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No. PL-30 (28)/77 *Dated the 27th April, 1977*

To

All the State Chief Engineers (Dealing with Roads)

Sub: **Bridges** financed either in part or in full from Central Funds-Removal of stains from concrete surfaces

A copy of the article "How to remove stains from concrete surfaces" that has appeared in the Journal of **the American** Concrete Institute, December 1975, is enclosed for your reference and necessary action.

1.2. This article gives details for the removal of metallic stains, bitumen stains, smoke stains etc., on concrete **surfaces. This** may please be given wide circulation to all the officers in your departments.

2.1. A detailed survey of all the existing bridges on National Highways may please be made and examined to **see how far the** stains wherever noticed could be removed by the process indicated in the enclosed article. **Thereafter, it** could be considered as to how the expenditure towards this could be met i.e. either from the **annual maintenance** Grants or from other heads.

3. This note may please be included in the Notice Inviting Tender for all bridges to be constructed in future **financed either** in full or in part from Central Funds. *A new bridge after completion may be accepted only after all the stains are removed.*

Enclosure to Letter No. PL-30 (28)/77 *Dated the 27.4.77*

HOW TO REMOVE STAINS FROM CONCRETE SURFACES

Unsightly stains on concrete surfaces need not be tolerated. Almost any stain can be removed from cured concrete, but old, long neglected stains may require repeated treatments. Listed below are treatments for the removal of the most frequently encountered, specific stains :

Metallic stains are among the more common discolorations found. Iron stains are easily recognizable by their resemblance to rust, or by their nearness to steel or iron in or on the concrete.

To remove deep and intense iron stains, the surface should be soaked with a solution made of one part sodium citrate crystals in six parts water. Dip white cloth in this solution and paste over the stain for 10-15 min. on horizontal surfaces, sprinkle a thin layer of sodium hydrosulphite, moisten with water and cover with a paste of whiting and water.

On vertical surfaces, after moistening with the sodium citrate solution, place the paste of whiting on a trowel, sprinkle on the hydrosulphite, moisten, and apply to the stain.

Do not leave the paste in place more than 1 hr. as black staining may result. Remove and flush with clear water. If stain remains, repeat the treatment.

Copper or bronze stains are usually green but can be brown. Either may be removed by making a dry mixture of sal ammoniac and powdered talc (1:4) and adding ammonia water (household ammonia) to make a paste. Place over the stain and allow to dry. (All label precautions should be observed when using ammonia water, particularly cautions regarding eyes and mocous memberanes).

Old stains of this kind may require several applications for complete removal. Aluminium chloride may be used instead of sal ammoniac.

Aluminium stains are usually a white deposit which may be removed by scrubbing with 10 to 20 per cent muriatic acid solutions. On coloured concrete, weaker solutions should be used. Flush with clear water after removal to prevent etching of the concrete. (Again, label precautions must be observed since murriatic acid can affect eyes, skin and breathing).

Bitumen Stains

Molten bitumen. This material can be removed satisfactorily because it does not penetrate the concrete surface. Cool with ice until it is brittle and chip off with a chisel, scrub the surface with abrasive powder to remove the residue and rinse with clear water.

Emulsified Bitumen. Bitumen emulsions consist of very small drops dispersed in water. They do not penetrate very deeply into the concrete surface. Scrub the stained area with Scouring powder and water. Do not use solvents since these would increase the penetration of the stain into the surface and make satisfactory removal impossible.

Cut-back **Bitumen.** Cutback bitumen consists of a solution of bitumen in a solvent. This penetrates very deeply into the surface of the concrete and it is practically impossible to remove the stain completely. The intensity of the stain can be reduced by application of a poultice impregnated with toluence (toluol) or benzene (benzol, not to be confused with bensine). Then scrub the surface with scouring powder and water.

Fire-Smoke Stains. Fire often causes severe stains on concrete. The appearance may be restored by: scrubbing with pumice or grit scouring powder to remove surface deposit; apply white flannel soaked in a mixture of 2 lb trisodium phosphate and 12 oz. chlorinated lime (use caution chlorinated lime can irritate eyes and skin) in 2 gal water (use only clear liquid after lime has settled).

The soaked flannel should be covered and kept moist with the solution. Deep stains from burning pitch may require several treatments.

Grease stains. Scrape off all excess grease from the surface and scrub with scouring powder, soap, trisodium phosphate, or detergent, if staining persists, methods involving solvents are required.

Use benzene, refined naptha solvent, or a chlorinated hydrocarbon solvent such as trichloreethylene to make a stiff poultice. Apply to the stain and do not remove until the paste is throughly dry. Repeat the application as often as necessary. If required, scrub with strong soap, scouring powder, trisodium phosphate, or proprietary detergents specially formulated for use in concrete. Rinse with clear water at end of treatment.

Lubricating oil stains. Lubricating or petroleum oil readily penetrates into the concrete surface. If the free oil is removed promptly there will be little danger of staining. It should be soaked up immediately with an absorbed material such as paper towels or cloth. Wiping should be avoided as it spreads the stains and drives the oil into concrete. Cover the spot with a dry, powdered, absorbent, inert material (the same as used in a poultice) or portland cement, and leave it for one day. Repeat this treatment until no more oil is absorbed by the powder. If a stain persists or if oil has been allowed to remain for some time and has penetrated the concrete, other methods are required.

Remove all liquid or solidified oil from the surface and scrub it with strong soap, scouring powder, trisodium phosphate, or proprietary detergents specially formulated for use on concrete. The following method can then be used.

Make a poultice with a solution of 5 per cent sodium hydroxide (caustic soda). Let dry for 20 to 24 hrs. remove, and scrub the surface with clear water.

Paint stains. Scrape off as much as possible of the hardened paint. Apply a poultice impregnated with a commercial paint remover. Allow to stand for 20 to 30 min. Scrub the stain gently to loosen the paint film and wash off with water. Any remaining residue can be

scrubbed off with scouring powder. Colour that has penetrated the surface can be washed out with dilute hydrochloric or phosphoric acid. This treatment can be applied also to dried enamel, lacquer, or linseed-oil-based varnish. For shellac stains, the paint remover is replaced by alcohal.

More detailed information on specific staining problems can be obtained from the New York concrete Construction Institute, or from the Portland Cement Association.

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