Table 1, Bulletin No 10, Structural Materials Research Laboratory of Lewis, Institute, shows compressive strength for various coarse aggregates

The Minnesota Highway Department in 1922 made compression tests on concrete cylinders in which the coarse aggregate was the only variable The porous rocks show highest compressive strength This test is only part of a general investigation on Effect of Weathering which has not yet been completed

Research under way —The writer has been unable to find any record of any investigations on this subject being carried on at the present time

Desirability of further research —Some concrete pavements have buckled The writer considers that the kind of coarse aggregate may have been a factor The following are suggested as items on which further information is desirable

1 Effect of porosity of coarse aggregate on strength of concrete when dry and when saturated
2 Effect of absorption of coarse aggregates on bond between coarse aggregate and mortar
3 Amount of expansion due to absorption and temperature changes of concrete when different coarse aggregates are used keeping mortar content constant
4 Effect of difference in modulus of elasticity of coarse aggregate and mortar
5 Expansion of different rocks due to absorption

DECREASED STRENGTH OF CONCRETE WHEN WET

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The following papers show results that indicate the decreased strength of concrete when wet

"The Effect of Saturation on the Strength of Concrete" J L Van Ornum, Washington University, St Louis, Missouri Journal of the Association of Engineering Societies, 1913

Results

1. "The compressive strength of concrete exposed to air may be reduced 40 per cent when saturated with water"
2 Bond tests "indicate clearly for both plain and deformed bars, that the bond strength values decline rapidly and then increase slowly after saturation" (for air-cured concrete). Average minimum was only about 75 per cent of that of the air-cured specimens.
3 Beam tests indicate about ¾ of the air-cured strength when immersed

"Effect of Moisture on the Strength of Concrete" Sherman M. Woodward and Frederick C Young, State University of Iowa, Iowa City, Iowa Engineering News, 1913

Results

1 A 1 3 Portland cement mortar was weakened 50 per cent by saturation
2 It was also proved that the weakening resulted at once, indicating that the cause was physical and not chemical.

"Saturation of Concrete Reduces Strength and Elasticity" M B Lagaard, Emergency Fleet Corporation, Philadelphia, Pennsylvania. Engineering News-Record, 1918

Results

1 Reduction of strength of 35 per cent when concrete is saturated
2 Saturation slightly reduced the modulus of elasticity Age of concrete up to two years does not seem to change this relation.

TABLE SHOWING REDUCTION IN STRENGTH DUE TO ABSORBED MOISTURE

(From tests by Minnesota Highway Department, 1922)

Coarse aggregate	Compressive strength lbs sq in		Difference in strength between wet and dry concrete, in per cent
	Dry	Wet	
Granite	5320	3464	−34 8
Gravel	5150	3330	−35 4
Gravel	4848	3380	−30 2
Gravel	4334	3093	−28 6
Quartzite	4894	3110	−36 4
Granite	4405	3910	−11 2
Gravel	4422	2749	−37 8
Limestone	4269	3895	− 8 8
Granite	4828	3280	−32 1
Trap	4140	4467	+ 7 9
Trap	4340	3016	−30 5
Quartzite	5308	3649	−31 2
Quartzite	4630	4910	+ 6 1
Granite	4735	4353	− 8 1
Gravel	4443	4535	+ 2 1
Granite	4651	3695	−20 6
Granite	4520	3323	−26 4

EFFECT OF GRADING OF MINERAL AGGREGATES IN SHEET ASPHALT AND BITUMINOUS CONCRETE CONSTRUCTION RELATIVE TO DEFORMATION OF SURFACES UNDER TRAFFIC

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A report on this problem necessarily is one of progress

Only a small amount of experimental data on the subject is to be found in published literature, although considerable has been written