



सिंचाई एवं जल संसाधन विभाग  
हरियाणा

## STANDARD OPERATING PROCEDURE (SOP) “Rain gauge Installation and Measurement”



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For  
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Irrigation and Water resources Department  
Govt of Haryana

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# INSTALLATION OF RAINGAUGE (NON-RECORDING TYPE) AND MEASUREMENT OF RAIN

## **1. STANDARD OPERATING PROCEDURE (SOP)**

This Standard Operating Procedure (SOP) is a step-by-step guide on the installation of rain gauges under Atal Bhujal Yojana (ABHY) for Haryana. The SOP contains details of rain gauge installation (non-recording type), rainfall data collection, method of measurement, and recording format to help PGWM committee/VWSC/WUA/WUG, District Implementation Partners (DIPs) to document the rainfall measurement for better decision making and improved governance. This SOP has been prepared using Bureau of Indian Standards (IS 4986:2002). All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards.

## **2. EXPOSURE OF RAINGAUGE**

- 2.1 The amount of precipitation collected by a rain gauge depends on its exposure and the details given in 2.1.1 to 2.1.5 shall be specially taken into consideration in selecting a suitable site.
  - 2.1.1 The gauge shall be placed on level ground not upon a slope or terrace
  - 2.1.2 On no account the rain gauge shall be placed on a slope such that the ground falls away steeply on the side of the prevailing wind.
  - 2.1.3 The distance between the rain gauge and the nearest object should generally be four times the height of the object, but never shall be less than twice the height of the object.
  - 2.1.4 Great care shall be taken at mountain and coastal stations that the gauges are not unduly exposed to the sweep of the wind. A belt of trees or a wall on the side of the prevailing wind at a distance, preferably four times its own height but exceeds at least twice its height, shall form an efficient shelter.
  - 2.1.5 Where the observations have to be made on an extensive sloping surface such as the side of a mountain, effort should be made to expose the gauge on a smooth side which is sufficiently large in area and whose slope and orientation correspond to the average slope and orientation of the surrounding. The rain gauge should be installed on stable slopes in hilly areas.
  - 2.1.6 DIPs experts of concerned cluster will be responsible for identification of suitable sites for installation of rain gauge.

### 3. INSTALLATION OF RAINGAUGE

- 3.1 The rain gauge shall be fixed on a masonry or concrete foundation 600 mm x 600 mm x 600 mm sunk into the ground. It may also be fixed using steel structure.
- 3.2 Into this foundation, the base of the gauge shall be cemented so that the rim of the gauge is horizontal and exactly 300 mm above ground level. This height is necessary to prevent more than a negligible amount of water splashing into the gauge. If the height exceeds 300 mm the amount of rain collected decreases owing to wind eddies setup by the gauge.
- 3.3 The lower half part of the rain gauge should be fixed in a manner that the rain gauge is completely horizontal and cannot be removed easily which ensures unwanted disruption of the rain gauge.
- 3.4 In order that observations at different stations may be comparable, the exposure must be as uniform as possible at all stations.
- 3.5 In flood-prone areas the level of the rain gauge shall be kept 300 mm above the maximum flood line.
- 3.6 After the Installation of the rain gauge, a plan or sketch showing various objects with their heights and their distances from the rain gauge shall be prepared and kept in record.

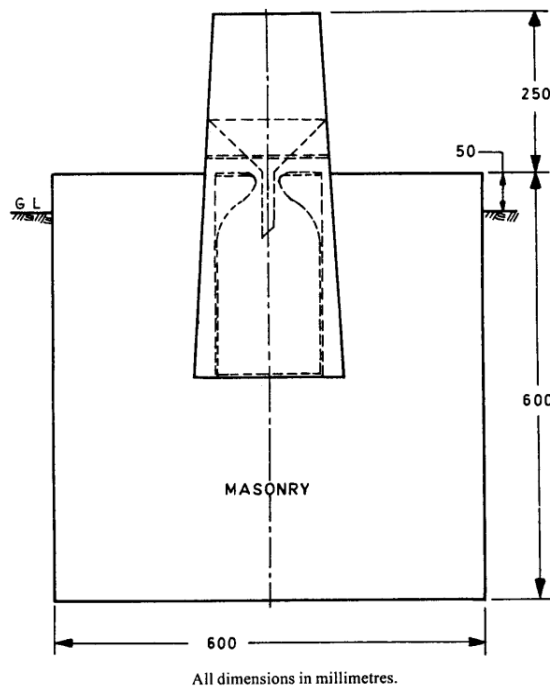


Figure 1: Installation of Rain gauge (IS 4986:2002)

#### 4. PROTECTION OF RAINGAUGE

- 4.1 The rain gauge shall be protected from being damaged (particularly by stray cattle) by erecting a fence around it as shown in Fig. 2. This may be made of any suitable material. The fence shall be such that the top of the fence is not higher than half the distance of the fence from the gauge.
- 4.2 The rain gauge shall be kept locked and periodically painted to prevent its surface from corroding or deteriorating.

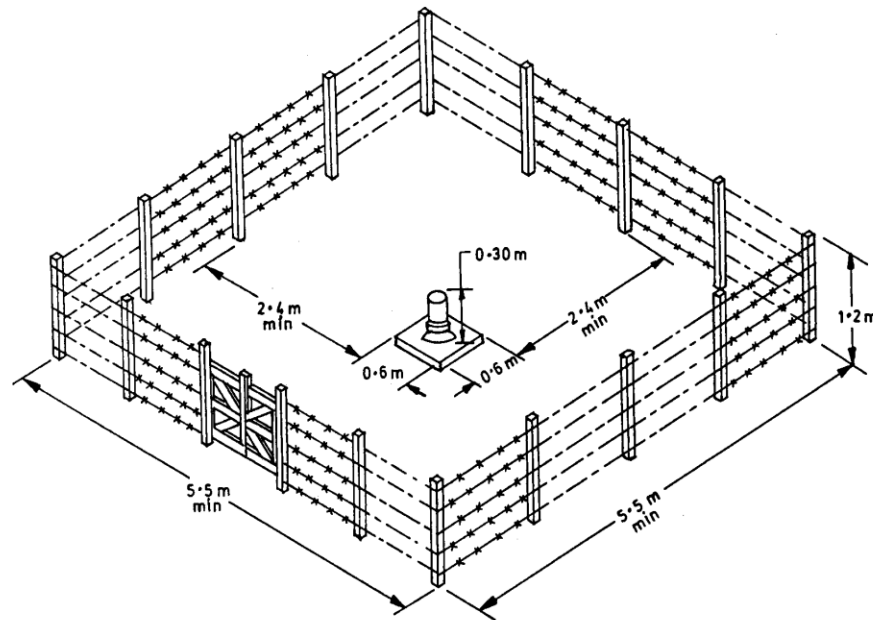


Figure 2: Rain gauge installed within fence (IS 4986:2002)

#### 5. MEASUREMENT OF RAIN FALL

- 5.1 To measure the rainfall, the water in the bottle shall be poured into the glass (beaker) measuring cylinder which shall be placed on a level surface. Care shall be taken to avoid spilling of the collected water. The eye shall then be brought horizontal at the bottom of the curved surface of the water (meniscus) and its reading shall be taken. If the bottom surface of the water rests between two divisions, the rainfall should be estimated to the nearest 0.1 mm.
- 5.2 If there is more water in the bottle, than the measuring glass (beaker) can hold, the glass shall be filled up nearly to the top most graduation mark and the reading noted shall be written down. This water shall then be thrown away and the above process repeated till all the water collected has been individually measured and written down. The total rainfall shall be the sum of all these measurements.

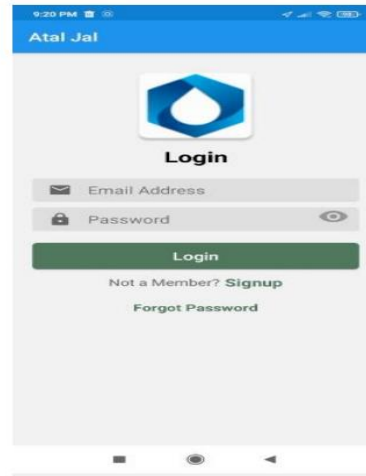
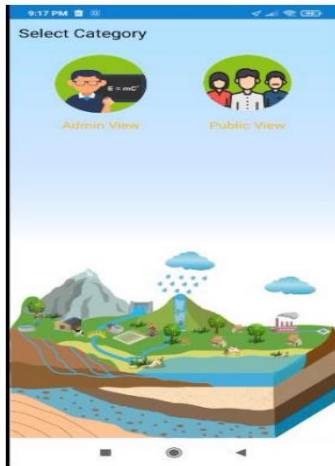
- 5.3 The rain water in the gauge shall be measured every day at 08:30 AM Indian Standard Time and the rain gauge shall be examined every day at that hour even when in the observer's opinion no rain has fallen.
- 5.4 The observer at each station shall maintain a record of the rainfall measured at 08:30 AM Indian Standard Time daily through Atal Jal Mobile App, all data record shall be maintained by using Atal Jal Mobile App and all the entries should be done through Atal Jal mobile App. In case if Mobile App is not functional then data record can be maintained manually by using template given in the Annex-1. The amount of rainfall measured shall be entered against the date of measurement irrespective of the fact whether the rainfall was received on the date of measurement or on the previous date.
- 5.5 If it is raining at the time of observation, all operations shall be completed as quickly as possible to avoid errors. If rainfall is heavy at the time of observation, a spare bottle shall be placed inside the receiver immediately after the one inside is taken out for measurement, in order that no rain is missed during the interval. The bottle shall then be replaced quickly and the rainfall collected in the spare bottle shall be poured into it.
- 5.6 If owing to neglect of the directions given in 5.6, the bottle has overflowed, the overflow receiver shall be taken up, and its contents measured and added to those of the bottle. If there is water in the overflow receiver when the bottle is not full, the bottle should be examined for leaks.
- 5.7 In order to avoid damage to the rim of the collector, the following procedure should be adopted while handling the rain gauge:
1. The collector should be removed gently and held in one hand
  2. The receiver should be taken out with the other hand
  3. The collector should be replaced
  4. After measurement of the rainfall, the collector should be again removed and held in one hand and the receiver should be restored to its position in the rain gauge with the other hand
  5. The collector should be replaced in its prescribed position for locking.
- 5.8 PGWM committee/VWSC/WUA and concerned DIP will be responsible for handling, safety and measuring & recording the data of the Rain Gauge.
- 5.9 Proper instructions and training shall be given to an observer before being given the charge of a rain gauge station.

## 6. DATA RECORDING THROUGH ATAL JAL MOBILE APP

In Rain Gauge Station module, it collects information like Site name, type of Rain Gauge, Rainfall and photographs of rain gauge station can be uploaded.

## Steps of Collecting data through Atal Jal Mobile Application

# COLLECTING DATA THROUGH ATALJAL MOBILE APPLICATION



Step-1



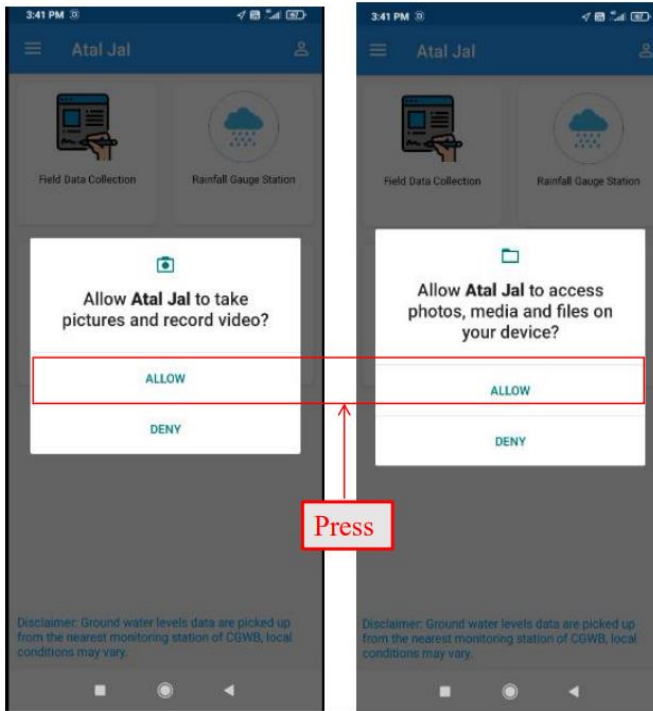
Step-2



Step-3

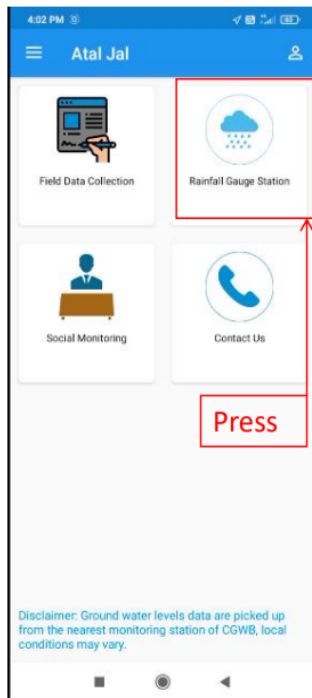
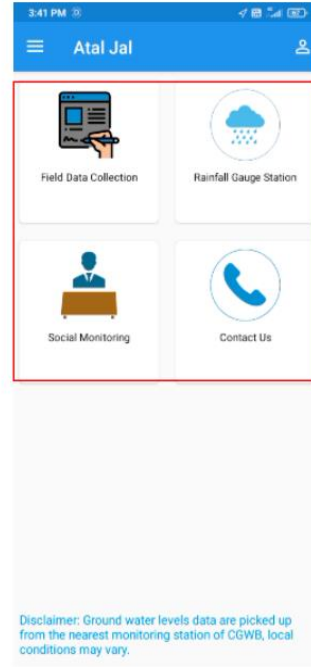


Step-4



Press

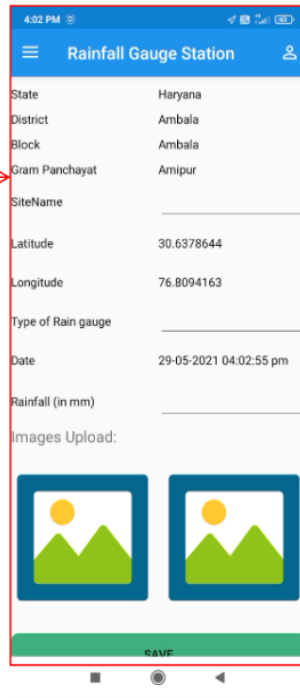
Step-5



Press

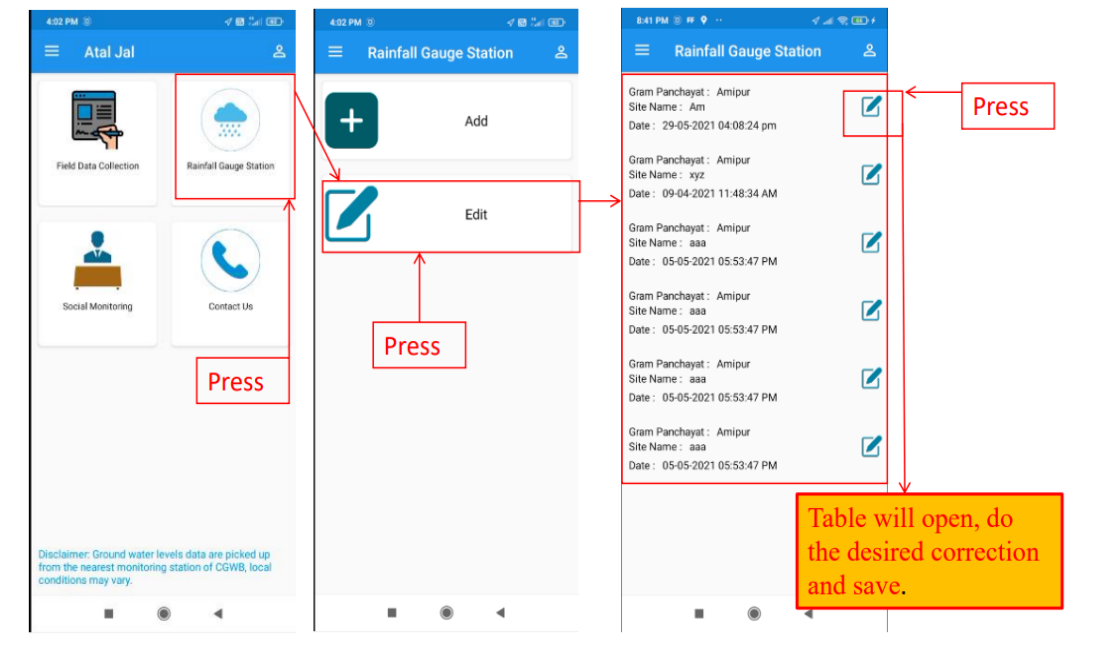


Press



Fill, Take and upload the Picture and Save.





## 7. BREAKAGE OF THE MEASURING GLASS (BEAKER)

- 7.1 Every rain gauge station shall be provided with at least two measuring glasses/beakers. When the measuring glass in regular use is broken, the spare measuring glass shall be brought into use at once, and another measuring glass shall be procured at the same time.
- 7.2 If it should be happened that the spare measuring glass at any station is also broken, special arrangements shall be made for the measurement of the rainfall during the interval between the breakage of the measuring glass and the arrival of a new measuring glass. An apothecary's fluid measuring glass shall be temporarily used to measure the rainfall until the broken measuring glass is replaced, In the event of the measuring glass being broken and the apothecary's measuring glass not being procurable, the rainfall collected on each day shall be stored up in a separate bottle, and kept corked. Each bottle containing the rainfall for each particular day shall be labeled and on receipt of a new measuring glass the rainfall shall be measured and entered in the register.

## 8. INSPECTION OF RAINGAUGES

- 8.1 Rain gauges shall be inspected periodically, at least twice a year, as the observers often allow large changes to take place in the exposure of a gauge without being aware that action is necessary. Inspections should be suitably spaced so that there is at least one inspection before the monsoon. Inspection shall be done by DPMU and inspections should be suitably spaced so that there are at least 3 inspections during the monsoon months.. The main object of inspection shall be to determine:

1. whether the site conditions confirm to Fig. 1 and Fig. 2
  2. whether the instrument is suitably placed and is in order
  3. whether spare cylinder is readily available
  4. whether the observer notes the rainfall measurements correctly and enters them properly in the rainfall records
  5. whether the rainfall records are properly and neatly kept and are in good order
  6. whether the observer makes his measurements at 08: 30 AM IST
  7. whether any part of the rain gauge requires repair or replacement
  8. whether there has been any change of sites at places where exceptionally heavy rainfall is recorded, it shall be ascertained that the bottle inside the receiver is of suitable capacity and not likely to overflow on days of heavy rainfall
  9. Whether data are entered accurately in the input files of the data base software, if available.
- 8.1.1 In order to determine whether the instrument is suitably placed and is in good order, the following points shall be ascertained by DPMU:
1. whether there is any tree growing up or houses being built which are likely to affect the exposure, or whether it is likely to be flooded in the event of heavy rain
  2. Whether the gauge is firmly fixed, so that it is not likely to be blown over
  3. Whether the rim, when pressed home, is level. As all gauges are made level when first erected, it may not be necessary to use spirit level at the time of inspection. However, it shall be checked that no obvious displacement of the rain gauge has taken place
  4. Whether the rim, or mouth, of the collector is circular
  5. The drains of storm water if any are maintained properly so that there is no accumulation of rainwater to affect the gauges.
- 8.1.2 In order to ascertain whether the observer PGWM Committee/WUA/VWSC/(DIPs) can measure rainfall accurately and make entries correctly, the bottle shall be partially filled two or three times with different quantities of water and the observer shall be required to measure them and write down the entries. If he cannot do this correctly, the inspecting officer (DPMU) should instruct the observer fully.
- 8.1.3 The inspecting officer shall also see that the rainfall register is in good condition and the entries in it are carefully and neatly made. He shall also verify that the observer knows how to make entries correctly in the register. The observer shall prepare the inspection report in the Performa given in Annex- 2.

### Annexure I: Template for the record of rainfall

Year of rainfall record:				Total annual rainfall:				GP name:				
Latitude (dd):				Longitude (dd):				Elevation (m, amsl):				
Block name:				District name:				State name:				
Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1												
2												
3												
4												
5												
6												
7												
8												
9												
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24												
25												
26												
27												
28												
29												
30												
31												
Total rainfall (mm)												
No. of rainy days												
<p>Note: If rainfall recorded during 24 hours ending at 08: 30 AM IST against any date in 2.5 mm or more, then the particular date is counted as rainy.</p>												

Note- This table is given for reference only. Data recording of rainfall shall be done through Atal Jal Mobile App.

## Annexure 2: Rain gauge inspection report

Inspection report received from inspector on:		
Inspection report of rain gauge (RG) station (GP) at:		
District:	State:	Latitude (dd):
Longitude (dd):		
Inspected on:	Reported by:	Signature:
Height a, msl.....Meters		
<b>1. Rain gauge block and district name</b>		
a) Rain gauge situated in:		
(Mention exact place). On plain land/hilly slope hill top/plateau. Name of the river catchment/sub-catchment		
b) When was the RG installed at/shifted to the present site?		
<b>2. Report of rainfall</b>		
a) Prescribed time(s) of taking observation(s) IST:		
b) Rainfall reports sent by E-mail (E-mail address, if any)		
c) Period during which sent		
d) Date of last inspection		
e) Date of following inspection		
f) Heavy rainfall report sent to:		
Period during which sent:		Amount of
rainfall:		
g) Arrangements, if any, for special observations		
<b>3. Exposure</b>		
a) Nature of nearby object:		
b) Its distance d in meters from RG:		
c) Its height h in meters:		
d) d/h:		
e) Direction with respect to RG		
3.1 General remarks about the surrounding areas (if there are trees growing up or buildings being built that are likely to affect the exposure, give details as above. There should be no object like a tree or building in the neighborhood such that its height is greater than half its distance from the RG, though some objects in conformity with the above may be present in order to mitigate the effects of wind. Mention special features, if any, such as proximity to the river, sandy or rocky soil, etc.)		
3.2 Mention whether a photograph or sketch or plan of the RG is attached to this report. Whenever practicable this should be done		
<b>4. Details of Collector</b>		

a) Funnel and Tube Rim horizontal? (Yes/No): Height of rim above ground: Funnel diameters Dented ? (Yes/No): Funnel tube clean and free from choking due to dust or dirt or insects?	No.	Maker	Condition:   Is the
b) Base and Body Firmly fixed in ground and how? paint:			Condition of General condition:
c) Receiver in use of bottle mm: Max capacity of overflow receiver mm: (Yes/No): heavy rain (Yes/No):			Max capacity  Leaking? Likely to overflow in
d) Fence: Dimensions (l x b x h) Condition			
e) Whether provided with lock and key?			
f) Any other remarks			
<b>5. Particulars about observer/deputy observer</b>			
a) Name of observer/deputy observer: read to tenth of an mm?			b) Can he
c) Does he take observation(s) at the prescribed time? observations entered in pocket rainfall register direct or on slips of paper in the first instance? Does he pickup instructions readily? of residence from RG site and correspondence properly maintained?			d) Are e) f) Distance g) Are rainfall records
h) Special instructions given, if any i) Other remarks maintaining rainfall recording register regularly?			j) Is observer
<b>6. Inspectors Recommendation:</b> (Recommendations shall include those for removal or reduction of height of obstacle if possible, or shifting of the RG, if shifting is recommended a plan of the new site showing the proposed positions of the RG and the neighboring objects, if any, together with their distance from the RG and their heights should be given)			



### Annexure 3: Undertaking Form rain gauge installation and rainfall measurement

Atal Bhujal Yojana –Haryana  
Irrigation & Water Resource Department,  
Haryana

#### UNDERTAKING

I.....Designation....."In-charge of the complex/Institution named.....of the Department of.....at village .....Block .....Distt..... undertake that, I have no objection if a rain gauge is installed by Irrigation and Water Resource Department, Haryana. I will allow to concerned for data measurement and recording and keep it in working order with technical guidance from the concerned DPMU (Atal Bhujal Yojana, Irrigation & Water Resources Department .....

Dated:

Name & Signature  
DPMU Representative Atal Jal  
I&WRD, Haryana

Name & Signature  
DIP Representative Atal Jal  
Name of Agency

Name & Signature  
Designation with Stamp