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REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
MANILA

13 February 1991

DEPARTMENT ORDER)
) SUBJECT: USE OF BITUMINOUS COLD-MIX FOR POTHOLES PATCHING
No. 45
Series of 1991

To facilitate the patching of potholes during the rainy/wet periods when the use of hot asphalt mix is generally not very effective; the Regional and District Offices of this Department are hereby directed to use the Bituminous Cold Mix during such periods.

In this regard, the attached Technical Guidelines on Bituminous Cold Mix for Potholes Patching shall be followed in order to attain the desired quality of patched roads.

Compliance herewith is enjoined.

JOSE P. DE JESUS
Secretary

ATTACHMENT to
DEPARTMENT ORDER No. 45
Series of 1991

TECHNICAL GUIDELINES ON BITUMINOUS COLD MIX FOR POTHOLES PATCHING

I. MATERIALS

A. Aggregates

1. Blending of Aggregates

Coarse Aggregate Max. size 3/4"	–	55%
Sand	–	40%
Banlik/Fly Ash	–	5%
Portland Cement/Hydrated Lime	–	1%

2. Grading

Sieve Size, mm	Cumulative % Passing
19.0	100
12.5	90
9.5	80
4.75	60
2.36	42
1.18	24
0.60	20
0.30	12
0.075	5

3. Unit Weight of Combined Aggregate (Loose) – 1943 kg/m^3 or 121 lb/cu. ft. or depending on the type of aggregates used

B. Bituminous Material

1. Specific Gravity of Cationic Emulsified Asphalt - 1.01

2. Percent of Cationic Emulsified Asphalt (by wt. of aggregate) - 6%-9% (provided the asphalt residue of the emulsion is 64%)

C. Volume Proportion of Mix

1. Volume of Aggregate - - - - - - - - 1 cu. ft.

2. Volume of Emulsified Asphalt -

$$\text{Vol. of EA} = \frac{\%\ \text{EA} \times \text{unit wt.}}{2.2 \times \text{sp. gr. of EA}}$$

II. MIXING PROCEDURE

1. Windrows of combined aggregates shall be shaped and should be left undisturbed until actual mixing.

2. If aggregates are too dry, add sufficient water (3-5% by wt. of aggregate or 1-3 liters/cu. ft.) to moisten aggregates and mix until water is thoroughly dispersed.

3. One percent (1%) of Portland Cement or Hydrated Lime shall be added to the wt. aggregate and mixed thoroughly before adding the cationic emulsified asphalt.

4. Specified quantity of cationic emulsified asphalt should be added in a thin stream to minimize the tendency of the asphalt to ball up with the fine aggregates until all aggregate particles are uniformly coated.

5. After mixing, allow the mixture to air dry for at least one (1) hour before laying.

NOTES:

a. Mix only 1 cu.ft. of aggregates per batch to facilitate mixing and to attain complete coating of aggregates.

b. If aggregates are too wet, remove excess water by air drying and do not add more water as this will cause stripping.

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III. METHOD OF CONSTRUCTION

The following basic steps to pothole patching must be closely carried out fully to ensure a long lasting patch. Some steps can be adjusted to the conditions that exist.

Marking:

The area around the pothole must be marked with chalk or paint in order that the workman doing the cutting can easily and quickly remove the failed material. Marking is done to include only portions of the pavement that will provide a good surface against which the patch is to bond; that is, these portions should have no cracks and appear solid compared to the area immediately adjacent to the pothole.

Cutting:

The workman doing the cutting should avoid cutting more than is marked (excess cutting reduces cost effectiveness due to increased material use). The walls of the hole should be made vertical to provide a good surface for adhesion and "locking" the patch in during compaction. Cutting should continue to a depth where good pavement or base material exists.

Cleaning:

This step includes removing any remaining debris from the hole; compressed air works well for this or even "wallis" will do. If the hole has been made to the base or subbase, these materials, if disturbed, must be compacted so that compaction by traffic will not occur after the patch is in place. It should be stressed that water and all debris must be removed from the hole, as these will cause poor bond that may lead to early failure of the patch.

Tacking:

A tack coat should be used to provide the bond between the old and the new surface. Too much tack coat will result in an excess amount of asphalt, which will lead to rutting, and eventual failure of the patch. The best method for tacking is to spray the tack in a thin coat. Brooming and pouring are generally not effective because excess tack material usually accumulates at the bottom of the hole around the edge.

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Placing:

Holes deeper than 15 cm should be filled (and compacted) in more than one lift. The base materials shall be put into the hole up to the level of existing base prior to filling up of patching materials. Placing should be done with a shovel in one lift working from one side of the patch to the other. To prevent segregation, the materials should be laid, rather thrown or raked, into the hole. The patch should be made so that after final compaction, it is slightly (about 1/4 cm) above the surrounding pavement to allow possible future compaction by traffic and eliminate "birthbaths". No patching materials should be left on the surrounding surface.

Compaction:

It is crucial that the patch be compacted properly. Poor compaction will cause shrinkage of the patch, allowing intrusion of water around the edges and ultimate failure.

The compaction method should match the size of repair. A 0.09 sq. m. patch does not require compaction with a 9-ton tandem steel-wheeled roller. Most road repairs can be made with small-to-medium sized vibratory plate or roller compactors. Care should be taken by the operator to ensure that the compaction force is directed on the patch and not the surrounding pavement.

Edge Sealing:

Edge sealing is done to keep water out of the joint between the pavement and patch. Any material can be used, so long as it does not cause excess asphalt to bleed around the patch. A layer of fine sand can be used to blot the seal.

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