EFile No.RW/NH-35072/05/2018-S&R (P&B) (Computer No.165688)

Government of India

Ministry of Road Transport & Highways

(S&R (P&B/New Technology) Zone)

Transport Bhawan, 1, Parliament Street, New Delhi-110001

Dated: 19th April, 2024

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. The Secretary General, Indian Roads Congress
8. The Director, IAHE, Noida, UP
9. All CE-ROs, ROs and ELOs of the Ministry.

Subject: - Recommended Bitumen Type & Grade for Different Climate & Traffic Loading for National Highway and Expressway Works in India - Reg.

Reference: Ministry's Circular No. even dated 23.08.2023

Madam/Sir,

Bituminous binder is one of the most important ingredient which influences the performance of bituminous mixes. Selection of appropriate grade of bituminous binder for a particular section of National Highway/Expressway based on prevailing loading, ambient temperature, rainfall, snowfall and speed is indispensable to have durable flexible pavement. Para 2.1 of the Ministry's circular cited above stipulates that "**Selection of Appropriate Grade of Bituminous Binder**: Bituminous binder for conventional pavement courses shall be in accordance with IRC: 37 "Guidelines for the Design of Flexible Pavements". However, provisions contained in relevant IRC Guidelines/Standards shall be applicable for selection of binder type & grade for pavement courses such as Stone Matrix Asphalt (SMA), Gap-graded Rubberised Bituminous Mixes (GGRB), High Performance Mixes (HiPER) and Cement Grouted Bituminous Macadam (CGBM)". The selection of appropriate grade of binder as per IRC: 37 is on the basis of design traffic but pavement temperature which substantially impacts behaviour/performance of bitumen binder is not considered in the said selection process.

2.0 To bridge the gap and ensure rationale basis of selection of appropriate type and grade of bituminous binder, Ministry constituted a Task Force comprising of academicians, researchers, manufacturers, subject-matter experts, representative of Indian Roads Congress, Advisor MoRT&H under chairmanship of ADG(S&R). The mandate of the Task Force

was to specifically recommend the appropriate type & grade of bitumen/modified bitumen for different climatic zone considering ambient temperature, rainfall, snowfall, traffic loading intensity etc., across India.

3.0 Based on the Task Force recommendations, it has been decided that in supersession to provisions contained in para 2.1 of the Ministry's circular cited above, **Bitumen Type & Grade for Different Climate & Traffic Loading for National Highway and Expressway Works in India** shall be adopted as given in **Annexure-I**.

4.0 It should be applicable in case of all new projects for which bids as received 60days after the issue of this circular. The contents of the Circular may be brought into the notice of all concerned for needful compliance.

5.0 This issues with the approval of Competent Authority.

Yours sincerely,
Bidur Kant Jha
19.04.2024

(Bidur Kant Jha)
Director
(New Technology for Highway Development)
For Director General (Road Development) & Special Secretary

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"

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6. Sr. PPS/ PPS to AS&FA
7. Sr. PPS/ PPS to ADG (SKN) / ADG (RP)/ ADG(DS)
8. Sr. PPS/ PPS to JS (RT&MVL)/ JS (EIC) / JS (Logistics)/ JS (NHIDCL)

Recommended Bitumen Type & Grade for Different Climate & Traffic Loading for National Highway and Expressway Works in India						
Maximum Pavement Temperature(T_{20mm})#	Minimum Pavement Temperature (T_{surf}) #	Mix Type	Traffic Loading computed for 20-year period			
			<=20msa	>20<=50msa	>50<=150msa	>150msa
≤ 58 °C	> (-)22°C	SMA	NA	NA	NA	NA
		GGRB	NA	NA	NA	NA
		BC	VG-30	VG-30	VG-30	VG-30
		DBM Upper/ DBM Lower /Single layer DBM	VG-30	VG-30	VG-30	VG-30
>58<=64 °C	>=(-)10°C	SMA	NA	NA	PMB64-10	PMB64-10
		GGRB	NA	NA	Rubberised Bitumen@	Rubberised Bitumen@
		BC	VG-40	VG-40	PMB64-10/CRMB55	PMB64-10/CRMB60
		DBM Upper/ DBM Lower /Single layer DBM	VG-30	VG-40	VG-40	VG-40
>64<=70 °C	>=(-)10°C	SMA	NA	NA	PMB70-10	PMB70-10
		GGRB	NA	NA	Rubberised Bitumen@	Rubberised Bitumen@
		BC	VG-40	VG-40/ PMB70-10/CRMB60	PMB70-10/CRMB60	PMB70-10/CRMB60
		DBM Upper/ DBM Lower /Single layer DBM	VG-40	VG-40	VG-40	VG-40
>70<=76 °C	>=(-)10°C	SMA	NA	NA	PMB76-10	PMB76-10
		GGRB	NA	NA	Rubberised Bitumen@	Rubberised Bitumen@
		BC	VG-40	PMB76-10/CRMB60	PMB76-10/CRMB60	NA
		DBM Upper/ DBM Lower /Single layer DBM	VG-40	VG-40	VG-40	VG-40 /(PG76-10 for upper DBM)/HIPER$ mixes

Note:

1. #. Maximum Pavement Temperature(T_{20mm}) & Minimum Pavement Temperature (T_{surf}) should be estimated using the following formula:
   $T_{20mm} = 0.9545*(T_{airmax} - 0.00618Lat^2 + 0.2289\ Lat + 42.2) - 17.78$; where T_{airmax} is average of 7-day maximum air temperature (hottest 7-consecutive day period of a year) in (°C) and Lat is the geographical latitude of the project site (in degrees).
   $T_{surf} = 0.859* T_{airmin} + 1.7$; where T_{airmin} is the lowest air temperature of a year in (°C).
2. VG Grade Bitumen should be as per BIS: 73-2013 except for VG-40 grade Bitumen Viscosity at 60°C should be minimum 3600Poise.
3. Polymer Modified Bitumen should be as per BIS: 15462-2019.
4. Polymer modified bitumen (PMB) for different service condition should be selected in accordance with Table 2 of BIS 15462:2019.
5. Crumb Rubber Modified Bitumen should be as per BIS: 17079-2019.
6. @-The specifications for base bitumen and Rubberised Bitumen to be used for GGRB mix should be as per the recommendations of IRC SP-107-2015.
7. $-Hiper mixes as per IRC: SP: 139-2023 for DBM Base/binder course should be considered in case of perpetual pavement to have cost-effective pavement.
8. Tests to be carried out on Pressure Aging Vessel (PAV) Residue (after RTFO)Complex modulus (G*) multiplied by Sin delta (G* sin δ) as Max 6000 kPa, 8 mm Plate, 2mm Gap, at 10 rad/s, at a temperature, 20°C for Polymer Modified Bitumen.

Bidyut Kalita.