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<p><b>16. Abstract</b></p> <p>This study was initiated by the Michigan Department of Transportation (MDOT) to investigate concerns raised by members of Michigan's aggregate industry regarding the validity of moisture conditioning methods employed by MDOT's freeze-thaw testing program for coarse aggregates used in Portland cement concrete.</p> <p>This absorption study is being conducted (with reference to concrete coarse aggregate) to determine whether various soaking periods will achieve saturation levels comparable to the department's vacuum saturation moisture condition method used in the Michigan Test Method, MTM 113.</p> <p>The absorption rate for each coarse aggregate tested in this study is dependent on the respective source. At 24 hours of soaking, the geologically natural (gravels and quarried) sources (ASN: 30-35, 58-08, 63-97, and 93-03) reported from 62- to 78 percent of their respective laboratory-induced vacuum saturated level of absorption. In contrast, the manufactured blast-furnace slag aggregate (ASN: 82-22) reported 33 percent of its respective vacuum saturated level of absorption. The soaking period necessary to attain approximately 90 percent of vacuum saturation was shown to be approximately 30 days for the four geologically natural materials compared to one year for the manufactured aggregate source. All geologically natural sources reported vacuum saturation levels of absorption after one year of continuous soaking. At three years of continuous soaking, the manufactured blast-furnace slag aggregate reported 98 percent of its respective vacuum saturated level of absorption.</p> <p>The findings also show that the naturally occurring in-situ moisture contents for each sampled source, regardless of their reference relative to the static water table, were nearly equivalent to their respective laboratory-induced vacuum saturated absorption levels. For one source (ASN: 63-48), the naturally occurring moisture content below the static water table reported 104 percent of its respective vacuum saturated level of absorption. Hence, it is shown by this study that vacuum saturated levels of absorption can be achieved naturally in-situ, without artificial means.</p> <p>Finally, the findings from this study show that the vacuum saturation method for moisture conditioning coarse aggregates prior to laboratory freeze-thaw testing does not alter the pore characteristics of the typical gravel, carbonate, or manufactured blast-furnace slag coarse aggregates historically used in MDOT concrete pavements.</p>			
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**MICHIGAN DEPARTMENT OF TRANSPORTATION  
MDOT**

**Absorption Capacity of Coarse Aggregates for  
Portland Cement Concrete**

**Final Report**

**John F. Staton, P.E.  
Joseph D. Anderson**

**Testing and Research Section  
Construction and Technology Division  
Research Report R-1528**

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Kirk T. Steudle, Director  
Lansing, Michigan  
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