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MICHIGAN
STATE HIGHWAY DEPARTMENT
Charles M. Ziegler
State Highway Commissioner

Report #45

DESIGN OF CONCRETE RESURFACING

RESEARCH LABORATORY
TESTING AND RESEARCH DIVISION
EAST LANSING, MICHIGAN
May 21, 1943

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The following report is based on the findings and conclusions resulting from a special study of concrete resurfacing by members of the Committee on Design of the Highway Research Board, (1) and by R. D. Bradbury. (2) The study included special condition surveys of several experimental concrete resurfacing projects located in New York, Michigan, Virginia, North Carolina, Iowa, Pennsylvania, Missouri and Ohio. Also recommendations by the Portland Cement Association are included. (3)

The features of design especially considered in the studies were: condition of old surface, thickness of resurfacing, joint construction, reinforcement, size of aggregates, and bond between the two concrete slabs.

Condition of Old Surface:

The extent of cracking, breakage and uneveness of surface of old pavement exerts a general influence on the ultimate structural condition of the resurfacing slab. This influence is strongly resisted and often over come through the use of increased resurfacing thickness, a "bond breaker" between the old and new concrete, properly distributed reinforcement and the provision of frequent joints.

Thickness of Resurfacing:

Recommended thickness for various classes of support and traffic are indicated in Table I.

Joints:

Both longitudinal and transverse joints should be provided in resurfacing. The same basic requirements for types and specimens of transverse joints that apply to monolithic concrete pavements are applicable also to concrete resurfacing.

RECOMMENDED THICKNESS OF RESURFACING
PORTLAND CEMENT ASSOCIATION (3)

	LOCATION AND CONDITIONS			
	Rigid old pavement not badly broken		Flexible old pavement or rigid old pavement badly broken	
	No Free* joints or edges	Free Joints or edges along which wheels can run	Joints or edges not free	Joints or edges free
Strictly local traffic of light-weight vehicles on residential street	3-in thickness	4-in., or 3-in. thickened to 4 at joints and edges	4-in.	5-in., or 4-in. thickened to 5 at joints and edges
Business or through street or county road carrying moder-ately heavy vehicles	4-in	5-in., or 4-in thickened to 5 at joints and edges	5-in.	6-in., or 5-in. thickened to 6 at joints and edges
Road or street carrying a large volume of heavy vehicles	5-in.	6-in., or 5-in. thickened to 6 at joints and edges	6-in.	7-in., or 6-in. thickened to 7 at joints and edges

*Free joints are those without tie bars, dowels or mechanical bond to assure the adjacent slab carrying part of the load. Free edges are those coinciding with the edge of the old pavement and not adjacent to curbs which prevent wheels from traveling along them.

Transverse joints in resurfacing need not necessarily extend through the old pavement. The joints should be located exactly over any old joints, or not less than 6 or 8 feet from them.

Longitudinal joints should divide the slabs into strips not more than 15 feet wide. Longitudinal joints are generally of the weakened plane types held together in the usual manner by tie bars.

Reinforcement:

Experience indicates that reinforcement is desirable in resurfacing. Mesh of closely spread small diameter bars weighing from 40 to 60 lbs. per 100 sq. ft. has been found to be satisfactory. The square 6" by 6" mesh is quite extensively used. Reinforcement should not extend across transverse joints.

Aggregates:

The proportions used in standard concrete pavement construction are suitable for resurfacing. The maximum size of coarse aggregate should not exceed one-third the depth of the resurfacing.

Bond Between New and Old Concrete:

Experience has not conclusively shown the need for taking special precautions to break bond between the old and new work. While successful resurfacing projects have been built by casting the new slab directly on the old pavement surface, still the practice of first covering the old slab with a layer of bond-breaking material such as asphalt, tar, paper or sand, has in some cases proved to be definitely beneficial.

If bond is sure to accrue due to roughness of the old surface, it may be good practice to provide for the best bond possible. This would mean that the old slab must be perfectly clean and properly treated to obtain intimate contact between old and new concrete.

Preparation of Old Surface:

The old surface is cleaned of any accumulation of foreign material. Potholes and irregularities in the old slab are filled with a suitable material to restore the contour of the old surface. Concrete is recommended as a filler material in order to insure uniform and adequate bearing support to the new concrete surface.

Widening:

Widening in connection with resurfacing may involve either increasing the width of existing lanes or the addition of one or more full traffic lanes.

Such work requires special design considerations for each particular project. Therefore reference to such matters is made to the Manual on Salvaging Old Pavements with Concrete published by the Portland Cement Association which has suggested designs for resurfacing.

References:

1. Resurfacing with Portland Cement Concrete
   E. M. Fleming, 12th Annual Proceedings of the Highway Research Board, Part 1, 1932.

2. Reinforced Concrete Pavements,
   R. D. Bradbury, Publication by the Wire Reinforcement Institute, 1938.

3. Salvaging Old Pavements with Concrete,
   Portland Cement Association Bulletin, 1938.

4. Construction of Roads and Pavements,
   T. R. Agg, Publication by McGraw Hill Book Company, 1940

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