenance of cement consumption register and record keeping of all the material to the works, maintenance of history card of hand pump, training on procedures of warabandi agreed to by the KVSs of the schemes.

II) Pump Operators, Pump Attendant & Helper

The life and performance of various types of pumps is solely in the hands of Pump Operators, unless he is properly trained and acquainted with the working and performance of particular type of pump he is manning, the life of the equipment is shortened and there are frequent break downs. Due to interruption in supply, the machinery works at low efficiency. The training of pump operators is therefore very vital in the larger interest of smooth functioning of water supply and irrigation system and reducing the O&M cost of pumping machineries.

III) Fitters, Assistant Fitter, Pipe Lineman, Keyman & Beldar

Training regarding assembly, fittings, installation, maintenance and repair of plumbing pipe fixtures, fittings for water supply and sanitary, drainage systems would be imparted. Besides, training for laying, jointing all kind of pipes and special i.e. CI, GI, PVC lead pipes, making ferrule connections repair to leakages, methods of chlorination of water supply schemes, routine maintenance of hand pumps etc.

IV Driver, Cleaner & Mechanic

Training in technical repair and maintenance schedules of vehicles, workshop training, driver manual, training in other machines and disaster management is to be imparted.

9 (e) TRAINING FACULTY

Training is a field that demands knowledgeable, experienced, devoted, sincere and dedicated trainers possessing adequate, communication skills.

For the selection of dedicated trainers, we may identify various dedicated Departmental Engineers. This way Department can manage in house Training programme with easily available faculty of its own.

9 (f) TRAINING FEED BACK

The training programs are to be evaluated in a scientific manner during or at the end of the program. The feedback is to be taken from the trained personnel and the improvements in their working after training also needs to be assessed. Based on these inputs the course contents is to be modified for further training programs.

9 (g) EXCLUSIVE TRAINING CENTRE

All well established Public Health engineering (PHE) Departments like CWC, TWAD, KWA, NWA, GWSSB etc. have their own independent training centers with adequate infrastructure facilities to make in-house training program really effective.

It is of utmost importance that IPH Department has an independent Training Centre in the state. For this, State Training Centre at Mandi is being established, which can be effectively used for conducting various campus training of the department.

For middle & lower level officials and ministerial staff training can in addition, be arranged at HIPA, Shimla which would be “Apex” training institution for imparting training keeping in view the infrastructure available with them.

9 (h) TRAINING ON CODES & SPECIFICATIONS

Adequate studies have not so far been made with regard to Public Health Engineering works in any hilly areas and high altitudes. Even our CPHEEO manuals do not throw adequate light to deal with specific hilly region problems.

Our water supply schemes involve very high head, requiring multi-stage, high head pumps, special quality pipes like API, MSERW etc. These problems are not encountered in plains. Similar is the case of Sewerage System in our undulating terrain and sewage treatment in cold climatic conditions. Improper or inadequate functioning of Sewage Treatment Plants can spoil our precious environment and pollute water sources. Thus an official is expected to have a fair knowledge of codes and specifications relevant to the department for which training needs to be imparted.

10. TRAINING METHODOLOGY

Trainings would be imparted at various institutes within and outside the State. Foreign trainings would selectively be provided to senior level officers. HIPA would act as “APEX” training institute. In addition in home and outdoor trainings would help lower rung field staff to improve their skills. The pedagogical tools would depend on the target group. All available modern methods of training like lecture, group discussions, project work, audio visual materials, printed materials, case studies/action learning, brain storming etc. shall be used. The department would evaluate the impact assessment of training in case of each type of training and the propose future training accordingly.

I. FOREIGN TRAININGS

Opportunities for foreign training shall be provided to meritorious officers through objective selection criteria. Such trainings lead to exposure to latest technologies being adopted in other

countries. Such trained persons should be posted at locations where they can utilize the training received and also act as mentor to others.

II. TRAINING IN INSTITUTES OUTSIDE STATE

Various refresher courses are undertaken by PHE departments and departments specialized for imparting trainings only these refresher courses take into account the level and the background of participants, the period for which the trainees can be conveniently spared for training.

PHE departments of all the states have their own Training Cells for imparting Refresher courses. In addition, there are other organizations in the country who are working exclusively for public health engineering trainings. These organizations have brought out manuals on Water Supply, Irrigation, Sewerage and various other aspects of Public Health Engineering from where help can be taken. These organizations are:

Central Public Health & Environment Engineering Organization, (Ministry of Urban Development, Govt. of India), National Environmental Engineering Research Institute (NEERI), Indian Water Works Associations (IWWA), Central Water Commission (CWC), Engineering Staff College of India (ESCI), National Water Academy (NWA) and Kerala Water Authority (KWA) etc.

In addition capacity building trainings, training on stress management, human resources development, knowledge management (KM) are undertaken by various Govt. agencies such as National Productivity Council etc.

III. OUTDOOR TRAINING

These can be conducted on the site of actual works in the field where works are in progress. Training such as pipe laying, running and maintenance of actual treatment plant, pump installation, leak detection, operation of the fire hydrants, pressure measurement and disinfection of new lines, lines after repairs and reservoir etc. can be imparted at site to learn

- I) Actual running and maintenance of Treatment Plant.
- II) Actual running and maintenance of pumping machinery.
- III) Actual running and maintenance of sewage treatment plant
- IV) Actual running and maintenance of Irrigation schemes.

IV IN HOUSE TRAINING

For in-house training, faculty can be arranged from within Department i.e. senior engineers like Superintending Engineers, Executive Engineers etc. having aptitude for imparting training with sound background / experience and knowledge of field work. Their skill for imparting training can be

enhanced by sending them to various refresher courses organized by Ministry of Urban Development, CPHEEO and other reputed training institutes. Further these trainers can be encouraged by paying them a suitable honorarium.

Faculty can also be obtained from PHE departments of other states running their own training programs and also experienced trainers and technical experts available in:

- a. CPHEEO, Govt. of India.
- b. NEERI, Nagpur.
- b) IWWA- Mumbai.
- c) Faculty in Environmental Engineering from various Technical Institutes
- d) Faculty for Training of Ministerial cadre can be arranged from HIPA and NIC.
- e) NICD New Delhi.
- f) NIRD Hyderabad.
- g) NPC (National Productive Council)

The training can be imparted in their institutions as per their training calendar.

V TRAINING AT INDUCTION OR PROMOTION

New recruits may have academic qualifications for the post but is not familiar with the setup of the department and its functions. Training on office procedure and rules at induction level to all categories can create a confident and efficient task force thereby improving the service delivery of the department.

During promotion, trainings are must so that employee is able to handle the new responsibilities that he has to shoulder on up gradation. With technology, working trends are changing very fast; refresher courses at frequent intervals are required for all level of employees to keep them abreast with latest advancements.

VI TRAINING AT HIPA

HIPA retains its position as 'Apex' training institution for conducting trainings for the officials of the department in view of the location, infrastructure, resource persons and faculty available with the Institute. HIPA has expertise in offering courses on official procedures computer training and on State related issues which would come handy for imparting training.

11. LIBRARY

IPH Department must become a regular member of following institutions to keep its knowledge updated:

- Bureau of Indian Standard (BIS), Manak Bhawan, New Delhi.
- Indian Water works Association, Pipeline Road, Vakola Mumbai.
- National Environmental Engineering Research Institute (NEERI) Nehru Marg, Nagpur.

Further a rich library full of latest literature, books, journals, codes manuals, periodicals for making reference by the Trainers and Trainees is a must particularly in respect of Indian Standards Relating to Water Supply, Sewerage and Irrigation.

- WHO reference books from WHO Office, New Delhi.
- Manuals on Water Supply, Irrigation and Sewerage from CPHEEO, Nirman Bhawan, New Delhi.
- Manual on Operation & Maintenance of Water Supply System-CPHEEO, Government of India.
- Proceedings of various seminars on Water Supply and Sewerage by NEERI, Nagpur.
- Standards Text Books. Journals.
- IS Codes related to department activities.
- Books on design of various structures, irrigation schemes, water distribution system, sewerage system etc.

12. TRAINING MANAGER

The department has designated Superintending Engineer (Works) as Training Manager-cum-Nodal Officer (Trainings) who will responsible for review and monitoring of the Training Plan. System for evaluating usefulness and effectiveness of the trainings would be evolved. Continuous update of feedback is to be ensured and trainee is expected to acquaint his colleagues and superiors with his updated knowledge. Date bank of feedback would help finalizing of syllabus of the courses and now courses required being undertaken, which would be monitored by the training manager. Standard of performance and best practices would be established to act as bench mark for others employees to follow.

13. TRAINING BUDGET

Imparting trainings also involve sufficient funds and it is necessary that earmarked budget is available for trainings so that quality of training is never compromised because of inadequate funds. As per the guidelines of the National Training Policy, 1996 and the policy decision of Govt. of H.P. a specific earmarking of 1% of salaries head of annual budget of I&PH department under training head is to be made.

14. MONITORING AND GUIDANCE

A Training Review Committee of IPH department would be constituted to monitor and review the work of training of employees comprising of following officers:-

1. Principal Secretary(IPH)	Chairman
2. Engineer-in-Chief	Member
3. Director, HIPA	-do-
4. Chief Engineer(D&M)	Member
5. Chief Engineer(Shimla Zone)	-do-
6. Chief Engineer(Mandi Zone)	-do-
7. Chief Engineer(Dharamsala Zone)	-do-
8. Chief Engineer(Hamirpur Zone)	-do-
9. Superintending Engineer(W)	Member Secretary

The Training Review Committee would meet at least once every quarter to review the work of training of employees in the department. The committee would consider:

1. Finalization of Annual Plan for the training of employees for imparting delivery of services to the public.
2. Monitoring and review the action plan vis-à-vis target and achievements in the field of trainings imparted to the employees.
3. Finalize the design and implementation of training courses and modules for training.
4. Identify and assess the thrust areas keeping in view the emerging issues on which the training is to be provided.

15. THRUST AREAS

This in order to cover various training concerns of the Govt. following emerging trends needs special focus:-

I) RTI Act

The enactment of RTI Act 2005 by Govt. of India and its adoption by HP Govt. through HP RTI rules, 2006 has increased the accountability of employee immensely. The prime aim of the Act is to ensure transparency and accountability in the working of every Public Authority. Hence it has become very important for every employee to have proper knowledge of the Act. The working and record keeping has to be systematic so as to enable prompt provision of information to applicant and rendering fast and effective service to people.

II) Disaster management

The department of I&PH has also prepared its own disaster management plan in alignment with the state Disaster Management Plan. The planned and systematic approach towards disaster management requires in depth knowledge of the subject and the employees are required to be trained in preparedness, mitigation and post disaster rehabilitation. An exhaustive training in disaster management is to be provided as ensuring water supply during emergent conditions of fire, flood, earth quake etc. is essential for survival of affected people. Disaster management, requires a multi-disciplinary approach and hence a strong coordination mechanism between various department of the state. I&PH department have also prepared its own disaster management plan in alignment with the state Disaster Management Plan. The planned and systematic approach towards disaster management requires in depth knowledge of the subject and the employees are required to be trained in preparedness, mitigation and post disaster rehabilitation. An exhaustive training in DM is to be provided as ensuring water supply during emergent conditions of fire, flood, earth quake etc. is essential for survival of affected people.

III) Information technology

Information technology has resulted in paradigm shift in all spheres of life. Applications of Information Technology have resulted in speedy and efficient in working. The department has been fully computerized up to Sub-Division level. Internet facilities have been provided to all divisional offices. The department is working on MIS module prepared with the help of NIC. Following activities have been initiated by the department.

Sr. No.	Module	Description
1	e-Service	Personal MIS
2	e-Sanchalan	Execution of works
3	e-Sameeksha	Monitoring of works
4	e-Samadhan	Public Grievances Monitoring System
5	e-Procurement.	All procurement, tender processing online
6	Inventory Management Module	Online updating of inventory particularly GI/DI Pipes etc.

In house trainings are being given but still the number of I.T. literate persons in the department is very small. A rigorous training module needs to be drafted to make employees' computer savvy.

IV) e-procurement

The Govt. has decided to adopt e-procurement as a mode of service delivery for which call, processing, finalization of tender and payment to contractors is all to be done online. The Digital Signature Certificates (DSC) of the officers delegated powers of procurement are required to be obtained. Detailed trainings for use of DSC and online procedures for e-procurement is required to be imparted to the officers and officials involved in tendering and finalizing procurement.

V) Quality Assurance and Quality Management

Introduction to quality, planning and control of quality during design of structure, quantitative techniques in quality control, quality assurance during construction, inspection of material and machinery, in process inspection and test, preparation of quality manual check list and inspection report, establishing quality assuring system, quality standards and codes in design and

construction, concept and philosophy of total quality management (TQM) Training in quality management systems (ISO-9000).

VI) Project Planning, Monitoring, Management & Control

Work-study, work breakdown structure, time estimates, applications CPM/PERT, statistical concepts, man-material-machinery-money optimization, scheduling, monitoring, updating, cost functions, time cost trade off, resource planning leveling and allocation. Resources based networks, crashing, master networks, interface activities and dependencies, line of balancing techniques, application of digital computers.

VII) Ethics values and Attitude

The training would emphasize adequately on administration based on values and ethics to build healthy and friendly administrative environment and stress on positive attitude and work/culture. Attitude of a person affects working of the department, he is working for. As attitude plays an extremely important role in his/ her performance. Thus in spite of the availability of the best of the knowledge and skill, the ability to provide the desired services may still be found wanting in individuals if they are not imbued with appropriate attitudes. It has been observed that training is presently concentrated mainly in the area of acquisition of knowledge and up gradation of skills and very little emphasis is given on attitudinal changes. The aspects of behavioural science particularly in calculate positive attitude in an employee needs to be added to training curriculum at all levels of trainings. After undergoing such training the employees develop a sense of belongingness to not only the organization but to the society as a whole.

Counting the numerical places of the alphabets of the word ATTITUDE adds to 100.

$$\begin{array}{cccccccc} \mathbf{A} & \mathbf{T} & \mathbf{T} & \mathbf{I} & \mathbf{T} & \mathbf{U} & \mathbf{D} & \mathbf{E} \\ \mathbf{1} + & \mathbf{20} + & \mathbf{20} + & \mathbf{9} + & \mathbf{20} + & \mathbf{21} + & \mathbf{4} + & \mathbf{5} = \mathbf{100} \end{array}$$

This means that positive change in attitude can result in 100% improvement in the personality of an individual reflecting in his performance and increase in his efficiency to optimum level.

REFRESHER TECHNICAL TRAINING COURSES FOR ENGINEERS

1. PROJECT FORMULATION & REPORT

Preliminary Project Reports, presentation of preliminary project Reports, Detailed Design, Detailed Estimate & Capital Cost and Detailed Estimate of Annual Maintenance Cost, Execution of Project.

2. PLANNING OF WATER SYSTEM

General, Per capita demand, Water Quality & its standards, Plant Layout, Automation, Design Period, Conveyance of supply, Distribution Works, pressure requirements, Capacity.

3. WATER VOLUME

General, Factors affecting consumption, Domestic and nondomestic requirement, Institutional needs, Water requirement for live stock, Industrial Needs, Fire demand, Quality of Water required For Treatments Plants, Un-accounted water.

4 GENERAL HYDRAULIC & MEASUREMENT OF FLOW:

General properties of water& ice , Water Pressure, Dimensions of Pressure, Gauge and Absolute Pressure, Measurement of flow, Triangular, trapezoidal weirs, Orifices, Open channels, measurements of Rainfall, Compilation of average rainfall over a basin, Estimation of maximum run off, flood discharge, Hydrograph Analysis.

5. QUALITY OF WATER

Water Quality surveys, Water Quality criteria, standards for Physical and Chemical quality of water as per CPHEEO, Sanitary Analysis & field investigation of water for use as raw water source, Industrial water, quality standards.

6. SURFACE WATER COLLECTION

Surface supplies, Rainfall and Run off, storage of water, intakes, intake weirs or diversion dams, selection of site for a dam, Planning, Selection of site, Storage capacity & Yield.

7. SPEIFCATIONS FOR VARIOUS TYPES OF PIPES

General, Cast iron Pipes, Jointing of Cast iron pipes; D.I. Pipes, steel Pipes; Pipes conforming to IS:1239, IS:1978, IS:1979, IS:3589. Pipe fittings for steel Pipes, Welding and Fabrication, AC Pipes,

Concrete Pipes, Per-stressed Concrete Pipes, SW Pipes, HCl Pipes, Plastic pipes, cost reduction in use of Pipes, selection of pipes.

8. CONVEYANCE OF WATER AND DESIGN OF PIPE LINES

Pressure Pipe Lines and its hydraulic design, capacity and size of conduit, Required capacity of various Water Work Systems Twin Lines, Water Hammer, Routes, Depth of cover, Structural Requirement and selection of Pipes, Design of Wall thickness of Pipes, Barlow's Equation, Relation of design to service failure, Design of flanges, Determination of Economical dia, Appurtenances in Water system, Profile of Pipe line, Hydraulic Grade line, laying of Pipe line, Testing of Pipe lines, Practical hints on Pipe Testing.

9. GROUND WATER FLOW AND ITS COLLECTION

Geological Engineering Considerations, Hydraulics of Ground Water, Instrumentation and its Principles of operation, Test-Bores, Tapping of underground Water, Formula for flow under equilibrium conditions, Driven Wells, Bored Wells, Jetted Wells, casing of Wells, Selection of screens, Infiltration Wells, Radial Collector Wells, Darcy's Law, Water Bearing soils & their classifications, infiltration Galleries, Well development & testing, shrouding or Grovel packing of tube Wells, Sanitary sealing of Wells, Borehole verticality & its checking, well failure & their remedies , improvement of existing wells, Springs.

10. WATER TREATMENT WORKS

Introduction, site selection of Treatment Plant, sequence of various methods of water treatment, coagulation, flocculation, Flocculation Equipment, Sedimentation, Filtration (1) slow sand (2) Rapid Sand (3) Pressure, Filters, Rectification and Upgrading of existing water Treatment Plants. Design Parameters for Water Treatment Plant.

11. DISINFECTION

Chlorine & its Properties, Factors Affecting Efficiency of Disinfection, Effects of Chlorine on Microbial Life, Disinfection and Disinfectants, application of Chlorine, Other Uses of Chlorine, Computation of doses of Chlorine, Technology of Water chlorination, chlorinators, use and care of chlorine gas cylinder, Erection of gaseous chlorinators, safety considerations, check list for chlorinators and chlorine rooms.

12. CORROSION CONTROL & SCALE REMOVAL

Introduction, Indication of Corrosion factors which influence corrosion, effects of dissolved substances on corrosion (a) Gasses (b) Calcium carbonate. Influence of corrosion on carrying capacity

of Water mains, Control of internal corrosion of Pipes lines, Protective coating, Laboratory control, Soil Corrosion, Protective Measures for external corrosion.

14. WATER SUPPLY & SANITATION IN EMERGENCY

General considerations, planning: Materials, Equipment & Vehicles etc., needs during Emergencies. Types of Emergent situations: (a) Strikes (b) Hazards in water works (c) Floods (d) Earth Quakes (e) Wars: Waste Disposal: (i) Sewerage system (ii) Excreta Disposal, Disposal installations (Privies), Urinals, Baths, Public Education.

15. WATER, SANITARY & SEWERAGE PROBLEMS IN HIGH ALTITUDES

Introduction, Terminology, High altitude & cold regions, Effects of Low Temperature on different Phenomenon: (a) Physical (b) chemical (c) biological (d) Low Barometric Pressure: Water supply system : selection of Source, surface Water, Ground Water, Pumps, Water quality, Treatment Works, Transmission & distribution lines, Storage, Waste Disposal system, sewerage system, sewage Treatment, septic tank.

16. PUMP TYPES, ITS OPERATION & MAINTENANCE

Type of pumps, its operation & maintenance, periodical check-up, causes of failure and remedial measures, do's and don'ts for pumps, spare parts of pumps such as impeller, shaft, bearing, casing etc., spare parts of motors, rewinding, replacement of bearings and alignment of pumps and motors, working of panel board parts such as starters, circuit breakers and transformer ratings, load frequency, improvement of power factors, tariff structure as per HPERC regulations for peak load, peak and normal timings, billing, consumption, surcharge.

17. LABORATORY PROCEDURES

Introduction: Physical, Chemical, Bacteriological, Microscopic tests, Collections of Water samples, sample containers, Sampling Procedures (a) sampling from River, Stream, Lake, Reservoir or shallow well, Sampling of hand pump Water, Sampling of Water from a tap on distribution, Data related to sample, Preservation and storage of sample, Frequency of sampling, Expression of Test results.

18. OPERATION & PREVENTIVE MAINTENANCE

Introduction, Maintenance of equipment, Maintenance of distribution system, Material for maintenance, Chemicals, Tools, Spare parts, Fire Extinguisher, First aid Boxes, Miscellaneous items, General Cleanliness, Health and Welfare of Water Works Personnel, Maintenance of Water Treatment Plants, Handling Complaints.

19. SEWERAGE SYSTEM

Sewerage system & its significance, separate versus combined system, Design considerations and survey & general investigations. Project Reports: preliminary project-Report, Detailed Project Report: Plants & Layout, system pattern, Practical Hints for designing of a Sewerage system & field Work, Design period, Population forecast, carrying capacity, Minimum size of sewer, Minimum & maximum velocity, Field book for junctions. Connection of existing open drains, Manholes, spacing of manholes, Vent columns, Material for sewers, Calculations for design of sewer lines, flow measuring devices, Parshall Flumes. Special considerations for planning sewerage system in Hilly Areas, Layout, Carrying capacity, Materials for sewer lines, Inspection chambers, specials, Hatch Boxes.

20. SEWAGE TREATMENT

Introduction, Waste Water quality and treatment required, Population equivalents, assimilative capacity of streams. Types of Treatments: (a) Preliminary (b) Primary (c) Intermediate (d) Secondary (e) Tertiary, Expected Efficiencies of various treatment processes, Cost estimates, Sedimentation, Septic tanks, soakage Pits, Aeration Tanks, Sludge Digestion, Digester capacity, Sludge Drying Beds, Oxidation Ditch, Aerated Lagoons, UASB, Package Sewerage Treatment Plants.

21. HYDROLOGY PROJECT-II

Research and development oriented nature of World Bank funded Hydrology Project-II necessitates extensive training programmer for employee involved in the project for achieving desired outcome. Various training proposed under hydrology is Geographical Information System (GIS), Methods of measurement of discharge on the G&D station over rivers, Water quality and Management, Hydro met Observers and application water resources.

22. MEASUREMENT OF IRRIGATION WATER, ITS APPLICATION

Methods of water measurement, weirs, parshall flumes, orifices and meter gates, border Irrigation, check basin irrigation, furrow irrigation, sprinkler irrigation, drip irrigation.

23. PROCUREMENT PROCEDURES

Procurement procedures for the World Bank aided project, surface water data validation uses HYMOS Software, Environmental aspects of water resources projects, Analysis of basic water quality parameters in ground, Hydro met observers training etc.

24. SAFETY IN CONSTRUCTION

Concept of safety, factors affecting safety, physiological, psychological and technological planning for safety provisions, structural safety, safety consideration during construction, safety during demolition and during use of equipment, management of accidents, injuries and provisions of first aid, provisional aspects of safety, site management with regard to safety recommendations, training for safety awareness and implementation, formulation of safety manuals, safety legislation, quality versus safety, case studies.

25. CONSTRUCTION AND CONTRACT MANAGEMENT

Project cost estimation, rate analysis, overhead charges, bidding models and bidding strategies, qualification of bidders, owner's and contract's estimate, Tendering and contractual procedures, Indian Contract Act, 1872, definition of contract and its applicability, conditions and specifications of contract.

26. ENVIRONMENT IMPACT ASSESSMENT

Planning and Management of Environment Impact studies, impact identification methodologies: base line studies, screening, scoping, checklist, networks, overlays, prediction and assessment of impacts on the socio-economic environment, environmental cost benefit analysis, decision methods for evaluation of alternatives, case studies, environmental impact assessment at project level, regional level, sectoral level and policy level. Sustainable development, environmental policy in planned, mixed and market economies and preventive environmental management.

27. TENDERING PROCESS, PROCEDURE AND CLAUSES OF AGREEMENT

Execution of works through contractors, type of tendering processes, tendering agreement its clauses and their interpretation, contract administration, claims, compensation and disputes, dispute resolution techniques, arbitration and conciliation act 1996, arbitration case studies, professional ethics, duties and responsibilities of parties

28. NRDWP GUIDELINES

Concept and approaches of NRDWP guidelines, water quality testing, community participation in source sustainability, equity and operation and maintenance (O&M), preparation of village and district water security plan, sensitization program on planning and innovation for recharge of water sources and water harvesting structures, IEC skill (particularly with the community and PRI) and planning, coordination, online entries and monitoring of data as per prescribed software, decentralized water governance.

REFRESHER TRAINING COURSE FOR MINISTERIAL CADRE

- I) Office Procedure
- II) service Matters
- III) Conduct Rules
- IV) Contracts
- V) Stores-Acquisition & Maintenance
- VI) Cash and Cash Accounts
- VII) Reports and Returns.
- VIII) Computer Basics.
- IX) Working in various MIS modules of IPH
- X) RTI ACT 2005 and HP RTI Rules 2006.
- XI) Stress Management & Attitude changes
- XII) Gender equality.
- XIII) Rules and acts pertaining to IPH department such as Land Acquisition Laws, Forest Conservation Act, Ground Water Act, Minor Canal Act, Water supply Act, Income Tax Act, VAT/Sales tax Act etc.