



भारत का राजपत्र The Gazette of India

सी.जी.-डी.एल.-अ.-08052024-254098
CG-DL-E-08052024-254098

असाधारण
EXTRAORDINARY

भाग III—खण्ड 4
PART III—Section 4

प्राधिकार से प्रकाशित
PUBLISHED BY AUTHORITY

सं. 314]

नई दिल्ली, सोमवार, मई 6, 2024/वैशाख 16, 1946

No. 314]

NEW DELHI, MONDAY, MAY 6, 2024/VAISAKHA 16, 1946

राष्ट्रीय बांध सुरक्षा प्राधिकरण

अधिसूचना

नई दिल्ली 24 अप्रैल, 2024

फा. सं. टीई-32/2/2023- एनडीएसए-एमओडब्ल्यूआर.—राष्ट्रीय बांध सुरक्षा प्राधिकरण, 2021 बांध सुरक्षा अधिनियम, 2021 (2021 का 41) की धारा 54 की उप-धारा (2) के खंड (ज), (झ), (ञ), (ट), (ड), (ढ), (त) और (द) के साथ पठित उप-धारा (1) द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए, राष्ट्रीय समिति की सिफारिशों के आधार पर राष्ट्रीय बांध सुरक्षा प्राधिकरण, एतद्वारा द्वारा निम्नलिखित विनियम बनाता है, अर्थात:-

- संक्षिप्त शीर्षक और शुरुआत—** (1) इन विनियमों को निरीक्षण, यांत्रिकीकरण, भूकंपीय आंकड़ों, जोखिम मूल्यांकन और निर्दिष्ट बांध विनियम, 2024 का मूल्यांकन कहा जाएगा।
(2) ये विनियम सरकारी राजपत्र में प्रकाशन की तारीख से लागू होंगे।
- परिभाषाएं—** (1) इन विनियमों में, जब तक कि संदर्भ से अन्यथा अपेक्षित न हो,—
(क) "अधिनियम" का अर्थ है बांध सुरक्षा अधिनियम, 2021 (2021 का 41);
(ख) "प्राधिकरण" का अर्थ है अधिनियम की धारा 8 के तहत स्थापित राष्ट्रीय बांध सुरक्षा प्राधिकरण;
(ग) "मालिक" का अर्थ है विनिर्दिष्ट बांध का मालिक;
(घ) "अनुसूची" का अर्थ है इन विनियमों की कोई भी अनुसूची।

NATIONAL DAM SAFETY AUTHORITY

NOTIFICATION

New Delhi, the 24th April, 2024.

F. No. TE-32/2023-NDSA-MOWR.—In exercise of the powers conferred by sub-section (1), read with clauses (h), (i), (j), (l), (m), (n), (p) and (r) of sub-section (2), of section 54 of the Dam Safety Act, 2021 (41 of 2021), the National Dam Safety Authority on the recommendations of the National Committee on Dam Safety, hereby makes the following regulations, namely: -

1. Short title and commencement. - (1) These regulations may be called the Inspection, Instrumentation, Seismic Data, Risk Assessment and Evaluation of Specified Dam Regulations, 2024.

(2) They shall come into force on the date of their publication in the Official Gazette.

2. Definitions.— (1) In these regulations, unless the context otherwise requires,—

(a) “Act” means the Dam Safety Act, 2021 (41 of 2021);

(b) “Authority” means the National Dam Safety Authority established under section 8 of the Act;

(c) “owner” means owner of specified dam;

(d) “Schedule” means any of the Schedules to these regulations.

(2) Words and expressions used herein and not defined in these regulations but defined in the Act, shall have the meanings respectively assigned to them in the Act.

3. Guidelines and checklists for inspection of specified dams.— (1) Every owner, through their dam safety unit, shall undertake pre-monsoon and post-monsoon inspection of the specified dam in the Form specified in Schedule-I.

(2) The inspections shall also be carried out during and after every flood, earthquake or any other natural or man-made calamities, or if any sign of distress or unusual behavior is noticed in the dam.

(3) Every owner, through their dam safety unit, shall carry out the following activities under this regulation,—

(i) review the past inspection reports, monitoring data, photographs, videos, maintenance records or any other data as may be deemed necessary;

(ii) carry out on-site examination of the dam and its appurtenant works;

(iii) review the relevant data base;

(iv) carry out more detailed site investigations if the inspection reveals deteriorating dam conditions.

(v) ensure that the following database compiled in a systematic format is available in the dam site at all times, namely:—

(a) background information;

(b) design information;

(c) construction records;

(d) operation records; and

(e) monitoring records.

Explanation 1.—For the purposes of sub-clause (a), background information shall include salient features, regional and site geology, earthquake history as maintained by the India Meteorological Department, soil surveys, hydrology, land use, aerial and dam site photographs, etc.

Explanation 2.—For the purposes of sub-clause (e), monitoring records shall include measurement of seepage review of spillway discharge rates, upstream and downstream water levels, and readings from instruments such as piezometers, v notches, etc.

(4) The dam safety unit shall,—

(i) review all operation, maintenance, inspection and instrumentation records maintained by an owner, regulatory agency, or any other entity and the data collected from instrumentation and monitoring systems be stored in the database;

- (ii) in addition to the data available at the dam site, obtain newspaper accounts and interviews with people associated with the project during its construction and operation, if available.
- (iii) carry a list of general equipment, specialized equipment, safety equipment and protective clothing that may be necessary at the time of inspection as specified in **Schedule-ii**.
- (5) The inspection team shall, during the inspections, take safety measures for any potentially hazardous locations at the dam site, which include steep or wet embankment slopes, spillways with high sidewalls or flowing water, spillway conduits, confined spaces, riprap areas with large stones, outlet structures holding water, shorelines with riprap and deep water, concrete embankments, sinkholes, outlet banks, foundation gallery without elevators and high grass or bushes or whirlpools, hydraulic jumps, and eddies created from the discharging water, that are extremely dangerous to boaters and swimmers.
- (6) The owner shall keep record of the entire life of the dam by creating a permanent database that shall include inspection records, including documentation of actions taken to correct conditions found in the inspections.
- (7) The inspection observation shall be recorded as per the inspection checklist specified in **Schedule III** and an online entry of dam safety inspection shall be made through web portal, namely, the Dam Health and Rehabilitation Monitoring Application or DHARMA, maintained by the Authority.
- (8) The inspection team shall draw a field sketch of observed conditions as may be required.
- (9) High-resolution photographs (with date and location) may be taken during all kinds of inspections, especially for the parts with specific safety issues.
- (10) An inspector may keep a field notebook to document all the observations and findings and a checklist.
- (11) Audio-visual recorders may be used as per the field conditions.
- (12) Pre-monsoon inspection of specified dams shall be conducted during March and completed before 30th April of the same year and report be sent to the concerned State Dam Safety Organisation before 15th May of that year.
- (13) Post-monsoon inspection of specified dams shall be conducted during October and completed before 30th November of the same year and report be sent to the concerned State Dam Safety Organisation before 15th December of that year.

SCHEDULE-I

[See regulation 3(1)]

FORM**Part 1a - Inspection Details:**

Project Name:		Project ID Code (PIC):	
Project Type:		Project Purpose:	
Project Owner:		Hazard Classification:	
Project Operator:		Type of Inspection:	
Commissioning Date:		Inspection by:	
City/State/PIN:		Date of Inspection:	
District:		Reservoir water level in metre on the date of inspection:	
Latitude:		Storage Capacity (MCM):	(i) Gross..... (ii) Live.....
Longitude:		Weather Conditions:	
Important Controlling Level	a) TBL EL b) MWL EL c) FRL EL d) Spillway Crest EL e) MDDL EL f) Lowest River bed EL g) Deepest foundation level EL		

Part 1b - Inspection Remarks:

Please provide any additional information or comments not covered by Part 1a form above.

Part 2a - Inspection Checklist:

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
A-Reservoir						
A-1.1	<u>General</u>					
1.1.1	Is the reservoir water level unusually high or low?					
1.1.2	Are there signs of decline in water quality?					
1.1.3	Are there signs of recent sediment deposition?					
1.1.4	Is floating debris present?					
1.1.5	Any indications of major active or inactive landslide area in the reservoir rim If so, indicate their locations and extent.					
1.1.6	Are there people or livestock in and around reservoir?					
1.1.7	Any other issues?					
B-Dam and Dam Reach (Embankment)						
B-1.1	<u>General</u>					
1.1.1	Any major alterations or changes to the dam since the last inspection?					
1.1.2	Is there any new nearby development in the downstream floodplain?					
1.1.3	Any misalignment of poles, fencing or walls due to dam movement?					
B-1.2	<u>Upstream Slope</u>					
1.2.1	Any signs of bulging or concavity (depressions)? If so, indicate their locations and extent. (Check up the cross-sections with tape and level at random locations, at least two)					
1.2.2	Does the section of the dam and upstream slope appear structurally sound and stable?					
1.2.3	Presence of longitudinal or transverse cracks?					
1.2.4	Whether any signs of distress to stability of slopes noticed at any time in any part of the dam? If so, give brief details of the incidents and location, the method of treatment adopted and its effectiveness. Indicate the general condition of upstream pitching.					
1.2.5	Any degradation to slope protection (rip-rap)?					
1.2.6	Is there any profuse growth of bushes or weeds over any portion of the dam? If so, indicate the locations.					
1.2.7	Does the upstream slope shows existence of crab holes or holes made by rodents or burrowing animals or ant hills? If so, indicate the locations.					

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
1.2.8	Any other issues?					
B-1.3	<u>Crest of Dam</u>					
1.3.1	Is the crest profile at proper elevation? (To be test checked at random locations by taking level)					
1.3.2	Does it show any signs of excessive and/or uneven settlement? If so, indicate such locations and extent of settlement. (Surface settlement points must be installed for observing this aspect)					
1.3.3	Is the surface of the crest free from undulations and local depressions or heaving?					
1.3.4	Does it provide an all-weather road surface?					
1.3.5	Any degradation to access road (sealed/unsealed)?					
1.3.6	Does it develop any visible cracks in transverse or longitudinal directions? If so, attach a map showing their locations and extent. Depth of cracks must be ascertained by taking open trenches extending below the bottom of cracks.					
1.3.7	What is the condition of the edges of crest? Have got eroded and cut up resulting in reduced effective width?					
1.3.8	Is the crest free from local slips throughout its length on either sides?					
1.3.9	Do the headers, guard stones and parapet wall provided at the edges of the crest appear in proper profile and plumb?					
1.3.10	Any degradation to upstream parapet or downstream curb wall?					
1.3.11	Evidence of livestock on dam crest?					
1.3.12	Trees or profuse growth of weeds/bushes at any location?					
1.3.13	Proper lighting arrangement at dam top?					
1.3.14	Any other issues?					
B-1.4	<u>Downstream Slope</u>					
1.4.1	Any signs of bulging or concavity (depressions)?					
1.4.2	Are there any wet or slushy patches or any concentrated leaks, springs or trickles observed on the downstream slopes or the toe? If so, indicate their locations and extent. Please look out for patches of extensive vegetation growth and examine them carefully and record the findings.					
1.4.3	Presence of longitudinal or transverse cracks?					

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
1.4.4	Any signs of distress to the stability of slopes?					
1.4.5	Are rain cuts/erosion channels present at any location?					
1.4.6	Are all the rain cuts and erosion channels properly treated and made good? Please indicate location of recurring damages, if any.					
1.4.7	Is there any profuse growth of bushes or weeds over any portion of the dam? If so, indicate the locations.					
1.4.8	Does the downstream slope shows existence of crab holes or holes made by rodents or burrowing animals or ant hills? If so, indicate the locations.					
1.4.9	Any other degradation to slope protection (turfing)? Indicate the general condition of downstream pitching/ turfing and rock toe.					
1.4.10	Is the downstream area clear of debris and free draining?					
1.4.11	Any other issues?					
B-1.5	<u>Downstream Drainage</u>					
1.5.1	Are there any signs of water logging, slushy conditions or growth of aquatic weeds on the downstream of the dam? To be checked upto 300 m downstream of toe					
1.5.2	Are there any standing pools of water in the downstream of dam? If so, give their locations and extent. To be checked upto 300 m downstream of toe					
1.5.3	Are there any boils observed in the vicinity of the downstream toe of the dam? If so, give locations.					
1.5.4	Is the downstream area sufficiently clear and free draining?					
1.5.5	What is the depth of ground water table on the downstream as evident from the existing wells in the vicinity of the dam To be checked upto 300 m downstream of toe. Does the water table show any marked variation in accordance with the variations in reservoir water level?				a) Max. ground water level..... b) Location c) Date..... d) Corresponding Reservoir level.....	
1.5.6	Are all the exposed drains working satisfactorily?					
1.5.7	Toe drains and cross drains. i. Are the portions of longitudinal toe drain and exposed cross drains beyond the downstream toe of the					

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
	dam in regular section and freely draining? ii. Is the pitching to these drains intact? iii. Is there any weed growth in these drains? iv. Indicate other defects noticed in the drains, if any.					
1.5.8	Outfall Drain: a) Is the outfall drain in proper shape and grade and freely draining? b) Is the outfall drain properly cleaned and maintained? Does the outfall drain show any stagnant pools of water or weed growth?					
B-1.6	<u>Surface Drainage of Downstream Slopes</u>					
1.6.1	Is the condition of the downstream slope drainage arrangements, if provided, satisfactory?					
1.6.2	Is the paving to these drains intact?					
1.6.3	Are all the drains properly maintained and free of vegetation growth and debris?					
1.6.4	Does the slope have a tendency to develop severe rain cuts at any location?					
1.6.5	Enumerate any other defects noticed in the surface drainage of downstream slope.					
B-1.7	<u>Seepage Measurement</u>					
1.7.1	Is the quantity of seepage being daily or periodically measured and recorded? Please check the registers and record observations.					
1.7.2	Does it show any abnormal rise or fall? If so, does it have any relation to a certain reservoir level elevation?					
1.7.3	Does the seepage show a turbid colour at any stage? Was such a phenomenon observed at any stage at any location in the past?					
1.7.4	What is the measured rate of seepage flow with date and reservoir level; i. On the day of present inspection ii. Maximum since last June iii Minimum since last June				a) Date b) Rate of seepage flow(lpm) c) Reservoir level (m)	
1.7.5	Is the portion upstream and downstream of measuring points of seepage easily accessible with proper steps and paths and free of vegetation growth?					
1.7.6	Are the measuring points properly located, constructed and maintained so as to give					

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
	accurate and reliable measurements of seepage in accordance with the relevant IS Codes?					
1.7.7	Is the method of taking seepage measurements satisfactory?					
B-1.8	<u>Breaching Section (if provided)</u>					
1.8.1	Is the breaching section easily accessible?					
1.8.2	Is the condition of the breaching section satisfactory?					
1.8.3	Is the note of instructions as to when and how to operate the breaching section available on record?					
1.8.4	For reconstruction after the breach are the following items decided in advance? a) Quarry for embankment material					
	b) Suitable routes of access Is the maintenance staff fully aware of the instructions related to operation of the beaching section and for reconstruction after the breach					
1.8.5	Ascertain and indicate the latest event of operation of breaching section and its performance.					
1.8.6	Evidence of recent degradation?					
1.8.7	Any other issues?					
B-1.9	<u>Junction of Earth work with Masonry/Concrete dam sections and outlets</u>					
1.9.1	Is there any existence of leaks, springs or wet spots in the earth work in the vicinity of the junctions between earth work and masonry works? If so, what is the approximate rate and colour of the leakage? Does it turn turbid at any time? Please ascertain from enquiries and record the findings.					
1.9.2	Is there any tendency for separations, cracking, settlement or upheaval of the earth work in the vicinity of masonry or concrete? If so, indicate the locations and the exact nature of deficiency.					
1.9.3	Is there any tendency for surface erosion or slope instability at the junction?					
1.9.4	If the outlet conduit is located in the earth dam section, is the entire length of the conduit in perfect order and profile and free from offsets, open joints, cracks and leakage? Examine the conduit carefully from the downstream or from inside, if possible, and indicate the deficiencies observed, if any.					
1.9.5	Any other issues?					
B-1.10	<u>Relief Wells</u>					

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
1.10.1	Are the relief wells in good working condition and functioning well?					
1.10.2	Are the relief properly surged and cleaned periodically?					
1.10.3	Please indicate the dates of last surging and cleaning and the next surging due.					
1.10.4	Are the necessary plant and equipment for cleaning the relief wells, available with the office?					
1.10.5	Is the record of periodical measurements of discharge from each relief well maintained? If so, indicate total discharge and maximum discharge observed from a single well on the date of inspection.					
B-1.11	<u>Abutment and its Contacts</u>					
1.11.1	Any presence of leaks, springs or wet spots near the abutment?					
1.11.2	Any presence of cracking, settlement or upheaval of earthwork?					
1.11.3	Any evidence of erosion or slope instability?					
1.11.4	Trees or profuse growth of weeds/bushes?					
1.11.5	Any degradation to up/downstream slope protection (rip-rap, turfing)?					
1.11.6	Any other issues?					
C-1	Dam and Dam Block/Reach (Concrete/Masonry)					
C-1.1	<u>General</u>					
1.1.1	Any major alterations or changes to the dam since the last inspection?					
1.1.2	Is there any new nearby development in the downstream floodplain?					
1.1.3	Any misalignment of poles, fencing or walls due to dam movement?					
C-1.2	<u>Upstream Face</u>					
1.2.1	Evidence of surface defects (honeycombing, staining, stratification)?					
1.2.2	Concrete/masonry deterioration (spalling, leaching, disintegration)?					
1.2.3	Is cracking present (structural, thermal, along joints)?					
1.2.4	Evidence of differential settlement (displaced/offset/open joints)?					
1.2.5	Presence of vegetation (growth in joints between blocks)?					
1.2.6	Evidence of any other damage to joints and/or water stops?					
1.2.7	Any other issues?					
C-1.3	<u>Crest of Dam</u>					

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
1.3.1	Evidence of differential settlement (displaced/offset/open joints)?					
1.3.2	Presence of cracking (structural, thermal, along joints)?					
1.3.3	Profuse growth of weeds/grass/plants at any location?					
1.3.4	Any degradation to access road?					
1.3.5	Any degradation to upstream parapet or downstream curb wall?					
1.3.6	Any other issues?					
C-1.4	<u>Downstream Face</u>					
1.4.1	Evidence of surface defects (honey-combing, staining, stratification)?					
1.4.2	Concrete/masonry deterioration (spalling, leaching, disintegration)?					
1.4.3	Presence of cracking (structural, thermal, along joints)?					
1.4.4	Evidence of differential settlement (displaced/offset/open joints)?					
1.4.5	Presence of vegetation (growth in joints between blocks)?					
1.4.6	Evidence of any other damage to joints and/or water stops?					
1.4.7	Excessive seepage/sweating at any location on downstream face?					
1.4.8	Significant leakage at any location on downstream face?					
1.4.9	Any other issues?					
C-1.5	<u>Abutment and its Contacts</u>					
1.5.1	Any presence of leaks, springs or wet spots in vicinity of abutment?					
1.5.2	Any presence of cracking or settlement?					
1.5.3	Profuse growth of weeds/grass/plants at any location?					
1.5.4	Any other issues?					
D	<u>Gallery/Shaft and Drainage (Concrete/Masonry)</u>					
D-1.1	<u>General</u>					
1.1.1	Slushy condition or water logging immediately downstream of dam?					
1.1.2	Any evidence of boiling in vicinity of dam toe?					
D-1.2	<u>Gallery/Shaft Condition</u>					
1.2.1	Any problems accessing or inspecting gallery/shaft (obstruction)?					
1.2.2	Any safety issues (inadequate handrails, lighting or ventilation)?					

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
1.2.3	Problems of inadequate drainage (slippery stairs, water logging of gallery, clogged porous or foundation drains)?					
1.2.4	Evidence of differential settlement (displaced/offset/open joints)?					
1.2.5	Excessive seepage/sweating at any location along gallery/shaft?					
1.2.6	Significant or excessive leakage at any location along gallery/shaft / porous drain? If yes, provide location(s).					
1.2.7	Are proper arrangements made for the measurement of seepage into the gallery? Is the seepage measured separately from- 1. Porous pipes? 2. Foundation drains? And 3. Monolith Joints? Are the above arrangements satisfactory?					
1.2.8	Has there been substantial progressive reduction in the seepage through the foundations? Is it due to choking of the drain holes? If so, indicate number of holes choked.					
1.2.9	Are all the foundation and porous holes periodically cleaned with reaming tool and air water jetting? Indicate the last date of such cleaning and extent of variation observed in the seepage discharge before and after the cleaning.					
1.2.10	Is the seepage water and the deposit, if any, from the seepage being regularly examined for chemical composition? If so, indicate the result and the probable source of dissolved salts, if any.					
1.2.11	Are any seepage water springs observed in the downstream area anywhere? If so, indicate the locations and state the physical nature of this seepage. Look out for such seepage spots particularly near the dykes, fault zone etc. Ascertain if chemical testings are made of water samples from such springs for dissolved salts.					
1.2.12	Is there any leachate deposition? If yes provide location					
1.2.13	Any other issues?					
D-1.3	<u>Drain Condition</u>					
1.3.1	Is the flow in the drain unusually high or low?					
1.3.2	Presence of calcium or other deposits in drain?					
1.3.3	Is dewatering pumping station fully operational?					
1.3.4	Any problem inspecting pump?					
1.3.5	Any obstruction preventing or impairing					

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
	smooth operation?					
1.3.6	Any deterioration of pump and associated equipment?					
1.3.7	Is sump well clean and maintained?					
1.3.8	Is V-notch before sump well clean and maintained?					
1.3.9	Any other evidence of the drain being blocked/having reduced section?					
1.3.10	Is the flow in the drain noticeably sporadic/irregular?					
1.3.11	Does the drainage water have unusual color (leachate)?					
1.3.12	Any other issues?					
D-1.4	<u>Body Wall (Masonry/Concrete) of 'NOF' Dam and Spillway</u>					
1.4.1	What is the total seepage into gallery from the porous pipes in the dam at lake full condition? How does it compare with the seepage when the reservoir was first filled? (For the corresponding water level)					
1.4.2	If there has been substantial reduction in this seepage? Ascertain and indicate the probable reasons therefore.					
1.4.3	Has there been a tendency for gradual reduction of drainage through pipes and progressive appearance of sweating on the downstream face of the dam?					
1.4.4	Has there been considerable leaching from the seepage water and deposition of lime near the seepage exit spots?					
1.4.5	Are the samples of the seepage water and reservoir water being regularly tested for reactive and corrosive properties?					
1.4.6	Is there excessive seepage, sweating at any locations on the downstream face of the dam? (Examine the monolith or construction joints for such seepage and leaching and indicate the findings)					
1.4.7	Is there any swelling or cracking observed on the downstream face especially near the points of concentration of stresses like the toe or locations of abrupt change in geometry of the face of the opening? If so, indicate the details of observations.					
1.4.8	Is the pointing on upstream face of the dam in good condition? If not, indicate the nature and extent of deficiency.					
1.4.9	Are the registers and graphs showing the periodical measurements of seepage discharge from the porous drains in the gallery and from the downstream face at various lake levels maintained at site?					

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
D 1.5	<u>Waste Weir Bar and Tail Channel</u>					
1.5.1	Is the Concrete/masonry spillway bar in good condition? Is there any leakage through the masonry or from the foundation? If so, what remedial measures are proposed/taken for minimizing the leakage? Is the record of leakage measurement maintained? What is the quantity of Seepage/Leakage on the date of inspection?					
1.5.2	Is the coping over the spillway bar in good condition?					
1.5.3	Does the upstream and downstream face of waste weir bar need pointing?					
1.5.4	Is there any scouring on downstream side of the bar and/or EDA? If so what remedial measures are proposed/taken?					
1.5.5	Are there any damages or undermining to guide walls, divide wall and other appurtenants? If so, what remedial measures are proposed/taken?					
D 1.6	<u>Structural performance of the 'NOF' and 'OF' Portions of Dam Foundations</u>					
1.6.1	Are there any signs of structural distress noticed in the dam spillway and foundations in the form of- i. Excessive deflection with respect to permissible deflection at the time of design ii. Tendency of gradual sliding iii. Cracking and upheaval or settlement in any part of the body wall or foundations, iv. Excessive uplift, v. Excessive seepage and leaching through the body of the dam and the foundation.					
1.6.2	Conspicuous weathering of materials or components in any portion of the body wall or the foundations.					
E	<u>Spillway and Energy Dissipation Structure</u>					
E 1.1	<u>Spillway</u>					
1.1.1	Any problems inspecting spillway (obstructed access, damaged catwalk)?					
1.1.2	Any obstructions in or immediately downstream of the spillway?					
1.1.3	Evidence of abrasion, cavitation or scour on glacis (e.g. exposed reinforcement)?					
1.1.4	Presence of displaced, offset or open joints?					
1.1.5	Presence of cracking (structural, thermal, along joints)?					
1.1.6	Evidence of surface defects (honeycombing, staining, stratification)?					
1.1.7	Concrete/masonry deterioration (spalling,					

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
	leaching, disintegration)?					
1.1.8	Presence of vegetation (growth in joints between blocks)?					
1.1.9	Evidence of any other damage to joints and/or waterstops?					
1.1.10	Excessive seepage/sweating at any location on spillway glacis?					
1.1.11	Significant leakage at any location on spillway glacis?					
1.1.12	Any other issues?					
E-1.2	<u>Energy Dissipation Structure</u>					
1.2.1	Any problems inspecting energy dissipation structure?					
1.2.2	Any obstructions in or immediately downstream of dissipation structure?					
1.2.3	Evidence of abrasion, cavitation or scour on dissipation structure?					
1.2.4	Presence of displaced, offset or open joints?					
1.2.5	Presence of cracking (structural, thermal, along joints)?					
1.2.6	Evidence of surface defects (honeycombing, staining, stratification)?					
1.2.7	Concrete/masonry deterioration (spalling, leaching, disintegration)?					
1.2.8	Presence of vegetation (growth in joints between blocks)?					
1.2.9	Evidence of any other damage to joints?					
1.2.10	Any problems with under-drainage (blockage of open drain holes)?					
1.2.11	Can the tail pond be drained easily for inspection of the stilling basin or bucket? If not, what are the alternatives available for dewatering? Please ascertain and indicate the last event of inspection of stilling basin (or bucket).					
1.2.12	From the examination of the levels and contour plans and reference marks in tail channel; ascertain if there is progressive erosion and retrogression in the tail channel. If so, indicate the extent and location of such erosion with reference to the various components of dam, spillway, outlet, power house etc.					
1.2.13	Is the concrete surface of the stilling basin and apron (or bucket) in good condition? Are there any indications of pitting, cracking, spalling or wearing of the surface of bedding concrete? If so, please give details of the nature and extent of the damage.					
1.2.14	Is there any indication of abrasion and cavitation damage (pitting of concrete) especially at friction blocks, chute blocks and					

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		Y	N	NA		
	slotted roller teeth, the surface near the lower tangent point and the end sill? If so, please give the details of nature and extent of damage.					
1.2.15	Is the under drainage of the stilling basin (or bucket) satisfactory? Are all the open drain holes clear and functioning well?					
1.2.16	Any other issues?					
F	Intake/Outlet and Water Conveyance Structure					
F-1.1	<u>Intake/Outlet Structure</u>					
1.1.1	Any problems inspecting intake/outlet structure (obstructed/unsafe access)?					
1.1.2	Any obstructions in, upstream or downstream of intake/outlet structure?					
1.1.3	Evidence of abrasion, cavitation or scour on intake/outlet structure?					
1.1.4	Any evidence of structural distress (displaced/offset/open joints, cracking)?					
1.1.5	Any evidence of surface defects and/or concrete/masonry deterioration?					
1.1.6	Any other issues?					
F-1.2	<u>Water Conveyance Structure</u>					
1.2.1	Any problems inspecting intake/outlet structure (obstructed/unsafe access)?					
1.2.2	Any obstructions in, upstream or downstream of water conveyance structure?					
1.2.3	Evidence of abrasion, cavitation or scour on structure?					
1.2.4	Any evidence of structural distress (displaced/offset/open joints, cracking)?					
1.2.5	Any evidence of surface defects and/or material deterioration?					
1.2.6	Any evidence of seepage or leakage from water conveyance structure?					
1.2.7	Any other issues?					
G-1	<u>Hydro-Mechanical Component and Pump</u>					
G-1.1	Spillway Gates (Radial gates, Vertical lift gates, Automatic gates)					
1.1.1	Any problems inspecting gate/Stop-logs (obstructed/unsafe access)?					
1.1.2	Is the condition of the steel surface and the surface paint deteriorated?					
1.1.3	Are any connection bolts of rubber seals loosened or damaged? If so, indicate the details of defects.					
1.1.4	What is the general condition of rubber seals? Do any of the rubber seals show signs of weathering, hardening, cracking or tearing and					

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		Y	N	NA		
	damage?					
1.1.5	Are the rubber seals of side and bottom touching uniformly all along the sealing surface?					
1.1.6	Do the rollers (wherever applicable) touch the track plates uniformly? Are the rollers well lubricated?					
1.1.7	Are the embedded parts of spillway gates, emergency gates and stop-logs in sound condition and free from corrosion, uneven wear, cracking, chipping and dents? If not, state the nature of defects or deficiencies and observation, if any, regarding such defects.					
1.1.8	Check the following for structural soundness of all members and welded, bolted and riveted connections, uneven wear, uneven bearing, cracking, chipping and dents and indicate the findings: (1) Gate leaf and stiffeners (2) End arms (3) Trunnion girders / Yoke girder (4) Stop logs (5) Lifting beams (6) Gantry cranes (7) Tracks (8) Trunnion bracket (9) Chains/ wire ropes (10) Bridge structure					
1.1.9	Are the trunnion bearings of radial gates properly lubricated?					
1.1.10	Is there any damage or wear caused to the seal plates? If so, indicate the nature of damage noticed.					
1.1.11	Are any of the mechanical or structural components and fasteners or seals subjected to excessive wear? If so, please give details. Is there any tendency for recurring damage to any particular component? If so, please give details.					
1.1.12	Is sufficient stock of spares which need frequent replacement maintained at the site?					
1.1.13	Any issues with storage of equipment (emergency stop logs, lifting beam and gate leaves)?					
1.1.14	Any deterioration, corrosion? scaling? pitting? or cracking? of equipment (connecting bolts, welds?)					
1.1.15	Any obstructions preventing or impairing smooth operation?					
1.1.16	Any problems with the rollers (nottouching					

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		Y	N	NA		
	tracks, inadequate lubrication)?					
1.1.17	Any debris, etc., in the gate grooves?					
1.1.18	Any damages to Radial Gate trunnion pins? gate arms? lubrication? etc.?					
1.1.19	Any damage to embedded parts above waterline? access structure?					
1.1.20	Any damage to concrete grooves?					
1.1.21	Is the staff posted at the site for maintenance and operation of gates, hoists, equipment and electrical installations, well experienced, fully trained and conversant with the job requirements and responsibilities?					
1.1.22	Are the following documents maintained at the respective location of all the units? (1) Maintenance schedules specifying each operation, its frequency and "due" and "done" dates. (2) Operating instructions with "dos" and "don't" for all operational units.					
1.1.23	Are the trunnion hub and the brackets well maintained?					
1.1.24	Are the trunnions likely to get submerged during actual working of the spillway? If so, ascertain the causes for the same and specify. Please enquire for occurrence of such events, if any.					
1.1.25	Are all the nuts of connecting bolts and anchorages properly tightened?					
1.1.26	Any other issues?					
G-1.2	<u>Hoists, Cranes and Operating Mechanisms</u>					
1.2.1	Are the hoists working satisfactorily?					
1.2.2	Any problems inspecting hoist/crane/operating mechanism?					
1.2.3	Is sufficient stock of spares which need frequent replacement maintained at the site?					
1.2.4	Is the full length of the chains or wire rope of the hoist in sound condition and free from broken strands?					
1.2.5	Is the electrical wiring in sound condition?					
1.2.6	Is the alternative power system for gate operation working properly?					
1.2.7	Is the alternate hand operation system of hoist working?					
1.2.8	Any deterioration of equipment (connecting bolts, welds, surface, paint work?)					
1.2.9	Any wear or damage to wire cables and other moving parts?					
1.2.10	Any obstructions preventing or impairing smooth operation?					

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		Y	N	NA		
1.2.11	Any health and safety concerns (e.g. lack of "danger" sign during maintenance)?					
1.2.12	Any other issues?					
G 1.3.	<u>Spillway Bridge, Hoist Bridge, Trunnion Level Bridge Catwalks</u>					
1.3.1	Are the decking, girders and structural supports of spillway bridge, hoist bridge, trunnion level bridge and catwalks structurally sound?					
1.3.2	Is the chequered platform of the bridge structurally sound and safe?					
1.3.3	Is there satisfactory arrangement to prevent unauthorized entry into the control structures and bridges?					
1.3.4	Are the structural members and joints sound and free from corrosion?					
1.3.5	When were the steel components painted last?					
1.3.6	Is the surface of steel work and paints satisfactory?					
1.3.7	Is the parapet or railing over the bridges sound, safe and painted?					
1.3.8	Is the walkway properly anchored to the piers?					
1.3.9	Are the track rails for gantry cranes structurally sound and intact?					
G-1.4	<u>Valves</u>					
1.4.1	Any problems inspecting valve?					
1.4.2	Any obstructions preventing or impairing smooth operation?					
1.4.3	Any deterioration of valve and associated equipment?					
1.4.4	Any other issues?					
G-1.5	<u>Walls: Guide walls/Divide walls/Junction walls/Return walls/Spray walls etc. (Strike out whichever is not applicable)</u>					
1.5.1	Are all the locations of such wall accessible for inspection, maintenance and repairs?					
1.5.2	Is the drainage of back sides of the walls (wherever applicable) from the weep holes satisfactory? If not, indicate the nature of deficiencies.					
1.5.3	Is there any tendency for the water to undercut the ends of the walls?					
1.5.4	Is there any foundation erosion or scour noticed in the vicinity of such walls? If so, give the details of nature and extent of such damage.					
1.5.5	Is there any surface erosion/damage caused, to face or body of such walls?					
1.5.6	Do any of the walls show symptoms of unusual settlement, developments of cracks and tilting?					

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		Y	N	NA		
	If so, give details of the defects noticed.					
1.5.7	Is there any damage to guide bunds? If so, give details of the damage.					
G-1.6	<u>End Weir</u>					
1.6.1	Is it accessible?					
1.6.2	Is there any erosion, pitting or spalling of the concrete or masonry surface? If so, give details					
1.6.3	Is there any scour noticed on the immediate downstream of such weir? If so, give details of location and extent of such damage.					
G-1.7	<u>Hydraulic Performance of Energy Dissipation Arrangements</u>					
1.7.1	Do the flow conditions in the stilling basin (or bucket) have a tendency to draw material into the bucket and cause its churning and abrasion damage to the surface of buckets baffle blocks, apron and end sill? Is the hydraulic performance in agreement with the results of model studies? (wherever applicable) Ascertain the performance from observed tail water rating curves and deficient observation, if any, such as sweep outs and excessive erosion under plunge pools and locations of secondary rollers and retrogression.					
G-1.8	<u>Trash Racks</u>					
1.8.1	Is the trash rack fixed or movable?					
1.8.2	What is the mode of cleaning? Is it manual or by TRCM?					
1.8.3	Is the welding work on Trash Rack in sound health?					
1.8.4	Any problems inspecting trash rack?					
1.8.5	Problems of excessive debris and/or inadequate cleaning?					
1.8.6	Any deterioration of trash rack (rust, corrosion, and damaged blades)?					
1.8.7	Any other issues?					
G-1.9	<u>Trash Rack Cleaning Machines</u>					
1.9.1	Any problems inspecting trash rack cleaning machine?					
1.9.2	Missing or inadequate spare parts (particularly requiring regular replacement)?					
1.9.3	Any deterioration of equipment (wheel trolleys, gantry structures, operating mechanism, connecting bolts, welds, surface, paint work?)					
1.9.4	Any wear or damage to wire cables and other moving parts?					
1.9.5	Any obstructions preventing or impairing					

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		Y	N	NA		
	smooth operation?					
1.9.6	Missing or inadequate provision of back-up/standby power supply?					
1.9.7	Any health and safety concerns (e.g. lack of "danger" sign during maintenance)?					
1.9.8	Any other issues?					
G-1.10	<u>Pumps</u>					
1.10.1	Any problems inspecting pump?					
1.10.2	Any obstructions preventing or impairing smooth operation?					
1.10.3	Any deterioration of pump and associated equipment?					
1.10.4	Any other issues?					
G-1.11	<u>Approach bridge, operation platform and cabin (for outlets):</u>					
1.11.1	Are the decking, girders and structural supports of approach bridge structurally sound?					
1.11.2	Is the floor of the operating platform structurally sound and safe?					
1.11.3	Is there satisfactory arrangement to prevent unauthorized entry into the control structures of the outlet?					
1.11.4	Are the structural members and joints sound and free from corrosion?					
1.11.5	When were the steel components painted last?					
1.11.6	Is the surface of steel work and paint satisfactory?					
1.11.7	Is the parapet or railing over the control tower, operating platform and approach bridge sound and safe?					
G-1.12	<u>Outlet</u>					
1.12.1	Is the air vent periodically cleaned?					
1.12.2	Are there any structural damages to the intake well?					
1.12.3	Is there any leakage observed through the well proper and the conduit concrete or masonry? If so, give details of its location and extent.					
1.12.4	Is there any damage noticed to the conduit concrete, breast wall and gate slots?					
1.12.5	Is the bye-pass valve/filling-in-valve (wherever provided) operating satisfactory? (a) Take operation trials of the following as provided and record the observations and defects noticed, if any. (1) Service gate(s). (2) Emergency gate(s). (3) Stop-log gate(s).					

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
	<p>(4) Sluice valves.</p> <p>Note:-</p> <p>(i) The operating trial for the emergency gate shall be taken with service gate in partially open position to test the capability of emergency gate for self-closing under these conditions. The trial for the operation of the emergency gate under balanced condition of water pressure also needs to be taken</p> <p>(ii) To guard against the possibility of outlet gate hoist being operated forcibly after closed position of gate a “Distinctive Mark” should be insisted or check the functioning of the limit switches.</p>					
1.12.6	Are there vibrations and noise noticed in operation of out-let gates at any time? If so, are any periodical observations taken to ascertain their severity?					
1.12.7	Is the energy dissipation arrangement working satisfactorily for all the discharges? Is there any structural damage to the energy dissipation structure? If so, give details of nature and extent of damage.					
1.12.8	Is the conduit structurally sound and reasonably leak proof? If not, give details of nature and extent of the defects.					
1.12.9	Is there any seepage noticed around the conduit as ascertained from the observations of the downstream conditions? If so, is it likely to cause (In case of earth dams) erosion and piping?					
G-1.13	Outlet Gates					
1.13.1	Is the surface of gates and the paint deteriorated?					
1.13.2	Are the connecting bolts of rubber seals properly tightened or damaged?					
1.13.3	Do the rubber seals show signs of weathering and damage and need replacements?					
1.13.4	Are the rubber seals of sides and bottom touching the bearing surface uniformly?					
1.13.5	Do all the rollers touch the track plates?					
1.13.6	Are the rollers well lubricated?					
1.13.7	Are the stem rods for lifting the gates perfectly straight?					
1.13.8	Is the operation of outlet gates smooth?					
	Are the actual operations of lifting and lowering of the gates and hoist mechanisms adequate and smooth?					
1.13.9	Are all the gears and hoist mechanisms well lubricated?					

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
1.13.10	Is the storing arrangement for emergency gate leaves and the stop logs in satisfactory condition?					
1.13.11	Are the seal plates/seals in sound condition?					
1.13.12	Is the full length of wire rope (wherever applicable) of the hoist in serviceable condition and free from any broken strands?					
1.13.13	Are all the nuts of connecting bolt and anchors properly tightened?					
1.13.14	Are all the lifting beams in proper working order and in levelled condition. If not ascertain the nature and extent of problems. Do any of the mechanical or structural parts of the gate, fasteners of hoist show signs of excessive wear? If so, please give details.					
1.13.15	Is there any tendency for recurring damage to any particular component or components? If so, please give details.					
1.13.16	Is sufficient stock of spares, which need frequent replacement, maintained at the site?					
G-1.14	<u>River Outlet/River Sluice</u>					
1.14.1	Is the overall condition of river outlet works/river sluices satisfactory? Is the operation of the gate (Service/Emergency/Stop-log) satisfactory as ascertained by taking operating trial? If not, indicate the defects noticed.					
1.14.2	Are the trash racks (wherever provided) cleaned before monsoon?					
1.14.3	Is there excessive silting on the upstream of the sluice?					
1.14.4	When were the gates last opened for desilting, etc.?					
1.14.5	Please indicate the approximate quantity of the leakage through the gates, if any.					
1.14.6	Is there any seepage or leakage through the conduit surface?					
1.14.7	Is there any damage to the upstream and downstream convergence of the conduit?					
1.14.8	Is the condition of energy dissipation arrangement satisfactory? If not, indicate nature and extent of damage. Is there any retrogression noticed in the downstream channel? If so, give details of nature and extent of damage.					
<u>Barrage/Weir</u>						
H-1	Barrage/ Weir					
H-1.1	<u>General</u>					
1.1.1	Have any major alterations or changes made to					

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
	the Barrage/ Weir since the last inspection?					
1.1.2	Is there any new nearby development in the downstream floodplain?					
1.1.3	Any misalignment of poles, fencing or walls due to Barrage movement?					
H-1.2	<u>Barrage Floor</u>					
1.2.1	Is the Barrage Floor visible, and is inspection possible?					
1.2.2	Evidence of surface defects (honeycombing, staining, stratification)?					
1.2.3	Concrete/masonry deterioration (abrasion, cavitation, etc.)?					
1.2.4	Is cracking present (structural, thermal, along joints)?					
1.2.5	Evidence of any other damage to joints and/or water stops?					
1.2.6	Any other issues?					
H 1.3	<u>Piers</u>					
1.3.1	Evidence of surface defects (honeycombing, staining, stratification)?					
1.3.2	Concrete/masonry deterioration (spalling, disintegration)?					
1.3.3	Is cracking present (structural, thermal, along joints)? If yes, provide the details may be provided					
1.3.4	Evidence of differential settlement (displaced/offset/open joints)?					
1.3.5	Evidence of any other damage to joints and/or water stops?					
1.3.6	Any other issues?					
H 1.4	<u>Bridge</u>					
1.4.1	Are the decking, girders and structural supports of the bridge structurally sound?					
1.4.2	Is the Parapet wall structurally sound? Any damages may be reported.					
1.4.3	Whether the condition of bridge joints is sound?					
1.4.4	Whether the condition of the bridge bearings is sound?					
1.4.5	Whether the condition of wearing course is sound or not?					
1.4.6	Any other issues?					
H 1.5	<u>Energy Dissipation Arrangement</u>					
1.5.1	Are there any problems inspecting the energy dissipation structure?					
1.5.2	Are there any obstructions in or immediately					

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
	downstream of the dissipation structure?					
1.5.3	Evidence of abrasion, cavitation, or scour on dissipation structure?					
1.5.4	Presence of displaced, offset or open joints?					
1.5.5	Presence of cracking (structural, thermal, along joints)?					
1.5.6	Any evidence of surface defects?					
1.5.7	Concrete/masonry deterioration?					
1.5.8	Evidence of any other damage to panel joints?					
1.5.9	Are there any problems with under-drainage (blockage of open drain holes)?					
1.5.10	Can the tail pond be drained easily to inspect the stilling basin or bucket? If not, what are the alternatives available for dewatering? Please ascertain and indicate the last event of inspection of the stilling basin.					
1.5.11	Examining the levels, contour plans, and reference marks in the tail channel, ascertain if there is progressive erosion and deterioration in the tail channel. If so, indicate the extent and location of such erosion concerning the various components of the barrage.					
1.5.12	Is the concrete surface of the stilling basin and apron in good condition? Are there any indications of pitting, cracking, abrasion or wearing of the surface of bedding concrete? If so, please give details of the nature and extent of the damage.					
1.5.13	Is the under-drainage of the stilling basin satisfactory? Are all the open drain holes clear and functioning well?					
1.5.14	Any other issues?					
H 1.6	<u>Flare Out Wall</u>					
1.6.1	Evidence of surface defects (honeycombing, staining, stratification, etc.)?					
1.6.2	Concrete/masonry deterioration (spalling, disintegration)?					
1.6.3	Is cracking present (structural, thermal, along joints)? If yes, details may be provided					
1.6.4	Evidence of differential settlement (displaced/offset/open joints)?					
1.6.5	Evidence of any other damage to joints and/or water stops?					
1.6.6	Any other issues?					
H 1.7	<u>Flank Wall</u>					
1.7.1	Evidence of surface defects (honeycombing, staining, stratification etc.)?					

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
1.7.2	Concrete/masonry deterioration (spalling, disintegration)?					
1.7.3	Is cracking present (structural, thermal, along joints)? If yes, details may be provided					
1.7.4	Evidence of differential settlement (displaced/offset/open joints)?					
1.7.5	Evidence of any other damage to joints and/or water stops?					
1.7.6	Any other issues?					
H 1.8	<u>Guide Wall</u>					
1.8.1	Evidence of surface defects (honeycombing, staining, stratification etc.)?					
1.8.2	Concrete/masonry deterioration (spalling, disintegration)?					
1.8.3	Is cracking present (structural, thermal, along joints)? If yes, details may be provided					
1.8.4	Evidence of differential settlement (displaced/offset/open joints)?					
1.8.5	Evidence of any other damage to joints and/or water stops?					
1.8.6	Any other issues?					
H 1.9 A	<u>Left Head Regulator</u>					
1.9.A.1	Are there any problems inspecting the spillway (obstructed access, damaged catwalk)?					
1.9.A.2	Are there any obstructions in or immediately downstream of the head regulator?					
1.9.A.3	Evidence of abrasion, cavitation or scour on glaci (e.g. exposed reinforcement)?					
1.9.A.4	Presence of displaced, offset or open joints?					
1.9.A.5	Presence of cracking (structural, thermal, along joints)?					
1.9.A.6	Evidence of surface defects (honeycombing, staining, stratification etc.)?					
1.9.A.7	Concrete/masonry deterioration (spalling, leaching, disintegration)?					
1.9.A.8	Presence of vegetation (growth in joints between blocks)?					
1.9.A.9	Evidence of any other damage to joints and/or water stops?					
1.9.A.10	Excessive seepage/sweating at any location on the glaci?					
1.9.A.11	Significant leakage at any location on the glaci?					
1.9.A.12	Any other issues?					

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
H 1.9 B	<u>Right Head Regulator</u>					
1.9.B.1	Are there any problems inspecting the spillway (obstructed access, damaged catwalk)?					
1.9.B.2	Are there any obstructions in or immediately downstream of the head regulator?					
1.9.B.3	Evidence of abrasion, cavitation or scour on glacis (e.g. exposed reinforcement)?					
1.9.B.4	Presence of displaced, offset or open joints?					
1.9.B.5	Presence of cracking (structural, thermal, along joints)?					
1.9.B.6	Evidence of surface defects (honeycombing, staining, stratification etc.)?					
1.9.B.7	Concrete/masonry deterioration (spalling, leaching, disintegration)?					
1.9.B.8	Presence of vegetation (growth in joints between blocks)?					
1.9.B.9	Evidence of any other damage to joints and/or water stops?					
1.9.B.10	Excessive seepage/sweating at any location on the glacis?					
1.9.B.11	Significant leakage at any location on the glacis?					
1.9.B.12	Any other issues?					
H 1.10 A	<u>Upstream Divide Wall</u>					
1.10A.1	Evidence of surface defects (honeycombing, staining, stratification)?					
1.10A.2	Concrete/masonry deterioration (spalling, disintegration)?					
1.10A.3	Is cracking present (structural, thermal, along joints)? If yes, details may be provided					
1.10A.4	Evidence of differential settlement/tilting (displaced/offset/open joints)?					
1.10A.5	Evidence of any other damage to joints and/or water stops?					
1.10A.6	Any other issues?					
H 1.10 B	<u>Downstream Divide Wall</u>					
1.10B.1	Evidence of surface defects (honeycombing, staining, stratification)?					
1.10B.2	Concrete/masonry deterioration (spalling, disintegration)?					
1.10B.3	Is cracking present (structural, thermal, along joints)? If yes, details may be provided					
1.10B.4	Evidence of differential settlement/tilting (displaced/offset/open joints)?					

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
1.10B.5	Evidence of any other damage to joints and/or water stops?					
1.10B.6	Any other issues?					
H 1.11	<u>Guide Bund – Riverside</u>					
1.11.1	Any signs of bulging or concavity (depressions)? If so, indicate their locations and extent. (Check up the cross-sections with tape and level at random locations, at least two)					
1.11.2	Does the section of the bund and riverside slope appear structurally sound and stable?					
1.11.3	Presence of longitudinal or transverse cracks?					
1.11.4	Were any signs of distress to the stability of slopes noticed at any time in any part of the bund? If so, give brief details of the incidents and location, the treatment method adopted and its effectiveness. Indicate the general condition of upstream pitching.					
1.11.5	Any degradation to slope protection (rip-rap)?					
1.11.6	Is there any profuse growth of bushes or weeds over any portion of the bund? If so, indicate the locations.					
1.11.7	Does the riverside slope show crab holes or holes made by rodents, burrowing animals, or ant hills? If so, indicate the locations.					
1.11.8	Any other issues?					
H 1.12	<u>Guide Bund – Countryside</u>					
1.12.1	Any signs of bulging or concavity (depressions)?					
1.12.2	Are any wet or slushy patches or concentrated leaks, springs or trickles observed on the countryside slopes or the toe? If so, indicate their locations and extent. Please look out for patches of extensive vegetation growth, scrutinize them and record the findings.					
1.12.3	Presence of longitudinal or transverse cracks?					
1.12.4	Any signs of distress to the stability of slopes?					
1.12.5	Are rain cuts/erosion channels present at any location?					
1.12.6	Are all the rain cuts and erosion channels properly treated and made good? Please indicate the location of recurring damages, if any.					
1.12.7	Is there any profuse growth of bushes or weeds over any portion of the bund?					

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
	If so, indicate the locations.					
1.12.8	Does the countryside slope show crab holes or holes made by rodents, burrowing animals, or ant hills? If so, indicate the locations.					
1.12.9	Any other degradation to slope protection (turfing)? Indicate the general condition of countryside pitching/ turfing and rock toe.					
1.12.10	Is the countryside area clear of debris and free draining?					
1.12.11	Any other issues?					
H 1.13	<u>Abutment and its contacts</u>					
1.13.1	Are there any leaks, springs or wet spots near the abutment?					
1.13.2	Any presence of cracking or settlement?					
1.13.3	Profuse growth of weeds/grass/plants at any location?					
1.13.4	Whether weep holes functioning?					
1.13.5	Whether condition of abutment contacts is sound?					
1.13.6	Any other issues?					
H 1.14	<u>CC Block Protection Works</u>					
1.14.1	Is there any erosion, abrasion and pitting of upstream concrete block protection works?					
1.14.2	Any presence of erosion, abrasion and pitting of downstream concrete block protection works?					
H 1.15	<u>Loose Stone Protection Works</u>					
1.15.1	Is there any damage in upstream apron protection works?					
1.15.2	Is there any damage in downstream apron protection works?					
1.15.3	Whether launching of upstream apron observed?					
1.15.4	Whether launching of downstream apron observed?					
H 1.16 A	<u>Left Silt Excluder</u>					
1.16.A.1	Any presence of an obstruction in the silt excluder?					
H 1.16 B	<u>Right Silt Excluder</u>					
1.16.B.1	Any presence of an obstruction in the silt excluder?					
H 1.17.A	<u>Upstream Cutoffs</u>					
1.17.A.1	Any presence of water flow downstream of the downstream cutoff?					
H 1.17.B	<u>Downstream Cutoffs</u>					

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
1.17.B.1	Any presence of water flow downstream of the downstream cutoff?					
1.17.B.2	Whether cutoff exposed?					
H 1.18	<u>Any other component</u>					
I-1	Access Road					
I-1.1	<u>General</u>					
1.1.1	Any problems ensuring security of dam site (including gates and fencing)?					
1.1.2	Is there a properly constructed and well maintained all weather access road to the dam site?					
1.1.3	What is the type of the pavement of the access road and its condition?					
1.1.4	Are there properly constructed and well maintained access road arrangements to the following components for inspection, maintenance and repairs? Top of Dam Spillway Gates and hoisting arrangement Drainage gallery, adits and exits Bridge structure Downstream stilling basin					
	Junction and abutments Outlet control tower Outlet gates Toe of earth dam, downstream drainage arrangements and berms. All saddle dams.					
1.1.5	What is the general condition of all the masonry structures on various access roads?					
1.1.6	Are all the structures on the access roads adequately safe for allowing passage of plant machinery for emergent repairs?					
1.1.7	Any obstructions along or at entrance to access road (temporary or long- term)?					
1.1.8	Any slope stability issues (road embankment or adjacent slopes)?					
1.1.9	Profuse growth of weeds/grass on or in vicinity of access road?					
1.1.10	Any drainage problems (standing water on or adjacent to road)?					
1.1.11	Any other degradation to road surface (ruts, potholes, cavities, cracking)?					
1.1.12	Any other issues?					
J-1	Instrumentation					
J-1.1	<u>General</u>					
1.1.1	Are all the instruments installed accessible?				As per Annexure-I	

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
	(Attach separate list). Are all the locations properly lighted, ventilated and adequately protected from possibilities of damage?					
1.1.2	Any problems inspecting instrument (obstructed/unsafe access)?					
1.1.3	Is the instrument vulnerable to damage or theft (inadequate protection)?					
1.1.4	Any problems ensuring correct functioning of instrument (lighting, ventilation)?					
1.1.5	Any evidence of degradation to condition of instrument (rusting, vandalism)?					
1.1.6	Are all the instruments in working order? Ascertain the cases of instruments going out of order and indicate.					
1.1.7	Are all the registers of observations posted up-to-date? Please take test observations and initial the register.					
1.1.8	Are all the plotting of the instrumentation data completed up-to-date? Are sufficient stocks of spares, gauges, master gauges, stationary items etc., maintained at the site for uninterrupted data collection?					
1.1.9	Operator or public safety issues?					
1.1.10	Any other issues?					
J-1.2	<u>Communication Facilities</u>					
1.2.1	Are following facilities available at dam site? (1) Wireless Telephone / mobile/Fax/Internet					
1.2.2	Any other issue (please indicate part, location, etc., as necessary)					
K-1	<u>Emergency Preparedness</u>					
K-1.1.	<u>Emergency Action Plan</u>					
1.1.1	Is the Emergency Action Plan (EAP) prepared for the dam as per the national guidelines? If not, the expected date of preparation of guidelines					
1.1.2	When EAP was last updated?					
1.1.3	If not, are any dam staff unaware or insufficiently conversant with the EAP?					
1.1.4	Any concerned authorities unaware or insufficiently conversant with the EAP?					
1.1.5	Are communication directories/contact details and other dynamic information are being updated annually?					
1.1.6	Any problems accessing or operating the communication/ warning system?					

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
1.1.7	Are inundation maps updated and available to concerned authorities?					
1.1.8	Are the concerned authorities informed about the system of emergency reporting procedures and warning?					
1.1.9	Are available safety spots on the downstream of the dam identified and made known to the concerned authorities? Are adequate warning devices and facilities provided at the dam?					
1.1.10	Are proper arrangements made for security of the dam and preventing cases of unauthorized trespass, vandalism and sabotage to the dam works?					
1.1.11	Date of last annual stakeholder consultation meeting along with mock drill exercise conducted					
1.1.12	Does the EAP disseminated to all the concerned stakeholders?					
1.1.13	Any other issues?					
K-1.2	<u>Inspection of Records</u>					
1.2.1	Whether following Dam Safety Documents are prepared and approved by the competent authority? I. As Built Drawings II. EAP III. Completion Report IV. Data Book V. O and M manual					
1.2.2	Are the relevant documents reviewed and updated from time to time?					
1.2.3	Are all the members of the maintenance staff adequately trained and fully conversant with their responsibilities concerning. a) Designer's Operation Criteria. b) Standing Operating Procedures. c) Maintenance and Vigilance Procedures of the dam. d) Maintenance and operation of all control equipment. e) Reservoir Operation Schedules, Gate Operation Schedule f) Maintenance and Operation of all instruments. g) Identification of signs of deficient behavior. h) Reporting Procedures of emergency situations.					

S. No.	Inspection Item	Response ^a			Observations and recommendations, if any, of the authorized inspecting officer	Condition ^b (Unsatisfactory/Poor/Fair/Satisfactory)
		Y	N	NA		
	i) Emergency repairs					
L-1.1	Inspection Photographs					
1.1.1	Information to be furnished as per Part 2 e.					
^a Respond either yes (Y), no (N) or not applicable (NA). ^b Condition: Please rate the condition as either Satisfactory, Fair, Poor or Unsatisfactory as described below:						
1.	Satisfactory - No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the applicable regulatory criteria or tolerable risk guidelines.					
2.	Fair - No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action.					
3.	Poor - A dam safety deficiency is recognized for loading conditions which may realistically occur. Remedial action is necessary. Poor may also be used when uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency. Further investigations and studies are necessary.					
4.	Unsatisfactory - A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution.					

Part 2b**Action taken on Remedial Measures suggested in the previous Inspection Report****Previous Inspection Report Date:**

SN	Observations/ Significant Deficiencies Noticed	Remedial Measures Suggested	Action Taken After Last Inspection Report
1.			
2.			
3.			
4.			
5.			
..			
..			

Part 2c**Consolidated Dam Health Status Report (as per the current inspection):**

SN	Observations/Significant Deficiencies Noticed	Remedial Measures Suggested
1.		
2.		
3.		
4.		
5.		
..		

pection – Unsatisfactory/Poor/Fair/Satisfactory (tick appropriate) Overall Safety Category* of the Dam -

Category III – none or minor deficiencies which are rectifiable

Date:

CHECKLIST OF VARIOUS INSTRUMENTS INSTALLED ON LARGE DAMS

Location

[illegible]

[illegible]

Sl. No.	Name of Instruments	Nos.	Location	Since when installed (Month/Year)	Whether in working condition (Yes/No)	Date last calibration Date for next calibration	Observations maintained (Yes/No)	Agency responsible for data collection and processing	Analysis of data done at field level (Yes/No)	Data sent to DSO regularly? (Yes/No)	Remarks
	(ii)										
	(iii)										
GEODETIC INSTRUMENTS											
1.	Total Station										
2.	Survey Markers										
3.	Settlement Plates										
SEISMIC INSTRUMENTS											
1.	Seismograph										
2.	Accelerograph										

Part 2e**PHOTOGRAPHS TO BE ATTACHED IN THE INSPECTION REPORT**

All photographs shall be color photographs. Photographs shall be clear and include scale references where applicable. Photographs shall include, but not be limited to the following:

1. Overview of dam from upstream
2. Overview of dam from downstream
3. Overview of upstream face from right abutment
4. Overview of upstream face from left abutment
5. Overview of dam crest from right abutment
6. Overview of dam crest from left abutment
7. Overview of downstream face from right abutment
8. Overview of downstream face from left abutment
9. Overview of spillway from upstream
10. Overview of spillway from downstream (tailrace or channel area)
11. Overview of right training wall
12. Overview of left training wall
13. Overview of stilling basin
14. Overview of Galleries
15. Overview of downstream channel
16. Overview of Control Room exterior
17. Overview of Control Room interior
18. Overview of Gates
19. Overview of Hoisting Arrangements
20. Outlet inlets and discharge points
21. Overview of reservoir
22. Areas of specific deficiencies (e.g., cracks, erosion, displacement, seeps, deterioration, etc.)

Each photograph shall include a caption indicating the subject of the photograph as well as highlighting any specific deficiencies pictured. All photographs shall be presented with no more than two (2) photos per page.

SCHEDULE-II

[See Regulation 3 (4) (iii)]

INSPECTION FIELD KIT EQUIPMENT

Inspection Checklist – Serves as a reminder to inspect for all important features and conditions. An example is presented in Appendix B.

General Embankment Sketch – A sketch of a typical dam embankment may be used to denote the location and dimensions of deficiencies on the embankment and abutments of the dam. A ruler may be useful for scaling dimensions on the sketch. A high-resolution aerial photograph of the dam is recommended for use during dam inspections.

Notebook and Pencil – It is important to write down observations at the time they are made. This reduces mistakes and the need to return to the area to refresh an inspector's memory. A clipboard can provide a sturdy writing surface.

Voice Recording Device – A small portable voice recorder can be used effectively to make a record of field observations when it is not convenient to make written notes. Most smartphones can record voice messages.

Camera – Photographs offer a reliable record of observed field conditions. They can be valuable in comparing past and present configurations. An inexpensive model usually takes pictures good enough for inspection records. Modern digital cameras are excellent for the development of comprehensive photographic records.

Hand Level – This is needed to find areas of interest accurately and to determine embankment heights and slopes. A surveying rod (stadia rod) or another type of measuring rod is a useful aid in making measurements.

Probe – A probe gives information on conditions below the surface, such as the depth and softness of a saturated area. Also, by observing moisture brought up on the probe's surface, an inspector can decide whether an area is saturated or simply moist. Probes with a metal tip are preferred. An effective and inexpensive probe can be made by removing the head from a golf club.

Tape Measure – Many descriptions are not accurate enough when estimated or paced. The tape measure provides accurate measurements which allow meaningful comparisons to be made.

as cracks and wet areas, to allow future comparison.

Knife or Machete – These tools can be useful for clearing weeds and brush, and for scraping rocks or soil.

Flashlight – The interior of an outlet in a dam can often be inspected adequately without crawling through by using a good flashlight or fluorescent lantern.

Shovel – A long-handled shovel is useful in clearing drain outfalls, removing debris, and locating monitoring points. A short-handled shovel may suffice and is more convenient to carry.

Rock or Geologist Hammer – Questionable-looking riprap or concrete can be checked for soundness with a rock hammer. Care must be taken not to break through thin spots or cause unnecessary damage.

Bonker – The condition of support material behind concrete or asphalt faced dams cannot be found out by observing the surface or facing. By firmly tapping the surface or the facing material, conditions below can be determined by the sound produced when the material is tapped. Facing material supported fully by fill material produces a "click" or "bink" sound while facing material that is over a void or hole in the facing produces a "clonk" or "bonk" sound. The bonker can be made of 30 mm diameter hardwood dowel with a metal tip firmly affixed to the tapping end. A rubber shoe like those on some furniture legs is recommended for the other end to allow the bonker to be used as a walking aid on steep, slippery slopes.

Binoculars – These are useful for inspecting limited access areas especially on concrete dams. They are also helpful for inspecting risers and trash racks that are not accessible from the dam embankment.

Bucket and Timer – These are used to make approximate measurements of seepage or leakage flows. Calculating the time needed for the seepage flow to fill the bucket enables an inspector to calculate the number of gallons per minute. Various container sizes may be needed, depending on the flow rates. More exact measurements can be made with a flow meter when the discharges are large.

Stakes and Flagging Tape – These are used to mark areas requiring future attention and to stake the limits of existing

First-Aid Kit – A basic first-aid kit should be part of every dam inspection kit in case of injury. At a minimum, it should include assorted bandages, antiseptic medicine, pain relief tablets, sunburn lotion, ice packs, a splint, sterilized gauze, scissors, tweezers, and sterilized tape.

Special Equipment

Video Camera – A video camera, preferably digital, can be used to record the entire site; this may be especially useful for concrete and masonry dams or spillways where access is difficult. A high-power magnification can be useful when video recording concrete and masonry dams. Most video cameras are equipped with sound and date recorders.

Inclinometer – An inclinometer is used to make quick measurements of embankment slopes.

Flow Meter – This instrument is used to measure flow velocity and quantity. The flow must be large; small amounts of seepage cannot be measured with a flow meter.

TV Monitor – A TV monitor is used to view and record conditions inside pipes and conduits that are inspected with a video camera mounted on a remote-controlled vehicle.

Two-way Radios – These are useful for communications when more than one inspector is present on large sites.

Confined Space Access Equipment – This includes equipment for personnel access to vertical risers or discharge conduits where emergency retrieval may be necessary. This includes such things as ropes, harnesses, and ladders. It also includes portable gas meters for testing confined spaces for harmful gasses that may be present. These may be required when entering discharge structures under the ground.

Boats – A boat may be required for access to areas on the reservoir, including shorelines and spillways.

Piezometer Gage or Water Level Indicator – Used to measure depth to water in piezometer or water wells.

Laptop Computers – These portable computers are a convenient tool for making field inspections cost effective and efficient. The computers must have software that is designed for dam inspections and must be compatible with other office equipment so that the information can be readily transferred to the inspection report. Pocket PC's are often referred to as "PDA's."

Global Positioning Sensor (GPS) – Handheld GPS units are recommended for use in mapping deficiencies found during inspections, such as areas where water is seeping from the ground, slides, and cracks. GPS units can be used to monitor the progression of deficiencies over a period of time if they are accurate enough. GPS units access GPS satellites to determine the user's position. The best units can be used to find both spatial coordinates and ground surface elevation.

SAFETY EQUIPMENT AND PROTECTIVE CLOTHING

Hard Hat – A hard hat is recommended for inspecting large outlets or when working in construction areas.

Rope – Can be used when inspecting steep slopes or conduits. A rope can also be used when inspecting areas along the shoreline. Another person should be present to assist with using a rope.

Insect Repellent – Biting insects can reduce the efficiency and effectiveness of an inspector and sour his disposition. Ticks and mosquitoes can cause skin irritations and severe health problems in some instances.

Snake Bite Kit – In areas where poisonous snakes might be present, a snake bite kit should be included in the first-aid kit; protective leg guards are also available.

Watertight Boots – These are often needed when inspecting various areas of the dam site where standing water is present. Waist-high waders are useful for riser inspection.

Steel-toed Shoes – Steel-toed shoes should be used when there is a danger of debris falling on an inspector's feet.

Sturdy Hiking Boots – Hiking boots may help prevent slipping and falling when traversing slopes and wet areas. Good ankle support can aid in preventing injury to ankles.

Life Jacket – A life jacket is a safety measure to be used when inspecting areas where there is a danger of falling into the water, especially along the shoreline of a deep reservoir, or a reservoir with steep upstream slopes. They are a necessity if an inspector is using a boat and a lifeline if hanging from a safety scaffold.

Smartphone – A smart phone can come in handy in emergencies or when additional information is needed from the office or the owner's office.

Safety Glasses – May be needed in some cases for eye protection.

Gloves – May be useful if stakes are being installed, or if riprap and deteriorated concrete are being investigated.

Reflective Safety Vest or Coat – If inspections are performed during hunting seasons, bright colored clothing is a good preventative measure to avoid shooting accidents.

SCHEDULE-III

[see regulation 3(7)]

SCHEDULED DAM SAFETY INSPECTION CHECK LIST

A form designed for use during scheduled dam safety inspections – including pre- and post- monsoon inspections – follows. The form contains a comprehensive checklist (Part 2a) of items that are found at dams that need to be evaluated during a safety inspection. The checklist consists of (1) a series of questions that need to be answered as Yes/No/Not Applicable for each inspection item, (2) a remarks box in which critical aspects can be commented upon following each question, and (3) a final condition assessment (Unsatisfactory/Poor/Fair/Satisfactory) for that inspection item. Not all inspection items will be found at a dam. The form concludes with a Consolidated Dam Health Status Report (Part 2b).

The following information is provided for:

B.1 Personal Safety

For safety reasons, it is advisable to have three or more personnel on each inspection. This applies particularly travel to, and operations in, isolated areas.

B.2 Equipment

The following equipment items are noted here to ensure the Inspector is reminded of the importance to her/his personal safety. Additional detail is in Appendix A of this guideline:

- Checklist (enclosed), field book, pens and pencils
- Recording devices, including GPS, camera(s) both still and video
- Hand level, clinometer, tape measure, stakes and flagging material, crack gauge, probes and binoculars
- Safety gear including waders, harnesses, hard-hats, goggles, safety boots, SCBA (self- contained breathing apparatus, gas detector (carbon dioxide and other gases) for confined space entry, torch (“mine-safe”) for unventilated conduits, tunnels or adits, first-aid kit, lock-off labels and anything else to comply with safety regulations
- Safety equipment for upstream water inspections from boat or elevated platform, includes life vests and life-lines
- Shovel, bucket, sealable plastic bags and a Geologist hammer

B.3 Recording Inspection Observations

Check and record the status of all items in the attached checklist under the remarks column. Provide accurate location (GPS or ground measurement) of questionable areas and take photographs. Note extents and limits of such areas (length, width, height or depth, volume). Provide a brief description of any anomalous condition such as:

- Quantity/quality of drain outflows, seepage and its source(s)
- Location, type and extent of deteriorated concrete
- Location, length, displacement and depth of cracks
- Extent of moist, wet, or saturated areas
- Defects, deterioration, damages, non-functional components such as detection and measuring devices, mechanical or electrically operated instruments and HM controls

ANIL JAIN, Chairman

[ADVT-III/4/Exty./083/2024-25]