TECHNICAL REPORT TOWARDS THE FIRE ACCIDENT OCCURRED ON 11.08.2023 IN QUALITY ASSURANCE LABORATORY INSIDE THE PREMISES OF BBMP HEAD OFFICE

Ref: Hon'ble Chief Commissioner, BBMP office order No.BBMP/CC/PR /118/2023-24, dated:11.08.2023

* * * * * *

With reference to the above subject, the Quality Control Laboratory established by BBMP was inspected by the undersigned on 14.08.2023. On careful examination of the laboratory, the laboratory is equipped to conduct test pertaining to asphalt works and concrete works. The southern side of the laboratory is housing the bitumen work related test equipment's and the northern part of the laboratory is housing the equipment's to conduct tests related to concrete works.

The mandate of this technical enquiry is to find out the infrastructural concerns of the laboratory established by BBMP.

Smt.Yamuna, Chief Engineer(I/c), Quality Assurance was given the task of providing information of the test that was being conducted on 11.08.2023. The Chief Engineer, QA along with the other engineers submitted a detailed report on the chemical being used for dislodging bitumen from the bituminous mix. They have categorically stated that, benzene was being used for bitumen content / extraction test vide IRC, SP:11-1984. The extract of the IRC, SP:11 is produced as below:

C. METHOD OF TEST FOR BINDER CONTENT FOR PAVING MIXTURES BY CENTRIFUGE

The test is intended for determination of binder content in the mix by cold solvent extraction. The mineral matter recovered from the test can be used for checking the gradation of the aggregates in the mix.

A representative sample about 500 gm is exactly weighed and placed in the bowl of the extraction apparatus and covered with commercial grade of benzene. Sufficient time (not more than 1 hour) is allowed for the solvent to disintegrate the sample before running the centrifuge.

The filter ring of the extractor is dried, weighed and then fitted around the edge of the bowl. The cover of the bowl is clamped tightly. A beaker is placed under to collect the extract.

The machine is revolved slowly and then gradually, the speed is increased to a maximum of 3600 r.p.m. The speed is maintained till the solvent ceases to flow from the drain. The machine is allowed to stop and 200 ml. of the benezene is added and the above procedure is repeated.

A number of 200 ml. solvent additions (not less than three) are used till the extract is clear and not darker than a light straw colour.

The filter ring from the bowl is removed, dried in air and then in oven to constant weight at 115°C, and weighed. The fine materials that might have passed through the filter paper are collected back from the extract preferably by centrifuging. The material is washed and dried to constant weight as before. The percentage of binder in the sample is calculated as follows:

Percentage binder on the total mix

$$= \frac{W_1 - (W_2 + W_3) + W_4}{W_1}$$

where

W_1 = weight of sample

W_2 = weight of the sample after extraction

W_3 = weight of fine material, recovered from the extract

W_4 = increase in weight of the filter ring

In the case of road tar which is not completely soluble in benzene, necessary correction is made on the basis of the per cent insoluble of the neat road tar in the solvent.

The Chief Engineer, QA has also informed that, proper training through external faculty member was arranged and have produced geo-stamped photographs showing the "Training Sessions" being conducted to the staff involved in QA activities in the laboratory. (The report of the CE(QA) is enclosed as **Annexure-A**)

By the above evidence it can be understood that, the engineers in the quality control lab were aware of the Standard Operating Procedure (SOP) for conducting the bitumen extraction test in particular.

The Chief Engineer, QA has also informed in the report that, Sri.Anand.G, AEE was supervising the tests being conducted on the sample of the bituminous concrete mix collected pertaining to the work of asphalting to roads in Basavanagudi sub division, Basavanagudi Assembly Constituency. Sri.Suresh, Class-4 Employee was with Sri.Anand.G assisting in the said tests.

On questioning the Sri.Anand.G, AEE and Sri.Suresh, Class-4 employee separately it was found that, both Sri.Anand.G was well-versed with conducting

the bitumen extraction test and Sri.Suresh in assisting the physical work like operating the manual centrifugal pump and arranging the basin inside the centrifugal pump.

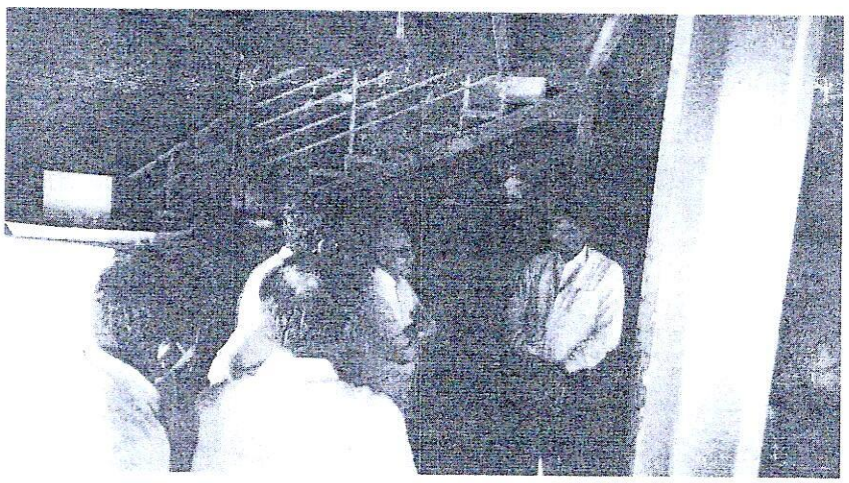
After detailed enquiry it is found that, the SOP and the methodology of heating the bituminous mix sample was deviated. Electric stove was being used to soften the bituminous mix and open fire was being adopted for drying and separating the aggregate mix and residual benzene from the bituminous mix.

The IRC SP:11-1984 categorically indicate that, the usage of oven for softening, drying and separating the aggregate mix and residual benzene. The usage of open fire may be the primary cause for the accident occurred in the laboratory.

Comments on Laboratory Infrastructure:

Dr.K.N.Subramanya, Principal, RV College of Engineering and Dr.Anjaneyappa, Assistant Professor, RV College of Engineering were contacted for Evaluation and for Expert opinion of the BBMP laboratory situated in BBMP head office premises. The team lead by Dr.K.N.Subramanya, Principal, RV College of Engineering and Dr.Anjaneyappa, Assistant Professor, RV College of Engineering visited the premises on 08.09.2023.

The photographs showing the visit made by the Principal is as below:



The Experts jointly opined that, the laboratory is housed in a very small space and is not adequate as per standard specifications. They informed that, there should be circular space around each equipments for each person working on the equipments during conducting the tests. In the present instance they opined that, the equipments in the laboratory are cramped and there is not even lateral space between the two equipments for a person to handle the equipments properly.

The experts also opined that, the mezzanine floor constructed out of steel fabrication over the laboratory is an ill-conceived idea. It was also opined that, the height of the laboratory roof should have a minimum height of 3.75m to 4.0m (12ft to 14ft) with cross entries and ventilation.

The experts opined that, small windows have blocked the free passage of smoke that has erupted due to fire. They concluded that, the laboratory should be immediately disused.

Conclusion of the Report:

1. The laboratory situated in the BBMP head office premises, may be disused and new laboratory block may be constructed within the head office premises in the space available in front of "Naukara Bhavana".

2. The ground floor and the mezzanine floor may be used as "Office Space". The windows which are 1.2m x 1.2m of size may be altered to minimum 1.8m x 1.2m.

3. The equipments in the laboratory are in very good condition and laboratory block should be constructed so as to re-install the available equipments without any damage.

Engineer-in-Chief
Bruhat Bengaluru Mahanagara Palike