

Dated: 22<sup>th</sup> February, 2022

**CIRCULAR**

To,

1. The Chief Secretaries of all the State Governments/ UTs.
2. The Principal Secretaries/ Secretaries of all States/ UTs Public Works Department/ Road Construction Department/ Highways Department (dealing with National Highways and other centrally sponsored schemes).
3. The Chairman, National Highways Authority of India, G-5 & 6, Sector-10, Dwarka, New Delhi-110 075.
4. The Managing Director, NHIDCL, PTI Building, New Delhi-110001.
5. The Director General (Border Roads), Seema Sadak Bhawan, Ring Road, New Delhi- 110 010.
6. All Engineers-in-Chief and Chief Engineers of Public Works Department of States/ UTs/ Road Construction Department/ Highways Departments (dealing with National Highways and other centrally sponsored schemes).
7. All CE-ROs, ROs and ELOs of the Ministry.

**Subject: - Use of Ultra High Performance Fiber Reinforced Concrete (UHPFRC) in Design & Construction of Structures/Bridges of National Highways - Regarding**

Madam/Sir,

Advanced structural design guidelines IRC: 112-2020 "Code of Practice for Concrete Road Bridges" and analysis software are presently being used in India. These are in tune with the International codes. However, its full exploitation to design the durable cost-effective slender sections are being made in a very limited manner. Therefore, need is felt for adoption of State-of-Art advanced level of bridge technologies for use in National Highway projects so that widespread usages of more cost effective sustainable design solutions and implementation methodologies are encouraged.

2. Concrete up to M50 grade is generally being used for bridges and structures on National Highways in India. Indian Roads Congress (IRC) has published IRC: SP: 70-2016 "Guidelines for the Use of High Performance Concrete in Bridges" which provides for use of High Performance Concrete/Self-Compacted Concrete up to M90 grade. It is, however, observed that use of High Performance Concrete/Self-Compacted Concrete (M60 to M90 grade) is limited to a few long span extra dose/cable stayed bridges only.

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3. Properly designed Ultra-high-performance fiber reinforced concrete (UHPFRC) which have following superior characteristics are being used in some developed countries:

- Available up to Grade M150MPa
- Available up to ultimate tensile strength 8MPa and ultimate flexural strength 30MPa.
- At least 4-6 times stronger than normal concrete (in compressive strength)
- Much more durable than conventional concrete
- Longer service life
- Reduced deck height
- Lower carbon footprint

4. Recently UHPFRC girders have been used in Sole River Bridge at Km 42+050 of NH -752K near Latur (2x56m span). Few more bridges/viaducts of span varying from 50-72m have been approved for construction. A bridge over Ganga River parallel to JP Setu in Patna is under planning that envisages use of UHPFRC girders for 100m span.

5. On careful consideration of the advantages of UHPFRC, it is found that UHPFRC girders may be preferred in long span bridges i.e. span length ranging from 50m to 100m in India. In the urban viaduct structures, where generally 30m standard span is used, span length can be increased to 60m with use of UHPFRC. It can also be used for smaller span.

6. To promote use of UHPFRC girders in bridges and structures in India, following has been decided:

6.1. While preparing detailed project report, Consultants shall evaluate both traditional PSC girders and UHPFRC girders for elevated corridors/ viaduct sections and bridges having length 500 m and above and consider the preferred alternative in cost estimate and analysis. Similar exercise shall also be done if aggregate length of bridges having span length greater than 30m and viaduct sections is greater than 2000m in a single project.

6.2. The French design standard and material specification to be referred are NF P18-710- " National addition to Euro code 2 – Design of concrete structures: specific rules for Ultra-High Performance Fibre-Reinforced Concrete (UHPFRC) & NF P18-470- "Concrete - Ultra-High Performance Fiber-Reinforced Concrete - Specifications, Performance, Production and Conformity".

6.3. Concessionaire/Contractor is free to use UHPFRC girders in its design. IE/AE shall review and approve the design without any prejudice.

6.4. Although usage of UHPFRC is expected to result in significant cost savings and reduction in life cycle costs, it is decided at this stage that the cost implications of

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using the technology may be fully absorbed within the Agreement cost of the project until further orders and the Authority (i.e. executing agency) shall neither demand for any share of cost reduction benefits nor pay/compensate for additional expenses incurred by the Concessionaire / EPC Contractors as per the Ministry's policy circulated vide letter No. RW/NH-33044/18/2020-S&R (P&B) dated 14.12.2020 even if the changes are accompanied by reduction in number of foundations and piers.

6.5. Defect liability period of such bridges/structures will be 10 years irrespective of whether defect liability period of the project is 5 years.

6.6 Concessionaire/contractor shall submit a detailed bridge inspection plan on completion of the construction works to the Ministry for approval. Concessionaire/contractor, IE/AE, Authority shall jointly conduct periodic inspection of the structure and will prepare a condition monitoring report. This report shall be prepared and submitted to the Ministry on half-yearly basis till completion of the defect liability period unless otherwise decided by the Ministry.

7. It is requested that the contents of the letter may be brought into the notice of all concerned for needful compliance.

8. This issues with the approval of Competent Authority.

विदुर कान्त झा / Bidur Kant Jha  
निदेशक / Director  
सड़क परिवहन एवं राजमार्ग मंत्रालय  
Ministry of Road Transport & Highways  
भारत सरकार / Government of India  
नई दिल्ली / New Delhi-110001

Yours faithfully,

*Bidur Kant Jha*  
22-02-2022

(Bidur Kant Jha)  
Director

(New Technology for Highway development)  
For DG (RD) & SS

Copy to:

1. All CEs in the Ministry of Road Transport & Highways
2. All ROs of the Ministry of Road Transport & Highways
3. The Secretary General, Indian Roads Congress
4. Technical circular file of S&R (P&B) Section
5. NIC-for uploading on Ministry's website under "What's new"

Copy for information and necessary action to:

1. Sr. PPS to Secretary (RT&H)
2. PPS to DG (RD) & SS
3. Sr. PPS/ PPS to Addl. Secretary (Road Safety)/ Addl. Secretary (RT&H & LA)
4. Sr. PPS/ PPS to AS&FA
5. Sr. PPS/ PPS to ADG (SKN) / ADG (RP)/ ADG(DS)
6. Sr. PPS/ PPS to JS (RT&MVL)/ JS (EIC) / JS (Logistics)/ JS (NHIDCL)