Design

Forms shall be substantial and sufficiently tight to prevent leakage of mortar; they shall be properly braced or tied together so as to maintain position and shape. If adequate foundation for shores cannot be secured, trussed supports shall be provided.

Oiling Forms

When required the inside of forms shall be coated with non-staining mineral oil or other approved material or thoroughly wetted (except in freezing weather). Where oil is used, it shall be applied before the reinforcement is placed.

Removal

Forms shall not be disturbed until authorized by the engineer. Shoring shall not be removed until the concrete has acquired sufficient strength to safely support its own weight and the load upon it. Members subjected to additional loads during construction shall be adequately shored to support both the member and construction loads in such a manner as will protect the member from damage.

METAL REINFORCEMENT

Cleaning

Metal reinforcement, before being placed, shall be thoroughly cleaned of mill and rust scale and of coatings that will destroy or reduce the bond. Reinforcement appreciably reduced in section shall be rejected. Where there is delay in depositing concrete, reinforcement shall be reinspected and, when necessary, cleaned.

Bending

Reinforcement shall be carefully formed to the dimensions indicated on the plans. Cold bends shall be made around a pin having a diameter of six or more times the least dimension of the reinforcement bars.

Straightening

Metal reinforcement shall not be bent or straightened in a manner that will injure the material. Bars with kinks or bends not shown in the plans shall not be used. Heating of reinforcement will be permitted only when the entire operation is approved by the engineer.

Placing

Metal reinforcement shall be accurately positioned, and secured against displacement by using annealed iron wire of not less than No. 18 gauge or suitable clips at intersections, and shall be supported by concrete or metal chairs or spacers, or metal hangers, unless otherwise shown on the plans. To insure protection against moisture the minimum clear distance between any bar and the nearest concrete face shall be not less than 3 inches in all cast-in-place concrete. In precast sections such as piles, the minimum clear distance shall be not less than 2 inches.

Splicing

Wherever it is necessary to splice reinforcement otherwise than as shown in the plans, the character of the splice shall be decided by the engineer on the basis of safe bond stress and the stress in the reinforcement at the splice. Splices shall not be made at points of maximum stress nor shall adjacent bars be spliced at the same point.

Future Bonding

Exposed reinforcement bars intended for bonding with future extensions shall be protected from corrosion.

JOINTS

General

Instructions given on the plans or in the schedule governing the work as to location and construction of joints, shall be strictly followed.

Construction Joints

When necessary to provide construction joints not indicated on the plans, such joints shall be located and formed so as not to impair the strength and to least impair the appearance of the structure. Where conditions require, the joints shall be reinforced as directed by the engineer in order to secure the necessary bond strength. Horizontal construction joints or joints running lengthwise of the structure will not be permitted.

Expansion Joints

Expansion joints shall be located as indicated on the plans and shall be constructed in strict accordance with the detailed drawings.

INTEGRAL COMPOUNDS

General

The use of integral compounds will not be permitted.

PLACING CONCRETE UNDER WATER

Watertight cofferdams of approved design and materials shall be used for all foundations in water bearing soils. The excavation shall be thoroughly dewatered through a sump and with the use of a suitable pump, prior to the placing of concrete. Pumping shall stop as soon as placing concrete is started, or at such time that will prevent the washing out of the fine material in the mass.

When it is impossible to remove the water from the excavation, and when permitted by written order of the engineer, concrete may be placed in or through water under the regulations expressed in the recommendations of the Joint Committee on Standard Specifications for Concrete and Reinforced Concrete. In this case the engineer will personally supervise the work.

Excerpts from the Recommendations of the Joint Committee on Standard Specifications for Concrete and Reinforced Concrete.

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C. Depositing Under Water

47. The methods, equipment, and materials to be used shall be submitted to and approved by the engineer before the work is started. Concrete shall be deposited by a method that will prevent the washing of the cement from the mixture, minimize the formation of laitance and avoid flow of water until the concrete has fully hardened. Concrete shall be placed so as to minimize segregation of materials. Concrete shall not be placed in water having a temperature below 35° F.

48. Concrete to be deposited under water shall contain 1¾ bbl. (7 bags) or more of portland cement per cubic yard of concrete in place.

49. Cofferdams shall be sufficiently tight to prevent flow of water through the space in which the concrete is to be deposited. Pumping will not be permitted while concrete is being deposited, nor until it has fully hardened.

50. Concrete shall be deposited continuously, keeping the top surface as nearly level as possible, until it is brought above the water, or to the required height. The work shall be carried on with sufficient rapidity to prevent the formation of layers.

* * * * *

51. (a) Tremie,—The tremie shall be watertight and sufficiently large to permit a free flow of concrete. It shall be kept filled at all times during deposit. The concrete shall be discharged and spread by raising the tremie in such manner as to maintain as nearly as practicable a uniform flow and avoid dropping the concrete through water. If the charge is lost during depositing the tremie shall be withdrawn and re-filled.

The tremie may be filled by one of the following methods: (1) Place the lower end in a box partly filled with concrete, so as to seal the bottom, then lower into position; (2) plug the tremie with cloth sacks or other material, which will be forced down as the pipe is filled with concrete; (3) plug the end of the tremie with cloth sacks filled with concrete.

(b) Drop-Bottom Bucket.—The bucket shall be of a type that cannot be dumped until it rests on the surface upon which the concrete is to be deposited. The bottom doors when tripped shall open freely downward and upward. The top of the bucket shall be open. The bucket shall be completely filled, and slowly lowered to avoid back-wash. When discharged, the bucket shall be withdrawn slowly until well above the con crete.

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52. Great care shall be exercised to disturb the concrete as little as possible when it is being deposited in order to avoid the formation of laitance. On completing a section of concrete, the laitance shall be entirely removed before work is resumed.

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