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ENGINEERING INSTRUCTION

NEW YORK STATE DEPARTMENT OF TRANSPORTATION

SUBJECT: CONCRETE EXPOSED TO SEAWATER AND OTHER HIGH SULFATE ENVIRONMENTS

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Soil, groundwater, and seawater all contain sulfates which can damage permeable concretes, especially those mixed with cements having high tricalcium aluminate contents. The Portland Cement Association recommends that to provide sulfate resistant concretes:

1. Cement content should exceed 600 pounds per cubic yard.
2. Water cement ratio should be 0.45 or lower.
3. Type II cements should be used where only moderate sulfate resistance is necessary and Type V cement where higher resistance to sulfate action is required.

Since standard Class B concrete contains less cement (517 pounds per cubic yard) than the recommended 600 pounds per cubic yard, this class of concrete should not be specified for use in seawater or in other moderate or high sulfate environments. For footings, therefore, and for other concretes exposed to seawater, Class A concrete should be specified instead of the usual Class B. Class A concrete uses 606 pound of cement per cubic yard and its water cement ratio, of 0.46, is regarded as being sufficiently close to the PCA recommended 0.45 level. The attached note, which will be inserted into all Region 8, 10 and 11 projects having concrete items, requires the contractor to use Type II cement in concrete exposed to seawater and defines what is meant by seawater.

In some areas of the state, sulfate concentrations are several times that of seawater and it will be necessary to require Type V cement as well as require the Class A concrete. Contact your Regional Soils or Materials Engineer for testing suspect areas.

This instruction takes effect with the letting of February 23, 1984.

CONCRETE EXPOSED TO SEAWATER ENVIRONMENTS

Make the following changes to the Standard Specifications of January 2, 1981:

Page 5-1 Under § 501-2.02 Materials, A.Cement, delete the text and substitute the following:

> "Cement shall be Portland Cement of the type indicated in the contract documents. All cement shall be Department accepted. Any cement hardened by moisture shall be rejected and not used in Department work.
>
> If no type cement is specified in the contract documents, either Type 1 or Type 2 may be used, except that only Type 2 cement shall be used in concretes exposed to seawater and its spray. For the purposes of these specifications, the term seawater shall mean all tidal waters of New York State except those of the Hudson River and its tributaries north of the Newburgh-Beacon Bridge."

Page 5-3 In the "Primary Use" column of Table 501-3, following the words "footings and abutments," add the words "not exposed to seawater".

Also, at the foot of the table, add the following to the note:

> "Seawater is defined under § 501-2.02 Materials."