Balh Valley Medium Irrigation Project, Himachal Pradesh- A case study

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Abstract

Indian economy mainly depends on agriculture. Even today more than 65 % of the total population stays in rural area and associated with agriculture activities. They are directly or indirectly dependent on agriculture for their survival. Irrigation is a vital input for increasing the productivity of crops. The irrigation potential utilized is less than the irrigation potential created. Despite significant progress in the creation of irrigation potential, under-utilization continues to persist. Himachal Pradesh is not an exception for the same.

Adoption of piped networks and /or micro irrigation systems in canal command areas in the country would help us to increase the area under irrigation and result in making the entire system economically viable. Such adoption would lead to huge water savings, increase in agricultural productivity, considerable savings in inputs, social justice and many other advantages.

With the above objectives, the work of development of Balh Valley Medium Irrigation Project in Himachal Pradesh was undertaken in an integrated manner during 2009-12. The project has been completed successfully and is under Operation and Maintenance with the contracting company, Jain Irrigation Systems Ltd. The project concept, salient features, components, difficulties, challenges faced during execution and solutions are explained in this paper.

1. Project Concept:

Under this unique project, water is brought to the De-silting unit through siphon on BBMB (Bhakra Beas Management Board) canal by gravity. The silt is separated and water is then pumped from the sump to the Main Conveyance Line to irrigate 2355 Ha command area situated at the upper and also lower portion of the Main Conveyance System (MCS) through lift schemes and gravity schemes. Delivery Chambers have been provided on the top most elevation in the command area for each lift scheme. Water is then distributed by gravity to the fields. The scheme has a provision of installation of sprinkler irrigation systems through gravity. It is a fully automatic scheme having SCADA control and latest instrumentation. There is also a provision of about 17 tube wells along with pump sets to irrigate some 600 ha land on right bank canal.
2. **Salient Features of the Project:**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Near Sundernagar, Dist : Mandi (HP)</td>
</tr>
<tr>
<td>Area to be Irrigated</td>
<td>5,817</td>
</tr>
<tr>
<td>No. of Beneficiaries</td>
<td>7,500</td>
</tr>
<tr>
<td>Water Source</td>
<td>BBMB Canal</td>
</tr>
<tr>
<td>Project Cost</td>
<td>65 Crores</td>
</tr>
<tr>
<td>Cost Per Acre</td>
<td>1,11,700</td>
</tr>
<tr>
<td>Period for Completion</td>
<td>36 months</td>
</tr>
<tr>
<td>Handed Over On</td>
<td>2012</td>
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<tr>
<td>Maintenance Contract</td>
<td>5 Years</td>
</tr>
<tr>
<td>System Type</td>
<td>Pressurized &amp; Gravity Sprinkler</td>
</tr>
</tbody>
</table>

**Components Executed By Jain Irrigation**

1) 900 mm to 450 mm HDPE Rising main 18.48 Km  
2) Gravity Irrigation Schemes 10 No  
3) Tube wells 17 No  
4) De-silting Unit 1 No  
5) Outlets More than 1000 No  
6) Pump house cum panel room 1 No  
7) Lift Irrigation schemes 13 No  
8) Sprinkler Irrigation 2780 Ha

3. **Issues, Difficulties faced and solutions**

**Planning Phase:**

**A. Inadequate Input/Available data:** Topo sheet at scale of 50000:1 for whole district, No clear-cut demarcation of irrigable area was marked/given. Levels of key stations/lifts & flows with no conformation.

**Solution:** We carried sample survey/verification for sample data, Pushed department to hold accountability for data within +/- 5% range for any financial variation.

**B. Automation:** No automation concept/philosophy available but only broad expectations.

**Solution:** We were not equipped with expertise/experience on integrated Irrigation System and of such level of automation. However what good we did is to almost 100% of parameters were identified but effective solution then we perceived was majorly on hydraulic valves.

**C.** We didn’t have any ground/experience available for execution of such a large size project.

**Solution:** This lacuna/ disadvantage was minimized due to lump-sum nature of project as the competitors were also not equipped for higher risk factor & lack of expertise in Irrigation network designing & automation.

**D.** The conversion of canal to closed conduit:

**Solution:** The very nature of terrain & training/atmosphere in which we developed has negated the possibility of any canal and we challenged our comfort zone by trying hard for working endlessly on multiple hydraulic designs & economy. The questionnaire from Department has further pushed
us to evolve for meeting the requirements. It’s probably can do feeling and must do approach has resulted in acceptance of Department on our proposal. It’s about 8 months of continuous pursuance/presentation/meetings/clarifications ended up in conversion of canal to conduit.

Execution Phase:
A.: Statutory Clearances (land Acquisition, Forest Clearances, Road Crossing & SOP) : The First stretch for laying of MCS was handed over after 14 months from date of award. Forest clearances/tree felling has continuously hindered the pace of work.

Suggestion:
• Study the status of clearances ASAP, Help out the Department for speedy clearances using own network, Document the delays/hindrances properly Always for extension & deviation at latter stage.
• Avoid excess mobilization initially till clearances were obtained to avoid idling of resources.
• Work out/short list the activities which are least affected/independent of clearances for immediate start up.
• Mobilization should be combination of out sourced/Internal resources to manage the pace & idling both.

B: Slow Design approvals: In many cases the design approvals takes many months due to multi-layer departmental setup & No Responsible approach.

Suggestion:
• Priority identification based on the activities which will require minimum input and facilitate go ahead of large activity capable of engaging highest resources & yield maximum advance/ bill collection for helping overall fund cycle.
• How to approach for designing based on specification/parameters of agreement shall be clearly discussed within team. This also includes re-clarifying on ambiguous issues
• The liaison with concern authorities needs shall be kept strong.

C: Material Procurement: The non-existence of feedback system & Priority Dispatches.

Suggestion:
• Time line for production/procurement needed to be set for each order based on priority & auto email feedback after completing each stage of production/procurement like booking confirmation, production completion, dispatch with vehicle details etc. The loss/delay due to no feedback or non-conformity of time line is huge in execution.
• The concept of full truck load dispatch needed to be reworked by either dispatching any other nearby depot by combining orders or working out the option of dispatches with core courier companies. It is also possible to communicate the project team for revising requirement to meet full truck load requirement which allow us to stretch the planning window & enhance the requirement but delay in fittings should be cut down as its causing more loss than its saving on transport.

D: Fund Management:
• The minimum capital for each project shall be provisioned initially and maintaining the capital sufficiency through collection is responsibility of Project-in-charge.
The Project must work as individual entity which can borrow from or lend to organization on fixed rate of interest which will ultimately reflect on project financial performance.

The sufficiency of fund/resources is key to swift & timely execution + allow favorable rate of negotiations for out sourced services like contracts.

**E: Resource Management:**

**Human Resource:**

Most Critical & Difficult part of project management.

- Human Resources unlike mechanical can’t be organized/monitored under predefine parameters where each individual comes with personal positive & limitations.
- Keeping all aligned for common goal with a healthy environment within team is critical.
- Generating Sense of security & Pride for being associated with Organization & work is necessary for long term & increasing productivity with every added project.
- Maintaining Less bulky & smart team is key for higher success in projects.

**Mechanical Resources**: 

- Must maintain combination of self & Outsourced resources to adjust the deployment & Idling based on work.

**Labor Management**: 

- A pool of strong service provider & Standard operating procedure for labor licensing & related compliances.

4. **Challenges in executing Integrated Irrigation projects like Balh Valley:**

- Conceptualization & ability to coordinate philosophy of individual Engineering components like Hydraulics, Pipe, Civil, Agriculture, Mechanical, Electrical, Automation and Electronics.

- Execution Planning & schedule of all above, identification of right sequence for activities & procurement back up.

- Having the right set of people in team, ready to work/think beyond comfort zone, study, Consult & implement.

- Distribution of work/core responsibility activity wise is important for simultaneous progress on all fronts is mandatory.

- The land limitation for Head works pushed us to explore the option of Tube settler (which curtail plan area requirement by 60%).

- Considering the variation between Peak & off-peak demand, the pumping units for main pumping station was so selected that required number of pumps could only be operated to meet the varying crop water demand during various times of the year.

- Issues involved in in-lets and out-lets of Desilting arrangements.
The main conveyance system (MCS) is a closed conduit (HDPE) carrying the water up to 18.48 km while serving 41 villages in between. It serves 13 lifts and 10 gravities at different locations of MCS. The MCS is designed in two parts i.e. rising & gravity where earlier is off-taking the water into an Overhead Tank which is the intake for gravity part. The MCS was designed as rising main from head works (RD 0) to RD 7365, in HDPE pipe ranging from 900 mm to 710 mm dia and up to 8 kg/cm² class. The 150% of improved roughness coefficient of HDPE over the other piping material has given us well desired advantage in designing the conduit as every centimeter of hydraulic level has its count. The overhead tank was designed to cater multiple goals i.e. achieving desired hydraulic level to drive the gravity main for further 11.1 km + surge arrest+ water level in tank provides fair idea of water demand downstream. The gravity part of the MCS was designed from Overhead tank (RD 7365) to Tail End (RD 18480) having dia from 710 mm to 450 mm. The very probable question of maintaining the hydraulics of system under different pressure/flow condition across off take points (points where MCS is tapped to serve the sump of Lifts/gravity), was answered through the combination of flow control hydraulic valves, water metering and level monitoring of sumps. This ensures designed with-drawl from each off-take of MCS which keeps MCS pressurized, ensure water to all off takes simultaneously, more like an on demand arrangement. This pressurized and buried MCS has ensured the equal opportunity to all the users irrespective of their remoteness from the source. The issues like water theft, seepage, water logging, land wastage, evaporation losses has been self-attended in the system, however the land acquisition has change the ownership of land from one to the department but the land use has not been changed, it has an indirect interest of the owner to get the price for the land with fair chances to continue taking the crops again after construction and stabilization of the MCS.

5. Post execution situation- social impact

- No formal study carried however visible impacts are as follows:
  - The 30% of CCA is intensively grown with Vegetable & specifically tomato.
  - The crops like Maze were eliminated from command.
  - The rice & wheat also become two majority grown crops replacing Maze and fallow fields.

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