



No. J-62/8/2022-BP-I-DOP  
Government of India/ भारत सरकार  
Ministry of Communications/ संचार मंत्रालय  
Department of Posts/ डाक विभाग  
Estates Division/ सम्पदा संभाग

Dak Bhawan, Sansad Marg/ डाक भवन, संसद मार्ग  
New Delhi-110001/ नई दिल्ली-110001

Dated the 04<sup>th</sup> December, 2023

To,  
The Chief Postmasters General,  
All Circles.

Subject: Standard of Procedure (SOP) for construction of post office buildings in Department of Posts using 3D printing technology-reg.

Madam/Sir,

An approved Standard of Procedure (SOP) for construction of post office buildings in Department of Posts using 3D printing technology is enclosed for information and necessary action. It is also requested to ensure that proper records must be maintain for the assets created using the 3D Technology at Divisional, Regional and Circle level.

2. This has the approval of Secretary (Posts).

Yours faithfully,

24/12/2023

Ramesh Chand Chandrawal  
Assistant Director General (Building)

Encl: As above

Copy to:

1. Chief Engineer (Civil) – I and II, Postal Civil Wing, Dak Bhawan.
2. The CGM, CEPT, Bengaluru with request for uploading the same on India Post Website.

## CONSTRUCTION OF POST OFFICE BUILDING USING 3D CONCRETE PRINTING TECHNOLOGY (Standard Operating Procedure)

1. The technology of 3D Concrete Printing is one of the selected potential technologies under Global Housing Technology Challenge (GHTC), India organized by M/o Housing & Urban Affairs, GoI. The conference & exhibition of GHTC-India was held during March 03-04, 2019 at Vigyan Bhawan, New Delhi, which was inaugurated by Hon'ble Prime Minister of the Country. This technology of 3D Concrete Printing is also being incubated at IIT, Madras (One of ASHA-India centres selected by MoHUA, GoI), & extensive evaluation of this technology is going on in this Institute. There is no Indian Standard on 3D Concrete Printing System published by BIS as yet, however, as per our understanding, the standard on 3D Concrete printing is under formulation at BIS. The PACS of BMTPC is for innovative technologies & materials for which no standards are available.
2. The 3D Concrete Printing Technology has been certified under Performance Appraisal & Certification Scheme (PACS) of BMTPC, & issued to two Agencies. In this system, the concrete structures/wall are constructed by placing the concrete mixture layer by layer by robotic printer, based on the 3D drawing of the structure (3D CAD Model). For the concrete mixture requirement of quick setting & with specific characteristics, different admixtures, fibres etc. are used. The Assessment of suitability of the this 3D Concrete Printing System is based on engineering & durability properties of concrete specimens using 3D Concrete Printing, prototype buildings & actual projects executed using this system, Certificate for Structural stability of the above Volumetric (3D) concrete printed building & Proof Checking of the design & drawings by IIT, Madras, Quality Assurance system followed by the Certificate holders, etc. The properties of the building materials used which are primarily the constituents of Concrete are required to meet our relevant Indian Standards/ Standard Code of Practices. The basic performance, analysis behaviour and design requirements of the building using 3D Concrete Printing have been adopted same as applicable to regular/conventional reinforced concrete buildings.
3. Being a recent system, the examples of buildings constructed using this system are not very old. However, based on the conformance of required engineering & durability properties of the hardened concrete as per relevant Indian Standards, sound engineering & construction practice adopted, the life expectancy of building constructed using 3 D Printing technology may be similar to regular/ conventional RCC framed building.
4. The design of foundation is based on geo-technical investigation of soil strata & loading conditions of the structure as per relevant Indian Standards. This is irrespective of the fact whether building is constructed using 3D Printing technology or through regular/ conventional methods. Any types of Foundations, based on various soil stratas, can be adopted for this system. In the case of certification for both M/s L&T & M/s Tvasta, the structural stability including lateral stability of the structure against seismic force, has been certified by IIT, Madras.

5. The Circle Head shall identify the proposed post office building to be constructed using 3D Printing Technology. Required Schedule of Accommodation and scope of work viz. number of floors, development of site, any future extension etc. and any special requirement for the building, may be finalised.
6. The Circle Head shall submit the proposal for obtaining in principle approval from the Directorate by the Competent Authority, mentioning whether it is constructed adopting 3D Concrete Printing technology or conventional method.
7. After obtaining the in principle approval from the Competent Authority the Circle Head will call for the tenders in Engineering, Procurement and Construction (**EPC model**) as per Manual for Procurement of Work (updated version) published by the Department of Expenditure, Ministry of Finance, Government of India and relevant provision of GFR, 2017.
8. The procedure to carry out the work and formulation of tender documents, payment conditions, quality control shall conform in general according to the guidelines prescribed in the Manual for Procurement of Works published by Department of Expenditure, Ministry of Finance, Government of India and relevant provision of GFR, 2017.
9. The Circle Head may call the open tenders from the specialized agencies in construction of buildings using 3D Volumetric Concrete Printing Technology (VCPT), duly approval and certification from the BMTPC, Ministry of Housing and Urban Affairs, Government of India as per relevant provision of GFR, 2017.
10. The tender document shall include responsibility for investigations, design and construction to the contractor for a lump sum price determined through the competitive bidding.
11. The contractor shall have the freedom to design and plan the construction of schedule using the best practices to achieve quality, durability, reliability, maintainability and safety as specified along with efficiency and economy. The project risks such as soil conditions and weather or commercial and technical risk relating to design and construction are assigned to the contractor. The procuring entity bears the risk for any delay in handing over the land, approval from the local authorities, environment clearances, shifting of utilities and approval in respect of engineering plans. (for details kindly refer Para 3.2.5 of Manual for Procurement Works).
12. For checking the specifications and standards laid down in the agreement the Circle Head may hire a Consultant Engineer/Institute preferably from IIT/NIT/CSIR with expertise in the field of Design and Construction in accordance with relevant provision of GFR, 2017. The vetting of designs etc. and monitoring and supervision of the construction may be done through the consultant Engineer/Institute.

13. The Circle Head shall form a Committee to monitor the consultant's activity as well as the physical and financial progress of the project. The committee shall comprise of Director Postal Services, Executive Engineer (C), Executive Engineer (E) and Sr. Accounts Officer.
14. Monitoring of work may include checking of quality, progress and passing of running payments in consultation with Project Management Consultant (PMC).
15. On completion of project, agency/company will submit completion certificate and all necessary guarantee bonds like water proofing, anti termite, fire safety duly vetted by the Committee and consultant before making final payment.
16. Handing over the projects should be accompanied by detailed layout for services like water supply, sewerage and electrical system to facilitate the future maintenance.
17. Technical user manual from the agency/company should be provided elaborating do's and don't's for day to day maintenance and optimum durability.
18. The concrete mix design & methodology adopted to construct the cavity wall should be such as to prevent any seepage of water. The relevant tests for the same as per applicable standard, may also be carried out.
19. The fire rating of the concrete structure using various constituents used in 3 D printing process are expected to be similar as for regular concrete, however, the same for the specific design & specifications of the wall/ slab component, may also be tested/verified using relevant Indian Standards.

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